ADVANCED MIXED WASTE TREATMENT PROJECT (AMWTP) 
HAZARDOUS WASTE MANAGEMENT ACT (HWMA) / RESOURCE CONSERVATION and RECOVERY ACT (RCRA) PERMIT

IDAHO NATIONAL LABORATORY

EPA ID NO. ID4890008952
Revision Date: June 14, 2021
Book 2 of 2
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<td>Appendix XXIII</td>
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<td>Appendix XXIV</td>
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# APPENDIX I

## AMWTP PROCESS FLOW SHEET EXHIBITS

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# APPENDIX II

## WMF-634 DRAWINGS, EXHIBITS, AND TOPOGRAPHIC MAP

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Traffic patterns and frequencies are derived from previous ten years of operational experience and volume of waste (12,000 m3) estimated to be on-site as of June 2018.
## APPENDIX III

**Type II Module Drawings**

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### Type I Module Drawings

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SWEPP Drawings

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a. TLF is the old acronym for the WAF
## APPENDIX VI

### WMF-628 Drawings

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## AMWTP OUTSIDE STORAGE AREA DRAWINGS

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## APPENDIX IX

### WMF-676 GENERAL ARRANGEMENT DRAWINGS

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### APPENDIX X

**AMWTP CONTROL SYSTEM AND DATA MANAGEMENT EXHIBITS**

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Exhibit X-2: DMS Interface Block Diagram
APPENDIX XI

SECONDARY CONTAINMENT SYSTEM CAPACITY AND MAXIMUM WASTE VOLUME CALCULATIONS

EDF-0017, Revision 02: Secondary Containment System Capacity Calculations Summary

EDF-0270, Revision 04: Secondary Containment System Capacity Calculations – Non-Facility Buildings

EDF-0271, Revision 02: Secondary Containment System Capacity Calculations – HWMA/RCRA, WMF-676 Treatment Facility

EDF-0272, Revision 02: Secondary Containment System Capacity Calculations – HWMA/RCRA, WMF-676 Treatment Facility – NFPA Secondary Containment Requirements

EDF-0277, Revision 01: Maximum Waste Storage Capacity for WMF-636 Pad 2 and AMWTP Outside Storage Area
### Engineering Design File Record Sheet

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**Summary:** (Revision 02 changes shown in bold/italics)

The secondary containment system (SCS) calculations, references 1, 2 and 3, demonstrate the maximum allowable volume of liquid waste allowable in the storage area(s) of each permitted waste treatment and/or storage facility at the Advanced Mixed Waste Treatment Project (AMWTP). The SCS calculations use the worst-case scenario storage configurations, while maintaining compliance with the HMWA/RCRA SCS capacity requirements.

The SCS capacity has been determined by calculating the maximum available capacity, based on the as-built building configuration, then reducing that capacity based on displacement by building structures, equipment, and the containers in the worst-case storage configuration. The calculations utilize minimum aisle space requirements identified in the AMWTP HWMA/RCRA Storage Permit to ensure compliant storage configurations while deriving the maximum SCS capacity.

In general, the available SCS capacity at the maximum storage configuration for each permitted storage area surpasses the requirement to contain the greater of 10% of the volume of containers or the volume of the largest container containing free liquids (see reference 4).

**References:**

1. **EDF-0270;** Secondary Containment System Capacity Calculations, Non-Treatment Facility Buildings
2. **EDF-0271;** Secondary Containment System Capacity Calculations – HWMA/RCRA, WMF-676 Treatment Facility
3. **EDF-0272;** Secondary Containment System Capacity Calculations - NFPA, WMF-676 Treatment Facility
5. TQ-MK-144, Maximum / Minimum Dimensions of Boxes Allowed into the AMWTF
6. AMWTP Drawing 53-10484, AMWTP Corrugated Overpack Box Assembly

**Originator:** V. C. Gunnell

**Date:** 10-03-07

**Technical Review:** M. Clarke, T. Millet

**Date:** 10-03-07

**Additional Reviewers: (by title)**

**Print Title:** [Environmental]

**Signature:** [Signature]

**Date:** 10/22/07

**Distribution List:**

**Approval:** [Lincoln Grissom]

**Design Eng. Mgr.**

**Date:** 10/4/07

(Print name and title of cognizant manager)
CONTINUATION SHEET

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**Summary (continued from page 1):**

The SCS calculations for WMF-676, Reference 3, include containment analyses as required by the Uniform Fire Code (UFC), National Fire Protection Association (NFPA), and DOE order 420.1. These calculations show that the containment curbing, etc. within the various areas of WMF-676 are sufficient and meet the *fire protection sprinkler water* containment requirements.

*The SCS calculations for WMF-676, Reference 2, include containment analyses as required by HWMA/RCRA. These calculations show that the containment curbing, etc. within the various areas of WMF-676 are sufficient and meet the HWMA/RCRA containment requirements* with the exception of Room 009, Box Elevator, which is classified as an “in process” area and a “storage” area.

The allowable container volume calculated in Reference 2 used the limiting volume of the smallest containment area for storing waste box containers in WMF-676.

The limiting dimensions for a waste box container to physically enter WMF-676 are 56-inches wide by 96-inches long by 76-½-inches tall (Reference 5) with a volume equal to 238 cubic feet. Given that the allowable container volume is 184.35 cubic feet (*1,379 gal*; Reference 2), waste box containers with an interior volume capacity greater than 184.35 cubic feet will not enter WMF-676 for storage.

Short of implementing significant physical modifications to increase the containment volume of Containment Areas 2-03 and 2-04 (Reference 2, Attachment 1), and considering that the largest box currently projected to enter WMF-676 has an interior volume of 165.63 cubic feet (Reference 6), *Design Engineering recommends implementing* administrative or software engineering controls as required to prohibit the entrance of waste boxes possessing an interior volume in excess of 184.35 cubic feet into WMF-676 for storage. It is anticipated that waste boxes will contain no free liquids or relatively small amounts.
1. Title: Secondary Containment System Capacity Calculations – Non-Facility Buildings

2. Index Codes:
   - Building/Type: Type I and II
   - SSC ID: NA
   - Site Area: AMWTP

3. Formal Calculation?
   - Yes (MCP-2374)
   - No (MCP-2059)
   - Quality Level: 3
   - QLD Number: 7675

   An analysis or calculation that involves a hazard category 1, 2, or 3 nuclear facility (see 5[a] below) MUST be performed as a formal analysis or calculation per MCP-2374, unless the SSC is QL-3 and the ICP chief engineer agrees in advance and in writing that a commercial analysis or calculation may be performed (see MCP-2374, Section 1.2).

   Formal analyses and calculations require engineering management approval.

   Standalone Analyses or Calculation?
   - Yes
   - No

4. (a) NPH PC or SDC: NA
   (b) SSC Safety Category: SC
   (c) Fire Protection engineer review required: Yes

5. (a) Involves a hazard category 1, 2, or 3 nuclear facility: Yes
   (b) Affects WAI: Yes
   (c) Relates to a hazard category 1, 2, or 3 nuclear facility safety basis, SC SSC, or SS SSC and, therefore, requires Nuclear Safety review: Yes

6. (a) Summary of Purpose, Scope, and Conclusion:
This EDF superseded AMWTP OPS Engineering calculation OPSCAL-ME-0032 which replaced Appendix IX of the AMWTP HWMA/RCRA Storage Permit, Revised August 05, 2005. Revision 04 of this EDF removes the HENC, DTT and adds the Large Item Counter (LIC) in WMF-628.

   The secondary containment system (SCS) calculations provided in this EDF demonstrate the maximum allowable volume of liquid waste that can be placed into the storage area(s) of each Type 1 or Type II storage modules using the worst-case scenario storage configurations while verifying compliance with the HWMA/RCRA permit SCS capacity requirements.

   (b) Summary of Assumptions that must be Verified:
   The SCS capacity has been determined by calculating the maximum available SCS capacity, based on the as built building configuration, then reducing that capacity based on displacement by building structures, equipment, and the containers in the worst-case storage configuration. These calculations apply the minimum aisle-spacing requirements identified in the AMWTP HWMA/RCRA Storage Permit to ensure compliant storage configurations while deriving the maximum SCS capacity.

   (c) Summary of Effects on Operations or Maintenance and Safety Basis Requirements and Limits:
   This EDF determines the amount of total free liquids stored and the available SCS capacity to identify requirement compliance with the AMWTP HWMA/RCRA Storage Permit.
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8. Registered Professional Engineer’s Seal (if required)  

[Signature]

This Engineering Design File was prepared under the direction of the Registered Professional Engineer as indicated by the seal and signature provided on this page. The Professional Engineer is registered in the State of Idaho to practice Engineering.

* Not required for commercial analyses and calculations.
1. SCOPE

This EDF supersedes AMWTP OPS Engineering Calculation OPSCAL-ME-0032 which replaced Appendix IX of the AMWTP HWMA/RCRA Storage Permit, Revised August 05, 2005. The secondary containment system (SCS) calculations provided in this EDF demonstrate the maximum allowable volume of liquid waste that can be placed into the storage area(s) of each Type I or Type II storage module at the AMWTP, using the worst-case scenario storage configurations, while maintaining compliance with the HWMA/RCRA SCS capacity requirements.

2. CALCULATIONS

2.1 WMF-634 SCS calculations

For the purposes of these calculations, the “storage area” in WMF-634 is defined as the south half of the building; the characterization equipment, control rooms, and structures are installed in the north half of the building.

2.1.1 WMF-634 Floor Area/Capacity

WMF-634 is a rectangular-shaped building 120-ft wide and 240-ft long. The foundation walls and a 6-in. high curb extend the full perimeter of the building. Building floors are sloped 3 in. from the outer walls to the center of the building on the long axis. The 3-in. slope extends 30 ft from the end walls. Floor area capacity equals the volume contained within the 6-in. curbed area plus the volume of the sloped floor below the curbing.

A. Volume within the Curbed Area

\[ \text{Volume} = (240 \text{ ft} - (2 \times 19 \text{ in. wall and curb})) \times (120 \text{ ft} - (2 \times 19 \text{ in. wall and curb})) \times 6 \text{ in.} \]

\[ \text{Total} = 13,835 \text{ ft}^3 \]

B. Volume of Sloped Areas Below Curbing (to be conservative, calculations do not address the end wall slope)

\[ \text{Volume} = \frac{1}{2} \times \text{base} \times \text{height} \times \text{length} \times 2 = 0.25 \times 58.4 \times 180 \times 2 \]

\[ \text{Total} = 2,628 \text{ ft}^3 \]

C. Total Floor Area Capacity

\[ A + B = 13,835 \text{ ft}^3 + 2,628 \text{ ft}^3 = 16,463 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 \]

\[ \text{Total} = 123,143 \text{ gal} \]
2.1.2 Volume Displaced by Building Structures in WMF-634

Building structures within WMF-634 include access ramps at rollup doors and aprons at each end of the building, personnel access door landings on each wall, and wall column supports. In addition, the coring room, box assay walls, and two control rooms displace available volume in WMF-634.

A. Volume Displaced by Door Ramps and Aprons

Door ramp dimensions are 28-ft wide by 15.5-ft deep, sloping 6 in. into the building.

Door ramp volume = \( \frac{1}{2} \) (length \times width \times height) = \( \frac{28 \text{ ft} \times 15.5 \text{ ft} \times 0.5 \text{ ft}}{2} \) = 108.5 ft\(^3\)

Apron dimensions are 15.5-ft long by 5-ft wide by 0.5-ft high at highest point.

Apron volume = \( \frac{1}{2} \) the volume of a wedge \times 2 aprons = \( \frac{(15.5 \text{ ft} \times 5 \text{ ft} \times 0.5 \text{ ft})}{2} \times 2 \) = 38.75 ft\(^3\)

Volume displaced by ramps and aprons = (108.5 ft\(^3\) + 38.75 ft\(^3\)) \times 2 ramps = 294.5 ft\(^3\) \times 7.48 gal/ft\(^3\)

Total = 2,203 gal

B. Volume Displaced by Personnel Door Landings

Personnel door landing dimensions are 4-ft long by 8-ft wide by 0.5-ft high.

Landing volume = length \times width \times height = 4 \text{ ft} \times 8 \text{ ft} \times 0.5 \text{ ft} = 16 \text{ ft}^3 \times 4 \text{ door landings} = 64 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3

Total = 479 gal

C. Volume Displaced by Support Columns

There are 14 columns that are 2.6-ft by 0.9-ft and 4 columns that are 1.3-ft by 0.9-ft.

Containment curbing is 0.5-ft high.

Volume displaced by columns = 14 (2.6 \text{ ft} \times 0.9 \text{ ft} \times 0.5 \text{ ft}) + 4 (1.3 \text{ ft} \times 0.9 \text{ ft} \times 0.5 \text{ ft})

= 16.38 \text{ ft}^3 + 2.34 \text{ ft}^3 = 18.72 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3

Total = 140 gal

D. Volume Displaced by Coring Room

The coring room footprint is 1,503 ft\(^2\). The depth at each end of the coring room is

\[
\frac{0.25 \text{ ft}}{60 \text{ ft}} = \frac{y_1}{15.167 \text{ ft}}; \quad y_1 = 0.063 \text{ ft} \quad \text{and} \quad \frac{0.25 \text{ ft}}{60 \text{ ft}} = \frac{y_2}{45.167 \text{ ft}}; \quad y_2 = 0.188 \text{ ft}
\]

Volume of rectangle = (0.063 + 0.5) ft \times 1,503 ft\(^2\) - 846.2 ft\(^3\)

Volume of wedge = \( \frac{1}{2} \times (0.188 - 0.063) \text{ ft} \times 1,503 \text{ ft}^2 = 93.9 \text{ ft}^3\)

Volume displaced by coring room = 846.2 ft\(^3\) + 93.9 ft\(^3\) = 940.1 ft\(^3\) \times 7.48 gal/ft\(^3\)

Total = 7,032 gal

E. Volume Displaced by Box Assay Area Walls

The footprint of the box assay area walls is 91 ft\(^2\).

Volume = 91 ft\(^2\) \times (28/60 \times 0.25 + 0.5) ft = 91 ft\(^2\) \times (0.117 + 0.5) ft = 56.1 ft\(^3\)

Volume of box assay walls = 56.1 ft\(^3\) \times 7.48 gal/ft\(^3\)

Total = 420 gal
F. Volume Displaced by RTR and Assay Control Rooms

The RTR control room footprint is 449 ft².

Volume of rectangle = 449 ft² × 0.5 ft = 224.5 ft³
Volume of wedge = \( \frac{1}{2} \times (33/60 \times 0.25) \times 449 \text{ ft}^2 = \frac{1}{2} \times 0.138 \times 449 \text{ ft}^3 = 30.9 \text{ ft}^3 \)
Volume displaced by RTR control room = 224.5 ft³ + 30.9 ft³ = 255.4 ft³ × 7.48 gal/ft³
Total = 1,910 gal

The assay control room footprint is 504 ft².

Volume of rectangle = 504 ft² × 0.5 ft = 252 ft³
Volume of wedge = \( \frac{1}{2} \times (43/60 \times 0.25) \times 504 \text{ ft}^2 = \frac{1}{2} \times 0.179 \times 504 \text{ ft}^2 = 45.1 \text{ ft}^3 \)
Volume displaced by assay control room = 252 ft³ + 45.1 ft³ = 297.1 ft³ × 7.48 gal/ft³
Total = 2,222 gal

Volume displaced by control rooms = 1,910 gal + 2,222 gal
Total = 4,132 gal

G. Total Facility Structural Displacement

2,203 gal + 479 gal + 140 gal + 7,032 gal + 420 gal + 4,132 gal
Total = 14,406 gal

2.1.3 Volume Displaced by Containers and Pallets in WMF-634

To determine the volume displaced by containers stored in the storage area of WMF-634, this calculation considers the configuration for the maximum number of rows that could potentially be stored in the available space. The number of rows was determined by maintaining a minimum 20-ft aisle space (excluding support beams and portable equipment) the length of the building, and 3-ft aisle spaces (excluding support beams and portable equipment) between each row of containers and the building walls.

Using these criteria, the number of rows of 4-ft by 4-ft by 8-ft boxes that could be potentially configured in the south half of WMF-634 is 6 full rows, 32-ft wide by 44-ft long, and 2 partial rows, 8-ft wide by 36-ft long. This provides a total area of 9,024 ft². The number of rows of 55-gal drums that could be potentially configured in the south half of WMF-634 is 19 full rows, 8-ft wide by 44-ft long, and 2 partial rows, 8-ft wide by 36-ft long. This provides a total area of 7,264 ft². Therefore, the maximum storage configuration occurs using boxes. Drawing 53-1921 (attached) illustrates a typical storage configuration for WMF-634.

A. Pallet Displacement

The metal pallets used to store waste are 4-ft by 4-ft, 4-ft by 8 ft, and/or 4-ft-10-in. by 8-ft. Use of the 4-ft by 8-ft pallets provide the maximum storage capacity (refer to Section 2.1.3.B below). Each 4-ft by 8-ft pallet consists of twelve 4-in. wide by 4-ft long slats, supported by four 4-in. wide by 3.5-in. high by 8-ft long U-shaped beams (i.e., stringers). The slats and stringers are made of 10-gauge-galvanized steel, with a density of 495 lb/ft³. Each slat is lipped 0.5 in. along each side, with a V-groove down the center. Each stringer is lipped 0.5 in. at the top to support the slats. Each stringer has four 2-in. high by 10-in. long holes, two in each side, with 0.5 in. extruded lips. Each 4-ft by 8-ft pallet weighs approximately 300 lb.

Volume displaced by one pallet = 300 lb / (495 lb/ft³) = 0.61 ft³ × 7.48 gal/ft³
Total = 4.534 gal/pallet
B. **Total Number of Pallets for Boxes**

The maximum storage area storage configuration and, therefore, maximum number of pallets is associated with using the 4-ft by 8-ft pallets. The total number of pallets required is determined from the maximum storage area configuration described above. The six full rows are each 32-ft wide by 44-ft long. The two partial rows are each 8-ft wide by 36-ft long.

- Full rows deep = 44 ft ÷ 4 ft / pallet = 11 pallets deep
- Full rows wide = 32 ft ÷ 8 ft / pallet = 4 pallets wide
- Total pallets required to support full row = 4 × 11 = 44 pallets × 6 full rows = 264 pallets
- Partial rows deep = 36 ft ÷ 4 ft / pallet = 9 pallets
- Partial rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
- Total pallets required to support partial row = 1 × 9 = 9 pallets × 2 partial rows = 18 pallets
- Total pallets required for storing waste boxes in WMF-634 = 264 pallets + 18 pallets = 282 pallets × 4.534-gal displacement/pallet

Total = 1,279 gal

C. **Total Number of Pallets for 55-gal Drums**

The total number of pallets required is determined from the maximum storage configuration described above. The 19 full rows are each 8-ft wide by 44-ft long. The two partial rows are each 8-ft wide by 36-ft long.

- Full rows deep = 44 ft ÷ 4 ft / pallet = 11 pallets deep
- Full rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
- Total pallets required to support full row = 1 × 11 = 11 pallets × 19 full rows = 209 pallets
- Partial rows deep = 36 ft ÷ 4 ft / pallet = 9 pallets
- Partial rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
- Total pallets required to support partial row = 1 × 9 = 9 pallets × 2 partial rows = 18 pallets
- Total pallets required for storing waste drums in WMF-634 = 209 pallets + 18 pallets = 227 pallets × 4.534-gal displacement / pallet

Total = 1,029 gal

D. **Waste Container Displacement—for Boxes**

Calculations for volume displacement by boxes use the assumption that all rows of waste possess the same slope as floor. Rows of boxes are 32-ft wide and 44-ft deep, with 3-ft aisle spacing (excluding support beams and portable equipment) between rows and walls. The boxes are stored on pallets 4.25-in. high. The volume of waste displaced by a row of boxes is a summation of the wedge formed by the level line between the high end of the pallet nearest the wall and the bottom of the boxes aligned with the sloped floor; plus, the rectangle formed between the liquid line and the level line above the pallets.

- Volume displaced by full rows = (wedge + rectangle) × # of full rows
- Volume of wedge = 1/2 × 44 ft × (47/58.4 × 3 in.) × 1 ft/12 in. × 32 ft = 141.64 ft³
- Volume of rectangle = [(6 in. + (3/58.4 × 3 in.) − 4.25 in.) × 1 ft/12 in.] × 44 ft × 32 ft = 223.42 ft³
- Total for six full rows = 223.42 ft³ + 141.64 ft³ = 365.06 ft³ × 6 full rows = 2,190 ft³
- Volume displaced by partial rows = (wedge + rectangle) × # of partial rows
- Volume of wedge = 1/2 × 36 ft × (39/58.4 × 3 in. × 1 ft/12 in.) × 8 ft = 24.04 ft³
- Volume of rectangle = [(6 in. + (3/58.4 × 3 in.) − 4.25 in.) × 1 ft/12 in.] × 36 ft × 8 ft = 45.7 ft³
- Total for two partial rows = 24.04 ft³ + 45.7 ft³ = 69.74 ft³ × 2 partial rows = 139 ft³
- Total volume displaced by containers = volume displaced by the full rows + volume displaced by partial rows = 2,190 ft³ + 139 ft³ = 2,329 ft³ × 7.48 gal/ft³

Total = 17,421 gal
E. **Waste Container Displacement—for Drums**

The first two paragraphs of Section 2.1.3 have demonstrated that the volume displaced by boxes is greater than the volume displaced by drums. Therefore, this Section must prove that the available SCS capacity of WMF-634 related to volume displaced by boxes is adequate.

### 2.1.4 Volume Displaced by Characterization Equipment in WMF-634

#### A. RTR Equipment

Each RTR unit footprint is 391 ft².

- Volume of rectangle = 391 ft² × (6/60 × 0.25 + 0.5) ft = 391 ft² × (0.025 + 0.5) ft = 205.3 ft³
- Volume of wedge = ½ × (36/60 × 0.25 - 0.025) ft × 391 ft² = ½ × (0.150 - 0.025) ft × 391 ft² = 24.4 ft³
- Total volume for one RTR = 205.3 ft³ + 24.4 ft³ = **229.7 ft³**
- Total for two RTRs = 2 × 229.7 ft³ × 7.48 gal/ft³ = **3,436 gal**

#### B. Air Compressor

The air compressor footprint is 24 ft².

- Volume displaced by air compressor = 24 ft² × (5/60 × 0.25 + 0.5) ft = 24 ft² × (0.021 + 0.5) ft × 7.48 gal/ft³ = 93.5 gal
- Second Air Compressor Volume displaced by compressor legs and base plates = 4 × 12.25 in. × 14 in. × 0.5 in. + 4 × 4.5 in.² × 4.63 in. + 4 × 100 in.² × 0.88 in. + 19 in. × 11 in. × 3 in. = 1,403.25 in.³/1,728 in.³/ft³ = 0.8121 ft³ × 7.48 gal/ft³ = 6.07 gal
- Total = 100 gal

#### C. Master Control Centers (MCCs)

Nominal dimensions of the MCC on the north wall are 5-ft by 2-ft. Dimensions of the MCC located along the west box assay wall are 15-ft by 2-ft.

- Volume displaced by north MCC = 5 ft × 2 ft × (3/60 × 0.25 + 0.5) ft = 10 ft² × (0.013 + 0.5) ft = 5.13 ft³ × 7.48 gal/ft³ = **38 gal**
- Volume displaced by central MCC = 15 ft × 2 ft × (43.667/60 × 0.25 + 0.5) ft = 30 ft² × (0.182 + 0.5) ft = 20.5 ft³ × 7.48 gal/ft³ = **153 gal**
- Volume displaced by both MCCs = 38 gal + 153 gal = **191 gal**

#### D. Drum Vent and Headspace Gas Sampling Unit

The drum vent system footprint is 140 ft².

- Volume of rectangle = 140 ft² × (26/60 × 0.25 + 0.5) ft = 140 ft² × (0.108 + 0.5) ft = 85.1 ft³
- Volume of wedge = ½ × (38/60 × 0.25 - 0.108) ft × 140 ft² = ½ × 0.050 ft × 140 ft² = 3.5 ft³
- Volume displaced by one DVS = 85.1 ft³ + 3.5 ft³ = 88.6 ft³ × 7.48 gal/ft³ = 663 gal
- Volume displaced by two DVS systems = 2 × 663 gal = **1,326 gal**
E. Drum Radioassay Systems

The footprint for each drum radioassay system is 106 ft².

Volume of rectangle = 106 ft² × (12/60 × 0.25 + 0.5) ft = 106 ft² × (0.050 + 0.5) ft = 58.3 ft³
Volume of wedge = ½ (19/60 × 0.25 -0.050) ft × 106 ft² = 1.55 ft³
Volume displaced by one drum radioassay system = 58.3 ft³ + 1.55 ft³ = 59.9 ft³ × 7.48 gal/ft³ = 448 gal
Volume displaced by two drum radioassay systems = 2 × 448 gal

Total = 896 gal

F. Box Radioassay System

The footprint of the box radioassay system is 304 ft².

Volume displaced by box radioassay system = 304 ft² × (39.6/60 × 0.25 + 0.5) ft = 304 ft² × (0.165 + 0.5) ft = 202.2 ft³ × 7.48 gal/ft³

Total = 1,512 gal

G. Conveyors

Using the projected area on the floor from the conveyors helps determine the volume displaced by the conveyors. This is a very conservative approach as the conveyors are supported by legs. The cumulative nominal conveyor length (not including the conveyor inside the coring room and vestibule) is approximately 170-ft.

Volume displaced by conveyors = 170 ft × 2.33 ft × (45.167/60 × 0.25 + 0.5) ft = 396.1 ft³ × 0.688 ft³ = 272.5 ft³ × 7.48 gal/ft³

Total = 2,038 gal

H. Total Volume Displaced by Characterization Equipment

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<td><strong>Total</strong></td>
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2.1.5 Available SCS Capacity in WMF-634

Available WMF-634 SCS Capacity for boxes equals the building capacity minus the volume displaced by building structures minus the volume displaced by box pallets minus the volume displaced by boxes minus the volume displaced by characterization equipment.

Available SCS Capacity = 123,143 gal – 14,406 gal – 1,279 gal – 17,421 gal – 9,499 gal

Total = 80,538 gal

2.1.6 Free Liquid Volume in WMF-634

The *basis for the* maximum liquid waste volume for mixed waste in WMF-634 is 26% of the total waste volume stored. The 26% represents the number of containers that contained some liquids when more than 17,000 containers were examined at the Stored Waste Examination Pilot Plant (SWEPP).
Maximum number of boxes (stacked 4 boxes high) = 6 rows of boxes 4 wide and 11 deep + 2 partial rows of boxes 1 wide and 9 deep = $6 \times 44 + 2 \times 9 = 282 \times 4$ high = 1,128 Total Boxes

Free liquid volume for box storage = $128 \text{ ft}^3 / \text{box} \times 1,128 \text{ boxes} = 144,384 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 = 1,079,992 \text{ gal} \times 0.26$

Total = 280,798 gal

Section 2.1.3.D demonstrates that boxes provide the maximum free liquid content for this type of configuration.

### 2.1.7 Containers Stored Amidst Characterization Equipment on North Side of WMF-634

The following calculations show that adequate capacity remains for optional storage of containers amidst the characterization equipment on the north half of WMF-634 to accommodate characterization activities.

Floor area taken by characterization equipment:

- RTRs: 782 ft$^2$
- Air Compressor: 24 ft$^2$
- MCCs: 40 ft$^2$
- DVSs: 280 ft$^2$
- Drum Assays: 318 ft$^2$
- Box Assay: 304 ft$^2$
- Conveyors: 396 ft$^2$

Total = 2,144 ft$^2$

Floor area taken by characterization rooms/walls:

- Coring Room: 1,503 ft$^2$
- RTR Control Room: 449 ft$^2$
- Assay Control Room: 504 ft$^2$
- Box Assay Walls: 91 ft$^2$

Total = 2,547 ft$^2$

The area remaining if the characterization equipment and rooms/walls were superimposed on the area taken by the footprint of the maximum drum storage configuration for the south half of the building:

Area available in north half for drums on floor (amidst equipment) = $7,264 \text{ ft}^2 - (2,144 \text{ ft}^2 + 2,547 \text{ ft}^2) = 7,264 \text{ ft}^2 - 4,691 \text{ ft}^2 = 2,573 \text{ ft}^2$

Number of drums that can fit in available area = $2,573 \text{ ft}^2 / 4 \text{ ft}^2$/drum = 643 drums

In addition to drums amidst the characterization equipment, several drums are in process (i.e., on conveyors and within equipment):

Approximate drums in process:
- On conveyor at 170 ft: x 2 ft/drum = 85 drums
- In RTRs: 8 drums
- In radioassay units: 2 drums
- In drum vent unit: 1 drum
- In coring room: 26 drums

Total = 122 drums

Approximate total drums in north half amidst and atop equipment: 643 + 122 = 765 drums

Volume of drums in north half = 765 drums × 55 gal/drum = 42,075 gal

Potential free liquid volume for containers in north half = 42,075 gal × 0.26 = 10,940 gal

Volume displaced by one drum if stored on floor (conservative worst-case for comparison only) = $\pi \times (1 \text{ ft})^2 \times (0.5 \text{ ft}) \times 7.48 \text{ gal/ft}^3 = 11.75 \text{ gal}$

Capacity displaced by drums on floor in north half = 643 drums × 11.75 gal/drum = 7,555 gal

Available capacity for containers in north and south halves of the building = 80,538 gal – 7,555 gal = 72,983 gal
2.1.8 Demonstration of Adequate WMF-634 SCS Capacity

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>291,738 gal</td>
<td>29,174 gal</td>
<td>72,983 gal</td>
</tr>
</tbody>
</table>

As shown, the maximum WMF-634 potential free liquid storage volume for the worst-case south half storage area scenario of storing boxes is 280,798 gal. The maximum potential free liquid storage volume for the worst-case north half in-process scenario is 10,940 gal. The SCS must provide capacity for 10% of the maximum liquid volume = \( (280,798 + 10,940) \times 0.10 = 29,174 \text{ gal} \)

The required SCS capacity for the maximum storage area configuration is 29,174 gal, which is less than the 72,983 gal of available SCS capacity; therefore, adequate SCS capacity is provided in WMF-634.

2.1.9 Demonstration of Total Free Liquids Stored Based on WMF-634 SCS Capacity

As shown, the maximum WMF-634 potential free liquid storage volume for the worst-case physical storage area scenario of storing boxes is 291,738 gal. If the secondary containment capacity is used to calculate the allowable maximum waste volume stored, then it can be shown that the maximum waste volume stored for containers based on secondary containment capacity is greater than the maximum waste volume stored based on physical storage limitations.

Maximum liquid waste volume stored in WMF-634

\[ = \text{Secondary Containment Capacity} / 0.10 \]

\[ = 123,143 \text{ gal} / 0.10 = 1,231,430 \text{ gal} \]

Potential free liquid volume for containers in WMF-634 = 1,231,430 gal \( \times 0.26 = 320,172 \text{ gal} \)

10% of total free liquid stored in WMF-634 = Potential free liquid volume \( \times 0.10 = 320,172 \text{ gal} \times 0.10 = 32,017 \text{ gal} \)

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>320,172 gal</td>
<td>32,017 gal</td>
<td>72,983 gal</td>
</tr>
</tbody>
</table>

The required SCS capacity for the maximum storage area configuration based on the secondary containment capacity is 32,017 gal, which is less than the 72,983 gal of available SCS capacity; therefore, adequate SCS capacity is provided in WMF-634.

2.2 TYPE II Module SCS Calculations (WMF-629 through WMF-633)

2.2.1 Type II Module Floor Area/Capacity

Each Type II Module (WMF-629 through WMF-633) is a rectangular-shaped building 120-ft wide and 240-ft long. The foundation walls and a 6-in. high curb extend the full perimeter of the building. Building floors are sloped 3 in. from the outer walls to the center of the building on the long axis. The 3-in. slope extends 30 ft from the end walls. Floor area capacity equals the volume contained within the 6-in. curbed area plus the volume of the sloped floor below the curbing.
A. **Volume within the Curbed Area**

\[
\text{Volume} = [240 \text{ ft} - (2 \times 19 \text{ in. wall and curb})] \times [120 \text{ ft} - (2 \times 19 \text{ in. wall and curb})] \times 6 \text{ in.} = 236.83 \text{ ft} \times 116.83 \text{ ft} \times 0.5 \text{ ft}
\]

\[
\text{Total} = 13,835 \text{ ft}^3
\]

B. **Volume of Sloped Areas Below Curbing (to be conservative, calculations do not address the end wall slope)**

\[
\text{Volume} = \left(\frac{1}{2} \text{ base} \times \text{ height} \times \text{ length}\right) \times 2 = 0.25 \text{ ft}^2 \times 58.4 \text{ ft} \times 180 \text{ ft} \times 2
\]

\[
\text{Total} = 2,628 \text{ ft}^3
\]

C. **Total Floor Area Capacity** = A + B

\[
\text{Total} = 13,835 \text{ ft}^3 + 2,628 \text{ ft}^3 = 16,463 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3
\]

\[
\text{Total} = 123,143 \text{ gal}
\]

2.2.2 **Volume Displaced by Building Structures in the Type II Modules**

Building structures within each Type II Module include truck door-access ramps and aprons at each end of the building, personnel-access door landings on each wall, and wall column supports.

A. **Volume Displaced by Door Ramps and Aprons**

Door ramp dimensions are 28-ft wide by 15.5-ft deep, sloping 6 in. into the building.

Door ramp volume = \(\frac{1}{2} \times (\text{length} \times \text{width} \times \text{height}) = (28 \text{ ft} \times 15.5 \text{ ft} \times 0.5 \text{ ft}) / 2 = 108.5 \text{ ft}^3\)

Apron dimensions are 15.5-ft long by 5-ft wide by 0.5-ft high at highest point.

Apron volume = \(\frac{1}{2}\) the volume of a wedge \(\times 2\) aprons = \(\frac{[15.5 \text{ ft} \times 5 \text{ ft} \times 0.5 \text{ ft}]}{2} \times 2 = 38.75 \text{ ft}^3\)

Volume displaced by ramps/aprons = \((108.5 \text{ ft}^3 + 38.75 \text{ ft}^3) \times 2 \text{ ramps} = 294.5 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\)

\[
\text{Total} = 2,203 \text{ gal}
\]

B. **Volume Displaced by Personnel Door Landings**

Personnel door landing dimensions are 4-ft long by 8-ft wide by 0.5-ft high.

Landing volume = \(\text{length} \times \text{width} \times \text{height} = 4 \text{ ft} \times 8 \text{ ft} \times 0.5 \text{ ft} = 16 \text{ ft}^3 \times 4 \text{ door landings} = 64 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\)

\[
\text{Total} = 479 \text{ gal}
\]

C. **Volume Displaced by Support Columns**

There are 14 columns that are 2.6-ft by 0.9-ft and four columns that are 1.3-ft by 0.9-ft. Containment curbing is 0.5-ft high. Volume displaced by columns = \(14 (2.6 \text{ ft} \times 0.9 \text{ ft} \times 0.5 \text{ ft}) + 4 (1.3 \text{ ft} \times 0.9 \text{ ft} \times 0.5 \text{ ft}) = 16.38 \text{ ft}^3 + 2.34 \text{ ft}^3 = 18.72 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\)

\[
\text{Total} = 140 \text{ gal}
\]

D. **Total Facility Structural Displacement**

\[
= 2,203 \text{ gal} + 479 \text{ gal} + 140 \text{ gal}
\]

\[
\text{Total} = 2,822 \text{ gal}
\]
2.2.3 Volume Displaced by Containers and Pallets in the Type II Modules

To determine the volume displaced by containers stored in each Type II Module, the configuration for the maximum number of rows that could potentially be stored in the available space was considered. The number of rows was determined by maintaining a minimum 20-ft aisle space (excluding support beams and portable equipment) the length of the building, and 3-ft aisle spaces (excluding support beams and portable equipment) between each row of containers and the building walls.

Using these criteria, the number of rows of 4-ft by 4-ft by 8-ft boxes that could be potentially configured in each half of a Type II Module is six full rows, 32-ft wide by 44-ft long, and two partial rows, 8-ft wide by 36-ft long. This provides an area of 9,024 ft² for each half, for a total of 18,048 ft² per building. The number of rows of 55-gal drums that could be potentially configured in each half of a Type II Module is 19 full rows, 8-ft wide by 44-ft long, and two partial rows, 8-ft wide by 36-ft long. This provides an area of 7,264 ft² for each half, for a total of 14,528 ft² per building. Therefore, the maximum storage configuration occurs using boxes. Drawings 51-9907 and 51-10009 (attached) illustrate a typical storage configuration for the Type II Modules.

A. Pallet Displacement

The metal pallets, which can be used to store waste, are 4-ft by 4-ft, 4-ft by 8-ft, and/or 4-ft 10-in. by 8-ft. Use of the 4-ft by 8-ft pallets provide the maximum storage capacity (refer to Section 2.2.3.B below). Each 4-ft by 8-ft pallet consists of 12 slates, 4-in. wide by 4-ft long, supported by four 4-in. wide by 3.5-in. high by 8-ft long U-shaped beams (i.e., stringers). The slats and stringers are made of 10-gauge-galvanized steel, with a density of 495 lb./ft³. Each slat is lipped 0.5 in. along each side, with a V-groove down the center. Each stringer is lipped 0.5 in. at the top to support the slats. Each stringer has four 2-in. high by 10-in. long holes, two in each side, with 0.5-in. extruded lips. Each 4-ft by 8-ft pallet weighs approximately 300 lb.

Volume displaced by one pallet = \( \frac{300 \text{ lb}}{495 \text{ lb/ft}^3} = 0.65 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 \)

Total = 4.534 gal/pallet

B. Total Number of Pallets for Boxes

The maximum storage configuration and, therefore, maximum number of pallets is associated with using the 4-ft by 8-ft pallets. The total number of pallets required is determined from the maximum storage configuration described above. The 12 full rows are each 32-ft wide by 44-ft long. The four partial rows are each 8-ft wide by 36-ft long.

Full rows deep = 44 ft ÷ 4 ft / pallet = 11 pallets deep
Full rows wide = 32 ft ÷ 8 ft / pallet = 4 pallets wide
Total pallets required to support full row = 4 × 11 = 44 pallets × 12 full rows = 528 pallets
Partial rows deep = 36 ft ÷ 4 ft / pallet = 9 pallets
Partial rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
Total pallets required to support partial row = 1 × 9 = 9 pallets × 4 partial rows = 36 pallets
Total pallets required for storing waste boxes = 528 pallets + 36 pallets = 564 pallets × 4.534-gal displacement / pallet

Total = 2,557 gal
C. **Total Number of Pallets for 55-gal Drums**

The total number of pallets required is determined from the maximum storage configuration described above. The 38 full rows are each 8-ft wide by 44-ft long. The four partial rows are each 8-ft wide by 36-ft long.

- Full rows deep = \(44 \text{ ft} \div 4 \text{ ft/pallet} = 11 \text{ pallets deep}\)
- Full rows wide = \(8 \text{ ft} \div 8 \text{ ft/pallet} = 1 \text{ pallet wide}\)
- Total pallets required to support full row = \(1 \times 11 = 11 \text{ pallets} \times 38 \text{ full rows} = 418 \text{ pallets}\)
- Partial rows deep = \(36 \text{ ft} \div 4 \text{ ft/pallet} = 9 \text{ pallets}\)
- Partial rows wide = \(8 \text{ ft} \div 8 \text{ ft/pallet} = 1 \text{ pallet wide}\)
- Total pallets required to support partial row = \(1 \times 9 = 9 \text{ pallets} \times 4 \text{ partial rows} = 36 \text{ pallets}\)
- Total pallets required for storing waste drums = \(418 \text{ pallets} + 36 \text{ pallets} = 454 \text{ pallets}\)

\[\text{Total} = 4,534 \text{-gal displacement/pallet} \times 454 \text{ pallets} = 2,058 \text{ gal}\]

D. **Waste Container Displacement for Boxes**

Calculations are determined with the assumption that all rows of waste are positioned over the sloped floor. Rows of boxes are 32-ft wide and 44-ft deep, with 3-ft aisle (excluding support beams and portable equipment) spacing between rows and wall. The boxes are stored on pallets 4.25-in. high. The volume of waste displaced by a row of boxes is a summation of the wedge formed by the level line between the high end of the pallet nearest the wall and the bottom of the boxes aligned with the sloped floor; plus, the rectangle formed between the liquid line and the level line above the pallets.

- Volume displaced by full rows = \((\text{wedge} + \text{rectangle}) \times \# \text{ of full rows}\)
- Volume of wedge = \(1/2 \times 44 \text{ ft} \times (47/58.4 \text{ ft} \times 3 \text{ in.}) \times 1 \text{ ft/12 in.} \times 32 \text{ ft} = 141.64 \text{ ft}^3\)
- Volume of rectangle = \((6 \text{ in.} + (3/58.4 \text{ ft} \times 3 \text{ in.}) - 4.25 \text{ in.}) \times 1 \text{ ft/12 in.} \times 44 \text{ ft} \times 32 \text{ ft} = 223.42 \text{ ft}^3\)
- Total for twelve full rows = \(223.42 \text{ ft}^3 + 141.64 \text{ ft}^3 = 365.06 \text{ ft}^3 \times 12 \text{ full rows} = 4,381 \text{ ft}^3\)
- Volume displaced by partial rows = \((\text{wedge} + \text{rectangle}) \times \# \text{ of partial rows}\)
- Volume of wedge = \(1/2 \times 36 \text{ ft} \times (39/58.4 \text{ ft} \times 3 \text{ in.} \times 1 \text{ ft/12 in.}) \times 8 \text{ ft} = 24.04 \text{ ft}^3\)
- Volume of rectangle = \((6 \text{ in.} + (3/58.4 \text{ ft} \times 3 \text{ in.}) - 4.25 \text{ in.}) \times 1 \text{ ft/12 in.} \times 1 \text{ ft/12 in.} \times 36 \text{ ft} \times 8 \text{ ft} = 45.7 \text{ ft}^3\)
- Total for four partial rows = \(24.04 \text{ ft}^3 + 45.7 \text{ ft}^3 = 69.74 \text{ ft}^3 \times 4 \text{ partial rows} = 279 \text{ ft}^3\)
- Total volume displaced by containers = \(4,381 \text{ ft}^3 + 279 \text{ ft}^3 = 4,660 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\)
- Total = \(34,857 \text{ gal}\)

E. **Waste Container Displacement for Drums**

The first two paragraphs of Section 2.2.3 have demonstrated that the volume displaced by boxes is greater than the volume displaced by drums. Therefore, this Section must prove that the available SCS capacity of the Type II Modules related to volume displaced by boxes is adequate.

2.2.4 **Available SCS Capacity in the Type II Modules**

Available Type II Module SCS Capacity for boxes equals the building capacity minus the volume displaced by building structures minus the volume displaced by box pallets minus the volume displaced by boxes.

\[\text{Available SCS Capacity} = 123,143 \text{ gal} - 2,822 \text{ gal} - 2,557 \text{ gal} - 34,857 \text{ gal} = 82,907 \text{ gal}\]
2.2.5 Free Liquid Volume in the Type II Modules

The maximum liquid waste volume for mixed waste in each Type II Module is based on 26% of the total waste volume stored. The 26% represents the number of containers that contained some liquids when more than 17,000 containers were examined at the Stored Waste Examination Pilot Plant (SWEPP).

Maximum number of boxes (stacked 4 boxes high) = 12 rows of boxes 4 wide and 11 deep + 4 partial rows of boxes 1 wide and 9 deep = 12 \times 44 + 4 \times 9 = 564 \times 4 \text{ high} = 2,256 \text{ Total Boxes}

Free liquid volume for box storage = 128 \text{ ft}^3 / \text{box} \times 2,256 \text{ boxes} = 288,768 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 = 2,159,985 \text{ gal}

Total = 561,596 \text{ gal}

Section 2.2.3 demonstrates that boxes provide the maximum free liquid content for this type of configuration.

2.2.6 Demonstration of Adequate Type II Module SCS Capacity

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>561,596 gal</td>
<td>56,160 gal</td>
<td>82,907 gal</td>
</tr>
</tbody>
</table>

As shown, the maximum Type II Module potential free liquid storage volume for the worst-case storage scenario of storing boxes is 561,596 gal. The SCS must provide capacity for 10% of the maximum liquid volume. 561,596 \times 0.10 = 56,160 gal.

The required SCS capacity for the maximum storage configuration is 56,160 gal, which is less than the 82,907 gal of available SCS capacity; therefore, adequate SCS capacity is provided in each Type II Module.

2.3 WMF-628 SCS Calculations

For the purposes of these calculations, the “storage area” in WMF-628 is defined as two full rows and three quarters of a full row on the north half of the building assuming only boxes are stored, four full rows, one quarter of a full row and one partial row on the south half of the building assuming only boxes are stored, the characterization equipment installed in the north half of the building, the drum treatment tent (DTT) installed in the south half of the building, and building structures.

2.3.1 WMF-628 Floor Area/Capacity

WMF-628 is a rectangular-shaped building 120-ft wide and 240-ft long. The foundation walls and a 6-in. high curb extend the full perimeter of the building. Building floors are sloped 3 in. from the outer walls to the center of the building on the long axis. The 3-in. slope extends 30 ft from the end walls. Floor area capacity equals the volume contained within the 6-in. curbed area plus the volume of the sloped floor below the curbing.

A. Volume within the Curbed Area

\[
\text{Total} = 13,835 \text{ ft}^3
\]

\[
= [240 \text{ ft} - (2 \times 19 \text{ in. wall and curb})] \times [120 \text{ ft} - (2 \times 19 \text{ in. wall and curb})] \times 6 \text{ in.}
\]

\[
= 236.83 \text{ ft} \times 116.83 \text{ ft} \times 0.5 \text{ ft}
\]
B. Volume of Sloped Areas Below Curbing (to be conservative, calculations do not address the end wall slope)

\[
= (\frac{1}{2} \text{ base} \times \text{ height} \times \text{ length}) \times 2 = 0.25 \text{ ft/2} \times 58.4 \text{ ft} \times 180 \text{ ft} \times 2
\]

Total = 2,628 ft³

C. Total Floor Area Capacity

A + B = 13,835 ft³ + 2,628 ft³ = 16,463 ft³ \times 7.48 \text{ gal/ft³}

Total = 123,143 gal

2.3.2 Volume Displaced by Building Structures in WMF-628

Building structures within WMF-628 include access ramps at rollup doors and aprons at each end of the building, personnel access door landings on each wall, and wall column supports.

A. Volume Displaced by Door Ramps and Aprons

Door ramp dimensions are 28-ft wide by 15.5-ft deep, sloping 6 in. into the building.

Door ramp volume = \( \frac{1}{2} (L \times W \times H) = (28 \text{ ft} \times 15.5 \text{ ft} \times 0.5 \text{ ft}) / 2 = 108.5 \text{ ft³} \)

Apron dimensions are 15.5-ft long by 5-ft wide by 0.5-ft high at highest point.

Apron volume = \( \frac{1}{2} \) the volume of a wedge \( \times 2 \) aprons = \( \frac{[(15.5 \text{ ft} \times 5 \text{ ft} \times 0.5 \text{ ft}) / 2]}{2} = 38.75 \text{ ft³} \)

Volume displaced by ramps and aprons = \( (108.5 \text{ ft³} + 38.75 \text{ ft³}) \times 2 \) ramps = 294.5 \text{ ft³} \times 7.48 \text{ gal/ft³}

Total = 2,203 gal

B. Volume Displaced by Personnel Door Landings

Personnel door landing dimensions are 4-ft long by 8-ft wide by 0.5-ft high.

Landing volume = \( \text{length} \times \text{width} \times \text{height} = 4 \text{ ft} \times 8 \text{ ft} \times 0.5 \text{ ft} = 16 \text{ ft³} \times 4 \) door landings = \( 64 \text{ ft³} \times 7.48 \text{ gal/ft³} \)

Total = 479 gal

C. Volume Displaced by Support Columns

There are 14 columns that are 2.6-ft by 0.9-ft and 4 columns that are 1.3-ft by 0.9-ft. Containment curbing is 0.5-ft high.

Volume displaced by columns = \( 14 \text{ (2.6 ft} \times 0.9 \text{ ft} \times 0.5 \text{ ft}) + 4 \text{ (1.3 ft} \times 0.9 \text{ ft} \times 0.5 \text{ ft}) = 16.38 \text{ ft³} + 2.34 \text{ ft³} \)

Total = 18.72 \text{ ft³} \times 7.48 \text{ gal/ft³}

Total = 140 gal

D. Total Facility Structural Displacement

2,203 gal + 479 gal + 140 gal

Total = 2,822 gal
2.3.3 Volume Displaced by Containers and Pallets in WMF-628

To determine the volume displaced by containers stored in the storage area of WMF-628, this calculation considers the configuration for the maximum number of rows that could potentially be stored in the available space. The number of rows was determined by maintaining a minimum 20-ft aisle space (excluding support beams and portable equipment) the length of the building, and 3-ft aisle spaces (excluding support beams and portable equipment) between each row of containers and the building walls.

Using this criteria, the number of rows of 4-ft by 4-ft by 8-ft boxes that could be potentially configured in the south half of WMF-628 is 2.75 full rows, 32-ft wide by 44-ft long, and 2 partial rows, 8-ft wide by 33-ft long. The number of rows of 4-ft by 4-ft by 8-ft boxes that could be potentially configured in the north half of WMF-628 is 3 full rows, 32-ft wide by 44-ft long, and 2 partial rows, 8-ft wide by 33-ft long. This provides a total area of 9,152 ft².

The number of rows of 55-gal drums that could be potentially configured in the south half of WMF-628 is 13 full rows, 8-ft wide by 44-ft long, 2 partial rows, 8-ft wide by 41 feet long, and 2 partial rows, 8-ft wide by 33-ft long. The number of rows of 55-gal drums that could be potentially configured in the north half of WMF-628 is 9 full rows, 8-ft wide by 44-ft long and no partial rows. This provides a total area of 8,928 ft². Drawing 51-10009 (attached) illustrates a typical storage configuration for WMF-628.

A. Pallet Displacement

The metal pallets used to store waste are 4-ft by 4-ft, 4-ft by 8-ft, and/or 4-ft-10-in. by 8-ft. Use of the 4-ft by 8-ft pallets provide the maximum storage capacity (refer to Section 2.3.3.B below). Each 4-ft by 8-ft pallet consists of twelve 4-in. wide by 4-ft long slats, supported by four 4-in. wide by 3.5-in. high by 8-ft long U-shaped beams (i.e., stringers). The slats and stringers are made of 10-gauge-galvanized steel, with a density of 495 lb/ft³. Each slat is lipped 0.5 in. along each side, with a V-groove down the center. Each stringer is lipped 0.5 in. at the top to support the slats. Each stringer has four 2-in. high by 10-in. long holes, two in each side, with 0.5 in. extruded lips. Each 4-ft by 8-ft pallet weighs approximately 300 lb.

Volume displaced by one pallet = 300 lb / (495 lb/ft³) = 0.61 ft³ × 7.48 gal/ft³
Total = 4.534 gal/pallet

B. Total Number of Pallets for Boxes

The maximum storage area storage configuration and, therefore, maximum number of pallets is associated with using the 4-ft by 8-ft pallets. The total number of pallets required is determined from the maximum storage area configuration described above. The seven full rows are each 32-ft wide by 44-ft long. The five partial rows are each 8-ft wide by 36-ft long.

Full rows deep = 44 ft ÷ 4 ft / pallet = 11 pallets deep
Full rows wide = 32 ft ÷ 8 ft / pallet = 4 pallets wide
Total pallets required to support full row = 4 × 11 = 44 pallets × 7 full rows = 308 pallets
Partial rows deep = 36 ft ÷ 4 ft / pallet = 9 pallets
Partial rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
Total pallets required to support partial row = 1 × 9 = 9 pallets × 1 partial rows = 9 pallets
Total pallets required for storing waste boxes in WMF-628 = 308 pallets + 9 pallets = 317 pallets × 4.534-gal displacement / pallet
Total = 1,438 gal
C. Total Number of Pallets for 55-gal Drums

The total number of pallets required is determined from the maximum storage configuration described above. The 22 full rows are each 8-ft wide by 44-ft long. The one partial row is 8-ft wide by 36-ft long.

- Full rows deep = 44 ft ÷ 4 ft / pallet = 11 pallets deep
- Full rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
- Total pallets required to support full row = 1 × 11 = 11 pallets × 22 full rows = 242 pallets
- Partial rows deep = 36 ft ÷ 4 ft / pallet = 9 pallets
- Partial rows wide = 8 ft ÷ 8 ft / pallet = 1 pallet wide
- Total pallets required to support partial row = 1 × 9 = 9 pallets × 1 partial rows = 9 pallets
- Total pallets required for storing waste drums in WMF-628 = 242 pallets + 9 pallets = 251 pallets

D. Waste Container Displacement—for Boxes

Calculations for volume displacement by boxes use the assumption that all rows of waste possess the same slope as floor. Rows of boxes are 32-ft wide and 44-ft deep, with 3-ft aisle spacing (excluding support beams and portable equipment) between rows and walls. The boxes are stored on pallets 4.25-in. high. The volume of waste displaced by a row of boxes is a summation of the wedge formed by the level line between the high end of the pallet nearest the wall and the bottom of the boxes aligned with the sloped floor; plus, the rectangle formed between the liquid line and the level line above the pallets.

- Volume displaced by full rows = (wedge + rectangle) × # of full rows
  - Volume of wedge = 1/2 × 44 ft × (47/58.4 × 3 in. × 1 ft/12 in.) × 32 ft = 141.64 ft³
  - Volume of rectangle = [(6 in. + 3/58.4 × 3 in.) − 4.25 in.] × 1 ft/12 in. × 44 ft × 32 ft = 223.42 ft³
  - Total for seven full rows = 223.42 ft³ + 141.64 ft³ = 365.06 ft³ × 7 full rows = 2,555 ft³
- Volume displaced by partial rows = (wedge + rectangle) × # of partial rows
  - Volume of wedge = 1/2 × 36 ft × (39/58.4 × 3 in. × 1 ft/12 in.) × 8 ft = 24.04 ft³
  - Volume of rectangle = [(6 in. + 3/58.4 × 3 in.) − 4.25 in.] × 1 ft/12 in. × 36 ft × 8 ft = 45.7 ft³
  - Total for one partial row = 24.04 ft³ + 45.7 ft³ = 69.74 ft³ × 1 partial rows = 69.74 ft³
  - Total volume displaced by containers = volume displaced by the full rows + volume displaced by partial rows = 2,555 ft³ + 69.74 ft³ = 2,625 ft³ × 7.48 gal/ft³

Total = 19,636 gal

E. Waste Container Displacement—for Drums

The first two paragraphs have demonstrated that the volume displaced by boxes is greater than the volume displaced by drums. Therefore, that the following calculations will be based on the available SCS capacity of WMF-628 related to volume displaced by boxes.

Volume Displaced by Characterization/Treatment Equipment in WMF-628

F. (Large Item Counter) LIC Unit

The footprint of the LIC Gamma unit is 8 ft × 40 ft = 320 ft²
Volume displaced by LIC Gamma unit = 320 ft² × 0.5 = 160 ft³ × 7.48 gal/ft³ = 1,196.8 gal

The footprint of the LIC Neutron unit is 12 ft × 40 ft = 480 ft²
Volume displaced by LIC Neutron unit = 480 ft² × 0.5 = 240 ft³ × 7.48 gal/ft³ = 1,795.2 gal
G. HSGS Unit

The footprint of the HSGS unit is 16 ft × 24 ft = 384 ft²

Volume of rectangle = 384 ft² × (9/60 × 0.25 + 0.5) ft = 384 ft² × (0.0375 + 0.5) ft = 206.4 ft³

Volume of wedge = ½ (33/60 × 0.25 - 0.0375) ft × 384 ft² = ½ × 0.100 ft × 384 ft² = 19.2 ft³

Volume displaced by HSGS unit = 206.4 ft³ + 19.2 ft³ = 225.6 ft³ × 7.48 gal/ft³ = 1,687.5 gal

H. Misc. Equipment

Two 8 ft × 10 ft metal storage boxes

Volume of rectangle = 80 ft² × (39/60 × 0.25 + 0.5) ft = 80 ft² × (0.1625 + 0.5) ft = 53.0 ft³

Volume of wedge = ½ (49/60 × 0.25 - 0.1625) ft × 80 ft² = ½ × 0.417 ft × 80 ft² = 1.67 ft³

Volume displaced by metal storage boxes = 53.0 ft³ + 1.67 ft³ = 2 × 54.67 ft³ = 818 gal

I. Total Volume Displaced by Characterization Equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Volume (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIC Gamma unit</td>
<td>1,196.8</td>
</tr>
<tr>
<td>LIC Neutron unit</td>
<td>1,795.2</td>
</tr>
<tr>
<td>HSGS unit</td>
<td>1,687.5</td>
</tr>
<tr>
<td>Misc. equip.</td>
<td>818.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,497.5</strong></td>
</tr>
</tbody>
</table>

2.3.4 Available SCS Capacity in WMF-628

Available WMF-628 SCS Capacity for boxes equals the building capacity minus the volume displaced by building structures, the volume displaced by box pallets, the volume displaced by boxes and the volume displaced by characterization equipment.

Available SCS Capacity = 123,143 gal − 2,822 gal − 1,438 gal − 1,138 gal − 19,636 gal − 5,497.5 gal

**Total** = 92,611.5 gal

2.3.5 Free Liquid Volume in WMF-628

The basis for the maximum liquid waste volume for mixed waste in WMF-628 is 26% of the total waste volume stored. The 26% represents the number of containers that contained some liquids when more than 17,000 containers were examined at the Stored Waste Examination Pilot Plant (SWEPP).

Maximum number of boxes (stacked 4 boxes high) = 7 rows of boxes 4 wide and 11 deep + 1 partial row of boxes 1 wide and 9 deep = 7 × 44 + 9 = 317 × 4 high = 1,268 Total Boxes

Free liquid volume for box storage = 128 ft³ / box × 1,268 boxes = 162,304 ft³ × 7.48 gal/ft³ = 1,214,304 gal × 0.26

**Total** = 315,649 gal

Section 2.1.3.D demonstrates that boxes provide the maximum free liquid content for this type of configuration.
2.3.6 Containers Stored Amidst Characterization/Treatment Equipment on North and South Sides of WMF-628

The following calculations show that adequate capacity remains for optional storage of containers amidst the characterization equipment on the north and south sides of half of WMF-628 to accommodate characterization/treatment activities.

Floor area taken by characterization/treatment equipment:

- LIC Gamma unit 320 ft²
- LIC Neutron unit 480 ft²
- HSGS unit 384 ft²
- Misc. equip. 160 ft²
Total 1,344 ft²

The area remaining if the characterization/treatment equipment is superimposed on the area taken by the footprint of the maximum drum storage configuration for the area of the building:

Area available for drums on floor (amidst equipment) is the area of 17 full drum rows + area of 3 partial rows – area taken by equipment footprints = (17 × 8 ft × 44 ft) + (3 × 8 ft × 36 ft) – 1,344 ft² = 5,984 ft² + 864 ft² – 1,344 ft² = 5,504 ft²

Number of drums that can fit in available area = 5,504 ft² / 4 ft²/drum = 1,376 drums

In addition to drums amidst the characterization equipment, a number of drums are in process (i.e., within equipment):

Approximate drums in process:

- LIC Gamma unit 0 container**
- LIC Neutron unit 0 container**
- In HSGS unit 2 drums
Total 2 drums

** The LICs are currently stored in WMF-635 but have not been commissioned, nor are there plans to do so. As such, there are no drums in process considered in this evaluation.

Approximate total drums amidst and within equipment: 1,376 + 2 = 1,378 drums

Volume of drums = 1,378 drums × 55 gal/drum = 75,790 gal

Potential free liquid volume for containers amidst and within equipment = 75,790 gal × 0.26 = 19,705 gal

Volume displaced by one drum if stored on floor (conservative worst-case for comparison only) = π × (1 ft)² × (0.5 ft) × 7.48 gal/ft³ = 11.75 gal

Capacity displaced by drums amidst and within equipment = 1,378 drums × 11.75 gal/drum = 16,191.5 gal

Total Free Liquids Stored in WMF-628 = free liquid volume for stored containers + free liquid volume for containers in process = 315,649 gal + 19,705 gal = 335,354 gal

10% of total free liquids = (0.10) × 335,354 = 33,535 gal

Available SCS capacity in WMF-628 = 92,611.5 gal – 16,191.5 gal = 76,420 gal
2.3.7 Demonstration of Adequate WMF-628 SCS Capacity

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>335,354 gal</td>
<td>33,535 gal</td>
<td>76,420 gal</td>
</tr>
</tbody>
</table>

As shown, the maximum WMF-628 potential free liquid storage volume for the worst-case storage area scenario of storing boxes is 315,649 gal. The maximum potential free liquid storage volume for the worst-case storage of drums in-process scenario is 19,705 gal. The SCS must provide capacity for 10% of the maximum liquid volume.

\[
(315,649 \text{ gal} + 19,705 \text{ gal}) \times 0.10 = 335,354 \text{ gal} \times 0.10 = 33,535.4 \text{ gal}
\]

The required SCS capacity for the maximum storage area configuration is 33,535.4 gal, which is less than the 76,420 gal of available SCS capacity; therefore, adequate SCS capacity is provided in WMF-628.

2.3.8 Demonstration of Total Free Liquids Stored Based on WMF-628 SCS Capacity

As shown, the maximum WMF-628 potential free liquid storage volume for the worst-case physical storage area scenario of storing boxes is 335,354 gal. If the secondary containment capacity is used to calculate the allowable maximum waste volume stored, then it can be shown that the maximum waste volume stored for containers based on secondary containment capacity is greater than the maximum waste volume stored based on physical storage limitations.

Maximum liquid waste volume stored in WMF-628

\[
= \frac{\text{Secondary Containment Capacity}}{0.10} = \frac{123,143 \text{ gal}}{0.10} = 1,231,430 \text{ gal}
\]

Potential free liquid volume for containers in WMF-628 = 1,231,430 gal \times 0.26 = 320,172 gal

10% of total free liquid stored in WMF-628 = Potential free liquid volume \times 0.10

\[
= 320,172 \text{ gal} \times 0.10 = 32,017 \text{ gal}
\]

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>320,172 gal</td>
<td>32,017 gal</td>
<td>76,420 gal</td>
</tr>
</tbody>
</table>

The required SCS capacity for the maximum storage area configuration based on the secondary containment capacity is 32,017 gal, which is less than the 76,420 gal of available SCS capacity; therefore, adequate SCS capacity is provided in WMF-628.
2.4 TYPE I Module SCS Calculations

The Type I storage module houses three storage areas: the main storage area (MSA); the Payload Assembly and Aspiration Area/Waste Characterization and Repackaging Area (PAAA/WCRA), which consists of two rooms; and the TRUPACT loading area (TLA). The SCS calculations provided in this section demonstrate that adequate/excess secondary containment is available based on the waste configuration. The calculation provides separate SCS capacity calculations for each storage area.

2.4.1 Type I Module MSA SCS Calculations

A. MSA Floor Area/Capacity

The MSA is a rectangle-shaped area with the north portion measuring 82.5-ft by 72.4-ft. The south portion of the MSA, by the Drum Venting Facility (DVF), measures 84.4-ft by 83.75-ft. The minimum depth of the SCS curb for the MSA is 0.5 ft.

MSA floor area = (82.5 ft × 72.4 ft) + (84.4 ft × 83.75 ft) = 13,041.5 ft²

The initial capacity of the MSA without deductions = 13,041.5 ft² × 0.5 ft

Total = 6,520.75 ft³ (48,775 gal)

B. Volume Displaced by MSA Building Structures

The following physical building structures are within the MSA SCS, causing a reduction in SCS capacity: door ramps, an interior ramp, step-off pads, curbs; columns; the DVF area; scales, office space; and the fire protection room.

Volume Reduced by Door Ramps, Interior Ramp, Step-off Pads, and Curbs

**DOOR RAMPS (2)**

Volume = [length (L) × width (W) × height (H)]/2

1st Volume = (12 ft × 10.5 ft × 0.5 ft)/2 = 31.5 ft³

2nd Volume = (14 ft × 10 ft × 0.5 ft)/2 = 35 ft³ = 31.5 ft³ + 35 ft³

Total = 66.5 ft³

**INTERIOR RAMP (1)**

Volume = (L × W × H)/2 = (39 ft × 20 ft × 0.5 ft)/2

Total = 195 ft³

**STEP-OFF PADS (3)**

Volume = L × W × H

1st Volume = 53 in. × 71 in. × 6 in. = 22,578 in.³

2nd Volume = 42 in. × 42 in. × 6 in. = 10,584 in.³

3rd Volume = 49 in. × 45 in. × 6 in. = 13,230 in.³

= 46,392 in.³ × (5.787 × 10⁻⁴ ft³ / in.³)

Total = 26.8 ft³

**RAMP CURBS (2 pair)**

Volume = (L × W × H) × 2

1st pair = (10.5 ft × 0.75 ft × 0.5 ft) × 2 = 7.9 ft³

2nd pair = (10 ft × 0.75 ft × 0.5 ft) × 2 = 7.5 ft³

Total = 15.4 ft³
INTERNAL WALL CURB

Volume = 7 in. × 6 in. × 65.5 ft = 0.5833 ft × 0.5 ft × 65.5 ft
Total = 19.1 ft³

Total volume reduced by door structures = 66.5 ft³ + 195 ft³ + 26.8 ft³ + 15.4 ft³ + 19.1 ft³ = 323 ft³

Volume Reduced by Columns, DVF Area, and Fire Protection Room

COLUMNS (17 total, 15 at 3 ft × 1 ft × 0.5 ft and 2 at 3 ft × 3 ft × 0.5 ft)

Volume = L × W × H × number of columns = (3 ft × 1 ft × 0.5 ft) × 15 = 22.5 ft³
Total = 32 ft³

DVF AREA

Volume = L × W × H (dimensions are conservative) = 34 ft × 56 ft × 0.5 ft
Total = 952 ft³

FIRE PROTECTION ROOM

Volume = L × W × H = 9 ft × 6 ft × 0.5 ft
Total = 27 ft³

EQUIPMENT (scales measuring 6 ft × 6 ft)

Volume = 6 ft × 6 ft × 0.5 ft
Total = 18 ft³

OFFICE SPACE

Volume = L × W × H = 8 ft × 16 ft × 0.5 ft
Total = 64 ft³

Total volume for miscellaneous structures = 32 + 952 + 27 + 18 + 64 = 1,093 ft³

Total Facility Structural Displacement

Structural displacement = door structure displacement + miscellaneous structure displacement = 323 ft³ + 1,093 ft³
Total = 1,416 ft³

C. Volume Displaced by Containers and Pallets in the MSA

To determine the volume displaced by containers stored in the MSA, the calculation uses the configuration depicted in Drawing 51-9912 (attached). The number of rows configured in the MSA include: one row, 56-ft long by 8-ft wide; one row, 16-ft long by 8-ft wide; and four rows, 24-ft long by 8-ft wide.
Individual Pallet and Container Displacement

PALLETs

The metal pallets are each 4.83-ft by 8-ft. Each pallet consists of 12 slats, 4-in. wide by 4.83-ft long, supported by three 4-in. wide by 3.5-in. high by 8-ft long U-shaped beams (i.e., stringers). The slats and stringers are made of 10-gauge galvanized steel with a density of 495 lb/ft³. Each slat is lipped 0.5 in. along each side with a V-groove down the center. Each stringer is lipped 0.5 in. at the top to support the slats. Each stringer has four 2-in. high by 10-in. long holes, two in each side, with 0.5-in. extruded lips. Each pallet weighs approximately 322 lb.

Volume displaced by one pallet = \( \frac{322 \text{ lb}}{495 \text{ lb/ft}^3} = 0.65 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 \)

Total = 4.9 gal/pallet

CONTAINERS

1. Boxes

   Each box measures 4-ft by 4-ft by 8-ft. Since the pallets are 4.25-in. high, 1.75 in. (0.15 ft) of each box extends below the SCS curb.

   Volume = \( L \times W \times H = 4 \text{ ft} \times 8 \text{ ft} \times 0.15 \text{ ft} = 4.8 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 \); Total = 35.9 gal

   Total displacement per pallet with box = pallet displacement + box displacement

   = 4.9 gal + 35.9 gal

   Total = 41 gal

2. Drums

   Each drum measures 2 ft in diameter. Since the pallets are 4.25-in. high, 1.75 in. (0.15 ft) of each drum extends below the SCS curb.

   Drums per pallet = \( \frac{4.83 \text{ ft}}{2 \text{ ft dia./drum} \times 8 \text{ ft} / 2 \text{ ft dia./drum} = 2 \text{ drums wide} \times 4 \text{ drums long} = 8 \text{ drums} / \text{ pallet} \)

   Volume = \( \pi \times (1 \text{ ft})^2 \times 0.15 \text{ ft} = 0.47 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 \times 8 \text{ drums} \)

   Total = 28.2 gal

   Total displacement per pallet with drums = Pallet Displacement + Drum Displacement

   = 4.9 gal + 28 gal

   Total = 33 gal

Calculations show that boxes provide the maximum displacement for given storage configurations. The calculation uses values determined for box/pallet displacement to demonstrate the worst-case scenario for waste storage volume.

Maximum Number of Boxes Stacked One High

Using the number and length of rows described above the total number of boxes is determined using the following calculation:

Total boxes = Length of row / (4 ft/box) \times number of rows

1 row, 56-ft long = \( \frac{56 \text{ ft}}{4 \text{ ft/box}} = 14 \text{ boxes} \)
1 row, 16-ft long = \( \frac{16 \text{ ft}}{4 \text{ ft/box}} = 4 \text{ boxes} \)
4 rows, 24-ft long = \( (24 \text{ ft/4 ft}) \times 4 = 24 \text{ boxes} = 14 + 4 + 24 \)

Total = 42 boxes stacked one high
Maximum Pallet/Container Displacement
For displacement calculation, assume there is one pallet per box.

\[
\text{Maximum displacement} = \text{Total Displacement of Pallet with Box} \times \text{Total Number of Pallets} = 41 \text{ gal per pallet and box} \times 42 \text{ pallets and boxes} = 1,722 \text{ gal}
\]

D. Available SCS Capacity in the MSA

Available MSA SCS Capacity = Initial Capacity - [Door Structure Displacement + Displacement from Misc. Structures] – Maximum Pallet/Container Displacement = \[
\left(6,521 \text{ ft}^3 - 1,416 \text{ ft}^3\right) \times 7.48 \text{ gal/ft}^3 - 1,722 \text{ gal} = 38,185 \text{ gal} - 1,722 \text{ gal}
\]
Total = 36,463 gal

E. Free Liquid Volume in the MSA

The maximum liquid waste volume for mixed waste in the MSA is based on 26% of the total waste volume stored. The 26% represents the number of containers that contained some liquids when >17,000 containers were examined at the SWEPP.

Free Liquid Volume—Boxes

Using the facility configuration described above, the maximum stacking configuration for boxes, is four high in the MSA.

\[
42 \text{ pallets} \times 4 \text{ boxes/pallet} = 168 \text{ boxes} \\
\text{Volume} = 128 \text{ ft}^3 / \text{box} \times 7.48 \text{ gal/ft}^3 \times 168 \text{ boxes} = 957.44 \text{ gal/box} \times 168 \text{ boxes} = 160,849.9 \text{ gal} \times 0.26 \\
\text{Total} = 41,821 \text{ gal}
\]

Free Liquid Volume—Drums

The number of 55-gal drums that can be placed in the MSA is based on each drum being 2 ft in diameter, stacked four wide, and five high per row in the MSA.

\[
1 \text{ row}, 56 \text{ ft/row} = 56 \text{ ft/row} / 2 \text{ ft/drum} \times 1 \text{ row} \times 4 \text{ wide} \times 5 \text{ high} = 560 \text{ drums} \\
1 \text{ row}, 16 \text{ ft/row} = 16 \text{ ft/row} / 2 \text{ ft/drum} \times 1 \text{ row} \times 4 \text{ wide} \times 5 \text{ high} = 160 \text{ drums} \\
4 \text{ rows}, 24 \text{ ft/row} = 24 \text{ ft/row} / 2 \text{ ft/drum} \times 4 \text{ rows} \times 4 \text{ wide} \times 5 \text{ high} = 960 \text{ drums} \\
\text{Total Drums} = 560 \text{ drums} + 160 \text{ drums} + 960 \text{ drums} = 1,680 \text{ drums} \\
\text{Volume} = 1,680 \text{ drums} \times 55 \text{ gal/drum} = 92,400 \text{ gal} \times 0.26 \\
\text{Total} = 24,024 \text{ gal}
\]

Calculations show that boxes provide the maximum free liquid content for the given storage configuration. The values determined for box free liquid content are used to demonstrate the worst-case scenario for maximum potential liquid waste volume.
F. MSA SCS Capacity Estimate

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>41,821 gal</td>
<td>4,182 gal</td>
<td>36,463 gal</td>
</tr>
</tbody>
</table>

Demonstration of Adequate Capacity

As shown the maximum MSA potential liquid storage capacity is 41,821 gal. The SCS must provide capacity for 10% of the maximum MSA potential storage capacity.

\[
\text{Volume} = 41,821 \text{ gal} \times 0.10 \\
\text{Total} = 4,182 \text{ gal}
\]

The required SCS capacity is 4,182 gal, which is less than 36,463 gal of available SCS capacity. Therefore, the Type I Module MSA provides adequate SCS capacity.

2.4.2 Type I Module PAAA/WCRA SCS Calculations

A. PAAA/WCRA Floor Area/Capacity

The PAAA/WCRA consists of two rooms, separated by a wall. There is no elevated ramp or pad at the door separating these rooms; therefore, the SCS volume is considered the total volume provided in both rooms. The PAAA/WCRA measures 167-ft by 83.75-ft with a SCS curb height of 0.5 ft.

\[
\text{PAAA/WCRA floor area} = 167.7 \text{ ft} \times 83.75 \text{ ft} = 14,044.9 \text{ ft}^2 \\
\text{The initial capacity of the PAAA/WCRA without deductions} = 14,044.9 \text{ ft}^2 \times 0.5 \text{ ft} \\
\text{Total} = 7,022 \text{ ft}^3 (52,528 \text{ gal})
\]

B. Volume Displaced by PAAA/WCRA Building Structures

The following physical building structures are located within the PAAA/WCRA SCS: door ramps, step-off pads, and curbs; and columns, operating equipment, partition wall, office space, and gas generation testing system.

Volume Reduced by Door Ramps, Step-off Pads, and Curbs

RAMPS (2)

\[
\text{Volume} = (L \times W \times H) / 2 \\
1\text{st volume} = (13 \text{ ft} \times 9.5 \text{ ft} \times 0.5 \text{ ft})/2 = 30.9 \text{ ft}^3 \\
2\text{nd volume} = (14 \text{ ft} \times 10 \text{ ft} \times 0.5 \text{ ft})/2 = 35.0 \text{ ft}^3 \\
\text{Total} = 66 \text{ ft}^3
\]

STEP-OFF PADS (4)

\[
\text{Volume} = L \times W \times H \\
1\text{st volume} = 42 \text{ in.} \times 42 \text{ in.} \times 6 \text{ in.} = 10,584 \text{ in.}^3 \\
2\text{nd volume} = 69 \text{ in.} \times 42 \text{ in.} \times 6 \text{ in.} = 17,388 \text{ in.}^3 \\
3\text{rd volume} = 67 \text{ in.} \times 41 \text{ in.} \times 6 \text{ in.} = 16,482 \text{ in.}^3 \\
4\text{th volume} = 50 \text{ in.} \times 45 \text{ in.} \times 6 \text{ in.} = 13,500 \text{ in.}^3 \\
\text{Total} = 57,954 \text{ in.}^3 \times (5.787 \times 10^{-4}) \text{ ft}^3/\text{in.}^3 = 34 \text{ ft}^3
\]
RAMP CURBS (2 pairs)

\[ \text{Volume} = (L \times W \times H) \times 2 \]

1st pair = \((9.5 \text{ ft} \times 0.75 \text{ ft} \times 0.5 \text{ ft}) \times 2 = 7.1 \text{ ft}^3\)

2nd pair = \((10 \text{ ft} \times 0.75 \text{ ft} \times 0.5 \text{ ft}) \times 2 = 7.5 \text{ ft}^3\)

Total = \(7.1 \text{ ft}^3 + 7.5 \text{ ft}^3 = 15 \text{ ft}^3\)

INTERNAL WALL CURBS

\[ \text{Volume} = 2.6 \text{ ft} \times 0.5 \text{ ft} \times 216.2 \text{ ft} \]

Total = \(281 \text{ ft}^3\)

Total volume reduced by door structures = \(66 \text{ ft}^3 + 34 \text{ ft}^3 + 15 \text{ ft}^3 + 281 \text{ ft}^3\)

Total = \(396 \text{ ft}^3\)

Volume Reduced by PAAA/WCRA Columns, Equipment, and the Wall Partition

1. COLUMNS (15 total - 10 at \(3 \text{ ft} \times 1 \text{ ft} \times 0.5 \text{ ft}\) and 5 at \(3 \text{ ft} \times 3 \text{ ft} \times 0.5 \text{ ft}\))

\[ \text{Volume} = L \times W \times H \times \text{number of columns} = (3 \text{ ft} \times 1 \text{ ft} \times 0.5 \text{ ft}) \times 10 = 15.0 \text{ ft}^3 \]

Total = \(38 \text{ ft}^3\)

2. EQUIPMENT (1 piece, drum conveyor, measuring \(7 \text{ ft} \times 12 \text{ ft}\))

\[ \text{Volume} = (7 \text{ ft} \times 12 \text{ ft} \times 0.5 \text{ ft}) \]

Total = \(42 \text{ ft}^3\)

3. CENTER WALL (one wall 85-ft long with a 9-inch wide base)

\[ \text{Volume} = 85 \text{ ft} \times 0.75 \text{ ft} \times 0.5 \text{ ft} \]

Total = \(32 \text{ ft}^3\)

4. OFFICE SPACE

\[ \text{Volume} = L \times W \times H = 10 \text{ ft} \times 8.7 \text{ ft} \times 0.5 \text{ ft} \]

Total = \(44 \text{ ft}^3\)

Total volume for miscellaneous structures = \(38 \text{ ft}^3 + 42 \text{ ft}^3 + 32 \text{ ft}^3 + 44 \text{ ft}^3\)

Total = \(156 \text{ ft}^3\)

Volume Reduced by GGT System

1. CANISTERS (Total 80)

Canister Diameter: 26 in.; Base Diameter: 30 in.
Platform Dimensions: 34 in. \(\times\) 34 in.
Secondary Containment Curb Height: 6 in.
(Although most of the canister platforms will be elevated off the floor, assume the footprint of canisters/platforms will consume the entire secondary containment to curb height of 6 in.)

\[ \text{Platform of each canister} = 34 \text{ in.} \times 34 \text{ in.} \times 6 \text{ in.} = 6,936 \text{ in.}^3 \times (5.787 \times 10^{-4} \text{ ft}^3/\text{in.}^3) = 4 \text{ ft}^3 \]

Platform of 80 canisters = \(80 \text{ canisters} \times 4 \text{ ft}^3/\text{canister} = 320 \text{ ft}^3 = 320 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\)

Total = \(2,394 \text{ gal}\)
2. MAXIMUM OF TWO FLOOR CRANES

Each crane will be in a separate loading area. Each area will be approximately 12-ft by 12-ft.
Each Floor Crane: 25 in. × 60 in.
Secondary Containment Curb Height: 6 in.
Crane base volume = 25 in. × 60 in. × 6 in. = 9,000 in.³ = 9,000 in.³ × (5.787 × 10⁻⁴ ft³/in³) = 5 ft³
2 cranes base volume = 2 cranes × 5 ft³/crane = 10 ft³ = 10 ft³ × 7.48 gal/ft³
Total = 75 gal

3. MAXIMUM OF TWO ANALYTICAL CARTS

Cart Dimensions: 5 ft × 2.5 ft (per cart)
Secondary Containment Curb Height: 6 in.
(Although most of the cart will be elevated off the floor (due to wheels), assume the footprint of cart will consume the entire secondary containment to curb height of 6 in.)
Analytical cart base volume = 5 ft × 2.5 ft × 0.5 ft = 6 ft³
2 carts base volume = 2 carts × 6 ft³/cart = 12 ft³ = 12 ft³ × 7.48 gal/ft³
Total = 90 gal

4. VOC SCRUBBING CART

Although most of the cart will be elevated off the floor (due to support legs), assume the footprint of cart will consume the entire secondary containment to curb height of 6 in.
Cart Dimensions: 4 ft × 2 ft; Secondary Containment Curb Height: 6 in.
Scrubbing cart base volume = 4 ft × 2 ft × 0.5 ft = 4 ft³ = 4 ft³ × 7.48 gal/ft³
Total = 30 gal

5. FOUR LARGE GAS CYLINDERS

Cylinder Diameter: 1 ft; Secondary Containment Curb Height: 6 in.
Cylinder base volume = π× (0.5 ft)² × 0.5 ft = 0.4 ft³
4 cylinders base volume = 4 cylinders × 0.4 ft³/cylinder = 2 ft³ = 2 ft³ × 7.48 gal/ft³
Total = 15 gal

6. BATTERY CHARGER

Battery Charger Dimensions: 4 ft × 2 ft; Secondary Containment Curb Height: 6 in.
Battery charger base volume = 4 ft × 2 ft × 0.5 ft = 4 ft³ = 4 ft³ × 7.48 gal/ft³
Total = 30 gal

Summary of Secondary Containment Used by GGT System:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cubic Feet Secondary Containment Taken Up</th>
<th>Gallons Secondary Containment Taken Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 Canisters</td>
<td>320 ft³</td>
<td>2,349 gal</td>
</tr>
<tr>
<td>Maximum of Two Floor Cranes</td>
<td>10 ft³</td>
<td>75 gal</td>
</tr>
<tr>
<td>Maximum of Two Analytical Carts</td>
<td>12 ft³</td>
<td>90 gal</td>
</tr>
<tr>
<td>VOC Scrubbing Cart</td>
<td>4 ft³</td>
<td>30 gal</td>
</tr>
<tr>
<td>4 Large Gas Cylinders</td>
<td>2 ft³</td>
<td>15 gal</td>
</tr>
<tr>
<td>Battery Charger</td>
<td>4 ft³</td>
<td>30 gal</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>352 ft³</strong></td>
<td><strong>2,634 gal</strong></td>
</tr>
</tbody>
</table>
Volume Reduced by Portable GGT System

1. **PAD FOR ELECTRICAL TRANSFORMER**
   - Pad Height: 6 in.
   - Pad Length: 24 in.
   - Pad Width: 12 in.
   - Volume of Pad = 6 in. × 24 in. × 12 in. = 1,728 in.³ = 1,728 in.³ × (5.787 × 10⁻⁴ ft³/in.³) = 1 ft³ × 7.48 gal/ft³
   - Total = 7.5 gal

2. **POWER SUPPLY**
   - Power Supply Height: 6 in.
   - Power Supply Length: 12 in.
   - Power Supply Width: 12 in.
   - Power Supply Volume = 6 in. × 12 in. × 12
   - = 864 in.³ = 864 in.³ × (5.787 × 10⁻⁴ ft³/in.³) = 0.5 ft³
   - Total = 3.8 gal

Total Facility Structural Displacement

Structural Displacement = door structure displacement + misc. structure displacement + GGT System displacement + Portable GGT System displacement = 396 ft³ + 156 ft³ + 352 ft³ + 1.5 ft³
- Total = 905.5 ft³

C. **Volume Displaced by Containers and Pallets in the PAAA/WCRA**

To determine the volume displaced by containers stored in this area, the configuration depicted in Drawing 51-9912 (attached) was used. The number of 8-ft wide rows that are in the PAAA/WCRA is as follows: six 60-ft rows, two 24-ft rows, and three 36-ft rows.

**Individual Pallet and Container Displacement**

**PALLETS**

The metal pallets are 4.83-ft by 8-ft. Each pallet consists of 12 slats, 4-in. wide by 4.83-ft long, supported by three 4-in. wide by 3.5-in. high by 8-ft long U-shaped beams (i.e., stringers). The slats and stringers are made of 10-gauge galvanized steel, with a density of 495 lb/ft³. Each slat is lipped 0.5 in. along each side with a V-groove down the center. Each stringer is lipped 0.5 in. at the top to support the slats. Each stringer has four 2-in. high by 10-in. long holes, two in each side, with 0.5-in. extruded lips. Each pallet weighs approximately 322 lb.

- Volume displaced by one pallet = 322 lb / 495 lb/ft³ = 0.65 ft³ × 7.48 gal/ft³
- Total = 5 gal/pallet

**CONTAINERS**

1. **Boxes**

Each box measures 4-ft by 4-ft by 8-ft. Since the pallets are 4.25-in. high, 1.75 in. (0.15 ft) of each box extends below the SCS curb.

- Volume = L × W × H = 4 ft × 8 ft × 0.15 ft = 4.8 ft³ × 7.48 gal/ft³ = 36 gal
- Total displacement per pallet with box = pallet displacement + box displacement = 5 gal + 36 gal
- Total = 41 gal
2. **Drums**

Each drum measures 2 ft in diameter. Since the pallets are 4.25-in. high, 1.75 in. (0.15 ft) of each drum extends below the SCS curb.

\[
\text{Drums / pallet} = \frac{4.83 \text{ ft}}{2 \text{ ft dia./drum}} \times \frac{8 \text{ ft}}{2 \text{ ft dia./drum}} = 2 \text{ drums wide } \times 4 \text{ drums long} = 8 \text{ drums / pallet}
\]

Volume = \(\pi \times (1 \text{ ft})^2 \times 0.15 \text{ ft} = 0.47 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 \times 8 \text{ drums}

Total = 28 gal

**Total displacement per pallet with drums** = pallet displacement + drum displacement within the SCS = 5 gal + 28 gal

Total = 33 gal

Calculations show that boxes provide the maximum displacement for the given storage configurations. The values determined for box/pallet displacement are used to demonstrate the worst-case scenario for waste storage volume.

**Maximum Number of Boxes Stacked One High**

Using the number and length of rows described above, the total number of boxes was determined using the following calculation:

Total Pallets = length of row/(4 ft/pallet) \times number of rows

6 rows, 60 ft = \((60 \text{ ft}/4) \times 6 = 90 \text{ boxes}\)

2 rows, 24 ft = \((24 \text{ ft}/4) \times 2 = 12 \text{ boxes}\)

3 rows, 36 ft = \((36 \text{ ft}/4) \times 3 = 27 \text{ boxes}\)

Total = 90 + 12 + 27 = 129 boxes (stacked one high)

**Maximum Pallet/Container Displacement**

Maximum displacement = total displacement of pallet with box \times total number of pallets = 41 gal per pallet and box \times 129 pallets

Total = 5,289 gal

**D. Available SCS Capacity in the PAAA/WCRA**

Available PAAA/WCRA Capacity = initial capacity − [door structure displacement + the displacement from misc. structures + the displacement from GGT system + the displacement from the portable GGT system] − maximum displacement of pallets and boxes = \[(7,022 \text{ ft}^3 − 905.5 \text{ ft}^3) \times 7.48 \text{ gal/ft}^3\] − 5,289 gal

Total = 40,462 gal

**E. Free Liquid Volume in the PAAA/WCRA**

The maximum liquid waste volume for mixed waste in the PAAA/WCRA is based on 26% of the total waste volume stored. The 26% represents the number of containers that contained some liquids when >17,000 containers were examined at the SWEPP.

**Free Liquid Volume—Boxes**

Using the facility configuration described above, the maximum stacking configuration for boxes is four high in the PAAA/WCRA = 129 pallets \times 4 \text{ boxes/pallet} = 516 boxes

Volume = 128 ft\(^3\)/box \times 7.48 \text{ gal/ft}^3 \times 516 \text{ boxes} = 494,039 \text{ gal} \times 0.26

Total = 128,450 gal
Free Liquid Volume—Drums

The number of 55-gal drums that can be placed into the PAAA/WCRA is based on each drum being 2 ft in diameter, stacked four wide, and five high per row.

\[
\text{Drums per pallet} = 2 \text{ wide} \times 4 \text{ long} \times 5 \text{ high} = 40 \text{ drums}
\]

\[
\text{Total drums} = (40 \text{ drums per pallet} \times 129 \text{ pallets}) = 5,160 \text{ drums}
\]

\[
\text{Volume} = 5,160 \text{ drums} \times 55 \text{ gal/drum} = 283,800 \text{ gal} \times 0.26
\]

\[
\text{Total} = 73,788 \text{ gal}
\]

Calculations show that boxes provide the maximum free liquid content for the given storage configuration. The values determined for box free liquid content are used to demonstrate the worst-case scenario for maximum potential liquid waste volume.

F. PAAA/WCRA SCS Capacity Estimate

<table>
<thead>
<tr>
<th>TOTAL FREE LIQUIDS STORED</th>
<th>10% OF TOTAL FREE LIQUIDS</th>
<th>AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>128,450 gal</td>
<td>12,845 gal</td>
<td>40,462 gal</td>
</tr>
</tbody>
</table>

Demonstration of Adequate Capacity

As shown the maximum PAAA/WCRA potential liquid storage capacity is 128,450 gal. The SCS must provide capacity for 10% of the free liquid stored.

\[
\text{Volume} = 128,450 \times 0.10
\]

\[
\text{Total} = 12,845 \text{ gal}
\]

The required SCS capacity is 12,845 gal, which is less than 40,462 gal of available SCS capacity. Therefore, the Type I Module PAAA/WCRA provides adequate SCS capacity.

2.4.3 Type I Module TLA SCS Calculations

Drums are stored as 14-drum TPA configurations, in ten-drum overpacks (TDOPs) containing ten 55-gal drums, or in TRUPACT SWBs containing four 55-gal drums on spill pallets or pans or in TRUPACT casks. Intuitively, since the lidded/sealed and leak tested TRUPACT casks hold the TPAs, or two TRUPACT SWBs, any/all releases from drums would be contained in the cask; therefore, SCS calculations are not provided for TPAs or boxes in TRUPACT casks.

Spill containment in the TLA will consist of a SCS capable of holding 10% of the total potential liquid in a 14-pack TPA or two TRUPACT SWBs, each of which holds four 55-gal drums.

A. Available SCS in the TLA

Containment will be manufactured units such as the following:

- “Ultra-Spill Deck” as manufactured by UltraTech International. Decks may be configured into a 104-in. by 104-in. unit (four each, 52-in. square units with bulkhead fittings to allow spilled liquid to flow from one module to the next; each module will hold 44 gal). = 4 \times 44 \text{ gal}

\[
\text{Total} = 176 \text{ gal}
\]

- OR

Ultra-Confinement pans 96-in. in diameter with interior pallet to allow visual inspection; pans will contain approximately 85 gal of liquid.

\[
\text{Total} = 85 \text{ gal}
\]
B. Potential Free Liquid Volumes Stored on Spill Pallets or Pans

Free Liquid Volume in a TPA

\[ \text{Volume} = 0.26 \times (55 \text{ gal/drum} \times 14 \text{ drums/TPA}) \]
\[ \text{Total} = 200 \text{ gal} \]

Free Liquid Volume in two TRUPACT SWBs

\[ \text{Volume} = 0.26 \times (4 \times 55 \text{ gal}) \times 2 \]
\[ \text{Total} = 114 \text{ gal} \]

Free Liquid Volume in a TDOP

\[ \text{Volume} = 0.26 \times (10 \times 55 \text{ gal}) \]
\[ \text{Total} = 143 \text{ gal} \]

C. TLA SCS Capacity Estimate

<table>
<thead>
<tr>
<th>MAXIMUM FREE LIQUIDS STORED PER PALLET OR PAN</th>
<th>10% OF MAXIMUM</th>
<th>MINIMUM AVAILABLE SECONDARY CONTAINMENT CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 gal</td>
<td>20 gal</td>
<td>85 gal</td>
</tr>
</tbody>
</table>

Demonstration of Adequate Capacity

As shown, the maximum potential liquid stored per pallet or pan is 200 gal. The SCS (spill pallet or pan) must provide capacity for 10% of the free liquid stored.

\[ \text{Volume} = 200 \text{ gal} \times 0.10 \]
\[ \text{Total} = 20 \text{ gal} \]

The required SCS capacity is 20 gal, which is less than the 85 gal of minimum available SCS capacity. Therefore, the Type I Module TLA for TPAs or SWBs provides adequate SCS capacity.

2.5 Section 5. SWEPP Storage Area SCS Calculations

SWEPP storage area SCS calculations have been completed by determining floor area/capacity using Terra Model software. Terra Model mapping shows that the maximum depth within the storage area is approximately 3.9-in. Pallets are approximately 4 in. high. For calculation purposes, total immersion of pallets is assumed. Due to pallet height, no part of the containers can be immersed in the available SWEPP storage area impoundment volume. The pallet displacement value is calculated by addressing the example container storage configuration in the storage area using 55-gal drums, as depicted in Drawing 51-9906 (attached), to determine the maximum number of pallets required for storage. This section shows that for the desired permitted storage capacity of 108 m³, the SCS capacity is approximately 4.5 times greater than 10% of the available total free liquid associated with 108 m³ of waste in 55-gal drums.
2.5.1 Floor Area/Capacity

The SWEPP storage area is located at the south end of the High Bay. The building exterior walls form the outer boundaries of the storage area on the south, east, and west sides. Curbing and a forklift ramp near the center of the building floor area form the boundary on the north side. The storage area extends 66 ft 8 in. from the south wall into the SWEPP High Bay on the west side and 49 ft 8 in. on the east side. The floor for the entire High Bay slopes approximately 0.5% toward the north. On the east side of the SWEPP storage area, the floor is sloped from the south side toward the north at approximately 0.4%. The floor on the west side of the storage area is sloped from the northwest corner to the east at approximately 0.6%. To more accurately calculate the total volume of the SWEPP storage area, floor measurement data from facility drawings along with floor elevation data were entered Terra Model software. The resulting topographic map of the storage area indicates the maximum possible depth is less than 4 in. at a location on the north end of the storage west side. The software also provides the capability to determine the volume of the total area within the confines of the storage area. The total initial estimated containment volume for the SWEPP storage area is 4,003 gal.

2.5.2 Volume Displaced by Curbing

Curbing displacement takes place primarily on the east wall, and around the columns and fire water riser containment. The curbing on the east wall and columns is 6-in. wide. Depth varies from north to south in the SWEPP storage area. Calculations use the maximum depth of an item.

South wall curbing: The maximum depth at the south wall is 0.0 in. = 0.0 gal.
East wall curbing maximum depth is 0.1 ft = 0.9 ft³ × 7.48 gal/ft³; Total = 7 gal

Volume displaced by column curbing:
= 2 ft × 3.25 ft × 0.02 ft = 0.13 ft³ × 7.48 gal/ft³; Total = 1 gal
= 3 ft × 3.25 ft × 0.27 ft = 2.6 ft³ × 7.48 gal/ft³; Total = 20 gal
= 2.33 ft × 3.25 ft × 0.21 ft = 1.6 ft³ × 7.48 gal/ft³; Total = 12 gal
= 2.33 ft × 2.5 ft × 0.28 ft = 1.6 ft³ × 7.48 gal/ft³; Total = 12 gal

Total volume displaced by curbing = 7 gal + 1 gal + 20 gal + 12 gal + 12 gal
Total = 52 gal

2.5.3 Volume Displaced by Metal Pallets

The metal pallets measure 4 ft square. Each pallet consists of six slats, 4-in. wide by 4-ft long, supported by three 4-in. wide by 3.5-in. high by 4-ft long U-shaped beams. The slats and stringers are made of 10-gauge galvanized steel. Each slat is lipped 0.5 in. along each side with a V-groove down the center. Each stringer is lipped 0.5 in. at the top to support the slats. Each stringer has four 2-in. high by 10-in. long holes, two in each side, with 0.5-in. extruded lips. The pallets weigh approximately 136 lb each. Thus, the volume displaced by one pallet:

= 136 lb / 495 lb/ft³ = 0.27 ft³ × 7.48 gal/ft³
Total = 2 gal/pallet
The number of pallets required to store 108 m³ of waste in 55-gal drums is determined by addressing pallet requirements for the various storage configurations as depicted in Drawing 51-9906 in Appendix V. Associated pallet calculations follow.

The storage configuration depicted in Drawing 51-9906 (attached) has one row, 4 drums wide by 7 drums long; three rows, 4 drums wide by 10 drums long; and one row, 4 drums wide by 6 drums long.

4 drums wide:
Number of pallets wide = 4 drums wide × 2 ft/drum × 1 pallet/4-ft wide = 2 pallets wide
Number of pallets long:
Row 6 drums long = 6 drums long × 2 ft/drum × 1 pallet/4-ft long = 3 pallets long
Pallets / row = 2 pallets wide × 3 pallets long;
Total = 6 pallets

Row 7 drums long = 7 drums long × 2 ft/drum × 1 pallet/4-ft long = 3.5 pallets, or 4 pallets long
Pallets / row = 2 pallets wide × 4 pallets long
Total = 8 pallets

Row 10 drums long = 10 drums long × 2 ft/drum × 1 pallet/4-ft long = 5 pallets long
Pallets / row = 2 pallets wide × 5 pallets long = 10 pallets × 3 rows
Total = 30 pallets
Total pallets for 55-gal drums = 6 + 8 + 30
Total = 44 pallets

Pallet displacement for 55-gal drums = 44 pallets × 2-gal/pallet
Total = 88 gal

2.5.4 Volume Displaced by Facility Equipment

A. Fork Lift Charging Station

A forklift charging station may be located within the SWEPP storage area. Assuming two forklifts are placed in the charging area, maximum displacement is:

Assume forklift tires, tines and drum-handling attachments are totally submerged.

Four tires per forklift = 15 in. × 8 in. × 4 in. × 4 / fork lift = 1,920 in.³ / 1,728 in.³/ft³
= 1.1 ft³ × 7.48 gal/ft³; Total = 8 gal

Two tines per forklift = 48 in. × 4 in. × 2 in. × 2 / fork lift = 768 in.³ / 1,728 in.³/ft³
= 0.44 ft³ × 7.48 gal/ft³; Total = 3 gal

One drum handler per forklift at 300 lb = 300 lb / 495 lb/ft³ = 0.61 ft³ × 7.48 gal/ft³
Total = 5 gal

Total displacement for two forklifts = (8 gal + 3 gal + 5 gal) × 2
Total = 32 gal

B. Gamma Spectrometer

The maximum depth in the gamma spectrometer area due to floor slope is 3.5 in.

Gamma spec. plate support structure displacement = 4 ft × 6 ft × 3.5 in. = 12,096 in.³ / 1,728 in.³/ft³
= 7.0 ft³ × 7.48 gal/ft³
Total = 52 gal
C. New (1999) Gamma Spectrometer

The maximum depth in the gamma spectrometer area due to floor slope is 3.5 in.

Conveyor system = \(37 \text{ ft} \times 3 \text{ ft} \times 3.5 \text{ in.} + 5 \text{ ft} \times 5 \text{ ft} \times 3.5 \text{ in.} = 68,544 \text{ in.}^3 / 1,728 \text{ in.}^3/\text{ft}^3 = 39.7 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\);

Total = 297 gal

Detector/shield system = \(6 \text{ ft} \times 6 \text{ ft} \times 3.5 \text{ in.} = 18,144 \text{ in.}^3 / 1,728 \text{ in.}^3/\text{ft}^3 = 10.5 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\);

Total = 79 gal

Analytical support tables and rack = \(5 \text{ ft} \times 10 \text{ ft} \times 3.5 \text{ in.} = 25,200 \text{ in.}^3 / 1,728 \text{ in.}^3/\text{ft}^3 = 14.6 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3\);

Total = 109 gal

Total displacement for new gamma spectrometer = 297 gal + 79 gal + 109 gal = 485 gal

D. Total Volume Displaced by Equipment

= 32 gal + 52 gal + 485 gal

Total = 569 gal

2.5.5 Available SCS Capacity

Capacity (55-gal drums) = Floor area/capacity − volume displaced by curbing − volume displaced by pallets - volume displaced by equipment = 4,003 gal - 52 gal - 88 gal - 569 gal

Total = 3,294 gal

2.5.6 Free Liquid Volume in SWEPP Storage Area (55-gal Drums)

Number of 55-gal drums in SWEPP storage area = number of drums on pallets X number of drums high = 172 drums \times 3 \text{ drums high}

Total = 516 drums

Estimated liquid volume (55-gal drums) = 516 drums \times 55 \text{ gal/drum}

Total = 28,380 gal

2.5.7 SCS Capacity Estimate

<table>
<thead>
<tr>
<th>Type of Container</th>
<th>Total Free Liquids Stored</th>
<th>10% of Total Free Liquids</th>
<th>Available Secondary Containment Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-gal Drums</td>
<td>28,380 gal</td>
<td>2,838 gal</td>
<td>3,294 gal</td>
</tr>
</tbody>
</table>

As shown, the maximum SWEPP Storage Area free liquid storage volume for the worst-case scenario is 28,380 gal. The SCS must provide capacity for 10% of the maximum liquid volume.

28,380-gal \times 0.10 = 2,838 gal

The required SCS capacity for the maximum storage area configuration is 2,838 gal, which is less than the 3,294 gal of available SCS capacity; therefore, adequate SCS capacity is provided in the SWEPP Storage Area.
3. CONCLUSION

The SCS capacity has been determined by calculating the maximum available SCS capacity, based on the as-built building configuration, then reducing that capacity based on displacement by building structures, equipment, and the containers in the worst-case storage configuration. These calculations apply the minimum aisle-spacing requirements identified in the AMWTP HWMA/RCRA Storage Permit to ensure compliant storage configurations while deriving the maximum SCS capacity.

In summary, the following table shows the available SCS capacity at the maximum storage configuration for each building storage area(s). In addition, the table shows the maximum potential storage area liquid waste volume at this capacity; the available SCS capacity must be at least 10% of that volume.

<table>
<thead>
<tr>
<th>Storage Area</th>
<th>Total Free Liquids Stored (gal)</th>
<th>10% of Total Free Liquids (gal)</th>
<th>Available Secondary Containment Capacity (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMF-634</td>
<td>320,172</td>
<td>32,017</td>
<td>72,983</td>
</tr>
<tr>
<td>Type II Module: (WMF-629 through WMF-633)</td>
<td>561,596</td>
<td>56,160</td>
<td>82,907</td>
</tr>
<tr>
<td>WMF-628</td>
<td>335,354</td>
<td>33,535</td>
<td>76,420</td>
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<tr>
<td>Type I Module: MSA</td>
<td>41,821</td>
<td>4,182</td>
<td>36,463</td>
</tr>
<tr>
<td>Type I Module: PAAA/WCRA</td>
<td>128,450</td>
<td>12,845</td>
<td>40,462</td>
</tr>
<tr>
<td>Type I Module: TLA</td>
<td>200</td>
<td>20</td>
<td>85</td>
</tr>
<tr>
<td>SWEPP</td>
<td>28,380</td>
<td>2,838</td>
<td>3,294</td>
</tr>
</tbody>
</table>

4. REFERENCES

1. AMWTP HWMA/RCRA Storage Permit, Appendix IX, Revised August 05, 2005
2. EDF-0017, “Secondary Containment System Capacity Calculations Summary”
3. Drawing 53-1921, “Type II Module (WMF-634) Characterization Facility General Arrangement”
**Title:** Secondary Containment System Capacity Calculations – HMWA/RCRA

**Building/System No.:** WMF-676 / System 000

### Summary:

**Purpose/Scope:**

This EDF, in conjunction with EDF-0272, is a revision to and supersedes EDF-0081, which was previously OPSCAL-ME-0033 and BNFL-03053-002. This revision isolates the HWMA/RCRA secondary containment requirements from the NFPA secondary containment requirements for the AMWTP Treatment Facility WMF-676. Changes at this revision shown in **bold/italics, show updated calculations for Area 1-10, Room 126B.**

### Conclusion / Recommendations:

The new maximum waste box volume reflects a back-calculation using the maximum containment capacity of Area 2-04 (See Attachment 1), which is the smallest containment area that acts as a storage area for waste box containers. The containment capacity of secondary containment area 2-04 is 1,379 gallons and is the limiting containment volume for storing waste box containers in WMF-676. Future changes to allow waste box containers into the facility with an interior volume greater than 1,379 gallons will result in facility modifications to increase the containment capacity of containment area 2-04 and potentially containment area 2-03 to remain compliant with Reference 4.1.1 paragraph (b)(3). Design Engineering recommends implementing administrative or software engineering controls as required **prohibiting** the entrance of waste boxes possessing an interior volume in excess of 184.35 cubic feet into WMF-676. It is anticipated that waste boxes entering WMF-676 will contain no free liquids or relatively small amounts.

### References:

See Section 4 of Analysis

### Originator:

Curry  Council  [Signature]  7/5/11

### Technical Review:

Mark  Hal  [Signature]  7/5/11

### Additional Reviewers: (by title)

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<tbody>
<tr>
<td>Environmental</td>
<td>[Signature]</td>
<td>07/11/11</td>
</tr>
</tbody>
</table>

### Distribution List:

**Approval:**

Printed Name:  **Ron Todd**  
Printed Title:  **Engineering Manager**  
Signature:  **R. Todd**  
Date:  **7-12-11**
Analysis:

1 PURPOSE

The purpose of this analysis is to determine and show the areas where secondary containment under Resource Conservation and Recovery Act (RCRA) and DOE Order 420.1 is required.

This updated analysis has been prepared to represent the Advanced Mixed Waste Treatment Facility (AMWTF or WMF-676) liquid spill containment configuration in its final condition before the startup of “hot” operations.

2 METHOD

2.1 The design method is as follows:

2.1.1 Identify rooms or areas for containment. The AMWTF is segregated into individual containment areas that include single or multiple rooms.

2.1.2 Determine gross room areas and overall containment areas. The areas are determined from the architectural general floor plan arrangements.

2.1.3 Determine net containment areas and total liquid spill containment volumes for each containment area.

- RCRA requirements determine the required containment area volume to contain liquid waste spills in each containment area.

2.1.4 Determine curb heights to meet RCRA requirements.

2.1.5 Show containment boundaries on Exhibits 1, 2, and 3.

3 DESIGN INPUTS AND ASSUMPTIONS

3.1 Room areas and overall containment areas are based on the architectural general arrangement drawings (Section 4.2)

3.2 In receiving, process, and staging areas, the maximum number of containers of mixed waste was estimated (based on the architectural drawings) for containers stored in gloveboxes, on conveyors and fixed pedestals, and staged on the floors within these areas. Attachment 1 provides the allocation of containers of mixed waste to storage and staging locations, by room and containment area.

The total number of containers of mixed waste and the associated volume of potential liquid waste to contain is in accordance with the AMWTP HWMA/RCRA Treatment permit.

3.3 Curbs, as used in this document, are to show containment areas, not necessarily to imply that curbs are the only method of containment. Curbs, landing pads, stoops, ramps, sealants, and other means provide control of spilled liquids.
3.4 Nominal curb height is 4 inches throughout WMF-676. In a number of rooms and areas, other curb heights and/or containment methods exist to meet RCRA requirements for spill containment.

3.5 Overflow troughs exist in a number of rooms and areas to contain the design volume of fire protection sprinkler water within adjacent spill containment areas. These overflow troughs are located at a height above the calculated minimum RCRA curb heights, at least 2-inches above the floor. Thus, there exists no impact to the required RCRA curb heights because of installed overflow troughs used for containment of fire protection sprinkler water.

3.6 Based on examination of more than 17,000 waste containers, only 26% of the containers contained free liquids.

3.7 The architectural general arrangement drawings serve as the basis for gross floor area calculations for rooms and containment areas. The method for calculating net floor areas and overall containment volumes includes subtracting occupied areas from the gross floor areas. Detailed walk down measurements of curbs, anchor plates, and other fixed equipment, and estimating the numbers of containers staged on the floors serve as the basis for calculating occupied floor areas. Attachment 1 provides the results of these calculations.

4 REFERENCES

4.1 Codes and Standards
4.1.1 40 CFR 264.175, Containment
4.1.2 DOE Order 420.1, Facility Safety

4.2 Architectural Drawings
- 53-0201, Treatment Facility First Floor Plan General Arrangement
- 53-0207, Treatment Facility Second Floor Plan General Arrangement
- 53-0212, Treatment Facility Interstitial Utility Access General Arrangement

4.3 AMWTP HWMA/RCRA Treatment Permit

4.4 AMWTP EDF-0017, AMWTP Secondary Containment System Capacity Calculations Summary

4.5 TQ-MK-144, Maximum / Minimum Dimensions of Boxes Allowed into the AMWTF

4.6 BNFL-03053-002, Liquid Spill Containment Design Analysis

4.7 AMWTP EDF-0081, WMF-676 Secondary Containment System Capacity Calculations

4.8 AMWTP EDF-0272, WMF-676 Secondary Containment System Capacity Calculations - NFPA

5 COMPUTER SOFTWARE

This calculation did not perform computer modeling. This calculation used computer software spreadsheets (Microsoft® Excel) to organize data and to perform simple calculations such as the calculation of net areas, volumes, and curb heights for containment.
6 DESIGN ANALYSIS

This design analysis includes the design rationale and considerations for RCRA liquid spill containment, followed by a description of the specific areas where containment is required. Calculations performed to determine net containment areas and liquid volumes to contain form the primary basis for minimum curb heights and/or containment methods needed to meet RCRA requirements for liquid spill containment. The following is a summary of the steps taken to complete the liquid spill containment design analysis for the AMWTF.

First, the analysis developed containment areas throughout the plant (WMF-676). Containment areas consist of one or more adjacent rooms generally within the same building ventilation zone. Exhibits 1, 2, and 3 (Attachment 2) show these containment areas. Gross containment areas were calculated from the architectural general arrangement drawings, followed by walk downs and detailed calculations to determine net containment areas for both fire protection and RCRA spill containment.

Second, the analysis determined the volume of liquid to contain for RCRA for each of the containment areas. The required volume of RCRA liquid waste to contain within each individual containment area is 10% of the total volume of the mixed waste containers or the volume of the largest container within the area, whichever is greater.

Third, the analysis calculated the minimum curb height for RCRA for each of the containment areas, rounded up to the nearest 0.1 inch. In some areas, higher curbs are necessary to meet RCRA requirements for spill containment, as the nominal curb heights throughout WMF-676 are 4 inches. Attachment 1 specifies installed curb heights required to meet RCRA requirements.

Attachment 1 “Liquid Spill Containment Area Requirements” provides the detailed arrangement and organization of containment areas within WMF-676. In addition, it provides calculations for gross containment areas, occupied areas (e.g. curbs, anchor plates, other fixed equipment, containers staged on floors), net containment areas, volumes to contain for RCRA liquid wastes, and minimum curb heights for RCRA spill containment.

6.1 General Design Considerations

6.1.1 Regulatory Requirements

RCRA and DOE Order 420.1 establish the need for and the design requirements applicable to containment of hazardous materials (liquids only) in the AMWTF. RCRA requirements listed in 40 CFR 264.175 detail the requirement for the secondary containment system to contain 10% of the volume of containers or the volume of the largest container whichever is greater. The design requirements set forth in these documents regulate the design analysis for determining liquid spill containment curb heights.

6.2 Containment Curb Calculation

6.2.1 Containment Areas

Containment areas were developed for the AMWTF where liquid spill containment is required RCRA liquid wastes. Attachment 1 shows containment areas grouped into 18 containment areas on the first floor (26 rooms) and 13 containment areas (19 rooms) on the second floor and interstitial level. Of these 31 containment areas, only 18 are required to
contain RCRA liquid wastes. All 31 are required to contain fire protection sprinkler water (see Reference 4.8). The modification of curb heights, as necessary, satisfies containment needs.

6.2.2 Floor Space Occupied by Curbs, Equipment and Containers

In general, the architectural general arrangement drawings served as the basis for calculating the gross floor space of each containment area. Measuring the floor area occupied by curbs, anchor plates, and other fixed equipment, plus the area occupied by the estimated number of containers projected to be staged on each floor area determined the occupied floor space within each containment area.

The calculation used actual dimensions of curbs for each containment area, while using 50% of the floor area occupied by the ramps connected to curbs.

The calculation used a value of 0.1 ft² per anchor plate within occupied areas to account for the base plate and attached support leg for installed equipment. The calculation used larger values of occupied area for large anchor plates such as those required for support columns.

The calculation used architectural general arrangement drawings, field measurements, and visual estimates of major pieces of equipment within each containment area for other fixed equipment within occupied areas.

Floor areas occupied by the staging of containers of mixed waste (drums) were calculated for each containment area. Floor area occupied by each type of container was calculated as follows: (boxes are staged on conveyors or pedestals and do not occupy floor space)

- 55-gal drum  3.14 ft²  (24-inch diameter)
- 85-gal drum  4.91 ft²  (26-inch diameter)
- 100-gal drum  7.07 ft²  (34-inch diameter)

6.2.3 Net Containment Area

Subtracting the total occupied floor area from the gross floor area, for each containment area, results in its net containment area.

6.2.4 Maximum Waste Box Size

The maximum dimensions a waste box can possess and still physically enter WMF-676 are 56-inches wide by 96-inches long by 76-½-inches high (Reference 4.6) providing a volume of 1,780 gallons. Calculations to determine the allowable liquid capacity of a waste box utilized the maximum volume capacity of the smallest containment area, Containment Area 2-04. The allowable volume is then the net containment area multiplied by the height of the containment curb of area 2-04. (295 ft²)(0.5833 ft) = 184.35 ft³ or 1,379 gallons. Thus, only waste boxes with an interior volume less than or equal to 1,379 gallons may enter WMF-676.

6.2.5 Minimum Curb Heights

Minimum curb heights required for containing RCRA liquid wastes were calculated as follows:

Converting the volume of RCRA liquid wastes to contain to cubic feet, dividing the result by
the net containment area, and multiplying by 12 in/ft to obtain the minimum RCRA curb heights for each containment area. Note that not all containment areas required curbs for RCRA spill containment due to the absence of liquid wastes in those areas. See Reference 4.8 for fire protection curb heights in those areas. In two areas, higher curbs are necessary to meet RCRA requirements, as the nominal curb heights throughout WMF-676 are only 4 inches. These include: Room 217C (V.G. Door Airlock), which has a 7.5-inch curb installed to meet both fire protection and RCRA requirements for spill containment; And Room 226 (Box Conveyor Area), which has a 7-inch curb installed to meet both fire protection and RCRA requirements for spill containment.

7 CONCLUSIONS
Attachment 1 lists the calculated minimum required design curb heights to meet RCRA requirements. These curb heights are based on:

- Containment area configuration prior to “hot” operations
- Net containment area (ft²)
- Calculated volumes to contain
- RCRA spill containment requirements

Attachment 2 shows the containment areas represented as Exhibits 1, 2, and 3.

The nominal curb height of 4 inches is adequate for containment of RCRA liquid wastes in all areas except the following:

- Room 009, Box Elevator, 16.8-inch curb required, 12-inch curb installed. This area is classified as an “in process storage area” and can only store boxes with a volume less than 131.9 cubic feet.
- Room 217C, V.G. Door Airlock, 4.6-inch curb required, 7.5-inch curb installed.

8 ATTACHMENTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Liquid Spill Containment Area Requirements.</td>
</tr>
<tr>
<td>2.</td>
<td>Exhibits 1, 2, and 3</td>
</tr>
<tr>
<td>3.</td>
<td>References 4.1.1 and 4.5</td>
</tr>
</tbody>
</table>

Summary: See Section 7 of Analysis

Attachments (if any): See Section 8 of Analysis
ATTACHMENT 1
Liquid Spill Containment Area Requirements

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq.ft.)</th>
<th>Curbs (sq.ft.)</th>
<th>Anchor Plates (sq.ft.)</th>
<th>Other Fixed Equipment (sq.ft.)</th>
<th>Drums and Boxes on Floor (sq.ft.)</th>
<th>Total Occupied Area (sq.ft.)</th>
<th>Net Containment Area for RCRA (sq.ft.)</th>
<th>Volume from Liquid Waste (gallons)</th>
<th>Calculated minimum RCRA Curb Height (inches)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-01</td>
<td>134</td>
<td>Waste Receiving and Storage</td>
<td>Clean</td>
<td>1108.3</td>
<td>80.8</td>
<td>4.9</td>
<td>0.0</td>
<td>0.0</td>
<td>85.7</td>
<td>1022.6</td>
<td>1379</td>
<td>2.2</td>
<td>4 boxes and 20 drums (55-gal) on conveyors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Installed overflow trough is 2-inches high designed to flow into Room 131 (Area 1-07) an approved RCRA containment area.</td>
</tr>
<tr>
<td>1-02</td>
<td>009</td>
<td>Box Elevator</td>
<td>Clean</td>
<td>136.7</td>
<td>0.0</td>
<td>0.8</td>
<td>4.0</td>
<td>0.0</td>
<td>4.8</td>
<td>131.9</td>
<td>1379</td>
<td>16.77</td>
<td>1 box staged in elevator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Installed curb height is 12 inches</td>
</tr>
<tr>
<td>1-05</td>
<td>146</td>
<td>Drum Storage Area &quot;A&quot;</td>
<td>Z1</td>
<td>814.3</td>
<td>41.0</td>
<td>6.4</td>
<td>9.0</td>
<td>127.7</td>
<td>184.1</td>
<td>630.2</td>
<td>455.0</td>
<td></td>
<td>24 drums (4 85-gal &amp; 20 100-gal) on conveyors, 26 drums (85-gal) staged on floor, total waste volume 4550-gal</td>
</tr>
<tr>
<td>145</td>
<td></td>
<td>Corridor</td>
<td>Z1</td>
<td>164.4</td>
<td>164.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>164.4</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td>Installed overflow trough in this area are 2-inches high.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>978.7</td>
<td>205.4</td>
<td>6.4</td>
<td>9.0</td>
<td>127.7</td>
<td>348.5</td>
<td>630.2</td>
<td>455.0</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>1-06</td>
<td>146A</td>
<td>Waste Drum Venturi/Filter</td>
<td>Z2</td>
<td>923.3</td>
<td>14.7</td>
<td>5.5</td>
<td>10.0</td>
<td>72.1</td>
<td>102.3</td>
<td>821.0</td>
<td>199.0</td>
<td></td>
<td>16 drums (55-gal) on conveyors and 6 drums (100-gal) and 6 drums (85-gal) staged on floor, total volume 1990-gal</td>
</tr>
<tr>
<td>146B</td>
<td></td>
<td>Drum Storage Area &quot;B&quot;</td>
<td>Z2</td>
<td>305.8</td>
<td>13.4</td>
<td>3.4</td>
<td>1.0</td>
<td>42.5</td>
<td>60.3</td>
<td>245.5</td>
<td>120.0</td>
<td></td>
<td>6 drums (100-gal) on conveyors and 6 drums (100-gal) staged on floor, total volume 1200-gal</td>
</tr>
</tbody>
</table>
### ATTACHMENT 1

#### Liquid Spill Containment Area Requirements

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Curb (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Drums and Boxes on Floor (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for RCRA (sq. ft.)</th>
<th>Volume from Liquid Wastes (gallons)</th>
<th>Calculated minimum RCRA Curb Height (inches)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>141B</td>
<td></td>
<td>Supercompaction</td>
<td>Z2</td>
<td>1644.4</td>
<td>0.0</td>
<td>10.0</td>
<td>155.0</td>
<td>127.3</td>
<td>292.3</td>
<td>1352.1</td>
<td>260.5</td>
<td>11 drums (55-gal) in glovebox, 2 drums (100-gal) on conveyors, 18 drums (100-gal) staged on floor, total volume 2,605-gal</td>
<td></td>
</tr>
<tr>
<td>141</td>
<td></td>
<td>Vestibule</td>
<td>Z1/Z2</td>
<td>110.0</td>
<td>18.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>18.3</td>
<td>91.7</td>
<td>0.0</td>
<td>Installed overflow trough in this area is 2-inches high.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>2983.5</td>
<td>46.4</td>
<td>18.9</td>
<td>166.0</td>
<td>241.9</td>
<td>473.2</td>
<td>2510.3</td>
<td>579.5</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>1-07</td>
<td>131</td>
<td>Transfer Conveyor</td>
<td>Z1</td>
<td>1536.2</td>
<td>238.6</td>
<td>5.4</td>
<td>16.0</td>
<td>314.2</td>
<td>574.2</td>
<td>962.0</td>
<td>803.0</td>
<td>46 drums (55-gal) on conveyors, 100 drums (55-gal) staged on floor, total volume 8030-gal. Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft. Installed overflow troughs in this area are 2-inches high.</td>
<td></td>
</tr>
<tr>
<td>1-08</td>
<td>127B</td>
<td>Vestibule/Airlock</td>
<td>Z1/Z2</td>
<td>91.6</td>
<td>0.0</td>
<td>1.2</td>
<td>0.0</td>
<td>0.0</td>
<td>1.2</td>
<td>90.4</td>
<td>55.0</td>
<td>4 drums (55-gal) on conveyors</td>
<td></td>
</tr>
<tr>
<td>1-09</td>
<td>127A</td>
<td>Drum Venturi Airlock</td>
<td>Z2</td>
<td>400.0</td>
<td>67.5</td>
<td>1.6</td>
<td>18.0</td>
<td>0.0</td>
<td>87.1</td>
<td>312.9</td>
<td>55.0</td>
<td>5 drums (55-gal) in GB, 1 drum (55-gal) on conveyor</td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>126B</td>
<td>Drum Assay Area</td>
<td>Z2</td>
<td>223.2</td>
<td>22.3</td>
<td>4.5</td>
<td>12.0</td>
<td>0.0</td>
<td>38.8</td>
<td>184.4</td>
<td>55.0</td>
<td>1 drum (55-gal) in GB, 2 drums(55-gal) docked to GB. RCRA containment is required only in the vicinity of the Drum Import/Export GB. This is reflected in the Gross Containment Area used for this Area</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

(Unless otherwise specified, containment curb heights are 4-inches high)
<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Curb (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Drums and Boxes on Floor (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for RCRA (sq. ft.)</th>
<th>Volume from Liquid Wastes (gallons)</th>
<th>Calculated minimum RCRA Curb Height (inches)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-11</td>
<td>126C</td>
<td>Drum Assay Conveyors</td>
<td>Z3</td>
<td>740.6</td>
<td>14.7</td>
<td>6.0</td>
<td>28.0</td>
<td>0.0</td>
<td>48.7</td>
<td>691.9</td>
<td>165.0</td>
<td>(Unless otherwise specified, containment curb heights are 4-inches high)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125B</td>
<td>North Box Line/Drum Conveyor Area</td>
<td>Z3</td>
<td>1085.0</td>
<td>14.7</td>
<td>10.0</td>
<td>12.0</td>
<td>0.0</td>
<td>36.7</td>
<td>1048.3</td>
<td>154.0</td>
<td>28 drums (55-gal) on conveyors or pedestals, total volume 1540-gal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>124B</td>
<td>South Box Line/Drum Conveyor Area</td>
<td>Z3</td>
<td>1085.0</td>
<td>14.7</td>
<td>10.0</td>
<td>12.0</td>
<td>0.0</td>
<td>36.7</td>
<td>1048.3</td>
<td>154.0</td>
<td>28 drums (55-gal) on conveyors or pedestals, total volume 1540-gal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>2910.6</td>
<td>44.1</td>
<td>26.0</td>
<td>52.0</td>
<td>0.0</td>
<td>122.1</td>
<td>2788.5</td>
<td>473.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>1-12</td>
<td>147</td>
<td>Central Conveyor System</td>
<td>Z3</td>
<td>2698.7</td>
<td>35.0</td>
<td>10.0</td>
<td>35.0</td>
<td>0.0</td>
<td>201.0</td>
<td>281.0</td>
<td>2417.7</td>
<td>825.0</td>
<td>86 drums (55-gal) on conveyors or pedestals, total volume 8250-gall</td>
</tr>
<tr>
<td></td>
<td>147D</td>
<td>Maintenance Area</td>
<td>Z3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(included in 147 above)</td>
</tr>
<tr>
<td>1-15</td>
<td>143</td>
<td>Drum Storage Area &quot;C&quot;</td>
<td>Clean</td>
<td>1415.3</td>
<td>84.5</td>
<td>9.0</td>
<td>21.0</td>
<td>0.0</td>
<td>114.5</td>
<td>1300.8</td>
<td>320.0</td>
<td>0.4</td>
<td>20 drums (85-gal) and 15 drums (100-gal) on conveyors, total volume 3200-gal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Installed overflow trough in this area is 2-inches high.</td>
</tr>
<tr>
<td>2-02</td>
<td>236</td>
<td>SCW Treatment</td>
<td>Z2</td>
<td>2960.2</td>
<td>95.1</td>
<td>10.0</td>
<td>230.0</td>
<td>68.8</td>
<td>403.9</td>
<td>2556.3</td>
<td>204.0</td>
<td>0.2</td>
<td>10 drums (85-gal) in glovebox, 14 drums (85-gal) staged on floor, total volume 2040-gal.</td>
</tr>
<tr>
<td>2-03</td>
<td>226</td>
<td>Box Conveyor Area</td>
<td>Z1</td>
<td>400.0</td>
<td>19.7</td>
<td>2.0</td>
<td>8.0</td>
<td>0.0</td>
<td>29.7</td>
<td>370.3</td>
<td>1379</td>
<td>6.0</td>
<td>2 boxes on conveyors</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Installed curb height is 7-inches</td>
</tr>
</tbody>
</table>
## ATTACHMENT 1
### Liquid Spill Containment Area Requirements

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Curb (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Drums and Boxes on Floor (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for RCRA (sq. ft.)</th>
<th>Volume from Liquid Wastes (gallons)</th>
<th>Calculated minimum RCRA Curb Height (inches)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-04</td>
<td>217C</td>
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*Notes
(Unless otherwise specified, containment curb heights are 4-inches high)*
ATTACHMENT 2

GENERAL NOTE:
CURBS AND/OR SEALANTS ARE REQUIRED AROUND FLOOR PENETRATIONS TO PREVENT FLOOR TO FLOOR MIGRATION OF LIQUID.

LEGEND:

CONTAINMENT WALLS

CONTAINMENT WALL OPENING WITH CURB

ADVANCED MIXED WASTE TREATMENT PROJECT
EXHIBIT No. 1
EXHIBIT TO LIQUID SPILL CONTAINMENT DESIGN ANALYSIS
AMWF LIQUID SPILL CONTAINMENT AREAS
FIRST FLOOR

EDF-0271, Revision 02
GENERAL NOTE:
CURBS AND/OR SEALANTS ARE REQUIRED
AROUND FLOOR PENETRATIONS TO PREVENT
FLOOR TO FLOOR MIGRATION OF LIQUID.

LEGEND:
CONTAINMENT WALLS
CONTAINMENT WALL OPENING WITH CURB

EXHIBIT No. 2
EXHIBIT TO LIQUID SPILL CONTAINMENT
DESIGN ANALYSIS
REV 02

AMWTP LIQUID SPILL
CONTAINMENT AREAS
SECOND FLOOR

CADD FILE: M54R_02_EXHIBIT-2_02.DWG
EDF-0271, Revision 02
GENERAL NOTE:
CURBS AND/OR SEALANTS ARE REQUIRED AROUND FLOOR PENETRATIONS TO PREVENT FLOOR TO FLOOR MIGRATION OF LIQUID.

LEGEND:

CONTAINMENT WALLS

CONTAINMENT WALL OPENING WITH CURB
Reference 4.1.1

[Code of Federal Regulations]
[Title 40, Volume 25]
[Revised as of July 1, 2005]
From the U.S. Government Printing Office via GPO Access
[CITE: 40CFR264.175]

[Page 357]

TITLE 40--PROTECTION OF ENVIRONMENT
CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY (CONTINUED)

PART 264, STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT,
STORAGE, AND DISPOSAL FACILITIES--Table of Contents

Subpart I, Use and Management of Containers
Sec. 264.175 Containment.

(a) Container storage areas must have a containment system that is designed and operated in accordance with
paragraph (b) of this section, except as otherwise provided by paragraph (c) of this section.

(b) A containment system must be designed and operated as follows:

1. A base must underly the containers which is free of cracks or gaps and is sufficiently impervious to contain
leaks, spills, and accumulated precipitation until the collected material is detected and removed;

2. The base must be sloped or the containment system must be otherwise designed and operated to drain and
remove liquids resulting from leaks, spills or precipitation, unless the containers are elevated
or are otherwise protected from contact with accumulated liquids;

3. The containment system must have sufficient capacity to contain 10% of the volume of containers or the
volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be
considered in this determination;

4. Run-on into the containment system must be prevented unless the collection system has sufficient excess
capacity in addition to that required in paragraph (b)(3) of this section to contain any run-on which might enter the
system; and

5. Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in
as timely a manner as is necessary to prevent overflow of the collection system.

[Comment: If the collected material is a hazardous waste under part 261 of this Chapter, it must be managed as a
hazardous waste in accordance with all applicable requirements of parts 262 through 266 of this chapter. If the
collected material is discharged through a point source to waters of the United States, it is subject to the
requirements of section 402 of the Clean Water Act, as amended.]

(c) Storage areas that store containers holding only wastes that do not contain free liquids need not have a
containment system defined by paragraph (b) of this section, except as provided by paragraph (d) of this section
or provided that:

1. The storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from
precipitation, or

2. The containers are elevated or are otherwise protected from contact with accumulated liquid.

(d) Storage areas that store containers holding the wastes listed below that do not contain free liquids must
have a containment system defined by paragraph (b) of this section:

1. FO20, FO21, FO22, FO23, FO26, and FO27.

### TECHNICAL QUERY

**TQ Number:** MK-144

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<th>To: (Recipient)</th>
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<td>John Isherwood</td>
<td>BNFL</td>
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<th>From: (Requestor)</th>
<th>Organization:</th>
</tr>
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<tbody>
<tr>
<td>Todd Gooding</td>
<td>MK</td>
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**Subject/Document:**
Maximum/minimum box size requirements for AMWTF

**Information Requested:**
What are the maximum and minimum dimensions of boxes allowed into the AMWTF?

*The PDC Rev. 03 5.3.4.1 states that the maximum box size is “58.5 inches by 76.4 inches by 96 inches (+/- 2 inches).” A maximum width of 58.5 inches plus 2 inches for tolerance provides a design width of 60.5 inches. Currently, the wall openings for the VG doors are 62 inches wide. Construction tolerances for the location of wall are +/- 0.5 inches. A worst case scenario could lead to a box to wall opening clearance of only 0.3 inches (61.5 inches - 60.5 inches)/2. HK has expressed great concern at locating a 10,000-pound box within this tolerance. Rumors exist about the maximum box dimensions changing such that the width of wall openings for the VG doors is not a concern. If the PDC is correct, then the VG door opening width must be increased to provide additional clearance to allow a box to pass through the wall opening without risk.*

*The PDC Rev. 04 does not indicate a minimum box size yet there are box dimensions shown in Table 5.1-2 of 24 inches by 24 inches by 18 inches. Current box line design does not accommodate a box this small.*

**Section 2.**

**Reply:**

The maximum and minimum box envelope sizes are as follows:

**MAX** - 56 in $\times$ 76.5 $\times$ 96 (W $\times$ H $\times$ L).

**MIN** - 48 in $\times$ 24 $\times$ 68

All boxes outside of these envelope sizes will require repacking to conform.

**Name:** P. Leatherbarrow  
**Signature:** [Signature]  
**Date:** 05/10/01

---

**Name:** Todd Gooding  
**Signature:** [Signature]  
**Date:** 03/12/01
Title: Secondary Containment System Capacity Calculations – HMWA/RCRA

Summary:

Purpose/Scope:

This EDF, in conjunction with EDF-0271, is a revision to and supersedes EDF-0081, which was previously OPSCAL-ME-0033 and BNFL-03053-002. This revision isolates the NFPA secondary containment requirements from the HWMA/RCRA secondary containment requirements for the AMWTP Treatment Facility WMF-676. Changes at this revision, shown in **bold/italics**, show updated calculations for Area 1-10, Room 126B.

Conclusion / Recommendations:

Refer to Section 7 of Analysis

References: See Section 4 of Analysis

Originator: Curry Coulter [Signature] 7/5/11

Technical Review: Mark Hiatt [Signature] 7/5/11

Additional Reviewers: (by title)

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Distribution List:

Approval:

Printed Name: Ron Todd

Printed Title: Engineering Manager

[Signature] 7-12-11
Analysis:

1 PURPOSE

The purpose of this analysis is to determine and show the areas where secondary containment under Uniform Fire Code (UFC), National Fire Protection Association (NFPA), and DOE Order 420.1 is required.

This updated analysis has been prepared to represent the Advanced Mixed Waste Treatment Facility (AMWTF or WMF-676) liquid spill containment configuration in its final condition before the startup of “hot” operations.

2 METHOD

2.1 The design method is as follows:

2.1.1 Identify rooms or areas for containment. The AMWTF is segregated into individual containment areas that include single or multiple rooms.

2.1.2 Determine gross room areas and overall containment areas. The areas are determined from the architectural general floor plan arrangements.

2.1.3 Determine net containment areas and total liquid spill containment volumes for each containment area.

- NFPA 13, NFPA 15, and UFC requirements determine the required containment area volume to contain fire protection sprinkler water.

2.1.4 Show containment boundaries on Exhibits 1, 2, and 3.

3 DESIGN INPUTS AND ASSUMPTIONS

3.1 Room areas and overall containment areas are based on the architectural general arrangement drawings (Section 4.2)

3.2 Fire sprinkler occupancy classification is Ordinary Hazard Group 2 in accordance with the Uniform Fire Code. As such, design sprinkler densities are assumed at 0.2 gpm/ft² up to a maximum floor area of 1500 ft². For the purposes of calculating containment volumes, assume fire sprinkler water flows at the design density for a period of 20 minutes.

3.3 Curbs, as used in this document, are to show containment areas, not necessarily to imply that curbs are the only method of containment. Curbs, landing pads, stoops, ramps, troughs, grates, sealants, and other means will provide control of spilled liquids and fire protection sprinkler water.

3.4 Nominal curb height is 4 inches throughout WMF-676. In a number of rooms and areas, other curb heights and/or containment methods exist to meet fire protection sprinkler water containment requirements.
3.5 Overflow troughs exist in a number of rooms and areas to contain the design volume of fire protection sprinkler water within adjacent spill containment areas. These overflow troughs are located at a height above the calculated minimum RCRA curb heights, at least 2-inches above the floor. Thus, there exists no impact to the required RCRA curb heights because of installed overflow troughs used for containment of fire protection sprinkler water.

3.6 Nominal trough dimensions are 2 inches in depth and 8 inches in width, with the bottom of the trough located 2 inches above the floor. Nominal flow for each overflow trough is 70 gallons per minute.

3.7 For the purposes of calculating fire protection containment volumes, assume that free liquids from the single largest container of mixed waste are negligible with respect to the volume of fire protection sprinkler water. Therefore, the volume of fire protection sprinkler water to contain does not include the volume of potential liquid wastes that may be spilled concurrently with the discharge of fire protection sprinkler water.

3.8 The architectural general arrangement drawings serve as the basis for gross floor area calculations for rooms and containment areas. The method for calculating net floor areas and overall containment volumes includes subtracting occupied areas from the gross floor areas. Detailed walk down measurements of curbs, anchor plates, and other fixed equipment, and estimating the numbers of containers staged on the floors serve as the basis for calculating occupied floor areas. Attachment 1 provides the results of these calculations.

4 REFERENCES

4.1 Codes and Standards
4.1.1 NFPA 13: Installation of Sprinkler Systems
4.1.2 NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection
4.1.3 Uniform Fire Code
4.1.4 DOE Order 420.1, Facility Safety

4.2 Architectural Drawings

- 53-0201, Treatment Facility First Floor Plan General Arrangement
- 53-0207, Treatment Facility Second Floor Plan General Arrangement
- 53-0212, Treatment Facility Interstitial Utility Access General Arrangement

4.3 RPT-ESH-012, AMWTP Fire Hazards Analysis, July 2004

4.4 AMWTP HWMA/RCRA Treatment Permit

4.5 AMWTP EDF-0017, AMWTP Secondary Containment System Capacity Calculations Summary

4.6 BNFL-03053-002, Liquid Spill Containment Design Analysis

4.7 AMWTP EDF-0081, WMF-676 Secondary Containment System Capacity Calculations

4.8 AMWTP EDF-0271, WMF-676 Secondary Containment System Capacity Calculations - HWMA/RCRA

EDF-0272, Revision 02
5 COMPUTER SOFTWARE

This calculation did not perform computer modeling. This calculation used computer software spreadsheets (Microsoft® Excel) to organize data and to perform simple calculations such as the calculation of net areas, volumes, and curb heights for containment.

6 DESIGN ANALYSIS

This design analysis includes the design rationale, considerations and requirements for containment of fire protection sprinkler water, followed by a description of the specific areas where containment is required. Calculations performed to determine net containment areas and liquid volumes to contain form the primary basis for minimum curb heights and/or containment methods needed to meet fire protection requirements for liquid spill containment. The following is a summary of the steps taken to complete the liquid spill containment design analysis for the AMWTF.

First, the analysis developed containment areas throughout the plant (WMF-676). Containment areas consist of one or more adjacent rooms generally within the same building ventilation zone. Exhibits 1, 2, and 3 (Attachment 2) show these containment areas. Gross containment areas were calculated from the architectural general arrangement drawings, followed by walk downs and detailed calculations to determine net containment areas for both fire protection and RCRA spill containment.

Second, the analysis determined the volume of liquid to contain for fire protection for each of the containment areas. The volume of the fire protection sprinkler water to contain was calculated at the UFC design flow and density (0.2 gpm/ft² for 20 minutes or 4 gal/ft²) up to a maximum of 1500 W (6000 gal) for each individual containment area.

Third, the analysis calculated the minimum curb height for fire protection for each of the containment areas, rounded up to the nearest 0.1 inch. In a number of areas, higher curbs and/or overflow troughs are necessary to meet fire protection requirements for spill containment, as the nominal curb heights throughout WMF-676 are 4 inches. Attachment 1 specifies installed curb heights and overflow troughs required to meet both fire protection and RCRA requirements.

Attachment 1 “Liquid Spill Containment Area Requirements” provides the detailed arrangement and organization of containment areas within WMF-676. In addition, it provides calculations for gross containment areas, occupied areas (e.g. curbs, anchor plates, other fixed equipment, containers staged on floors), net containment areas, volumes to contain for fire protection sprinkler water, and minimum curb heights for fire protection sprinkler water containment.

6.1 General Design Considerations

6.1.1 Regulatory Requirements

UFC, NFPA, and DOE Order 420.1 establish the need for and the design requirements applicable to containment of fire protection sprinkler water and hazardous materials (liquids only) in the AMWTF. Containment curbs and walls will contain fire protection sprinkler water from areas with potential surface contamination from radioactive. UFC requires indoor storage of radioactive materials in accordance with 8003.1. UFC requires secondary containment of hazardous materials liquids and fire protection sprinkler water. The secondary containment system (SCS) shall contain a spill from the single largest container, plus the volume of fire protection sprinkler water from the minimum design area for a period of 20 minutes. Where
process data indicated that the free liquid in any single container is minor, this analysis considers the volume negligible and is not included in the spill containment calculations. The design requirements set forth in these documents regulate the design analysis for determining liquid spill containment curb heights.

6.2 Containment Curb Calculation

6.2.1 Containment Areas

Containment areas were developed for the AMWTF where liquid spill containment is required for fire protection sprinkler water and RCRA liquid wastes. Attachment 1 shows containment areas grouped into 18 containment areas on the first floor (26 rooms) and 13 containment areas (19 rooms) on the second floor and interstitial level. All 31 are required to contain fire protection sprinkler water, with 17 required to contain RCRA liquid wastes (see Reference 4.8). The modification of curb heights and installation of overflow troughs, as necessary, satisfies containment needs.

6.2.2 Floor Space Occupied by Curbs, Equipment and Containers

In general, the architectural general arrangement drawings served as the basis for calculating the gross floor space of each containment area. The occupied floor space within each containment area was determined by measuring the floor area occupied by curbs, anchor plates, and other fixed equipment, plus the area occupied by the estimated number of containers projected to be staged on each floor area.

The calculation does not consider transient items (containers staged on the floors) in the occupied floor area for fire protection curbing calculations. Therefore, occupied floor area for fire protection sprinkler water is greater than that for the RCRA liquid wastes by the area occupied by transient items (containers staged on floors).

The calculation used actual dimensions of curbs for each containment area, while using 50% of the floor area occupied by the ramps connected to curbs.

The calculation used a value of 0.1 ft² per anchor plate within occupied areas to account for the base plate and attached support leg for installed equipment. The calculation used larger values of occupied area for large anchor plates such as those required for support columns.

The calculation used architectural general arrangement drawings, field measurements, and visual estimates of major pieces of equipment within each containment area for other fixed equipment within occupied areas.

6.2.3 Net Containment Area

Subtracting the total occupied floor area from the gross floor area, for each containment area, results in its net containment area.

6.2.4 Volume of Liquid to Contain

The calculation uses the UFC design flow and density to determine the volume of fire protection sprinkler water to contain. These design values are 0.2 gpm/ft² for 20 minutes or 4 gal/ft² up to a maximum of 1500 ft² (6000 gal) for each individual containment area.

6.2.5 Minimum Curb Heights
Minimum fire protection (NFPA) curb heights required for containing the fire protection sprinkler water were calculated as follows:

The calculation converted the volume of fire protection sprinkler water to contain to cubic feet, then divided by the adjusted net containment area, and multiplied by 12 in/ft. Note that not all containment areas provide curb heights that will alone satisfy the fire protection containment requirements. In these areas, higher curbs and/or overflow troughs are necessary to meet fire protection requirements, as the nominal curb heights throughout WMF-676 are only 4 inches. Attachment 1 specifies installed curb heights and overflow troughs required to meet fire protection requirements.

7 CONCLUSIONS

Attachment 1 lists the calculated minimum required design curb heights to meet fire protection sprinkler water containment requirements. These curb heights are based on:

- Containment area configuration prior to “hot” operations
- Net containment area (ft²)
- Calculated volumes to contain
- Fire sprinkler design flow and density

Attachment 2 shows the containment areas represented as Exhibits 1, 2, and 3.

The nominal curb height of 4 inches is adequate for containment of fire protection sprinkler water in all areas except the following:

- Room 128B, Secondary Waste Room, 7.2-inch curb required, 4-inch curb installed, excess fire sprinkler water designed to overflow into Room 128C and Room 129 via installed overflow troughs.
- Room 128A, LLW Box Fill Station, 6.5-inch curb required, 6.5-inch curb installed.
- Room 146/145, Drum Staging Area “A”/Corridor, 8.3-inch curb required, 4-inch curb installed, excess fire sprinkler water designed to overflow into Room 143 and Room 141B via installed overflow troughs.
- Room 131, Transfer Conveyor, 7.6-inch curb required, 4-inch curb installed, excess fire sprinkler water designed to overflow into Room 134 and Room 142B via installed overflow troughs.
- Room 127B, Vestibule/Airlock, 6.5-inch curb required, 4-inch curb installed, excess fire sprinkler water is contained by overflow into Room 127A and Room 131.
- Room 127A, Drum Venturi/Airlock, 8.2-inch curb required, 4-inch curb installed, excess fire sprinkler water is contained by overflow into Room 127B and Room 131.
- Room 126B, Drum Assay Area, 7.8-inch curb required, 4-inch curb installed, excess fire sprinkler water is contained by overflow into Room 131.
- Room 119, Elevator Machine Room, 6.5-inch curb required, 8.0-inch curb installed.
- Room 141C, Machine Room, 6.4-inch curb required, 8.0-inch curb installed.
- Room 143, Drum Staging Area “C”, 7.0-inch curb required, 4-inch curb installed, excess fire sprinkler water designed to overflow into Room 146 and Room 141B via installed overflow troughs.

- Room 128C, Clean Container/LLW Export, 7.4-inch curb required, 4-inch curb installed, excess fire sprinkler water designed to overflow into Room 128B via installed overflow troughs.

- Room 122A, Terminal Filter Room, 4.7-inch curb required, 5.0-inch curb installed.

- Room 142B, Terminal Filter Room, 6.7-inch curb required, 4-inch curb installed, excess fire sprinkler water designed to overflow into Room 131 via installed overflow troughs.

- Room 226, Box Conveyor Area, 6.8-inch curb required, 7.0-inch curb installed.

- Room 217C/217B, V.G. Door Airlock/Suit change, 7.3-inch curb required, 7.5-inch curb installed.

- Room 232B/232H, Operations Area/LLW Export Corridor, 6.5-inch curb required, 7.0-inch curb installed.

- Room 229B/220B/220C, North Box Line/Suit change/V.G. Door Airlock, 5.9-inch curb required, 4.0-inch curb installed, excess fire sprinkler water designed to overflow into Room 228B and Room 225A via installed overflow troughs.

- Room 228B, South Box Line, 9.6-inch curb required, 4.0-inch curb installed, excess fire sprinkler water designed to overflow into Room 225A and Room 229B via installed overflow troughs.

- Room 224B/225A, Hot Maintenance/Box Size Reduction Area, 5.4-inch curb required, 4.0-inch curb installed, excess fire sprinkler water designed to overflow into Room 228B and Room 229B via installed overflow troughs.

- Room 224C/224A, Hydraulic Room/Vestibule, 7.0-inch curb required, 7.0-inch curb installed.

- Room 200B, Elevator Machine Room, 6.5-inch curb required, 8.0-inch curb installed.

- Room 212C, Filter Maintenance Area, 6.5-inch curb required, 7.0-inch curb installed.

- Room 212F, Filter Maintenance Area, 6.5-inch curb required, 7.0-inch curb installed.

- Room 212H, Filter Maintenance Area, 6.5-inch curb required, 7.0-inch curb installed.

8 ATTACHMENTS

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<td>2.</td>
<td>Exhibits 1, 2, and 3; Attachment 2, pages 18 – 20</td>
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Summary: See Section 7 of Analysis

Attachments (If any): See Section 8 of Analysis
ATTACHMENT 1
Liquid Spill Containment Area Requirements

| Area Number | Room Number | Room Description          | Zone | Gross Containment Area (sq. ft.) | Curbs (sq. ft.) | Anchor Plates (sq. ft.) | Other Fixed Equipment (sq. ft.) | Total Occupied Area (sq. ft.) | Net Containment Area for NFPA (sq. ft.) | Volume of Liquid from Sprinklers (gallons) | Calculated Minimum NFPA Curb Height (inches) | Notes |
|-------------|-------------|---------------------------|------|---------------------------------|----------------|------------------------|--------------------------------|--------------------------------|------------------------------------------|--------------------------------------------|-------|
| 1-01        | 134         | Waste Receiving and Storage | Clean | 1108.3                          | 80.8           | 4.9                    | 0.0                            | 85.7                           | 1022.6                                   | 4433.2                                    | 4.0   | Excess fire sprinkler water designed to overflow to Room 131 via installed troughs |
| 1-02        | 009         | Box Elevator              | Clean | 136.7                           | 0.0            | 0.8                    | 4.0                            | 4.8                            | 131.9                                   | 546.8                                     | 6.7   | 1 box staged in elevator |
| 1-03        | 128B        | Secondary Waste Room      | Z1    | 818.9                           | 77.5           | 1.4                    | 8.0                            | 126.2                          | 732.0                                   | 3275.6                                    | 4.0   | Containment for NFPA requirements only, no liquid wastes allowed per administrative control |
|             |             |                           |       |                                 |                |                        |                                |                                |                                         |                                            |       | Excess fire sprinkler water designed to overflow to Room 128C and Room 129 via installed troughs |
| 1-04        | 128A        | LLW Box Fill Station      | Z2    | 725.3                           | 0.0            | 5.0                    | 4.0                            | 48.3                           | 716.3                                   | 2901.2                                    | 4.0   | Containment for NFPA requirements only, no liquid wastes allowed per administrative control |
|             | 128         | Vestibule                 | Z1/Z2 | 57.8                            | 0.0            | 0.0                    | 0.0                            | 0.0                            | 57.8                                     | 231.2                                     |       | Installed curb height is 6.5 inches for NFPA |
|             |             | Total                     |       | 783.1                           | 0.0            | 5.0                    | 4.0                            | 48.3                           | 774.1                                   | 3132.4                                    | 6.5   | Excess fire sprinkler water designed to overflow to Room 143 and Room 141B via installed troughs |
| 1-05        | 146         | Drum Storage Area "A"     | Z1    | 814.3                           | 41.0           | 6.4                    | 9.0                            | 184.1                          | 757.9                                   | 3257.2                                    |       | |
|             | 145         | Corridor                  | Z1    | 164.4                           | 164.4          | 0.0                    | 0.0                            | 164.4                          | 0.0                                     | 657.6                                     | 4.0   | |
|             |             | Total                     |       | 978.7                           | 205.4          | 6.4                    | 9.0                            | 348.5                          | 757.9                                   | 3914.8                                    | 4.0   | |
# ATTACHMENT 1

## Liquid Spill Containment Area Requirements

### First Floor (continued)

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Carbs (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1-06</td>
<td>146A</td>
<td>Waste Drum Venturi/Filter</td>
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<td>Drum Storage Area &quot;B&quot;</td>
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Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft.

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<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Carbs (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1-07</td>
<td>131</td>
<td>Transfer Conveyor</td>
<td>Z1</td>
<td>1536.2</td>
<td>238.6</td>
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Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft.

Excess fire sprinkler water designed to overflow to Room 134 and Room 142B via installed troughs.

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Carbs (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1-08</td>
<td>127B</td>
<td>Vestibule/Airlock</td>
<td>Z1/Z2</td>
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<td>366.4</td>
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<td>91.6</td>
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Installed curb height is 4 inches for NFPA. Excess fire sprinkler water is contained by overflow to Rooms 127A and 131.

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Carbs (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
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<td>1-09</td>
<td>127A</td>
<td>Drum Venturi Airlock</td>
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<td>400.0</td>
<td>67.5</td>
<td>1.6</td>
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Installed curb height is 4 inches for NFPA. Excess fire sprinkler water is contained by overflow to Rooms 127B and 131.

<table>
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<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Carbs (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
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<tr>
<td>1-10</td>
<td>126B</td>
<td>Drum Assay Area</td>
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<td>558.5</td>
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<td>558.5</td>
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</table>

Installed curb height is 4 inches for NFPA. Excess fire sprinkler water is contained by overflow to Room 131.
<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Curb (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment Area (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
<th>Notes</th>
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<tr>
<td>1-11</td>
<td>126C</td>
<td>Drum Assay Conveyors</td>
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<td>1048.3</td>
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<td>Central Conveyor System Feed Area</td>
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<td>147D</td>
<td>Maintenance Area (included in 147 above)</td>
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<td>Elevator Machine Room</td>
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Notes:
- Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq. ft.
- Containment for NFPA requirements only, non-RCRA area
- Installed curb height is 8 inches for NFPA
- Containment for NFPA requirements only, non-RCRA area
- Installed curb height is 8 inches for NFPA
- Excess fire sprinkler water designed to overflow to Room 146 and Room 141B via installed troughs
- Containment for NFPA requirements only, no liquid wastes allowed per administrative control
- Excess fire sprinkler water designed to overflow to Room 128B via installed trough
## ATTACHMENT 1

### Liquid Spill Containment Area Requirements

<table>
<thead>
<tr>
<th>Area Number</th>
<th>Room Number</th>
<th>Room Description</th>
<th>Zone</th>
<th>Gross Containment Area (sq. ft.)</th>
<th>Carbs (sq. ft.)</th>
<th>Anchor Plates (sq. ft.)</th>
<th>Other Fixed Equipment (sq. ft.)</th>
<th>Total Occupied Area (sq. ft.)</th>
<th>Net Containment Area for NFPA (sq. ft.)</th>
<th>Volume of Liquid from Sprinklers (gallons)</th>
<th>Calculated minimum NFPA Curb Height (inches)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1-17</td>
<td>122A</td>
<td>Terminal Filter Room Z2</td>
<td>2128.9</td>
<td>63.0</td>
<td>5.0</td>
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<td>266.4</td>
<td>2050.9</td>
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<td>4.7</td>
<td>Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft.</td>
<td>Installed curb height is 5 inches for NFPA</td>
</tr>
<tr>
<td>1-18</td>
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<td>Terminal Filter Room Z2</td>
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<td>92.8</td>
<td>806.0</td>
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<td>Containment for NFPA requirements only, no liquid wastes allowed per administrative control</td>
<td>Excess fire sprinkler water is designed to overflow to Room 131 via installed troughs</td>
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<td>214A</td>
<td>300 Area HEPA Filter Room Z2</td>
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<td>236</td>
<td>SCW Treatment Z2</td>
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<td>Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft.</td>
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<td>8.0</td>
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<td>370.3</td>
<td>1600.0</td>
<td>6.9</td>
<td>Installed curb height is 7 inches for NFPA and RCRA</td>
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<td>V.G. Door Airlock Z2</td>
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EDF-0272, Revision 02
## ATTACHMENT 1
### Liquid Spill Containment Area Requirements

| Area Number | Room Number | Room Description        | Zone | Gross Containment Area (sq.ft) | Carbs (sq.ft) | Anchor Plates (sq.ft) | Other Fixed Equipment (sq.ft) | Total Occupied Area (sq.ft) | Net Containment Area for NFPA (sq.ft) | Volume of Liquid from Sprinklers (gallons) | Calculated minimum NFP A Curb Height (inches) | Notes |
|-------------|-------------|-------------------------|------|-------------------------------|--------------|----------------------|-------------------------------|-------------------------------|--------------------------------------|-----------------------------------------------|------------------|
| 232H        |             | LLW Export Corridor     | Z3   | 164.7                         | 0.0          | 0.0                  | 0.0                           | 0.0                           | 0.0                                  | 164.7                                            | 658.8                        | Installed curb height is 7 inches for NFPA and RCRA |
|             | Total       |                         |      | 1207.0                        | 15.9         | 0.0                  | 0.0                           | 204.4                         | 1191.1                               | 4828.0                                           | 6.5                           |                                       |
| 2-06 229B   |             | North Box Line          | Z3   | 1562.7                        | 15.9         | 10.0                 | 295.0                         | 320.9                         | 1241.8                               | 6250.8                                           | Waste sort troughs not excluded from containment area|
| 220B        |             | Switch Change Z2/Z3     |      | 138.7                         | 14.7         | 0.0                  | 0.0                           | 14.7                          | 124.0                                | 554.8                                            |                                |
| 220C        |             | V.G. Door Airlock       | Z2/Z3| 304.9                         | 0.0          | 3.0                  | 25.0                          | 28.0                          | 276.9                                | 1219.6                                           |                                |
|             | Total       |                         |      | 2006.3                        | 30.6         | 13.0                 | 320.0                         | 363.6                         | 1642.7                               | 6000.0                                           | 4.0                           | Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft. |
|             |             |                         |      |                               |              |                      |                               |                               |                                      |                                                  | Excess fire sprinkler water designed to overflow to Room 228B and 225A via installed troughs |
| 2-07 228B   |             | South Box Line          | Z3   | 1357.0                        | 31.9         | 10.0                 | 407.0                         | 448.9                         | 908.1                                | 5428.0                                           | 4.0                           | Waste sort troughs not excluded from containment area |
| 2-08 224B   |             | Hot Maintenance         | Z3   | 1012.1                        | 22.9         | 0.0                  | 10.0                          | 32.9                          | 979.2                                | 4048.4                                           |                                |
| 225A        |             | Box Size Reduction Area | Z3   | 936.0                         | 14.7         | 2.3                  | 95.0                          | 112.0                         | 824.0                                | 3744.0                                           |                                |
|             | Total       |                         |      | 1948.1                        | 37.6         | 2.3                  | 105.0                         | 144.9                         | 1803.2                               | 6000.0                                           | 4.0                           | Maximum 6000-gal of fire sprinkler water to contain for areas greater than 1500 sq.ft. |
|             |             |                         |      |                               |              |                      |                               |                               |                                      |                                                  | Excess fire sprinkler water designed to overflow to Room 228B and 229B via installed troughs |

EDF-0272, Revision 02
## ATTACHMENT 1

### Liquid Spill Containment Area Requirements

| Area Number | Room Number | Room Description                  | Zone | Gross Containment Area (sq. ft.) | Carbs (sq. ft.) | Anchor Plates (sq. ft.) | Other Fixed Equipment (sq. fl.) | Total Occupied Area (sq. ft.) | Net Containment Area for NFP (sq. ft.) | Volume of Liquid from Sprinklers (gallons) | Calculated minimum NFPA Curb Height (inches) | Notes |
|-------------|-------------|------------------------------------|------|---------------------------------|----------------|-------------------------|---------------------------------|------------------------------------|---------------------------------------------|---------------------------------------------|-------|
| 2-09        | 224C        | Hydraulic Room                     | Z1   | 1279.9                          | 0.0            | 0.0                     | 100.0                          | 132.4                              | 1178.9                                      | 5119.6                                      |       |
|             | 224A        | Vestibule                          | Z1/Z2| 30.0                            | 0.0            | 0.0                     | 0.0                            | 0.0                                 | 0.0                                         | 120.0                                      |       |
| 2-10        | 200B        | Elevator Machine Room              | Clean| 76.0                            | 0.0            | 0.4                     | 0.0                            | 0.4                                 | 75.6                                        | 304.0                                      | 6.5   |
| 2-11        | 212C        | Filter Maintenance Area            | Z2   | 490.8                           | 0.0            | 1.0                     | 8.0                            | 34.2                                | 481.8                                       | 1963.2                                     | 6.5   |
| 2-12        | 212F        | Filter Maintenance Area            | Z2   | 1164.5                          | 0.0            | 6.4                     | 4.0                            | 60.7                                | 1154.1                                      | 4658.0                                     | 6.5   |
| 2-13        | 212H        | Filter Maintenance Area            | Z2   | 494.9                           | 0.0            | 2.8                     | 2.0                            | 30.0                                | 490.1                                       | 1979.6                                     | 6.5   |

**Notes:**
- Containment for NFPA requirements only, non-RCRA area
- Installed curb height is 7 inches for NFPA
- Containment for NFPA requirements only, non-RCRA area
- Installed curb height is 8 inches for NFPA
- Containment for NFPA requirements only, no liquid wastes allowed per administrative control.
- Installed curb height is 7 inches for NFPA
- Containment for NFPA requirements only, no liquid wastes allowed per administrative control.
- Installed curb height is 7 inches for NFPA
- Containment for NFPA requirements only, no liquid wastes allowed per administrative control.
- Installed curb height is 7 inches for NFPA
ATTACHMENT 2

NOTE: FLOOR TO FLOOR MIGRATION

GENERAL NOTE:
CURBS AND/OR SEALANTS ARE REQUIRED
AROUND FLOOR PENETRATIONS TO PREVENT
FLOOR TO FLOOR MIGRATION OF LIQUID.

LEGEND:

CONTAINMENT WALLS

CONTAINMENT WALL OPENING WITH CURB
ATTACHMENT 2

GENERAL NOTE:
CURBS AND/OR SEALANTS ARE REQUIRED
AROUND FLOOR PENETRATIONS TO PREVENT
FLOOR TO FLOOR MIGRATION OF LIQUID.

LEGEND:

CONTAINMENT WALLS

CONTAINMENT WALL OPENING WITH CURB

ADDITIONAL INFORMATION

ADVANCED MIXED WASTE TREATMENT PROJECT

EXHIBIT No. 3
EXHIBIT TO LIQUID SPILL CONTAINMENT
DESIGN ANALYSIS
REV. 03

AMWTP LIQUID SPILL
CONTAINMENT AREAS
INTERSTITAL SPACE

EWD FILE: MSG-54600_EXHIBIT-3.DWG

EDF-0272, Revision 02
Title: Maximum Waste Storage Capacity for WMF-636 Pad 2 and AMWTP Outside Storage Area.

Summary:
Maximum waste volumes were calculated for Pad 2 permitting purposes. The maximum volumes were calculated for high density volumes using two different scenarios which were, 1) using high density 55 gallon drum configuration, and 2) using high density 4' x 4' x 8' box configurations. In addition, an outside storage area on the northwest side of the WMF-636 was evaluated for, 1) loaded TRUPACT II Trailer storage and, 2) normal density 4' x 4' x 8' Box storage, 3) normal density drums.

The WMF-636, Pad 2 maximum waste volumes are as follows:
High Density 55 Gallon Drum storage volume = 2,893,000 gallons capacity
High Density 4' x 4' x 8' Box storage volume = 6,350,140 gallons capacity

WMF-636, Outdoor Storage Area waste volumes are as follows:
Maximum Loaded TRUPACT II Trailer storage volume = 6 each
Normal Density 4' x 4' x 8' Box storage volume = 404,995 gallons capacity
Normal Density 55 Gallon Drums = 130,900 gallons capacity

References:
DISCUSSION:

The maximum waste storage volumes were calculated for two different areas associated with the AMWTP. Those areas are WMF-636 Pad 2, which is the east wing of the WMF-636 proper, and an asphalted container storage area located on the northwest corner of the WMF-636 building. The assumptions and calculations for the waste volumes for the two different areas are as follows:

**TSA-RE, WMF-636, Pad 2**

**Assumptions:**
- A 20 feet wide aisle for operations extends from the south overhead door to the north side of the building.
- A 20 feet wide aisle for operations extends from the east overhead door to the north/south aisle.
- A 10 feet wide corridor extends from the north south corridor along the north wall to Pad 1.
- All stacks both drum and boxes are separated by a 3 feet wide aisle, and all stacks are kept a minimum of 3 feet from structural items including walls, columns, and partitions.
- All soil areas in Pad 2 have been asphalted. Maximum waste volumes include these areas.
- **Volume calculations assumptions include:**
  1. Box volumes include the entire volume of the box.
  2. Drum volumes are based on the standard 55 gallon drum volumes.
  3. High density drum stacks are 4 wide by 5 high by the full depth of the row. All drums are stacked on six pack retainers. All stacks are separated by a minimum 3 feet wide aisles
  4. High density box stacks are 4 boxes wide by 4 boxes high. Standard boxes are 4’ x 4’ x 8’. All stacks are separated by a minimum of 3 feet wide aisles.

**AMWTP Outside Storage Area**

**Assumptions:**
- The area is encompassed on the north and west sides by the north access road, and maintains a 50 feet corridor between the main structure to the east and the airlock structure to the south, leaving area nominally 81.1 feet in the north/south and 88.5 feet in the east/west.
- This area can be used to store either loaded TRUPACT Trailers or standard 4’x 4’x 8’ boxes in stacks 2 boxes wide by 3 boxes high, or 55 gallon drums stacked 2 wide and three high.
- A TRUPACT trailer requires a 8 feet wide space and a four feet aisle is maintained between each of the trailers.
CALCULATIONS

HIGH DENSITY DRUM CAPACITY - TSA-RE, PAD 2

→ EAST SIDE OF N/S ISLE
35 rows x 4 (wide) x 5 (high) = 34 deep
Waste Volume = 55 gal x 35 x 4 x 5 x 34
= 1,309,000 gallons capacity

→ WEST SIDE OF N/S ISLE
36 rows x 4 (wide) x 5 (high) x 40 deep
Waste Volume = 55 gal x 36 x 4 x 5 x 40
= 1,584,000 gallons capacity

Maximum Waste Volume for High Density Drums on Pad 2 = 3,893,000 Gallons Capacity.

HIGH DENSITY BOX CAPACITY - TSA-RE, PAD 2

→ EAST SIDE OF N/S ISLE
(3.5 row + 75 rows) x 4 box wide x 4 box high x 17 box deep
Waste Volume = 11 rows x 4 x 4 x 17 x 95.75 gal/box
= 2,864.840 gallons

→ WEST SIDE OF N/S ISLE
11.375 row x 4 box wide x 4 box high x 20 box deep
Waste Volume = 11.375 x 4 x 4 x 20 x 95.75 gal/box
= 3,485.300 gallons

Maximum Waste Volume for 4' x 4' x 8' Boxes in High Density Configuration on Pad 2
2,864.840 + 3,485.300 = 6,350.140 Gallons
CALCULATIONS

NORMAL DENSITY BOX CAPACITY - TSHA-RE OUTSIDE STORAGE PAD

Row 1 - 19 boxes deep
2  - 18 " "
3  - 16.5 " "
4  - 13 " "
5  - 8 " "

Rows are stacked 2 boxes wide and three boxes high

Boxes are 4' x 4' x 8'
- 7.48 gallons/ft³

Total Box Storage Volume =
\[(19 + 18 + 16.5 + 13 + 4) \times 2 \times 3 \times (4' \times 4' \times 8') \times (7.48) =
\]
\[104,997 \text{ gallons}\]

NORMAL DENSITY DRUM CAPACITY - TSR-RE OUTSIDE STORAGE PAD

NORMAL DENSITY - 2 WIDE : 3 HIGH

Average Row Length - 61 ft

61 ft x 6 drums x 13 rows = 2,380 drums

2,380 drums x 55 gallons/drum = 130,900 gallons
APPENDIX XII

ASPHALT STRUCTURAL STABILITY FOR DENSE PACK LOADING ON PAD 2

EDF-0338, Revision 05: Evaluation of the Asphalt Floor System for Dense Pack Loading
Title: Evaluation of the Asphalt Floor System for Dense Pack Loading

Revision 05 Summary: Revision 05 only applies to containers stored in a Dense Pack configuration as described in this EDF. All reference to the typical soil bearing pressure of 2000 PSF has been removed, since it created confusion. A ultimate soil bearing pressure of 1540 PSF (assuming GW and GP soils and 4 inch wide interfacing runners) with a factor of safety of 2 yields a allowable soil bearing capacity of 770 PSF for Dense Pack Loading. Also, all references to enhanced runner widths for metal pallets have been removed since this concept was never used.

Summary:
The purpose of the EDF is to outline maximum Dense Pack Loading and support parameters for the WMF636, Pad 2 asphalt floor system.

The asphalt floor system will be able to safely support the following high density configurations:

- 55 gallon drums stacked four wide and five high; drums will be placed on 4' x 8' four-bar (or greater) pallets or an equivalent pallet. Care will be taken to ensure loading is distributed to asphalt floor system by adding a 3/4" plywood sheet to further distribute the loads, if needed.
- Waste boxes stacked 4 boxes wide by 4 boxes high; boxes will have adequate runners and/or a sheet of 3/4" plywood placed under the boxes to uniformly distribute the stack loads onto the asphalt floor system.
- Puck drums and overpacks stacked 4 drums wide by 4 drums high; puck drums will be placed on 64"x 64" wood pallets which will uniformly distribute the load to the asphalt floor system.

The drums will be stored on standard metal pallets and/or special design wood pallets, the boxes will be stored on the box skids and added skids (cracking), and plywood base interfaces, as required for the loading conditions. The loading conditions in this area will be administratively controlled via AMWTP operating procedures to ensure the sub base bearing loading does not exceed 770 pounds per square foot (PSF) for Dense Pack Loading. The following chart summarizes the typical asphalt interface loading scenarios.

Containers (drums and boxes) stored in a configuration not greater than 3 high are not subject to the restrictions in this EDF due to the stability of the waste stack. However, good operating practices should follow the chart below as a guide for allowable foundation loading.

<table>
<thead>
<tr>
<th>Pallet/Box Type</th>
<th>Runner Length</th>
<th>Base Description</th>
<th>Maximum Foundation Loading per Pallet or Box Stack lbs (@770PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 bar metal pallet</td>
<td>96 inches</td>
<td>4 runners, each 4 inches wide</td>
<td>8,213</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with 3/4&quot; plywood base</td>
<td>22,805</td>
</tr>
<tr>
<td>5 bar metal pallet</td>
<td>96 inches</td>
<td>5 runners, each 4 inches wide</td>
<td>10,266</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with 3/4&quot; plywood base</td>
<td>31,102</td>
</tr>
<tr>
<td>11 bar wood pallet</td>
<td>48 inches</td>
<td>See EDF-0948</td>
<td>36,730</td>
</tr>
<tr>
<td>64&quot; x 64&quot; wood pallet</td>
<td>64 inches</td>
<td>3/4&quot; plywood base</td>
<td>18,240</td>
</tr>
<tr>
<td>3 skid box (Bull Run)</td>
<td>44 inches</td>
<td>3 runners, each 4 inches wide</td>
<td>2,950</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with 3/4&quot; plywood base</td>
<td>5,061</td>
</tr>
</tbody>
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Title: Evaluation of the Asphalt Floor System for Dense Pack Loading

<table>
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<th>EDF No.: EDF-0338</th>
<th>Revision No.: 05</th>
<th>FMP No. (if any):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building/System No.: WMF636</td>
<td>5 runners, 3-4&quot; and 2-3.5&quot; wide</td>
<td>4,673</td>
</tr>
<tr>
<td></td>
<td>with 3/4&quot; plywood base</td>
<td>12,150</td>
</tr>
<tr>
<td>5 skid box (FRP)</td>
<td>46 inches</td>
<td>5 runners, each 3.5 inches wide</td>
</tr>
<tr>
<td></td>
<td>with 3/4&quot; plywood base</td>
<td>4,305</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10,825</td>
</tr>
</tbody>
</table>

References:
1. Lockheed Martin Drawing 175774, RWMC Building 6363 TSA Retrieval Enclosure Interior Drainage Plan, Rev 3.

Originator: TED SLUDE / Signature Date: 3/17/2016

Technical Review: Ryan Searle / Signature Date: 3/17/2016

Additional Reviewers: (by title)

<table>
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<th>Environment Coordinating Permitting</th>
<th>Print Title</th>
<th>Signature Date</th>
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<td>Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>

Distribution List:

Approval:
Printed Name: Quin Blackburn
Printed Title: Engineering Lead

Signature Date

Date
While asphalt itself area has due to some positive features which The bearing surface. These positive features include:

- The entire pad is covered by a roof system which has been in place for the last 20 years, and this roof system was completely repaired in 2015 to minimize potential leaks. This prevents rain from saturating the subsurface in situ soil materials.
Title: Evaluation of the Asphalt Floor System for Dense Pack Loading

- The static water table is approximately 650 feet below grade and there are no perched water tables in the area.
- Competent blue basalt lithology is less than 10 feet below the floor system grade and in many places is less than a foot. This minimizes the depth of the weaker stratum soils, thus minimizing the potential for differential settlement or shear failure.
- The in situ materials (above the basalt bedrock and below the top soil) are non cohesive sands, silts, and gravels which are capable of bearing loads in the 1540 lb/ft² (does not include a factor of safety) range if kept dry.
- Pad 2 was pre-loaded with waste for an extensive period of time (~40 years), creating a loading condition equivalent to the high density loading, and no failed areas due to settlement have been observed on the pad. Some localized asphalt areas failed due to high moisture content from roof leaks. These areas were removed and the saturated soils were removed and replaced with competent granular base material overlain by asphalt to match the original pad concept.

Yielding and some minor settlement will occur in the asphalt material. However, due to the shallow profile (four inch depth) and the homogeneous nature of the asphalt, settlement will be relatively minor and uniform. The subgrade should not experience significant yielding or settlement due to the pre-loading conditions, the material bearing capacities, and distribution of the load at the subgrade elevation. The granular base will provide a good foundation for the asphalt layer, and will have a ultimate bearing capacity (nominal) 1540lbs/ft² for 4 inch wide runners (see attached calculations).

**Soil Bearing and Foundation Loading Limit Calculations**

The calculation method to determine adequate Dense Pack Loading for PAD 2 treats the asphalt and base materials as granular gravels distributing the load to the in situ soils and bedrock. For each Dense Pack loading conditions on this pad, using pallets or boxes having 4 inch wide runners, an ultimate soil bearing capacity of 1540 PSF is calculated using the Terzaghi-Meyerhoff equation 10.1 (reference 2) and further reduced using a factor of safety of 2 to an allowable 770 PSF. This soil bearing pressure with the applied factor of safety will be used as a general foundation loading limit for Dense Pack Loading. Should Dense Pack Loading conditions outside of the examples in this EDF be encountered, those conditions can be evaluated using the boundary conditions established in this EDF. Based on the type of containers and the cumulative weights, adequate foundation support (plywood, lumber, or other, as determined by the engineer) will be provided under the waste stacks in contact with the asphalt pad to ensure the soil bearing pressure does not exceed the allowable limit of 770 PSF.

The following table summarizes the allowable soil bearing capacities for Dense Pack Loading on the Pad 2 foundation, for the typical pallet/box types, assuming a 770 PSF allowable bearing capacity.

**WMF-636 Pad 2 Foundation Dense Pack Loading Information**

<table>
<thead>
<tr>
<th>Pallet/Box Type</th>
<th>Runner Length</th>
<th>Base Description</th>
<th>Maximum Foundation Loading per Pallet or Box Stack lbs(@770PSF)</th>
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<tbody>
<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td>with 3/4&quot; plywood base</td>
<td></td>
</tr>
<tr>
<td>5 bar metal pallet</td>
<td>96 inches</td>
<td>5 runners, each 4 inches wide</td>
<td>10,266</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with ¾&quot; plywood base</td>
<td></td>
</tr>
<tr>
<td>11 bar wood pallet</td>
<td>48 inches</td>
<td>See EDF-0948</td>
<td>36,730</td>
</tr>
<tr>
<td>64&quot; x 64&quot; wood pallet</td>
<td>64 inches</td>
<td>¾&quot; plywood base</td>
<td>18,240</td>
</tr>
</tbody>
</table>
**Title:** Evaluation of the Asphalt Floor System for Dense Pack Loading  

<table>
<thead>
<tr>
<th>Building/System No.: WMF636</th>
</tr>
</thead>
</table>
| EDF No.: EDF-0338  
| Revision No.:05  
| FMP No. (if any): |  
| 3 skid box (Bull Run) | 44 inches | 3 runners, each 4 inches wide | 2,950  
| | | with ¾” plywood base | 5,061  
| | | 5 runners, 3- 4”and 2- 3.5” wide | 4,673  
| | | with ¾” plywood base | 12,150  
| 5 skid box (FRP) | 46 inches | 5 runners, each 3.5 inches wide | 4,305  
| | | with ¾” plywood base | 10,825  

**Summary:**

High Density stacking of containerized materials can be achieved on the WMF-636 Pad 2 asphalt safely, if the loading is controlled to prevent subgrade materials from failing. The chart contained in this EDF describes the foundation/stack interface conditions that will typically be encountered. Most foundation interfaces will consist of 4 inch wide runners supplemented by ¾” thick plywood sheathing and the associated allowable loading for these conditions.

For containers stored in a Dense Pack configuration, an allowable loading of 770 PSF will apply, to protect the ultimate soil bearing capacity of 1540 PSF.

**Attachments (if any):**

1. Pad 2 Soil Loading Calculations
3. 4 Bar Metal Pallet Capacity Calculations
4. 5 Bar Metal Pallet Capacity Calculations
5. 11 Bar Wood Pallet Data
6. 64” x 64” Wood Pallet Calculations
7. 3 Skid Box Calculations
8. 5 Skid Box Calculations
9. 4 Bar Metal Pallet Drawing
10. 5 Bar Metal Pallet Calculations
11. Wooden Storage Pallet – TSA-RE Specifications
12. 64” x64” Wood Pallet & 11 Bar Wood Pallet Drawing
13. 3 Skid Box Drawing
14. 5 Skid Box Drawing
**Pad 2 Soil Loading**

**Existing Parameters:**
- 4" of Asphalt - Neglect and treat as soil.
- 4" - 6" of Crushed Aggregate - GP
- Subgrade Soils are GW
- 0° for GP 4 GW = 38°
- Cohesion (c) = 0
- P = 120 PCF (Nominal)
- \( P_q \) = Surcharge = 0
- \( P_g \) = Gross Bearing Capacity
- \( P_a \) = Allowable Bearing Capacity \( P_a = 4.3 \)
- B = Footing Width (FT) - Long Continuous Footing
- \( H_f = 77 \); \( D_f = \) Depth of Footing = 0

**Support Mechanisms Evaluated:**
- Fully Distributed Load
- 4 Bar - 4' x 8' Pallet
- 5 Skid Box
- 64" x 64" Pallet
- Fully Distributed Load

**Gross Bearing Capacity - Terzaghi - Meyerhof**
\[
P_g = \frac{1}{2} P B N_D + \frac{c}{N_C} + (\beta f + \gamma D_f) N_2
\]

**Evaluate Runner Widths**

\[ B = 4" \]

\[
P_g = \frac{1}{2} P_B N_D = \frac{1}{2} (120)(4\frac{1}{2})(77)
\]

\[
P_g = 1,540 \text{ lbf} = \text{Factor of Safety} (FS) = 2
\]

\[
P_a = \frac{P_g}{2} = \frac{1,540}{2} = 770 \text{ psf}
\]

770 psf
UNIFORM LOADS BASED ON BENDING STRESS FOR 3 OF GREATER SPANS

\[ W_b = \frac{120 F_0 K S}{l_i^2} \]

WHERE:

- \( W_b \) = UNIFORM LOAD BASED ON BENDING STRESS (psf)
- \( F_0 \) = ALLOWABLE BENDING STRESS (psi)
- \( K S \) = EFFECTIVE SECTION MODULUS (in.\(^3\)/ft)
- \( l_i \) = SPAN CENTER TO CENTER OF SUPPORTS (in.)
4 Bar Metal Pallet

\[ F_b = 1650 \text{ psi} \quad K_S = 0.496 \quad P_a = 770 \text{ lb/ft}^2 \]

4 Bar Metal Pallet (without Plywood Base)

\[ (4 \text{ skids})(8 \text{ ft})(4.5 \text{ in})(770 \text{ lb/ft}^2) = 8,213 \text{ lb} \]

4 Bar Metal Pallet with 3/4" Plywood Base

Capacity = Skid Capacity + Plywood Capacity

\[ W_b = \frac{(120)(F_b)(K_S)}{L^2} = 1 \text{ lb/ft} \]

\[ = \frac{(120)(1650)(0.496)}{(14.67)^2} = 456 \text{ lb/ft}^2 \]

Capacity = 8,213 + (456 \text{ lb/ft}^2)(32 \text{ ft}^2)

\[ = 22,805 \text{ lb} \]
**5 BAR Metal Pallet** (58" x 96" w 4" skids)

\[ F_b = 1250 \text{ psi} \]  
\[ K_S = 0.496 \]  
\[ P_a = 770 \text{ lb/ft}^2 \]

**5 BAR METAL Pallet with Plywood Base**

\[ (5 \text{ skid})(8 \text{ ft})(3.5 \text{ ft})(770 \text{ lb/ft}^2) = 10,266 \text{ lbs} \]

**5 Bar Metal Pallet with Plywood Base**

\[ \text{CAPACITY} = \text{SKID CAPACITY} + \text{PLYWOOD CAPACITY} \]
\[ \text{CAPACITY} = (10,266 \text{ lb}) + w_b (\text{SURFACE AREA} \text{ ft}^2) \]

\[ w_b = \frac{(120)(F_b)(K_S)}{L^2} \]
\[ = \frac{(120)(1250 \text{ psi})(0.496)}{(3.5)^2} \]
\[ = 538 \text{ lb/ft}^2 \]

\[ \text{CAPACITY} = 10,266 \text{ lb} + (538 \text{ lb/ft}^2)(38.66 \text{ ft}^2) \]
\[ = 31,102 \text{ lbs} \]
11 Bar Wood Pallet
Per EDF 0948
Capacity 36,730 lb
64" x 64" Wood Pallet

Fb = 1650 psi, KS = 0.496, Pa = 673.75 lb/in^2 (EDF-0948)

L1 = 15.1"

SKID CAPACITY (On Asphalt Pad)

(5 skids) (3.5/12 ft) (1/12 ft) (770 lb/ft^2) = 5,988 lb

CAPACITY = SKID CAPACITY + Plywood Capacity

\[ W_b = \frac{120 (F_b) (K_S)}{L_1^2} \]

\[ W_b = \frac{(120)(1650 \text{ psi})(0.496)}{15.1^2 \text{ in}^2} = 430.7 \text{ lb} \]

CAPACITY = 5988 lb + \left( \frac{430.7 lb}{64^2} \right)

= 18,239 lb
3 SKID BOX (Bull Run BR-90)
SKID CAPACITY ON ASPHALT PAD:
\[(3 \text{ skids}) \left( \frac{3}{4} \text{ ft} \right) \left( \frac{1}{2} \text{ ft} \right) (770 \text{ lb/ft}^2)\]
\[= 2,951 \text{ lb}\]

\[\Rightarrow 3 \text{ SKID CAPACITY WITH } \frac{3}{4}" \text{ PLYWOOD INTERFACE}\]
\[(\text{SKID CAPACITY}) + (\text{PLYWOOD CAPACITY})\]
\[= (2,951 \text{ lb}) + (\frac{w_b}{\text{SURFACE AREA}})\]
\[w_b = \frac{120 \left( 1650 \text{ psf} \right) \left( .496 \right)}{3.2 \text{ ft}^2} = 95 \frac{1}{4}\text{ lb/ft}^2\]
\[= (2,951 \text{ lb}) + (95 \frac{1}{4} \text{ lb/ft}^2 \left( \frac{72 \text{ in} \times 44 \text{ in}}{144 \text{ in}^2} \right))\]
\[= (2,951 \text{ lb}) + (2,110 \text{ lb})\]
\[= 5,061 \text{ lb}\]

3 SKID BOX W/ INTERMEDIATE CRIBBING:
= SKID CAPACITY ON ASPHALT PAD:
\[= (3 \text{ skids}) \left( \frac{3}{4} \text{ ft} \right) \left( \frac{1}{2} \text{ ft} \right) \left( \frac{3.5}{2} \text{ ft} \right) (770 \text{ lb/ft}^2)\]
\[= 4,673 \text{ lb}\]

3 SKID BOX W/ INTERMEDIATE CRIBBING + \frac{3}{4}" PLYWOOD INTERFACE
= (SKID CAPACITY) + (PLYWOOD CAPACITY)
\[= (4,673 \text{ lb}) + (\frac{w_b}{\text{PLYWOOD SURFACE AREA}})\]
\[w_b = \frac{120 \left( 1650 \text{ psf} \right) \left( .496 \right)}{17^2} = 340 \frac{1}{4}\text{ lb/ft}^2\]
\[= (4,673 \text{ lb}) + (340 \frac{1}{4} \text{ lb/ft}^2 \left( \frac{72 \text{ in} \times 44 \text{ in}}{144 \text{ in}^2} \right))\]
\[= 12,150 \text{ lb}\]
5 SKID BOX FRP (84" x 48" x 48")

SKID CAPACITY ON ASPHALT:
= (5 skids)(3.5/12 ft)(AW1/2 ft)(770 lb/ft²)
= 4,305 lb

5 SKID BOX WITH A 3/4" PLYWOOD INTERFACE:
= (skid capacity) + (plywood capacity)

= (4,305 lb) + (\(\frac{120 (1.50) (0.496)}{(20.1)^2}\))

\(\frac{120 (1.50) (0.496)}{(20.1)^2}\)

= 243 lb/ft²

= (4,305 lb) + (243 lb/ft²)(84)(46 ft²)

= 10,825 lb
NOTES:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. WELD PER AWS D1.3 USING ITEM 5, WELD FILLER METAL,
   WITH VISUAL INSPECTION PER AWS D1.3.
   MARK PER STD-7006-2A WITH 446370-1 ASSEMBLY.
   COAT ALL WELDS USING ITEM 4, GALVANIZING METAL COATING.

DETAIL 2
SCALE: 1/8

SECTION A-A
SCALE: 1/4

DETAIL 3
SCALE: 1/4

-1 ASSEMBLY
SCALE: 1/8

McMASTER-CARR
CATALOG #99123
SHEET, 12 GA (.108 THICK)
GRADE B, COATING DESIGNATION, G90

GALVANIZING METAL COATING
WELD FILLER METAL ER70S-X AWS A 5.18

<table>
<thead>
<tr>
<th>PART</th>
<th>MFG.</th>
<th>PART</th>
<th>MFG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>72513</td>
<td>B</td>
<td>Slat</td>
<td>B</td>
</tr>
<tr>
<td>72513</td>
<td>B</td>
<td>Slat</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>Stringer</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>Assembly</td>
<td>B</td>
</tr>
</tbody>
</table>

WASTE CHARACTERIZATION LIMITS:
STORAGE FACILITY
PALLETS (48" x 48")
Control No 0719-1611

Notes

* Do not duplicate without the written permission of International Metal Pallet.
* Coat all welds with Rust Retardent
* Fab. from ASTM A653 Commercial Grade. 16 GA. Galvanized
* All Dimensions & weights are approx.

'Static wt. is deemed acceptable unless given written notice.
* 4-way holes are 1/7/8" x 10" with 1/2" extruded lip.

Runners: 5 EA.
Top Slat: 16 EA.
Bottom Slat: 0
Pallet WT: 201 LB. Static = 73,080 LB

International Metal Pallet
www.metaloallet.com
800-846-0709
Drawing No.
B-9658-1616-4
WOOD STORAGE PALLETS - TSA-RE

SPECIFICATIONS

WOOD PALLETS WILL BE CONSTRUCTED TO THE FOLLOWING MINIMUM REQUIREMENTS:

- PLYWOOD SHALL BE ¾" THICK CDX GRADE
- 4X4 LUMBER SHALL BE KILN DRIED FIR
- ALL WOOD SURFACES SHALL BE PAINTED OR IMPREGNATE WITH AN APPROVED FIRE RETARDANT COATING. THE COATING SYSTEM SHALL SEAL 100% OF ALL EXPOSED SURFACES.
- THE PLYWOOD SHALL BE JOINED TO THE 4X4 FIR RUNNERS USING BOTH SCREWS AND ADHESIVES.

  → SCREWS SHALL BE 2½" GALVANIZED HEAVY DUTY SCREWS. THE SCREWS SHALL ENGAGE EACH RUNNER ON 8 INCH CENTERS, WITH A MINIMUM OF 3 IN A FIELD.

  → CONSTRUCTION ADHESIVE SHALL BE A COMMERCIAL GRADE ADHESIVE MADE FOR JOINING WOOD SURFACES.

ASSUMPTIONS:

LOADING - MAXIMUM LOADING CONDITION IS FOR HIGH DENSITY STACKING, i.e.
- 55 GALLON DRUMS, 5 HIGH, 1000 lb/drum
- 4x4x8 WOOD BOXES - 4 HIGH, 10,000 lb/BOX

PALLETS ARE CONSTRUCTED OF DOUGLAS FIR OR STRONGER WOOD PRODUCTS

ECCENTRIC LOADING OF PALLETS WILL NOT OCCUR DUE TO DESIGN CONFIGURATION
NOTES:
1. MULTIPLE SEAMS MAY BE USED ON EACH FACE OF THE 64"x64" PALLETS. SEAMS PARALLEL TO RUNNERS MUST TERMINATE ON THE CENTER OF A RUNNER. ALL OTHER SEAMS MUST BE PERPENDICULAR TO THE RUNNERS.
2. NAILS MAY BE USED INSTEAD OF SCREWS. NAILS WILL BE 10D OR LARGER COMMONS W/ COATING.
3. FOR 64"x64" PALLETS THE BOTTOM SHEET MAY BE EITHER 1/2" OR 3/4" PLYWOOD. BUT ANY SINGLE PALLETS SHALL NOT HAVE BOTH ON THE BOTTOM SIDE. 1/2" PLYWOOD WILL BE FROM DRUM SPACER EXCESS MATERIAL.
4. ALL WOOD SURFACES SHALL BE COATED WITH OR CONSTRUCTED OF AN APPROVED FIRE RETARDANT SYSTEM NEETING OR EXCEEDING A CLASS A RATING. THE SYSTEM SHALL SEAL 100% OF ALL SURFACES.
5. ON THE 64"x64" PALLETS STENCIL "FIRE RETARDANT PALLET" AND THIS SIDE UP ON THE 1/2" DECKING. THE LETTERS SHOULD BE BLACK ON 3" TALL.
6. ON THE 48"x96" PALLETS STENCIL "FIRE RETARDANT PALLET" "THE LETTERS SHOULD BE BLACK AND 3" TALL.

4' x 4' x 64' RUNNERS, FIR OR BETTER ON 15" CENTERS (NOMINAL) 5 REQUIRED
PLYWOOD SHEET, 3/4" CONSTRUCTION GRADE TOP SIDE
PLYWOOD SHEET 3/4" CONSTRUCTION GRADE (NOTE 3)

64" x 64" WOOD PALLETS

48" x 96" WOOD PALLETS

4' x 4' x 48' RUNNERS, FIR OR BETTER ON 15" CENTERS (NOMINAL) 11 REQUIRED
PLYWOOD SHEET, 3/4" CONSTRUCTION GRADE TOP SIDE
APPENDIX XIII

WMF-676 VENTILATION SYSTEMS REMEDY SCHEDULE
# WMF-676 VENTILATION SYSTEMS REMEDY SCHEDULE

<table>
<thead>
<tr>
<th>System Description</th>
<th>Plant Item Number</th>
<th>Plant and Equipment Description</th>
<th>Redundancy</th>
<th>Failure/ Main. Mode</th>
<th>Response</th>
<th>Maintenance Requirement/ Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>730 System Zone 2 Supply</td>
<td>AHU-730-200, AHU-730-201</td>
<td>2 x 100% supply air handling units</td>
<td>1 x 100% unit run</td>
<td>1 unit fails</td>
<td>Alarm to control room Auto change to standby unit Initiate interlocks with associated extract systems</td>
<td>Plant can operate in this mode without impact on containment indefinitely</td>
</tr>
<tr>
<td>730 System Zone 2 Supply</td>
<td>AHU-730-200, AHU-730-201</td>
<td>2 x 100% supply air handling units</td>
<td>1 x 100% unit run</td>
<td>2 units fail</td>
<td>Initiate interlocks with associated extract systems</td>
<td>Operators leave Zone 2 and Zone 3 areas and await confirmation that Zone 2 supply system is operational</td>
</tr>
<tr>
<td>750 System Zone 3 Extract</td>
<td>EF-750-202A, EF-750-202B</td>
<td>2 x 100% extract fans</td>
<td>1 x 100% fan run</td>
<td>1 fan fails</td>
<td>Alarm to control room Auto change to standby unit Initiate interlocks with associated extract systems</td>
<td>Plant can operate indefinitely in this mode without impact to containment</td>
</tr>
<tr>
<td>760 System Glovebox Extract</td>
<td>EF-760-204A, EF-760-204B</td>
<td>2 x 100% extract fans</td>
<td>1 x 100% fan run</td>
<td>1 fan fails</td>
<td>Alarm to control room Auto change to standby unit Initiate interlocks with associated supply and extract systems</td>
<td>Plant can operate indefinitely in this mode without impact to containment</td>
</tr>
<tr>
<td>750 System Zone 3 Extract HEPA Filters Second Stage</td>
<td>AFU-750-208, AFU-750-209, AFU-750-210</td>
<td>3 x 50% second stage HEPA filter banks</td>
<td>3 x 50% filter banks operate at downrated capacity for normal operation</td>
<td>Isolate 1 filter bank on line with Zone 3 extract system running</td>
<td>N/A</td>
<td>Operators cease glovebox operation and await confirmation that glovebox extract system is operational</td>
</tr>
</tbody>
</table>

Total system duty can be handled by remaining 2 filter banks during filter change
### WMF-676 VENTILATION SYSTEMS REMEDY SCHEDULE

<table>
<thead>
<tr>
<th>System Description</th>
<th>Plant Item Number</th>
<th>Plant and Equipment Description</th>
<th>Redundancy</th>
<th>Failure/ Main. Mode</th>
<th>Response</th>
<th>Maintenance Requirement/ Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>750 System Zone 3 Extract HEPA Filters Third Stage</td>
<td>AFU-750-213,AFU-750-214,AFU-750-215</td>
<td>3 x 50% third stage HEPA filter banks</td>
<td>3 x 50% filter banks operate at downrated capacity for normal operation</td>
<td>Isolate 1 filter bank on line with Zone 3 extract system running</td>
<td>N/A</td>
<td>Total system duty can be handled by remaining 2 filter banks during filter change</td>
</tr>
<tr>
<td>760 System Glovebox Extract HEPA Filters Second Stage</td>
<td>AFU-760-204,AFU-760-205</td>
<td>2 x 100% second stage HEPA filter banks</td>
<td>2 x 100% filter banks operate at downrated capacity for normal operation</td>
<td>Isolate 1 filter bank on line with glovebox extract system running</td>
<td>N/A</td>
<td>Total system duty can be handled by remaining filter bank during filter change</td>
</tr>
<tr>
<td>760 System Glovebox Extract HEPA Filters Third Stage</td>
<td>AFU-760-206,AFU-760-207</td>
<td>2 x 100% third stage HEPA filter banks</td>
<td>2 x 100% filter banks operate at downrated capacity for normal operation</td>
<td>Isolate 1 filter bank on line with glovebox extract system running</td>
<td>N/A</td>
<td>Total system duty can be handled by remaining filter bank during filter change</td>
</tr>
<tr>
<td>All Glovebox Extract Systems</td>
<td>All</td>
<td>Glovebox</td>
<td>N/A</td>
<td>Glovebox breach (glove tear)</td>
<td>Extract fans system 760 on glovebox extract ensures minimum velocity of 200 fpm through open glove port</td>
<td>Operator withdraws hands from gloves Monitor operator Fit new glove Reset control system</td>
</tr>
</tbody>
</table>
1. **Introduction**

1.1 **Purpose**

This document outlines the technical and quality assurance requirements for the preparation and application of coatings used to provide secondary containment for the Advanced Mixed Waste Treatment Project (AMWTP). All coatings used as part of the secondary containment system meet the requirements of the Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 [Title 40 of the Code of Federal Regulations (CFR) 264.175].

1.2 **Coating System Requirements**

The coatings used as part of the secondary containment system are generally comprised of a spall/hole repair material, a primer for use over bare concrete, and a self-leveling solids epoxy capable of achieving a final dry film thickness of 50 to 145 mils. All coatings used on the base of the secondary containment system, typically a concrete floor, provide the containment “system,” and meet the requirements of IDAPA 58.01.05.008 (40 CFR 264.175). The secondary containment system includes provisions for heavy abrasion areas (e.g., aggregate filled) and heavily cracked areas (e.g., embedded membrane).

2. **Acceptable Systems**

Acceptable coating systems for providing secondary containment are listed in the following sections. The following coating systems (See Table 1) have been selected based upon engineering design, HWMA/RCRA requirements, safety concerns, maintenance issues, etc. The coatings specified in Table 1 have been evaluated for the specific use of the coating, and have been designed to allow for specific use. For example, an aggregate material may be added to a coating in a high traffic area to provide a non-slip surface. All materials added to a specific coating, as shown in Table 1, do not reduce the ability of the system to meet the requirements listed under IDAPA 58.01.05.008 (40 CFR 264.175).
### Table 1 – Acceptable Coating Systems

<table>
<thead>
<tr>
<th>COATING MANUFACTURER</th>
<th>COATING&lt;sup&gt;a&lt;/sup&gt;</th>
<th>PRODUCT NAME&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameron International</td>
<td>Primer</td>
<td>Prime A Pell 200&lt;sup&gt;°&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Primer (Metal)</td>
<td>B55 Series&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Primer and Sealer</td>
<td>Amercoat 68HS</td>
</tr>
<tr>
<td></td>
<td>Primer and Sealer</td>
<td>NuKlad 105A</td>
</tr>
<tr>
<td></td>
<td>Epoxy Filler</td>
<td>NuKlad 114A</td>
</tr>
<tr>
<td></td>
<td>Epoxy Filler</td>
<td>Amerlock 400BF</td>
</tr>
<tr>
<td></td>
<td>Self-leveling Epoxy</td>
<td>NuKlad 120A</td>
</tr>
<tr>
<td></td>
<td>Surface</td>
<td>Amercoat 220</td>
</tr>
<tr>
<td></td>
<td>Waterborne Acrylic</td>
<td>Amercoat 351</td>
</tr>
<tr>
<td></td>
<td>Topcoat</td>
<td>Amercoat 385</td>
</tr>
<tr>
<td></td>
<td>100% Solids Epoxy</td>
<td>Amerlock 400</td>
</tr>
<tr>
<td></td>
<td>Multi-Purpose Epoxy</td>
<td>Amerlock 400NT&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>High-Solids Epoxy</td>
<td>Amerlock 2</td>
</tr>
<tr>
<td></td>
<td>Coating</td>
<td>Amercoat 450HS</td>
</tr>
<tr>
<td></td>
<td>High-Solids Epoxy</td>
<td>Amershield</td>
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<tr>
<td></td>
<td>Coating</td>
<td>Amercoat 1000</td>
</tr>
<tr>
<td></td>
<td>High-Solids Epoxy</td>
<td>Polyurethane Coating</td>
</tr>
<tr>
<td></td>
<td>Coating</td>
<td>Polyurethane Coating</td>
</tr>
<tr>
<td></td>
<td>High-Solids Epoxy</td>
<td>Synthetic Resin Coating</td>
</tr>
<tr>
<td></td>
<td>Polyurethane Topcoat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polyurethane Coating</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synthetic Resin Coating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carboline</td>
<td>Primer/Sealer</td>
<td>Semstone 110 or 5401&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Patch</td>
<td>Semstone 140, 145, 145SL, or 245</td>
</tr>
<tr>
<td></td>
<td>Scratch/Build</td>
<td>Semstone 501 or 510</td>
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<tr>
<td></td>
<td>Patch</td>
<td>Semstone 805 or 806</td>
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<tr>
<td></td>
<td>Elastomeric Sealer</td>
<td>Semstone 870</td>
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<tr>
<td></td>
<td>Semi-Leveling Coating</td>
<td>Silica Aggregate&lt;sup&gt;g&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Aggregate</td>
<td>Semstone Scrim Cloth/Semstone 100 Fabric&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Membrane</td>
<td></td>
</tr>
<tr>
<td>Sherwin Williams</td>
<td>Primer</td>
<td>General Polymers 3579</td>
</tr>
<tr>
<td></td>
<td>Patch</td>
<td>TPM #115 or TPM #711&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Scratch/Build</td>
<td>General Polymers 3561, General Polymers Epo-flex 3552, General Polymers 3744, or Envirolastic AR425</td>
</tr>
<tr>
<td></td>
<td>Patch</td>
<td>Envirolastic AR530</td>
</tr>
<tr>
<td></td>
<td>Scratch/Build</td>
<td>Cor-Seal PS 7200 or GP Epo-flex 3555</td>
</tr>
<tr>
<td></td>
<td>Topcoat</td>
<td>General Polymers 5115 Aggregate and Trafficate Filler with 50 mesh dry Silica Sand&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Topcoat Repair</td>
<td>Fiberglass Scrim FS38-.4&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Elastomeric Sealer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aggregate</td>
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</tr>
<tr>
<td></td>
<td>Membrane</td>
<td></td>
</tr>
<tr>
<td>Keeler &amp; Long</td>
<td>Primer</td>
<td>Kolor-Poxy 5129</td>
</tr>
<tr>
<td></td>
<td>Filler</td>
<td>Fast Set Grout&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Scratch/Build</td>
<td>Kolor-Poxy 5500 or 7700</td>
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<tr>
<td></td>
<td>Elastomeric Sealer</td>
<td>RLP 2378</td>
</tr>
<tr>
<td></td>
<td>Aggregate</td>
<td>KL Quartz&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Membrane</td>
<td>KL Fabric&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

---

a. Coatings are applied to a dry film thickness as specified by the manufacturer. Coating application will be done in accordance with manufacturer specifications.
b. Manufacturer Product Specification Sheets are provided at the end of this Appendix.
c. This product is manufactured by Chemprobe Coating Systems.
d. This product is manufactured by the Sherwin-Williams Company.
e. Manufacturer Product Specification Sheet for Amerlock 400NT is the same as for Amerlock 400.
f. Semstone 5401 is the same product as Semstone 1340. The coatings come from two product lines and are given two different coating names. However, the products are the same in physical and chemical properties and have the same chemical resistance. See Manufacturer Product Specification Sheet 1340 at the end of the Appendix for information on both Semstone 5401 and 1340.

g. This material is an inert material that may be added to a specific coating in a given area. For example, sand aggregate could be added to an epoxy topcoat in order to provide a non-slip walking surface. All inert materials added do not reduce the chemical resistance of a coating.

h. TPM #711 is a cement based repair mortar and will be coated with a coating system that meets the requirements of IDAPA 58.01.05.008 (40 CFR 264.175).
3. **Application**

**General**

All surface preparation and coating application will conform to the applicable standards of the Society of Protective Coatings and the manufacturer’s specifications. All work will be performed by trained/skilled personnel in a manner comparable with the best standards of practice.

**Surface Preparation – Concrete**

The following cleaning activities will be performed on all concrete surfaces to be coated.

A. Concrete surfaces shall be prepared in accordance with the requirements of SSPC-SP-13, “Surface Preparation of Concrete” and will be free of all contamination, from release agents, curing compounds, and any existing coatings.

B. All oily or greasy surface contaminants, dirt, loose material, and dust shall be removed by cleaning in accordance with the American Society of Testing and Materials (ASTM) requirements. Specific attention shall be given to the removal of wax-based floor sweeping compounds.

C. All surface defects such as fins, protrusions, bulges or mortar spatter shall be removed by grinding, scraping, or equivalent method.

D. All flooring surfaces shall be prepared by vacuum assisted abrasive blasting or low emission open abrasive blasting in accordance with ASTM requirements. Power tool cleaning may be used around edges or in hard to reach areas.

E. The prepared surface will have a uniform roughened appearance similar to that of coarse sandpaper.

F. Abrasives will not be used that will erode the substrate beyond what is necessary to impart a specified texture.

G. Abrasives used in blast cleaning operations will be new, washed, graded, non-hazardous, non-radioactive, and free of contaminants, which would interfere with the adhesion of coatings.

H. As a final step in the preparation process, the prepared surface will be vacuumed to remove any loose particles or dust. Once clean, the surfaces will be off-limits to personnel in order to avoid contamination of the surfaces.

**Surface Preparation – Steel Appurtenances**

The following cleaning activities will be performed on all steel surfaces to be coated.

A. Solvent Cleaning

1. Prior to using any of the methods of surface preparation specified herein, remove heavy deposits of grease and oil from the bare substrate using a scraper, squeegee, or equivalent method.
2. Remove all oil and grease residues in accordance with the standards of the Society of Protective Coatings requirements.

3. Only use solvents or detergents that will not damage the substrate.

4. Use clean cloths for final cleaning.

Note: It may be necessary to supplement the above stated methods with mechanical cleaning such as scraping, wire brushing, or equivalent method to dislodge surface contaminants.

B. Surface Roughening

Remove gloss from the existing coating and thoroughly roughen the surface to assure proper adhesion of the newly applied material. Use one or more of the methods identified below:

1. Hand and Power Sanding – Use hand and power tools to sand, and uniformly and densely roughen the entire surface. When preparing coatings, use vacuum shrouding around tools, as required, to reduce worker exposures to potentially toxic materials.

2. Brush-Off Blast Cleaning – Prepare the entire surface to a Brush-Off degree of cleanliness in accordance with the Society of Protective Coatings requirements. Various control measures may be used to minimize the extent of damage caused to the coating system. Control measures include, but are not limited to, reducing blasting pressures using a fine abrasive, and increasing the blasting distance.

Coating Application

A. Protective coverings will be used to protect fixtures, equipment, and other surfaces not to be coated.

B. Coatings will only be applied to concrete when it is dry and fully cured. Moisture content tests will be conducted in accordance with ASTM requirements.

C. Steel surfaces will only be coated after all surface preparation requirements have been completed.

D. When coating wide floors, manpower and techniques will be adjusted so that seams are not noticeable.

E. Mixing and Thinning

1. All coating components will be mixed in exact proportions specified by the manufacturer. This is particularly important when mixing in aggregate for a slurry coat application. Care will be given to ensure all material is removed from containers during mixing and metering operations.

2. All coatings will be thoroughly mixed until all components are thoroughly combined and are of a smooth consistency. Coatings will not be applied beyond pot-life limits specified by the manufacturer.
3. Filler aggregate will be uniformly mixed in accordance with manufacturer’s specifications.

4. The type of thinner used for coatings will be in accordance with manufacturer’s specifications. The amount of thinner added will not exceed the limits established in the specifications.

F. Spall/Hole/Defect Repair

1. Spalls, holes, and depressions evident on the floor surface will be flush filled after cleaning with the specified repair material. The repair area will be struck flush immediately after patching in order to avoid lumps that will disrupt the uniformity of the subsequent coats.

G. Primer Application

1. The primer will be applied in accordance with the manufacturer’s specifications. Under no circumstances may the primer be allowed to puddle on the floor. Roll out excess material where necessary.

H. Application of Scratch Coat

1. The scratch coat will be applied in accordance with the manufacturer’s instructions. Under no circumstances may the primer be allowed to puddle on the floor. Roll out excess material where necessary.

2. During the application, extreme care shall be taken to remove all ridges and material as the material cures extremely hard. Protrusions might require power grinding to remove.

I. Application of Self-Leveling Epoxy Coat

1. Plan the work so that the material can be poured and spread as a continuous, monolithic layer. “Cut-in” around disruptions in the continuum of the floor, such as at equipment bases and columns, first.

2. Terminations should be made at locations where the interface seam will be the least noticeable, such as at equipment bases and columns, first.

3. Termination seams will be made in accordance with the manufacturer’s specifications.

4. Air can become entrapped during mixing and application. Any large bubbles that become evident soon after placing the material probably are a result of air incorporated during the mixing process. Smaller air bubbles are also invariably present. These bubbles will take more time to rise to the surface. Methods will be employed to minimize these air bubbles.
J. Special Requirements for Build/Scratch Coat Application to High Abrasion Floors

The Build/Scratch Coat will be applied as a broadcast or aggregate slurry film, unless stipulated otherwise by the manufacturer.

K. Special Requirements for Build/Scratch Coat Application to Heavily Cracked Floors

Apply designated Build/Scratch Coat reinforced with fiberglass scrim cloth and fortified with aggregate. Install the mesh into the Scratch Coat prior to completing the Build Coat application with aggregate, as specified by the manufacturer.

L. Application of Flexible Sealant

The Flexible Sealant will be applied in accordance with the manufacturer’s specifications to properly prepared surfaces.

Number of Coats and Required Dry Film Thickness

After completion of surface preparation, as specified, all surfaces will receive a floor coating system as determined by the manufacturer’s specifications.

Cure

A. The manufacturer’s recommended minimum/maximum recoat windows will be followed throughout the coating application process.

B. The completed floor coating will be allowed to cure for at least 24 hours before being subjected to foot traffic and 48 hours before being subjected to wheeled vehicles.

Repairs

A. For discrete localized repairs, prepare the area with a rotary disk grinder or by other comparable power tool methods as required to (1) expose fresh concrete and remove any foot traffic glaze and (2) feather the perimeter and scuff up the surrounding intact floor coating over a band of about 1 – 3 inches wide.

B. Power tools will be outfitted with vacuum recovery systems to minimize dusting unless more comprehensive measures, such as enclosing the work area and ducting the contained air to a filter, are used.

C. For small “dings,” abrading may be accomplished by manual sanding.

D. For major reworks the complete system should be removed and a new system applied.

E. As a final step in the preparation process, always vacuum the prepared surface to pick up any loose particles or dust. Any areas wet during the preparation process must be allowed to dry (as determined visually).

F. The repair/refurbishing is made by first applying the Primer and then making any patch repairs to flush-out the concrete. Primer recoat window will be followed.
G. One Build Coat will be applied after the patch has cured in accordance with the manufacturer’s specifications.

**Clean-Up**

Upon completion of the work, all materials, equipment, and containers shall be removed from the site. Coating or paint spots upon adjacent surfaces will be removed and the entire jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired, or refinished to the specification stated in Section 3.0 of this document.

4. **References**

A. American Society for Testing and Materials (ASTM)

1. ASTM D 4258, “Standard Practice for Surface Cleaning Concrete for Coating.”
2. ASTM D 4259, “Standard Practice for Abrading Concrete.”
5. ASTM D4285, “Standard Test Method for Indicating Oil or Water in Compressed Air.”
7. ASTM D4227, “Standard Practice for the Qualification of Coating Applicators for Application of Coatings to Concrete Surfaces.”

B. Standards of the Society of Protective Coatings

1. SSPC-QP 1, “Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures).”
2. SSPC-QP 8, “Standard Procedure for Evaluating the Qualifications of Contracting Firms that Install Polymer Coatings and Surfacings on Concrete and Other Cementitious Substrates.”
3. SSPC-SP 1, “Solvent Cleaning.”
4. SSPC-SP 7, “Brush Off Blast Cleaning.”
5. SSPC-SP 12, “Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Jetting Prior to Recoating.”

6. SSPC-SP 13, “Surface Preparation of Concrete.”

7. SSPC Publication No. 91-12, “Coating and Lining Inspection Manual.”
Manufacturer Product Data Sheets for Ameron Coatings
**PRODUCT PROFILE**

**GENERAL DESCRIPTION**
Modified Siloxane with Diffused Quartz Carbid

**COMMON USAGE**
Concrete, stone and masonry treated with Prime-A-Pell 200 resist water intrusion, stain damage, freeze/thaw spalling, efflorescence and rust damage.

**PRODUCT DESCRIPTION**
Prime-A-Pell 200 is a clear, filmless, penetrating water repellent for virtually all above-grade, vertical concrete, stucco, block and brick masonry. The treatment does not alter the color or texture of the surface, nor significantly affect the vapor transmissions qualities of the substrate. The solution penetrates the substrate and chemically reacts to create a powerful barrier against water penetration. This barrier is resistant to ultraviolet and weather deterioration. Prime-A-Pell 200 is manufactured utilizing a process whereby defused quartz carbide and an oligomeric siloxane are coupled, then dispersed in hydrocarbon solvent. The mixture is applied in a wet-on-wet, may be applied in multiple coats for adequate performance.

**STORAGE TEMPERATURE**
102°F (39°C)

**FLASH POINT - SETA**
Non-flammable

**ACTIVE INGREDIENT**
Modified Siloxane with Diffused Quartz Carbid

**HEALTH & SAFETY**
Paint and related products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to use of this product. Use only in well-ventilated areas. Special precautions should be taken to avoid vapor transmission (fumes). From entering the building before the building is vacated. Ventilation systems and fresh air intakes should be turned off and closed. All direct routes of vapor ingress such as windows and doors must be secure. Notify occupants of the building prior to application. As vapors may be irritating. Keep out of the reach of children.

**PACKAGING**
1 gallon (3.79 L) cans, 5 gallon (18.96 L) pails, 55 gallon (208.2 L) drums

**SHELF LIFE**
24 months at recommended storage temperature.

**COLORS**
Prime-A-Pell 200 is a clear liquid when applied, dries invisible, leaving the aesthetic appearance of the substrate unchanged.

**APPEARANCE**
Clear liquid

**COMMON USAGE**
Concrete, stone and masonry treated with Prime-A-Pell 200 resist water intrusion, stain damage, freeze/thaw spalling, efflorescence and rust damage.

**LIMITATIONS**
Prime-A-Pell 200 is formulated for use on horizontal or below-grade surfaces. It is not intended for use on windows, doors, gutters, roof edges, or for repair or maintenance of masonry. The substrate must be clean and dry. New concrete and mortar must be allowed to cure at least 28 days before treatment. The substrate must be sound, dry and free of cracks, dirt, oils, efflorescence, paint, curing compounds and all other contaminants which may affect the penetration of Prime-A-Pell 200. Fill all cracks, voids and repoint mortar joints necessary. New concrete and mortar must be allowed to cure a minimum of 48 days before application. Prime-A-Pell 200 may have limited efficacy on calcareous masonry such as limestones, marbles and travertines. The product is not appropriate for application to polished stone. Prime-A-Pell 200 must be applied to the substrate to be treated, therefore, it is not suitable for many painted or unexposed surfaces. It is not recommended for soils in an area where there is a possibility of contaminated food contact.

**SURFACE PREPARATION**

**ALL SURFACES**
The surface to be treated must be sound, dry and free of cracks, dirt, oils, efflorescence, paint, curing compounds and all other contaminants. New concrete and mortar must be allowed to cure a minimum of 28 days before application. Surface and air temperature must be between 45°F(7°C) and 95°F(35°C). Prime-A-Pell 200’s effectiveness is related to the amount of drying time, which increases as ed temperature decreases below 65°F(18°C). Protect treated surfaces from rain and lawn sprinklers for 6 to 8 hours. Allow 7 days before evaluating performance. Shown glass, wood and other surfaces that are not intended to be treated from overspray. Any overspray should be removed immediately with paint thinner or mineral spirits. Also protect asphaltic and painted surfaces, trees, shrubs and other landscaping from overspray.

**TECHNICAL DATA**

**VOLATILE ORGANIC COMPOUNDS**
6.1 lbs/gallon (729 grams/litre)

**SOLUBILITY IN WATER**
None

**ACTIVE INGREDIENT**
Oligomeric Alkylalkoxy Siloxane/Defused Quartz Carbid

**ACTIVE CONTENT**
7%

**APPEARANCE**
Clear liquid

**PACKAGING**
1 gallon (3.79 L) cans, 5 gallon (18.96 L) pails, 55 gallon (208.2 L) drums

**NET WEIGHT PER GALLON**
6.48 ± 0.10 lb/gal (776 g/L)

**STORAGE TEMPERATURE**
102°F (39°C)

**FLASH POINT - SETA**
102°F (35°C)

**HEALTH & SAFETY**
Paint and related products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to use of this product. Use only in well-ventilated areas. Special precautions should be taken to avoid vapor transmission (fumes) from entering the building before the building is vacated. Ventilation systems and fresh air intakes should be turned off and closed. Alldirect routes of vapor ingress such as windows and doors must be secure. Notify occupants of the building prior to application. As vapors may be irritating. Keep out of the reach of children.

43300 Seven Mile Road
Northville, MI 48167
1-800-659-4731
www.masonpro.com
**APPLICATION**

**COVERAGES**

Coverage rates are guidelines and will vary depending upon the texture of the surface and porosity of the substrate.

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Sq Ft./Gal</th>
<th>m²/litre</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU (porous)</td>
<td>50-75</td>
<td>1.2-1.8</td>
</tr>
<tr>
<td>CMU (normal)</td>
<td>75-125</td>
<td>1.8-3.1</td>
</tr>
<tr>
<td>Stucco</td>
<td>100-125</td>
<td>2.5-3.1</td>
</tr>
<tr>
<td>CastStone</td>
<td>100-125</td>
<td>2.5-3.1</td>
</tr>
<tr>
<td>Precast</td>
<td>200-300</td>
<td>4.9-7.4</td>
</tr>
<tr>
<td>Concrete Panels</td>
<td>200-300</td>
<td>4.9-7.4</td>
</tr>
<tr>
<td>FiredClayBrick (porous)</td>
<td>125-150</td>
<td>3.1-3.7</td>
</tr>
<tr>
<td>FiredClayBrick (dense)</td>
<td>200-250</td>
<td>4.9-6.1</td>
</tr>
<tr>
<td>Sandstone</td>
<td>65-150</td>
<td>1.6-3.7</td>
</tr>
</tbody>
</table>

A test application must be performed to determine the exact coverage rate, desired performance, and compatibility of Prime-A-Pell 200 and the substrate before beginning a job.

**THINNING**

Do not dilute or thin. Prime-A-Pell 200 must be used as supplied by the manufacturer.

**APPLICATION EQUIPMENT**

Mix well prior to application. Apply using a low-pressure rotary or gear pump sprayer with a fan tip (0.03-0.06 orifice) that allows for application of the product at 20-30 psi. A commercial grade pump-up sprayer tank equipped with a fan tip is also acceptable. Airless paint sprayers are not acceptable for the application of water repellents. Do not atomize the product.

On vertical installations, apply with a wet-on-wet technique. Apply as a saturating application of the product working from the bottom up. On porous substrates such as concrete masonry units, allow a slight rundown (less than three inches). On high density materials such as precast concrete panels or GFRC, do not allow any rundown. On all substrates, allow the product to penetrate the substrate for approximately 5 to 7 minutes, then apply again in the same manner. This second pass will require less material. Follow coverage rate guidelines, however, a test application should always be performed.

On horizontal installations, apply in a saturation application. Apply enough material for the surface to remain wet for 2 to 3 minutes before absorbing into the substrate. Do not allow puddles to remain on the surface; any areas of ponding should be broomed out.

**MAINTENANCE**

No required. Reapply after Prime-A-Pell 200 no longer repels water or offers desired protection. Life expectancy is dependent upon substrate condition and quality of application.

**CLEANUP**

Clean equipment after use with paint thinner or mineral spirits.
**PRODUCT INFORMATION**

**PRODUCT DESCRIPTION**

DIRECT-TO-METAL ENAMEL is a high-build alkyd coating with rust-inhibitive properties for application directly to bare steel.

- Good gloss and color retention
- Corrosion resistance and finish coat protection in one coat
- Outstanding long term flexibility
- Excellent application properties

**PRODUCT CHARACTERISTICS**

**Finish:** Semi-Gloss

**Color:** Wide range of colors available

**Volume Solids:** 41% ± 2%, may vary by color

**Weight Solids:** 59% ± 2%, may vary by color

**VOC (calculated):** <450 g/L; 3.75 lb/gal

**Recommended Spreading Rate per coat:**

<table>
<thead>
<tr>
<th>Wet mils (microns)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>175</td>
<td>13.0</td>
</tr>
<tr>
<td>13.0</td>
<td>325</td>
<td></td>
</tr>
</tbody>
</table>

| Dry mils (microns) | 3.0 | 75 | 5.0 | 125 |

| ~Coverage sq ft/gal (m²/L) | 131 | 3.2 | 188 | 4.6 |

| Theoretical coverage sq ft/gal (m²/L) @ 1 mil / 25 microns dft | 656 | 16.1 |

**Test Name** | **Test Method** | **Results**
---|---|---
Abrasion Resistance | ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load | 200 mg loss
Adhesion | ASTM D4541 | 300 psi
Direct Impact Resistance | ASTM G14 | >30 in. lbs.
Dry Heat Resistance | ASTM D2485 | 200°F (93°C) (discolors)
Exterior Durability | 1 year, 45° South | Very good
Flexibility | ASTM D522, 180° bend, 1/4" mandrel | Passes
Moisture Condensation Resistance | ASTM D4585, 100°F (38°C) | Passes
Pencil Hardness | ASTM D3363 | 3B
Salt Fog Resistance | ASTM B117, 500 hours | Passes
Thermal Shock | ASTM D2246 (5 cycles) | Passes

**Recommended Uses**

For use over prepared steel in industrial environments.

- Interior / exterior
- Primer / finish
- New construction
- Railings
- Machinery
- Structural steel
- Steel doors
- Steel decking
- Suitable for use in USDA inspected facilities
- Conforms to AWWA D102 OCS #1

**PERFORMANCE CHARACTERISTICS**

**Substrate**: Steel

**Surface Preparation**: SSPC-SP6/NACE 3

**System Tested**: 2 cts. Direct-to-Metal Enamel @ 3.0 mils (75 microns) dft/ct.

*unless otherwise noted below

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Test Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion Resistance</td>
<td>ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load</td>
<td>200 mg loss</td>
</tr>
<tr>
<td>Adhesion</td>
<td>ASTM D4541</td>
<td>300 psi</td>
</tr>
<tr>
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<td>ASTM G14</td>
<td>&gt;30 in. lbs.</td>
</tr>
<tr>
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<td>ASTM D2485</td>
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</tr>
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<td>Passes</td>
</tr>
<tr>
<td>Pencil Hardness</td>
<td>ASTM D3363</td>
<td>3B</td>
</tr>
<tr>
<td>Salt Fog Resistance</td>
<td>ASTM B117, 500 hours</td>
<td>Passes</td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>ASTM D2246 (5 cycles)</td>
<td>Passes</td>
</tr>
</tbody>
</table>

Provides performance comparable to products formulated to federal specifications: MIL-E-15090, TT-E-485F

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*NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.*

*Shelf Life: 36 months, unopened
Store indoors at 40°F (4.5°C) to 100°F (38°C).*

*Flash Point: 101°F (38°C), PMCC
Reducer: Not recommended
Clean Up: VM&P Naphtha, R1K3*
**PRODUCT INFORMATION**

**DIRECT-TO-METAL ENAMEL**

**B55 SERIES**

**RECOMMENDED SYSTEMS**

<table>
<thead>
<tr>
<th>Steel, Light Service:</th>
<th>1 ct.</th>
<th>Direct-To-Metal Enamel</th>
<th>3.0-5.0 (75-125)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, Moderate Service:</td>
<td>2 cts.</td>
<td>Direct-To-Metal Enamel</td>
<td>3.0-5.0 (75-125)</td>
</tr>
</tbody>
</table>

The systems listed above are representative of the product's use, other systems may be appropriate.

**SURFACE PREPARATION**

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

- Iron & Steel: SSPC-SP2

**Surface Preparation Standards**

<table>
<thead>
<tr>
<th>Condition of Surface</th>
<th>ISO 8501-1</th>
<th>BS7079:A1</th>
<th>Swedish Std.</th>
<th>SSPC</th>
<th>NACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Metal</td>
<td>Sa 3</td>
<td>Sa 3</td>
<td>SP 5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Near White Metal</td>
<td>Sa 2.5</td>
<td>Sa 2.5</td>
<td>SP 10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Commercial Blast</td>
<td>Sa 2</td>
<td>Sa 2</td>
<td>SP 6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Brush-Off Blast</td>
<td>Sa 1</td>
<td>Sa 1</td>
<td>SP 7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Hand Tool Cleaning</td>
<td>Rusted</td>
<td>C St 2</td>
<td>SP 2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pitted &amp; Rusted</td>
<td>D St 2</td>
<td>D St 2</td>
<td>SP 2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Rusted</td>
<td>C St 3</td>
<td>C St 3</td>
<td>SP 1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pitted &amp; Rusted</td>
<td>D St 3</td>
<td>D St 3</td>
<td>SP 3</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**TINTING**

Tint with Blend-A-Color Toner at 75% strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

**APPLICATION CONDITIONS**

Temperature: 40°F (4.5°C) minimum, 120°F (49°C) maximum (air, surface, and material)

Relative humidity: 85% maximum

Refer to product Application Bulletin for detailed application information.

**ORDERING INFORMATION**

Packaging: 1 gallon (3.78L) and 5 gallon (18.9L) containers

Weight: 9.2 ± 0.2 lb/gl, 1.10 Kg/L may vary with color

**SAFETY PRECAUTIONS**

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

**WARRANTY**

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel
Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). Coat any bare steel within 8 hours or before flash rusting occurs.

Previously Painted Surfaces
If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

Surface Preparation Standards

<table>
<thead>
<tr>
<th>Condition of Surface</th>
<th>ISO 8501-1 BS7079: A1</th>
<th>Swedish Std SIS055900</th>
<th>SSPC</th>
<th>NACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Metal</td>
<td>Sa 3</td>
<td>Sa 3</td>
<td>SP 5</td>
<td>3</td>
</tr>
<tr>
<td>Near White Metal</td>
<td>Sa 2.5</td>
<td>Sa 2.5</td>
<td>SP 10</td>
<td>3</td>
</tr>
<tr>
<td>Commercial Blast</td>
<td>Sa 2</td>
<td>Sa 2</td>
<td>SP 4</td>
<td>3</td>
</tr>
<tr>
<td>Brush-Off Blast</td>
<td>Sa 1</td>
<td>Sa 1</td>
<td>SP 7</td>
<td>3</td>
</tr>
<tr>
<td>Hand Tool Cleaning</td>
<td>Rusted</td>
<td>C St 2</td>
<td>SP 2</td>
<td>2</td>
</tr>
<tr>
<td>Power Tool Cleaning</td>
<td>Pitted &amp; Rusted</td>
<td>D St 2</td>
<td>SP 3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Rusted</td>
<td>C St 3</td>
<td>SP 3</td>
<td>2</td>
</tr>
</tbody>
</table>

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer .......................... Not recommended
Clean Up .......................... VM&P Naphtha, R1K3
Airless Spray
Pressure .......................... 2000 psi
Hose .......................... 3/8” ID
Tip .......................... 0.019”

Conventional Spray
Gun .......................... Binks 95
Fluid Nozzle .......................... 63B
Air Nozzle .......................... 63PB
Atomization Pressure ........... 50 psi
Fluid Pressure ........... 20-25 psi

Brush
Brush .......................... Natural Bristle

Roller
Cover .......................... 3/8” woven with solvent resistant core

If specific application equipment is not listed above, equivalent equipment may be substituted.
Surface preparation must be completed as indicated.

Mixing Instructions: Mix paint thoroughly to a uniform consistency with low speed power agitation prior to use.

Apply paint at the recommended film thickness and spreading rate as indicated below:

<table>
<thead>
<tr>
<th>Wet mils (microns)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry mils (microns)</td>
<td>7.0 175</td>
<td>13.0 325</td>
</tr>
<tr>
<td>Coverage sq ft/gal (m²/L)</td>
<td>3.0 75</td>
<td>5.0 125</td>
</tr>
</tbody>
</table>

Theoretical coverage sq ft/gal (m²/L) @ 1 mil / 25 microns dft:
656 16.1

**NOTE:** Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

**Recommended Spreading Rate per coat:**

<table>
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**Theoretical coverage sq ft/gal (m²/L) @ 1 mil / 25 microns dft:**
656 16.1

**NOTE:** Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

**Drying Schedule @ 10.0 mils wet (250 microns):**

<table>
<thead>
<tr>
<th>@ 77°F/25°C</th>
<th>@ 120°F/49°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% RH</td>
<td></td>
</tr>
<tr>
<td>To touch</td>
<td>1.5 hours</td>
</tr>
<tr>
<td>Tack free</td>
<td>6 hours</td>
</tr>
<tr>
<td>To recoat</td>
<td>18 hours</td>
</tr>
<tr>
<td>To cure</td>
<td>7 days</td>
</tr>
</tbody>
</table>

**Drying time is temperature, humidity, and film thickness dependent.**

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

**Performing Tips**

- Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.
- When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.
- Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.
- No reduction of material is recommended as it can affect film build, appearance, and adhesion.
- In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with VM&P Naphtha, R1K3.

**Clean Up Instructions**

Clean spills and spatters immediately with VM&P Naphtha, R1K3. Clean tools immediately after use with VM&P Naphtha, R1K3. Follow manufacturer's safety recommendations when using any solvent.

**Disclaimer**

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

**Safety Precautions**

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

**Warranty**

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Amercoat® 68HS

Zinc rich epoxy primer

- Outstanding resistance to chemicals and severe weathering
- Excellent adhesion to inorganic zincs
- Easily applied by airless or conventional spray
- Amercoat 861 Accelerator can be used for low temperature curing.

Typical Uses

Amercoat 68HS is a shop primer for bare steel on new construction or major repair projects, and as a field maintenance primer over bare steel or steel coated with organic or inorganic zinc primers and epoxy topcoats such as, Amercoat 385, Amerlock® 400 or Amershield™.

Surface Preparation

Coating performance, in general, is proportional to the degree of surface preparation. Surface must be clean, dry and free of all contaminants.

Typical Properties

- Adhesion, Elcometer D4541 1000 psi

Qualifications

- AASHTO – Standard Specification for Highway Bridges
- AISC – Specification for Structural Joints Using ASTM A325 or A490 Bolts

Physical Data

- Finish Flat
- Color Reddish gray
- Components 3
- Volume solids (ASTM D2697 modified) 70% ± 3%
- Coats 1
- Dry film thickness per coat 3 mils (75 microns)
- Theoretical coverage ft²/gal m²/L
  - 1 mil (25 microns) 1123 27.5
  - 3 mils (75 microns) 1 374 1 9.2
- VOC lb/gal g/L
  - mixed 2.4 288
  - mixed/thinned (1/2 pt/gal) 2.8 335
- Temperature resistance, dry °F °C
  - continuous (maximum) 200 93
- Flash point (SETA) °F °C
  - cure 110 - 43
  - resin 118 - 28
  - Amercoat 65 117 - 25
  - Amercoat 12 112 - 17

Application Data

- Applied over Steel
- Surface preparation SSPC-SP3, 6 or 10
- Method Airless or conventional spray
- Mixing ratio (by volume) 1- or 5-gal unit package
- Pot life (hours) °F/°C
  - nonaccelerated 8 16 24
  - accelerated (1/4 pt 861/5 gal) 5 1 91 6

Environmental conditions

- Temperature °F °C
  - air 32 to 120 0 to 49
  - surface 32 to 140 0 to 60
  - material (minimum) 40 4

Surfaces temperatures must be 5°F (3°C) above the dew point to prevent condensation.

Drying time (ASTM D1640) (hours) °F/°C

<table>
<thead>
<tr>
<th></th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
<th>32/0</th>
</tr>
</thead>
<tbody>
<tr>
<td>touch</td>
<td>1/4</td>
<td>1/2</td>
<td>0</td>
<td>1N</td>
</tr>
<tr>
<td>through</td>
<td>400</td>
<td>16</td>
<td>91</td>
<td>6</td>
</tr>
<tr>
<td>topcoat (minimum)</td>
<td>600</td>
<td>200</td>
<td>142</td>
<td>4</td>
</tr>
<tr>
<td>topcoat (maximum months)</td>
<td>600</td>
<td>600</td>
<td>166</td>
<td></td>
</tr>
</tbody>
</table>

accelerated (1/4 pt/861/5 gal)

<table>
<thead>
<tr>
<th></th>
<th>1/3</th>
<th>0</th>
<th>1/2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>touch</td>
<td>–</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>through</td>
<td>11/2</td>
<td>400</td>
<td>16</td>
<td>96</td>
</tr>
<tr>
<td>topcoat (minimum)</td>
<td>3/4</td>
<td>0</td>
<td>1/2</td>
<td>4</td>
</tr>
<tr>
<td>topcoat (maximum months)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

NR = Not Recommended
Application Data Summary

See Application Instructions for complete information on surface preparation, equipment, environmental conditions and application procedures. To obtain maximum performance, apply as recommended. For conditions outside the requirements or limitations described, contact your Ameron representative.

Safety Precautions

Read each component's material safety data sheet before mixing. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

This product is for industrial use only. Not for residential use.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

### Thinner Amercoat 65

<table>
<thead>
<tr>
<th></th>
<th>Equipment cleaner</th>
<th>Thinner or Amercoat 12</th>
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</thead>
<tbody>
<tr>
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<td></td>
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</table>

### Shipping Data

<table>
<thead>
<tr>
<th></th>
<th>1 gal</th>
<th>5 gal</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>cure</td>
<td>resin</td>
</tr>
<tr>
<td></td>
<td>1-qt can</td>
<td>1-gal can</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-gal can</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-gal can</td>
</tr>
<tr>
<td></td>
<td></td>
<td>powder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EnviroPac</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cure</td>
<td>resin</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>20.2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cure</td>
<td>resin</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td>26.6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>powder</td>
<td>98.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44.7</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors at 40 to 100°F (4 to 38°C)

- cure, resin, powder 1 year from shipment date

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities. See application instructions for complete information and safety precautions.

This mixed product is photochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.
Nu-Klad® 105A

Epoxy primer and sealer

**Product Data**

- **Primer for concrete surfaces**
  
  Nu-Klad 105A primer/sealer is recommended for concrete surfaces prior to application of Nu-Klad 100A, 110A, 120A and Amercoat® 3228 epoxy surfacers. Nu-Klad 105A is also recommended as a primer for Nu-Klad 470A elastomeric polyurethane, Amerlock® 400 and Amershield™.
  
  As a primer/sealer, Nu-Klad 105A is applied to concrete slabs or to formed concrete surfaces which have been water cured and properly prepared.
  
  As a concrete curing compound, Nu-Klad 105A is applied to concrete slabs immediately after pouring and finishing. Nu-Klad 105A is applied to formed concrete surfaces as soon as the forms are removed, three days after initial pour.

**Typical Uses**

- Chemical processing plants
  - Power
  - Sewage and waste treatments
- Finishing operations
  - Mining
  - Metal
- Mills
  - Pulp and paper
  - Steel
  - Textile

**Typical Systems Using Nu-Klad 105A**

**Nu-Klad 105A as a Primer**

Concrete must cure a minimum of 14 days prior to the application of Nu-Klad 105A as a primer/sealer.

**First Coat** | **Second Coat** | **Third Coat**
---|---|---
Nu-Klad 105A | Nu-Klad 100A, 110A | Amerlock 400, 120A, 470A or Amercoat 3228
| or none | or none | or none

When epoxy surfacers are applied outdoors, over Nu-Klad 105A as a primer/sealer the maximum recoat window is relatively short. If the maximum time is exceeded the Nu-Klad 105A surface will have to be roughened prior to topcoating.

**Nu-Klad 105A as a Concrete Curing Compound**

Nu-Klad 105A is applied to concrete slabs immediately after pouring and finishing, or to formed concrete surfaces as soon as the forms are removed (three days after initial pour). Concrete must cure a minimum of 14 days (total) prior to topcoating with epoxy surfacers.

**First Coat** | **Second Coat** | **Third Coat**
---|---|---
Nu-Klad 105A | Nu-Klad 100A, 110A | Amerlock 400, 120A, 470A or Amercoat 3228
| or none | or none | or none

When epoxy surfacers are applied outdoors, over Nu-Klad 105A as a concrete curing compound, the maximum recoat time will **ALWAYS** be exceeded and the Nu-Klad 105A surface will have to be roughened.

**Physical Data**

**Color**

**Components**
- 2

**Curing mechanism**
- Chemical reaction between components

**Coats**
- 1

**Theoretical coverage per unit**

<table>
<thead>
<tr>
<th>ft²/gal</th>
<th>m²/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 to 400</td>
<td>6.1 to 9.8</td>
</tr>
</tbody>
</table>

**Volume solids (calculated)**
- 100%

**Temperature resistance**
- Wet
  - continuous: 160°F (71°C)

**VOC mixed**
- 0.0 lbs/gal (0.0 g/l)

**Flash point (SETA)**
- Cure: 215°F (102°C)
- Resin: 183°F (84°C)
- Mixed: 210°F (99°C)
- Amercoat 12: 2°F (−17°C)
- Amercoat 928: 175°F (−115°C)

**Application Data**

**Applied over**
- Concrete

**Surface preparation**
- ASTM D4260, ASTM D4259

**Method**
- Airless spray, brush, roller, squeegee

**Working time (hours)**

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>117</td>
<td>136</td>
<td></td>
</tr>
</tbody>
</table>

**Environmental conditions**

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>air</td>
<td>50 to 100</td>
<td>10 to 38</td>
<td></td>
</tr>
<tr>
<td>surface</td>
<td>50 to 120</td>
<td>10 to 49</td>
<td></td>
</tr>
<tr>
<td>material (minimum)</td>
<td>50</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Drying time (ASTM D1640) (hours)**

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>touch</td>
<td>13</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>through</td>
<td>20</td>
<td>24</td>
<td>36</td>
</tr>
</tbody>
</table>

**Epoxy surfacing topcoat time over 105A**

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>minimum (hours)</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>maximum** (days)</td>
<td>15</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>inside</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>outside</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Amerlock/Amershield topcoat times**

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>minimum (hours)</td>
<td>13</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>maximum*** (months)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*Nu-Klad 105A is subject to color change upon aging.*

**Roughensurface**

**Maximum topcoat time exceeded, Nu-Klad 105A which is thick and glossy must be roughened.**

**Roughensurface**

**Maximum topcoat time exceeded**

**Equipment cleaner**
- Amercoat 12 or 928
Application Data Summary
See Application Instructions for complete information on surface preparation, environmental conditions, application procedures and equipment. To obtain maximum performance, apply as recommended. Adhere to all safety precautions during storage, handling, application and drying periods.

Surface Preparation
Coating performance is, in general, proportional to the degree of surface preparation. All surfaces must be clean, dry and free of all contaminants.

Safety Precautions
Read each component’s material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

This product is for professional use only. Not for residential use.

Warranty
Ameron warrants its products to be free from defects in material and workmanship. Ameron’s sole obligation and Buyer’s exclusive remedy in connection with the products shall be limited, at Ameron’s option, to either replacement of products not conforming to this Warranty or credit to Buyer’s account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer’s discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer’s failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

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Shipping Data
<table>
<thead>
<tr>
<th></th>
<th>1-gal unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cure</td>
</tr>
<tr>
<td></td>
<td>1.5 lbs in 1-qt can</td>
</tr>
<tr>
<td></td>
<td>resin</td>
</tr>
<tr>
<td></td>
<td>7.9 lbs in 1-gal can</td>
</tr>
<tr>
<td>Shipping weight (approx)</td>
<td>lb</td>
</tr>
<tr>
<td></td>
<td>resin</td>
</tr>
<tr>
<td></td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>cure</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>resin</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors in unopened, tightly sealed containers at 40 to 100°F (4 to 38°C)

The mixed product is nonphotochemically reactive as defined by the South Coast Air Quality Management District’s Rule 102 or equivalent regulations.

Numerical values are subject to normal manufacturing tolerances, colors and testing variances. Allow for application losses and surface irregularities.

Limitation of Liability
Ameron’s liability on any claim of any kind, including claims based upon Ameron’s negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.
Nu-Klad® 114A

**Product Data**

- Filler for steel, formed concrete or concrete block

Nu-Klad 114A is a 100% solids epoxy filler compound to fill holes, voids and surface discontinuities in steel, formed concrete or concrete block up to one inch across as measured in their largest dimension. A single application will fill or seal most air bubbles and holes. On concrete block surfaces, Nu-Klad 114A provides a smooth surface in a single application for applying coatings or Nu-Klad 100A spray-on epoxy surfacer.

Nu-Klad 114A may be used to fill pits, voids, or seams in steel or concrete water tanks. For potable water tanks, topcoat with an ANSI/NSF Standard 61 - approved potable water tank lining such as Amerlock 2 or 400.

**Typical Uses**

Steel and concrete surfaces in:
- Nuclear facilities
- Plants – fossil fuel, sewage and waste treatment, food and beverage, chemical processing
- Mills – pulp and paper, textile, steel
- Mining and metal finishing operations
- Water tanks

**Typical Properties – after 7 days @ 70°F (21°C)**

**Mechanical**
- Density (ASTM D71 modified) 88.6 lbs/ft³
- Tensile strength (ASTM D412) 3000 psi
- Compressive strength (ASTM C579) 12549 psi
- Modulus of elasticity (ASTM C580) 9.4 x 10⁵ psi

**Application Data Summary**

See Application Instructions for complete information on surface preparation, environmental conditions, application procedures and equipment. To obtain maximum performance, apply as recommended. Adhere to all safety precautions during storage, handling, application and drying periods.

**Surface Preparation**

Coating performance is, in general, proportional to the degree of surface preparation. Prior to coating, all surfaces must be clean, dry and free of all contaminants, including salt deposits.

**Qualifications**

ANSI/NSF Standard 61 - for use in drinking water
- Maximum Surface Area / Volume - 0.033 in³/L or maximum 1% of a 4000 gallon tank or larger
- Maximum Use Temperature - 23°C

**Physical Data**

- Color: Off-white
- Components: 2
- Curing mechanism: Chemical reaction between components
- Volume solids: 100%
- Theoretical coverage: ft²/unit
  - 1 mil (25 microns): 406
  - 3 lb unit: 2709
- VOC: lb/gal g/L
  - mixed: 0.0
- Flash point (SETA): °F °C
  - 114A cure: >200 - 93
  - 114A resin: >200 - 93
  - Amercoat 12: 2 - 17
  - Amercoat 928: 175 - 79

**Application Data**

- Applied over
- Prepared or primed steel, concrete, masonry block

- Surface preparation
  - steel: Abrasive blast ASTM D4258, 4259 or 4260
  - concrete: ASTM D4261
  - masonry: Nu-Klad 105A

- Primer: Squeegee, roller, trowel, spatula

- Method: Amercoat 12 or 928

- Mixing ratio (by volume): 1.84 parts resin to 1 part cure

- Working time (hours)
  - 90/32 70/21 50/10
  - Initial setting: 1 2½ 4
  - Curing time before topcoating
    - minimum: 9 18 36
    - maximum with 114A: 36 72 144
    - with 100A: 72 168 336
    - with Amercoat 90HS: 6 months

- If maximum recoat time exceeded, roughen surfaces

- Environmental conditions
  - Temperature: °F °C
    - material and surface: 50 to 120 10 to 27
  - Equipment cleaner: Amercoat 12 or 928
Safety Precautions
Read each component's material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

This product is for professional use only. Not for residential use.

Warranty
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Shipping Data

<table>
<thead>
<tr>
<th>Packaging units</th>
<th>Cure</th>
<th>Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 lb</td>
<td>1-qt can</td>
<td>1-qt can</td>
</tr>
<tr>
<td>20 lb</td>
<td>1/2-gal can</td>
<td>2 1/2-gal can</td>
</tr>
</tbody>
</table>

Shipping weight (approx)
- Cure: 3 lb, 0.79 lb
- Resin: 2.21 lb, 14.72 lb

Shelf life when stored indoors at 40 to 100°F (4 to 38° C)
1 year from shipment date

Numerical values are subject to normal manufacturing tolerances and testing variances. Allow for application losses and surface irregularities.

This mixed product is nonphotochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Limitation of Liability
Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.
Product Data/ Application Instructions

• Block filler for use on prepared interior or exterior masonry block

Application Data
Adhere to all application instructions, precautions, conditions and limitations to obtain maximum performance. For conditions outside the requirements or limitations described, contact your Ameron representative.

Surface Preparation
Surface must be clean and free of all contaminants. Refer to ASTM D4258 for cleaning.

Application Equipment
The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure and tip size may be needed for proper spray characteristics.

Airless spray – Standard equipment such as Graco Bulldog Hydra-Spray or larger, with a 0.021 to 0.029-inch fluid tip.

Brush or roller – For touchup or texturing coating.


Application Procedures
1. Flush all equipment with thinner or Amercoat 12 before use.
2. Stir resin using an explosion-proof power mixer to disperse pigments.
3. Add cure to resin. Mix thoroughly until uniformly blended to a workable consistency.
4. Do not mix more material than can be used within the expected pot life.
5. For optimum application material should be from 50 to 90°F (10 to 32°C). Above 110°F (43°C) sagging may occur.
6. Thin only for workability; thin no more than 1/2 pint of Amercoat 65 per gallon of Amerlock 400BF. A small amount of thinner greatly reduces viscosity; running or sagging may occur.
7. Apply in even, parallel passes; overlap 50 percent to avoid holidays, bare areas and pinholes. If required, cross spray at right angles.
8. Ventilate confined spaces with clean air between curing application coats and while curing final coat.
9. Repair any damaged areas by brushout or spray.
10. Clean equipment with thinner of Amercoat 12 immediately after use.

Physical Data

<table>
<thead>
<tr>
<th>Color</th>
<th>Off-white</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components</td>
<td>2</td>
</tr>
<tr>
<td>Curing mechanism</td>
<td>Solvent release and chemical reaction between components</td>
</tr>
<tr>
<td>Volume solids (calculated)</td>
<td>75% ± 3%</td>
</tr>
<tr>
<td>Dry film thickness per coat Coats</td>
<td>10-20 mils (250-500 microns)</td>
</tr>
<tr>
<td>Theoretical coverage</td>
<td>ft²/gal m²/L</td>
</tr>
<tr>
<td>1 mil (25 microns)</td>
<td>1203 29.5</td>
</tr>
<tr>
<td>10 mils (250 microns)</td>
<td>120.3 2.9</td>
</tr>
<tr>
<td>VOC mixed</td>
<td>lb/gal g/L</td>
</tr>
<tr>
<td>mixed/thinned ½ pt</td>
<td>1.8 21.6</td>
</tr>
<tr>
<td>Temperature resistance, Dry continuous</td>
<td>°F ºC</td>
</tr>
<tr>
<td>200 93</td>
<td></td>
</tr>
<tr>
<td>Temperature resistance, Dry intermittent</td>
<td>350 177</td>
</tr>
<tr>
<td>Flash point (SETA) cure and resin</td>
<td>°F ºC</td>
</tr>
<tr>
<td>80 27</td>
<td></td>
</tr>
<tr>
<td>Amercoat 65</td>
<td>78 25</td>
</tr>
<tr>
<td>Amercoat 12</td>
<td>2 -17</td>
</tr>
</tbody>
</table>

Application Data

Applied over
Concrete; concrete cinder, or masonry block

Surface preparation
Dry, clean, well prepared surface

Method
Airless spray, brush (touch-up), roller (back-up)

Mixing ratio (by volume)
1 part resin to 1 part cure

Pot life (hours)

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32 70/21 50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amerlock 400BF</td>
<td>1 1/2 2 1/2 4</td>
</tr>
</tbody>
</table>

Environmental conditions

<table>
<thead>
<tr>
<th>Temperature air and surface material</th>
<th>°F ºC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>20 to 122 -7 to 50</td>
</tr>
<tr>
<td>Summer</td>
<td>50 to 90 10 to 32</td>
</tr>
</tbody>
</table>

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation. At freezing temperatures, surface must be free of ice.

Drying time (ASTM D1640) (hours)

<table>
<thead>
<tr>
<th>°F/°C</th>
<th>90/32 70/21 50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>touch 10 mils</td>
<td>1 3 5</td>
</tr>
<tr>
<td>through 10 mils</td>
<td>1 1/2 4 6</td>
</tr>
<tr>
<td>Thinner</td>
<td>Amercoat 65</td>
</tr>
</tbody>
</table>

Equipment cleaner
Amercoat 12
Safety Precautions

Read each component’s material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which Ameron is unaware and over which it has no control.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.

Shipping Data

<table>
<thead>
<tr>
<th>Packaging units</th>
<th>2 and 5 gal</th>
<th>1 gal in 1-gal can</th>
<th>2.5 gal in 3 gal can</th>
</tr>
</thead>
<tbody>
<tr>
<td>cure</td>
<td>14.7</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>resin</td>
<td>14.2</td>
<td>6.4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2-gal unit</th>
<th>37.4</th>
<th>17.0</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>cure</td>
<td>36.4</td>
<td>16.5</td>
<td></td>
</tr>
<tr>
<td>resin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shipping weight (approx)</th>
<th>lb</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-gal unit</td>
<td>14.7</td>
<td>6.7</td>
</tr>
<tr>
<td>cure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>resin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-gal unit</td>
<td>37.4</td>
<td>17.0</td>
</tr>
<tr>
<td>cure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>resin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Shelf life when stored indoors at 40 to 100°F (4 to 38°C) | 1 year from shipment date |

Numerical values are subject to normal manufacturing tolerances, color and testing variabilities. Allow for application losses and surface irregularities.

Improper use and handling of this product can be hazardous to health and cause fire or explosion.

This mixed product is photochemically reactive as defined by the South Coast Air Quality Management District’s Rule 102 or equivalent regulations.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron’s sole obligation and Buyer’s exclusive remedy in connection with the products shall be limited, at Ameron’s option, to either replacement of products not conforming to this Warranty or credit to Buyer’s account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer’s discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer’s failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and knowledge in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron’s liability on any claim of any kind, including claims based upon Ameron’s negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.
Application Instruction

Adhere to all application instructions, precautions, conditions and limitations during storage, handling, application and drying periods to obtain the maximum performance. For conditions outside the requirements or limitations described, contact your Ameron representative.

Surface Preparation

Coating performance is proportional to the degree of surface preparation. Refer to specifications for specific primer being used. Nu-Klad 120A is applied over Nu-Klad 105A Primer/Sealer. The primed concrete surface must be clean and dry and free of contaminants such as dust, dirt, grease, or oil.

Concrete – Acid etch (ASTM D4260) or abrasive blast (ASTM D4259). Apply Nu-Klad 120A within maximum recoat time after priming. A primer is optional for two-coat application. When a second coat is used for smoothing, for adjusting thickness or for repair, apply within maximum recoat time. If recoat time is exceeded, roughen the surface before reapplication. Over very rough abrasive-blasted concrete a skin coat of Nu-Klad 120A may assist in achieving a smooth surface.

Application Equipment

The following equipment is recommended, but other equipment may be used:

Roller – Short nap, phenolic core.
Gauge rake – Such as, Silikal gauge rake in 24- or 32-inch lengths.
Plastic spiked roller – Such as, Silikal porcupine roller.

Mixing

Nu-Klad 120A is a 3 component package. Stir resin thoroughly to disperse pigment before mixing with cure. Add cure to resin and mix slowly until uniformly blended. Do not mix at high speed, air entainment will occur. Then add powder. Stir until uniformly blended by keeping mixing blade down at the bottom of container to reduce air entainment. Nu-Klad 120A is ready for use immediately after mixing resin and cure; no induction time is required. Do not mix more material than can be used within the working time: 2 hours at 70°F (21°C). Material which has begun to set cannot be satisfactorily used and must be discarded.

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.

Application Procedure

Nu-Klad 120A is packaged in the proper proportions which must be mixed together before use. Mix full units only.

Pour and Spread

Roller – Nu-Klad 120A can be applied using a short nap roller.
1. Pour mixed material on the floor and spread with a short nap roller.
2. Eliminate bubbles by rolling applied material with a spiked plastic roller.
3. Clean equipment with Amercoat® 12 or 928.

Gauge rake – Nu-Klad 120A can be applied using a gauge rake.
1. Pour mixed material, then spread evenly over concrete flooring using the gauge rake.
2. Eliminate bubbles by rolling material with a spiked plastic roller.
3. Clean equipment with Amercoat 12 or 928.

Repair – Reapply Nu-Klad 120A over clean Nu-Klad 120A surface up to 3 days @ 70°F (21°C). Roughen surface after 3 days.

<table>
<thead>
<tr>
<th>Working time (hours)</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1/2</td>
<td>3/4</td>
<td>1 1/2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drying time (hours)</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch</td>
<td>2</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Through (walk-on)</td>
<td>6</td>
<td>16</td>
<td>28</td>
</tr>
</tbody>
</table>

| Time before service (days) | 1 | 2 | 4 |

<table>
<thead>
<tr>
<th>Minimum topcoat time (hours)</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>with Amerlock® 400,</td>
<td>6</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Amershield®</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum recoat time (days)*</th>
<th>120A over 120A</th>
<th>120A over 105A</th>
<th>Amershield over 120A</th>
<th>Amerlock 400 over 120A</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>28</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>10</td>
<td>45</td>
<td>28</td>
</tr>
<tr>
<td>15</td>
<td>30</td>
<td>45</td>
<td>45</td>
<td>28</td>
</tr>
</tbody>
</table>

* Roughen surface if maximum recoat time is exceeded.
Safety Precautions
Read each component's material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion. Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

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Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and knowledge in the industry, and therefore is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability
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Due to Ameron's policy of continuous product improvement, the information contained in this Product Data/Application Instructions sheet is subject to change without notice. It is the Buyer's responsibility to check that this issue is current prior to using the product. For the most up-to-date Product Data/Application Instructions always refer to the Ameron International Performance Coatings & Finishes website at www.ameroncoatings.com.
Amercoat 220 is a high-performance waterborne acrylic enamel that may be applied direct to metal* on most exterior and interior surfaces. Also ideal for concrete and masonry, it may be used over tightly adhering old paint and rust as well as primed surfaces. Amercoat 220 provides a beautiful, flexible, cleanable gloss finish that resists cracking, peeling and impact damage. Amercoat 220 significantly out-performs conventional acrylic coatings. It retains color and gloss like a polyurethane, far better than traditional alkyds.

Amercoat 220 requires minimal surface preparation, usually only metal etching or power tool cleaning to remove loose rust. Easy to apply and clean up, Amercoat 220 is a versatile topcoat for a wide variety of new construction and maintenance applications. Contact your PPG representative for conditions outside the requirements or limitations described.

*Important – Amercoat 220 deep or dark colors made from neutral or clear tint base should always be used with a prime coat when going over metallic surfaces such as steel and aluminum.

**Typical Uses**
- Walls
- Food processing plants
- Institutional maintenance and new construction
  - Schools
  - Hospitals
  - Laboratories
  - Storage areas
- Industrial maintenance and new construction
  - Tank exteriors
  - Structural steel
- Marine applications
  - Vessel topsides and interiors
  - Offshore platform topsides and interiors
- Not recommended for continuous immersion

**Physical Data**

**Finish**
- Semigloss

**Color**
- See color chart

Uniform appearance will require two coats of white or pastel colors over dark substrates. Use only light-colored primer or intermediate coat when one finish coat of white or pastel Amercoat 220 is specified.

Gloss varies with color. Yellow, red and orange colors will fade faster than other colors due to the replacement of lead-based pigments with lead-free pigments in these colors.

**Components**
- 1

**Curing mechanism**
- Drying

**Volume solids (calculated)**
- 35% ± 3%

**Dry film thickness per coat**
- 2 mils (50 microns)
- 2-5 mils (50-125 microns)

Coating thickness depends on severity of exposure and surface roughness.

**Costs**
- 1 to 2

**Theoretical coverage**
- ft²/gal m²/L
- 1 mil (25 microns) 561 13.8
- 2 mils (50 microns) 280 6.9

**VOC**
- 1.5 lb/gal 180 g/L

**Flash point (SETA)**
- °F °C
- >212 >100

**Qualifications**
- NFPA – Class A
- USDA – Incidental Food Contact

**Application Data**

**Applied over**
- Prepared or primed steel and concrete, previously painted surfaces, wood, aluminum, galvanizing, dry wall

**Primer**
- 148, 385, 400, 5105, Dimetec®21-5 or D9 Series

When applying over Dimetec 21-5, Amercoat 856 Additive must be used.

**Surface preparation**
- See primer application instructions

**Method**
- Conventional or airless spray, brush, roller

**Environmental conditions**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>air</td>
<td>40 to 110</td>
<td>4 to 33</td>
</tr>
<tr>
<td>surface</td>
<td>40 to 120</td>
<td>4 to 49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative humidity</th>
<th>°F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(maximum)</td>
<td>60%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.

**Formerly Amerguard™ 220**
Surface Preparation

Coating performance is proportional to the degree of surface preparation. Clean surface thoroughly to remove any dust, dirt, grease, oil, loose paint or other contaminants. Clean by using scrub brushes and detergent.

Steel* – Remove all loose rust, dirt, grease or other contaminants by one of the following depending on the degree of cleanliness required: SSPC-SP3; SSPC-SP2; SSPC-SP6; SSPC-SP7. Water blasting is also acceptable. For more severe service, clean to SSPC-SP10. The choice of surface preparation will depend on the system selected and end-use service conditions.

Galvanizing* – Remove oil or soap film with neutral detergent or emulsion cleaner. Then use zinc treatment such as Galvaprep® or equivalent or blast lightly with fine abrasive.

Aluminum* – Remove oil, grease or soap film with neutral detergent or emulsion cleaner; treat with Alodine® 1200, Alumiprep® or equivalent or blast lightly with fine abrasive.

Concrete/masonry – Clean concrete surface, abrasive blast ASTM D4259 or acid-etch ASTM D4260. Fill concrete voids with Amercoat 965 or 114A. Clean masonry surface by ASTM D4261. Fill masonry block with Amerlock® 400BF Block Filler or Amercoat 147 Waterborne Block Filler.

Wood – Sand new and bare wood to remove any surface contamination and surface cells. Remove oil spots, sap or pitch by wiping with Amercoat® 65. Properly dispose of solvent rags to avoid spontaneous combustion hazard. A wood primer or a first coat of Amercoat 220 may be used to prime surface. To recoat primed wood, remove all dirt, grease or oil with a cleaner. Rinse with clean water. Remove wax with commercial dewaxer. Sand loose paint to a tight, adherent surface.

Aged coatings – All surfaces must be clean, dry, tightly bonded and free of all loose paint, corrosion products or chalky residue. Clean by pressure water blast (1000 psi or greater), SSPC-SP1, SSPC-SP3 or SSPC-SP7.

Drywall – Tape all joints, fill cracks and nail holes with patching paste or spackle; sand smooth. Remove all dust. Unsealed surface will require two coats of Amercoat 220.

Dimetcote® – When applying directly over inorganic zinc or zinc-rich primers, a mist coat may be required to minimize bubbling. This will depend on age of coating, surface roughness and conditions during curing. Refer to specific primer being used for surface preparation.

*Important – Amercoat 220 deep or dark colors made from neutral or clear tint base should always be used with a prime coat when going over metallic surfaces such as steel and aluminum.

Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure and tip size may be needed for proper spray characteristics.

Airless spray – Standard equipment such as Graco Series 600. Tip sizes from 0.015- to 0.019-inch fluid tip.

Conventional spray – Industrial equipment, such as DeVibiss, MBC or JGA spray gun. Separate air and fluid pressure regulators and a moisture and oil trap in the main air supply line are recommended.

Power mixer – Jiffy Mixer

Brush – Natural bristle. Maintain a wet edge.

Roller – Industrial solvent resistant roller. Level any air bubbles with bristle brush.

Environmental conditions

<table>
<thead>
<tr>
<th>Temperature</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>air</td>
<td>40 to 110</td>
<td>4 to 43</td>
</tr>
<tr>
<td>surface</td>
<td>40 to 120</td>
<td>4 to 49</td>
</tr>
</tbody>
</table>

Relative humidity

- 40°F maximum 60%
- 50 to 100°F maximum 85%
- above 100°F maximum 95%

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.

Application Procedure

1. Flush equipment with fresh water before using.

2. Stir material thoroughly to a workable consistency to ensure suspension of pigments. Thinning is not normally required. If thinning is required for workability, add up to 1/2 pt of water per gallon of Amercoat 220. Do not exceed thinning limit. Film build will be reduced.

Drying time (ASTM D1640) @ 2 mils DFT.

- 90/32 touch (min)
- 70/21 through (hours)

- 50/10
- minimum 1
- maximum 3

Cracking may occur at temperatures below 50°F during initial drying.

3. Apply a wet coat in oven, parallel passes; overlap each pass 50 percent to avoid bare areas, pinholes. If required, cross spray at right angles.

4. Ventilate with clean air during application and drying. Temperatures and relative humidity of ventilating air will affect drying times. Avoid contact with water or condensation on the coating surface until dry through; otherwise, surface discoloration may occur.

5. Clean all equipment immediately after use with fresh water to remove any partially dried material.
Typical Properties

Performance**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion (ASTM D4060)</td>
<td>110 mg</td>
</tr>
<tr>
<td>CS-17, 1000 cycles, 1 kg</td>
<td>110 mg</td>
</tr>
<tr>
<td>Impact (ASTM G14)</td>
<td>160 in/lbs</td>
</tr>
<tr>
<td>Adhesion (Filometer) (ASTM D4541)</td>
<td>500 psi</td>
</tr>
<tr>
<td>Flexibility (ASTM D522)</td>
<td>&gt;35%</td>
</tr>
<tr>
<td>Moisture vapor transmission (ASTM D1653)</td>
<td>1.04</td>
</tr>
<tr>
<td>Specific permeability</td>
<td></td>
</tr>
<tr>
<td>Temperature resistant (dry) °F/°C</td>
<td>200/93</td>
</tr>
<tr>
<td>Continuous</td>
<td></td>
</tr>
<tr>
<td>Intermittent</td>
<td>250/121</td>
</tr>
<tr>
<td>Weatherability</td>
<td></td>
</tr>
<tr>
<td>(QUV &amp; Florida Exposure)</td>
<td></td>
</tr>
<tr>
<td>Chalk resistant</td>
<td></td>
</tr>
<tr>
<td>Gloss retention</td>
<td>1 yr/Excellent</td>
</tr>
<tr>
<td>Salt Spray (ASTM B117)</td>
<td>None (ASTM D1654)</td>
</tr>
<tr>
<td>1000 hrs; 1 coat</td>
<td></td>
</tr>
<tr>
<td>Face corrosion</td>
<td></td>
</tr>
<tr>
<td>Humidity/Condensation (ASTM D4585)</td>
<td>None (ASTM D1654)</td>
</tr>
<tr>
<td>100 hrs; 1 coat</td>
<td></td>
</tr>
<tr>
<td>Face corrosion</td>
<td></td>
</tr>
<tr>
<td><strong>Note: Values are for factory manufactured material. Tint based colors will have reduced water resistance.</strong></td>
<td></td>
</tr>
</tbody>
</table>

Compatibility

Coated surfaces: may be applied over most existing coatings, including alkyds, epoxies, vinyls, polyurethanes, acrylic. To insure good adhesion, conduct a compatibility test over clean, intact area or roughen the surface with light abrasive blasting or sanding.

Suitable primers:

- Amercoat 148 Waterborne Acrylic
- Amercoat 351 100% solids multi-purpose epoxy
- Amercoat 385 Epoxy
- Amerlock 400 Epoxy
- Amercoat 5105 Alkyd
- Dimetcote 21-5 Waterbased Inorganic Zinc Silicate
- Dimetcote 9 Series Inorganic Zinc Primer

Drying time (ASTM D1640) @ 2 mils DFT °F/°C

- touch (minutes): 90/32, 70/21, 50/10
- through (hours): 15, 20, 60
- Recoat time (hours) minimum: 1, 3, 13

Cracking may occur at temperatures below 50°F during initial drying.

Thinner

Equipment cleaner

Water

Shipping Data

<table>
<thead>
<tr>
<th>Packaging</th>
<th>1 gal</th>
<th>5 gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping weight (approx)</td>
<td>lb</td>
<td>kg</td>
</tr>
<tr>
<td>1-gal can</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>5-gal can</td>
<td>53</td>
<td>24</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors at 40 to 100°F (4 to 38°C) 18 months from manufacture date

Protect from freezing.

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities. See application instructions for complete information and safety precautions.

This product is nonphotocchemically reactive as defined by the South Coast Air Quality Management District’s Rule 102 or equivalent regulations.

Safety Precautions

Read material safety data sheet before use. Safety precautions must be strictly followed during storage, handling and use.

**CAUTION - Improper use and handling of this product can be hazardous to health.**

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mist concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interior and buildings.

This product is to be used by those knowledgeable about proper application methods. PPG makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which PPG is unaware and over which it has no control.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

*This product is for professional use only. Not for residential use.*
Product Data/ Application Instructions

- Solventless
- High-build
- Hot water resistant
- Chemical resistant
- Abrasion resistant
- Excellent barrier properties
- Standard airless application
- Easily cleaned

Typical Uses

- Chemical tank lining
- Water tank lining
- Pipe lining and coating
- Abrasion resistant coating
- Concrete protection

Amercoat 351 is a solventless, high performance coating that can be applied with standard airless equipment. It is suitable for use as a tank lining for a variety of fuel and clean products for non-reactive chemicals, caustic, salt water, ballast and dry bulk materials.

The abrasion resistance of Amercoat 351 allows it to be used as a lining for slurries, or as a coating for concrete in high wear services.

Amercoat 880 glass flake additive may be added to Amercoat 351 to increase film build, further reinforce mechanical properties and lower moisture permeability. For increased film build in one coat, Amercoat 884 can be added.

Amercoat 351 is an excellent barrier coat, providing long-term resistance to corrosion even under aggressive conditions. It is suitable for immersion in both salt and deionized waters up to 120°F (49°C).

Typical Properties

Abrasional (ASTM D4060)
- 1 kg/1000 cycles / cs-17 wheel
- 41 mg wt. loss

Adhesion, elcometer (ASTM D4541)
- 1200 psi

Salt spray - 12 mils/5000 hrs.
- face corrosion (ASTM B117)
- None

Humidity condensation (ASTM D4585)
- 2000 + hrs

Moisture Vapor Transmission (ASTM F1249)
- 6.07g/m²

Amercoat 351 is an excellent barrier coat, providing long-term resistance to corrosion even under aggressive conditions. It is suitable for immersion in both salt and deionized waters up to 120°F (49°C).

Physical Data

Finish
- Semigloss

Color
- Gray

*Note: When exposed to sunlight, color changes will occur.

Components
- 2

Curing mechanism
- Chemical reaction between components

Volume solids (calculated)
- 100%

Dry film thickness per coat
- with 880
- 12-25 mils
- with 884 1 gal
- 20-55 mils

Theoretical coverage:
- 1604 ft²/gal
- 39.4 m²/L
- 201
- 4.9

Temperature resistance
- Wet
- 120°F / 49°C
- 200°F / 93°C
- intermittent
- 140°F / 60°C
- 250°F / 121°C

Flash point (SETA)
- 351 cure
- >212°F / >100°C
- 351 resin
- >212°F / >100°C
- Amercoat 928
- 175°F / 79°C

Qualifications

USDA - Incidental Food Contact

Application Data

Applied over
- Primed or prepared steel, concrete

Surface preparation
- steel: SSPC-SP10
- concrete: ASTM D4259 or 4260

Primer
- Amercoat 370

Method
- Airless spray

Mixing ratio (by volume)
- 351
- 3 parts resin to 1 part cure

Pot life (hours)
- 90/32°F / °C
- 70/21°C
- 50/10°F / °C
- 1/1½

Environmental conditions

Temperature
- air and surface
- 40 to 90°F / 4 to 32°C
- material
- 50 to 90°F / 10 to 32°C

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.
Chemical Resistance

The following is a representative list of chemicals to which Amercoat 351 may be exposed as a lining. Contact your Ameron representative for recommendations concerning specific requirements.

- Alum
- Gasoline, unleaded
- 10% Ammonium hydroxide
- Kerosene
- Aromatic
- Methanol (to 120°F, 49°C)
- n-Butyl acetate
- Mineral oil
- Carbon Tetrachloride
- Nonyl phenol
- Castor oil
- Oxygenated salt water
- 50% Caustic (to 160°F, 71°C)
- Palm oil (to 160°F, 71°C)
- Crude oil (to 120°F, 49°C)
- Salt water (to 120°F, 49°C)
- Diesel fuel
- 20% Sodium carbonate
- Diethylene glycol
- Triton X-100
- Ethanol (to 120°F, 49°C)
- Water (to 120°F, 49°C)
- Formaldehyde
- Xylene

Systems Using Amercoat 351

1st Coat 2nd Coat
Amercoat 351 Amercoat 351
Amercoat 351 Amercoat 450HS

Surface Preparation

Coating performance is, in general, proportional to the degree of surface preparation. Prior to coating, the surface must be clean, dry, undamaged and free of all contaminants, including salt deposits. Round off all rough welds and remove all weld spatter.

Steel – Abrasive blast SSPC-SP10. Blast to achieve an anchor profile of 1 to 2 mils (25-50. microns) anchor profile as indicated by a Keane-Tator Surface Profile Comparator, Testex Tape or similar device. Remove abrasive residue or dust from surface. Apply Amercoat 351 as soon as possible to keep steel from rusting. If a holding primer is required, Amercoat 83HS may be used.

Concrete—Clean concrete surface. Abrasive blast (ASTM D4259) or acid etch (ASTM D4260) to remove all previous coatings, chalk and surface glaze or laitance. Fill small holes or voids in cast concrete wall or overhead surfaces with Nu-Klad 114A filler compound before applying Amercoat 351. Apply Amercoat 351 within 7 days after application of Nu-Klad 114A.

Adhere to all application instructions, precautions, conditions and limitations to obtain the maximum performance. For conditions outside the requirements or limitations described, contact your Ameron representative.

Drying time (ASTM D1640) (hours) °F/°C
- 90/32 70/21 50/10
- touch 8 10 16
- through 12 18 60
- Recoat time**
- minimum 8 12 36
- maximum (days) 5 14 20

**Roughensurfaceimprovesurfaceadherencebeforerecoating.

Time before service @ 8 mils (days) °F/°C
- 90/32 70/21 50/10
- immersion*** 4 7 14

***Cureat50°Fminimum.

Equipment cleaner Amercoat 928

Shipping Data

Packaging 1- and 4-gal can
- cure 0.25 gal in 1-gal can
- resin 0.75 gal in 1-gal can
- 3.0 gal in 5-gal can

Shipping weight (approx) lb kg
- 1-gal unit
- cure 2.5 1.1
- resin 9.3 4.2
- 4-gal unit
- cure 9.0 4.1
- resin 40.0 18.1

Shelf life when stored indoors at 40 to 100°F (4 to 38°C) cure and resin 1 year from shipment date

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities.

The mixed product is nonphotochemically reactive as defined by South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Low Temperature Limitations

After application the substrate and coating temperature must be at 40°F or above to avoid creating film defects from exposure to temperatures below 40°F.

Cure time required before exposure to temperatures below 40°F are as follows:

- 70°F 60°F 50°F 40°F
- 3 hrs 7 hrs 16 hrs 48 hrs

High Temperature Limitation

After application at surface temperatures of 40°F to 90°F the Amercoat 351 must cure as follows before being exposed to temperatures above 90°F to avoid sagging:

- 90°F 70°F 60°F 50°F 40°F
- 4 hrs 6 hrs 8 hrs 10 hrs 24 hrs

When surface temperatures are above 90°F use Amercoat 884 additive to maintain film build. Without the Amercoat 884 additive sagging may occur above 4 mils DFT at a substrate temperature of 140°F.
Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure and tip size may be needed to achieve the proper spray characteristics.

**Airless spray** — Standard equipment with a ratio of 45:1, such as Graco King. Pump should be equipped with ¾ inch internal diameter high pressure spray hose for lengths of less than 50 feet. For length greater than 50 feet, spray hose should be ½ inch internal diameter.

When Amercoat 880 is added, the tip size should be 0.035-inch or larger. Tip size when Amercoat 884 is added should be 0.027 to 0.035.

**Power mixer** — Jiffy Mixer

**Brush or Roller** — Additional coats may be required to attain proper thickness.

Application Procedure

Amercoat 351 is packaged in the correct proportions of resin and cure which must be mixed together before use.

1. Flush equipment with Amercoat 928 cleaner.
2. Stir both resin and cure to an even consistency. Add cure to resin mixing until a uniform consistency is achieved. **Do not use thinners.** Never mix more than can be sprayed within pot life time.

<table>
<thead>
<tr>
<th>Pot life (hours)</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>90/32</td>
<td>70/21</td>
</tr>
<tr>
<td>½</td>
<td>1</td>
</tr>
</tbody>
</table>

3. Apply a wet coat in even, parallel passes. Overlap each pass 50 percent to avoid bare areas, pinholes or holidays. Cross spray at right angles if necessary.
4. Material temperature must be between 50 and 90°F. Higher temperatures shorten the pot life. Lower temperatures affect sprayability.
5. Ventilate with clean air during application. Maintain air temperature to prevent condensation on coating surface.
6. Check film thickness using a wet film thickness gauge. If films less than 8 mils (200 microns) apply additional material. Maximum dry film thickness when using Amercoat 880 is 25 mils per coat.

**Note:** Increase film build in the application of Amercoat 884 when added. IMD-31 will increase film thickness to between 20-55 mils. See Amercoat 884 Product Data Sheet for specific information.

7. For immersion service, check for bare areas, pinholes and holidays with a non-destructive wet sponge holiday detector such as Tinker-Rasor Model M1 or Model AP/W. Apply additional Amercoat 351 to areas requiring touch-up within maximum recoat time. Time before service @ 8 mils (days)

<table>
<thead>
<tr>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>90/32</td>
</tr>
<tr>
<td>70/21</td>
</tr>
<tr>
<td>50/10</td>
</tr>
</tbody>
</table>

8. Clean equipment with Amercoat 928 immediately after use.

Repair

Spot abrasive blast to remove all rust, loose paint and other contaminants from damaged areas abraded to bare steel.

Clean and roughen coating surface if recoat time is exceeded. Apply Amercoat 351 as soon as possible after surface is cleaned to prevent contaminants on the surface.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron’s sole obligation and Buyer’s exclusive remedy in connection with the products shall be limited, at Ameron’s option, to either replacement of products not conforming to this Warranty or credit to Buyer’s account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer’s discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer’s failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron’s liability on any claim of any kind, including claims based upon Ameron’s negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.
Safety Precautions

Read each component’s material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements must be carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

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Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.
Amercoat® 385

Multi-purpose epoxy

(385 Series)

Physical Data

<table>
<thead>
<tr>
<th>Finish</th>
<th>Flat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Amercoat 385</td>
</tr>
<tr>
<td></td>
<td>Amercoat 385PA</td>
</tr>
<tr>
<td>Inhibitive pigment</td>
<td>Oxide red, buff</td>
</tr>
<tr>
<td>Components</td>
<td>2</td>
</tr>
<tr>
<td>Curing mechanism</td>
<td>Solvent release and chemical reaction between components</td>
</tr>
<tr>
<td>Volume solids (ASTM D2697 modified)</td>
<td></td>
</tr>
<tr>
<td>385 or 385PA</td>
<td>68% ± 3%</td>
</tr>
<tr>
<td>Dry film thickness per coat</td>
<td></td>
</tr>
<tr>
<td>385 or 385PA with 880 glassflakes</td>
<td>4 to 6 mils (100 to 150 microns)</td>
</tr>
<tr>
<td>1 mil (25 microns)</td>
<td>1059</td>
</tr>
<tr>
<td>4 mils (100 microns)</td>
<td>265</td>
</tr>
<tr>
<td>385 with 880 at 6 mils (150 microns) will be 185 ft² per gallon.</td>
<td></td>
</tr>
<tr>
<td>Coats</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Theoretical coverage ft²/gal m²/L</td>
<td></td>
</tr>
<tr>
<td>385 or 385PA</td>
<td></td>
</tr>
<tr>
<td>1 mil (25 microns)</td>
<td>1059</td>
</tr>
<tr>
<td>4 mils (100 microns)</td>
<td>265</td>
</tr>
<tr>
<td>385 with 880 at 6 mils (150 microns) will be 185 ft² per gallon.</td>
<td></td>
</tr>
<tr>
<td>VOC lb/gal g/L (EPA method 24)</td>
<td></td>
</tr>
<tr>
<td>385 mixed/thinned</td>
<td>2.3</td>
</tr>
<tr>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Temperature °F °C °F °C</td>
<td></td>
</tr>
<tr>
<td>continuous</td>
<td>140 60 200 93</td>
</tr>
<tr>
<td>intermittent</td>
<td>175 79 250 121</td>
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<tr>
<td>Flash point (SETA) °F °C</td>
<td></td>
</tr>
<tr>
<td>385 cure</td>
<td>118 48</td>
</tr>
<tr>
<td>385 resin</td>
<td>128 53</td>
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<tr>
<td>Amercoat 861</td>
<td>300 149</td>
</tr>
<tr>
<td>Amercoat 65</td>
<td>78 25</td>
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<tr>
<td>Amercoat 101</td>
<td>145 63</td>
</tr>
<tr>
<td>Amercoat 12</td>
<td>2 -17</td>
</tr>
</tbody>
</table>

Qualifications

Military Sealift Command Underwater hulls, topside and salt water ballast tank service.

NAVSEA Chapter 631 for aluminum hull use

USDA Incidental Food Contact

MIL-P-23236B Type IV Dedicated Sea Water Ballast only.

Class 2 Grade B

Typical Uses

- Multi-purpose high build epoxy
- High solids high build epoxy intermediate
- Primer for durable systems with wide range of topcoats, including polyurethanes and acryles
- Ballast water tanklining
- High build anti-corrosive coating for ship hulls
- Excellent shop primer for corrosive service
- Suitable for immersion service
- Outstanding chemical and weather resistance
- Excellent adhesion to inorganic zinc silicate
- Easy application
- Contains no lead or chromate pigments
- Low VOC
- Wide film build range
- Compatible with a variety of substrates and surface preparations

Amercoat 385 is a high-performance epoxy coating forming a tough, abrasion-resistant, durable film. It adheres strongly to bare steel, coated steel and inorganic zinc silicate primed surfaces on new construction, repair and field maintenance projects. Amercoat 385 will also adhere to intact painted surfaces and tight rust and may be used to repair itself or inorganic zinc silicate primers.

Amercoat 385 provides an excellent barrier to corrosion; its inhibitive pigment version (385PA) affords corrosion inhibition at damaged areas. It has good protection to chemical resistance, making it suitable for use in aggressive environments. Amercoat 385 is user-friendly and can be applied by a variety of methods to produce a smooth, fast-drying film. It is suitable for immersion in both salt and fresh water at temperatures up to 140°F, continuous and can be used as a tank lining for alkaline and salt solutions, petroleum fuels, sewage waste and certain chemicals.

Amercoat 385 may also be applied over aluminum, stainless steel, galvanizing, concrete and previously coated surfaces in addition to steel.

Amercoat 880 glassflake may be added to increase film build and lower moisture vapor permeability. For additional information see Amercoat 880 Product Data Sheet or contact your Ameron representative.

Typical Uses

- Decks, hulls and superstructures of ships, barges and workboats.
- Piers, offshore platforms and related structures.
- Tank exteriors in oil refineries, paper mills, chemical processing facilities and waste water treatment plants.
- Tank lining.
- Industrial structural steel, machinery and piping.
Typical Properties

Physical
- Abrasion (ASTM D4060) 108 mg weight loss
- 1 kg load/1000 cycles
- CS-17 wheel
- Adhesion, Elcometer (ASTM D4541) >1000 psi

Performance
- Salt spray – 1 coat @ 6 mils 5000 hours exposure
- face corrosion (ASTM B117) None
- face blistering (ASTM B117) None
- Humidity (condensation) (ASTM D4585)
  - 3000 hours exposure
  - face corrosion None
- Steam cleanable Yes
- Chemical resistance – Condition after 1 year immersion
  - caustic 30%, 50% up to 140°F Excellent
  - fuel (MSC recipe) Excellent
  - salt water Excellent
  - DI water up to 140°F Excellent

Amercoat 385 Chemical Resistance Guide

<table>
<thead>
<tr>
<th>Environment</th>
<th>Splash and Spillage</th>
<th>Fumes and Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidic</td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>Alkaline</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Solvents</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Salt solutions</td>
<td>G</td>
<td>VG</td>
</tr>
<tr>
<td>Acidic</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Neutral</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Alkaline</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Water</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>

F-Fair G-Good E-Excellent VG-Very Good

This chart shows typical resistance of Amercoat 385. Contact your Ameron representative for your specific requirements.

Systems Using Amercoat 385

1st Coat 2nd Coat 3rd Coat

- Amercoat 385 or 385PA
- Amercoat 385 or 385PA Amershield™
- Amercoat 385 or 385PA 450 Series
- Dimetcote® 9 Series 385 Amershield, 450 Series Amershield, 450 Series
- Amercoat 68 Series 385 Amershield, 450 Series Amershield, 450 Series
- Amercoat 385 385 279, 275E, 277E, ABC 3, ABC 4

Confirm compliance with VOC regulations before using coating systems. For immersion service, apply 2 coats at a minimum of 8 mils total DFT.

Over Dimetcote, and Amercoat 68 Series primers, a mist coat/full coat and thinning with Amercoat 101 may be required to prevent application bubbling.

Use Amercoat 385PA primer when inhibitive pigmented primer is specified as the first coat.

Use Amercoat 385PA oxide red when MIO pigment is specified.

Application Data

Applied over substrates
- Steel, concrete, masonry block, aluminum, galvanizing, coated surfaces

Primer/s
- See Systems Table

Method
- Airless, conventional spray, brush or roller

Mixing ratio (by volume)
- 385 or 385PA 1 part resin to 1 part cure
- 385 with 880 glassflake 1-gal 880 per mixed 2-gal 385
- 385 with 880 glassflake 1 1/2-gal 880 per mixed 10-gal 385

Pot life (hours)
- °F/°C
  - 90/32 70/21 50/10
  - 385 or 385PA 1/2 3 5
  - 385 with 880 glassflake 1 1/2 2 1/2 4

Environmental conditions
- Temperature °F °C
  - Air and surface 32 to 120 0 to 49
  - Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.

Drying time (ASTM D1640) @ 6 mils, DFT (hours)
- °F/°C
  - 90/32 30/3 90/32 50/10 32/0
  - touch 1 2 3 6
  - through 10 16 24 168
  - with 880 glassflake 12 18 26 192

Topcoat or recoat time
- minimum 6 8 10 72
- Addition of 861 Accelerator does not change dry-to-touch or dry-through times but does accelerate cure for service.

Topcoat or recoat time (days) (maximum)
- °F/°C
  - Product
    - 450 Series or Amershield™ 14 30 42
    - 385 or 385PA non-immersion
      - No maximum – Clean surface required
      - Immersion
        - 6 months – high pressure water wash and roughen surface if exceeded
        - 18 months – high pressure wash and roughen surface if exceeded
    - ABC 3, or ABC 4, Amercoat 275E, 277E, 279
      - Apply while 385 is soft to thumb pressure

Failure to apply antifoulings while coating is still soft to thumb pressure may result in poor adhesion and eventual delamination.

Time before service @ 8 mils (hours)
- °F/°C
  - 385 or 385PA 90/32 70/21 50/10 32/0
  - Immersion
    - Ambient
      - Hot 24 48 72 240
      - Non-immersion 12 24 36 168
  - Thinnings (up to 1/2 pt)
    - Above 70°F (21°C) Amercoat 101
    - Below 70°F (21°C) Amercoat 65

In confined areas thin with Amercoat 101

Equipment cleaner
- Thinner or Amercoat 12
Adhere to all application instructions, precautions, conditions and limitations to obtain the maximum performance. When used over recommended primers, refer to Application Instructions for the specific primer being used for surface preparation data and application and drying procedures. For conditions outside the requirements or limitations described, contact your Ameron representative.

Surface Preparation

Coating performance is proportional to the degree of surface preparation. Refer to specifications for the specific primer being used. Prior to coating, primed surface must be clean, dry, undamaged and free of all contaminants including salt deposits. Round off all rough welds and remove all weld spatter.

Steel – Remove all loose rust, dirt, grease or other contaminants by one of the following depending on the degree of cleanliness required: SSPC-SP2, 3, 6 or 7. SP12 (WJ-2L) is also acceptable. For more severe service and immersion, clean to SSPC-SP10. The choice of surface preparation will depend on the system selected and end-use service conditions.

Blast to achieve a dense, angular anchor profile of 1-2 mils (25-50 microns) as indicated by a Keane-Tator Surface Profile Comparator or Testex Tape. Increase coating thickness if profile greater than 3 mils.

Galvanizing – Remove oil or soap film with neutral detergent or emulsion cleaner; then use zinc treatment such as Galvaprep® or equivalent or blast lightly with fine abrasive.

Aluminum – Remove oil, grease or soap film with neutral detergent or emulsion cleaner; treat with Alodine® 1200, Aluminiprep® or equivalent or blast lightly with fine abrasive.

Concrete/masonry – Surface must be cured, clean, dry, free of contamination and disintegrated or chalky materials. Clean concrete surface; abrasive blast (ASTM D4259) or acid etch (ASTM D4260). Fill concrete voids with Nu-Klad® 965 or 114A to achieve a smooth surface. Clean masonry block by ASTM D4261. Fill masonry block with Amerlock® 400BF Block Filler.

Aged coatings – All surfaces must be clean, dry, tightly bonded and free of all loose paint, corrosion products or chalky residue. Clean by low pressure water cleaning (1000 psi, min.), SSPC-SP1, 2, 3 or 7. Amercoat 385 is compatible over most types of properly applied and tightly adhering coatings. However, a test patch is recommended to confirm compatibility.

Repair – Prepare damaged areas to original surface preparation specifications, feathering edges of intact coating. Thoroughly remove dust or abrasive residue before touch up.

Application Equipment

Airless spray – Standard equipment such as Graco Bulldog or larger with a 0.15- to 0.021-in. (0.38 to 0.53 mm) fluid tip.

Conventional spray – Industrial equipment such as DeVilbiss MBC or JGA spray gun with 78 or 765 air cap and “E” fluid tip, or Binks No. 18 or 62 gun with a 66 x 63PB nozzle set up. Separate air and fluid pressure regulators, and a moisture and oil trap in the main air supply line are recommended.

Power mixer – Jiffy Mixer powered by an air or an explosion-proof electric motor.

Brush – Natural bristle. Maintain wet edge.

Roller – Use industrial roller. Level any air bubbles with bristle brush.

Application Procedure

Amercoat 385 or 385PA consists of two components which must be mixed together before use. It is packaged in the proper portions in 2- or 10-gallon units.

1. Stir equipment with thinner or Amercoat 12 before use.

2. Stir each component thoroughly, then combine resin and cure and mix until uniform. When using Amercoat 880 glassflake, add material to mixed unit of Amercoat 385 following 880. Instructions for use.

3. Thin only if necessary for workability, add Amercoat 101 up to ½ pint (approximately 6%) per gallon of Amercoat 385. Use Amercoat 65 when faster drying is desired. Use Amercoat 101 when applying in confined spaces. Use only Ameron recommended thinners.

4. Do not mix more material than will be used within pot life. Pot life is shortened by higher temperatures.

5. For conventional spray, use adequate air pressure and volume to ensure proper atomization.

6. Apply a wet coat in even, parallel passes; overlap each pass 50 percent. If required, cross-spray at right angles to avoid holidays, bare areas and pinholes.

Note: When applying directly over inorganic zines or zinc-rich primers, a mist coat/full coat technique may be required to minimize bubbling. This will depend on the age of the primer, surface roughness, and environmental conditions during application and curing.

7. When applying antifouling coatings, apply first antifouling coat while Amercoat 385 is still soft to touch pressure. Failure to apply antifouling while Amercoat 385 is still soft may result in poor adhesion between coatings and eventual delamination of the antifouling.

8. Normal recommended dry film thickness per coat is 4 to 6 mils for 385 and 6 to 14 mils for 385 with 880. However, if greater thickness is applied in local areas because of overlapping, no runs or sags will normally occur at a dry film thickness up to 10 mils for 385 and 16 mils for 385 with 880. Total dry film thickness in two coats must not exceed 16 mils for 385 and 32 mils for 385 with 880.

9. A wet film thickness of 6 mils (150 microns) normally provides 4 mils (100 microns) of dry film.

10. When using brush or roller application method, additional coats may be required to achieve proper film thickness.

11. When a pinhole-free film is required, check film continuity of material with a nondestructive holiday detector such as Tinker and Rasor Model M-1. Apply additional Amercoat 385 to areas requiring touch up.

12. Clean all equipment with thinner or Amercoat 12 immediately after use.
Safety Precautions

Read each component's material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion. Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, testing and proper separation of application areas.

Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which Ameron is unaware and over which it has no control.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron’s sole obligation and Buyer’s exclusive remedy in connection with the products shall be limited, at Ameron’s option, to either replacement of products not conforming to this Warranty or credit to Buyer’s account in the invoices amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer’s discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer’s failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron’s liability on any claim of any kind, including claims based upon Ameron’s negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.

Shipping Data

Packaging

<table>
<thead>
<tr>
<th>Product</th>
<th>2- and 10-gal units</th>
</tr>
</thead>
<tbody>
<tr>
<td>385 or 385PA</td>
<td></td>
</tr>
</tbody>
</table>

Shipping weight (approx.)

<table>
<thead>
<tr>
<th>Product</th>
<th>2- and 10-gal units</th>
</tr>
</thead>
<tbody>
<tr>
<td>385 or 385PA</td>
<td></td>
</tr>
<tr>
<td>2-gal unit</td>
<td>lb</td>
</tr>
<tr>
<td>385 or 385PA</td>
<td></td>
</tr>
<tr>
<td>1 gal in 1-gal can</td>
<td>12</td>
</tr>
<tr>
<td>1 gal in 1-gal can</td>
<td>13</td>
</tr>
<tr>
<td>385 or 385PA</td>
<td></td>
</tr>
<tr>
<td>5-gal unit</td>
<td>lb</td>
</tr>
<tr>
<td>385 or 385PA</td>
<td></td>
</tr>
<tr>
<td>5 gal in 5-gal can</td>
<td>61</td>
</tr>
<tr>
<td>5 gal in 5-gal can</td>
<td>60</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors at 40 to 100°F (4 to 38°C)

cure, resin and paste 1 year from shipment date

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities. See application instructions for complete information and safety precautions. The mixed product is photochemically reactive as defined by the South Coast Air Quality Management District’s Rule 102 or equivalent regulations.
Amerlock® 400
High-solids epoxy coating

Typical Uses
Amerlock 400 is used in those areas where blasting is impractical or impossible. As a maintenance coating, Amerlock 400 protects steel structures in industrial facilities, bridges, tank exteriors, marine weathering, offshore, oil tanks, piping, roofs, water towers and other exposures. Amerlock 400 has good chemical resistance to splash/spillage, fumes and immersion in neutral, fresh and salt water (see resistance table). Contact your PPG representative for specific information.

Physical Data

<table>
<thead>
<tr>
<th>Finish</th>
<th>Color</th>
<th>Semigloss</th>
<th>Standard, Rapid Response, custom colors and aluminum</th>
</tr>
</thead>
</table>

Qualifications
USDA – Incidental food contact
NFP A – Class A
NSF Standard 61 – For use in drinking water.

Physical Properties

- Low VOC
- High-performance general maintenance coating for new or old steel
- Cures through wide temperature range
- Self-priming topcoat over most existing coatings
- Can be overcoated with wide range of topcoats
- Compatible with prepared damp surfaces
- Compatible with adherent rust remaining on prepared surfaces
- 5 mils or more in a single coat
- Resists high humidity and moisture
- Temperature resistance to 450°F on insulated or uninsulated surfaces when mixed with Amercoat 880 glass flake additive
- Can be applied to substrates with temperatures up to 250°F

Amerlock's low solvent level meets VOC requirements, reduces the chances for film pinholing and solvent entrapment at the substrate-coating interface, often a major cause of coating failure with conventional epoxies and lower solids systems.

Amerlock 400 is available in a variety of colors, including aluminum, and therefore does not require a topcoat. For extended weatherability or special uses, a topcoat may be desired.

Typical Uses
Amerlock 400 is used in those areas where blasting is impractical or impossible. As a maintenance coating, Amerlock 400 protects steel structures in industrial facilities, bridges, tank exteriors, marine weathering, offshore, oil tanks, piping, roofs, water towers and other exposures. Amerlock 400 has good chemical resistance to splash/spillage, fumes and immersion in neutral, fresh and salt water (see resistance table). Contact your PPG representative for specific information.

Amerlock 400 is available in a variety of colors, including aluminum, and therefore does not require a topcoat. For extended weatherability or special uses, a topcoat may be desired.

Physical

- Abrasion resistance (ASTM D4060)
  - 1 kg load/1000 cycles, weight loss
    - CS-17 wheel 102 mg
- Impact resistance (ASTM D2794)
  - Direct 24 in × lb
  - Reverse 6 in × lb
- Moisture vapor transmission (ASTM D1653)
  - 6.28 g/m²/24 hrs
- Adhesion (ASTM D4541)
  - 900 psi

Performance

- Salt spray (ASTM B117) 3000 hours
  - Face blistering None
- Humidity (ASTM D2247) 750 hours
  - Face corrosion, blistering None
- Immersion (NACE TM-01-69) fresh water 1 year
  - Blistering None

Amerlock 400 is used in those areas where blasting is impractical or impossible. As a maintenance coating, Amerlock 400 protects steel structures in industrial facilities, bridges, tank exteriors, marine weathering, offshore, oil tanks, piping, roofs, water towers and other exposures. Amerlock 400 has good chemical resistance to splash/spillage, fumes and immersion in neutral, fresh and salt water (see resistance table). Contact your PPG representative for specific information.

Qualifications
USDA – Incidental food contact
NFP A – Class A
NSF Standard 61 – For use in drinking water.

Some discoloration and darkening will occur at temperatures greater than 200°F; this will not affect film integrity or coating performance.

Flash point (SELT) 

<table>
<thead>
<tr>
<th>Resin</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/400</td>
<td>131</td>
<td>55</td>
</tr>
<tr>
<td>400 cure</td>
<td>85</td>
<td>29</td>
</tr>
<tr>
<td>2AL/400AL</td>
<td>110</td>
<td>43</td>
</tr>
<tr>
<td>400AL cure</td>
<td>116</td>
<td>47</td>
</tr>
<tr>
<td>Amercoat 8</td>
<td>20</td>
<td>-7</td>
</tr>
<tr>
<td>Amercoat 65</td>
<td>78</td>
<td>25</td>
</tr>
<tr>
<td>Amercoat 101</td>
<td>145</td>
<td>63</td>
</tr>
<tr>
<td>Amercoat 12</td>
<td>2</td>
<td>-17</td>
</tr>
</tbody>
</table>

* Amerlock 400 resin and Amerlock 2 resin are identical, and are packaged under a common label as Amerlock 2/400 resin. Amerlock 400 cure and Amerlock 2 cure are different, and are labeled individually.
### Chemical Resistance Guide

<table>
<thead>
<tr>
<th>Environment</th>
<th>Immersion</th>
<th>Spillage</th>
<th>Fumes and Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400</td>
<td>400AL</td>
<td>400</td>
</tr>
<tr>
<td>Acetic</td>
<td>*</td>
<td>*</td>
<td>E</td>
</tr>
<tr>
<td>Alkaline</td>
<td>*</td>
<td>*</td>
<td>G</td>
</tr>
<tr>
<td>Solvents</td>
<td>*</td>
<td>*</td>
<td>E</td>
</tr>
<tr>
<td>Salt water</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Water</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>F-Fair</td>
<td>G</td>
<td>Good</td>
<td>E</td>
</tr>
<tr>
<td>E-Excellent</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>

*Contact your PPG representative.

This table is only a guide to show typical resistances of Amerlock 400 and 400AL. For specific recommendations, contact your PPG representative for your particular corrosion protection needs.

### Systems using Amerlock 400 or 400AL

<table>
<thead>
<tr>
<th>1st coat</th>
<th>2nd Coat***</th>
<th>3rd Coat***</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>400</td>
<td>450H Series</td>
<td>None</td>
</tr>
</tbody>
</table>

Amershieldd * 400**

Dimetrote® 9

Series 400

Dimetrote 9 Series 400

450H Series

*For color contrast when 2 coats of 400AL are used, 400AL red can be used as first coat.

### Recoat/Topcoat time

<table>
<thead>
<tr>
<th>Minimum (hours)</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>8</td>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>400 with 1 pt 861</td>
<td>4</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>400AL</td>
<td>3</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>400AL with ½ pt 861</td>
<td>3</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

### Recoat/Topcoat time @ 70°F (21°C)

<table>
<thead>
<tr>
<th>System</th>
<th>Maximum time</th>
</tr>
</thead>
<tbody>
<tr>
<td>400/400</td>
<td>3 months</td>
</tr>
<tr>
<td>400 with 861/400</td>
<td>1 month</td>
</tr>
<tr>
<td>400/Amershieldd or 450H Series</td>
<td>1 month</td>
</tr>
<tr>
<td>400/5405</td>
<td>1 day</td>
</tr>
<tr>
<td>400 with 861/Amershieldd or 450H Series</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

Drying times are dependent on air and surface temperatures as well as film thickness, ventilation and relative humidity. Maximum recoating time is highly dependent upon actual surface temperatures — not simply ambient air temperatures. Surface temperatures should be monitored, especially with sun-exposed or otherwise heated surfaces. Higher surface temperatures shorten the maximum recoat window.

Note: if maximum time is exceeded, roughen surface. For topcoats (finish coats) not listed, see Product Data sheet for specific topcoat time limitations.

### Surface Preparation

Coating performance is, in general, proportional to the degree of surface preparation. Abrasive blasting is usually the most effective and economical method. When this is impossible or impractical, Amerlock 400 can be applied over mechanically cleaned surfaces. All surfaces must be clean, dry and free of all contaminants, including salt deposits.

Amerlock 400 may be used over most types of properly prepared and tightly adhering coatings. A test patch is recommended for use over existing coatings.

Steel – Remove all loose rust, dirt, moisture, grease or other contaminants from surfaces. Power-tool clean SSPC-SP3 or hand-tool clean SSPC-SP2. For more severe environments, dry abrasive blast SSPC-SP7. Water blasting is also acceptable. For immersion service — dry abrasive blast SSPC-SP10. For high-heat service on uninsulated substrates, abrasive blast per SSPC-SP6. For insulated substrates, abrasive blast per SSPC-SP10. In both cases, a 2-3 mil profile must be obtained.

### Application Data

<table>
<thead>
<tr>
<th>Applied over</th>
<th>Steel, concrete, aluminum, galvanizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface preparation</td>
<td>Steel, Concrete, Aluminum, Galvanizing</td>
</tr>
<tr>
<td>Product</td>
<td>Amerlock 400, 400AL, Amerlock 861 Accelerator</td>
</tr>
<tr>
<td>Environment</td>
<td>Air or Surface Temperature</td>
</tr>
<tr>
<td>Amt</td>
<td>Mixed 5 gal</td>
</tr>
<tr>
<td>861 Accelerator Amt</td>
<td>90/32</td>
</tr>
<tr>
<td>Amerlock</td>
<td>70/21</td>
</tr>
<tr>
<td>400</td>
<td>50/10</td>
</tr>
<tr>
<td>1 pt 400AL</td>
<td>32/0</td>
</tr>
<tr>
<td>½ pt 400AL</td>
<td>4</td>
</tr>
<tr>
<td>1 pt 400AL</td>
<td>7</td>
</tr>
<tr>
<td>1 pt 400</td>
<td>10</td>
</tr>
<tr>
<td>½ pt 400</td>
<td>15</td>
</tr>
<tr>
<td>1 pt 400</td>
<td>4</td>
</tr>
<tr>
<td>½ pt 400AL</td>
<td>2</td>
</tr>
<tr>
<td>1 pt 400AL</td>
<td>4</td>
</tr>
</tbody>
</table>

*Note: Amerlock 400 may be applied to surfaces as hot as 250°F (121°C). When applying Amerlock 400 to surfaces between 122°F and 250°F, thin 1 pt per gallon with Amercoat 101 thinner. Multiple passes may be required to achieve film build and to avoid solvent blistering.

### Drying time (ASTM D1640) (hours)

<table>
<thead>
<tr>
<th>861 Amt /mixed 5 gal</th>
<th>120/49</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
<th>32/0</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1½</td>
<td>4</td>
<td>9</td>
<td>28</td>
<td>96</td>
</tr>
<tr>
<td>½ pt 400AL</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td>36</td>
<td>96</td>
</tr>
<tr>
<td>1 pt 400</td>
<td>1½</td>
<td>3</td>
<td>5</td>
<td>24</td>
<td>72</td>
</tr>
<tr>
<td>1 pt 400AL</td>
<td>1</td>
<td>1½</td>
<td>2½</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

### Drying time continued

<table>
<thead>
<tr>
<th>Amt</th>
<th>6</th>
<th>12</th>
<th>16</th>
<th>40</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1½</td>
<td>7½</td>
<td>24</td>
<td>72</td>
<td>216</td>
</tr>
<tr>
<td>½ pt 400AL</td>
<td>6</td>
<td>6</td>
<td>20</td>
<td>40</td>
<td>140</td>
</tr>
<tr>
<td>1 pt 400AL</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

### Cure for immersion (days)

<table>
<thead>
<tr>
<th>Amt</th>
<th>None</th>
<th>400AL</th>
<th>400AL</th>
<th>400AL</th>
<th>400AL</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>21</td>
<td>NR</td>
</tr>
<tr>
<td>½ pt</td>
<td>400AL</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>21</td>
</tr>
</tbody>
</table>

Amercoat 861 Accelerator will slightly discolor Amerlock 400 white and other Amerlock light colors.

**NR = Not recommended**
Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

Airless spray – Standard equipment with 30:1 pump ratio or larger, with a 0.017- to 0.021-inch fluid tip.

Conventional spray – Industrial equipment, such as DeVilbiss MBC or JGA or Binks 18 or 62 spray gun. A moisture and oil trap in the main air supply line, a pressure material pot with mechanical agitator and separate regulators of air and fluid pressure are recommended.

Power mixer – Jiffy Mixer powered by an air or explosion-proof electric motor.

Brush or roller – Additional coats may be required to attain proper thickness.

Application Procedure

1. Flush all equipment with thinner or Amercoat® 12 before use.
2. Stir resin and cure using an explosion-proof power mixer to disperse pigments.
3. Add cure to resin. Mix thoroughly until uniformly blended to a workable consistency. For low temperature application, use Amercoat 861 accelerator. Do not exceed the 1 pint Amercoat 861 accelerator per 5 gallon unit recommendation.
4. Do not mix more material than can be used within the expected pot life.
5. For optimum application, material should be from 50° to 90°F (10° to 32°C). Above 122°F (50°C), sagging may occur.
6. Use only PPG recommended thinners. For potable water applications, see current NSF listing at www.nsf.org for approved thinners and thinning restrictions. For other applications, above 85°F (29°C) use Amercoat 8, or 101 at lower temperatures use Amercoat 65. A small amount of thinner greatly reduces viscosity; excessive thinning will cause running or sagging. Thin cautiously as follows:
   - Amercoat 8 or 65 thinner: 400 to 400AL
   - Airless – up to ½ pt/gal: 1 ½ pt/gal
   - Conventional – up to ½ pt/gal: 1 ½ pt/gal

   Below 50°F additional thinning may be needed and multiple coats required to achieve specified thickness.

   Above 122°F, up to 250°F surface temperatures, use Amercoat 101 thinner sparingly to promote flow and leveling. Excessive thinning will cause running or sagging.
7. To minimize orange peel appearance, adjust conventional spray equipment to obtain adequate atomization at lowest air pressure.
8. Apply a wet coat in even, parallel passes with 50 percent overlap to avoid holidays, bare areas and pinholes. If required, cross spray at right angles.
9. When applying Amerlock 400 directly over inorganic zinc or zinc rich primers, a mist coat/full coat technique may be required to minimize bubbling. This will depend on the age of the Dimecoat®, surface roughness and conditions during curing.

   Note – Do not use Amerlock 400AL on water damp surfaces.
10. Ventilate confined areas with clean air between coats and while curing the final coat. Prevent moisture condensation on the surface between coats.
11. Repair damaged areas by brush or spray.
12. Clean equipment with thinner or Amercoat 12 immediately after use.

Shipping Data

- Packaging unit
  - 2 gal: 2 gal
  - 1-gal can: 2.5-gal can
  - resin: 1-gal can: 2.5-gal can

- Shipping weight (approx)
  - lbs: kg
  - 2-gal unit
    - 400 cure: 12.5
    - 2/400 resin: 13.7
    - 400AL cure: 12.1
    - 400AL resin: 11.0
  - 5-gal unit
    - 400 cure: 31.8
    - 2/400 resin: 35.0
    - 400AL cure: 30.9
    - 400AL resin: 28.3

Shelf life when stored indoors at 40° to 100°F (4° to 38°C) resin and cure 1 year from shipment date.

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities. This mixed product is photochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Safety Precautions

Read each component’s material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep solvent vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. PPG makes no recommendation about the types of safety measures that may need to be adopted because these depend on application and space, of which PPG is unaware and over which it has no control.

If you do not fully understand the warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.
**Amerlock® 2**

**Amerlock Series**

Fast drying surface tolerant VOC compliant epoxy

- Fast dry, dry to touch in 2 hours at 70°F (21°C)
- Recoat in 3 hours at 70°F (21°C)
- Low temperature cure down to 0°F (-18°C)
- Exceptional corrosion protection in industrial and marine corrosive environments
- Surface tolerant, excellent adhesion to tight rust and prepared damp surfaces
- Self priming topcoat over most existing coatings
- Can be overcoated with a wide range of topcoats
- Temperature resistance to 450°F on insulated or uninsulated surfaces when mixed with Amercoat 880 glass flake additive.

Amerlock 2’s low solvent level meets most VOC requirements, reduces the chances for film pinholing and solvent entrainment at the substrate-coating interface, often a major cause of coating failure with conventional epoxies and lower solids systems.

Amerlock 2 is available in a variety of colors, and therefore does not require a topcoat. For extended weatherability or special uses, a topcoat may be desired.

**Typical Uses**

Amerlock 2 is designed for use in a variety of areas, even those where surface preparation is impossible. As a maintenance coating, Amerlock 2 protects steel structures in industrial facilities, bridges, tank exteriors, marine weathering, offshore, oil tanks, piping, roofs, water towers and other exposures. Amerlock 2 has good chemical resistance to splash/spillage, fumes and immersion in neutral, fresh and salt water (see resistance table). Contact your PPG representative for specific information.

**Qualifications (Amerlock 2)**

1. USDA – Incidental food contact
2. NSF Standard 61* - For use in drinking water.
3. FDA 21 CFR 175.300 extraction test for direct food contact

*For NSF application information, please visit our website at www.ppgamercoat.ppgpmc.com/NSF/

**Physical Data**

<table>
<thead>
<tr>
<th>Finish</th>
<th>Semigloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Standard, Rapid Response, custom colors and aluminum</td>
</tr>
<tr>
<td>Components</td>
<td>2</td>
</tr>
<tr>
<td>Curing mechanism</td>
<td>Solvent release and chemical reaction between components</td>
</tr>
</tbody>
</table>

| Volume solids (ASTM D2697 modified) | 83% ± 3% | 85% ± 3% |
| Dry film thickness (per coat)       | 4-8 mls (100-200 microns) |
| Coats                              | 1 or 2 |
| Theoretical coverage               | ft²/gal | m²/L |
| 1mil (25 microns)                  | 1331    | 32.6 |
| Amerlock 2                         | 1363    | 33.1 |
| 5 mils (125 microns)               | 266     | 6.5  |
| Amerlock 2                          | 273     | 6.7  |
| VOC                                | lb/gal | g/L |
| Amerlock 2 mixed*                  | 1.5   | 180  |
| mixed/thinned (% pt/gal)*           | 1.8   | 216  |
| Amerlock 2AL mixed**               | 1.0   | 123  |
| mixed/thinned (% pt/gal)**          | 2.0   | 234  |
| *EPA method 24                     |         |
| **Calculated                       |         |

| Temperature resistance,*            | wet     | dry   |
| continuous                         | 100 °F  | 200 °F|
| intermittent                        | 100 °F  | 93  °C|
| with 880 (1 gal can/2gal mix)       |         |
| continuous                         | 100°F (38°C) | 425°F (218°C) |
| intermittent                        | 100°F (38°C) | 450°F (232°C) |
| Flash point (SETA)                 | °F      | °C   |
| Amerlock 2/400 resin*              | 131     | 55   |
| Amerlock 2 cure                    | 114     | 46   |
| Amerlock 2AL resin                 | 110     | 43   |
| Amerlock 2AL cure                  | 122     | 50   |
| Amercoat* 8                        | 20      | -7   |
| Amercoat 65                        | 78      | 25   |
| Amercoat 101                       | 145     | 63   |
| Amercoat 12                        | 2       | -17  |

* At temperatures above 200°F, dry film thickness must not exceed 10 mls (250 mils).
* Amerlock 2 resin and Amerlock 400 resin are identical, and are packaged under a common label as Amerlock 2/400 resin. Amerlock 2 cure and Amerlock 400 cure are different, and are labeled individually.
Surface Preparation
Coating performance is, in general, proportional to the degree of surface preparation. Abrasive blasting is usually the most effective and economical method. When this is impossible or impractical, Amerl ock 2 can be applied over mechanically cleaned surfaces. All surfaces must be clean, dry and free of all contaminants, including salt deposits.
Amerl ock 2 may be used over most types of properly prepared and tightly adhering coatings. A test patch is recommended for use over existing coatings.
Steel – Remove all loose rust, dirt, moisture, grease or other contaminants from surface. Power-tool clean SSPC-SP3 or hand-tool clean SSPC-SP2. For more severe environments, dry abrasive blast SSPC-SP7. Water jetting is also acceptable. For immersion service – dry abrasive blast SSPC-SP10.
Aluminum – Remove oil, grease or soap film with neutral detergent or emulsion cleaner; treat with Alodine® 1200, Alumiprep® or equivalent or blast lightly with fine abrasive.
Galvanizing – Remove oil or soap film with detergent or emulsion cleaner; then use zinc treatment such as Galvaprep® or equivalent or blast lightly with fine abrasive. Not recommended over chromate treated galvanizing.
Concrete – Acid etching (ASTM D4260) or abrasive blast (ASTM D4259) new concrete cured a minimum of 14 days.

Application Data

<table>
<thead>
<tr>
<th>Applied over</th>
<th>Steel, concrete, aluminum, galvanizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixing ratio (by volume)</td>
<td>1 part resin to 1 part cure</td>
</tr>
<tr>
<td>Environmental conditions</td>
<td>Air and surface temperature 20° to 120°F (-6° to 49°C)</td>
</tr>
</tbody>
</table>

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation. At freezing temperatures, surface must be free of ice.

<table>
<thead>
<tr>
<th>Drying time (ASTM D1640) (hours)</th>
<th>touch °F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>120/49 90/32 70/21 50/10 32/0 20/-6</td>
<td></td>
</tr>
<tr>
<td>Amerl ock 2</td>
<td>0.5 1 2 3 5 11 30 —</td>
</tr>
<tr>
<td>Amerl ock 2AL</td>
<td>0.5 2 3.5 5 11 13 38 96</td>
</tr>
<tr>
<td>Amerl ock 2</td>
<td>1 2 4.5 7 17 48 —</td>
</tr>
<tr>
<td>Amerl ock 2AL</td>
<td>1.5 3.5 7 17 48 —</td>
</tr>
<tr>
<td>Amerl ock 2</td>
<td>cure to immersion* (days) 1 2 3 7 21 —</td>
</tr>
</tbody>
</table>

*non-potable water

| Equipment cleaner | Thinner or Amerl ock 12 |

Note: If maximum time is exceeded, roughen surface. For top coats (finish coats) not listed, see Product Data sheet for specific top coat time limitations.

<table>
<thead>
<tr>
<th>Recoat/Topcoat time minimum (hours)</th>
<th>90/32 70/21 50/10 32/0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amerl ock 2/Amerl ock 2</td>
<td>1 3 6</td>
</tr>
<tr>
<td>Amerl ock 2/Amershield or 450H Series</td>
<td>1 week</td>
</tr>
<tr>
<td>Amerl ock 2/Amerl ocoat 5405</td>
<td>1 day</td>
</tr>
<tr>
<td>Amerl ock 2AL/Amerl ock 2AL</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

Drying times are dependent on air and surface temperatures as well as film thickness, ventilation and relative humidity. Maximum recoating time is highly dependent upon actual surface temperatures - not simply ambient air temperatures. Surface temperatures should be monitored, especially with sun-exposed or otherwise heated surfaces. Higher surface temperatures shorten the maximum recoat window.

Note: If maximum time is exceeded, roughen surface. For top coats (finish coats) not listed, see Product Data sheet for specific top coat time limitations.

<table>
<thead>
<tr>
<th>Pot life (hours)</th>
<th>90/32 70/21 50/10 32/0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amerl ock 2</td>
<td>unthinned 0.75 1 2 4</td>
</tr>
<tr>
<td>½ pint thinner</td>
<td>1 1.5 2.5 5</td>
</tr>
<tr>
<td>Amerl ock 2AL</td>
<td>unthinned 0.5 0.75 1.5 —</td>
</tr>
<tr>
<td>½ pint thinner</td>
<td>1 1.25 2 —</td>
</tr>
</tbody>
</table>

Pot life is the period of time after mixing that a five-gallon unit of material is sprayable when thinned as recommended. Mixture may appear fluid beyond this time, but spraying and film build characteristics may be impaired.
Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

Airless spray – Standard equipment having a 45:1 or higher pump ratio, with a 0.017- to 0.021-inch fluid tip.

Conventional spray – Industrial equipment, such as DeVilbiss MBC or JGA or Binks 18 or 62 spray gun. A moisture and oil trap in the main air supply line, a pressure material pot with mechanical agitator and separate regulators of air and fluid pressure are recommended.

Power mixer – Jiffy Mixer powered by an air or explosion-proof electric motor.

Brush or roller – Additional coats may be required to attain proper thickness. Natural bristle brush, 3/8” nap roller with solvent resistant core.

Application Procedure

1. Flush all equipment with thinner or Amercoat® 12 before use.
2. Stir resin and cure using an explosion-proof power mixer to disperse pigments.
3. Add cure to resin. Mix thoroughly until uniformly blended to a workable consistency.
4. Do not mix more material than can be used within the expected pot life.
5. For optimum application, material should be from 50°F to 90°F (10°C to 32°C). Above 122°F (50°C), sagging may occur.
6. Use only PPG recommended thinners. For potable water applications, see current NSF listing at www.nsf.org for approved thinners and thinning restrictions. For other applications above 85°F (29°C) use Amercoat 8 or Amercoat 101, at lower temperatures use Amercoat 65. A small amount of thinner greatly reduces viscosity; excessive thinning will cause running or sagging. Thin cautiously as follows:

<table>
<thead>
<tr>
<th>Resin</th>
<th>Airless – up to</th>
<th>Conventional – up to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amerlock 2</td>
<td>½ pt/gal</td>
<td>½ pt/gal</td>
</tr>
<tr>
<td>Amerlock 2AL</td>
<td>1 pt/gal</td>
<td>1 pt/gal</td>
</tr>
</tbody>
</table>

Below 50°F additional thinning may be needed and multiple coats required to achieve specified thickness.

7. To minimize orange peel appearance, adjust conventional spray equipment to obtain adequate atomization at lowest air pressure.
8. Apply a wet coat in even, parallel passes with 50 percent overlap to avoid holidays, bare areas and pinholes. If required, cross spray at right angles.
9. When applying Amerlock 2 directly over inorganic zinc or zinc rich primers, a mist coat/full coat technique may be required to minimize bubbling. This will depend on the age of the Dimetacot®, surface roughness and conditions during curing.
10. Ventilate confined areas with clean air during application and while curing the final coat. Prevent moisture condensation on the surface between coats.
11. Repair damaged areas by brush or spray.
12. Clean equipment with thinner or Amercoat 12 immediately after use.

Note: Do not apply Amerlock 2AL on water-damp surfaces.

Shipping Data

<table>
<thead>
<tr>
<th>Packaging unit</th>
<th>2 gal</th>
<th>5 gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resin</td>
<td>1-gal can</td>
<td>2.5-gal can</td>
</tr>
<tr>
<td>Cure</td>
<td>1-gal can</td>
<td>2.5-gal can</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shipping weight (approx)</th>
<th>lbs</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-gal unit</td>
<td>12.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Amerlock 2 cure</td>
<td>13.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Amerlock 2/400 resin</td>
<td>11.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Amerlock 2AL resin</td>
<td>13.3</td>
<td>5.9</td>
</tr>
<tr>
<td>Amerlock 2AL cure</td>
<td>33.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Amerlock 2/400 resin</td>
<td>28.3</td>
<td>12.8</td>
</tr>
<tr>
<td>Amerlock 2AL resin</td>
<td>34.5</td>
<td>15.6</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors at 40°F to 100°F (4°C to 38°C) resin and cure 1 year from shipment date.

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities.

This mixed product is photochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Safety Precautions

Read each component’s material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor.

Proper ventilation and protective measures must be provided during application and drying to keep solvent vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. PPG makes no recommendation about the types of safety measures that may need to be adopted because these depend on application and space, of which PPG is unaware and over which it has no control.

If you do not fully understand the warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.
Amercoat® 450HS

Gloss aliphatic polyurethane topcoat

Physical Data

<table>
<thead>
<tr>
<th>Finish</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color*</td>
<td>See color card</td>
</tr>
<tr>
<td>Components</td>
<td>2</td>
</tr>
<tr>
<td>Mixing ratio (by volume)</td>
<td>4 parts resin to 1 part cure</td>
</tr>
<tr>
<td>Curing mechanism</td>
<td>Solvent release and chemical reaction between components</td>
</tr>
<tr>
<td>Volume Solids</td>
<td>66% ± 3%</td>
</tr>
<tr>
<td>VOC (EPA Method 24)</td>
<td>lb/gal g/L</td>
</tr>
<tr>
<td>unthinned (10% by volume)</td>
<td>2.4 288</td>
</tr>
<tr>
<td>thinned</td>
<td>2.8 340</td>
</tr>
<tr>
<td>Dry film thickness (per coat)</td>
<td>2-3 mils (50-75 microns)</td>
</tr>
<tr>
<td>Coats</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Theoretical coverage</td>
<td>ft²/gal m²/L</td>
</tr>
<tr>
<td>1 mil</td>
<td>1059 26</td>
</tr>
<tr>
<td>2 mils</td>
<td>530 13</td>
</tr>
<tr>
<td>Temperature resistance</td>
<td>°F/°C</td>
</tr>
<tr>
<td>wet</td>
<td>continuous</td>
</tr>
<tr>
<td>dry</td>
<td>intermittent</td>
</tr>
<tr>
<td>Flash Point</td>
<td>°F °C</td>
</tr>
<tr>
<td>cure</td>
<td>92 33</td>
</tr>
<tr>
<td>resin</td>
<td>97 36</td>
</tr>
<tr>
<td>mixed</td>
<td>98 37</td>
</tr>
<tr>
<td>Amercoat 923</td>
<td>102 39</td>
</tr>
<tr>
<td>Amercoat 101</td>
<td>140 60</td>
</tr>
<tr>
<td>Amercoat 12</td>
<td>2 -17</td>
</tr>
<tr>
<td>Thinners</td>
<td>Amercoat 65, Amercoat 101</td>
</tr>
<tr>
<td>Cleaner</td>
<td>Amercoat 12</td>
</tr>
</tbody>
</table>

*Certain colors (especially yellow, red and orange) may require additional coats to achieve adequate hiding, particularly when applied over dark or contrasting primer color. Color variance with rapid response listed colors may be greater than with standard production batches. If color is critical, change batches at natural breaks in structure or intermix batches for consistency.

Yellow, red and orange colors will fade faster than other colors due to the replacement of lead-based pigments with lead-free pigments in these colors.

Typical Properties

Chemical resistance guide
When applied over suitable primer or intermediate coat:

<table>
<thead>
<tr>
<th>Environment</th>
<th>Splash and Spillage</th>
<th>Fumes and Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidic</td>
<td>VG</td>
<td>E</td>
</tr>
<tr>
<td>Alkaline</td>
<td>VG</td>
<td>E</td>
</tr>
<tr>
<td>Solvents</td>
<td>G</td>
<td>E</td>
</tr>
<tr>
<td>Salt solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acidic</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Neutral</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Alkaline</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Water</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>G-Good</td>
<td>VG-Very Good</td>
<td>E-Excellent</td>
</tr>
</tbody>
</table>

This table is only a guide. For specific recommendations, contact your Ameron representative for your particular corrosion protection needs. Amercoat 450HS is not recommended for immersion service.

Typical Uses

Amercoat 450HS Series can be used as a finish coat where attractive appearance and a wide range of corrosive resistance is required.

- Chemical plants
- Pulp and paper mills
- Offshore platforms
- Petroleum refineries and containers.

* Certain colors (especially yellow, red and orange) may require additional coats to achieve adequate hiding, particularly when applied over dark or contrasting primer color. Color variance with rapid response listed colors may be greater than with standard production batches. If color is critical, change batches at natural breaks in structure or intermix batches for consistency.

Yellow, red and orange colors will fade faster than other colors due to the replacement of lead-based pigments with lead-free pigments in these colors.
Typical Systems

<table>
<thead>
<tr>
<th>1st Coat</th>
<th>2nd Coat</th>
<th>3rd Coat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimetcote or</td>
<td>Amercoat 385</td>
<td>Amercoat 450 Series</td>
</tr>
<tr>
<td>Amercoat 68 Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amercoat 235,</td>
<td>Amercoat 450 Series</td>
<td></td>
</tr>
<tr>
<td>Amercoat 236,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amercoat 370 or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amercoat 385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amerlock Series</td>
<td>Amercoat 450 Series</td>
<td></td>
</tr>
</tbody>
</table>

Surface Preparation

Coating performance, in general, is proportional to the degree of surface preparation. Refer to application instructions for specific primers and intermediate coats being used for application and curing procedures. All previous coats must be clean and dry. Adhere to all minimum and maximum topcoat times for specific primers and intermediate coats. Aged epoxy coatings must be roughened before applying 450HS.

Application Data

Substrates

- Prepared and primed steel, concrete, aluminum, galvanizing, or aged coatings.
- Refer to Product Data Sheet/Application Instructions of specific primer or intermediate coat being used.

Surface preparation:

<table>
<thead>
<tr>
<th>Steel</th>
<th>Concrete</th>
<th>Aluminum</th>
<th>Galvanizing</th>
<th>Aged coatings</th>
</tr>
</thead>
</table>

Method

Airless or conventional spray, roller, brush (touch-up only)

Mixing ratio (by volume)

4 parts resin to 1 part cure

Environmental conditions

air and surface temp

|˚F| -7 to 49
|˚C|

Pot life (hours)

<table>
<thead>
<tr>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>¾</td>
<td>1½</td>
<td>3</td>
</tr>
</tbody>
</table>

Dry times

<table>
<thead>
<tr>
<th>F/C˚</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
<th>32/0</th>
</tr>
</thead>
<tbody>
<tr>
<td>touch (minutes)</td>
<td>10</td>
<td>30</td>
<td>90</td>
<td>NR</td>
</tr>
<tr>
<td>with 866M*</td>
<td>7</td>
<td>25</td>
<td>75</td>
<td>240</td>
</tr>
<tr>
<td>through (hours)</td>
<td>4</td>
<td>8</td>
<td>24</td>
<td>NR</td>
</tr>
<tr>
<td>with 866M*</td>
<td>1½</td>
<td>2½</td>
<td>8</td>
<td>36</td>
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</table>

Recoat times

<table>
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<tr>
<th>F/C˚</th>
<th>90/32</th>
<th>70/21</th>
<th>50/10</th>
<th>32/0</th>
</tr>
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<tr>
<td>minimum (hours)</td>
<td>2</td>
<td>4</td>
<td>12</td>
<td>NR</td>
</tr>
<tr>
<td>with 866M*</td>
<td>1</td>
<td>1½</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>maximum (days)</td>
<td>7</td>
<td>30</td>
<td>60</td>
<td>NR</td>
</tr>
<tr>
<td>with 866M*</td>
<td>2</td>
<td>7</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

*Accelerated at ½-pint 866M per 5 gallons mixed.

Thinner

Amercoat 65 or 101

Equipment cleaner

Amercoat 12
Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure and tip size may be needed for proper spray characteristics.

Airless spray—Standard equipment such as Graco, DeVilbiss, Binks, Speeflo, or others having a 28:1 or higher pump ratio and a fluid tip with 0.013- to 0.015-inch (0.33- to 0.38-mm) oriﬁce.

Conventional spray—Industrial equipment such as DeVilbiss MBC or Binks BBR spray gun. Separate air and ﬂuid pressure regulators, mechanical pot agitator and a moisture and oil trap in main air supply line are recommended.

Brush or roller - Natural bristle brush or solvent-resistant roller with ¼-inch to ⅜-inch nap. For best appearance when rolling, level any air bubbles with bristle brush.

Application Procedure

Amercoat 450HS is packaged in two components in the proper proportions which must be mixed together before use:

1. Flush equipment with thinner or Amercoat 12 before use.
2. Stir each component thoroughly, then add cure to resin and mix until uniformly blended to a workable consistency. Do not mix more material than will be used within 4 hours at 65-80°F (18-27°C). Pot life is shortened by higher temperatures and use of Amercoat 866M. See pot life data. Use up to ½ pint of Amercoat 866M Accelerator per 5 gallons mixed.
3. Thin only if necessary for workability.
4. When applying by conventional spray, use adequate air pressure and volume to ensure proper atomization.
5. Apply a wet coat in even parallel passes, overlap 50 percent to avoid holidays, bare areas and pinholes. If required, cross spray at right angles.
6. Application of 3 mils (75 microns) wet ﬁlm thickness will normally provide 2 mils (50 microns) dry ﬁlm.
7. Clean all equipment with thinner or Amercoat 12 immediately after use.
8. Keep containers tightly closed since repeated exposure to moisture will cause gelation. Moisture contaminated material is also subject to gas in on storage. Handle bulged containers with caution; lids may eject forcibly.

<table>
<thead>
<tr>
<th>Packaging units</th>
<th>1 gal</th>
<th>5-gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>cure</td>
<td>0.2 gal in 1-qt can</td>
<td>1 gal in 1-gal can</td>
</tr>
<tr>
<td>resin</td>
<td>0.8 gal in 1-gal can</td>
<td>4 gal in 5-gal can</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipping weight (approx)</td>
<td>lb</td>
<td>kg</td>
</tr>
<tr>
<td>1-gal unit</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>cure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>resin</td>
<td>10.2</td>
<td>4.6</td>
</tr>
<tr>
<td>5-gal unit</td>
<td>9</td>
<td>4.1</td>
</tr>
<tr>
<td>cure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>resin</td>
<td>49</td>
<td>22</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors at 40 to 100°F (4 to 38°C) resin and cure 1 year from shipment date
Safety Precautions

Read each component's material safety data sheet before use. Mixd material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tending and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which Ameron is unaware and over which it has no control.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for Industrial use only. Not for residential use.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and knowledge in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.
Product Data/ Application Instructions

- High solids, high build, multi functional coating
- Low VOC
- High gloss, self priming
- Excellent gloss retention
- Direct-to-metal or concrete
- Outstanding abrasion, reverse and direct impact resistance
- Good chemical and stain resistance
- Tough and flexible coating

Amershiel is a high solids, high build, multi functional, aliphatic polyurethane coating, used as a one coat system or as high performance topcoat in maintenance coating systems. To obtain the maximum performance for which Amershiel is formulated, strict adherence to all application instructions, precautions, conditions and limitations is necessary. If conditions exist that is not within the requirements or limitations described, consult your PPG representative.

**Typical Uses**
Industrial structural steel, tanks, piping and concrete floors and walls in power, waste treatment, pulp and paper, chemical, petrochemical and food and beverage plants. Railcar exterior and hopper lining. Bridge structural steel. Stadiums, Marine structural steel, decks, bootops, topsides and superstructures on ships, barges and offshore platforms.

**Outstanding Characteristics**
Amershiel displays high gloss; shows excellent colour and gloss retention during extended service periods. The direct-to-metal capabilities of Amershiel provide a single coat system at reduced installation cost. Compatible over abrasive blasted hot-rolled steel. It has outstanding abrasion resistance and excellent resistance to direct and reverse impact. Has excellent adhesion to concrete providing a durable, glossy, easy-to-clean system. May be used over Amerlock 400 as a durable, weather resistant topcoat for extra heavy duty service; over selected Dimetcote coatings as a direct topcoat; over intact old paint as a maintenance product. Amershiel’s drying and curing may be adjusted with Amercoat 665 accelerator for convenient application. Ask your PPG representative for specific information.

**Physical Data**

**Finish**
- Gloss

**Colour**
- RAL and BS-colours *

**Components**
- 2

**Mixing ratio (by volume)**
- resin: 4 parts
- cure: 1 part

**Curing mechanism**
- solvent release and chemical reaction

**Volume solids**
- 73 (ISO 3233)**

**VOC***
- EC SED 1999/13/EC ....... 207 g/kg (280 g/l)
- UK PG6/23(92) Appendix 3. 185 g/l (1.5 lbs/gal)

**Dry film thickness**
- 125 µm per coat

**Number of coats**
- 1 or 2 ****

**Calculated coverage**
- 5.8 m²/l at 125 µm

Allow for application losses, surface irregularities, etc.

**Specific gravity**
- 1.2 - 1.4 kg/l (mixed product)

**Flash points (Closed Cup)***
- °C °F
  - resin: 26 79
  - cure: 47 117
  - Amercoat 920: 24 75
  - Amercoat 12: 24 75

**Thinner**
- Amercoat 920

**Cleaner**
- Amercoat 12

*Uniform appearance may require two coats when used in a less hiding colour over contrasting primers or intermediate coats. Use only a light coloured primer or intermediate coat when only one finish coat in a less hiding colour is specified.

**Volume solids is measured in accordance with ISO 3233. Slight variations ±3% may occur due to colour and testing variances.

*** VOC figures are quoted according to both the EC directive 1999/13/EC which are theoretically calculated figures and the UK PG6/23(92) Appendix 3 which are practically determined figures.

**** Brush or roller application may require additional coats.
Approvals and Certificates
Class 1 – flame spread in accordance with BS 476, part 7.
"0" class fire rating in accordance with UK Building Regulations, based on testing according to BS 476, parts 6 and 7 (fire propagation).
Approved by the Newcastle Occupational Health Agency for the storage of grain.

Recommended Systems

<table>
<thead>
<tr>
<th>Substrate Coats of Amershield</th>
<th>Total dft µm</th>
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</thead>
<tbody>
<tr>
<td>Steel</td>
<td>1-2</td>
</tr>
<tr>
<td>Amercoat 68 Series</td>
<td>1</td>
</tr>
<tr>
<td>Amerlock 400C</td>
<td>1</td>
</tr>
</tbody>
</table>

**Minimum temperature Amerlock 400C during application and drying: 15°C/59°F. Do not use aluminium versions of Amerlock 400

Use a maximum recoating time of 3 days for Amerlock 400C. If exceeded, consult your PPG representative for a recommendation.

Application Data

Substrate .................................. prepared steel, galvanising, aluminum, concrete, masonry
Application methods ................. airless or conventional spray, brush or roller**

Environmental Conditions (during application)
Air temperature: ...................... 4 to 50°C 40 - 122°F
Surface temperature: .............. 4 to 50°C 40 - 122°F
Surface temperature must be at least 3°C/5°F above dew point to prevent moisture condensation on the surface.

Potlife (at 20°C/68°F) .............. 2½ hours
Potlife is dependent on temperature and quantities mixed.

Drying times (at 125 µm dft)*
<table>
<thead>
<tr>
<th>°C/°F</th>
<th>10/50</th>
<th>20/68</th>
<th>30/86</th>
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</thead>
<tbody>
<tr>
<td>Dry to touch (hours)</td>
<td>4</td>
<td>2½</td>
<td>1</td>
</tr>
<tr>
<td>Dry through (hours)</td>
<td>72</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

Recoat times °C/°F
<table>
<thead>
<tr>
<th>°C/°F</th>
<th>10/50</th>
<th>20/68</th>
<th>30/86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum (hours)</td>
<td>48</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Maximum (hours)</td>
<td>168</td>
<td>168</td>
<td>12</td>
</tr>
</tbody>
</table>

NOTE: where accelerated cure is required ask your PPG representative for possible use of Amercoat 865 accelerator. Drying times are dependent on air and steel temperature, applied film thickness, ventilation and other environmental conditions. Times are proportionally shorter at higher temperature and longer at lower temperatures. Prior to recoating ensure the surface is clean. Maximum recoating interval times are dependent on temperature, degree of weathering, type of topcoating and service conditions of the complete coating system. Consult your PPG representative for specific recommendations.

Thinner .................................. Amercoat 920
Cleaner .................................. Amercoat 12

Environment Splash and spillage Fumes and weather

<table>
<thead>
<tr>
<th>Environment</th>
<th>Acidic</th>
<th>Alkaline</th>
<th>Salt solutions</th>
<th>Acidic</th>
<th>Neutral</th>
<th>Alkaline</th>
<th>Sea water</th>
<th>Fresh water</th>
<th>Solvents</th>
<th>Petroleum products</th>
</tr>
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<tr>
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<tr>
<td>Salt solutions</td>
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<tr>
<td>Fresh water</td>
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<tr>
<td>Solvents</td>
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<td>Excellent</td>
<td>Excellent</td>
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<tr>
<td>Petroleum products</td>
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<td>Excellent</td>
<td>Excellent</td>
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<td>Excellent</td>
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</tr>
</tbody>
</table>

This table is only a guide to show typical resistance of Amershield. Contact your PPG representative for your particular corrosion protection needs. Amershield is not recommended for immersion service.

Application Equipment
MIXER - Power mixer with an explosion proof electric motor.
AIRLESS SPRAY - Standard airless spray equipment, such as Graco, DeVilbiss, Nordson-Bedee, Spee-Flo or others having a 28:1 or higher pump ratio and a fluid tip with a 0.38 to 0.53 mm (0.015 to 0.021 inch) orifice.
CONVENTIONAL AND AIR-ASSISTED AIRLESS SPRAY - DeVilbiss, Binks or Graco production spray equipment with moisture and oil trap in the main air supply line.
BRUSH - Natural bristle. Maintain a wet edge.
ROLLER - Level any air bubbles with a bristle brush. When brush or roller applied, multiple coats may be needed to achieve dry film thickness of 125 µm (5 mils).

Repair
Spot blast or power tool clean bare substrate to the requirements shown under surface preparation. Feather edges of intact coating. Remove dust, dirt and contamination before recoating.
Surface Preparation
STEEL - Mill scale and rust must be removed. Abrasive blast hot-rolled steel to Sa 2* or SSPC SP6** and rusted and pitted steel to Sa 2½* or SSPC SP10** (ISO 8501-1).
ALUMINIUM - Remove oil, grease or soap film with neutral detergent or emulsion cleaner; blast lightly with fine abrasive.
GALVANISING - Remove oil or soap film with neutral detergent or emulsion cleaner; treat with Amercoat 59 or blast lightly with fine abrasive.
DIMETCOTE - Wash off water soluble contaminants; remove oil, grease, etc. with a neutral detergent or emulsion cleaner. Solvent wipe is not satisfactory.
COATED SURFACE - Clean by high pressure (1000 psi = 70 bar or more) water blast, sweep blast (SSPC SP-7**), solvent emulsion cleaning (SSPC SP-1**) or power tool cleaning (SSPC SP-3**). Surface must be clean, dry and free of oil, grease, dirt or other contamination. Apply test patch to confirm compatibility and adhesion.

Shipping Data

Packaging
resin ..................................... 3.2 l (0.85 gal) in 5 l can
............................................. 16 l - in 20 l can
cure ...................................... 0.8 l in 1 l can
............................................. 4 l in 5 l can

Shipping weight
resin ..................................... approx. 4.5 kg and 17.5 kg
cure ..................................... approx. 1 kg and 3.4 kg

Shelf life ................................. 1 year from shipment date when stored indoors in unopened, original containers at 5 to 40°C (41 - 104 °F).

Application Procedure
Amershield is packaged in the proper mixing proportions of resin and cure.
Resin 3.2 and 16 l in 5 and 20 l can
Cure: 0.8 and 4 l in 1 and 5 l can
1. Flush equipment with recommended cleaner before use.
2. Stir resin thoroughly, add cure and mix until uniform. Do not mix more material than will be used within potlife time. Mixing ratio is 4 parts resin to 1 part cure by volume.
3. If thinning is necessary for workability thin with no more than 15 % vol. of Amercoat 920. For airless spray normally no thinning is required.
4. When applying by spray, adjust pressures for equipment configuration and environmental conditions to ensure proper atomization.
5. Apply a wet coat, making parallel passes and overlapping each pass 50%.

NOTE: When applying directly over inorganic zinc at full thickness, bubbling may occur. Use a mist coat/full coat application procedure.
6. Application at 160 µm wet film thickness (unthinned) will normally provide 125 µm dry film.
7. Moisture sensitive - Keep cure container tightly closed. Repeated moisture exposure will cause gelation and gassing; handle bulged containers with caution, lids may eject forcibly.
8. Check thickness of dry coating with a non-destructive dry film thickness gauge, such as Mikrotelst or Elcometer. If less than specified thickness, apply additional material as needed.
9. In confined areas ventilate with clean air during application and drying until all solvents are removed. Temperature and humidity of ventilating air must be such that moisture condensation will not form on surface.
10. Clean all equipment with recommended cleaner immediately after use or at least at the end of each working day or shift. When left in spray equipment, Amershield will cure and cause plugging.
Caution
This product is flammable. Keep away from heat and open flame. Keep container closed. Use with adequate ventilation. Avoid prolonged and repeated contact with skin. If used in confined areas, observe the following precautions to prevent hazards of fire or explosion or damage to health:
1. Circulate adequate fresh air continuously during application and drying;
2. Use fresh air masks and explosion proof equipment;
3. Prohibit all flames, sparks, welding and smoking.
Do not empty into drains. Take precautionary measures against static discharges. For specific information on hazardous ingredients, required ventilation, possible consequences of contact, exposure and safety measures see Safety Data Sheet.

Safety
Since improper use and handling can be hazardous to health and cause of fire or explosion, safety precautions included with Product Data/Application Instruction and Material Safety Data Sheet must be observed during all storage, handling, use and drying periods.

Warranty
PPG warrants its products to be free from defects in material and workmanship. PPG’s sole obligations and Buyer’s exclusive remedy in connection with the products shall be limited, at PPG’s option, to either replacement of products not conforming this warranty or credit to Buyer’s account in the invoiced amount of the non-conforming products. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer’s discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer’s failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

PPG makes no other warranties concerning the product. No other warranties, whether express, implied or statutory, such as warranties of merchantability or fitness particular purpose, shall apply. In no event shall PPG be liable for consequential or incidental damages.

Any recommendations or suggestion relating to the use of the products made by PPG, whether in its technical literature, or response to specific enquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyer’s having requisite skill and know-how in the industry, and therefore it is Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability
PPG’s liability on any claim of any kind, including claims based upon PPG’s negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part there of which give rise to the claim.
In no event shall PPG be liable for consequential or incidental damages.

Due to PPG’s policy of continuous product improvement, the information contained in this Product Data/Application Instructions sheet is subject to change without notice. It is the Buyer’s responsibility to check that this issue is current prior to using the product. For the most up-to-date Product Data/Application Instructions always refer to the PPG Protective & Marine Coatings website at www.ppgpmc.com
To avoid any confusion that may arise through translation into other languages, the English version of the Product Data/Application Instructions will be the governing literature and must be referred to in case of deviations with product literature in other languages.

Condition of Sale
All our transactions are subject to our Terms and Conditions of Sale.
Product Data/Application Instructions

- One component primer
- Low VOC

Typical Uses
Amercoat 1000 is a primer used with PSX 1001 to give a high-performance maintenance system with ease of one pack application.

Surface Preparation
Coating performance is, in general, proportional to the degree of surface preparation. Prior to coating, all surfaces must be clean, dry, undamaged and free of all contaminants, including salt deposits.

Steel – New steel surfaces to a minimum SSPC-SP6. Blast to achieve a 1 mil (25 micron) profile as indicated by a Keane-Tator Surface Profile Comparator, Testex Tape or a similar device.

Aged coatings - All surfaces must be clean, dry, tightly bonded and free of all loose paint, corrosion products or chalky residue. Clean by pressure water blast (1000 psi or greater), SSPC-SP1, 2, 3, or 7. Amercoat 1000 is compatible over most types of properly applied and tight-adhering coatings. However, a test patch is recommended to confirm compatibility.

Repair - Prepare damaged areas to original surface preparation specifications, feathering edges of intact coating. Thoroughly remove dust or abrasive residue before touch up.

Application Equipment
The following is a guide: suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

Conventional spray – Industrial equipment such as DeVilbiss MBC or JGA spray gun. Separate regulators for air and fluid pressure, mechanical pot agitator and a moisture and oil trap in the main air supply line are recommended.

Airless spray – Standard equipment such as Graco, DeVilbiss, Nordson, Spee-Flo or others having 28:1 or higher pump ratio and fluid tip with a 0.015- to 0.019-inch (0.38mm to 0.53mm) orifice.

Brush – Natural bristle. Maintain a wet edge.

Roller – Industrial solvent-type. Level any air bubbles with a bristle brush.

Powemixer – Jiffy mixer powered by an air or explosion-proof electric motor.

Physical Data

<table>
<thead>
<tr>
<th>Physical Data</th>
<th>Amercoat 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finish</td>
<td>Flat</td>
</tr>
<tr>
<td>Color</td>
<td>Oxide red, buff, off-white, and pearl gray</td>
</tr>
<tr>
<td>Components</td>
<td>1</td>
</tr>
<tr>
<td>Curing mechanism</td>
<td>Solvent release and air oxidation</td>
</tr>
<tr>
<td>Volume solids (calculated)</td>
<td>60% ± 3%</td>
</tr>
<tr>
<td>Dry film thickness per coat</td>
<td>4 - 5 mils (100 - 125 microns)</td>
</tr>
<tr>
<td>Coats</td>
<td>1-2</td>
</tr>
<tr>
<td>Theoretical coverage</td>
<td>ft/gal m²/L</td>
</tr>
<tr>
<td>1 mil (25 microns)</td>
<td>962.4 23.6</td>
</tr>
<tr>
<td>5 mils (125 microns)</td>
<td>192.4 4.8</td>
</tr>
<tr>
<td>VOC (EPA Method 24)</td>
<td>lb/gal g/L</td>
</tr>
<tr>
<td>mixed</td>
<td>2.6 312</td>
</tr>
<tr>
<td>mixed, thinned (½pt/gal)</td>
<td>2.7 324</td>
</tr>
<tr>
<td>Flash point (SETA)</td>
<td>°F °C</td>
</tr>
<tr>
<td>Amercoat 1000</td>
<td>82 28</td>
</tr>
<tr>
<td>Amercoat 65</td>
<td>78 26</td>
</tr>
<tr>
<td>Amercoat 12</td>
<td>2 -17</td>
</tr>
</tbody>
</table>

Application Data

Applied over Prepared steel
Surface preparation SSPC-SP3, 6 or 8
Method Airless or conventional spray, brush or roller

Environmental conditions

<table>
<thead>
<tr>
<th>Temperature</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>air and surface</td>
<td>45 to 100</td>
<td>7 to 38</td>
</tr>
</tbody>
</table>

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.

Drying time at 8 mils WFT

| Touch (minutes) | 15 | 25 | 45 |
| Through (minutes) | 75 | 90 | 130 |

Minimum recoat/topcoat (hours) | 2 | 2 | 4 |

Maximum recoat/topcoat (hours) | None |

Thinner Amercoat 65
Equipment cleaner Amercoat 12

Formerly Amercoat 3346
Application Procedure

1. Flush all equipment with thinner or Amercoat 12.
2. Stir to uniform consistency. Strain through cheesecloth or equivalent to remove skin particles or other contamination.
3. If thinning is necessary for workability, add up to ½ pt of Amercoat 65 thinner per 1 gal of Amercoat 1000.
4. Apply a wet coat in even, parallel passes; overlap each pass 50 percent to avoid bare areas, pinholes or holidays. Excessive wet film thickness will cause sags and runs.
5. Store unused materials in tightly closed containers. Partially filled containers may show surface skinning after storage. Strain before use to remove skin.
6. Clean application equipment with thinner or Amercoat 12.

Safety Precautions

Read product’s material safety data sheet before use.

CAUTION - Improper use and handling of this product can be hazardous to health and cause fire or explosion. Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas, consulting supervisors. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because the safety measures depend on the environment and space, of which Ameron is unaware and over which it has no control. If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.

Shipping Data

<table>
<thead>
<tr>
<th>Packaging</th>
<th>1 gal</th>
<th>5 gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping weight (approx)</td>
<td>lb</td>
<td>kg</td>
</tr>
<tr>
<td>1-gal can</td>
<td>13.5</td>
<td>6</td>
</tr>
<tr>
<td>5-gal can</td>
<td>67</td>
<td>30.5</td>
</tr>
</tbody>
</table>

Shelf life when stored indoors at 40 to 100°F (4 to 38°C) 1 year from date of shipment.

Numerical values are subject to normal manufacturing tolerances, colors and testing variances. Allow for application losses and surface irregularities. This product is photochemically reactive as defined by the South Coast Air Quality Management District’s Rule 102 or equivalent regulations.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron’s sole obligation and Buyer’s exclusive remedy in connection with the products shall be limited, at Ameron’s option, to either replacement of products not conforming to this Warranty or credit to Buyer’s account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer’s discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer’s failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Limitation of Liability

Ameron’s liability on any claim of any kind, including claims based upon Ameron’s negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.
Manufacturer Product Data Sheets for Carboline Coatings
Selection & Specification Data

Generic Type: Modified Epoxy

Description: Two part epoxy exhibiting superior adhesion to concrete and steel. Used primarily as a primer/sealer for concrete surfaces and top coated with a variety of chemically resistant toppings.

Features:
- Outstanding wetting properties
- Solvent-free
- Long working time
- Excellent adhesion
- Compatible with a variety of toppings

Color: Amber

Dry Film Thickness: 5.0 - 20.0 mils (127 - 508 microns) per coat

Solids Content: By Volume 100% +/- 2%

Theoretical Coverage Rate:
- 1604 ft² at 1.0 mils (39.4 m²/l at 25 microns)
- 321 ft² at 5.0 mils (7.9 m²/l at 125 microns)
- 80 ft² at 20.0 mils (2.0 m²/l at 500 microns)

Allow for loss in mixing and application.

VOC Values:

Substrates & Surface Preparation

General: Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

Concrete: Concrete: Clean and dry. Remove all loose, unsound concrete. Do not apply coating unless concrete has cured at least 28 days @ 70°F (21°C) and 50% RH or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require filling/surfacing.

Mixing & Thinning

Mixing: Mix Part A resin with Part B hardener until uniform in color and consistency.

Ratio: A:B 2:1

Pot Life: Approximately 60 minutes @ 75°F (24°C)

Application Procedures

General: Apply to prepared surface using flat floor squeegee, paint roller, or brush. Apply in one even coat to thoroughly wet and seal surface. Do not allow to puddle.

Note: To avoid potential outgassing problems, Carboline recommends applying Semstone 110 while ambient temperature is descending. As common with all epoxies and novolacs, under certain conditions such as low temperature and high humidity, this product may develop an oily film on its surface known as "blush". This blush should be removed by a soap and water wash prior to any re-coating.

Application Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Material</th>
<th>Surface</th>
<th>Ambient</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>50 °F (10 °C)</td>
<td>50 °F (10 °C)</td>
<td>50 °F (10 °C)</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum</td>
<td>90 °F (32 °C)</td>
<td>110 °F (43 °C)</td>
<td>110 °F (43 °C)</td>
<td>90%</td>
</tr>
</tbody>
</table>

Curing Schedule

<table>
<thead>
<tr>
<th>Surface Temp.*</th>
<th>Dry to Touch</th>
<th>Maximum Recoat Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 °F (10 °C)</td>
<td>24 Hours</td>
<td>4 Days</td>
</tr>
<tr>
<td>65 °F (18 °C)</td>
<td>10 Hours</td>
<td>3 Days</td>
</tr>
<tr>
<td>80 °F (27 °C)</td>
<td>6 Hours</td>
<td>48 Hours</td>
</tr>
<tr>
<td>95 °F (35 °C)</td>
<td>5 Hours</td>
<td>24 Hours</td>
</tr>
</tbody>
</table>

The surface of SEMSTONE 110 will be tackfree in 6-8 hours at 70°F/21°C.

*SEMSTONE 110 may be topped while still wet. Check specific topcoat data sheet or consult Carboline’s Technical Service Department for specific instructions.

Cleanup & Safety

Cleanup: Toluene or Xylene solvents

Safety: Read and follow all caution statements on this product data sheet and on the SDS for this product. Employ normal workmanlike safety precautions.

Ventilation: When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not able to monitor levels, use MSHA / NIOSH approved respirator.

Caution: Fire and explosion hazards: This product contains less than 1% volatile components, however, vapors are heavier than air and can travel long distances, ignite and flash back. Eliminate all Ignitions sources. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workers should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Packaging, Handling & Storage

Shelf Life: Part A & Part B: 24 months

Shipping Weight
- 1.5 gallon unit: 15 lbs (7 kg)
- 15 gallon unit: 146 lbs (67 kg)

Flash Point
- Part A: 302°F (150°C)
- Part B: 230°F (110°C)

Storage: Store indoors, 50-90°F (10-32°C)

June 2017

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Selection & Specification Data

Generic Type: Polyamido-Amine Epoxy

Description: Penetrating primer/sealer for use on concrete substrates and Carboiline Pyrocrete Fireproofing products. It performs extremely well in sealing cementitious surfaces and is designed to receive a variety of different general types of finish coats. Some recommended uses of 1340 include the use as a curing compound or form release agent. When applied to “green” concrete it will retard the escape of moisture during the cure period. It is also excellent for use as a form release coating on plywood or steel forms. Meets the requirements of ASTM C300 when applied at 5.0-10.0 mils (125-250 microns) wet.

Features:
- Exceptional wetting characteristics
- Low stress, highly flexible film
- Very high solids
- Low odor
- User-friendly brush & roller application
- VOC compliant to current AIM regulations
- Nuclear Service Level 1

Color: Clear Amber (0910)

Finish: Gloss

Primers: Self-priming. May be applied over most generic types of coatings.

Topcoats: Acrylics, Epoxies, Polyurethanes

Dry Film Thickness: 1.0 - 2.0 mils (25 - 50 microns) DFT for most applications but can be applied up to 4.0 mils (100 microns) for sealing rough surfaces or shot-blasted concrete. When used as a curing and/or form release agent, it may be applied up to 10.0 mils (250 microns) wet.

Solids Content: By Volume: 98% ± 2%

Theoretical Coverage Rate: 1572 mil ft² (38.5 m²/l at 25 microns)

Allow for loss in mixing and application. Porous and irregular substrates like concrete/fireproofing coverage rates and should be taken into account.

VOC Values:
- As supplied: 0.2 lbs/gal (24 g/l)
- EPA Method 24: 0.8 lbs/gal (65 g/l)
- Thinned: 25 oz/gal w/ #76: 1.8 lbs./gal (214 g/l)
- These are nominal values.

Dry Temp. Resistance:
- Continuous: 175°F (79°C)
- Non-Continuous: 200°F (93°C)

Limitations:
- Epoxy lose gloss, discolor and eventually chalk in sunlight exposure.
- Do not use for immersion service.

Substrates & Surface Preparation

Concrete: Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

As a Curing Membrane: Carboguard 1340 has been tested in accordance with ASTM C 309-98a Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete and passes the requirements set forth in the standard. While 1340 may be applied to green concrete, generally additional coats or other coatings should not be applied until the concrete has cured 28 days at 75°F (24°C) and 50% R.H. or equivalent. Prior to topcoating we recommend that a test patch be applied to insure proper adhesion.

General: Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require surfacing. Application prior to surfacing assures tight adhesion between concrete and surfacers or membranes. Compatibility with other coatings, surfacers and polyurethane membranes eliminates need for form release oils or curing oils.

Pyrocrete Fireproofing Products: Contact Carboiline Technical Service or your Carboiline sales representative for specific applications and requirements.

Previously Painted Surfaces: Lightly sand or abrade to roughen and degloss the surface. Existing paint must attain a minimum 3B rating in accordance with ASTM D3359 “X-Scribe” adhesion test.

Membrane: As curing or form release liquids. Carboguard 1340 has been tested in accordance with ASTM C 309-98a Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete and meets the requirements set forth in the standard. While 1340 may be applied to green concrete, generally additional coats or other coatings should not be applied until the concrete has cured 28 days at 75°F (24°C) and 50% R.H. or equivalent. Prior to topcoating we recommend that a test patch be applied to insure proper adhesion.

April 2003 replaces February 2002

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Carboguard® 1340

**Application Equipment**

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

**General Guidelines:**

### Spray Application (General)
Contact Carboline Technical Service for spray equipment and technique.

### Brush & Roller (General)
Avoid excessive re-brushing or re-rolling. Apply only enough material to wet the surface uniformly. Any puddles formed must be brushed out.

### Brush
Use a medium bristle brush.

### Roller
Use a medium or long-nap synthetic roller cover with phenolic core.

**Mixing & Thinning**

### Mixing
Power mix separately, then combine and power mix. DO NOT MIX PARTIAL KITS.

### Ratio
1.1 Ratio (A to B)

### Thinning
Normally not required but may be thinned up to 25 oz/gal (20%) with Thinner #76. Use of thinners other than those supplied or recommended by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

### Pot Life
45 minutes at 75°F (24°C). Pot life will be less at higher temperatures.

**Cleanup & Safety**

### Cleanup
Use Thinner #2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

### Safety
Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

### Ventilation
When used in enclosed areas and product is thinned, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to ensure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved respirator.

### Caution
This product exotherms at the end of its pot life. Any unused quantities will become extremely hot. The material begins to thicken at the end of its pot life, which is an indication of exotherm. Immediately spread out on an appropriate surface or add sand or other suitable heat sink to the unused material to reduce the severity of exotherm. Take appropriate precautions against breathing fumes. This product when thinned contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

**Application Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Material</th>
<th>Surface</th>
<th>Ambient</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>60°-80°F (16°-27°C)</td>
<td>60°-80°F (16°-27°C)</td>
<td>60°-80°F (16°-27°C)</td>
<td>0-80%</td>
</tr>
<tr>
<td>Minimum</td>
<td>60°F (15°C)</td>
<td>50°F (10°C)</td>
<td>50°F (10°C)</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum</td>
<td>90°F (32°C)</td>
<td>130°F (54°C)</td>
<td>100°F (38°C)</td>
<td>90%</td>
</tr>
</tbody>
</table>

This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel. Special application techniques may be required above or below normal application conditions.

**Curing Schedule**

<table>
<thead>
<tr>
<th>Surface Temp. &amp; 60% Relative Humidity</th>
<th>Dry to Topcoat or Handle</th>
<th>Maximum Recoat Time w/ Water Borne</th>
<th>Maximum Recoat Time w/ Solvent Borne</th>
<th>Final Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>50°F (10°C)</td>
<td>24 Hours</td>
<td></td>
<td></td>
<td>9 Days</td>
</tr>
<tr>
<td>75°F (24°C)</td>
<td>12 Hours</td>
<td></td>
<td></td>
<td>3 Days</td>
</tr>
<tr>
<td>90°F (32°C)</td>
<td>6 Hours</td>
<td></td>
<td></td>
<td>6 Days</td>
</tr>
</tbody>
</table>

These times are based on a 1.0-2.0 mil (25-50 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze. Any haze or brush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing. If the maximum recoat time is exceeded, the surface must be abraded by sweep blasting or sanding before the application of additional coats.

**Curing Schedule for Curing/Form Release Agent**

<table>
<thead>
<tr>
<th>Surface Temp. &amp; 50% Relative Humidity</th>
<th>Dry to Topcoat or Handle</th>
<th>Final Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>75°F (24°C)</td>
<td>5 Hours</td>
<td>6 Days</td>
</tr>
</tbody>
</table>

These times are based on 5.0-10.0 (125-250 microns) mils dry film thickness.

**Packaging, Handling & Storage**

<table>
<thead>
<tr>
<th>Shipping Weight</th>
<th>Flash Point (Setflash)</th>
<th>Storage Temperature &amp; Humidity</th>
<th>Shelf Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 Gallon Kit</td>
<td>Part A: &gt;205°F (96°C)</td>
<td>40° - 110°F (4°-43°C) Store indoors.</td>
<td>Part A &amp; B: Min. 36 months at 75°F (24°C)</td>
</tr>
<tr>
<td>2 Gallon Kit</td>
<td>Part B: &gt;205°F (96°C)</td>
<td>0-90% Relative Humidity</td>
<td></td>
</tr>
<tr>
<td>(Approximate)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 lbs (3 kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 lbs (10 kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.*

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April 2003 replaces February 2002

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350 Harley Industrial Dr, St. Louis, MO 63144-1599
314/944-0000  314/944-6617 (fax)  www.carboline.com

P P M Company
## Selection & Specification Data

<table>
<thead>
<tr>
<th>Generic Type</th>
<th>100% solids epoxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>High performance lining system designed for concrete. Semi-leveling coating which may be applied as an aggregate filled and/or reinforced coating system. Specially formulated to withstand some of industry’s most aggressive chemicals.</td>
</tr>
</tbody>
</table>
| Features          | • Excellent resistance to chemical attack  
                     • Excellent abrasion and impact resistance  
                     • Exceptional thermal shock resistance  
                     • Superior bonding properties  
                     • High cohesive strength  
                     • Low permeability  
                     • Low odor |
| Primer            | Semstone 110 Primer |
| Note              | For substrates with out-gassing concerns use Carboguard 1340. Primer should be applied while the substrate temperature is decreasing. |
| Dry Film Thickness| 30.0 mils (762 microns) per coat |
|                   | Application thickness may vary from 30-150 mils (0.75-3.8 mm) depending on expected service conditions (i.e., chemical exposure, temperature, traffic load and other mechanical abuse, immersion service vs. splash-spill, etc.). Consult CarboLine’s Technical Service Department for specific thickness recommendations. In addition, coverage rates will be affected by the condition of the surface being coated (degraded vs. smooth, steel vs. concrete, etc.). |
| Typical Uses      | • Process Slabs  
                     • Tank Farm Floors  
                     • Chemical Loading and Unloading Areas  
                     • Spill Containment Areas |
| Solids Content    | By Volume 100% +/- 2% |
| Theoretical Coverage Rate | 1604 ft² at 1.0 mils (39.4 m²/l at 25 microns)  
                              53 ft² at 30.0 mils (1.3 m²/l at 750 microns) |
| Voc Values        | As Supplied 0 |

## Substrates & Surface Preparation

### General

Proper preparation is critical to ensure an adequate bond. The substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance. Laitance and unbonded cement particles must be removed by mechanical methods, i.e., abrasive blasting or scarifying. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent and rinsing with clean water. For recommendations or additional information regarding substrate preparation, please contact CarboLine’s Technical Service Department.

### Steel

Equipment base plates, etc. to be coated along with the concrete should be abrasive blasted to a near white metal finish, SSPC-10 or NACE-2, with a 1 to 2 mils anchor profile.

### Substrates & Surface Preparation

**Concrete or CMU**
Concrete should be properly cured for 28 days and have the following characteristics: Substrate tensile strength of at least 300 psi. pH in the range of 7 to 11. The surface must show open pores throughout and have a sandpaper texture.

### Mixing & Thinning

**Mixing**
Premix part A for 30 seconds using a Jiffy-type mixer. Pour part B into the part A and mix thoroughly for two minutes.

**Ratio**
4:1 A:B

**Pot Life**
45-60 minutes @ 75°F (24°C)*  
*Significantly less at elevated temperatures.

## Application Procedures

### General

**Broadcast Application (AFC-Broadcast)**
Apply a base coat at the specified thickness using a squeegee or notched trowel. For a 60 mil (1.5mm) system apply a 25 mil(0.63mm) base coat and for a 125 mil(3.1mm) system apply a 50 mil(1.3 mm) base coat. Immediately after applying the base coat begin broadcasting the aggregate until a dry appearance is achieved.  
Note: the use of a 20/40 mesh aggregate is recommended.  
After the base coat has cured remove the loose aggregate. Apply a 10-15 mil(0.25-0.38 mm) top coat using a squeegee or roller.

**Blended Application (AFC-Blended)**
After mixing part A and B split the mix into two 5-gallon buckets. While continuing to mix with a Jiffy mixer, slowly add the aggregate.  
Note: A 2:1 sand to liquid weight ratio will produce a trowel-like consistency. A 3:1 ratio will give a grout-like consistency. The use of 20/40 mesh silica aggregate is recommended.  
Apply the mixture at the desired thickness using a notched trowel. After the surface has cured it must be washed with soap and water prior to re-coating.

**Reinforced (AFRC-Broadcast)**
A fiberglass scrim cloth may be added to the 125 mil broadcast system. Apply the cloth into the base coat prior to applying the aggregate.

**Reinforced (AFRC-Blended)**
A fiberglass scrim cloth may be added to the 125 blended system. Apply a 25-35 mil base coat and then lay the scrim cloth into the base coat.  
**Note:** When using the Blended Application methods above a “vertical-grade” mix can be achieved by blending the base coat with Thixotrope D in a 1:1 by volume mix. Thixotrope D is sold separately.
Semstone® 140

Application Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Material</th>
<th>Surface</th>
<th>Ambient</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>50 °F (10 °C)</td>
<td>50 °F (10 °C)</td>
<td>50 °F (10 °C)</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum</td>
<td>90 °F (32 °C)</td>
<td>90 °F (32 °C)</td>
<td>90 °F (32 °C)</td>
<td>90%</td>
</tr>
</tbody>
</table>

Substrate temperature should be greater than 5°F (3°C) above dew point.

For optimal working conditions, substrate temperature must be between 60°F (15°C) and 80°F (27°C). Measure the surface temperature with a surface thermometer. Cold areas must be heated until the slab temperature is above 50°F (10°C). This will allow the material to achieve a proper cure. Also, a cold substrate will make the material stiff and difficult to apply. Warm areas or areas in direct sunlight must be shaded or arrangements made to work during evenings or at night. A warm substrate (60-80°F (15-27°C)) will add in the material’s workability; however, a hot substrate (80-100°F (27-37°C)) or a substrate directly in the sun will shorten the material’s working time and can cause other phenomenon such as pinholing and bubbling.

If the temperature is expected to drop below 50°F (10°C) use Semstone 140 CT.

Consult Carboline Technical Service if conditions are not within the recommended guidelines.

Curing Schedule

<table>
<thead>
<tr>
<th>Surface Temp. *</th>
<th>Chemical Service</th>
<th>Dry to Touch</th>
<th>Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 °F (24 °C)</td>
<td></td>
<td>36 Hours</td>
<td>12 Hours</td>
</tr>
</tbody>
</table>

* And 50% relative humidity

Cleanup & Safety

Cleanup

MEK, Toluene or Xylene solvents are recommended for clean up of Semstone 140 material spills. Use these materials only in strict accordance with manufacturer’s recommended safety procedures. Dispose of waste materials in accordance with government regulations.

Safety

The selection of proper protective clothing and equipment will significantly reduce risk to injury. Body covering apparel, safety goggles and impermeable gloves are highly recommended.

Ventilation

- The use of a NIOSH/MSHA approved respirator using a #TC-23C-738 organic vapor or a #TC-23C-740 organic vapor acid gas cartridge is mandatory.
- Use only with adequate ventilation.

Packaging, Handling & Storage

Shelf Life

Part A: 24 months
Part B: 24 months

Shipping Weight

(Approximate)

1 gal unit: 11.2 lbs (5.1 kg)
5 gal unit: 54.1 lbs (24.6 kg)

Storage Temperature & Humidity

Twenty-four hours before application, all components should be stored at 70-85°F (21-29°C) to facilitate handling

Flash Point

(Setaflash)

Part A: 350°F (177°C)
Part B: 240°F (116°C)

Storage

Store indoors, keep out of direct sunlight

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Carboline® and Carboguard® are registered trademarks of Carboline Company.
**Selection & Specification Data**

- **Generic Type**: Epoxy novolac
- **Description**: 100% solids, high performance, novolac epoxy lining system designed for concrete. It is a semi-leveling coating and may be applied as an aggregate filled and/or reinforced coating system. Specially formulated to withstand some of industry’s most aggressive chemicals, including 98% sulfuric acid, as well as many organic chemicals and solvents.
- **Features**:
  - Excellent resistance to chemical attack
  - Excellent abrasion and impact resistance
  - Exceptional thermal shock resistance
  - Superior acid resistance
  - Superior bonding qualities
  - High cohesive strength
  - Low permeability
  - Low odor
- **Primer**: Semstone 110 Primer
  - **Note**: For substrates with out-gassing concerns use Carboguard 1340. Primer should be applied while the substrate temperature is decreasing.
- **Dry Film Thickness**: 30.0 mils (0.8 mm) per coat
  - Application thickness may vary from 30-150 mils (0.75-3.8 mm) depending on expected service conditions (i.e., chemical exposure, temperature, traffic load and other mechanical abuse, immersion service vs. splash-spill, etc.). Consult Carboline’s Technical Service Department for specific thickness recommendations. In addition, coverage rates will be affected by the condition of the surface being coated (degraded vs. smooth, steel vs. concrete, etc.).
- **Typical Uses**:
  - Process slabs
  - Tank farm floors
  - Chemical loading and unloading areas
  - Spill containment areas
- **Solids Content**: By Volume 100% +/- 2%
- **Theoretical Coverage Rate**:
  - 1604 ft² at 1.0 mils (39.4 m²/l at 25 microns)
  - 53 ft² at 30.0 mils (1.3 m²/l at 750 microns)
  - Allow for loss in mixing and application.
- **VOC Values**: As Supplied 0

**Substrates & Surface Preparation**

- **Concrete or CMU**: Concrete should be properly cured for 28 days and have the following characteristics:
  - Substrate tensile strength of at least 300 psi.
  - pH in the range of 7 to 11.
  - The surface must show open pores throughout and have a sandpaper texture.
- **Mixing & Thinning**
  - **Mixer**: Premix part A for 30 seconds using a Jiffy-type mixer. Pour part B into part A and mix thoroughly for two minutes.
  - **Ratio**: 4:1 A:B
  - **Pot Life**: 45-60 minutes @ 75°F (24°C)*
    - *Significantly less at elevated temperatures*

**Application Procedures**

- **General**
  - **Broadcast Application (AFC-Broadcast)**: Apply a base coat at the specified thickness using a squeegee or notched trowel. For a 60 mil (1.5mm) system apply a 25 mil(0.63mm) base coat and for a 125 mil(3.1mm) system apply a 50 mil(1.3 mm) base coat. Immediately after applying the base coat begin broadcasting the aggregate until a dry appearance is achieved.
  - **Blended Application (AFC-Blended)**: After mixing part A and B split the mix into two 5-gallon buckets. While continuing to mix with a Jiffy mixer, slowly add the aggregate.
  - **Reinforced (AFRC-Broadcast)**: A fiberglass scrim cloth may be applied to the base coat prior to applying the aggregate.
    - **Steel**: Equipment base plates, etc. to be coated along with the concrete should be abrasive blasted to a near white metal finish, SSPC-10 or NACE-2, with a 1 to 2 mils anchor profile.
Semstone® 145

Application Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Material</th>
<th>Surface</th>
<th>Ambient</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>50 °F (10 °C)</td>
<td>50 °F (10 °C)</td>
<td>50 °F (10 °C)</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum</td>
<td>90 °F (32 °C)</td>
<td>90 °F (32 °C)</td>
<td>90 °F (32 °C)</td>
<td>90%</td>
</tr>
</tbody>
</table>

Substrate temperature should be greater than 5°F (3°C) above dew point. For optimal working conditions, substrate temperature must be between 60°F (15°C) and 80°F (27°C). Measure the surface temperature with a surface thermometer. Cold areas must be heated until the slab temperature is above 50°F (10°C). This will allow the material to achieve a proper cure. Also, a cold substrate will make the material stiff and difficult to apply. Warm areas or areas in direct sunlight must be shaded or arrangements made to work during evenings or at night. A warm substrate (60-80°F (15-27°C)) will aid in the material’s workability; however, a hot substrate (80-100°F (27-37°C)) or a substrate directly in the sun will shorten the material’s working time and can cause other phenomenon such as pinholing and bubbling.

If the temperature is expected to drop below 50°F (10°C) use Semstone 140 CT. Consult Carboline Technical Service if conditions are not within the recommended guidelines.

Curing Schedule

<table>
<thead>
<tr>
<th>Surface Temp.</th>
<th>Chemical Service</th>
<th>Dry to Touch</th>
<th>Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 °F (24 °C)</td>
<td></td>
<td>36 Hours</td>
<td>12 Hours</td>
</tr>
</tbody>
</table>

*And 50% relative humidity

Cleanup & Safety

Cleanup
MEK, Toluene or Xylene solvents are recommended for clean up of Semstone 140 material spills. Use these materials only in strict accordance with manufacturer’s recommended safety procedures. Dispose of waste materials in accordance with government regulations.

Safety
The selection of proper protective clothing and equipment will significantly reduce risk to injury. Body covering apparel, safety goggles and impermeable gloves are highly recommended.

Ventilation
The use of a NIOSH/MSHA approved respirator using a #TC-23C-738 organic vapor or a #TC-23C-740 organic vapor acid gas cartridge is mandatory. Use only with adequate ventilation.

Packaging, Handling & Storage

Shelf Life
Part A: 24 months
Part B: 24 months

Shipping Weight
1 gallon kit: 12 lbs (5.3 kg)
5 gallon kit: 57 lbs (25.7 kg)

Storage
50-75°F (10-24°C)

24 hours before application, all components should be stored at a 70-85°F (21-29°C) to facilitate handling.

Flash Point
Part A: 170°F (77°C)
Part B: 240°F (116°C)

Storage
Store indoors
## Selection & Specification Data

<table>
<thead>
<tr>
<th>Generic Type</th>
<th>Epoxy novolac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>High performance, 100% solids, novolac epoxy coating designed for concrete protection against chemical attack and physical abuse. This coating has been specially formulated with vertical film build characteristics for application to walls (and floors alike) to provide an outstanding barrier against some of industry’s most aggressive chemicals, including 98% sulfuric acid as well as many organic chemicals and solvents.</td>
</tr>
<tr>
<td>Features</td>
<td>• Excellent resistance to chemical attack</td>
</tr>
<tr>
<td></td>
<td>• Excellent abrasion and impact resistance</td>
</tr>
<tr>
<td></td>
<td>• Exceptional thermal shock resistance</td>
</tr>
<tr>
<td></td>
<td>• Superior adhesion to both steel or concrete</td>
</tr>
<tr>
<td></td>
<td>• High cohesive strength</td>
</tr>
<tr>
<td></td>
<td>• Low permeability</td>
</tr>
<tr>
<td></td>
<td>• Low odor</td>
</tr>
</tbody>
</table>

| Primer                | Semstone 110 Primer |
| Note:                 | For substrates with out-gassing concerns use Carboguard 1340. Primer should be applied while the substrate temperature is decreasing. |

| Dry Film Thickness    | 30.0 mils (762 microns) per coat |
| Typical Uses          | • Process areas                  |
|                       | • Tank farm containment areas    |
|                       | • Production areas               |
|                       | • Spill containment Areas        |
|                       | • Light Manufacturing            |

| Solids Content        | By Volume 100% +/- 0% |
| Theoretical Coverage Rate | 1598 ft² at 1.0 mils (39.2 m²/l at 25 microns) |
|                       | 53 ft² at 30.0 mils (1.3 m²/l at 750 microns) |
| Allow for loss in mixing and application. |

| VOC Values            | As Supplied 3 g/l |

## Substrates & Surface Preparation

### General
Proper preparation is critical to ensure an adequate bond. The substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance. Laitance and unbonded cement particles must be removed by mechanical methods, i.e., abrasive blasting or scarifying. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent and rinsing with clean water. For recommendations or additional information regarding substrate preparation, please contact Carboline’s Technical Service Department.

### Steel
Equipment base plates, etc. to be coated along with the concrete should be abrasive blasted to a near white metal finish (SSPC-10 or NACE-2) with a 1 to 2 mils anchor profile.

## Substrates & Surface Preparation

### Concrete or CMU
Concrete should be properly cured for 28 days and have the following characteristics:
- Substrate tensile strength of at least 300 psi.
- pH in the range of 7 to 11.
- The surface must show open porosity throughout and have a profile similar to medium sandpaper texture. Refer to SSPC-SP13 / NACE 6.

### Mixing & Thinning

#### Mixing
Premix Part A until homogenous using a Jiffy-type mixer. Pour part B into part A and mix thoroughly for two minutes.

**Pot Life**
45-60 minutes at 75°F
*Significantly less at elevated temperatures

### Application Equipment Guidelines

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

#### Airless Spray
Use air motor with an air ratio of 42:1 or larger. All filters should be removed from the pump. Use a 3/8 in. spray hose from pump to gun, not to exceed 100 linear ft. It is best to bring the material directly to the gun body and not go through a tube in the handle. The size of airless spray tip should be from 0.019-0.035 inches. The mixed material temperature should be 75-85°F/24-38°C for best spraying properties. Temperatures above 85°F (29°C) will shorten pot life.

#### Plural Component Airless Spray
Use a fixed (4:1) ratio plural component spray rig with heated hoppers, heated hoses to a mixer manifold through a static mixer to a 50 ft whip hose and self-cleaning reversible tips from 0.017” to 0.035”. The Part A material should be a minimum of 110°F (43°C) and the Part B should be 90-100°F (32-38°C). Take care to prevent mixed material from settling up in your hoses. For best results keep hoses as short as possible, purge them immediately with Carboline Thinner #76 if work is interrupted, keep them out of direct sunlight and insulated from hot surfaces.

### Application Procedures

#### General
Before any touch up or recoat material can be applied the first coat must be properly prepared for intercoat adhesion. The first coat must be cured firm to touch. Coating on floors must be able to support foot traffic. Scrub the first coat with soap and water and thoroughly rinse and dry. If the first coat cures more than 24 hours, sand or mechanically abrade the surface after scrubbing it down. Any surface to be touched up or recoated should be protected. When the recoat material is applied the surface must be dry and free of all dirt, dust, debris, oil, grease or other contamination.
Semstone® 145 SL

Application Procedures

Airless Spray  Immediately before applying spray coat, stripe all continuous welds and edges with a brush coat to assure adequate protection of these areas. Apply material to specified thickness using 8-14 mil (200-350 microns) per pass. Apply in a criss-cross, multi-pass technique, moving gun at a fairly rapid rate and maintaining a wet-appearing film. Use a wet film gauge to monitor film build.

Curing Schedule

<table>
<thead>
<tr>
<th>Surface Temp. °F</th>
<th>Dry to Touch</th>
<th>Firm</th>
<th>Chemical Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 °F (24 °C)</td>
<td>12 Hours</td>
<td>24 Hours</td>
<td>36 Hours</td>
</tr>
</tbody>
</table>

* with 50% relative humidity

Cleanup & Safety

Cleanup  MEK, Toluene or Xylene solvents are recommended for clean up of Semstone 145 SL material spills. Use these materials only in strict accordance with the manufacturer’s recommended safety procedures. Dispose of waste materials in accordance with government regulations.

Safety  The selection of proper protective clothing and equipment will significantly reduce risk to injury. Body covering apparel, safety goggles and impermeable gloves are highly recommended.

Ventilation  • The use of a NIOSH/MSHA approved respirator using a #TC-23C-738 organic vapor or a #TC-23C-740 organic vapor acid gas cartridge is mandatory.
  • Use only with adequate ventilation.

Packaging, Handling & Storage

Shelf Life  1 year in the original, unopened container.

Shipping Weight (Approximate)  1 gal unit: 11.8 lbs (5.4 kg)
  5 gal unit: 55.9 lbs (25.4 kg)

Storage Temperature & Humidity  50-75°F (10-24°C)

24 hours before application, all materials (components A and B, aggregate, etc.) should be stored at a 70-85°F/21-29°C to facilitate handling.

Flash Point (Setaflash)  Part A: 170°F (77°C)
  Part B: 199°F (93°C)

Storage  Store indoors
PRODUCT DESCRIPTION
Semstone 245 is a 100% solids, high performance, novolac epoxy lining system designed for concrete. Semstone 245 is a semi-leveling coating, it may be applied as an aggregate filled and/or reinforced coating system. Semstone 245 is specially formulated to withstand some of the industry’s most aggressive chemicals, specifically chlorinated solvents.

USES, APPLICATIONS
- Process Slabs
- Tank Farm Floors
- Chemical Loading and Unloading Areas
- Spill Containment Areas

PRODUCT ADVANTAGES
Semstone 245 is a two-component system that possesses the following characteristics:
- Excellent resistance to chemical attack
- Excellent abrasion and impact resistance
- Exceptional thermal shock resistance
- Superior bonding qualities
- High cohesive strength
- Low permeability
- Low odor

CHEMICAL RESISTANCE
Semstone 245 is formulated to resist a variety of chemical solutions. Please consult Carboline Technical Service Department for specific recommendations.

PACKAGING
Semstone 245 is available in 1 gallon and 3 gallon units.

A 1 gallon unit consists of:
1 1 gallon can of Part A (resin)
1 quart can of Part B (hardener)

A 3 gallon unit consists of:
1 5 gallon pail of Part A (resin)
1 1 gallon can of Part B (hardener)

COVERAGE
Semstone 245 will cover 1,604 mils sq. ft./gal. For estimating purposes, one gallon of Semstone 245 will cover 64 sq. ft./5.96 sq. m at a thickness of 25 mil/0.63 mm. Application thickness may vary from 30-150 mils/0.75-3.8 mm depending upon expected service conditions (i.e., chemical exposure, temperature, traffic load and other mechanical abuse, immersion service vs. splash-spill, etc.). Consult Carboline’s Technical Service Department for specific thickness recommendations. In addition, coverage rates will be affected by the condition of the surface being coated (degraded vs. smooth, steel vs. concrete, etc.).

STORAGE CONDITIONS
Store all components between 50-70°F/10-21°C in a dry area. Keep out of direct sunlight. Avoid excessive heat and do not freeze.

Twenty-four hours before application, all materials (components A and B, aggregate, etc.) should be stored at a 65-75°F/18-24°C to facilitate handling.

PHYSICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength</td>
<td>18,000 psi (ASTM C-579: AFC)</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td></td>
</tr>
<tr>
<td>Sag Film</td>
<td></td>
</tr>
<tr>
<td>Bond Strength</td>
<td></td>
</tr>
<tr>
<td>Bonding Qualities</td>
<td></td>
</tr>
<tr>
<td>Chemical Resistance</td>
<td></td>
</tr>
<tr>
<td>Water Vapor Transmission</td>
<td>0.0120 grams/hr./ft² (ASTM E-96)</td>
</tr>
<tr>
<td>Permeability</td>
<td>0.0042 perm. -in. (ASTM E-96)</td>
</tr>
<tr>
<td>Weight per Mixed Gallon</td>
<td>10.6 lbs</td>
</tr>
<tr>
<td>Shelf Life</td>
<td>24 months</td>
</tr>
<tr>
<td>Cure Time @ 75°F</td>
<td>12 hrs Firm, 24 hrs Chemical Service</td>
</tr>
<tr>
<td>Flammability</td>
<td>Non-flammable</td>
</tr>
</tbody>
</table>

* Significantly less at elevated temperatures

SUBSTRATE PREPARATION

General
Proper preparation is critical to ensure an adequate bond. The substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance. Laitance and unbonded cement particles must be removed by mechanical methods, i.e., abrasive blasting or scarifying. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent and rinsing with clean water. For recommendations or additional information regarding substrate preparation, please contact Carboline’s Technical Service Department.

Concrete
Concrete should be properly cured for 28 days and have the following characteristics:
- Substrate tensile strength of at least 300 psi.
- pH in the range of 7 to 11.

The surface must show open pores throughout and have a sandpaper texture.

Steel
Equipment base plates, etc. to be coated along with the concrete should be abrasive blasted to a near white metal finish, SSPC-10 or NACE-2, with a 1 to 2 mils anchor profile.

Masking
Mask surfaces that are not to be coated. This material is difficult to remove once applied.

APPLICATION GUIDELINES
Before mixing and applying any material, make sure environmental conditions are satisfactory for application. For optimal working conditions, substrate temperature must be between 50°F/10°C and 70°F/21°C. Measure the surface temperature with a surface...
RECOMMENDATIONS

- Apply only on clean, sound, dry and properly prepared substrates.
- Minimum ambient and surface temperatures are 35°F/2°C at the time of application.
- Maximum surface temperatures should not exceed 90°F/32°C during the time of application.
- Substrate temperature should be greater than 5°F/3°C above dew point.
- Application and curing times are dependent upon ambient and surface conditions. Consult Carboline’s Technical Service Department if conditions are not within the recommended guidelines.

PRECAUTIONS

- MEK, Toluene or Xylene solvents are recommended for clean up of Semstone 245 material spills. Use these materials only in strict accordance with manufacturer’s recommended safety procedures.
- Dispose of waste materials in accordance with government regulations.
- The use of a NIOSH/MSHA approved respirator using a #T-23C-738 organic vapor or a #T-23C-740 organic vapor acid gas cartridge is mandatory.
- The selection of proper protective clothing and equipment will significantly reduce risk to injury. Body covering apparel, safety goggles and impermeable gloves are highly recommended.
- In case of contact, flush the area with water for 15 minutes and seek medical attention. Wash skin with soap and water.
- Use only with adequate ventilation.

NOTES

- Material Safety Data Sheets on Semstone 245 are available on request.
- Specific information regarding chemical resistance of Semstone 245 is available in the Semstone Chemical Resistance Guide.
- A staff of technical service engineers is available to assist in product application or to answer questions related to Carboline products.
- Requests for technical literature or service can be made through local sales representatives and offices, or corporate offices located worldwide.
### Selection & Specification Data

#### Generic Type
Two component solvent free epoxy

#### Description
Epoxy patching and surfacing compound that exhibits excellent bond strength and chemical resistance to a variety of acids, alkalies, salt solutions and oils. It is used to fill voids and bugholes in precast or poured-in-place concrete and other masonry surfaces. Repairs damaged concrete, fills narrow cracks, and can be used as a coving material for floor-wall transitions or lap joint areas. May also be used to repair weld seams and pits in metal.

#### Features
- Solvent free
- Excellent film strength, abrasion, and impact resistance
- Rapid hardening for quick service
- Easy to mix ratios
- Excellent film build and working properties

#### Color
Light gray

#### Primers
Normally self-priming to steel, concrete or masonry surfaces. May be applied over other epoxies.

#### Topcoats
Epoxies, Polyurethanes

#### Dry Film Thickness
As required to fill the void or resurface the substrate. May be applied up to 1/8 inch (125 mils) per application on a vertical surface.

#### Solids Content
By Volume: 100%

#### Theoretical Coverage Rate
12.8 ft.$^2$/gal at 125 mils (1/8 inch)

#### VOC Values
As supplied: 0.00 lbs./gal

#### Limitations
Epoxies lose gloss, discolor and eventually chalk in sunlight exposure.

### Substrates & Surface Preparation

#### General
Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

#### Steel
- **Cleanliness:** SSPC-SP10
- **Surface Profile:** 1.5-3.0 mils (38-75 microns)

#### Galvanized Steel
SSPC-SP1 and prime with specific Carboline primers as recommended by your Carboline Sales Representative.

#### Concrete
Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete.

#### CMU
Mortar joints should be thoroughly cured for a minimum of 15 days at 75°F (24°C) and 50% relative humidity or equivalent.

### Performance Data

<table>
<thead>
<tr>
<th>Test Method</th>
<th>System</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D4541 Bond Strength (Elcometer)</td>
<td>501 over concrete</td>
<td>&gt;400 psi concrete failure</td>
</tr>
<tr>
<td>ASTM C579 Compressive Strength</td>
<td>501</td>
<td>5000 psi</td>
</tr>
<tr>
<td>ASTM C307 Tensile Strength</td>
<td>501</td>
<td>1300 psi</td>
</tr>
<tr>
<td>ASTM C580 Flexural Strength</td>
<td>501</td>
<td>2200 psi</td>
</tr>
<tr>
<td>ASTM D2240 Hardness Shore D Durometer</td>
<td>501</td>
<td>60</td>
</tr>
</tbody>
</table>

Test reports and additional data available upon written request.
Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

General Guidelines:

Hand Tools
This is a high solids thixotropic coating that is applied through the use of one or more of the following: steel finishing trowel, taping knife, spatula, or rigid squeegee. Use the surrounding area as a leveling guide for finishing.

Mixing & Thinning

Mixing
Power mix separately and then combine and power mix for at least two minutes or until a uniform gray color is achieved. Recommend using a heavy-duty, slow speed drill and a jiffy mixer. When mixing partial kits it is critical to proportion equal volumes of the two components to ensure proper cure and film properties. Any unused material must be resealed immediately.

Ratio
1:1 Ratio (A to B)

Pot Life
15-30 min at 75°F (24°C) depending on volume mixed. Pot life ends when coating becomes too viscous to use. Pot life times will be less at higher temperatures or larger mixed masses.

Cleanup & Safety

Cleanup
Use scouring pads and water or Thinner #2. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety
Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation
When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to ensure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved respirator.

Caution
All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Material</th>
<th>Surface</th>
<th>Ambient</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>60°F-85°F (16°C-29°C)</td>
<td>60°F-85°F (16°C-29°C)</td>
<td>60°F-90°F (16°C-32°C)</td>
<td>0-80%</td>
</tr>
<tr>
<td>Minimum</td>
<td>55°F (13°C)</td>
<td>55°F (13°C)</td>
<td>55°F (13°C)</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum</td>
<td>90°F (32°C)</td>
<td>125°F (52°C)</td>
<td>110°F (43°C)</td>
<td>80%</td>
</tr>
</tbody>
</table>

This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions. It may be sanded 8 to 16 hours after application, depending on ambient conditions.

Curing Schedule

<table>
<thead>
<tr>
<th>Surface Temp. &amp; 50% Relative Humidity</th>
<th>Set Time to Topcoat with Other Finishes</th>
<th>Ultimate Physical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>75°F (24°C)</td>
<td>6-8 Hours</td>
<td>7 days</td>
</tr>
</tbody>
</table>

Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times. Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze. Any haze or blush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing. Maximum recoat/topcoat times are 30 days for epoxies and 90 days for polyurethanes at 75°F (24°C). If the maximum recoat times have been exceeded, the surface must be abraded by sweep blasting or sanding prior to the application of additional coats.

Packaging, Handling & Storage

<table>
<thead>
<tr>
<th>Shipping Weight (Approximate)</th>
<th>3.6 gallon kit</th>
<th>50 lbs (23 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point (Setaflash)</td>
<td>Part A &gt;267°F (131°C)</td>
<td>Part B &gt;485°F (251°C)</td>
</tr>
<tr>
<td>Storage Conditions</td>
<td>60°F-85°F (16°C-30°C) Store indoors.</td>
<td>Do not freeze.</td>
</tr>
<tr>
<td>Shelf Life</td>
<td>Min. 36 months</td>
<td></td>
</tr>
</tbody>
</table>

*Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.
Selection & Specification Data

Generic Type
A water-based epoxy repair mortar which is cement and aggregate filled.

Description
An economical epoxy patching and surfacing compound that exhibits excellent bond strength to concrete and other masonry surfaces. It is ideally suited for patching spalled concrete and masonry wall surfacing to accept subsequent topcoats. Carboguard 510 repairs damaged concrete, fills large cracks, and can be used as a coving and sloping material for floor-wall transitions.

Features
- Water based, low odor
- Excellent film strength, abrasion, and impact resistance
- Is castable, making it suitable for restoring pump foundations
- Easily topcoated to provide additional chemical resistance or appearance
- Also used as a primer without aggregate

Color
Gray

Primers
Normally self-priming to concrete or masonry surfaces.

Topcoats
Epoxies, Epoxy-Novolacs, Polyurethanes

Dry Film Thickness
As required to fill the void or resurface the substrate. May be applied up to 2 inches per application. Feather-edging is not recommended.

Theoretical Coverage Rate
Primer only: 120 ft² per gallon
3-gallon unit with aggregate blend: 1.68 ft³

VOC Values
As supplied: 0.00 lbs/gallon
Water based product

Limitations
- Minimum surface and ambient temperature is 50°F (10°C).
- Not for use under vinyl ester or polyester materials.

Substrates & Surface Preparation

General
Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

Concrete
Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete.

CMU
Mortar joints should be thoroughly cured for a minimum of 15 days at 75°F (24°C) and 50% relative humidity or equivalent.

Performance Data

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamometer Adhesion to concrete</td>
<td>350 psi</td>
</tr>
<tr>
<td>ASTM C-109 Compressive Strength</td>
<td>5840 psi</td>
</tr>
<tr>
<td>ASTM C-190 Tensile Strength</td>
<td>865 psi</td>
</tr>
<tr>
<td>ASTM C-348 Flexural Strength</td>
<td>1840 psi</td>
</tr>
<tr>
<td>Abrasion Resistance Tabor Abrader (CS-17 Wheel)</td>
<td>0.09 mg.</td>
</tr>
</tbody>
</table>

Test reports and additional data available upon written request.

December 2002 replaces June 2001

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**Application Equipment**

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

**General Guidelines:**

- Carboguard 510 may be applied using conventional concrete placement and finishing tools. Mixing should be done by a horizontal blade mortar mixer.

**Mixing & Thinning & Application**

**Mixing**

Power mix Parts A and B separately, then combine and use as a primer at a spreading rate of 120 ft² per gallon.

Within 4 hours of priming, combine the following mixture, for use as a surfacing build up material. Premix sand and cement for best results before adding to A+B mixture.

**Ratio**

1:2

| Part A | 1/2 Cubic foot kit (for voids, bugholes) | 38 gal. (3.4 lbs.) |
| Part B | 7.7 gal. (6.2 lbs.) |
| Sand #40-80 angular mesh | 39 lbs. |
| Portland Cement (Type 1) | 11 pounds |

- **3 Gallon Kit** (for filling up to 1" thick)
  - Part A | 1 gallon (8.8 lbs.) |
  - Part B | 2 gallon (16.2 lbs.) |
  - Sand #30-50 angular mesh* | 150 lbs. |
  - Portland Cement (Type 1) | 42 lbs. |

- **3 Gallon Kit** (for filling over 1" thick)
  - Part A | 1 gallon (8.8 lbs.) |
  - Part B | 2 gallon (16.2 lbs.) |
  - Sand #30-50 angular mesh* | 50 lbs. |
  - Portland Cement (Type 1) | 42 lbs. |
  - Pea Gravel ¾"* | 100 lbs. |
  - Volume Yield: | 1.66 cubic feet |

* Sand, cement and pea gravel for 3 and 15 gallon kits are not supplied by Carbol ine and should be bought locally.

**Application Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Material</th>
<th>Surface</th>
<th>Ambient</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>70°-80°F (21°-26°C)</td>
<td>70°-80°F (21°-26°C)</td>
<td>70°-80°F (21°-26°C)</td>
<td>0-80%</td>
</tr>
<tr>
<td>Minimum</td>
<td>50°F (10°C)</td>
<td>50°F (10°C)</td>
<td>50°F (10°C)</td>
<td>0%</td>
</tr>
<tr>
<td>Maximum</td>
<td>90°F (32°C)</td>
<td>125°F (52°C)</td>
<td>110°F (43°C)</td>
<td>80%</td>
</tr>
</tbody>
</table>

This product simply requires the substrate temperature to be above the dew point. Special application techniques may be required above or below normal application conditions. Note: When conditions such as excessive wind and high ambient temperatures exist, cover the area with polyethylene sheeting.

**Curing Schedule**

<table>
<thead>
<tr>
<th>Surface Temp &amp; 50% Relative Humidity</th>
<th>Set Time to Topcoat</th>
<th>Light Traffic</th>
<th>Heavy Traffic</th>
<th>Final Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>75°F (24°C)</td>
<td>12 Hours</td>
<td>24 Hours</td>
<td>48 Hours</td>
<td>28 Days</td>
</tr>
</tbody>
</table>

These times are based on ½" thickness at 70°F (21°C). Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times. Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze. Any haze or blush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing.

When using Carboguard 510 as an underlayment for epoxy, epoxy-novac, or polyurethane coatings, it will be necessary to allow the Carboguard 510 to cure a minimum of 24 hours for every 2 inches of thickness. The maximum recoat time without surface preparation is 7 days at 85°F. Always take precautions to prohibit the surface from becoming contaminated prior to application of topcoating; it will be necessary to detergent wash and abrasive blast or sand the surface if it has been contaminated.

**Cleanup & Safety**

**Cleanup**

Use scouring pads and water. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

**Safety**

Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

**Ventilation**

When used as a tank lining or in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved respirator.

**Packaging, Handling & Storage**

**Shipping Weight**

<table>
<thead>
<tr>
<th>(Approximate)</th>
<th>½ cu. Ft. Kit</th>
<th>3 Gallon kit*</th>
<th>15 gallon kit*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62 lbs</td>
<td>27 lbs.</td>
<td>135 lbs.</td>
</tr>
<tr>
<td></td>
<td>(28 kg)</td>
<td>(12 kg)</td>
<td>(61 kg)</td>
</tr>
</tbody>
</table>

* Liquid components A & B only.

**Flash Point**

<table>
<thead>
<tr>
<th>(Setaslash)</th>
<th>Part A</th>
<th>485°F (251°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part B</td>
<td>Water-based</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Part C</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**Storage Conditions**

65° - 85°F (18°-30°C) Store indoors. Do not freeze

**Shelf Life**

Part A & B: Min. 24 months at 75°F (24°C)

*Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.

December 2002 replaces June 2001

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PRODUCT DESCRIPTION
SEMSTONE 805 is a Flexible Epoxy Polymer Coating & Lining providing a chemical, water and/or abrasion resistant barrier for steel and concrete. SEMSTONE 805 is one of Carboline’s most versatile coating systems. Developed as a self-leveling, flexible chemical resistant coating and lining, this two-component system can also be used as a high build coating and lining system with the addition of a third component.

SEMSTONE 805 is a 100% solids, low odor, two component system consisting of Part A and Part B components. It may be applied as a neat system (unfilled), reinforced system, aggregate filled system to extend coverage, or as an aggregate filled reinforced system. A bagged Part C thixotropic agent is added for high build applications. It is most often used with reinforcing fabric (#100) over expansion joints.

TYPICAL USES AND APPLICATIONS
SEMSTONE 805 offers users a variety of application options for the protection of steel and concrete. It can be used as a chemically resistant seal for expansion joints and other points of movement, and as a reinforced coating system for severely cracked concrete surfaces. With the addition of Part C non-silica thixotropic agent, SEMSTONE 805 can be applied as a high build coating and lining system or as a trowel/caulk grade or putty material.

Consult Carboline’s Technical Service Department for specific chemical resistance information.

HANDLING CHARACTERISTICS
SEMSTONE 805 may be applied using an airless spray unit in accordance with manufacturer's specifications, notched trowel, squeegee, brush or roller. It can be applied as a trowel/caulk grade or putty material with the addition of Part C thixotropic agent.

Depending on expected service conditions application thickness may vary. Consult Carboline Technical Sales Representative for specific thickness recommendations.

When applying as a high build system or to vertical surfaces, the addition of Part C is required.

PHYSICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Gray</td>
</tr>
<tr>
<td>Solids by Volume</td>
<td>100%</td>
</tr>
<tr>
<td>Weight per Mixed Gallon</td>
<td>10.1 lbs</td>
</tr>
<tr>
<td>Pot Life @ 75°F</td>
<td>30-to-45 min</td>
</tr>
<tr>
<td>Primer</td>
<td>SEMSTONE 110 Damp Proof, SEMSTONE 110-P/S</td>
</tr>
<tr>
<td>Hardness</td>
<td>55 (ASTM D-2240 Shore A: neat)</td>
</tr>
<tr>
<td>Abrasion Resistance</td>
<td>120 (mg lost) (ASTM D-1044: neat)</td>
</tr>
<tr>
<td>(CS17 wheels - 1000 cycle, 1000 gram) AFC</td>
<td>40</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>1050 psi</td>
</tr>
<tr>
<td>Tensile Elongation</td>
<td>100%</td>
</tr>
<tr>
<td>Bond Strength</td>
<td>Concrete Failure in Concrete (ASTM D-4541: (psi))</td>
</tr>
</tbody>
</table>

PACKAGING
SEMSTONE 805 is packaged in 1-gallon and 2-gallon units.
Each unit consists of a pre-measured Part A component and a pre-measured Part B component. A bagged Part C thixotropic agent is available for work on vertical surfaces.

STORAGE
Keep SEMSTONE 805 products tightly sealed in their original containers until ready for use. Store at 50-to-80°F, out of direct sunlight. Properly stored, SEMSTONE 805 has a minimum shelf life of one year. Refer to the batch number on the label for date of manufacture.

PRECAUTIONS
FOR INDUSTRIAL USE ONLY.
When using SEMSTONE 805 products, be aware of these safety precautions:
- Avoid contact with eyes and skin.
- Do not ingest or inhale.
- Always wear chemical goggles, rubber gloves, and appropriate work clothing.
- Wear fresh air hood and make provisions for forced ventilation when working in confined areas.
- Wear fresh air hood or an organic mist respirator when spraying in an open area.

August 2003 replaces May 2003
SEMSTONE® 805
Flexible Epoxy
Polymer Coating & Lining

- Prolonged or repeated exposure to this material may cause skin irritation or allergic reaction.
- Refer to material safety data sheets (MSDS) regarding individual components.

NOTES
- Material Safety Data Sheets on SEMSTONE 805 are available on request.
- A staff of technical service engineers is available to assist in product application, or answer questions related to Carboline products.
- Requests for technical literature or service can be made through local sales representatives and offices, or corporate offices located throughout the world.
PRODUCT DESCRIPTION AND USES
SEMSTONE 806 is a 100% solids, low odor, rubberized epoxy. It is used as a chemically resistant coating for concrete. When reinforced with our flexible reinforcing fabrics it provides a system which will bridge working cracks as well as expansion joints.

SEMSTONE 806 reinforced with #100 fabric can bridge crack expansion joint movement up to 1/2" without cracking.

SEMSTONE 806, as packaged, is a self-leveling material. However, it may be used as a high build coating system by the addition of a third component, Part C, which is a non-silica thixotrope (when used with Parts A and B). The product may be applied by airless spray, notched trowel, squeegee, brush or roller. To make a trowel/caulk grade or putty, add Part C.

SEMSTONE 806 provides an abrasion, chemical and water resistant coating that exhibits good flexibility allowing it to accommodate crack movement. Concrete slabs with severe cracking problems, as well as all construction and expansion joints, may be treated using SEMSTONE 806 with #100 Fabric is ideal for use as a secondary containment coating.

PACKAGING
SEMSTONE 806 is available in 1-gallon and 5-gallon units. Each unit consists of premixed Part A and Part B components. Bagged Part C thixotropic agent may be ordered separately.

COVERAGE
Coverage will be affected by the condition of the surface being coated (degraded vs. smooth, steel vs. concrete, etc.) and the ability of the applicators to maintain a consistent thickness. To figure THEORETICAL coverage per gallon, divide desired mil thickness into 1604. The result will be the number of square feet per gallon. The thickness of the coating system will vary depending on which fabric is used. The following is the thickness and THEORETICAL coverage rates for fabric reinforced systems once they have been saturated with SEMSTONE 806:

<table>
<thead>
<tr>
<th>FABRIC</th>
<th>THICKNESS*</th>
<th>THEORETICAL COVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>#100</td>
<td>50-to-60 mils</td>
<td>26-to-32 square feet/gallon</td>
</tr>
</tbody>
</table>

*Thicknesses listed represent finish thicknesses after saturation of fabric. Over-saturation of the fabrics will increase finish thicknesses and decrease coverage rates.

STORAGE TEMPERATURE
Keep SEMSTONE 806 components tightly sealed in their original containers until ready for use. Store at 50-to-85°F, out of direct sunlight. The optimum temperature for material workability is 75-to-85°F. Properly stored, SEMSTONE 806 has a minimum shelf life of one year.

Refer to batch number on label for date of manufacture.

SURFACE PREPARATION
General
Surfaces must be dry and free of dirt, dust, oil, grease, chemicals and other contaminants immediately prior to each application of SEMSTONE 806.

Concrete
1. Immediately prior to application of coating, concrete substrate must be:
   - Adequately cured (generally, at least 28-days; check with Carboline if concrete has cured less than 28-days).
   - Structurally sound.
   - Free of all dirt, dust, debris, oil, grease, fats, chemical contamination, salts, solvents, surface hardeners, incompatible curing compounds and form release agents, laitance and efflorescence.
   - Concrete surfaces must be dry and must have:
     - Surface tensile strength of at least 300 psi.
     - pH in the range of 7-to-11.
     - All fins, projections and splatter removed.
     - All defects repaired using patching as described herein.
     - Failed or otherwise incompatible old coatings removed.
     - A surface texture similar to medium sandpaper (40-to-60 grit).

2. Locate all expansion joints, control joints, floor drains, equipment base plates, and mid-floor termination points. Handle them according to Carboline SEMSTONE Construction Details.

3. Degraded concrete should be restored using Carboguard 510 Concrete Repair Mortar.

Previously Applied Coatings
1. Ensure coating and bond integrity.
2. Soap and water wash the surface of the cured coating.
3. Roughen the surface by sanding or abrasive blasting.
4. Remove dust and debris.

PHYSICAL CHARACTERISTICS

- Color: Gray
- Solids by Volume: 100%
- Weight per Mixed Gallon: 9.9 lbs
- Pot Life@75°F: 30-to-40 min
- Primer: Optional
- Hardness: 55 (ASTM D-2240 Shore A: neat)
- Abrasion Resistance: 26 (mg loss); (ASTM D-1044: neat)
- Tensile Elongation: 75% (ASTM D-638: neat) reinforced with fabric: 60%
- Bond Strength: Concrete: cohesive failure in concrete (ASTM D-4541)
  - 2" overlap joint strength reinforced with fabric: exceeds tensile strength of system (>3500 psi)

Refer to Carboline’s separate document “Surface Preparation - Concrete” for further instruction in the preparation of concrete surfaces.

September 2003 replaces August 2003
SEMSTONE® 806
Rubberized Epoxy Polymer Coating

Temperature should be at least 50°F; significantly less time at elevated temperatures.

APPLICATION TEMPERATURE
The temperature of the surface to be coated, and the ambient air temperature should be at least 50°F during installation and curing. 24-hours before application, all materials (components A, B, and C, etc.) should be stored at 75-to-85°F to facilitate handling.

MASKING
Mask surfaces that are not to be coated. SEMSTONE 806 is difficult to remove, once applied.

APPLICATION EQUIPMENT
SEMSTONE 806 may be applied using a spray rig, notched trowel, brush or roller. When spraying SEMSTONE 806:
- A single component airless rig can be used to spray SEMSTONE 806.
- See Equipment Specifications 397-251, Graco King. Always use spray equipment in accordance with manufacturer’s instructions.

MIXING
The Part A component must be individually agitated immediately prior to use. Part A - Blend each Part A component to a uniform consistency in its individual container, using a Jiffy type mixer. Part B - No need to agitate.

Pour the entire contents of Part A into a clean container. Add Part B and mix thoroughly for two minutes using a Jiffy type mixer.

If using Part C for vertical surface application, add the pre-measured bag of Part C slowly to the mixed resins and hardeners and blend until the Part C has been evenly dispersed. The amount of Part C may be adjusted to meet job requirements. When using SEMSTONE 806 in conjunction with reinforcing fabric it is not necessary to add Part C.

The pot life of the mixture will be approximately 30-to-45 minutes at 75°F; significantly less time at elevated temperatures. The longer the material is in the bucket after mixing, the shorter its pot life will be. Use it immediately.

Instructions For Unreinforced Coating Applications
Apply the SEMSTONE 806 using your preferred application tools.

If work is interrupted, or at the end of the day, terminate the coating in a straight line.

Instructions For Reinforced Coating Applications
Apply SEMSTONE 806 to the prepared surface, primed or unprimed at a thickness of 40-to-50 mils on horizontal surfaces and 10-to-15 mils on vertical surfaces.

Immediately embed a layer of Reinforcing Fabric into the wet basecoat. Use a short napped felt roller to work any trapped air out from under the fabric and cause the fabric to lay flat.

Apply additional SEMSTONE 806 to the surface of the fabric until the fabric is saturated with SEMSTONE 806. When the fabric is completely saturated it will have a “sheen” finish to it and appear wet. The heavier fabrics will require more material to saturate than the lighter weight fabrics. It is very important that the applicator check the fabric frequently to look for dull, dry looking areas or spots as this is an indication that the fabric is not completely saturated, in which case more material will need to be applied before the system cures.

If work is interrupted, or at the end of the day, terminate the coating in a straight line.

Clean tie-in surfaces by soap and water washing before abrading.

Next day tie-in and spot repair is very easy. Simply abrade the surface using a wire brush and proceed with the application.

CLEAN UP
Remove all masking tape from items masked for protection during installation.

Before it gels, SEMSTONE 806 may be cleaned from tools and equipment using hot, soapy water. After SEMSTONE 806 gels, xylene or MEK will be required. Chlorinated solvents may be used if flammable solvents are not allowed.

SAFETY PRECAUTIONS
FOR INDUSTRIAL USE ONLY.

Avoid contact with eyes and skin; do not ingest or inhale.

When working with SEMSTONE 806, always wear chemical goggles, rubber gloves, and appropriate work clothing.

When spraying in a confined area, also wear a fresh air hood and make provisions for forced ventilation.

When spraying in an open area, an organic mist respirator can replace the fresh air hood.

Prolonged or repeated exposure to SEMSTONE 806 may cause skin irritation or allergic reactions.

Ref. to material safety data sheets regarding individual components.

SAFETY
READ THIS NOTICE
SAFETY AND MISCELLANEOUS EQUIPMENT

It is recommended that the operator provide himself with clean coveralls and rubber soled shoes and observe good personal hygiene. Certain personnel may be sensitive to various types of resins which may cause dermatitis.

When working in confined areas adequate ventilation must be provided. Respirators or fresh air supplied hoods may be required.

FIRE AND EXPLOSION HAZARDS: PRODUCT CONTAINS LESS THAN 1% VOLATILE COMPONENTS. HOWEVER, VAPORS ARE HEAVIER THAN AIR AND COULD TRAVEL LONG DISTANCES, IGNITE, AND FLASHBACK. ELIMINATE ALL IGNITION SOURCES. Keep away from heat, sparks and open flame and use necessary safety equipment such as air mask, explosion-proof electrical equipment, non-sparking tools and ladders, etc. Avoid contact with skin and breathing of vapor or spray mist. When working in tanks, rooms and other enclosed spaces, adequate ventilation must be provided. Refer to PLASITE Bulletin PA-3. Keep out of the reach of children.

CAUTION - Read and follow all caution statements on this product data sheet, material safety data sheet and container label for this product.

This bulletin provides standard information on the coating and application procedure. Since varying conditions may not be covered, consult your local sales representative or Carboline’s Technical Service Department for further information.

September 2003 replaces August 2003

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Carboline® and Semstone® are registered trademarks of Carboline Company.
**PRODUCT DESCRIPTION**

Semstone 870 is a high performance, vinyl ester lining system specially formulated to withstand some of industry’s most aggressive chemicals, including a broad range of organic chemicals. Semstone 870 is a self-leveling coating designed for concrete. It is applied as an aggregate filled and/or reinforced coating system. A cooler temperature version (870 CT) is available on special order. Semstone 870 S is designed for steel substrates and is formulated for spray application. It may be applied using catalyst injection spray equipment.

**USES, APPLICATIONS**
- Process slabs
- Tank farm floors
- Flue gas desulfurization equipment
- Chemical loading and unloading areas
- Spill containment areas

**PRODUCT ADVANTAGES**
The product is a two-component system that possesses the following characteristics:
- Excellent resistance to chemical attack
- Excellent abrasion and impact resistance
- Exceptional thermal shock resistance
- Superior bonding qualities
- High cohesive strength
- Low permeability
- Low odor

**CHEMICAL RESISTANCE**
The products are formulated to resist a variety of chemical solutions. Please consult Carboline Technical Service Department for specific recommendations.

**PACKAGING**
Semstone 870/870 CT are available in 1-gal and 5-gal units.

- 1-Gal Unit
  - 1 gal of Part A (resin)
  - 2.14 oz in a 6 oz. jar of Part B (catalyst)
- 5 gallon unit
  - 4.99 gal of Part A (resin)
  - 11 oz in a quart jar of Part B (catalyst)

Semstone 870 S (using catalyst injection) is only available in 5-gal units with a special 1-gal catalyst container that treats 50 gals of resin (Part A) at 2.5 ounces/gal usage.

**COVERAGE**
Semstone 870 will cover 1,363 mils sq. ft./gal. For estimating purposes, one gallon of Semstone 870 will cover 54 sq. ft./5.02 sq. m at a thickness of 25 mils/0.63 mm. Application thickness may vary from 30-150 mils/0.75-3.8 mm depending on expected service conditions (i.e., chemical exposure, temperature, traffic load and other mechanical abuse, immersion service vs. splash-spill, etc.). Semstone 870 S may be used from 60-100 mils depending on conditions. Consult Carboline’s Technical Service Department for specific thickness recommendations.

**STORAGE CONDITIONS**
Store all components between 50-65°F/10-18°C in a dry area. Keep out of direct sunlight. Avoid excessive heat and do not freeze. The shelf life is 3 months in the original, unopened container. The catalyst must be stored below 100°F.

Twenty-four hours before application, all materials (components A and B, aggregate, etc.) should be stored at a 60-75°F/18-21°C to facilitate handling.

---

**PHYSICAL CHARACTERISTICS**
*(based on Semstone 870)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength</td>
<td>17,500 psi (ASTM C-579: AFC)</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>Neat: 5,300 psi</td>
</tr>
<tr>
<td></td>
<td>Reinforced: 10,000 psi</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>Neat: 8,200 psi</td>
</tr>
<tr>
<td></td>
<td>Reinforced: 22,000 psi</td>
</tr>
<tr>
<td>Flexural Modulus of Elasticity</td>
<td>Neat: 10.9 x 10^5 psi</td>
</tr>
<tr>
<td></td>
<td>Reinforced: 15.6 x 10^5 psi</td>
</tr>
<tr>
<td></td>
<td>Aggregate Filled: 15.3 x 10^5 psi</td>
</tr>
<tr>
<td>Hardness</td>
<td>Neat: 80 (ASTM D-2240, Shore D)</td>
</tr>
<tr>
<td>Bond Strength</td>
<td>&gt; 400 psi</td>
</tr>
<tr>
<td>Water Vapor</td>
<td>(100% concrete failure)</td>
</tr>
<tr>
<td>Transmission</td>
<td>0.0120 grams/hr.ft^2 (ASTM E-96)</td>
</tr>
<tr>
<td>Permeability</td>
<td>0.0042 perm.-in. (ASTM E-96)</td>
</tr>
<tr>
<td>Weight per Mixed Gallon</td>
<td>10.4 lbs.</td>
</tr>
<tr>
<td>Pot Life</td>
<td>45 to 60 min and less at higher temperatures</td>
</tr>
<tr>
<td>Cure Times @ 75°F (870)</td>
<td>Dry to Touch: 12 hrs</td>
</tr>
<tr>
<td></td>
<td>Firm: 24 hrs</td>
</tr>
<tr>
<td></td>
<td>Chemical Service: 48 hrs</td>
</tr>
<tr>
<td>Cure Times @ 60°F (870 CT)</td>
<td>Dry to Touch: 12 hrs</td>
</tr>
<tr>
<td></td>
<td>Firm: 24 hrs</td>
</tr>
<tr>
<td></td>
<td>Chemical Service: 48 hrs</td>
</tr>
<tr>
<td>Flammability</td>
<td>Non-flammable</td>
</tr>
</tbody>
</table>

* Characteristics are shown to indicate the nature of this product. They represent typical values that would be achieved using commonly used aggregates and reinforcing mesh. Different aggregate blends or reinforcing mesh will alter these values accordingly.

**SUBSTRATE PREPARATION**

**General**
Proper preparation is critical to ensure an adequate bond. The substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance. Laitance and unbonded cement particles must be removed by mechanical methods, i.e., abrasive blasting or scarifying. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent and rinsing with clean water. For recommendations or additional information regarding substrate preparation, please contact Carboline’s Technical Service Department.

**Concrete**
Concrete should be properly cured for 28 days, have a tensile strength of at least 300 psi, and be in the pH range of 7 to 11. The surface must show open pores throughout and have a sandpaper texture.

**Steel**
Steel should be abrasive blasted to a near white metal finish, SSPC-10 or NACE-2, with a 3-4 mils (75-100 micron) anchor profile.
APPLICATION GUIDELINES
Before mixing and applying any material, make sure environmental conditions are satisfactory for application. For optimal working conditions, substrate temperature must be between 70°F/21°C and 80°F/27°C. Measure the surface temperature with a surface thermometer. Cold areas must be heated until the slab temperature is above 65°F/18°C. This will allow the material to achieve a proper cure. Also, a cold substrate will make the material stiff and difficult to apply. Warm areas or areas in direct sunlight must be shaded or arrangements made to work during evenings or at night. A warm substrate (70°F/21°C to 80°F/27°C) will aid in the material’s workability; however, a hot substrate (80°F/27°C to 90°F/32°C) or a substrate directly in the sun will shorten the material’s working time and can cause other phenomenon such as pinholing and bubbling. Substrate temperature should be greater than 5°F/3°C above dew point.

If the temperature is expected to drop below 65°F/18°C use Semstone 870 CT.

APPLICATION (Concrete)

To work during evenings or at night. A warm substrate (70°F/21°C to 80°F/27°C) will aid in the material’s workability; however, a hot substrate (80°F/27°C to 90°F/32°C) or a substrate directly in the sun will shorten the material’s working time and can cause other phenomenon such as pinholing and bubbling. Substrate temperature should be greater than 5°F/3°C above dew point.

Broadcast Application (AFC – Broadcast)
Pre-mix Part A (resin) for 30 seconds using a Jiffy Mixer. Pour Part B (catalyst) into the Part A pail and mix thoroughly for 2 minutes. Apply a base coat at the specified thickness using a squeegee or a notched trowel. For a 60 mil/1.5 mm system apply a 25 mil/0.63 mm base coat and for a 125 mil/3.1 mm system apply a 50 mil/1.3 mm base coat. Immediately after applying the base coat begin broadcasting the aggregate until a dry appearance is achieved. (Note: The use of a 20/40 mesh aggregate is highly recommended. One gallon of 20/40 mesh silica weighs 13-14 lbs). After the base coat has cured, remove the loose aggregate. Apply a 10-15 mil/0.25-0.38 mm topcoat using a squeegee or roller.

Material Coverages
Below is a list of coverages for the Broadcast application depending upon desired thickness and texture.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Nominal 60 mils/1.5 mm</th>
<th>Nominal 75 mils/1.9 mm</th>
<th>Nominal 125 mils/3.1 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semstone 800 Series Primer</td>
<td>300 sq. ft./carton</td>
<td>300 sq. ft./carton</td>
<td>300 sq. ft./carton</td>
</tr>
<tr>
<td>Semstone 870 Base Coat</td>
<td>64 sq. ft./gal.</td>
<td>45 sq. ft./gal.</td>
<td>32 sq. ft./gal.</td>
</tr>
<tr>
<td>Aggregate</td>
<td>1.5 lbs./sq. ft.</td>
<td>1.5 lbs./sq. ft.</td>
<td>2 lbs./sq. ft.</td>
</tr>
<tr>
<td>Semstone 870 Topcoat</td>
<td>15 mil</td>
<td>100 sq. ft./gal.</td>
<td>100 sq. ft./gal.</td>
</tr>
</tbody>
</table>

Blended Application (AFC – Blended)
Pre-mix Part A (resin) for 30 seconds using a Jiffy Mixer. Pour Part B (catalyst) into Part A and thoroughly mix for 2 minutes. After mixing Part A and Part B, split the mix into two 5-gallon buckets. While continuing to mix with a Jiffy Mixer slowly add the aggregate. Apply the mixture at the desired thickness using a notched trowel.

Notes: A 2:1 sand to liquid weight ratio will produce a trowel-like consistency. A 1:3 sand to liquid weight ratio will produce a grout-like consistency. The use of a 20/40 mesh silica aggregate is highly recommended. One gallon of 20/40 mesh silica weighs 13-14 lbs. For vertical surfaces add Semstone Thixotrope Part C (pre-measured mixes) or Cab-O-Sil (TS 720) to the blended mix at a 1:2 Cab-O-Sil to liquid volume ratio.

If desired, the surface may be recoated after it has finally cured.

Note: After an initial cure of 48 hours, the surface must be sanded and solvent wiped prior to recoating.

Material Coverages
Below is a list of coverages for the Blended application.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Nominal 125 mils / 3.1 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semstone 800 Series Primer</td>
<td>300 sq. ft./carton</td>
</tr>
<tr>
<td>Semstone 870 Mortar – 125 mils</td>
<td>20 sq. ft./gal</td>
</tr>
</tbody>
</table>

Reinforced (AFRC – Broadcast)
A fiberglass scrim cloth may be added to the 125 mil broadcast system. For the 125 mil broadcast system, apply the fiberglass scrim cloth into the base coat prior to applying the aggregate.

Reinforced (AFRC – Blended)
A fiberglass scrim cloth may be added to the 125 mil blended system. For the 125 mil blended system apply a 25-35 mil/0.63-0.88 mm base coat and lay the the fiberglass scrim cloth into the base coat.

Note: For a vertical surface, the base coat should be mixed with Cab-O-Sil (TS 720) at a 1:1 volume ratio.

Allow the base coat to become tacky and then apply Semstone 870 mortar at 90-100 mils/2.25-2.50 mm.

Note: Application of base coat, the fiberglass scrim cloth, and mortar should be completed in the same day.

APPLICATION (Steel)

Catalyst Injection Spray
Pre-mix resin for 60 seconds using a Jiffy Mixer. Catalyst (Activator VE) is supplied in a 1-gal container. Adjust delivery of catalyst to be in the range of 2.5 ounces (acceptable range 2.0 to 5.0 ounces) of catalyst per gallon of resin.

RECOMMENDATIONS
Apply only on clean, sound, dry and properly prepared substrates.
• Minimum ambient and surface temperatures are 65°F/18°C at the time of application.
• Maximum surface temperatures should not exceed 90°F/32°C during the time of application.
• Substrate temperature should be greater than 5°F/3°C above dew point.
• Application and curing times are dependent upon ambient and surface conditions. Consult Carboline’s Technical Service Department if conditions are not within the recommended guidelines.

PRECAUTIONS
• MEK. Toluene or Xylene solvents are recommended for clean up of Semstone 870 material spills. Use these materials only in strict accordance with manufacturer’s recommended safety procedures. Dispose of waste materials in accordance with government regulations.
• The use of a NIOSH/MSHA approved respirator using a #TC-23C-738 organic vapor or a #TC-23C-740 organic vapor acid gas cartridge is mandatory.
• The selection of proper protective clothing and equipment will significantly reduce risk to injury. Body covering apparel, safety goggles and impermeable gloves are highly recommended.
• In case of contact, flush the area with water for 15 minutes and seek medical attention. Wash skin with soap and water.
• Use only with adequate ventilation.

November 2012 replaces September 2011
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Manufacturer Product Data Sheets for Sherwin Williams Coatings
Protective & Marine Coatings

PRODUCT INFORMATION

GENERAL POLYMERS® 3579
STANDARD EPOXY PRIMER/ BINDER

PART A  GP3579
PART B  GP3579B01

PRODUCT DESCRIPTION

GENERAL POLYMERS 3579 STANDARD PRIMER / BINDER is a high solids, clear or pigmented epoxy primer and binder resin. GENERAL POLYMERS 3579 STANDARD PRIMER / BINDER is available in clear, red, white and gray, has good blushe resistance and is low in viscosity to promote penetration of the concrete sub- strate and excellent wetting of mortar aggregate.

ADVANTAGES

• Good blushe resistance at room temperature
• Low modulus of elasticity, stress relieving
• Acceptable for use in USDA inspected facilities

TYPICAL USES

GENERAL POLYMERS 3579 STANDARD PRIMER / BINDER is an epoxy primer for coatings, slurries, mortar overlays, and patches. It can be also used as a binder resin. For slurries, mortar and patching systems. Suitable for use in the Mining & Minerals Industry.

LIMITATIONS

• Slab on grade requires vapor/moisture barrier.
• Surface must be clean and dry.
• Cool damp conditions may cause surface blushing.
• Substrate must be structurally sound and free of bond inhibiting contaminants.
• During installation and initial cure cycle substrate and ambient air temperature must be at a minimum of 50°F (10°C). Substrate temperature must be at least 5°F (3°C) above the dew point for lower temperature installation contact your local representative.
• When required, adequate ventilation shall be provided and proper clothing and respirators worn.
• Strictly adhere to published coverage rates.

SURFACE PREPARATION

Proper inspection and preparation of the substrate to receive resinous material is critical. Read and follow the “Instructions for Concrete Surface Preparation” (Form G-1) for complete details.

PRODUCT CHARACTERISTICS

Color: Clear, Red, Gray, White
Mix Ratio: 2:1
Volume Solids: 96% ± 2%, mixed
Weight Solids: 96% ± 2%, mixed
VOC (EPA Method 24): <50 g/L mixed: 0.41 lbs/gal
Viscosity, mixed: 2,100 cps

Recommended Spreading Rate per coat:

<table>
<thead>
<tr>
<th>Wet mils (microns)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage sq ft/gal (m²/L)</td>
<td>varies according to usage</td>
<td></td>
</tr>
</tbody>
</table>

Drying Schedule @ 6 mils (150 microns) wet:

@ 73°F (23°C)
To touch: 6-8 hours
To recoat: 10-20 hours
If maximum recoat time is exceeded, abrade surface before recoating.

Pot Life:
gallon mass 25-30 minutes @ 73°F (23°C)

Shelf Life:
Part A: 36 months, unopened
Part B (Standard): 36 months, unopened
Store indoors at 50°F (10°C) to 90°F (32°C)

Flash Point: >230°F (>110°C), ASTM D 93, mixed

PERFORMANCE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Test Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesion</td>
<td>ACI 503R</td>
<td>300 psi concrete failure</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>ASTM D 695</td>
<td>9,000 psi</td>
</tr>
<tr>
<td>Flammability</td>
<td>Self-extinguishing over concrete</td>
<td></td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>ASTM D 790</td>
<td>6,000 psi</td>
</tr>
<tr>
<td>Hardness, Shore D</td>
<td>ASTM D 2240</td>
<td>75/65</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D 638</td>
<td>3,000 psi</td>
</tr>
</tbody>
</table>

continued on back
APPLICATION

• APPLICATION INSTRUCTIONS

1. Add 2 parts 3579A (resin) to 1 part 3579B (hardener) by volume. Mix with low speed drill and Jiffy blade for three minutes and until uniform. To insure proper system cure and performance, strictly follow mix ratio recommendations.

2. 3579 may be applied via spray, roller or brush. Apply evenly, with no puddles. Coverage will vary depending upon porosity of the substrate and surface texture.

3. 3579 application varies upon usage.

NOTE: Epoxy materials may tend to blush at the surface especially in humid environments. After the surface is primed and before installation of each subsequent coat, surface must be examined for blush (a whitish greasy and/or low gloss). The blush must be completely removed prior to recoating using warm detergent water or through solvent wipe.

Epoxy materials will appear to be cured and dry to touch prior to full chemical cross linking. Allow epoxy to cure for 2-3 days prior to exposure to water or other chemicals for best performance.

CLEANUP

Clean up mixing and application equipment immediately after use. Use toluene or xylene. Observe all and health precautions when handling or storing solvents.

SAFETY

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

MAINTENANCE

Occasional inspection of the installed material and spot repair can prolong system life. For Information, Contact your Sherwin-Williams representative.

SHIPPING

- Destinations East of the Rocky Mountains are shipped F.O.B. Cincinnati, Ohio.
- Destinations West of the Rocky Mountains are shipped F.O.B. Victorville, California.

For Information relating to international shipments, contact your local sales representative.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Packaging</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A:</td>
<td>1 gallon (3.8L) and 5 gallon (18.9L) containers</td>
<td></td>
</tr>
<tr>
<td>Part B:</td>
<td>1 gallon (3.8L) and 5 gallon (18.9L) containers</td>
<td></td>
</tr>
</tbody>
</table>

Weight: 9.4 ± 0.2 lb/gal; 1.13 Kg/L mixed, may vary by color

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
TPM® #115 Standard
Troweled Mortar

General Polymers TPM #115 STANDARD TROWELED MORTAR Systems are 1/8" - 1/4" high build protective resurfacing systems utilizing an epoxy and silica aggregate mortar, high build grout and seal coats. Different seal coat options are available for specific needs.

1/4" Smooth

Advantages

• High solids
• Protects substrates from conditions of thermal shock, and heavy impact and wear
• Resists degradation from many chemicals, acids and alkalis
• Wide range of colors available
• Available with an antimicrobial agent

Uses

• T
• Pulp and paper plants
• Waste water treatment facilities
• Pharmaceuticals
• Drum storage areas
• Food and beverage facilities

Typical Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Standard Colors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td></td>
</tr>
<tr>
<td>Adhesion</td>
<td>300 psi</td>
</tr>
<tr>
<td>Abrasion Resistance</td>
<td>70-90 mgs lost</td>
</tr>
<tr>
<td>Impact Resistance</td>
<td>Withstands 16 ft lbs</td>
</tr>
<tr>
<td>Elevated Temperatures</td>
<td>No slip or flow at required</td>
</tr>
<tr>
<td>Hardness @ 24 hours, Shore D</td>
<td>80/65</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>15,000 psi</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>1,700 psi</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>3,700 psi</td>
</tr>
<tr>
<td>Adhesion</td>
<td>concrete failure</td>
</tr>
<tr>
<td>Abrasion Resistance</td>
<td>70-90 mgs lost</td>
</tr>
<tr>
<td>Impact Resistance</td>
<td>Withstands 16 ft lbs</td>
</tr>
<tr>
<td>Elevated Temperatures</td>
<td>No slip or flow at required</td>
</tr>
<tr>
<td>MIL-D-3134, Sec.4.7.3</td>
<td>without cracking, delamination or chipping</td>
</tr>
<tr>
<td>Resistance to</td>
<td></td>
</tr>
<tr>
<td>MIL-D-3134J</td>
<td></td>
</tr>
</tbody>
</table>

ASTM C = Mortar System
ASTM D = Resin only
Installation
General Polymers materials shall only be installed by approved contractors. The following information is to be used as a guideline for the installation of the TPM #115 STANDARD TROWELED MORTAR Systems. Contact the Technical Service Department for assistance prior to application.

Surface Preparation — General
General Polymers systems can be applied to a variety of substrates, if the substrate is properly prepared. Preparation of surfaces other than concrete will depend on the type of substrate, such as wood, concrete block, quarry tile, etc. Should there be any questions regarding a specific substrate or condition, please contact the Technical Service Department prior to starting the project. Refer to Surface Preparation (Form G-1).

Surface Preparation — Concrete
Concrete surfaces shall be abrasive blasted to remove all surface contaminants and laitance. The prepared concrete shall have a surface profile equal to CSP 4-6. Refer to Form G-1.

After initial preparation has occurred, inspect the concrete for bug holes, voids, fins and other imperfections. Protrusions shall be ground smooth while voids shall be filled with a General Polymers system filler. For recommendations, consult the Technical Service Department.

Temperature
Throughout the application process, substrate temperature should be 50°F - 90°F. Substrate temperature must be at least 5°F above the dew point. Applications on concrete substrates should occur while temperature is falling to lessen offgassing. The material should not be applied in direct sunlight, if possible.

Application Information  CSP 4-6

<table>
<thead>
<tr>
<th>VOC MIXED</th>
<th>MATERIAL</th>
<th>MIX RATIO</th>
<th>THEORETICAL COVERAGE PER COAT CONCRETE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 g/L</td>
<td>Primer</td>
<td>3579</td>
<td>2:1</td>
<td>3 or 15 gals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>250 sq. ft. / gal</td>
<td></td>
</tr>
<tr>
<td>&lt;50 g/L</td>
<td>Mortar</td>
<td>3561</td>
<td>4:1</td>
<td>1.25 to 250 gals</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>5115</td>
<td>33 sq. ft. / 1.25 gal @ 1/4&quot;</td>
<td>50 lbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>44 sq. ft. / 1.25 gal @ 3/16&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>66 sq. ft. / 1.25 gal @ 1/8&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70 lbs / 1.25 gal</td>
<td></td>
</tr>
<tr>
<td>&lt;100 g/L</td>
<td>Grout coat</td>
<td>3746</td>
<td>2:1</td>
<td>3 or 15 gals</td>
</tr>
<tr>
<td></td>
<td>Premeasured Units</td>
<td></td>
<td>100 sq. ft. / gal</td>
<td></td>
</tr>
<tr>
<td>&lt;100 g/L</td>
<td>Seal Coat</td>
<td>3746</td>
<td>2:1</td>
<td>3 or 15 gals</td>
</tr>
<tr>
<td></td>
<td>Premeasured Units</td>
<td></td>
<td>100 sq. ft. / gal</td>
<td></td>
</tr>
</tbody>
</table>

* Additional 5115 aggregate may be added to 1.25 gallon of mixed epoxy to facilitate power troweling (10 lbs. recommended).

For additional topcoat options consult the General Polymers Topcoat Selection Guide, or contact your Sherwin Williams representative.
Primer
Mixing and Application

1. Add 2 parts 3579A (resin) to 1 part 3579B (hardener) by volume. Mix with low speed drill and Jiffy mixer for three minutes and until uniform. To ensure proper system cure and performance, strictly follow mix ratio recommendations.

2. 3579 may be applied via spray, roller or brush. Apply 5-8 mils, evenly, with no puddles. Coverage will vary depending upon porosity of the substrate and surface texture.

3. Wait until primer is tacky (minimum 1 hour), before applying the mortar. If primer is not going to be topped within open time, broadcast silica sand into resin lightly but uniformly and allow to cure overnight.

Mortar
Mixing and Application

1. Premix 3561A (resin) using a low speed drill and Jiffy mixer. Mix for one minute and until uniform, exercising caution not to whip air into the material.

2. Add 4 parts 3561A (4 quarts resin) to 1 part 3561B (1 quart hardener) by volume. Mix with low speed drill and Jiffy mixer for three minutes and until uniform. Place mixed 3561 into mortar mixer, slowly add 70 pounds of 5115 aggregate. Mix until aggregate is thoroughly “wet out”. Immediately dump mortar onto substrate and spread to desired thickness.

3. Compact and smooth the mortar using a hand or power trowel. Allow to cure (Cure times vary depending on environmental conditions) before applying grout coat.

Grout Coat
Mixing and Application

1. Premix 3746A (resin) using a low speed drill and Jiffy mixer. Mix for one minute and until uniform, exercising caution not to whip air into the material.

2. Add 2 parts 3746A (resin) to 1 part 3746B (hardener) by volume. Mix with low speed drill and Jiffy mixer for three minutes and until uniform.

3. Apply 3746 using a spring steel trowel or red rubber squeegee and back roll using a 1/4" nap roller at a spread rate of 100 sq. ft. per gallon, taking care not to pull the grout from the voids in the floor. Allow to cure (Cure times vary depending on environmental conditions) before applying seal coat.

Seal Coat
Mixing and Application

1. Premix 3746A (resin) using a low speed drill and Jiffy mixer. Mix for one minute and until uniform, exercising caution not to whip air into the material.

2. Add 2 parts 3746A (resin) to 1 part 3746B (hardener) by volume. Mix with low speed drill and Jiffy mixer for three minutes and until uniform.

3. Apply 3746 using a 1/4" nap roller at a spread rate of 200 sq. ft. per gallon.

4. Allow to cure 24 hours minimum before opening to traffic.

Note: Epoxy materials will appear to be cure and “dry to touch” prior to full chemical cross linking. Allow epoxy to cure for 2-3 days prior to exposure to water or other chemicals for best performance.

Application Equipment

Brush / Roller
Use 1/4" phenolic core rollers and professional quality, medium stiff natural bristle brushes.

Trowel
Use steel finishing towel or epoxy mortar power trowel such as manufactured by Superior.

Cleanup

Clean up mixing and application equipment immediately after use. Use toluene or xylene. Observe all fire and health precautions when handling or storing solvents.

Safety

Refer to the MSDS sheet before use. All applicable federal, state, local and particular plant safety guidelines must be followed during the handling and installation and cure of these materials.

Safe and proper disposal of excess materials shall be done in accordance with applicable federal, state, and local codes.

Material Storage

Store materials in a temperature controlled environment (50°F - 80°F) and out of direct sunlight.

Keep resins, hardeners, and solvents separated from each other and away from sources of ignition.

Maintenance

Occasional inspection of the installed material and spot repair can prolong system life. For specific information, contact the Technical Service Department.
Disclaimer

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Consult www.generalpolymers.com to obtain the most recent Product Data information and Application instructions.

Warranty

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TPM® #711
High Early Strength Repair Mortar System

General Polymers TPM #711 HIGH EARLY STRENGTH REPAIR MORTAR is a non-shrink cementitious blend with exact ratios of graded aggregates and other ingredients that produce a strong, durable, rapid repair and resurfacing product. TPM #711 HIGH EARLY STRENGTH REPAIR MORTAR is easy and fast to use, simply add potable water and mix to desired consistency.

Advantages
- Rapid, high early strength
- Reaches 2500 psi in 2 hours
- Shrink resistant
- Resistant to deicing chemicals
- Wear resistant
- Freeze / thaw resistant
- Easy installation
- Excellent bond to concrete substrate
- Able to be extended with 30 lbs. per gravel
- Exceeds ASTM C 028 requirements

Uses
- Manufacturing, storage and shipping areas
- Bridge decks and nosings
- Bridge high-rise railing grouting
- Parking garages, decks, ramps and lots
- Airport runways and runway light installations
- Highways and roadways
- Auto racetracks
- Commercial freezers
- Underlayment or repair material under other General Polymers products and systems

Limitations
TPM #711 HIGH EARLY STRENGTH REPAIR MORTAR should not be used in temperatures below 40°F (4°C). TPM 711 should not be used in less than 1/4” thick. Areas for patching must be uncontaminated; precautions should be taken when sandblasting or when compressors are used that water and oil collection pots are used.

Typical Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Initial Set Time @ 72°F</th>
<th>Final Set Time @ 72°F</th>
<th>Recast</th>
<th>Compressive Strength @72°F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 minutes</td>
<td>25 minutes</td>
<td>4 hours</td>
<td>2 hours 2,500 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 day 5,000 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28 days 8,000 psi</td>
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<tr>
<td>Flexural Strength @72°F</td>
<td></td>
<td></td>
<td></td>
<td>1 hour 250 psi</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 hours 700 psi</td>
</tr>
<tr>
<td>Bond Strength</td>
<td></td>
<td></td>
<td></td>
<td>1 day 2,000 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 days 2,500 psi</td>
</tr>
<tr>
<td>Freeze/Thaw</td>
<td></td>
<td></td>
<td></td>
<td>0.25% 50 cycles</td>
</tr>
<tr>
<td>Expansion &amp; Contraction</td>
<td></td>
<td></td>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td>Chloride Ion Permeability</td>
<td></td>
<td></td>
<td></td>
<td>ASTM C 1202 28 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Low (&lt;1000 coulombs)</td>
</tr>
</tbody>
</table>
Installation

General Polymers materials shall only be installed by approved contractors. The following information is to be used as a guideline for the installation of the TPM #711 HIGH EARLY STRENGTH REPAIR MORTAR System. Contact the Technical Service Department for assistance prior to application.

Surface Preparation — General

General Polymers systems can be applied to a variety of substrates, if the substrate is properly prepared. Preparation of surfaces other than concrete will depend on the type of substrate, such as wood, concrete block, quarry tile, etc. Should there be any questions regarding a substrate or condition, please contact the Technical Service Department prior to starting the project. Refer to Surface Preparation (Form G-1).

Surface Preparation — Concrete

Concrete surfaces shall be abrasive blasted to remove all surface contaminants and laitance. The prepared concrete shall have a surface depending upon system selected. Refer to Form G-1. After initial preparation has occurred, inspect the concrete for bug holes. If needed, consult the Technical Service Department.

Temperature

Throughout the application process, substrate temperature should be 50°F – 90°F. Substrate temperature must be at least 5°F above the dew point. Applications on concrete substrate should occur while temperature is falling to lessen offgassing. The material should not be applied in direct sunlight, if possible. Protect material from freezing prior to installation.

Application Information — Surface Prep Profile CSP 3-5

<table>
<thead>
<tr>
<th>VOC</th>
<th>MATERIAL</th>
<th>MIX RATIO</th>
<th>THEORETICAL COVERAGE PER COAT CONCRETE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 g/L</td>
<td>Primer</td>
<td>3579 5310 Dry Silica 20-40 mesh</td>
<td>2:1 Full Broadcast</td>
<td>160-200 sq. ft. / mixed gal 100-200 lbs per 1,000 sq. ft.</td>
</tr>
<tr>
<td>0 g/L</td>
<td>Mortar</td>
<td>TPM 711 plus .85 gallons maximum potable water</td>
<td>50 lbs bag</td>
<td>12.5 sq. ft. @ 1/2” or .45 cubic feet</td>
</tr>
</tbody>
</table>
Primer
Mixing and Application
1. Add 2 parts 3579A (resin) to 1 part 3579B (hardener) by volume. Mix with low speed drill and Jiffy blade for three minutes and until uniform. To insure proper system cure and performance, strictly follow mix ratio recommendations.

2. 3579 may be applied via spray, roller or brush. Apply evenly, with no puddles, at a spread rate of 160-200 sq. ft. per gallon. Immediately, broadcast 5310 Dry Silica Sand (20-40 mesh) at 100-200 lbs per 1,000 sq ft.

3. Allow to cure a minimum of 4 hours.

Mortar
Mixing and Application
1. TPM 711 should be mixed in rotary drum or other suitable mechanical mixer. Coarse aggregate meeting ASTM C 33 should be used for pours greater than 2” in depth. If adding aggregate add one-half of the aggregate, then add measured amount of water to mixer, about .85 gallons per bag. Add TPM 711 to water and aggregate with mixer operating. Add remainder of aggregate. Mix one minute, then if necessary, add a small amount of water during the second minute of mixing to obtain desired consistency. Do not mix more material than can be placed in 15 minutes. Dump batch and immediately deliver TPM 711 mix to prepared pavement area. Clean mixer by adding water and allowing mixer to run. Level the TPM 711 to the surrounding surface if necessary.

CURING:
Cure as soon as possible after the repaired area has hardened. For best results, saturate with water and cover with wet burlap and polyethylene. Curing compounds may be used when a water cure is not practical.

Precautions
• DO NOT featheredge or use for patches less than ½” deep.
• In hot weather, protect TPM #711 from water evaporation by covering with polyethylene sheets, use cool mixing water, and protect applied material from direct sunlight.
• In cold weather, follow ACI suggestions and protect TPM #711 by covering with polyethylene sheets, use warm water and heat repair area surface prior to application if below 40°F.
• Do not add admixtures (accelerators or water reducers) or anti-freeze to TPM #711.
• Do not add make-up water beyond the maximum detailed or loss of physical properties can occur.

surface should be abraded to remove laitance prior to coating.

Cleanup
Clean up mixing and application equipment immediately after use.

Safety
Refer to the MSDS sheet before use. Federal, state, local and particular plant safety guidelines must be followed during the handling and installation and cure of these materials.

CAUTION:
Contains Portland Cement and Silica. Avoid breathing dust. Cement powder or freshly mixed concrete, grout or mortar may cause skin injury. Avoid contact with skin; wash exposed areas promptly with water. If any cement powder or mixture gets into eyes, rinse immediately and repeatedly with water. Get prompt medical attention.

Material Storage
Store materials in a temperature controlled environment (50°F – 90°F) and out of direct sunlight.

Keep resins, hardeners, and solvents separated from each other and away from sources of ignition. One year shelf life is expected for products stored between 50°F – 90°F.

Maintenance
Occasional inspection of the installed material and spot repair can be done through the Technical Service Department.

Shipping
• Destinations East of the Rocky Mountains are shipped F.O.B. Cincinnati, Ohio.
• Destinations West of the Rocky Mountains are shipped F.O.B. Victorville, California.

Contact your local sales representative.
Disclaimer

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**protective & marine coatings**

**Product Information**

**Product Description**
General POLymers 3561 ePOxy resin Glaze is a high solids, two component epoxy resin used for general purpose decorative aggregate and heavy duty industrial systems. GENERAL POLYMERS 3561 EPOXY RESIN GLAZE possesses a good chemical resistance, with excellent compressive strength and abrasion resistance.

**Advantages**
- Acceptable for use in USDA inspected facilities
- Good chemical resistance
- High compressive and tensile strength
- Abrasion resistant
- Available with an antimicrobial agent

**Typical Uses**
General POLymers 3561 ePOxy resin Glaze is used as a clear binder resin for decorative aggregate systems. GENERAL POLYMERS 3561 EPOXY RESIN GLAZE is used as a binder resin in clear and solid color systems including slurry and trowel applied systems. Typical installations include surfacing doors in chemical processing plants, industrial aisles, docks, ramps, kitchens, utility rooms, restrooms, locker rooms, brewherries, photographic labs and water and waste and sewage plants. GENERAL POLYMERS 3561 EPOXY RESIN GLAZE can also be used for other surfaces requiring seamless decorative or solid colored heavy duty protective surfacing. Suitable for use in the Mining & Minerals Industry.

**Limitations**
- Used as a binder / grout resin, or primer only, not to be used as a topcoat.
- Slab on grade requires vapor/moisture barrier.
- Substrate must be structurally sound, dry and free of bond inhibiting contaminants.
- During installation and initial cure cycle substrate and ambient air temperature must be at a minimum of 50ºF (10ºC). Substrate temperature must be at least 5ºF (3ºC) above the dew point (for lower temperature installation contact General Polymers Technical Service Department).

**Product Characteristics**

**Flash Point:** >213ºF (>100ºC), ASTM D 93, mixed

**Performance Characteristics**

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Test Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion resistance</td>
<td>ASTM D4060, CS17 wheel, 1,000 cycles</td>
<td>100 mg loss</td>
</tr>
<tr>
<td>Adhesion</td>
<td>ACI 503R</td>
<td>300 psi concrete failure</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>ASTM D 695</td>
<td>10,000 psi</td>
</tr>
<tr>
<td>Flammability</td>
<td>Self-extinguishing over concrete</td>
<td></td>
</tr>
<tr>
<td>Flexural strength</td>
<td>ASTM D 790</td>
<td>12,000 psi</td>
</tr>
<tr>
<td>Hardness, shore D</td>
<td>ASTM D 2240</td>
<td>75/65</td>
</tr>
<tr>
<td>Tensile elongation</td>
<td>ASTM D 638</td>
<td>2-4% min.</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>ASTM D 638</td>
<td>6,000 psi</td>
</tr>
</tbody>
</table>

**Product Characteristics (Cont’d)**

- Recommended spreading rate per coat:
- Coverage sq ft/gal (m²/L): varies according to usage

**Drying Schedule @ 10 mils (250 microns) wet:**
- Standard Hardener:
  - To touch: 6-8 hours
  - To recoat: 12-24 hours
  - Light traffic: 24 hours minimum
  - Full Cure: 7 days
- If maximum recoat time is exceeded, abrade surface before recoating
  - Drying time is temperature, humidity
- Pot life: gallon mass 16 minutes @ 73ºF (23ºC)

**Fast Cure Hardener:**
- To touch: 6 hours
- To recoat: 8-16 hours
- Light traffic: 18-24 hours
- Full cure: 7 days
- If maximum recoat time is exceeded, abrade surface before recoating
  - Drying time is temperature, humidity
- Pot life: gallon mass 12 minutes @ 73ºF (23ºC)

**Shelf Life:**
- Part A (Standard): 36 months, unopened
- Part B (Standard): 18 months, unopened
- Store indoors at 50ºF (10ºC) to 90ºF (32ºC)

www.sherwin-williams.com/protective
Product Information

Application

- Application:

1. Premix 3561A (resin) using a low speed drill and Jiffy blade. Mix for one minute and until uniform, exercising caution not to whip air into the material.

2. Add 1 gallon (4 parts) 3561A (resin) to 1 quart (1 part) 3561B (hardener). Mix with low speed drill and Jiffy blade for three minutes and until uniform.

3. Coverage rates will vary depending upon application. Refer to T#105, TPM #115, or Ceramic Carpet #400 System Bulletin(s) for complete details.

Cleanup

Clean up mixing and application equipment immediately after use. Use toluene or xylene. Observe all safety and health precautions when handling or storing solvents.

Safety

Refer to the MSDS sheet before use. Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

Maintenance

Occasional inspection of the installed material and spot repair can prolong system life. For information, contact the Technical Service Department.

Shipping

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- Destinations West of the Rocky Mountains are shipped F.O.B. Victville, California.

For information relating to international shipments, contact your local sales representative.

Ordering Information

- Packaging:
  - Part A: 1 gallon (3.8L) and 5 gallon (18.9L) containers
  - Part B: 1 quart (1.0L) and 5 gallon (18.9L) containers

- Weight: 9.4 ± 0.2 lb/gal; 1.13 Kg/L mixed; may vary by color

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PRODUCT INFORMATION

PRODUCT DESCRIPTION

General POIymers® 3552 ePO-Fle X® Fle Xible ePOXY membrane is a high solids, epoxide material which combines the toughness, adhesion and durability of epoxies with a degree of flexibility common to polyurethanes. Flexibility is achieved without the use of plasticizers or other additives which can separate or migrate out of the epoxy complex as the material ages or is degraded due to environmental conditions. GENERAL POLYMERS 3552 EPO-FLEX FLEXIBLE EPOXY MEMBRANE may be used as a membrane as required. Installations under aesthetic and functional overlays include: mechanical equipment rooms, kitchens, animal research, wet production, secondary containment and other areas requiring protection from substrate through-system cracking.

ADVANTAGES

- Optional reinforcement
- Bridges hairline cracks, aids in suppression of cracking of trowel applied due to substrate movement associated with thermal movement.
- Flexible, yet tough
- Self-extinguishing
- Acceptable for use in USDA inspected facilities

TYPICAL USES

General POIymers® 3552 ePO-Fle X® Fle Xible ePOXY membrane is recommended for use as a membrane under General Polymers trowel and systems where substrate cracking is anticipated and/or evident or as a water-vapor/moisture barrier. Installations under aesthetic and functional overlays include: mechanical equipment rooms, kitchens, animal research, wet production, secondary containment and other areas requiring protection from substrate through-system cracking.

LIMITATIONS

- Slab on grade requires vapor/moisture barrier.
- Substrate must be structurally sound, dry and free of bond inhibiting contaminants.
- During installation and initial cure cycle substrate and ambient air temperature must be a minimum of 60°F (16°C). Substrate temperature must be at least 5°F (3°C) above the dew point (for lower temperature installation contact General Polymers Technical Service Department).
- When required, adequate ventilation shall be provided and proper clothing and respirators worn.
- Extinguish all sources of ignition during the entire installation cycle.
- Strictly adhere to published coverage rates.
- Strictly adhere to mixing ratios.

SURFACE PREPARATION

Proper inspection and preparation of the substrate to receive resinous material is critical. Read and follow the “Instructions for Concrete Surface Preparation” (Form G-1) for complete details.

PRODUCT CHARACTERISTICS

Color: Gray
mix ratio: 1:1
Volume solids: 93% ± 2%, mixed
Weight solids: 94% ± 2%, mixed
VOC (ePa method 24): <100 g/L mixed; 0.83 lb/gal
Viscosity, mixed: 2,000 cps

Wet mils (microns): 20 (500) 40 (1000)
Coverage sq ft/ gal (m²/L): 40 (1.0) 80 (2.0)

DRYING SCHEDULE @ 10 MILS (250 MICRONS) WET:

- To touch: 16-24 hours
- To recoat: 24 hours
- If maximum recoat time is exceeded, abrade surface before recoating.
- Drying time is temperature, humidity-dependent.
- Flash Point: >222°F (>104°C), ASTM D 93, mixed

SHelf LiFE:

Part A: Part B (Standard): 36 months, unopened
Part B (Standard): 36 months, unopened
Store indoors at 50°F (10°C) to 90°F (32°C)

PERFORMANCE CHARACTERISTICS

Test name Test method r results
adhesion ACI 503R 300 psi concrete failure
eelongation @ break ASTM D 412 145%
Flammability
Hardness, shore D ASTM D 2240 23
Tensile strength ASTM D 412 1,200 psi
Thermal Cycling ASTM C 884 24 hours, -21°C to 25°C No cracking

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**APPLICATION**

- **a PPli CaTiOn ins Tr UCTiOns**
  1. Premix 3552A (resin) using a low speed drill and Jiffy blade. Mix for one minute and until uniform, exercising caution not to whip air into the material.
  2. Add 1 part 3552A (resin) to 1 part 3552B (hardener) by volume. Mix with low speed drill and Jiffy blade for three minutes and until uniform. 3552 is a viscous material and requires complete mixing to cross link properly, match the mix blade to the volume of material to insure a full mix and always mix for a minimum of 3 minutes.**
  3. Immediately pour the mixed material onto the substrate and pull out using a 1/8” v-notched squeegee to yield 20 mils WFT. Readings must be taken continuously during application with a wet mil gauge to verify material is being applied at the proper thickness. Allow to cure overnight at 73ºF (23ºC) surface temperature. Material cures slower at lower temperatures.

**NOTE:** Epoxy materials may tend to blushing at the surface especially in humid environments. After surface is primed and before installation of each subsequent coat, surface must be examined for blushing (a whitish greasy and/or low gloss). The blushing must be completely removed prior to recoating using warm detergent water or through solvent wipe.

**SAFETY**

Clean up mixing and application equipment immediately after use. Use toluene or xylene. Observe all acid health precautions when handling or storing solvents.

**MAINTENANCE**

Occasional inspection of the installed material and spot repair can prolong system life.

**SHIPPING**

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<table>
<thead>
<tr>
<th>Packaging:</th>
<th>1 gallon (3.8L) and 5 gallon (18.9L) containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A:</td>
<td>1 gallon (3.8L) and 5 gallon (18.9L) containers</td>
</tr>
<tr>
<td>Part B:</td>
<td>Weight: 9.2 ± 0.2 lb/gal; 1.1 Kg/L mixed, may vary by color</td>
</tr>
</tbody>
</table>

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www.sherwin-williams.com/protective
**GENERAL POLYMERS® 3744**

**HIGH PERFORMANCE CR EPOXY**

<table>
<thead>
<tr>
<th>PART A</th>
<th>GP3744A</th>
<th>SERIES</th>
<th>PART B</th>
<th>GP3744B01</th>
<th>PART B</th>
<th>GP3744B02</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STANDARD HARDENER</td>
<td></td>
<td>FAST CURE HARDENER</td>
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<td></td>
</tr>
</tbody>
</table>

**PRODUCT INFORMATION**

**PRODUCT DESCRIPTION**

GENERAL POLYMERS 3744 HIGH PERFORMANCE CR EPOXY is a high solids, two component epoxy coating and binder resin. GENERAL POLYMERS 3744 HIGH PERFORMANCE CR EPOXY may be used directly over approved primed substrates or as a gloss seal coat over decorative systems. Its outstanding broad spectrum chemical resistance provides protection in aggressive environments. GENERAL POLYMERS 3744 HIGH PERFORMANCE CR EPOXY is extremely hard wearing, impact and abrasion resistant.

**ADVANTAGES**

- Impact and abrasion resistant
- Stain Resistant
- Chemical Resistant
- Available with an antimicrobial agent
- Available in a fast cure version
- Acceptable for use in USDA inspected facilities

**TYPICAL USES**

GENERAL POLYMERS 3744 HIGH PERFORMANCE CR EPOXY should be used in areas where maintenance of a high performance, aesthetically appealing and chemical resistant epoxy system is required.

**LIMITATIONS**

- Slab on grade requires vapor/moisture barrier.
- Substrate must be structurally sound, dry and free of bond inhibiting contaminants
- During installation and initial cure cycle substrate and ambient air temperature must be at a minimum of 50°F (10°C). Substrate temperature must be at least 5°F (3°C) above the dew point (for lower temperature installation contact the Technical Service Department).
- Maximum dry surface temperature not to exceed 160°F (71°C).
- Strictly adhere to published coverage rates.
- Apply at 10 mils if using white for complete hiding.

**SURFACE PREPARATION**

Proper inspection and preparation of the substrate to receive resinous material is critical. Read and follow the "Instructions for Concrete Surface Preparation" (Form G-1) for complete details.

**PRODUCT CHARACTERISTICS**

**Color:** Clear, standard, and custom colors available

**Mix Ratio:** 2:1

**Volume Solids:** 96% ± 2%, mixed

**Weight Solids:** 98% ± 2%, mixed

**VOC (EPA Method 24):** <50 g/L; 0.41 lb/gal

**Viscosity, mixed:** 2,017 cps, Clear

**Recommended Spreading Rate per coat:**

<table>
<thead>
<tr>
<th>Wet mils (microns)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage sq ft/gal (m²/L)</td>
<td>51</td>
<td>154</td>
</tr>
</tbody>
</table>

**Drying Schedule @ 6 mils (150 microns) wet:**

- Standard Hardener: @ 73°F (23°C)
  - To touch: 4-6 hours
  - To recoat: 12-16 hours
  - Full Cure: 7 days
- Fast Cure Hardener:
  - To touch: 3-4 hours
  - To recoat: 6-8 hours
  - Full Cure: 7 days

**Flash Point:** 266°F (130°C), ASTM D 93, mixed

**Performance Characteristics**

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Test Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion Resistance</td>
<td>ASTM D4060, CS17 wheel, 1,000 cycles</td>
<td>100 mg loss</td>
</tr>
<tr>
<td>Adhesion</td>
<td>ACI 503R</td>
<td>300 psi</td>
</tr>
<tr>
<td>Flammability</td>
<td>Self extinguishing over concrete</td>
<td></td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>ASTM D 790</td>
<td>12,400 psi</td>
</tr>
<tr>
<td>Gloss</td>
<td>60° Gloss Meter @ 73°F, 50% RH</td>
<td>85 millage units</td>
</tr>
<tr>
<td>Hardness, Shore D</td>
<td>ASTM D 2240</td>
<td>80</td>
</tr>
<tr>
<td>Impact Resistance</td>
<td>MIL-D-3134J</td>
<td>Direct, inch pound greater than 160 passes</td>
</tr>
<tr>
<td>Resistance to Elevated Temperatures</td>
<td>MIL-D-3134J</td>
<td>Required temperature of 158°F (70°C)</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D 638</td>
<td>6,000 psi</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM C 413</td>
<td>0.10%</td>
</tr>
</tbody>
</table>

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continued on back
PRODUCT INFORMATION

APPLICATION

APPLICATION INSTRUCTIONS

1. Premix 3744A (resin) using a low speed drill and Jiffy blade. Mix for one minute and until uniform, exercising caution not to introduce air into the material.

2. Add 2 parts 3744A (resin) to 1 part 3744B (hardener) by volume. Mix with low speed drill and Jiffy blade for three minutes and until uniform. To insure proper system cure and performance, strictly follow mix ratio recommendations.

3. Apply 3744 using a squeegee or trowel and back roll with a 1/4” nap roller at a spread rate of 180-240 square feet per gallon to yield 6-8 mils WFT with no puddles making sure of uniform coverage. Take care not to puddle materials and insure even coverage.

4. Allow to cure 24 hours minimum before opening to avoid water exposure.

Note: Epoxy materials will appear to be cured and “dry to touch” prior to full chemical cross linking. Allow epoxy to cure 2-3 days prior to exposure to water or other chemicals for best performance.

CLEANUP

Clean up mixing and application equipment immediately after use. Use toluene or xylene. Observe all acid health precautions when handling or storing solvents.

SAFETY

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

MAINTENANCE

Occasional inspection of the installed material and spot repair can prolong system life. For information, contact the Technical Service Department.

SHIPPING

- Destinations East of the Rocky Mountains are shipped F.O.B. Cincinnati, Ohio.
- Destinations West of the Rocky Mountains are shipped F.O.B. Victorville, California.

For information relating to international shipments, contact your local sales representative.

ORDERING INFORMATION

Packaging:
- Part A: 1 gallon (3.8L) and
  5 gallon (18.9L) containers
- Part B: 1 gallon (3.8L) and
  5 gallon (18.9L) containers

Weight: 9.68 ± 0.2 lb/gal; 1.16 Kg/L mixed, may vary by color

DISCLAIMER

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WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

For comprehensive chemical resistance information, consult the Chemical Resistant Guide and contact the Technical Service Department.

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**PRODUCT INFORMATION**

**PRODUCT DESCRIPTION**

ENVIROLASTIC AR425 is a 100% solids, spray-applied, aromatic polyurea coating and lining system, which exhibits extraordinary toughness and elastomeric performance characteristics. It can be applied at thicknesses of 30-250 mils (750-6250 microns) or greater in multiple passes during a single application.

- **Fast cure - short down time**: No VOCs and low odor
- **Seamless and waterproof**: Chemical resistant
- **Impact, tear, and abrasion resistant**: Bridges moving cracks to 1/8"
- **Retains physical properties at -20°F (-29°C) to 250°F (121°C)**

**PRODUCT CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Finish:</th>
<th>Semi-Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color:</td>
<td>Select colors available</td>
</tr>
<tr>
<td>Volume Solids:</td>
<td>100%</td>
</tr>
<tr>
<td>VOC (calculated):</td>
<td>0</td>
</tr>
</tbody>
</table>

**Recommended Spreading Rate per coat:**

| Wet mils (microns) | 30.0 (750) | 250.0 (6250) |
| Dry mils (microns) | 30.0 (750) | 250.0 (6250) |
| ~Coverage sq ft/gal (m²/L) | 6 (0.15) | 53 (1.3) |
| Theoretical coverage sq ft/gal (m²/L) @ 1 mil / 25 mils thick | 1600 (39.2) |

**Drying Schedule @ 30.0 mils wet (750 microns):**

- **At 73°F/23°C, 50% RH**
  - To touch: 45 seconds
  - To recoat: minimum 45 seconds, maximum 16 hours
  - Gel time: 15 seconds
  - Tack free: 45 seconds
  - To cure: 24 hours

If maximum recoat time is exceeded, abrade surface before recoating.

**Performance Characteristics**

**Abrasion Resistance**: ASTM D4060

**Adhesion**: ASTM D4541

**Thermal Expansion**: ASTM CS31 (m²/°F)

**Crack Bridging**: ASTM C836

**Nuclear Decontamination**: ASTM D2456/ANSI N 5.12

**Durability**: ASTM D2240

**Fire Test of Roof Covering**: ASTM E108 (comparable to UL 790) - Class A

**Impact Resistance**: ASTM D2794 - 72 in-lbs, direct

**Mandrel Bend**: ASTM D522 Conical Bend (1/32” steel pin) - Pass

**QUV Weatherometer**: ASTM 353, 3000 hours, UVB 313 bulb - Property Retention >90%

**Radiation Tolerance**: ASTM D4082 / ANSI 5.12 - Pass at 30 mils (750 microns), 60 mils (1500 microns), 120 mils (3000 microns), & 250 mils (6250 microns)

**Salt Spray Corrosion**: ASTM B117, 3000 hours - Blisters; None; Corrosion from scribe: 7.0 mm, Electrolytic adhesion: 2,000 psi

**Surface Burning Characteristics (Tunnel Test) @ 20.0 mils (500 microns):**

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Flame Spread</th>
<th>Smoke Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM E84 (Rating: Class 1)</td>
<td>Flame Spread: 10, Smoke Density: 35</td>
<td></td>
</tr>
</tbody>
</table>

**Tear Strength**: ASTM D1004 - 495 psi

**Tensile Elongation**: ASTM D638 - 425%

**Tensile Modulus**: ASTM D638 - 100% Modulus: 1,280 psi; 300% Modulus: 2,100 psi

**Tensile Strength**: ASTM D638 - 3,000 psi

**Water Vapor**: ASTM D1653-03, Method A (dry cup), Condition A, ASTM E96-00 Desiccant Method, Procedure A - 60 mils (1500 microns), 77°F (25°C), 50% RH, 0.60 gr/m²/hr @ 1 Mil Hg

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*Substrate: Steel*
ENVIROLASTIC® AR425

PRODUCT INFORMATION

Revised: May 6, 2016

TRM.85

PART A  B81V3200
PART B  B81-3200
ISOCYANATE SERIES

RECOMMENDED SYSTEMS

<table>
<thead>
<tr>
<th>Surface</th>
<th>Dry Film Thickness / ct.</th>
<th>Steel (lining):</th>
<th>1 ct. EnviroLastic AR425</th>
<th>60.0-80.0* (1500-2000)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, with hold primer (lining):</td>
<td>1 ct. Copoxy Shop Primer</td>
<td>1.0 -1.5** (25-40)**</td>
<td>60.0-80.0* (1500-2000)*</td>
<td></td>
</tr>
<tr>
<td>Concrete (lining):</td>
<td>1 ct. Corbond HS Epoxy Primer</td>
<td>3.0-4.0** (75-100)**</td>
<td>60.0-80.0* (1500-2000)*</td>
<td></td>
</tr>
<tr>
<td>Concrete (mechanical equipment room):</td>
<td>1 ct. Corbond HS Epoxy Primer</td>
<td>3.0-4.0** (75-100)**</td>
<td>60.0-80.0* (1500-2000)*</td>
<td></td>
</tr>
<tr>
<td>Concrete, low temperature or fast set:</td>
<td>1 ct. EnviroLastic AR425</td>
<td>30.0-40.0 (750-1000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

- Steel:
  - Atmospheric: SSPC-SP10/NACE 2, 3 mil (75 micron)
  - Immersion: SSPC-SP10/NACE 2, 3 mil (75 micron)

- Concrete & Masonry: SSPC-SP13/NACE 6 or ICRI No. 310.2, CSP 3-5.

TINTING

Do not tint.

APPLICATION CONDITIONS

<table>
<thead>
<tr>
<th>Condition of Surface</th>
<th>White Metal</th>
<th>Near White Metal</th>
<th>Commercial Blast</th>
<th>Blast-Off Blast</th>
<th>Hand Tool Cleaning</th>
<th>Power Tool Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 8501-1</td>
<td>Sa 2</td>
<td>Sa 2.5</td>
<td>Sa 2</td>
<td>Sa 1</td>
<td>Sa 1</td>
<td>Sa 2</td>
</tr>
<tr>
<td>Swedish Std.</td>
<td>SIS055900</td>
<td>SSPC-SP 10</td>
<td>SSPC-SP 10</td>
<td>SSPC-SP 2</td>
<td>SSPC-SP 2</td>
<td>SSPC-SP 2</td>
</tr>
<tr>
<td>SSPC</td>
<td>NACE</td>
<td>BrSH</td>
<td>CSP 3</td>
<td>CSP 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AIR AND SURFACE

| Temperature: | 150°F (66°C) minimum, 170°F (77°C) maximum |
| Air and surface: | -20°F (-29°C) minimum, 120°F (49°C) maximum |
| Relative humidity: | 80% maximum |

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Packaging:</th>
<th>Part A: 53 gallon (200L) drums</th>
</tr>
</thead>
<tbody>
<tr>
<td>B81V3200</td>
<td>B81-3200</td>
</tr>
</tbody>
</table>

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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**APPLICATION BULLETIN**

**ENVIROLASTIC® AR425**

**APPLICATION CONDITIONS**

- **Temperature:**
  - Material: 150°F (66°C) minimum, 170°F (77°C) maximum
  - Air and surface: -20°F (-29°C) minimum, 120°F (48°C) maximum
  - At least 5°F (2.8°C) above dew point

- **Relative humidity:** 80% maximum

**APPLICATION EQUIPMENT**

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

- **Reducer**
  - Not recommended

- **Clean-up**
  - Butyl Cellulose™ (R6K25) or Dowanol PM™

- **Plural Component Heated Spray Equipment:**
  - Equipment: Graco Reactor EXP2 or HXP3
  - Gun: GX7 DI, GX7-400, or GX-8
  - Fluid Pressure: 2,200 psi
  - Air Pressure: 100 psi
  - A Side Temperature: 150-170°F
  - B Side Temperature: 150-170°F
  - Inlet Strainer Screen: 30 mesh
  - Gun Screen: 80 mesh

- **Application equipment is not listed above, equivalent equipment may be substituted.**

**Surface Preparations**

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

**Iron & Steel (immersion service)**

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface (2 to 3 mils / 75 microns). Remove all weld spatter and round all sharp edges. Prime any bare steel the same day as it is cleaned or before rusting occurs.

**Iron & Steel (atmospheric service)**

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface (2 to 3 mils / 75 microns). Prime any bare steel the same day as it is cleaned or before rusting occurs.

**Concrete and Masonry**

For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 3-5. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT810. Primer required.

Follow the standard methods listed below when applicable:

- ASTM D4258 Standard Practice for Cleaning Concrete.
- ASTM D4259 Standard Practice for Abrading Concrete.
- ASTM D4260 Standard Practice for Etching Concrete.
- ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
- SSPC-SP 13/Nace 8 Surface Preparation of Concrete.
- ICRI No. 310.2 Concrete Surface Preparation.

**Concrete, Immersion Service:**

For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2, CSP 3-5.

**Surface Preparation Standards**

<table>
<thead>
<tr>
<th>Condition of Surface</th>
<th>ISO 8501-1</th>
<th>Swedish Std.</th>
<th>SSPC NACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Metal</td>
<td>Sa 2 1/2</td>
<td>S 61/2</td>
<td>SP 7 4</td>
</tr>
<tr>
<td>Near White Metal</td>
<td>Sa 2 5</td>
<td>S 63</td>
<td>SP 10 2</td>
</tr>
<tr>
<td>Commercial Blast</td>
<td>Sa 3</td>
<td>S 64</td>
<td>SP 5 1</td>
</tr>
<tr>
<td>Brush-Off Blast</td>
<td>Sa 3 1/2</td>
<td>S 65</td>
<td>SP 5 2</td>
</tr>
<tr>
<td>Hand Tool Cleaning</td>
<td>Rusted</td>
<td>D 83</td>
<td>SP 5 3</td>
</tr>
<tr>
<td>Power Tool Cleaning</td>
<td>Rusted</td>
<td>D 83</td>
<td>SP 5 3</td>
</tr>
</tbody>
</table>
APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Agitate resin blend (B) component thoroughly with a drum mixer before use to disperse pigment and assure homogeneity. Do not thin. Do not mix "A" and "B" resins together. Caution: Do not agitate in air and moisture.

Apply paint at the recommended □ □ thickness and spreading rate as indicated below:

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet mils (microns)</td>
<td>30.0 (750)</td>
<td>250.0 (6250)</td>
</tr>
<tr>
<td>Dry mils (microns)</td>
<td>30.0 (750)</td>
<td>250.0 (6250)</td>
</tr>
<tr>
<td>~Coverage sq ft/gal (m²/L)</td>
<td>6 (0.15)</td>
<td>53 (1.3)</td>
</tr>
<tr>
<td>Theoretical coverage sq ft/gal (m²/L) @ 1 mil/256 mils dry</td>
<td>1600 (39.2)</td>
<td></td>
</tr>
</tbody>
</table>

Drying Schedule: @ 30.0 mils wet (750 microns):
- @ 73°F/23°C
- 50% RH
- To touch: 45 seconds
- To recoat: minimum: 45 seconds maximum: 16 hours
- Gel time: 15 seconds
- Tack free: 45 seconds
- To cure: 24 hours
- If maximum recoat time is exceeded, abrade surface before recoating.
- Drying time is temperature, humidity.
- Pot Life: None
- Sweat-in-time: None

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Butyl Cellulose™ (R6K25) or Dowanol PM™. Clean tools and equipment immediately after use (including both "A" and "B" sides of plural component spray system) with Butyl Cellulose™ (R6K25) or Dowanol PM™.

SAFETY PRECAUTIONS

For immersion applications, a minimum total dry □ □ thickness of 40 mils (1000 microns) on steel and 80 mils (1500 microns) on concrete is required.

For Immersion Service: (if required) Holiday test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete.

May be applied in one or two coats to achieve the recommended □ □ thickness.

For steel, stripe coat all chine, welds, bolted connections, and sharp angles to prevent early failure in these areas. For concrete, all cracks must receive a 6" wide by 30 mil (750 micron) joint detail coat.

Use only heated, plural component equipment capable of producting 2,500 psi at 180°F (71°C) and 2 gallon (7.6L) minute output consistently.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Butyl Cellulose™ (R6K25), Dowanol PM™, or Propylene Glycol.

While spraying, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface □ □ □ □ defectiveness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive □ Build.

Do not agitate in air and moisture.

Consult your Sherwin-Williams representative for □ □ □ application and performance recommendations.

Refer to the MSDS sheet before use.

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**PRODUCT DESCRIPTION**

ENVIROLASTIC® AR530 BRUSH GRADE is a high solids, unapplied polyurea elastomer repair material that is based on proprietary polyurea formulation and a curing mechanism that can be applied at thicknesses of 10-250 mils (250-6250 microns) in consecutive multiple applications.

- Fast cure short downtime
- Low VOCs and low odor
- Bridges moving cracks to 1/8"
- Retains physical properties at -20°F (-29°C) to 250°F (121°C)

**PRODUCT CHARACTERISTICS**

- Finish: Semi-Gloss
- Color: Select colors available
- Volume Solids: 100%
- VOC (calculated): 0
- Mix Ratio: 1:1

<table>
<thead>
<tr>
<th>Recommended Spreading Rate per coat:</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet mils (microns)</td>
<td>10.0 (250)</td>
<td>250.0 (6250)</td>
</tr>
<tr>
<td>Dry mils (microns)</td>
<td>10.0 (250)</td>
<td>250.0 (6250)</td>
</tr>
<tr>
<td>Coverage sq ft/gal (m²/L) @ 1 mil/25 microns diff</td>
<td>6 (0.15)</td>
<td>160 (3.9)</td>
</tr>
<tr>
<td>Theoretical coverage sq ft/gal (m²/L)</td>
<td>1600 (39.2)</td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCT INFORMATION**

**Recommended Uses**

Designed for use as a repair material for polyurea coatings and linings in immersion and atmospheric applications.

Ideally suited for use on systems such as:

- Tank linings
- Secondary containment
- Hopper and tank car linings
- Waterproof deck coatings
- Chimney seals in manholes
- Acceptable for use in USDA inspected facilities

**Performance Characteristics**

- Abrasion Resistance: ASTM D4060, 1000 g 1000 cycles, concrete - 350 psi; steel - 850 psi; wood - 250 psi
- Adhesion: ASTM D4541, CS-17: 5 mg loss
- Linear Thermal Expansion: ASTM C531 (in/in°F), 4 x 10^5
- Crack Bridging: ASTM C836, Pass
- Gardner Impact: ASTM D2794, (1/32" steel panel), >160 in-lbs, direct and indirect
- Mandrel Bend: ASTM D522, Conical Bend (1/32" steel panel), Pass
- Tear Strength: ASTM D624, 525 psi
- Tensile Elongation: ASTM D638, 530%
- Tensile Modulus: ASTM D638, 100% Modulus - 1,400 psi; 300% Modulus - 1,800 psi
- Tensile Strength: ASTM D638, 2,440 psi

**Shelf Life:**

- 12 months, unopened
- Store indoors at 70°F (21°C) to 90°F (32°C)

**Flash Point:**

- 200°F (93°C)

**Viscosity (mixed):**

- 300 cps

**Clean Up:**

- Butyl Cellusolve™ (R6K25) or Dowanol PM™
E N V I R O L A S T I C® A R 5 3 0
B R U S H G R A D E

P a r t  a B 8 1 V 4 1 0 0 iS o c y a n a t e
P a r t  B B 8 1 - 4 1 0 0 S e r i e s
P r o t e c t i v e & M a r i n e C o a t i n g s

TRM. 8 1 R e v i s e d: M a y 6, 2016
w w w. s h e r w i n- w i l l i a m s. c o m/ p r o t e c t i v e

W O R K S H O P P I N G S T A N D A R D S

Surface Preparation
Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:
Steel:
Atmospheric: SSPC-SP10/NACE 2, 3 mil
Immersion: SSPC-SP10/NACE 2, 3 mil
Concrete & Masonry:
SSPC-SP13/NACE 6 or ICRI No. 310.2R., CSP 3-5

Surface Preparation Standards

Condition of Surface

<table>
<thead>
<tr>
<th>Material</th>
<th>SSPC-SP10/NACE 2</th>
<th>SSPC-SP10/NACE 3</th>
<th>ICRI 310.2R.</th>
<th>CSP 3-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Metal</td>
<td>Sa 3</td>
<td>Sa 2.5</td>
<td>DSt 2</td>
<td>CSt 3</td>
</tr>
<tr>
<td>Near White Metal</td>
<td>Sa 2.5</td>
<td>Sa 2.5</td>
<td>DSt 2</td>
<td>CSt 3</td>
</tr>
<tr>
<td>Commercial Blast</td>
<td>Sa 1</td>
<td>Sa 1</td>
<td>DSt 2</td>
<td>CSt 3</td>
</tr>
<tr>
<td>Brush-Off Blast</td>
<td>DSt 2</td>
<td>DSt 2</td>
<td>DSt 2</td>
<td>DSt 2</td>
</tr>
<tr>
<td>Hand Tool Cleaning</td>
<td>Rusted</td>
<td>Rusted</td>
<td>Rusted</td>
<td>Rusted</td>
</tr>
<tr>
<td>Power Tool Cleaning</td>
<td>Rusted</td>
<td>Rusted</td>
<td>Rusted</td>
<td>Rusted</td>
</tr>
</tbody>
</table>

Tinting
Do not tint.

Application Conditions

Temperature:
Material: 60°F (16°C) minimum, 120°F (49°C) maximum
Air and surface: -20°F (-29°C) minimum, 120°F (49°C) maximum
At least 5°F (2.8°C) above dew point
Relative humidity: 80% maximum

Refer to product Application Bulletin for detailed application information.

Ordering Information

Packaging:
Part A: 5 gallons (18.9L)
Part B: 5 gallons (18.9L)

Safety Precautions

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

Warranty

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

www.sherwin-williams.com/protective
Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel (immersion service)
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface \( \leq 3 \) mils / 75 microns. Remove all weld spatter and round all sharp edges. Prime any bare steel the same day as it is cleaned or before rusting occurs.

Iron & Steel (atmospheric service)
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface \( \leq 3 \) mils / 75 microns. Prime any bare steel the same day as it is cleaned or before rusting occurs.

Concrete and Masonry
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 3-5. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910. Primer required.

Follow the standard methods listed below when applicable:
- ASTM D4268 Standard Practice for Cleaning Concrete.
- ASTM D4259 Standard Practice for Abrading Concrete.
- ASTM D4260 Standard Practice for Etching Concrete.
- SSPC-SP 13/Nace 6 Surface Preparation of Concrete.
- ICRI No. 310.2R Concrete Surface Preparation.

Concrete, Immersion Service:
For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2R, CSP 3-5.

Surface Preparation Standards

<table>
<thead>
<tr>
<th>Condition of Surface</th>
<th>ISO 8501-1</th>
<th>Swedish Std.</th>
<th>SSPC</th>
<th>NACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Metal</td>
<td>SA 3</td>
<td>SA 3</td>
<td>SP 3</td>
<td>3</td>
</tr>
<tr>
<td>Near White Metal</td>
<td>SA 2.5</td>
<td>SA 2.5</td>
<td>SP 2</td>
<td>3</td>
</tr>
<tr>
<td>Commercial Blast</td>
<td>SA 2.5</td>
<td>SA 2.5</td>
<td>SP 2</td>
<td>3</td>
</tr>
<tr>
<td>Brush-Off Blast</td>
<td>SA 1</td>
<td>SA 1</td>
<td>SP 1</td>
<td>3</td>
</tr>
<tr>
<td>Hand Tool Cleaning</td>
<td>SA 2</td>
<td>SA 2</td>
<td>SP 2</td>
<td>3</td>
</tr>
<tr>
<td>Power Tool Cleaning</td>
<td>SA 2</td>
<td>SA 2</td>
<td>SP 2</td>
<td>3</td>
</tr>
<tr>
<td>Rusted</td>
<td>D3</td>
<td>D3</td>
<td>SP 2</td>
<td>3</td>
</tr>
<tr>
<td>Rusted &amp; Rusted</td>
<td>D3</td>
<td>D3</td>
<td>SP 2</td>
<td>3</td>
</tr>
</tbody>
</table>

Application Conditions

| Temperature: |
| Material: |
| Air and surface: |
- 60°F (16°C) minimum, 120°F (49°C) maximum
- -20°F (-29°C) minimum, 120°F (49°C) maximum

At least 5°F (2.8°C) above dew point

Relative humidity: 80% maximum

Application Equipment

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer: Not recommended
Clean-up: Butyl Cellulose™ (R6K25) or Dowanol PM™

Plural Component Dual Feed Metering Equipment:
Equipment: AST GMP-075 “Big Pro”
Static mixer: 1/2” dia, 32 element
Reduction: Not recommended

Plural Component Air Powered Caulk Guns:
Static mixer: 1/2” dia, 32 element
Reduction: Not recommended

If application equipment is not listed above, equivalent equipment may be substituted.
**ENVIROLASTIC® AR530**

**BRUSH GRADE**

**APPLICATION PROCEDURES**

Surface preparation must be completed as indicated.

**Mixing Instructions:** For small repair areas, combine one Part B resin to one Part A IS0 for each 1 pint batch. Do not pre-mix either component. Always add the Part B resin to the Part A ISO. Mix with margin towel for 15 to 30 seconds until uniform. For large repair areas, use plural component equipment.

Apply paint at the recommended thickness and spreading rate as indicated below:

<table>
<thead>
<tr>
<th>Recommended Spreading Rate per coat:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet mils (microns)</td>
</tr>
<tr>
<td>10.0 (250)</td>
</tr>
<tr>
<td>250.0 (6250)</td>
</tr>
<tr>
<td>Dry mils (microns)</td>
</tr>
<tr>
<td>10.0 (250)</td>
</tr>
<tr>
<td>250.0 (6250)</td>
</tr>
<tr>
<td>Coverage sq ft/gal (m²/L)</td>
</tr>
<tr>
<td>6 (0.15)</td>
</tr>
<tr>
<td>160 (3.9)</td>
</tr>
<tr>
<td>Theoretical coverage sq ft/gal</td>
</tr>
<tr>
<td>1600 (39.2)</td>
</tr>
<tr>
<td>NOTE: May require multiple coats.</td>
</tr>
</tbody>
</table>

**Drying Schedule @ 15.0 mils wet (375 microns):**

- @ 73°F/23°C
- 50% RH
- To touch: 20 minutes
- To recoat:
  - minimum: 20 minutes
  - maximum: 16 hours
- Gel time: 5 minutes
- Tack free: 20 minutes
- Vehicular: 1 hour
- To cure: 24 hours

If maximum recoat time is exceeded, abrade surface before recoating.

- Drying time is temperature, humidity.
- Pot Life: 3-5 minutes
- Sweat-in-time: None

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

**CLEAN UP INSTRUCTIONS**

Clean spills and spatters immediately with Butyl Cellusolve™ (R6K25) or Dowanol PM™. Clean tools and equipment immediately after use (including both “A” and “B” sides of plural component spray system) with Butyl Cellusolve™ (R6K25) or Dowanol PM™.

**PERFORMANCE TIPS**

For concrete, always perform Calcium Chloride test as per ASTM F1869. Do not proceed with MVE > 3 lbs.

Where primers are used, do not paint on concrete or steel with excess primer. Topcoat epoxy primers immediately after they become tack free. "Tack free" is slight to medium pressure with a gloved hand, placed on a primed surface, that when lifted shows a slight imprint or distortion to the surface, with no transfer of primer to the glove.

For immersion applications, a minimum total dry thickness of 40 mils on steel and 60 mils (1500 microns) on concrete is required.

For immersion service: (if required) Holiday test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete.

For steel, stripe coat all chine, welds, bolted connections, and sharp angles to prevent early failure in these areas. For concrete, all cracks must receive a 6" wide by 30 mil (750 micron) dft detail coat.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface roughness or porosity of the surface, skill of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overbrushing, climatic conditions, and excessive use with a gloved hand, placed on a primed surface, that when lifted shows a slight imprint or distortion to the surface, with no transfer of primer to the glove.

Consult your Sherwin-Williams representative for application and performance recommendations.

Refer to Product Information sheet for additional performance characteristics and properties.

**SAFETY PRECAUTIONS**

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

**WARRANTY**

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COR-SEAL PS
Polysulfide Sealant/Caulk

PRODUCT DESCRIPTION

COR-SEAL PS is a 100% solids, elastomeric, polysulfide sealant for caulking joints where chemical resistance is required. COR-SEAL PS maintains excellent bond between many substrates and/or materials.

FEATURES/BENEFITS

• Provides outstanding chemical resistance and UV stability
• Is 100% solids
• Resists thermal shock and cycling
• Does not require priming in most cases
• Maintains effective bond between materials of similar or dissimilar porosities, surface textures, and/or expansion coefficients

TYPICAL USES

COR-SEAL PS has been formulated to provide sealant protection in secondary containment projects. It is recommended as a sealant for expansion joints, control joints, and cracks greater than 1/4" in width. It is certified to NSF Standard 61, Section 6 for Joining and Sealing Materials and meets all aspects of ASTM C 920 specifications for Non-sag, Class 25 sealants.

PACKAGING

<table>
<thead>
<tr>
<th>Product #</th>
<th>Premeasured Kits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1605</td>
<td>1.5 gallons</td>
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</table>

TYPICAL PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Mix Ratio A:B</th>
<th>Premeasured @ 17:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Gray</td>
</tr>
<tr>
<td>Solids, by volume</td>
<td>100%</td>
</tr>
<tr>
<td>VOC (Volatile Organic Content)</td>
<td>- 0 -</td>
</tr>
<tr>
<td>Viscosity, mixed</td>
<td>1,000,000 cps</td>
</tr>
<tr>
<td>Pot life @ 73°F, 1 gallon mass</td>
<td>ASTM D 2471</td>
</tr>
<tr>
<td>@ 50°F</td>
<td>3 hrs</td>
</tr>
<tr>
<td>@ 73°F</td>
<td>1 - 1 1/4 hrs</td>
</tr>
<tr>
<td>@ 90°F</td>
<td>30 - 45 mins</td>
</tr>
<tr>
<td>Cure time, 73°F, 50% RH</td>
<td>&lt; 24 hrs</td>
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<tr>
<td>Dry to Touch</td>
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</tr>
<tr>
<td>Full Cure</td>
<td>3 days</td>
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<tr>
<td>Hardness, Shore D</td>
<td>ASTM D 2240</td>
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<tr>
<td></td>
<td>25-30</td>
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<tr>
<td>Tensile Strength</td>
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<td></td>
<td>150-200 psi</td>
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<tr>
<td>% Elongation</td>
<td>ASTM D 638</td>
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<td></td>
<td>500-550 %</td>
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<tr>
<td>100% modulus</td>
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<td></td>
<td>50 psi</td>
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<tr>
<td>200% modulus</td>
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</tr>
<tr>
<td></td>
<td>80 psi</td>
</tr>
<tr>
<td>% Joint Movement</td>
<td>± 25</td>
</tr>
<tr>
<td>Flammability</td>
<td>Self-extinguishing on concrete</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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LIMITATIONS

COR-SEAL PS is not recommended for:
• Glass glazing
• Joints less than 1/4” in width or depth
• Contaminated joints
• Certain architectural paints and finishes without prior testing

SURFACE PREPARATION

Proper inspection and preparation of the substrate to receive COR-SEAL PS is critical. Read and follow General Polymers “Guideline Instructions for Concrete Surface Preparation” (Form G-1, current version) for complete details and/or contact General Polymers Technical Service Department.

APPLICATION

• MATERIAL DELIVERY AND STORAGE
Store COR-SEAL PS in a temperature controlled environment, 50°F (10°C) to 80°F (26°C), and out of direct sunlight. Keep resins, hardeners, and solvents separated from each other and away from sources of ignition. Shelf life is one year in original, unopened containers stored at temperatures lower than 80°F (26°C).

• INSTALLATION
General Polymers understands that you want the system installed right the first time. Therefore, an exclusive group of local specialty contractors has been selected by General Polymers for their experience, expertise, stability, and most importantly, commitment to quality and owner satisfaction. Materials are to be installed per General Polymers Installation Instructions.

CHEMICAL RESISTANCE

For chemical resistance information, refer to General Polymers Corrosion Control Chemical Resistance Guide. Consult General Polymers Technical Service Department for specific details.

MAINTENANCE

Occasional inspection and spot repair of the installed sealant can prolong the system life. When installed properly, COR-SEAL PS should require little or no maintenance. However, if the sealant is damaged and the bond is intact, cut out the damaged area and re-caulk. If the bond has been affected, remove the sealant, clean and prepare the joint. For specific information, contact General Polymers Technical Service Department.

WARRANTY


THE COMPANY’S PRODUCTS ARE SOLD SUBJECT TO THE EXPRESS LIMITED WARRANTIES CONTAINED HEREIN. THE LIABILITY OF THE COMPANY WHETHER BASED ON ITS WARRANTY, CONTRACT OR OTHERWISE, SHALL IN NO CASE EXCEED THE PURCHASE PRICE FOR THE PRODUCTS AND DOES NOT INCLUDE INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHICH RESULT FROM THE USE OR MISUSE OF THE PRODUCTS SOLD HEREUNDER. EXCEPT AS PROVIDED HEREIN, THE COMPANY MAKES NO WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BUYER HEREBY EXPRESSLY WAIVES ANY CLAIM TO ADDITIONAL DAMAGES.

THE COMPANY’S LIMITED WARRANTY SHALL NOT APPLY IN THE CASE OF IMPROPER INSTALLATION OR CONSTRUCTION, DAMAGE DUE TO GOUGING OR OTHER DAMAGE BEYOND THE SCOPE AND PROTECTION OF THE INSTALLED SYSTEM, INCLUDING, IMPACT, ABRASION, THERMAL SHOCK AND EXPOSURE TO CONCENTRATIONS OF CHEMICALS HIGHER THAN THAT FOR WHICH THE MATERIALS WERE DESIGNED. THE COMPANY’S LIMITED WARRANTY DOES NOT APPLY TO AREAS WHICH HAVE FAILED FOR ANY CAUSE NOT RELATED TO THE PRODUCTS OR TO LOSS OF BOND DUE TO HYDROSTATIC PRESSURE, VAPOR PRESSURE, CAPILLARY ACTION OR MOISTURE FROM WITHIN, UNDER OR ADJACENT TO THE CONCRETE SURFACE, OR STRUCTURAL FAILURES. THE COMPANY IS NOT A LICENSED ARCHITECT, STRUCTURAL ENGINEER, OR DESIGN PROFESSIONAL, AND DOES NOT CARRY ERRORS AND OMISSIONS INSURANCE FOR DESIGN CLAIMS AND RENDERS NO OPINION REGARDING THE STRUCTURAL INTEGRITY OR SUITABILITY OF THE PROJECT, OR ANY DESIGN DEFICIENCIES IN ANY ARCHITECT, STRUCTURAL ENGINEER OR DESIGNER PLANS, AND SPECIFICALLY DISCLAIMS ANY RESPONSIBILITY THEREFORE.
PRODUCT DESCRIPTION

General POlymers 3555 ePO-Fle X HD ePOxy COatin G is a high solids, chemical resistant, elastomeric epoxy which combines the toughness, adhesion, and durability of epoxies with the common to polyurethane elastomers. Flexibility is achieved without the use of plasticizers or other additives which migrate from a material as it ages. GENERAL POLYMERS 3555 EPO-FLEX HD EPOXY COATING is self-leveling and may be used with fiberglass reinforcement to enhance system properties, or as a membrane. GENERAL POLYMERS 3555 EPO-FLEX HD EPOXY COATING can be used as a stand alone coating.

ADVANTAGES

• Self-leveling
• Flexible, yet tough
• May be poured-in-place to form an absorption pad for heavy loads and substrate movement
• Acceptable for use in USDA inspected facilities

TYPICAL USES

General POlymers 3555 ePO-Fle X HD ePOxy COatin G is recommended for use as a coating and as a component of EPO-FLEX Industrial Floor and EPO-FLEX MER (Mechanical Room Flooring Systems. GENERAL POLYMERS 3555 EPO-FLEX HD EPOXY COATING can also be used as a mem-

LIMITATIONS

• Slab on grade requires vapor/moisture barrier.
• Substrate must be structurally sound, dry and free of bond inhibiting contaminants.
• During installation and initial cure cycle substrate and ambient air temperature must be at a minimum of 60°F (16°C). Substrate temperature must be at least 5°F (3°C) above the dew point (for lower temperature installation contact your local sales representative).
• When required, adequate ventilation shall be provided and proper clothing and respirators worn.
• strictly adhere to published coverage rates.
• strictly adhere to mixing ratios.

SURFACE PREPARATION

Proper inspection and preparation of the substrate to receive resinous material is critical. Read and follow the “Instructions for Concrete Surface Preparation” (Form G-1) for complete details.

PRODUCT CHARACTERISTICS

Color: Gray
mix ratio: 1:1
Volume solids: 84% ± 2%, mixed
Weight solids: 91% ± 2%, mixed
VOC (ePa method 24): <100 g/L mixed; 0.83 lb/gal
Viscosity, mixed: 1,450 cps

RECOMMENDED SPREADING RATE PER COAT:

<table>
<thead>
<tr>
<th>Wet mils (microns)</th>
<th>minimum</th>
<th>maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage sq ft/gal (m²/L)</td>
<td>20 (500)</td>
<td>40 (1000)</td>
</tr>
</tbody>
</table>

Drying schedule @ 6 mils (150 microns) wet:

@ 73°F (23°C)
to touch: 5 hours
to recoat: 12-24 hours
Full Cure: 48 hours

If maximum recoat time is exceeded, abrade surface before recoating.
Drying time is temperature, humidity

Pot life:
gallon mass 20-25 minutes @ 73°F (23°C)

shelf life:
Part A: 36 months, unopened
Part B (Standard): 36 months, unopened

Store indoors at 50°F (10°C) to 90°F (32°C)
Flash Point:
>218°F (>103°C), ASTM D 93, mixed

PERFORMANCE CHARACTERISTICS

test name | test method | results
--- | --- | ---
adhesion | ACI 503R | 300 psi concrete failure
elongation | ASTM D 412 | 80%
Flammability | | Self-extinguishing over concrete
Hardness, shore D | ASTM D 2240 | 50/40
tensile strength | ASTM D 412 | 1,700 psi
thermal Cycling 24 hrs.. -21°C - 25°C | ASTM C 884 | No cracking
APPLICATION

• aPPli Cat On instr UCti Ons

1. Premix 3555A (resin) using a low speed drill and Jiffy blade. Mix for one minute and until uniform, exercising caution not to whip air into the material.

2. Add 1 part 3555A (resin) to 1 part 3555B (hardener) by volume. Mix with low speed drill and Jiffy blade for three minutes and until uniform.

3. Immediately pour the mixed material onto the substrate and pull out using a 1/8” v-notched squeegee to yield 20 mils WFT and cross roll with a 3/8” nap roller. Readings must be taken continuously during application with a wet mil gauge to verify material is being applied at the proper thickness. Allow to cure overnight at 73ºF surface temperature. Material cures slower at lower temperatures.

4. After the membrane is cured, check for surface blush. Remove any blush with detergent wash completing installation of desired system.

NOTE: Epoxy materials may tend to blush at the surface especially in humid environments. After surface is primed and before installation of each subsequent coat, surface must be examined for blush (a whitish greasy and/or low gloss). The blush must be completely removed prior to recoating using warm detergent water or through solvent wipe.

note: epoxy materials will appear to be cured and “dry to touch” prior to full chemical cross linking. Allow epoxy to cure 2-3 days prior to exposure to water or other chemicals for best performance.

ORDERING INFORMATION

Packaging:
- Part A: 1 gallon (3.8L) and 5 gallon (18.9L) containers
- Part B: 1 gallon (3.8L) and 5 gallon (18.9L) containers

Weight: 8.8 ± 0.2 lb/gal; 1.05 Kg/L

CLEANUP

Clean up mixing and application equipment immediately after use. Use toluene or xylene. Observe all safety precautions when handling or storing solvents.

SAFETY

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

MAINTENANCE

Occasional inspection of the installed material and spot repair can prolong system life.

SHIPPING

• Destinations East of the Rocky Mountains are shipped F.O.B. Cincinnati, Ohio.
• Destinations West of the Rocky Mountains are shipped F.O.B. Victorville, California.

For information relating to international shipments, contact your local sales representative.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

WARRANTY

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For comprehensive chemical resistance information, consult the Chemical Resistant Guide.
Manufacturer Product Data Sheets for Keeler and Long Coatings
The statement and methods presented in this bulletin are based upon the best available data and practices known to PPG/Keeler & Long at the present time. They are not representations or warranties of performance, results or comprehensiveness of such data. Since PPG /Keeler & Long is constantly improving its coatings and paint formulas, future technical data may vary somewhat from what was available when this bulletin was printed. Contact your PPG/Keeler & Long Sales Representative for the most up-to-date information.

Product Data Sheet

Keeler & Long/PPG
11605 Vimy Ridge Rd.
Alexander, AR 72002
PPG PMC Technical Support:
800-661-4774

Product Information

<table>
<thead>
<tr>
<th>Product Code:</th>
<th>KL5129 Part A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product:</td>
<td>KL5129 Curing Agent Part B</td>
</tr>
<tr>
<td>Suggested Use:</td>
<td>Sealer for use on concrete floors or walls.</td>
</tr>
</tbody>
</table>

Product Description

- **Color:** Clear amber
- **Gloss 60°:** Not applicable
- **Weight/Gallon:** 8.7 ± 0.5 lbs./gal. (mixed)
- **In Service Heat Limitations:** 200°F (93°C) maximum, dry heat
- **Flash Point:** 200°F (93°C)
- **Package:** KL5129 - five gallon pail filled at 2.4 gallons (9.08 liters) or one gallon pail filled at 0.60 gallon (2.27 liters). KL5129B - two gallon pail filled at 1.6 gallons (6.06 liters) or half gallon pail filled at 0.40 gallon (1.51 liters)
- **Percent Solids by Volume:** 95.0 ± 3.0% (mixed, calculated)
- **Percent Solids by Weight:** 95.0 ± 3.0% (mixed, applied and air dried)
- **VOC, Air Dried:** 0.43 lbs./gal. (52 g/L) mixed
- **VOC, EPA 24:** 1.19 lbs./gal. (143 g/L) mixed

Drying Schedule

- **Air Dry @ 77°F (25°C) ASTM D5895**
  - Dry to Touch: 12 hours
  - Dry to Handle: 12 hours
  - Dry to Recruit: 12 - 24 hours
  - Drying times listed may vary depending on temperature, humidity and air movement.

Application Data

| Substrate: | Concrete floors or walls |

Application Data (continued)

- **Substrate Preparation:** The service life of the coating is directly related to the surface preparation. The surface to be coated must be properly prepared, dry, clean and free of contamination. Track blast or acid etch and rinse well to neutralize. Use a rotary wire brush, grinder or brush blast for walls. A profile equivalent to 80 grit sandpaper is required.
- **Basecoat:** Not applicable
- **Application Method:** Airless Spray: Equipment capable of maintaining a minimum of 1500-2500 psi at the tip without surge. 0.013” (0.33 mm) to 0.017” (0.43 mm) orifice.
  - **Brush:** Use a high quality natural bristle brush.
  - **Roller:** Use a 3/8” nap polyester nylon roller cover with a solvent resistant core.
  - Refer to Application Guide APG-6 for additional information.
  - **Parts Base by Volume:** 3 parts KL5129
  - **Parts Catalyst by Volume:** 2 parts KL5129B
  - **Thinner Code & Percent:** Not recommended.
  - **Digestion Time:** None required.
  - **Pot Life:** 45 minutes at 77°F (25°C)
  - **Coverage Sq. Ft./Gal @ 1 mil:** 1524 sq. ft./gal*
  - **Wet Film Per Coat:** 2.1 to 4.2 mils
  - **Dry Film Per Coat:** 2.0 to 4.0 mils
  - **Mixing Instructions:** Mix both components prior to blending. Add KL5129B to KL5129. Thoroughly drain curing agent from its container to insure proper mix ratio. Agitate thoroughly. Scrape sides. No digestion required.
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**Clean Up Solvent:** KL3700

**Product Data Sheet**

**Kolor-Poxy™ Primer/Sealer**

**KL5129/KL5129B**

**Additional Information**

Apply only when air, product and surface temperatures are at least 50°F (10°C) and surface temperature is at least 5°F (3°C) above the dew point.

Store materials at temperatures between 50°F (10°C) and 85°F (29.4°C).

Permissible substrate temperature during application is 60°F (15.6°C) to 110°F (43.3°C).

Read all label and Material Safety Data Sheet (MSDS) information prior to use. MSDS are available by calling 1-888-9-PPGPMC (1-888-977-4762).

Not for residential use.

High-pressure injection of coatings into the skin by airless equipment may cause serious injury, requiring immediate medical attention at a hospital.

Spray equipment must be handled with due care and in accordance with manufacturer's recommendation.

WARNING! If you scrape, sand, or remove old paint, you may release lead dust or fumes. LEAD IS TOXIC. EXPOSURE TO LEAD DUST OR FUMES CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a properly fitted NIOSH-approved respirator and prevent skin contact to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the USEPA National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead. In Canada contact a regional Health Canada office. Follow these instructions to control exposure to other hazardous substances that may be released during surface preparation.
**Product Data Sheet**

**Kolor-Poxy™ Self Leveling Floor Coating**

**KL5500/KL5500B**

---

### Product Information

<table>
<thead>
<tr>
<th>Product Code:</th>
<th>KL5500 Part A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KL5500 Curing Agent Part B</td>
</tr>
</tbody>
</table>

**Product:** Epoxy-Amine

**Suggested Use:** A self-leveling coating for use on interior floors, steel decking or embeds where a smooth, high gloss durable surface is required.

**Not Recommended:** Exterior service. Consult Technical Services for recommendation where splash and spillage of strong acids are present.

### Product Description

- **Color:** Various
- **Gloss 60°:** 85 minimum
- **Weight/Gallon:** 11.7 +/- 0.5 lbs./gal. (mixed) *
- **In Service Heat Limitations:** 200°F (93°C) maximum, dry heat
- **Flash Point:** 150°F (66°C)
- **Package:**
  - KL5500 - five gallon pail filled at 2.72 gallons (10.3 liters).
  - KL5500B - Two-gallon pail filled at 1.28 gallons (4.84 liters).
- **Percent Solids by Volume:** 100.0 ± 3.0% (mixed, calculated)
- **Percent Solids by Weight:** 100.0 ± 3.0% (mixed, applied and air dried)
- **VOC, Air Dried:** 0 lbs./gal. (0 g/L) mixed
- **VOC, EPA 24:** 0.71 lbs./gal. (85 g/L) mixed

### Drying Schedule

- **Air Dry @ 77°F (25°C) ASTM D5895**
  - **Dry to Touch:** 5 hours
  - **Dry to Recoat:** 12 hours
  - **Light Traffic:** 24 hours
  - **Heavy Traffic:** 72 hours
  - Drying times listed may vary depending on temperature, humidity and air movement.

### Application Data

- **Substrate:** Concrete floors, steel decking, embeds
- **Preparation:** The service life of the coating is directly related to the surface preparation. The surface to be coated must be properly prepared, sealed, dry, clean and free of contamination.
- **Basecoat:** Kolor-Poxy™ Clear Sealer, Kolor-Poxy™ Primer/Sealer, Kolor-Poxy™ Primers and Enamels.
- **Application Method:** Apply using a squeegee or notched steel trowel to desired film thickness. After 5-10 minutes, roll with a porcupine roller in a crosshatch manner to release entrapped air and assist in leveling.

  Refer to Application Guide APG-6 for additional information.

- **Parts Base by Volume:** 2.125 parts KL5500
- **Parts Catalyst by Volume:** 1 part KL5500B
- **Thinner Code & Percent:** Not recommended.
- **Digestion Time:** Not required.
- **Pot Life:** 20 minutes at 77°F (25°C)
- **Coverage Sq. Ft./Gal. @ 1 mil:** 1604 sq. ft./gal *
- **Wet Film Per Coat:** 34.0 to 122.0 mils
- **Dry Film Per Coat:** 34.0 to 122.0 mils

**Mixing Instructions:**

- Mechanically agitate KL5500 before blending. Add KL5500B to KL5500.
- Mechanically agitate for 2 minutes. Pour mixed coating into a clean pail, scrape sides of the original pail and agitate for an additional 30 seconds. No digestion is required.

**Clean Up Solvent:** KL3700

---

The statement and methods presented in this bulletin are based upon the best available data and practices known to PPG/Keeler & Long at the present time. They are not representations or warranties of performance, results or comprehensiveness of such data. Since PPG/Keeler & Long is constantly improving its coatings and paint formulas, future technical data may vary somewhat from what was available when this bulletin was printed. Contact your PPG/Keeler & Long Sales Representative for the most up-to-date information.

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E.250 May, 2004
The statement and methods presented in this bulletin are based upon the best available data and practices known to PPG/Keeler & Long at the present time. They are not representations or warranties of performance, results or comprehensiveness of such data. Since PPG /Keeler & Long is constantly improving its coatings and paint formulas, future technical data may vary somewhat from what was available when this bulletin was printed. Contact your PPG/Keeler & Long Sales Representative for the most up-to-date information.

**Kolor-Poxy™ Self Leveling Floor Coating**

**KL5500/KL5500B**

**Additional Information**

*Values are calculated for KL5500 White mixed with KL5500B. Values may vary with color.*

- Apply only when air, product and surface temperatures are at least 60°F (15.5°C) and surface temperature is at least 5°F (3°C) above the dew point.
- Store materials at temperatures between 50°F (10°C) and 85°F (29°C).
- Permissible substrate temperature during application is 60°F (15.5°C) and 110°F (43.3°C).
- Consult Technical Service if temperature is out of the recommended application range.
- Read all label and Material Safety Data Sheet (MSDS) information prior to use. MSDS are available by calling 1-800-238-8596.
- Not intended for residential use.
- **WARNING!** If you scrape, sand, or remove old paint, you may release lead dust or fumes. LEAD IS TOXIC. EXPOSURE TO LEAD DUST OR FUMES CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a properly fitted NIOSH-approved respirator and prevent skin contact to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the USEPA National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead. In Canada contact a regional Health Canada office. Follow these instructions to control exposure to other hazardous substances that may be released during surface preparation.
Product Data Sheet

Kolor-Quartz™ Seamless Floor Coating
KL7700/KL7700B

Product Information

<table>
<thead>
<tr>
<th>Product Code:</th>
<th>KL7700 Clear Part A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KL7700B Curing Agent Part B</td>
</tr>
<tr>
<td>Product:</td>
<td>Epoxy-Amine</td>
</tr>
<tr>
<td>Suggested Use:</td>
<td>Use in areas where an aesthetically pleasing, durable floor coating is desired such as kitchens, restrooms, shower rooms, clean rooms, traffic areas and showrooms. Can be smooth or non-skid.</td>
</tr>
<tr>
<td>Not Recommended:</td>
<td>Splash and spillage of strong acids.</td>
</tr>
</tbody>
</table>

Product Description

| Color: | Clear. Colors can be obtained by adding colored quarts to the desired color. |
| Gloss 60°: | 80 minimum for smooth finish |
| Weight/Gallon: | 9.0 ± 0.3 lbs./gal. (mixed) |
| In Service Heat Limitations: | 200°F (93°C) maximum, dry heat |
| Flash Point: | Part A 124°F (51°C) |
|               | Part B 150°F (65.5°C) |
| Package: | KL7700 is filled in five-gallon containers at 2.5 gallons (9.46 liters) or two-gallon containers at 0.62 gallon (2.35 liters). KL7700B is filled in two gallon pails at 1.5 gallons (5.68 liters) or half gallon pails at 0.38 gallon (1.44 liters). |
| Percent Solids by Volume: | 99.4 ± 3.0% (mixed, calculated) |
| Percent Solids by Weight: | 99.4 ± 3.0% (mixed, applied and air dried) |
| VOC, Air Dried: | 0.05 lbs./gal. (7 g/L) mixed |
| VOC, EPA 24: | 0.85 lbs./gal. (102 g/L) mixed |

Drying Schedule

| Air Dry @ 77°F (25°C) ASTM D5895: | 6 hours |
| Dry to Touch: | 6 hours |
| Dry to Recoat: | 15-20 hours |

Application Data

| Substrate: | Concrete floors |
| Preparation: | The service life of the coatings is directly related to the surface preparation. |
| Surface to be coated must be properly prepared, sealed, dry, clean and free of all contamination. |
| Basecoat: | Kolor-Poxy™ Clear Sealer, Kolor-Poxy™ Primer/Sealer, Kolor-Poxy™ Primers, and Kolor-Poxy™ Self Leveling Floor Coating ** |
| Application Method: | Apply using a notched squeegee or fine nap or mohair roller to roll out the coating. Spread at a rate of 75-200 sq. ft. per mixed gallon. |
| Let coating self level for 2-3 minutes then "seed" or "broadcast" desired aggregate into the wet coating. Continue until the surface is saturated and no shiny areas are visible. |
| Roll out using a napless or foam roller. Do not use pressure on the roller. This step is to insure the aggregate is "bedded down" uniformly. |
| Allow to cure for 15-20 hours. Sweep up any loose aggregate and apply a glaze coat of KL7700/KL7700B Clear to the surface. Thinning may be required depending on temperature. Additional coats may be required to achieve desired appearance. |
| Refer to Application Guide APG-6 for additional information. |

| Parts Base by Volume: | 1.7 parts KL7700 |
| Parts Catalyst by Volume: | 1 parts KL7700B |

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E.310 May, 2004
**Application Data (continued)**

<table>
<thead>
<tr>
<th>Thinner Code &amp; Percent</th>
<th>Thinning is not normally required. If thinning is needed due to temperature, up to one (1) pint of KL3700 may be used, per mixed gallon.</th>
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</thead>
<tbody>
<tr>
<td>Digestion Time:</td>
<td>None required</td>
</tr>
<tr>
<td>Pot Life:</td>
<td>15-20 minutes at 77°F (25°C)</td>
</tr>
<tr>
<td>Coverage Sq. Ft./Gal.</td>
<td>75 to 200 sq. ft./mixed gallon @ 8.0 to 20.0 mils dry film.</td>
</tr>
<tr>
<td>Mixing Instructions:</td>
<td>Mechanically agitate KL7700 before blending. Add KL7700B to KL7700. Mechanically agitate for 2 minutes. Pour mixed coating into a clean pail. Scrape sides of the original pail and agitate for an additional 30 seconds.</td>
</tr>
<tr>
<td>Wet Film Per Coat:</td>
<td>8.0 to 20.1 mils</td>
</tr>
<tr>
<td>Dry Film Per Coat:</td>
<td>8.0 to 20.0 mils</td>
</tr>
<tr>
<td>Clean Up Solvent:</td>
<td>KL3700</td>
</tr>
</tbody>
</table>

**Additional Information**

Apply only when air, product and surface temperatures are between 65°F (18.3°C) and 85°F (29°C) and surface temperature is at least 5°F (3°C) above the dew point. Consult Keeler & Long/PPG Technical Service if application temperatures are outside recommended ranges. Store materials at temperatures between 50°F (10°C) and 85°F (29°C).

**When topcoating Kolor-Poxy™ Self Leveling Floor Coating with Kolor-Quartz™ Seamless Floor Coating, the Kolor-Quartz must be applied within a 15 to 30 hour recoat window. After 30 hours, the Kolor-Poxy Self Leveling Floor Coating must be abraded prior to the application of the Kolor-Quartz Coating.**

Not intended for residential use.

Read all label and Material Safety Data Sheet (MSDS) information prior to use. MSDS are available by calling 1-800-238-8596.

WARNING! If you scrape, sand, or remove old paint, you may release lead dust or fumes. LEAD IS TOXIC. EXPOSURE TO LEAD DUST OR FUMES CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a properly fitted NIOSH-approved respirator and prevent skin contact to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the USEPA National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead. In Canada contact a regional Health Canada office. Follow these instructions to control exposure to other hazardous substances that may be released during surface preparation.
DESCRIPTION

RLP 2378+ is a highly elastomeric, two-component, 100% solids polysulfide-based coating for a variety of surface applications. It provides an impermeable yet flexible membrane with excellent resistance to chemical attack and environmental degradation.

TYPICAL APPLICATION

- **Primer**: PolySpec 100EX @ 5–7 mils (concrete) or American Safety MS11CZLT Primer @ 4–6 mils (steel)
- **Basecoat**: RLP 2378+ @ 20 mils
- **Topcoat**: RLP 2378+ @ 20 mils
- **Option**: Fabric Reinforcement: Geotextile Fabric

PERFORMANCE DATA

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength (ASTM D-412)</td>
<td></td>
<td>300 psi</td>
</tr>
<tr>
<td>Elongation (ASTM D-638)</td>
<td></td>
<td>250%</td>
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<tr>
<td>Conical Mandrel Bend (ASTM D-522)</td>
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<td>-20°F</td>
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<tr>
<td>Hardness, Shore A (ASTM D-2240)</td>
<td></td>
<td>42-47</td>
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<tr>
<td>Operating Temperature, maximum, Dry:</td>
<td></td>
<td>150°F</td>
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<tr>
<td>Wet:...Dependent on chemical exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOC</td>
<td></td>
<td>0.0 lb/gal; 0.0 gm/L</td>
</tr>
<tr>
<td>Volume Solids</td>
<td></td>
<td>100%</td>
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</table>

STORAGE & INSTALLATION

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<thead>
<tr>
<th>Environment</th>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Storage Environment</td>
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<td>Dry area, 65–80°F</td>
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<tr>
<td>Application Temperature, ambient</td>
<td></td>
<td>50–95°F</td>
</tr>
<tr>
<td>Application Temperature, substrate</td>
<td>Minimum 5°F above dew point</td>
<td></td>
</tr>
<tr>
<td>Shelf Life</td>
<td></td>
<td>12 months</td>
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<tr>
<td>Pot Life, @ 77°F</td>
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<td>30 minutes</td>
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<tr>
<td>Foot Traffic, @ 77°F</td>
<td></td>
<td>16 hours</td>
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<tr>
<td>Full Service, @ 77°F</td>
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<td>24 hours / Continuous Immersion: 7 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Recoat (min)</th>
<th>Recoat (max)</th>
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<tbody>
<tr>
<td>60-69°F</td>
<td>36-16 hours</td>
<td>4 days</td>
</tr>
<tr>
<td>70-89°F</td>
<td>20-12 hours</td>
<td>72 hours</td>
</tr>
<tr>
<td>90°F</td>
<td>6-8 hours</td>
<td>48 hours</td>
</tr>
</tbody>
</table>

CONSIDERATIONS & LIMITATIONS

1. This product is not designed for vehicular traffic.
2. Confirm product performance in specific chemical environment prior to use.
3. Prepare substrate according to “Surface Preparation” portion of this document.
4. Do not apply to slabs on grade unless a heavy unruptured vapor barrier has been installed under the slab.
5. Always use protective clothing, gloves and goggles consistent with OSHA regulations during use. Avoid eye and skin contact. Do not ingest or inhale. Refer to Material Safety Data Sheet for detailed safety precautions.
6. When spraying in an open area, wear a NOSH-approved, disposable organic vapor respirator. When spraying in a confined space, wear a NOSH/MSHA-approved facemask, and make provisions for forced ventilation.
7. Do not direct high-pressure spray toward any part of the body. Ensure that all related equipment has proper pressure ratings and that pressure is relieved before servicing equipment.
8. For industrial/commercial use. Installation by trained personnel only.

RECOMMENDED USES

- Impermeable yet flexible membrane
- 100% solids, zero VOC formulation
- Resistant to broad range of fuels and chemicals
- Maintains elasticity at very low temperatures
- Resistant to UV degradation
- Excellent crack-bridging capabilities
- Can be applied directly over elastomeric expansion joint sealants

GENERIC DESCRIPTION

Polysulfide-Modified Epoxy

STANDARD COLORS

- Gray, Black

PACKAGING

- 4.5-Gallon Unit

MIX RATIO

- 1R : 2H

COVERAGES

- 80 ft² / gallon @ 20 mils
SURFACE PREPARATION
Refer to PolySpec Surface Preparation Guidelines for more details.

Concrete: Apply only to clean, dry and sound concrete substrates that are free of all coatings, sealers, curing compounds, oils, greases or any other contaminants.

Steel: For immersion service, “White Metal” abrasive blast with an anchor profile of 2–4 mils in accordance with Steel Structures Painting Council Specification SP-5-63 or NACE No. 1 is required. For splash and splappage exposure, “Near White” SP-10-63 or NACE No. 2 is required.

Earthen Dike: (Incorporates a fabric liner.) Grade the dike/basin to promote flow of rainwater or spilled products away from the tank to a sump or collection area. The Thiokol RLP 2378+ fabric liner system may be applied over any type of soil condition as long as the surface profile is smooth and stable. If there is the possibility of puncture from the underside, such as angular rock, install a minimum of 2” of compacted sand to smooth the area. A trench (minimum 1’ wide x 1’ deep) should be excavated at the top of the dike wall to secure the liner at the completion of the project. See “Fabric Liner” below.

FABRIC LINER
NOTE: Install section of fabric only of a size where the first coat of RLP 2378+ can be applied the same day.
1. Sandblast any concrete or steel to which liner will be adhered.
2. Install non-woven polypropylene fabric (5 oz/yd² minimum) in precut lengths perpendicular to the slope of the dike. Starting at the high point of the application site, lay out the fabric, overlapping the seams a minimum of 4”.
3. Fold back top of overlapped seam and apply 3/8” to 1/2” diameter bead of Thiokol 2235M Sealant 1” to 2” from edge of bottom sheet of fabric. Fold the top flap onto the base and roll with a metal roller, removing all wrinkles. Any sealant that is squeezed out of the seam should be smoothed.
4. Liner penetrations and connections should use precut skirts of flashing of the fabric liner adhered with 2235M to expedite the installation of the field of fabric liner.

INSTALLATION STEPS
NOTE: For installations over unsound surfaces or earthen dike, fabric liner will be used in lieu of primer. Please refer to “Surface Preparation” and “Fabric Liner” instructions outlined at left.
2. Independently premix each component prior to using in order to disperse any possible settling that may occur during transportation and storage.
3. Prepare and apply RLP 2378+ according to one of the methods outlined below:
   a. Plural Component Airless Spray Equipment (recommended)
      Plural component airless spray equipment must be capable of heating both RLP 2378+ components to 90–140°F (to improve atomization properties). A static mixer with a minimum of 12 elements should be installed in two locations: 1) where material exits manifold, and 2) before final 6' whip hose going to spray gun.
      Mix Ratio: 1:2.
      Tip Size: 0.025–0.029” with a 10” or 12” pattern.
   b. Batch Mixing for Roller, Squeegee, Brush, Airless Sprayer
      Pour Component B Hardener into Component A Resin pail. Mix well using a mechanical jiffy-type mixer operated at low speed until a consistent color is attained. Scrape container sides to ensure proper blend.
      OPTION: If thinning is required, dilute material with 8–10 ounces of xylene per gallon of mixed material.
      A Graco King pump, minimum of 45:1, can be used. A minimum 3/8” ID fluid line should be used with the shortest possible operating length. A short whip may be used to improve the mobility of the spray gun.
      Application by roller, squeegee and brush are also suitable methods.
      NOTE: Work very quickly due to the product’s short pot life (approximately 30 minutes at 77ºF). For airless spray applications, the operator must be aware of this issue to prevent material from setting up in pump and lines.
4. After the first coat has become slightly tack free (within approximately 2 hours of cure @70°F), apply an additional coat of resin/hardener mixture according to Step 3. Be sure first coat is clean and dry before application of second coat.
   NOTE: If it has rained or the second coating has not been recoated within 72 hours, the surface must be solvent-wiped to remove dust and dirt. If surfaces are to be re-coated after 7 days, the first coat must be scrubbed with a non-metallic scouring pad or water-blast to remove surface contamination. After the surface is dry, the topcoat may be applied.
5. For earthen dike systems, it is necessary to secure the liner at the top of the berm wall after the RLP 2378+ system has cured. This is accomplished by backfilling the trench with soil, rounded gravel or using a “deadman” post.
6. Always wear gloves when using this product.


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**APPENDIX XV**

**BOX LINE DRAWINGS and Exhibits**

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Drawing Number</th>
<th>Revision Number</th>
<th>PE Certification Date</th>
<th>Revision Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Second Floor – NE Quadrant General Arrangement</td>
<td>53-0208</td>
<td>08</td>
<td>11/01/17</td>
<td>11/02/17</td>
</tr>
<tr>
<td>2</td>
<td>Second Floor – SE Quadrant General Arrangement</td>
<td>53-0209</td>
<td>10</td>
<td>10/18/17</td>
<td>10/18/17</td>
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<tr>
<td>3</td>
<td>Carbon Dioxide Discharge Pipe Network Isometric</td>
<td>BNF6599-3</td>
<td>02</td>
<td>None</td>
<td>10/31/2013</td>
</tr>
<tr>
<td>4</td>
<td>Brokk Fire Suppression Nozzle Assembly</td>
<td>XV-1</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
EXISTING PIPE AND WELDED FITTINGS

BROKK Q-330-225
BROKK Q-330-225A
H1-L01
NOZZLE CODE = 4.5
S-NOZZLE
DISCHARGE HOSE, 1/2" X 16'-8"
DISCHARGE HOSE, 1/2" X 4'-2"
DISCHARGE HOSE, 1/2" X 4'-10"

H1-L01
NOZZLE CODE = 4.5
S-NOZZLE
DISCHARGE HOSE, 1/2" X 4'-10"
DISCHARGE HOSE, 1/2" X 4'-2"
DISCHARGE HOSE, 1/2" X 16'-8"

MAIN SUPPLY
RESERVE
FLOW VIA FLEXIBLE HOSE TO DISCHARGE PRESSURE SWITCH

SYSTEM DETAILS/CALCULATIONS

NOZZLE COVERAGE:
MAXIMUM DISTANCE FROM S-NOZZLE TO PROTECTED SURFACE: 4.5'
MAXIMUM PROTECTED AREA: 4.0' X 4.0' = 16.0 SQUARE FEET

CARBON DIOXIDE SUPPLY:
NOZZLE FLOW RATE: 68.3 POUNDS PER MINUTE
MINIMUM DISCHARGE TIME: 1.0 MINUTE
MULIPLIER FOR LIQUID DISCHARGE: 1.4
SUPPLY = NOZZLE FLOW RATE X LIQUID DISCHARGE MULTIPLIER X MINIMUM DISCHARGE TIME
68.3 LB./MIN X 1.4 X 1.0 MINUTE = 95.62 LBS. CARBON DIOXIDE

MAIN SUPPLY:
1 EA. FIKE P/N C70-100 CYLINDER ASSEMBLY CHARGED WITH 100 LBS. CARBON DIOXIDE
RESERVE SUPPLY:
1 EA. FIKE P/N C70-100 CYLINDER ASSEMBLY CHARGED WITH 100 LBS. CARBON DIOXIDE

ITEM
CO2 CONTAINER, FIKE P/N C70-100
FLEX DISCHARGE BEND, FIKE P/N C70-226
CHECK VALVE, 3/4" NPT, FIKE P/N C70-1205
HEADER VENT PLUG, FIKE P/N CO2-1363
HEADER SAFETY RELEASE, FIKE P/N C70-231
3/4" THREADED TEE, SS
3/4" X 1/2" THREADED REDUCER, SS
1/2" THREADED TEE, SS
3/4" THREADED UNION, SS

DESCRIPTION

NOTES:
1. ACTUAL HEIGHT OF MAINFOLD TO BE DETERMINED IN FIELD. LOCATE MANIFOLD TO ACCOMMODATE INSTALLATION OF FLEXIBLE DISCHARGE BENDS.
2. TYPICAL OF 3 MANIFOLDS.

TYPICAL CONTAINER/MANIFOLD DETAIL

CARBON DIOXIDE DISCHARGE PIPE NETWORK ISOMETRIC

PIPE NETWORK ANNOTATION

\( K = \text{NOMINAL PIPE SIZE} \)
\( \sqrt{2} = \text{PIPE SEGMENT LENGTH} \)

FIELD ROUTE 6 EA. 1/2" VENT LINES TO ATMOSPHERE VIA ACCESS CORRIDOR UA3 AND THROUGH NORTH WALL OF ROOM P07
BROKK FIRE SUPPRESSION
NOZZLE ASSEMBLY
Exhibit XV-1
### APPENDIX XVI

**BOX LINE MECHANICAL DATA SHEETS**

<table>
<thead>
<tr>
<th>MDS Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP340201</td>
<td>Box Line Portable Sump Pump</td>
</tr>
<tr>
<td>DQ340201</td>
<td>Box Line Overhead Power Manipulator</td>
</tr>
<tr>
<td>DQ340202</td>
<td>Master Slave Manipulator</td>
</tr>
<tr>
<td>DQ340240</td>
<td>Box Tipping Carriage w/Integral Clamping Frame</td>
</tr>
<tr>
<td>DQ340206</td>
<td>Box Line Waste Handling Crane</td>
</tr>
<tr>
<td>DQ340225</td>
<td>Floor Mounted Hydraulic Manipulator</td>
</tr>
<tr>
<td>DQ340220</td>
<td>Guillotine</td>
</tr>
<tr>
<td>DQ330221</td>
<td>Filter Crushing Machine</td>
</tr>
<tr>
<td>DZ340335</td>
<td>Waste Pre-Compaction Mechanism</td>
</tr>
<tr>
<td>DZ340203</td>
<td>Waste Export Table</td>
</tr>
<tr>
<td>DZ340322</td>
<td>Waste Size Reduction Area</td>
</tr>
<tr>
<td>DZ340324</td>
<td>Waste Export Table (West)</td>
</tr>
<tr>
<td>DZ320227</td>
<td>Variable Geometry Doors</td>
</tr>
<tr>
<td>DM-320-200</td>
<td>Box Opening Gantry System</td>
</tr>
<tr>
<td>W-345-011</td>
<td>Drum Lidding Equipment</td>
</tr>
</tbody>
</table>
# Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
<th>Site:</th>
<th>Idaho Falls</th>
<th>Data Sheet No.:</th>
<th>DP340201</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.:</td>
<td>K0105C</td>
<td>Area:</td>
<td>North &amp; South Box Lines</td>
<td>No. Installed:</td>
<td>4 (1+3 spares) in each Box Line.</td>
</tr>
<tr>
<td>PI No.:</td>
<td>P-340-201 &amp; P-330-201</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Box Line Portable Sump Pump</td>
<td>System No.:</td>
<td>330 &amp; 340</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Function:** To remove liquids from the waste sort troughs in North & South Box Line Cells

## SUMMARY DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td></td>
</tr>
<tr>
<td>Design Capacity (Operating Cycles)</td>
<td>per 24 hour</td>
</tr>
<tr>
<td>Cycle Time (To fill one bottle)</td>
<td>second</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Length</td>
<td>in.</td>
</tr>
<tr>
<td>Width</td>
<td>in.</td>
</tr>
<tr>
<td>Height</td>
<td>in.</td>
</tr>
<tr>
<td>Maximum Design Capacity</td>
<td>US gal/min</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
</tbody>
</table>

**Materials and Construction:** Stainless steel with polypropylene pipe work and fittings where appropriate.

**Maintenance:** The equipment will be a low cost commercial pump unit and will be disposed of as secondary waste and replaced on breakdown. It will be fitted with quick release couplings and electrical plug and sockets to allow easy ‘hands on’ replacement through gloveports or by maintenance personnel in PPE.

**Description:**

The pumps, each with an empty bottle, will be picked up by the power manipulator and placed on the floor of the trough to suck up any free liquids. The pump will be operated remotely by a pushbutton. The pump will be stopped automatically on detection of the bottle being full of liquid. When the trough is empty or the bottle full, the unit will be transferred by the power manipulator to the power manipulator maintenance gloveport access panel, where the bottle will be disconnected from the unit, lidded and a new bottle fitted. The bottle will be sent to the SCW facility for analysis/processing via a drum from the SCW export station.

Pumps will either be disposable or reusable. Should pumps be reused, color-coding of the pump will signify compatible waste streams.

**Inputs:** Alpha contaminated liquids, generally water-based, specific gravity 0.95 to 1.05

**Outputs:** As above

**Interfaces:** Pipework & fittings, power manipulator

**Operating Environment:** Zone 3 – Pump/Pipework to suit alpha contaminated liquids

**Services:** Electricity (Power & Control)

---

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/3</td>
<td>02</td>
<td>M. Gray</td>
<td></td>
<td></td>
<td>Update for permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
<tr>
<td>11/10/00</td>
<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
</tbody>
</table>
POWER MANIPULATOR 'JAW FRIENDLY' LIFTING BAR

ELECTRICAL SUPPLY TO PUMP

SELF/PRIMING DRAINING POSITIVE DISPLACEMENT PUMP (WITH QUICK RELEASE FITTINGS)

PUMP/BOTTLE CARRIER FRAME TO BE POSITIONED BY POWER MANIPULATOR ON TO BASE OF TROUGH & AT THE POWER MANIPULATOR MAINTENANCE GLOVEPORT ACCESS PANEL FOR BOTTLE REMOVAL/REPLACEMENT

LEVEL

BOTTLE FULL PUMP CUT OFF

OUTLET & LEVEL DETECTOR SCREW ON TO BOTTLE

POLY BOTTLE (1/2 GAL MAX CAPACITY)

DRIP TRAY

BASE OF WASTE SORT TROUGH

REMOVABLE MESH FILTER
**Mechanical Data Sheet**

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DQ340201

**Project No.:** K0105C  
**Area:** North & South Box Line  
**No. Installed:** 2

**PI No.:** Q-340-201 & Q-330-201  
**Category:** UBC PC 2  
**% Duty:** On Demand

**Description:** Box Line Overhead Power Manipulator  
**System No.:** 340

**Function:** To assist in solid waste sorting operations, cell equipment maintenance, clean-up operations

**SUMMARY DATA**

<table>
<thead>
<tr>
<th></th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Design Capacity (Operating Cycles)</td>
<td>lifts/day</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Long Travel Speed</td>
<td>ft/min</td>
</tr>
<tr>
<td>Cross Travel Speed</td>
<td>ft/min</td>
</tr>
<tr>
<td>Lift Speed</td>
<td>ft/min</td>
</tr>
<tr>
<td>Mast Rotation Speed</td>
<td>RPM</td>
</tr>
<tr>
<td>Maximum Vertical Lifting Capacity (Auxiliary Hook)</td>
<td>lb</td>
</tr>
<tr>
<td>Degrees of Freedom</td>
<td></td>
</tr>
<tr>
<td>Manipulator Reach</td>
<td>in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
</tbody>
</table>

**Materials and Construction:** Stainless steel and painted carbon steel

**Maintenance:** Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. The equipment shall be fitted with a retrieval system allowing the manipulator to be returned to the maintenance area above the in-cell sub-change room. Items will be replaced/maintained with the assistance of a maintenance hoist, in-cell cranes and a maintenance platform.

**Description:**
The manipulator will be an electro-mechanical type, used to sort and handle mixed contaminated waste, assist with maintenance of other in-cell equipment and assist with in-cell clean-up operations. The manipulator shall be attached to a telescopic mast, suspended from a hoist and trolley unit mounted on a travelling bridge. A manipulator jaw shall be provided for remote attachment and used to manipulate waste. 30, 55, & 83 gallon drum grabs, petal grab, lid lever tool, nibbler & a powered nut runner will be provided for remote attachment to mast after arm has been removed. A soft jaw module will also be provided. A hook shall be located on the base of the mast. All joints shall be sealed against the ingress of fluid or dust. The Power Manipulator duties include:
1) Removal of box lids, 2) Obtaining grab samples, 3) Cleaning the cell, 4) Assistance in maintenance activities, 5) General waste transfers, and 6) Used at Off Line Box Processing Station.

**Inputs:** None

**Outputs:** None

**Interfaces:** All equipment within the cell

**Operating Environment:** Zone 3, dry, alpha contaminated and dusty

**Services:** Electricity (Power & Control), pneumatic supply (80 psig ± 5%)

**Date Issue**  
**By**  
**Checked**  
**Approved**  
**Purpose of Issue**

**Signatures:**
- M. Gray  
- E. Calvert  
- D. Evans  
- K. Parkinson  
- E. Calvert  
- D. Evans  
- M. Gray  

**Numbers:**
- 10/27/03  
- 01/12/01  
- 11/10/00  

**Remarks:**
- For permit  
- Update for permit CCR  
- For permit
Mechanical Data Sheet

Description: Box Line Power Manipulator
Site: Idaho Falls
Data Sheet No.: DQ340201

ALL DIMENSIONS ARE APPROXIMATE

MANIPULATOR TO REACH INTO DRUM BELOW FLOOR LEVEL

SOUTH BOX LINE LOOKING EAST
# Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DQ340202

**Project No.:** K0105C  
**Area:** North & South Box Lines  
**No. Installed:** Up to 6

**PI No.:** Q-330-202 (1 off) and Q-340-202 (5 off)  
**Category:** UBC PC 2  
**% Duty:** On Demand

**Description:** Master Slave Manipulator  
**System No.:** 330 & 340  
**Function:** To assist in North & South Box Line solid waste sorting operations.

## SUMMARY DATA

<table>
<thead>
<tr>
<th><strong>UNITEDS</strong></th>
<th><strong>UNITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Duty</strong></td>
<td>hp 1/3</td>
</tr>
<tr>
<td><strong>Design Life</strong></td>
<td>year 15 minimum</td>
</tr>
<tr>
<td><strong>Failure on Demand</strong></td>
<td>- 0.5%</td>
</tr>
<tr>
<td><strong>Manipulator Operating Time</strong></td>
<td>hours per day 7.5 (max)</td>
</tr>
<tr>
<td><strong>Minimum Design Pressure</strong></td>
<td>in. wg -0.8 (in cell depression)</td>
</tr>
<tr>
<td><strong>Maximum Design Pressure</strong></td>
<td>in. wg 0</td>
</tr>
<tr>
<td><strong>Minimum Design Temperature</strong></td>
<td>°F 66</td>
</tr>
<tr>
<td><strong>Maximum Design Temperature</strong></td>
<td>°F 95</td>
</tr>
<tr>
<td><strong>Design Capacity (Lifting)</strong></td>
<td>lb 45 (max)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>ft &amp; in. See sheet 2.</td>
</tr>
<tr>
<td><strong>Degrees of Freedom</strong></td>
<td>- 6 +Grip</td>
</tr>
<tr>
<td><strong>Estimated Weight</strong></td>
<td>lb 150</td>
</tr>
</tbody>
</table>

**Materials and Construction**  
Stainless steel, Aluminium & Carbon Steel

**Maintenance**  
Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. A crane or power manipulator will be provided to aid removal and transfer to a trolley. Major maintenance of the ‘in-cell’ part of the MSM will be carried out in a remote Hot Maintenance Workshop.

**Description:**  
The MSMs are to be commercial units consisting of a master arm, slave arm and a standard length through wall tube assembly, installed in a wall liner and suitably sealed for an alpha environment. They will be used to carry out production and selected maintenance tasks, which, but for the hazardous nature of the waste would normally be carried out 'hands on.' The manipulator will also be used in conjunction with other waste handling equipment in waste sorting operations. Duties will include sorting and placing waste into containers, handling general purpose cutting and area 'clean up' tools, etc. The MSMs are to have a remote slave arm removal feature to allow the slave arm to be disconnected using a crane or power manipulator. The MSM shall be manually operated from an adjacent control station outside of the cavern with the operator viewing through windows and CCTV cameras. All motions shall be achieved mechanically; only the telescopic arm will be electrically operated.

Slave arms will be transferred within the Zone 3 area to the Hot Maintenance Cell for repair. Repaired and tested units will be returned in the opposite direction.

**Inputs:** Waste items  
**Outputs:** Waste items  
**Interfaces:** Export ports, troughs and cutting and 'clean up' tools  
**Operating Environment:** Zone 3, dry, alpha contaminated  
**Services:** Electricity (Power & Control)

---

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
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<tr>
<td>5/17/04</td>
<td>04</td>
<td>T. Kelly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/27/03</td>
<td>03</td>
<td>M. Gray</td>
<td>Richard Beck</td>
<td>P. Leatherbarrow</td>
<td>For CCR</td>
</tr>
<tr>
<td>07/12/01</td>
<td>02</td>
<td>J. Hembree</td>
<td>P. Buckley</td>
<td>G. Daniel</td>
<td>For permit</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
<tr>
<td>11/10/00</td>
<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
</tbody>
</table>

**Date** 
5/17/04  
**Issue** 
04  
**By** 
T. Kelly  
**Checked** 
Richard Beck  
**Approved** 
P. Leatherbarrow  
**Purpose of Issue**

**For CCR**  
Update For permit - CCR  
**For permit**

---

**BNFL Engineering Ltd**
TYPICAL SECTIONAL THROUGH CELL WALL

(ALL DIMENSIONS APPROXIMATE)
**Mechanical Data Sheet**

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
<th>Site:</th>
<th>Idaho Falls</th>
<th>Data Sheet No.:</th>
<th>DQ340240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.:</td>
<td>K0105C</td>
<td>Area:</td>
<td>North &amp; South Box Lines</td>
<td>No. Installed:</td>
<td>2 of each P.I.</td>
</tr>
<tr>
<td>PI No.:</td>
<td>Q-340-240 &amp; Q-330-240</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Box Tipping Carriage W/ Integral clamping frame</td>
<td>System No.:</td>
<td>330 &amp; 340</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Function:** To clamp a de-lidded box in the Tipping Carriage & using Waste Handling Crane, lift, transfer & tip, assisted by Tipping Yokes, the waste into the designated Waste Sort Trough.

**SUMMARY DATA**

<table>
<thead>
<tr>
<th><strong>Parameter</strong></th>
<th><strong>Units</strong></th>
<th><strong>Details</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum duty</td>
<td>hp</td>
<td>10 HP Power pack for tipping yokes, 1 HP for clamping frame</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td></td>
<td>0.07%</td>
</tr>
<tr>
<td>Design Capacity (Operating Cycles)</td>
<td>per 24 hour</td>
<td>6 (max)</td>
</tr>
<tr>
<td>Clamp Open/Close Cycle Time</td>
<td>second</td>
<td>120</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-0.8 (in cell depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>0</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>66</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>95</td>
</tr>
<tr>
<td>Dimensions</td>
<td>ft &amp; in.</td>
<td>See Sheet 2</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
<td>5800 (Actual)</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td></td>
<td>Stainless steel and painted carbon steel</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement.</td>
</tr>
</tbody>
</table>

**Description:**

Tipping carriages are located, in each of the Box Line cells. With a de-lidded box in position within the Tipping Carriage, the actuators power a clamp beam, securing the box within the carriage. The Waste Handling Crane (e.g., Q-340-206) using its Rams horn Hook and a lifting fixture will lift the Tipping Carriage and travel to the motorized tipping yokes. By rotating the Tipping Carriage, the carriage & de-lidded box are tipped such that the contents of the box are transferred into the Waste Sort Trough. The empty box & Carriage is raised clear and returned to the Box transfer conveyor. The two actuators reverse the clamp beam thus freeing the empty box for return to the Box Conveyor. The Tipping Carriage will be remotely operated from control stations outside the cavern by an operator viewing directly through windows or alternatively via a CCTV camera.

**Inputs:**

- Boxes full with waste (maximum size 96” long x 58.5” wide x 76.5” high)

**Outputs:**

- Empty boxes

**Interfaces:**

- Box transfer conveyor, lifting fixture, tipping yokes, Waste Handling Crane

**Operating Environment:**

- Zone 3, dry, alpha contaminated

**Services:**

- Electricity (Power & Control)

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/03</td>
<td>03</td>
<td>M. Gray</td>
<td>R. Red</td>
<td>P. Red</td>
<td>Update for permit - CCR</td>
</tr>
<tr>
<td>07/12/01</td>
<td>02</td>
<td>J. Hembree</td>
<td>P. Buckley</td>
<td>G. Daniel</td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>11/10/00</td>
<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit - CCR</td>
</tr>
</tbody>
</table>

**Note:**

Update for permit - CCR
Mechanical Data Sheet

Description: Box Clamping Frame / Tipping Carriage
Site: Idaho Falls
Data Sheet No.: DQ340240

- BOX LIFTING FIXTURE

- BOX TIPPING CARRIAGE

6' - 3''

11' - 9''

TIPPING CARRIAGE AT
BOX CLAMPING STATION
(VIEW LOOKING WEST)
TIPPING CARRIAGE AT
BOX CLAMPING STATION
(NEW LOOKING SOUTH)
Mechanical Data Sheet

Project: AMWTP  Site: Idaho Falls  Data Sheet No.: DQ340206
Project No.: K0105C  Area: North & South Box Line  No. Installed: 1
PI No.: Q-340-206 & Q-330-206  Category: UBC PC 2  % Duty: On Demand
Description: Box Line Waste Handling Crane  System No.: 330/340

Function: To handle waste boxes (within a box transport carriage), non-standard boxes and maintenance work

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Mean Time Between Failures</td>
<td>hour</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Design Capacity (Hoist SWL)</td>
<td>ton</td>
</tr>
<tr>
<td>Type Of Main Girder (Bridge)</td>
<td>-</td>
</tr>
<tr>
<td>Bridge Span</td>
<td>-</td>
</tr>
<tr>
<td>Longitudinal Travel Length</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Cross Travel Length</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Maximum Raised Hook Height</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Degrees of Freedom</td>
<td>-</td>
</tr>
<tr>
<td>Speed – Hoist</td>
<td>ft/min.</td>
</tr>
<tr>
<td>Speed – Cross Travel</td>
<td>ft/min.</td>
</tr>
<tr>
<td>Speed – Long Travel</td>
<td>ft/min.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
</tbody>
</table>

Materials and Construction: Painted carbon steel

Maintenance: Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. The crane will be maintained with items replaced 'hands on' by maintenance personnel in PPE off a platform above the roof of the sub change room.

Description:
The Waste Handling Crane, using its Ramshorn hook and lifting fixture, will lift the Tipping Carriage from the transfer conveyor and travel to the Tipping Yokes. The crane will also be used to assist in the maintenance function, it can be controlled from within the cell and its Ramshorn hook, fitted with 'D' shackle & slings will assist in lifting operations.
The crane shall be electric top running double girder bridge type with an overhead cross travel trolley unit. The trolley unit shall be fitted with a single hoist, equipped with a power rotating Ramshorn type hook, which is used to lift the waste box and tipping carriage. The hoist will be operated remotely from one of a number of control stations for process operations. Cable carriers shall be provided for long and cross travel power/control cable deployment. An infrared control is to be provided for in-cell maintenance operations.

Inputs: Waste boxes/Tipping Carriage
Outputs: Waste boxes/Tipping Carriage
Interfaces: Power Manipulator, MSM's and various grabs, waste boxes, tipping carriage, lifting fixture
Operating Environment: Zone 3, dry, alpha contaminated
Services: Electricity (Power & Control)

10/22/03  02  M. Gray  For permit - CCR
01/12/01  01  M. Green  E. Calvert  D. Evans  For permit
11/10/00  00  K. Parkinson  E. Calvert  D. Evans  For permit

Date  Issue  By  Checked  Approved  Purpose of Issue
VIEW LOOKING EAST
ALL DIMENSIONS ARE APPROXIMATE
Mechanical Data Sheet

Description: Box Line Waste Handling Crane
Site: Idaho Falls
Data Sheet No.: DQ340206

VIEW LOOKING NORTH
ALL DIMENSIONS ARE APPROXIMATE
# Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DQ340225

**Project No.:** K0105C  
**Area:** North & South Box Lines  
**No. Installed:** 1 in South 2 in North

**PI No.:** Q-340-225 & Q-330-225/A and B  
**Category:** UBC PC 2  
**% Duty:** On Demand

**Description:** Floor Mounted Hydraulic Manipulator  
**System No.:** 330 & 340

**Function:** To assist in North & South Box Line solid waste sorting and size reduction operations.

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Maximum Design Capacity</td>
<td>box/day</td>
</tr>
</tbody>
</table>
| Manipulator Operating Time | hours per day | 9 (max)  
Note: the manipulator is on ‘standby’ continuously. ‘Standby’ is with the hydraulic pumps running for immediate operation. |
| Minimum Design Pressure | in. wg | -0.8 (in cell depression) |
| Maximum Design Pressure | in. wg | 0 |
| Minimum Design Temperature | °F | 66 |
| Maximum Design Temperature | °F | 95 |
| Design Capacity (Lifting) | lb | 8360 |
| Degrees of Freedom | - | 6 + Grip |
| Maximum Arm Reach | ft & in. | 20′ - 0″ |
| Estimated Weight | lb | 6360 |
| Materials and Construction | Painted carbon steel |
| Maintenance | Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. |

**Description:**
The manipulators will be used to sort and size-reduce waste tipped into the sorting troughs in the North and South Box Line Waste Processing cells. Each manipulator will consist of a 3-part arm, a turntable/gear ring and slewing system. The arm is designed for heavy-duty handling and size reduction work. Cylinders exposed to extreme loads are to be provided with slide bearings. The power pack will be located remotely.

Each manipulator will be operated from an elevated control desk outside the cavern with direct viewing through a window and supplemented with CCTV cameras. The unit will be provided with remotely interchangeable tools and a storage rack. Tools deployed will include heavy-duty croppers, actuated hammers, etc. Commercial equipment to be used where available and fit for purpose.

The Floor Mounted Hydraulic Manipulator incorporates a ‘quick hitch system’ (a hydraulic device for gripping tools), which enables the tools to be quickly replaced remotely. Tool stands support the tools to allow the ‘quick hitch system’ to be used.

**Inputs:** Waste tipped from box  
**Outputs:** Size reduced waste  
**Interfaces:** Boxes, waste sort troughs, waste, tools/tool stands  
**Operating Environment:** Zone 3, dry, alpha contaminated  
**Services:** Electricity (Power & Control)

<table>
<thead>
<tr>
<th>Date Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/17/03</td>
<td>02</td>
<td></td>
<td></td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M Green</td>
<td>E. Calvert</td>
<td>For permit</td>
</tr>
<tr>
<td>11/10/00</td>
<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>For permit</td>
</tr>
</tbody>
</table>

D. Evans  
D. Evans
**Mechanical Data Sheet**

**Description:** Floor Mounted Hydraulic Manipulator

**Site:** Idaho Falls

**Data Sheet No.:** DQ340225

---

![Diagram of a mechanical system with labels for Tool Stands, Waste Sort Trough, Plan View, Quick Hitch System, Shear Tool or Sort Grab, and View Looking West.]
Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project: AMWTP</th>
<th>Site: Idaho Falls</th>
<th>Data Sheet No.: DQ340220</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.: K0105C</td>
<td>Area: South Box Line Cell</td>
<td>No. Installed: 1</td>
</tr>
<tr>
<td>PI No.: Q-340–220</td>
<td>Category: UBC PC 2</td>
<td>% Duty: On Demand</td>
</tr>
<tr>
<td>Description: Guillotine</td>
<td>System No.: 340</td>
<td></td>
</tr>
</tbody>
</table>

Function: To automatically size reduce long slender items to manageable lengths for transfer by MSMs into local waste export stations.

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Design Capacity (Operating Cycles)</td>
<td>per 24 hour</td>
</tr>
<tr>
<td>Guillotine Open/Close Cycle Time</td>
<td>second</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Dimensions</td>
<td>-</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Painted carbon steel frame, stainless steel clad table</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement.</td>
</tr>
</tbody>
</table>

Description:
The Guillotine is located in the South Cell within the reach of the Floor Mounted Hydraulic Manipulator (PI No Q-340-225) the overhead power manipulator (PI No. Q-340-201) & the MSMs (P.I. No. Q-340-202) which will place guillotined waste into the awaiting export drums. It will be comprised of a commercially available hydraulically powered High Force Shear Unit mounted perpendicular to a Feed Table & waste disposal chute. The Floor Mounted Manipulator will transfer the long items from the sort trough (P.I. No. Z-340-322) into the Guillotine Feed Table. With the Guillotine jaws open, the Feed Table will inch the items along utilizing an electrically driven stainless steel pushing frame to allow a pre-determined crop length. Cropped waste will fall/slide via the waste disposal chute onto a Waste Export Table (East) (P.I. No. Z-340-203) & subsequently be transferred via the power manipulator or the MSMs into 55 gal waste export drums docked below the Waste Export Table. The Guillotine will be remotely operated from control stations outside the cavern by an operator viewing directly through windows or alternatively via a CCTV camera.

Inputs: Long slender items, e.g., tubes, bar, angle iron, cable tray/trunking, beams & columns (maximum size 10" x 5" x 8' – 0" long)

Outputs: Items above sized reduced to enable them to fit into a 55 gal waste export drum

Interfaces: MSM, floor mounted hydraulic manipulator & Overhead Power Manipulator

Operating Environment: Zone 3, dry, alpha contaminated

Services: Hydraulics for power & electricity (Power & Control)

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/23/03</td>
<td>02</td>
<td>M. Gray</td>
<td>Redline</td>
<td>Initial</td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>11/10/00</td>
<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit - CCR</td>
</tr>
</tbody>
</table>
# Mechanical Data Sheet

## Project Details
- **Project:** AMWTP
- **Site:** Idaho Falls
- **Project No.:** K0105C
- **Area:** North Box Line Cell
- **No. Installed:** 1
- **PI No.:** Q-330-221
- **Category:** UBC PC 2
- **% Duty:** On Demand
- **Description:** Filter Crushing Machine
- **System No.:** 330

## Function
To achieve initial size reduction of HEPA (air) filters (max. size 24” x 24” x 12”), which would not otherwise fit straight into a 55 gal waste export drum.

## SUMMARY DATA

<table>
<thead>
<tr>
<th><strong>SUMMARY DATA</strong></th>
<th><strong>UNITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>%</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>per 24 hour</td>
</tr>
<tr>
<td>Jaw Open/Close Cycle Time</td>
<td>second</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Dimensions</td>
<td>See Sheet 2</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement.</td>
</tr>
</tbody>
</table>

## Description
The filter crusher may be located in the North Box Line Cell within the reach of the Overhead Power Manipulator. The Overhead Power Manipulator will transfer the filters from one of the sort troughs into the crusher. The crushing operation will be achieved by Actuators pulling a movable jaw towards a fixed jaw with the filter situated in a cavity between them. ‘Jaw Open’ and ‘Jaw Closed’ proximity switches are to be provided. The filter crusher automatically deposits the filter into the Waste Sort Troughs.

The Filter Crusher will be remotely operated from control stations outside the cavern by an operator viewing directly through windows or alternatively via a CCTV camera.

The filter crusher will be used to ‘break the back’ of used HEPA filter cartridges in either one or two planes. It will provide the minimum size reduction necessary to allow filters to be placed into 55 gallon drums. Minimum size reduction is necessary so as not to re-suspend the filtered particulate. The filter crusher unit is removable to allow space underneath to be cleaned.

## Inputs:
Mainly 24” x 24” x 12” HEPA filters and other smaller sizes that will not fit into 55 gal export drums

## Outputs:
Size reduced filters/waste suitable for transfer to 55 gallon drum

## Interfaces:
Waste sort troughs and floor mounted hydraulic manipulator & Overhead Power Manipulator

## Operating Environment:
Zone 3, dry, alpha contaminated and dusty

## Services:
Electricity (Power & Control)

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/03</td>
<td>02</td>
<td>M. Gray</td>
<td>[Signature]</td>
<td>[Signature]</td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
<tr>
<td>11/10/00</td>
<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
</tbody>
</table>

For permit
# Mechanical Data Sheet

## Project Information
- **Project:** AMWTP
- **Project No.:** K0105C
- **Area:** North & South Box Lines
- **PI No.:** Z-340-335 & Z-330-335
- **Category:** UBC PC 2
- **System No.:** 330 & 340
- **Data Sheet No.:** DZ340335

## Function
To compress waste in a 55 gallon drum when the door fails to close due to protuberant waste.

## SUMMARY DATA

<table>
<thead>
<tr>
<th><strong>Maximum Duty</strong></th>
<th>hp</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Life</strong></td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td><strong>Failure on Demand</strong></td>
<td>-</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Operating Cycle</strong> (To raise &amp; lower)</td>
<td>second</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total Operating Time</strong></td>
<td>minutes per 24 hour</td>
<td>10 (max)</td>
</tr>
<tr>
<td><strong>Design Capacity</strong> (Operating Cycles)</td>
<td>per 24 hour</td>
<td>30 (max)</td>
</tr>
<tr>
<td><strong>Minimum Design Pressure</strong></td>
<td>in. wg</td>
<td>-0.8 (in cell depression)</td>
</tr>
<tr>
<td><strong>Maximum Design Pressure</strong></td>
<td>in. wg</td>
<td>0</td>
</tr>
<tr>
<td><strong>Minimum Design Temperature</strong></td>
<td>°F</td>
<td>60</td>
</tr>
<tr>
<td><strong>Maximum Design Temperature</strong></td>
<td>°F</td>
<td>95</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>inch</td>
<td>20 diameter (approx.)</td>
</tr>
<tr>
<td><strong>Materials and Construction</strong></td>
<td>Painted Carbon Steel</td>
<td></td>
</tr>
</tbody>
</table>

## Maintenance
Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement.

## Description
The Drum Compaction Tool will be available for use at each port door within the North and South Box Lines. It will be picked up by the Floor Mounted Hydraulic Manipulator, transported to a port door and used to compress any soft waste preventing a port door from closing. The maximum downward force exerted shall be 500 lb. The base of the drum compaction tool may be used to move the waste inwards when compressing to minimize the risk of piercing the side of the drum. The tool may occasionally be used to increase packing efficiency of soft waste in the drum.

## Inputs
- 55 gallon drums with loose waste

## Outputs
- 55 gallon full drums with pre-compact waste

## Interfaces
- Floor Mounted Hydraulic Manipulator, Waste Export Ports, 55 Drums

## Operating Environment
- Zone 3, dry, alpha contaminated

## Services
- Supplied from Floor Mounted Hydraulic Manipulators (Q-330-225A & B and Q-340-225)

---

**Date** | **Issue** | **By** | **Checked** | **Approved** | **Purpose of Issue**
--- | --- | --- | --- | --- | ---
08/09/06 | 04 | | | | Incorporated hardcopy redline from rev. 03. Added AMWTP Logo.
7/10/06 | 03 | P. Townsend | P.A. Young | Gary Buss | Clarification of Design Intent
10/27/03 | 02 | M. Gray | P. Leatherbarrow | P. Leatherbarrow | For permit - CCR
01/12/01 | 01 | M. Green | E. Calvert | D. Evans | For permit - CCR
11/17/00 | 00 | S. Mason | E. Calvert | D. Evans | For permit - CCR
# Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
<th>Site:</th>
<th>Idaho Falls</th>
<th>Data Sheet No.:</th>
<th>DZ340203</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.:</td>
<td>K0105C</td>
<td>Area:</td>
<td>South Box Line</td>
<td>No. Installed:</td>
<td>1</td>
</tr>
<tr>
<td>PI No.:</td>
<td>Z-340-203</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Waste Export Table</td>
<td>System No.:</td>
<td>340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function:</td>
<td>The table retains waste during loading of waste, size reduced by the guillotine, into waste export drums docked below.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SUMMARY DATA

<table>
<thead>
<tr>
<th></th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td></td>
</tr>
<tr>
<td>Operating Cycle</td>
<td></td>
</tr>
<tr>
<td>(Door open/close)</td>
<td></td>
</tr>
<tr>
<td>Design Capacity-Door</td>
<td></td>
</tr>
<tr>
<td>(Operating Cycles)</td>
<td></td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in.</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in.</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Waste Export Table</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Dimensions</td>
<td>See Sheet 2</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
</tbody>
</table>

| Materials and Construction | Stainless Steel |

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The table will be capable of being cleaned using brushing/vacuum cleaning techniques with MSMs / Power Manipulator tools. The door port will be designed for ‘hands on’ maintenance by personnel in PPE.</td>
</tr>
</tbody>
</table>

## Description:
The Waste Export Table is located in the South Box Line Cell, to interface with the Guillotine (P.I. No Q-340-220) and the cell floor aperture and to be within the reach of both Master-Slave and Overhead Power Manipulators. 55 gal. drums, raised to docked positions by elevators from the cell below, accept waste transferred using the manipulators. The Waste Export Table contains two Waste Export Port Doors. The Waste Export Table will be viewed directly, through a window, by an operator positioned outside of the cell.

<table>
<thead>
<tr>
<th>Inputs:</th>
<th>Size Reduced Waste cropped by Guillotine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs:</td>
<td>Special case waste and waste destined for supercompaction</td>
</tr>
<tr>
<td>Interfaces:</td>
<td>55 gal drums, Guillotine, MSMs &amp; Overhead Power Manipulator</td>
</tr>
<tr>
<td>Operating Environment:</td>
<td>Zone 3, dry, alpha contaminated and dusty</td>
</tr>
<tr>
<td>Services:</td>
<td>Electricity (Power &amp; Control)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/03</td>
<td>02</td>
<td>M. Gray</td>
<td></td>
<td></td>
<td>For permit – CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit – CCR</td>
</tr>
<tr>
<td>11/13/00</td>
<td>00</td>
<td>S. Mason</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit – CCR</td>
</tr>
</tbody>
</table>

| 10/27/03 | 02 | M. Gray | | | For permit – CCR |
| 01/12/01 | 01 | M. Green | E. Calvert | D. Evans | For permit – CCR |
| 11/13/00 | 00 | S. Mason | E. Calvert | D. Evans | For permit – CCR |
**Mechanical Data Sheet**

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
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</thead>
<tbody>
<tr>
<td>Site:</td>
<td>Idaho Falls</td>
</tr>
<tr>
<td>Data Sheet No.:</td>
<td>DZ340322</td>
</tr>
<tr>
<td>Project No.:</td>
<td>K0105C</td>
</tr>
<tr>
<td>Area:</td>
<td>North &amp; South Box Lines</td>
</tr>
<tr>
<td>No. Installed:</td>
<td>2 in North Cell</td>
</tr>
<tr>
<td>1 in South Cell</td>
<td></td>
</tr>
<tr>
<td>PI No.:</td>
<td>Z-340-322 &amp; Z-330-322A</td>
</tr>
<tr>
<td>Category:</td>
<td>UBC PC 2</td>
</tr>
<tr>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Waste Size Reduction Area</td>
</tr>
<tr>
<td>System No.:</td>
<td>330 &amp; 340</td>
</tr>
<tr>
<td>Function:</td>
<td>The Waste Sort Troughs retain waste during tipping, sorting &amp; size reduction within the Box Line processing cells.</td>
</tr>
</tbody>
</table>

**SUMMARY DATA**

<table>
<thead>
<tr>
<th>Maximum Duty</th>
<th>hp</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>N/A</td>
</tr>
<tr>
<td>Maximum Capacity</td>
<td>boxes per day</td>
<td>3</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-0.8 (in cell depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>0</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>69</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>95</td>
</tr>
<tr>
<td>Waste Sort Trough Dimensions</td>
<td>ft &amp; in.</td>
<td>See Sheet 2</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
<td>7300 (Maximum load = 13,200)</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. In Zone 3 areas, maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. The area will be cleaned routinely by vacuum cleaning and/or brush employed by either the power manipulator or during manned entry into the cavern.</td>
<td></td>
</tr>
</tbody>
</table>

**Description:**

Two Waste Sort Troughs are located in the North Box Line Cell & one in the South Box Line Cell, with each trough served by its own Floor Mounted Manipulator. They will be constructed entirely from Stainless Steel. Each trough contains two Waste Export Station Ports, through which sorted/size reduced waste is posted into 55 gal export drums. In order to assist in cleaning & in-cell floor inspections by direct viewing as well as providing better maintenance access to all in-cell equipment & space for routing or services, the structure will include the provision for a raised/suspended floor around the sort trough areas.

The Sort Trough operations will be remotely operated from control stations outside the cavern by an operator viewing directly through windows or alternatively via a CCTV camera.

Waste troughs will contain the entire contents of a waste box and leave room for sorting and size reduction prior to waste being placed in the drum located below the trough. The troughs are a sealed, fabricated construction and have a raised chamfered spigot under the port doors. Troughs will contain in excess of the volume of a 55 gal drum, should free liquids be accidentally transferred.

**Inputs:** Waste tipped from box secured in Tipping Carriage

**Outputs:** Size reduced waste suitable for export in a 55 gal drum

**Interfaces:** 55 gal drums, Tipping Frame/Waste Handling Crane, Floor Mounted Hydraulic Manipulator & Overhead Power Manipulator

**Operating Environment:** Zone 3, dry, alpha contaminated and dusty

**Services:** N/A

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/03</td>
<td>02</td>
<td></td>
<td></td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td></td>
<td></td>
<td>For permit</td>
</tr>
<tr>
<td>11/13/00</td>
<td>00</td>
<td></td>
<td></td>
<td>For permit</td>
</tr>
</tbody>
</table>

**Signatures:**

M. Gray

E. Calvert

D. Evans
ALL DIMENSIONS ARE APPROXIMATE
# Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DZ340324

<table>
<thead>
<tr>
<th>Description</th>
<th>System No.: 340</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function:</strong> The table will retain waste for sorting/loading into waste export drums docked below at the Off-Line Box Processing Station.</td>
<td></td>
</tr>
</tbody>
</table>

## SUMMARY DATA

<table>
<thead>
<tr>
<th>Maximum Duty</th>
<th>Design Life</th>
<th>Failure on Demand</th>
<th>Operating Cycle (Door open/close)</th>
<th>Design Capacity (Operating Cycles)</th>
<th>Minimum Design Pressure</th>
<th>Maximum Design Pressure</th>
<th>Minimum Design Temperature</th>
<th>Maximum Design Temperature</th>
<th>Waste Export Table Dimensions</th>
<th>Estimated Weight</th>
<th>Materials and Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>hp</td>
<td>year</td>
<td>0.2%</td>
<td>second</td>
<td>per 24 hour</td>
<td>in. wg</td>
<td>in. wg</td>
<td>°F</td>
<td>°F</td>
<td>ft &amp; in.</td>
<td>lb</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

### Maintenance

Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. Maximum module/item weight 22lb.

## Description:

The Waste Export Table is located in the South Box Line Cell, to interface with the cell floor aperture aligned with the Off-Line Box Processing Station and to be within the reach of the master-slave manipulators and the overhead power manipulator. 55 gal drums raised to docked positions by elevators from the cell below accept waste transferred using the manipulators. The Waste Export Table contains two Waste Export Port Doors. The port doors will contain a course seal to prevent the egress of dust & debris. The ports are arranged in pairs to ensure that as one drum is being changed the second drum is available for filling. The ports will have a guide system for drum location. The Waste Export Table will be constructed from a sealed stainless steel fabrication to aid decontamination.

The Waste Export Table will be viewed directly through a window, by an operator positioned outside of the cell.

### Inputs:

Small boxed waste, or size reduced waste

### Outputs:

Waste in a 55 gal drum

### Interfaces:

55 gal drums, box of waste at Off-Line Box Processing Station, MSMs, Wall mounted Hydraulic Manipulator & Overhead Power Manipulator

### Operating Environment:

Zone 3, dry, alpha contaminated and dusty

### Services:

Electricity (Power & Control)
# Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project: AMWTP</th>
<th>Site: Idaho Falls</th>
<th>Data Sheet No.: DZ320227</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.: K0105C</td>
<td>Area: Room 226, 217C, 220C</td>
<td>No. Installed: 1 pair per PI No.</td>
</tr>
<tr>
<td>PI No.: Z-320-227, 228 &amp; 229</td>
<td>Category: UBC PC 2</td>
<td>% Duty: On Demand</td>
</tr>
<tr>
<td>Description: Variable Geometry Doors</td>
<td>System No.: 320</td>
<td></td>
</tr>
</tbody>
</table>

**Function:** To provide airlocks & means of segregation/isolation between zones & Box Import area.

## SUMMARY DATA

<table>
<thead>
<tr>
<th>Maximum Duty</th>
<th>hp</th>
<th>3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>0.5%</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>per 24 hour</td>
<td>10 (max)</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>minute</td>
<td>8</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-.8&quot; (Max)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>0</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>60</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>95</td>
</tr>
<tr>
<td>Horizontal Door Size: Width</td>
<td>ft &amp; in.</td>
<td>4' - 1&quot;</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
<td>9' - 1&quot;</td>
</tr>
<tr>
<td>Vertical Door Size: Width</td>
<td>ft &amp; in.</td>
<td>6' - 1&quot;</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
<td>9' - 1&quot;</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
<td>1100</td>
</tr>
</tbody>
</table>

**Materials and Construction:** Stainless steel or painted carbon steel

**Maintenance:** Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. In Zone 3 areas, maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. Maximum module/item weight 22lb. Maintenance of upper door mechanisms will be from a floor above the airlock rooms.

**Description:**
The Variable Geometry Doors consist of a pair of horizontal doors and a vertical door which will open to a controlled aperture slightly wider and higher than the box envelope size. This will maintain containment of the zone 3 cells by controlling the velocity of the incoming air past the box when the doors are open, thereby preventing back diffusion of contamination.

The operation of all doors will be interlocked to maintain ventilation containment.

**Inputs:**
4'-10 ½" wide x 6' -4 ½" high x 8'-0" long (Maximum Effective Transfer Size)

**Outputs:**
4'-10 ½" wide x 6' -4 ½" high x 8'-0" long (Maximum Effective Transfer Size)

**Interfaces:**
Box transfer conveyor, Waste boxes, Building structure

**Operating Environment:**
Zones 1, 2 & 3 - dry and alpha contaminated

**Services:**
Electricity (Power & Control)

---

01/12/01 01 M. Green E. Calvert D. Evans For permit
11/14/00 00 K. Parkinson E. Calvert D. Evans For permit
10/27/03 02 M. Gray For permit - CCR

Date: Issue: By: Checked: Approved: Purpose of Issue
Mechanical Data Sheet

Description: Variable Geometry Doors
Site: Idaho Falls
Data Sheet No.: DZ320227

16'-8" (REF) (Approx.)

VERTICAL DOOR CONTAINMENT BOX

VERTICAL DOOR DRIVE

TENTING FLANGE

VERTICAL DOOR IN OPEN POSITION

HORIZONTAL DOOR IN OPEN POSITION

CELL FLOOR

5'-2" OPENING

4'-1" DOOR WIDTH

6'-9" OVER OPEN DOOR

VIEW LOOKING SOUTH

HORIZONTAL DOOR DRIVE MECHANISMS

9'-1" (Approx.)

15'-6" (REF) (Approx.)

1'-3 1/2" (Approx.)
Mechanical Data Sheet

Quality Level: NO

<table>
<thead>
<tr>
<th>Rev</th>
<th>Reason for Revision</th>
<th>Originator &amp; Date</th>
<th>Checker &amp; Date</th>
<th>Verifier &amp; Date</th>
<th>LDE &amp; Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Issued for permit use</td>
<td>K. Parkinson 11/10/00</td>
<td>E. Calvert 11/10/00</td>
<td>N/A</td>
<td>D. Evans</td>
</tr>
<tr>
<td>01</td>
<td>Issued for permit use</td>
<td>M. Green 01/12/01</td>
<td>E. Calvert 01/12/01</td>
<td>N/A</td>
<td>D. Evans</td>
</tr>
<tr>
<td>02</td>
<td>Issued for permit use only - CCR. Revised to reflect modified equipment. Ownership of MDS transferred from BEL to BNFL, Inc as of this rev.</td>
<td>S. Anderton 01/18/01</td>
<td>D. Lord 01/18/01</td>
<td>N/A</td>
<td>P. Cavanaugh 01/18/01</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>T. Gooding 10/27/03</td>
<td>Richard Beck 10/27/03</td>
<td>N/A</td>
<td>P. Leatherbarrow 11/18/03</td>
</tr>
<tr>
<td>04</td>
<td>Clarify original design intent as reflected in as-built configuration</td>
<td>P. Townsend</td>
<td>P.A. Young</td>
<td>N/A</td>
<td>Gary Buss 07/10/06</td>
</tr>
<tr>
<td>05</td>
<td>Incorporated hardcopy redline from rev. 04. Added AMWTP logo.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Project: Advanced Mixed Waste Treatment Project (AMWTP)
Site: Idaho National Engineering and Environmental Laboratory (INEEL)
System Number: 320
Plant Item Number: M-320-200
Equipment Name: Box Opening Gantry System
Associated Drawing(s): 53-3298

Function: To deploy, manipulate and control the opening tools for wooden and metal boxes.

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp 13.5</td>
</tr>
<tr>
<td>Design Life</td>
<td>year 15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>Awaiting vendor information</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>minute TBD during testing</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg -0.8 (in cell depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg 0</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F 66</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F 95</td>
</tr>
<tr>
<td>Maximum Design Capacity</td>
<td>boxes Per 24 Hour 10 (1 Box at a time)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>ft. &amp; in. See Sheets 2 &amp; 3</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb 2500</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Painted Carbon Steel / Aluminium</td>
</tr>
</tbody>
</table>

Maintenance: Maintainable components shall be of modular design/construction and allow rapid access for safe and rapid access for maintenance and removable/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement and visibility.

Description:
The Box Opening Gantry System shall be a commercially available gantry system comprising of bridge, trolley, telescopic mast and wrist assemblies. The bridge, trolley and mast travel envelope shall enable the opening of all the box variations. The wrist assembly shall have pitch and yaw rotation for tool positioning. The wrist assembly shall be designed for remote tool change. The wrist assembly shall incorporate intelligent tooling and cutting force feedback.
The Gantry System shall integrate with the dust/swarf collection system.
<table>
<thead>
<tr>
<th>Description:</th>
<th>Box Opening Gantry System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs:</td>
<td>Intact boxes</td>
</tr>
<tr>
<td>Outputs:</td>
<td>Boxes, lid cut and retained.</td>
</tr>
<tr>
<td>Interfaces:</td>
<td>Box lid cutting tools, vacuum system and conveyor.</td>
</tr>
<tr>
<td>Operating Environment:</td>
<td>Zone 3, dry, contaminated and dusty</td>
</tr>
<tr>
<td>Services:</td>
<td>Electricity (Power &amp; Control)</td>
</tr>
</tbody>
</table>
All Dimensions are Approximate
All Dimensions are Approximate
## Project:
Advanced Mixed Waste Treatment Project (AMWTP)

## Site:
Idaho National Engineering and Environmental Laboratory (INEEL)

### System Number
345

### Plant Item Number
W-345-011

### Equipment Name
Drum Lidding Equipment

### Associated Drawings
C&D Robotics Dwg. 410544

### Associated Documents
W-335-012

## Description
Equipment roll seals (scans) 55 gallon drum lids to drums.

## Summary Data

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>days 365</td>
</tr>
<tr>
<td>Daily Duty:</td>
<td>hours 24</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>hours Min. 60 drums/24 hrs requirement</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg N/A</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg N/A</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F 66</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F 95</td>
</tr>
<tr>
<td>Dimensions</td>
<td>ft-in. 93 ½” (approx.)</td>
</tr>
<tr>
<td></td>
<td>ft-in. 81 ¾” (approx.)</td>
</tr>
<tr>
<td></td>
<td>ft-in. 126” (approx.)</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb As designed</td>
</tr>
</tbody>
</table>

- **Materials and Construction:** Carbon steel supports and general construction, tool steel rollers
- **Maintenance:** The equipment will be accessed directly and be of modular construction, modules to be easily removable with a minimum number of fittings to allow disassembly.
- **Inputs:** 55-gallon tight-head drum filled with waste without lid seamed on and a 55-gallon tight-head drum lid delivered by conveyor
- **Outputs:** Full, lidded 55-gallon tight-head drums
- **Interfaces:** Conveyor control, Conveyor Chain Driven live roller
- **Operating Environment:** Remote dry 66-81°F filter air ventilation – Zone 3
- **Services:** 480 volt electrical (power and control)
**Special Requirements**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>System design is to be maintenance friendly and support quick turn around—the use of quick disconnects on electrical leads, bolted connections of high wear parts, etc.</td>
</tr>
<tr>
<td>2.</td>
<td>The design is to be modularized with individual components (which require maintenance) not to exceed 25 pounds to facilitate lifting and removal. Components in excess of 25 lbs require lifting points.</td>
</tr>
<tr>
<td>3.</td>
<td>The system will function in a fully automatic mode. Drums will be received on a transfer conveyor, secured in place and a lid is to be rolled on without the use of lubricants.</td>
</tr>
<tr>
<td>4.</td>
<td>Will need to integrate with conveyer for delivery of drums.</td>
</tr>
<tr>
<td>5.</td>
<td>Deleted</td>
</tr>
<tr>
<td>6.</td>
<td>Design is to include a lid check mechanism that verifies lid is in place before leaving the lidding station.</td>
</tr>
<tr>
<td>7.</td>
<td>Clear, safe access for suited maintenance required.</td>
</tr>
</tbody>
</table>
ALL DIMENSIONS ARE APPROXIMATE
APPENDIX XVII

MATERIAL TRANSFER SYSTEM MECHANICAL DATA SHEETS

<table>
<thead>
<tr>
<th>MDS Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW370006</td>
<td>Waste Drum Handling Robots</td>
</tr>
<tr>
<td>DZ310200</td>
<td>Venturi Glovebox</td>
</tr>
<tr>
<td>DZ340299</td>
<td>Drum Import/Export Port Door</td>
</tr>
<tr>
<td>Z-390-200</td>
<td>Import/Export Glovebox</td>
</tr>
</tbody>
</table>
# Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project: AMWTP</th>
<th>Site: Idaho Falls</th>
<th>Data Sheet No.: DW370006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.: K0105C</td>
<td>Area: Room 147, 126C, 124B, 125B</td>
<td>No. Installed: 4</td>
</tr>
<tr>
<td>PI No.: W-370-006, W-390-003, W-335-010, W-345-006</td>
<td>Category: UBC PC 2</td>
<td>% Duty: On Demand</td>
</tr>
<tr>
<td>Description: Waste Drum Handling Robots</td>
<td>System No.: 370, 390, 335, 345</td>
<td></td>
</tr>
</tbody>
</table>

**Function:** To transfer waste drums between drum staging positions and conveyor sections supporting process equipment and other drum handling equipment.

## SUMMARY DATA

<table>
<thead>
<tr>
<th>Maximum Duty</th>
<th>hp</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>0.2%</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>lifts/hr</td>
<td>60 A at or near maximum load capacity</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in wg</td>
<td>-0.8 (in cell depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in wg</td>
<td>0</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>66</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>95</td>
</tr>
<tr>
<td>Long Travel Speed</td>
<td>ft/min</td>
<td>300</td>
</tr>
<tr>
<td>Cross Travel Speed</td>
<td>ft/min</td>
<td>150</td>
</tr>
<tr>
<td>Lift Speed</td>
<td>ft/min</td>
<td>10</td>
</tr>
<tr>
<td>Maximum Vertical Lifting Capacity</td>
<td>lb</td>
<td>1000</td>
</tr>
<tr>
<td>Degrees of Freedom</td>
<td>-</td>
<td>6 + Grip</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
<td>1000</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Painted welded carbon steel, aluminium</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. The equipment can be pushed to the maintenance area. Items will be replaced/maintained with the assistance of a maintenance hoist, fixed hoist points and a temporary maintenance platform.</td>
<td></td>
</tr>
</tbody>
</table>

Description:
The robots will be an electro-mechanical type, used to transfer 55-gallon drums between drum staging positions and conveyor sections supporting process equipment and other drum handling equipment in each of the systems. Each robot will be attached to a mast, suspended from a hoist and trolley unit mounted on a travelling bridge. The drum grab on the end of each robot will provide lateral base support for drums during transport.

## Inputs:
55-gallon drums

## Outputs:
55-gallon drums

## Interfaces:
All equipment within the cell

## Operating Environment:
Zone 3, dry, alpha contaminated and dusty

## Services:
Electricity (Power & Control), pneumatic supply (80 psig ± 5%)

---

**Signatures:**
- T. Gooding
- K. Clark
- C. Widdle
- J.A.

**Dates:**
- 10/27/03
- 02/22/01

**Purpose of Issue:**
- For permit
- For permit - CCR
- For permit
W-370-006, W-390-003.

ALL DIMENSIONS ARE APPROXIMATE
W-335-010, W-345-006

ALL DIMENSIONS ARE APPROXIMATE
## Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DZ310200

**Project No.:** K0105C  
**Area:** Drum Venturi  
**No. Installed:** One of each P.I.

**PI No.:** Z-310-200 & Z-423-200  
**Category:** UBC PC 2  
**% Duty:** On Demand

**Description:** Venturi Glovebox  
**System No.:** 310 & 423

**Function:** To provide a sealed negative pressurized environment.

### SUMMARY DATA

<table>
<thead>
<tr>
<th><strong>Summary</strong></th>
<th><strong>Units</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp 1</td>
</tr>
<tr>
<td>Design Life</td>
<td>Year 15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>0.5%</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>Drums per 24 hour 480</td>
</tr>
<tr>
<td>Linear Speed</td>
<td>ft/min. 40 (max.)</td>
</tr>
<tr>
<td>Cycle Time (Transfer of one drum)</td>
<td>second 90</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg -4 (Glovebox test depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg +4 (Test pressure)</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F 66</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F 95</td>
</tr>
<tr>
<td>Length</td>
<td>ft &amp; in. 13'-4&quot; Approx.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in. 5'-5&quot; Approx.</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in. 13'-6&quot; Approx.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb 6600</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

**Materials and Construction**

Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of some inner door components within Zone 3 will be by maintenance personnel wearing full PPE and breathing sets, which may hinder movement. The remaining components in potential Zone 3 are maintained through Gloveports. Equipment within Zone 2 will be by direct access.

**Description:**

The Venturi Airlock Glovebox conveyor will transfer lidded drums from a Zone 2 area into a Zone 3 environment. The glovebox operates on a venturi principle to maintain a safe environment for personnel. This is achieved by profiling the internal geometry of the glovebox shell, which will be designed to convey both drum sizes. For the venturi to operate effectively, 3–4 drums must always be present in the airlock section.

Drums will be moved through the glovebox on a roller type conveyor; the rollers being maintainable via gloveports. The conveying system will be of stainless steel construction with integral drive rollers.

The glovebox will have flanged end faces to mate with inner and outer vertical seal doors. The glovebox containment will be of stainless steel construction with viewing windows and gloveports.

The glovebox will also require a dedicated ducted plenum and extract vent, complete with filtration system.

**Inputs:**

- Lidded waste drums and unlidded clean drums

**Outputs:**

- Lidded waste drums and unlidded clean drums

**Interfaces (Z-310-200):**

- Zone 3 containment adjacent to north end of Central Conveyor System

**Interfaces (Z-423-200):**

- East side of Zone 3 Conveyor System, approximately mid-way

**Operating Environment:**

- Zone 2/3, dry, alpha contaminated

**Services:**

- Electricity (Power & Control), pneumatics (80 psig ± 5%)

---

**Dates:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/23/07</td>
<td>03</td>
<td></td>
<td></td>
<td>For permit</td>
</tr>
<tr>
<td>10/27/03</td>
<td>02</td>
<td></td>
<td></td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td></td>
<td></td>
<td>For permit</td>
</tr>
<tr>
<td>11/27/00</td>
<td>00</td>
<td></td>
<td></td>
<td>For permit</td>
</tr>
</tbody>
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**Signatures:**

- [Signature 1]
- [Signature 2]
- [Signature 3]
**Mechanical Data Sheet**

<table>
<thead>
<tr>
<th>Description</th>
<th>System No.:</th>
<th>Category: UBC PC 2</th>
<th>% Duty:</th>
<th>On Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function: To import/export 55 gal drums into &amp; out of the South Box Line Cell &amp; to prevent spilt loose waste from exiting through this port</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

### SUMMARY DATA

<table>
<thead>
<tr>
<th>Maximum Duty</th>
<th>hp</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>0.2%</td>
</tr>
<tr>
<td>Maximum Capacity</td>
<td>drums per 24 hour</td>
<td>50</td>
</tr>
<tr>
<td>Operating Cycle (Door open/close)</td>
<td>second</td>
<td>10-15</td>
</tr>
<tr>
<td>Total Operating Time</td>
<td>minutes per 24 hour</td>
<td>5 (max.)</td>
</tr>
<tr>
<td>Design Capacity (Operating Cycles)</td>
<td>per 24 hour</td>
<td>12 (max.)</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-0.8 (in cell depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>0</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>66</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>95</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Materials and Construction

Stainless steel

**Maintenance**

Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance personnel will be wearing full PPE and breathing sets which may hinder movement. Maximum module/item weight 22 lb.

**Description:**
The port door is located in the floor of the South Box Line Cell. This allows either the docking or transfer of a 55 gal drum from the Material Transfer Cell below into the South Box Line Cell & vice versa. During import, the drum will have been placed under the port door by the material transfer system, or in the case of export, the drum elevator will be in the raised position. The port door has four main components:

1. **Equipment Mounting Plate:** This controls the drum position, resists the forces exerted by the drum elevator and prevents uncontrolled movement of loose waste and leakage of free liquids.

2. **Port Door:** This is to be a robust construction to resist accidental damage from the Overhead Power Manipulator/Waste Handling Crane c/w Drum Grab Attachment, during drum loading. It prevents uncontrolled discharge of waste.

3. **Guide Ring:** In the ‘closed’ position, the hinged guide ring will be located in the port opening. The ring will allow a 55 gal drum to be docked and located against it without damage. In the ‘open’ position, the ring will be removed from the port opening to allow a 55 gal drum to be imported or exported through it.

4. **Door/Guide Ring Actuators:** These provide the power to raise and lower both the door fabrication and guide ring. Proximity switches will indicate the open and closed positions. The port door and guide ring will be remotely operated from control stations outside the cell by an operator viewing directly through windows or alternatively via a CCTV camera.

### Inputs:

55 gal drums

### Outputs:

55 gal drums

### Interfaces:

55 gal drums, Overhead Power Manipulator &/or Waste Handling Crane c/w Drum Grab Attachment

### Operating Environment:

Zone 3, dry, alpha contaminated

### Services:

Electricity (Power & Control)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Name</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/09/06</td>
<td>06</td>
<td>[Signature]</td>
<td>[Initial] 08/09/06</td>
</tr>
<tr>
<td>08/09/06</td>
<td>06</td>
<td>[Signature]</td>
<td>08/09/06</td>
</tr>
<tr>
<td>07/10/06</td>
<td>05</td>
<td>P. Townsend</td>
<td>P. A. Young</td>
</tr>
</tbody>
</table>

Incorporated hardcopy redline from rev. 05. Added AMWTP Logo.

Clarify original design intent as reflected in as-built configuration.
## Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/03</td>
<td>04</td>
<td>M. Gray</td>
<td>Richard Beck</td>
<td>P. Leatherbarrow</td>
<td>For permit - CCR</td>
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<tr>
<td>08/30/01</td>
<td>03</td>
<td>R. Sorenson</td>
<td>P. Leatherbarrow</td>
<td>J. Isherwood</td>
<td>For permit</td>
</tr>
<tr>
<td>07/12/01</td>
<td>02</td>
<td>J. Hembree</td>
<td>P. Buckley</td>
<td>G. Daniel</td>
<td>For permit</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Geen</td>
<td>E. Calvert</td>
<td>D. Evans</td>
<td>For permit</td>
</tr>
</tbody>
</table>

Data Sheet No.: DZ340299
Meatrical Data Sheet

Description: Drum Import/Export Port Door  Site: INL  Data Sheet No.: DZ340299

PLAN

PORT DOOR

GUIDE RING

2'10" x 2'10" SQUARE HOLE IN FLOOR (Approx.)

SECTION ON 'X-X' SHOWING 55 GAL DRUM DOCKED & BOTH LIDS OPEN
Project: Advanced Mixed Waste Treatment Project (AMWTP)
Site: Idaho National Laboratory (INL)
System Number: 390
Plant Item Number: Z-390-200
Equipment Name: Import/Export Glovebox
Associated Drawings: 53-10852 WMF-676 Drum Import Export Glovebox
53-0201 First Floor Plan General Arrangement
Associated Documents: EDF-0477

Description

The glovebox is equipped for receipt of drums and has the capabilities to remove liners, transfer drums in and out of the glovebox, transfer liners, visual examination (VE), and bag out operations. The glovebox will contain: hoist, conveyor, lifting tools. Room 126B will support the glove box with the following: drum haulers, scissor lifts, bar code readers, DMS workstation, weight scale, drum turntable, VE CCTV Camera, hand tools, step stools, and an elevated floor. This room will be used to close drums after the bag out process and survey drums before transportation to other parts of the facility.

The glovebox is designed for maximum visibility, maintainability and operational efficiency.

Summary Data

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty:</td>
<td>days 365</td>
</tr>
<tr>
<td>Daily Duty:</td>
<td>hours 24 (On Demand)</td>
</tr>
<tr>
<td>Design Capacity:</td>
<td>per day 20 drums</td>
</tr>
<tr>
<td>Nominal Operating Pressure:</td>
<td>in. wg -1 relative to zone 3</td>
</tr>
<tr>
<td>Nominal Operating Temperature:</td>
<td>°F 66 - 81</td>
</tr>
<tr>
<td>Dimensions: Length:</td>
<td>ft-in. 16'-4&quot; (approximately)</td>
</tr>
<tr>
<td>Width:</td>
<td>ft-in. 3'-0&quot; (approximately)</td>
</tr>
<tr>
<td>Height:</td>
<td>ft-in. 13'-4&quot; (approximately)</td>
</tr>
<tr>
<td>Estimated Weight:</td>
<td>lb</td>
</tr>
<tr>
<td>-------------------</td>
<td>----</td>
</tr>
<tr>
<td>Materials and Construction:</td>
<td>Stainless steel skin wall, ceiling, and door panels w/ safety glass windows.</td>
</tr>
<tr>
<td>Maintenance:</td>
<td>The glovebox is stationary with minimal maintenance requirements.</td>
</tr>
<tr>
<td>Inputs:</td>
<td>55-gallon metal waste drums and 55-gallon calibration drums within 83/85-gallon metal overpack drums via the scissor lifts.</td>
</tr>
<tr>
<td>Outputs:</td>
<td>High density polyethylene liners via 55-gallon drum and scissor lift. 55-gallon drums into 83/85-gallon overpacks.</td>
</tr>
<tr>
<td>Operating Environment:</td>
<td>Zone 2</td>
</tr>
<tr>
<td>Services:</td>
<td>Electrical power (120V, 230V, 480V, 3Ø), ICS control, DMS data, video, and instrument air.</td>
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</tbody>
</table>
### APPENDIX XVIII

**SPECIAL CASE WASTE AND DRUM REPACK SYSTEM DRAWINGS/EXHIBITS**

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Exhibit or Drawing Number</th>
<th>Revision Number</th>
<th>PE Certification Date</th>
<th>Revision Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SCW Transfer Glovebox - Position A Process Flow Diagram</td>
<td>XVIII-1</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
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<tr>
<td>2</td>
<td>SCW Treatment Glovebox - Position B (Liquids) Process Flow Diagram</td>
<td>XVIII-2</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>3</td>
<td>SCW Treatment Glovebox - Position B (ABS) Process Flow Diagram</td>
<td>XVIII-3</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>4</td>
<td>SCW Treatment Glovebox - Position B (Misc.) Sheet 1 Process Flow Diagram</td>
<td>XVIII-4</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>5</td>
<td>SCW Treatment Glovebox - Position B (Misc.) Sheet 2 Process Flow Diagram</td>
<td>XVIII-5</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>6</td>
<td>SCW Sampling Glovebox - Position C (Solids) Process Flow Diagram</td>
<td>XVIII-6</td>
<td>01</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>7</td>
<td>SCW Sampling Glovebox - Position C Process Flow Diagram (Liquids)</td>
<td>XVIII-7</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>8</td>
<td>SCW Container-in-Container Glovebox - Position D Process Flow Diagram</td>
<td>XVIII-8</td>
<td>01</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>9</td>
<td>SCW Waste Collection Area - Position F Process Flow Diagram</td>
<td>XVIII-9</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>10</td>
<td>Special Case Waste and Drum Repack System Area General Arrangement</td>
<td>53-9744</td>
<td>08</td>
<td>11/1/17</td>
<td>11/2/17</td>
</tr>
<tr>
<td>11</td>
<td>Drum Repack System Block Flow Diagram</td>
<td>XVIII-10</td>
<td>00</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Exhibit XVIII-2 SCW Treatment Glovebox – Position B ( Liquids) Process Flow Diagram
Exhibit XVIII-4 SCW Treatment Glovebox – Position B (Misc.) Sheet 1 Process Flow Diagram
Exhibit XVIII-7 SCW Sampling Glovebox – Position C Process Flow Diagram (Liquids)
Exhibit XVIII-9 SCW Waste Collection Area – Position F Process Flow Diagram
Exhibit XVIII-10 Drum Repack System Block Flow Diagram
## APPENDIX XIX

### TREATMENT (SPECIAL CASE WASTE) MECHANICAL DATA SHEETS

<table>
<thead>
<tr>
<th>MDS Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>Z-440-800</td>
<td>SCW Transfer Glovebox</td>
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<tr>
<td>Z-440-803</td>
<td>SCW Treatment Glovebox</td>
</tr>
<tr>
<td>Z-440-806</td>
<td>SCW Sampling Glovebox</td>
</tr>
<tr>
<td>Z-440-848</td>
<td>SCW Container-In-Container Glovebox</td>
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<tr>
<td>M-440-803</td>
<td>Aerosol Can Puncturer</td>
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**Mechanical Data Sheet**

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<th>Rev</th>
<th>Reason for Revision</th>
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<th>Checker &amp; Date</th>
<th>Verifier &amp; Date</th>
<th>LDE &amp; Date</th>
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<tr>
<td>0</td>
<td>Final design issue – issued for permit use</td>
<td>D. Horn (sig. On file) 01/18/01</td>
<td>T. Coleman (sig. On file) 01/18/01</td>
<td>N/A</td>
<td>K. Bentley (sig. On file) 01/18/01</td>
</tr>
<tr>
<td>1</td>
<td>Final design issue – incorporated permit review comments for permit use only</td>
<td>D. Horn (sig. On file) 02/23/01</td>
<td>T. Coleman (sig. On file) 02/23/01</td>
<td>N/A</td>
<td>K. Bentley (sig. On file) 02/23/01</td>
</tr>
<tr>
<td>2</td>
<td>Final Design issue – 100% Design</td>
<td>L. Shiau 06/18/01</td>
<td>D. Horn 06/18/01</td>
<td>N/A</td>
<td>D. Horn 05/18/01</td>
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<tr>
<td>3</td>
<td>Updated for permit - CCR</td>
<td>S. Schulteis 20 Oct. 2003</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
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**Project:** Advanced Mixed Waste Treatment Project (AMWTP)

**Site:** Idaho National Engineering and Environmental Laboratory (INEEL)

**System Number:** 440

**Plant Item Number:** Z-440-800

**Equipment Name:** SCW Transfer Glovebox

**Associated Drawing(s):**
- 55-9569 Special Case Waste Transfer Glovebox – Position A Process Flow Diagram
- 53-9744 Special Case Waste and Drum Repack System Area General Arrangement
- 53-9782 Special Case Waste and Drum Repack System Elevation Sht 2 of 3

**Associated Document(s):** BNFL-5232-P-013 Process Description for Special Case Waste Glovebox

---

**Description**

The glovebox is designed to maintain containment by confining any contamination to the Zone 3 ventilated areas of the building. The glovebox incorporates a receipt/sort/export area. If required the glovebox can provide minimal process lead/lag capability for containers subject to sampling. The glovebox contains a transfer roller conveyor, bag transfer port, bar code reader, 2 airlock doors and a basket hoist/trolley.

---

**Summary Data**

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>day</td>
</tr>
<tr>
<td>Daily Duty</td>
<td>hour</td>
</tr>
<tr>
<td>Average Throughput</td>
<td>Per day</td>
</tr>
<tr>
<td>Cycle Time (Transfer of drum contents)</td>
<td>minutes</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
</tbody>
</table>
# Mechanical Data Sheet

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<thead>
<tr>
<th>Maximum Design Pressure</th>
<th>in. wg</th>
<th>+2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Operating Temp. Range</td>
<td>°F</td>
<td>66 – 81</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>Length</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td></td>
<td>Width</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td></td>
<td>Height</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
<td>4,000 (includes equipment)</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>The equipment is of modular construction, modules to be easily removable with minimum number of fittings to allow dismantling within the containment by glovebox operators via gloveports. Equipment located externally to the glovebox is by direct access.</td>
<td></td>
</tr>
<tr>
<td>Inputs:</td>
<td>By drum elevator conveyor: transfer basket transfer drum containing special case waste</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By bag port: wipes and drum line originated SCW</td>
<td></td>
</tr>
<tr>
<td>Outputs:</td>
<td>By drum elevator conveyor: transfer basket transfer drum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By bag port: wipes, bag waste</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By isolation door: special case waste containers</td>
<td></td>
</tr>
<tr>
<td>Interfaces:</td>
<td>Drum Elevator, SCW Treatment Glovebox (Z-440-803), HVAC</td>
<td></td>
</tr>
<tr>
<td>Operating Environment:</td>
<td>Zone 3 – Contamination Area (Glovebox Internal)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zone 2 – Operating Area (Glovebox External)</td>
<td></td>
</tr>
<tr>
<td>Services:</td>
<td>Instrument Air, Electricity (Power &amp; Control), Ventilation</td>
<td></td>
</tr>
</tbody>
</table>

## Special Requirements

None
ALL DIMENSIONS ARE APPROXIMATE
**Description**

The glovebox is designed to maintain containment by confining any contamination to the Zone 3 ventilated areas of the building. The glovebox is used for draining liquids from aerosol cans and miscellaneous items, the treatment of liquids, absorption of liquids, and the absorption of mercury. The glovebox contains a jar mill, a balance, a vice, an aerosol can puncturing device, hand tools, a stirring plate, bar code reader and a bag transfer port.
### Summary Data

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>day</td>
</tr>
<tr>
<td>Daily Duty</td>
<td>Hour</td>
</tr>
<tr>
<td>Average Throughput</td>
<td>Per day</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>Second</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Normal Operating Temperature Range</td>
<td>°F</td>
</tr>
<tr>
<td>Design Temperature</td>
<td>°F</td>
</tr>
</tbody>
</table>

**Dimensions:**
- **Length**: ft & in. 8'-0" Approx.
- **Width**: ft & in. 3'-7" Approx.
- **Height**: ft & in. 6'-9" Approx.

**Estimated Weight**: lb 1,700 (includes equipment)

**Materials and Construction**: Stainless Steel

**Maintenance**: The equipment is small lab equipment that can be easily removed with minimum number of fittings to allow dismantling within the containment by glovebox operators via gloveports. Equipment located externally to the glovebox is by direct access.

**Inputs**: By isolation door (from transfer and sampling gloveboxes): special case waste containers
By bag port: new containers, absorption kits, mercury absorption kits, neutralization kits, dilution water

**Outputs**: By isolation door (to sampling glovebox): container in a container waste, recovered liquids waste
By bag port: empty liquid containers, depressurized aerosol cans, drained miscellaneous items, absorbed liquid waste, absorbed mercury waste

**Interfaces**: SCW Sampling Glovebox (Z-440-806), SCW Transfer Glovebox (Z-440-800), HVAC

**Operating Environment**: Zone 3 – Contamination Area (Glovebox Internal)
Zone 2 – Operating Area (Glovebox External)

**Services**: Electricity (Power & Control), Ventilation

### Special Requirements

None

---

Sheet 2 of 4
ALL DIMENSIONS ARE APPROXIMATE
<table>
<thead>
<tr>
<th>Description: Treatment Glovebox</th>
<th>Site: INEEL</th>
<th>Data Sheet No.: Z-440-803</th>
</tr>
</thead>
</table>

ALL DIMENSIONS ARE APPROXIMATE
## Project:
Advanced Mixed Waste Treatment Project (AMWTP)

## Site:
Idaho National Engineering and Environmental Laboratory (INEEL)

## System Number:
440

## Plant Item Number:
Z-440-806

## Equipment Name:
SCW Sampling Glovebox

### Associated Drawing(s):
- 55-9576 Special Case Waste Sampling Glovebox – Position C (Solids) Process Flow Diagram
- 53-9744 Special Case Waste and Drum Repack System Area General Arrangement
- 53-9782 Special Case Waste and Drum Repack System Elevation Sht 2 of 3

### Associated Document(s):
- BNFL-5232-P-013 Process Description for Special Case Waste Glovebox

## Description
The glovebox is designed to maintain containment by confining any contamination to the Zone 3 ventilated areas of the building. The glovebox is used for the sampling of liquids and solids. The glovebox contains: bar code reader, a can opener, a liquid tray, a pipette, a balance, hand tools (if required), VE CCTV Camera and a bag port.

## Summary Data

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>day 330</td>
</tr>
<tr>
<td>Daily Duty</td>
<td>Hour 24 (On demand)</td>
</tr>
<tr>
<td>Average Throughput</td>
<td>Per day 1 gallon container of waste</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>Second Variable (depends on waste stream)</td>
</tr>
</tbody>
</table>
### Mechanical Data Sheet

<table>
<thead>
<tr>
<th><strong>Minimum Design Pressure</strong></th>
<th>in. wg</th>
<th>-2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Design Pressure</strong></td>
<td>in. wg</td>
<td>+2</td>
</tr>
<tr>
<td><strong>Normal Operating</strong></td>
<td>°F</td>
<td>66 - 81</td>
</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>ft &amp; in.</td>
<td>8'–0” Approx.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in.</td>
<td>3'–7” Approx.</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
<td>6'–9” Approx.</td>
</tr>
<tr>
<td><strong>Estimated Weight</strong></td>
<td>lb</td>
<td>1,700 (includes equipment)</td>
</tr>
<tr>
<td><strong>Materials and Construction</strong></td>
<td>Stainless Steel</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The equipment is small lab equipment that can be easily removed with minimum number of fittings to allow dismantling within the containment by glovebox operators via gloveports. Equipment located externally to the glovebox is by direct access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inputs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By isolation door (from treatment glovebox): container in a container and recovered liquids (including aerosol container and miscellaneous item contents)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By isolation door (from container in container glovebox): sample material, used cleaning fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By bag port: new containers, wipes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outputs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By isolation door (to treatment glovebox): recovered liquids (including aerosol container, miscellaneous item contents, used cleaning fluid)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By isolation door (to container in container glovebox): monolithic container in a container waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By bag port: filled sample containers, container in a container sludge waste, bag transfer waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interfaces:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCW Treatment Glovebox (Z-440-803), SCW Container in Container Glovebox (Z-440-848), HVAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating Environment:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 3 – Contamination Area (Glovebox Internal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 2 – Operating Area (Glovebox External)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Services:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity (Power &amp; Control), Ventilation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Special Requirements

<table>
<thead>
<tr>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
ALL DIMENSIONS ARE APPROXIMATE
**Mechanical Data Sheet**

**Rev** | **Reason for Revision** | **Originator & Date** | **Checker & Date** | **Verifier & Date** | **LDE & Date**
---|---|---|---|---|---
0 | Final design issue – issued for permit use | D. Horn (sig. On file) 01/18/01 | T. Coleman (sig. On file) 01/18/01 | N/A | K. Bentley (sig. On file) 01/18/01
1 | Final design issue – incorporated permit review comments, for permit use only | D. Horn (sig. On file) 02/23/01 | T. Coleman (sig. On file) 02/23/01 | N/A | K. Bentley (sig. On file) 02/23/01
2 | Final design issue - 100% design | L. Schiau 06/18/01 | D. Horn 06/18/01 | N/A | D. Horn 06/18/01
3 | Issue for permit - CCR | S. Schultheis 10/27/03 | [Signature] | N/A | [Signature]

**Project:** Advanced Mixed Waste Treatment Project (AMWTP)

**Site:** Idaho National Engineering and Environmental Laboratory (INEEL)

**System Number:** 440

**Plant Item Number:** Z-440-848

**Equipment Name:** SCW Container in Container Glovebox

**Associated Drawing(s):**
- 55-9566 Special Case Waste Container in Container Glovebox – Position D Process Flow Diagram
- 53-9744 Special Case Waste and Drum Repack System Area General Arrangement
- 53-9782 Special Case Waste and Drum Repack System Elevation Sh 2 of 3

**Associated Document(s):** BNFL-5232-P-013 Process Description for Special Case Waste Glovebox

**Description**

The glovebox is designed to maintain containment by confining any contamination to the Zone 3 ventilated areas of the building. The glovebox is used for the sampling of monolithic container in a container waste. The glovebox contains a bar code reader and a bag transfer port.

**Summary Data**

<table>
<thead>
<tr>
<th><strong>SUMMARY DATA</strong></th>
<th><strong>UNITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>day 330</td>
</tr>
<tr>
<td>Daily Duty</td>
<td>hour 24  (On demand)</td>
</tr>
<tr>
<td>Average Throughput</td>
<td>Per day 1 gallon container of waste</td>
</tr>
<tr>
<td>Cycle Time (Coring operation)</td>
<td>Second Variable (depends on waste stream)</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg -2</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg +2</td>
</tr>
<tr>
<td>Normal Operating Temperature Range</td>
<td>°F</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>Dimensions:</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td></td>
</tr>
<tr>
<td>Maintenance:</td>
<td></td>
</tr>
<tr>
<td>Inputs:</td>
<td></td>
</tr>
<tr>
<td>Outputs:</td>
<td></td>
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<tr>
<td>Interfaces:</td>
<td></td>
</tr>
<tr>
<td>Operating Environment:</td>
<td></td>
</tr>
<tr>
<td>Services:</td>
<td></td>
</tr>
</tbody>
</table>

**Special Requirements**

None
ALL DIMENSIONS ARE APPROXIMATE
### Mechanical Data Sheet

**Project:** Advanced Mixed Waste Treatment Project (AMWTP)

**Site:** Idaho National Engineering and Environmental Laboratory (INEEL)

**System Number:** 440

**Plant Item Number:** M-440-803

**Equipment Name:** Aerosol Can Puncturer

**Associated Drawing(s):**
- 55-9573 Special Case Waste Treatment Glovebox – Position B Sht 2 (Misc.) Process Flow Diagram
- 53-9894 SCW Aerosol Can Puncturing Device Assembly

**Associated Document(s):** BNFL-5232-P-013 Process Description for Special Case Waste Glovebox

### Description

Device for puncturing aerosol cans containing known non-hazardous gas. Unit contains aerosol can during puncturing operations and is secured to the Treatment Glovebox floor.

### Summary Data

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>day</td>
</tr>
<tr>
<td>Daily Duty</td>
<td>Hour</td>
</tr>
<tr>
<td>Average Throughput</td>
<td>Per wk</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>Minute</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>In wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>In wg</td>
</tr>
<tr>
<td>Normal Operating Temperature Range</td>
<td>°F</td>
</tr>
<tr>
<td>Dimensions: Diameter</td>
<td>Ft &amp; in</td>
</tr>
<tr>
<td>Height</td>
<td>Ft &amp; in</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb.</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

**Maintenance**

The equipment is small lab equipment that can be easily removed with minimum number of fittings to allow dismantling within the containment by glovebox operators via gloveports.

**Inputs:**

Filled aerosol can is placed inside bag. Bag and can are placed device and secured with a bolt-on cap.
# BNFL Mechanical Data Sheet

## Outputs:
Bag, can and can contents are removed from the unit after bolt-on cap is removed.

## Interfaces:
SCW Treatment Glovebox (Z-440-803)

## Operating Environment:
Zone 3 – Contamination Area

## Services
N/A

### Special Requirements

None

---

Sheet 2 of 2
## APPENDIX XX

### TREATMENT (SUPERCOMPACTION) EXHIBITS

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Exhibit or Drawing Number</th>
<th>Revision Number</th>
<th>PE Certification Date</th>
<th>Revision Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Treatment Building Supercompaction Cell Layout First Floor Level</td>
<td>XX-1A</td>
<td>02</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>2</td>
<td>Treatment Building Supercompaction Cell Layout Mezzanine Level</td>
<td>XX-1B</td>
<td>02</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>3</td>
<td>Treatment Building Supercompaction Cell Layout Second Floor Level</td>
<td>XX-1C</td>
<td>02</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
PLAN ON FIRST FLOOR LEVEL 0'-0"

Note: This exhibit was created from drawing 53-3301 Rev 06.

Exhibit XX-1A Treatment Building Supercompaction Cell Layout First Floor Level 0'-0"
Note: This exhibit was created from drawing 53-3301 Rev 06.

Exhibit XX-1B  Treatment Building Supercompaction Cell Layout  Mezzanine Level 9'-10"
PLAN AT SECOND FLOOR LEVEL 19'-8"

Note: This exhibit was created from drawing 53-3301 Rev 06.

Exhibit XX-1C Treatment Building Supercompaction Cell Layout Second Floor Level 19'-8"
# APPENDIX XXI

## TREATMENT (SUPERCOMPACTION) MECHANICAL DATA SHEETS

<table>
<thead>
<tr>
<th>MDS Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DZ410200</td>
<td>Supercompactor</td>
</tr>
<tr>
<td>DZ410211</td>
<td>Supercompactor Infeed Glovebox</td>
</tr>
<tr>
<td>DZ410213</td>
<td>Drum Piercing Station</td>
</tr>
<tr>
<td>DZ410283</td>
<td>Supercompactor Glovebox</td>
</tr>
<tr>
<td>DZ410284</td>
<td>Puck Recovery Glovebox</td>
</tr>
<tr>
<td>DZ420200</td>
<td>Puck Staging Area</td>
</tr>
<tr>
<td>DZ420215</td>
<td>Post Compaction Glovebox</td>
</tr>
<tr>
<td>DQ410201</td>
<td>Drum Handling Machine</td>
</tr>
<tr>
<td>DQ420200</td>
<td>Puck Handler &amp; Gripper</td>
</tr>
<tr>
<td>DM420207</td>
<td>Puck Drum Bagless Transfer Mechanism</td>
</tr>
<tr>
<td>DW410204</td>
<td>Supercompaction Trolley</td>
</tr>
</tbody>
</table>
### Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DZ410200

<table>
<thead>
<tr>
<th>Project No.:</th>
<th>K0105C</th>
<th>Area:</th>
<th>Supercompaction Cell</th>
<th>No. Installed:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI No.:</td>
<td>Z-410-200</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Supercompactor</td>
<td>System No.:</td>
<td>410</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Function:** The machine will crush/size reduce lidded drums filled with waste material.

**SUMMARY DATA**

<table>
<thead>
<tr>
<th><strong>Maximum Duty</strong></th>
<th>hp</th>
<th>See Data Sheet DP410203</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Life</strong></td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td><strong>Failure on Demand</strong></td>
<td>-</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Cycle Time (Compaction Cycle)</strong></td>
<td>minute</td>
<td>5 (max)</td>
</tr>
<tr>
<td><strong>Compaction Force</strong></td>
<td>ton</td>
<td>2240 (min)</td>
</tr>
<tr>
<td><strong>Design Capacity</strong></td>
<td>drums per 24 hour</td>
<td>160 (max)</td>
</tr>
<tr>
<td><strong>Minimum Design Pressure</strong></td>
<td>in. wg</td>
<td>-4 (Glovebox test depression)</td>
</tr>
<tr>
<td><strong>Maximum Design Pressure</strong></td>
<td>in. wg</td>
<td>+4 (Test pressure)</td>
</tr>
<tr>
<td><strong>Minimum Design Temperature</strong></td>
<td>°F</td>
<td>50</td>
</tr>
<tr>
<td><strong>Maximum Design Temperature</strong></td>
<td>°F</td>
<td>104</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>Ft &amp; in.</td>
<td>9'- 6”</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>Ft &amp; in.</td>
<td>6'- 11”</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>Ft &amp; in.</td>
<td>23'- 0”</td>
</tr>
<tr>
<td><strong>Estimated Weight</strong></td>
<td>lb</td>
<td>123000</td>
</tr>
<tr>
<td><strong>Materials and Construction</strong></td>
<td>Mainly Carbon Steel</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through gloveports.</td>
<td></td>
</tr>
</tbody>
</table>

**Description:**
The supercompactor will consist of a 4 Column Hydraulic Press, a bolster and press plates. The bolster will lower to surround a lidded waste drum, positioned on a lower press plate that is fastened to the compaction trolley. The main ram with upper press plate will lower into the bolster and compact the drum.

Max size of drum: Diameter 2ft-1 in.; Height 3ft-3 in.

Puck size: Min. 1 in. approx. Max. 3ft-3in.

Hydraulic Fluid: approved fire safe hydraulic oil

**Inputs:** Lidded drums (1000 lb max approx.) for compaction

**Outputs:** Compacts (pucks)

**Interfaces:** Drum trolley, Infeed glovebox, Puck handler, Post Compaction Glovebox and Hydraulic Powerpack

**Operating Environment:** Zone 3 for items between glovebox flanges, alpha contaminated

**Services:** Hydraulics, Electricity (Power & Control), Cooling Water

---

### Date

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/23/07</td>
<td>03</td>
<td>J. Godak</td>
<td>[Signature]</td>
<td>[Signature]</td>
<td>For permit</td>
</tr>
<tr>
<td>10/27/03</td>
<td>02</td>
<td>S. Schultheis</td>
<td>R. Beck</td>
<td>P. Leatherbarrow</td>
<td>For permit - CCR</td>
</tr>
<tr>
<td>01/12/01</td>
<td>01</td>
<td>M. Green</td>
<td>E. Calvert</td>
<td>D. Yew</td>
<td>For permit</td>
</tr>
<tr>
<td>11/22/00</td>
<td>00</td>
<td>S. Mason</td>
<td>E. Calvert</td>
<td>D. Yew</td>
<td>For permit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Purpose of Issue</td>
</tr>
</tbody>
</table>
ZONE 2 AREA (OUTSIDE OF GLOVEBOX)

MAIN CYLINDER

HYDRAULIC CYLINDERS

FLEXIBLE BELLOWS

MOULD HOUSING

MAIN RAM

GLOVEBOX

BASE

BASEPLATE GROUTED INTO FLOOR

SEISMIC QUALIFIED HOLDING DOWN BOLTS

Approx. 9'-6"

SUPERCOMPACTOR

Approx. 23'-0"
## Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DZ410211

**Project No.:** K0105C  
**Area:** Supercompaction Cell  
**No. Installed:** 1

**PI No.:** Z-410-211  
**Category:** UBC PC 2  
**% Duty:** On Demand

**Description:** Supercompactor Infeed Glovebox  
**System No.:** 410

**Function:** To provide a Zone 3 containment to prevent the release of radioactivity and toxic substances whilst the process is carried out.

### SUMMARY DATA

<table>
<thead>
<tr>
<th>Attribute</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
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</tr>
<tr>
<td>Design Capacity</td>
<td>drums per 24 hour</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
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<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Infeed Glovebox Dimensions</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

**Maintenance**

Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.

**Description:**

High integrity sealed glovebox, which will contain infeed conveyor, infeed turntable, drum elevator door, drum handler, compaction trolley, drum piercing station.

### Inputs:

- Lidded drums to Supercompactor

### Outputs:

- Lidded drums to Supercompactor

### Interfaces:

- Central Conveying System, Supercompactor, North Venturi Glovebox, Infeed Airlock Door Glovebox, Drum Piercing Glovebox

### Operating Environment:

- Zone 3, alpha contaminated

### Services:

- Electricity (power and control), pneumatic supply (80 psig ± 5%)

---

5/17/04 05  
10/27/03 04  
06/01/01 03  
02/08/01 02  
01/12/01 01  
11/22/00 00

**Date:** Issue  
**By:** Checked  
**For CCR:** Approved

**Issue for permit - CCR:** For permit

**For permit:** For permit

**For permit:** For permit

**Purpose of Issue:** For permit
CROSS SECTION THROUGH INFEED GLOVEBOX
## Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
<th>Site:</th>
<th>Idaho Falls</th>
<th>Data Sheet No.:</th>
<th>DZ410213</th>
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<tbody>
<tr>
<td>Project No.:</td>
<td>K0105C</td>
<td>Area:</td>
<td>Supercompaction Cell</td>
<td>No. Installed:</td>
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</tr>
<tr>
<td>PI No.:</td>
<td>Z-410-213</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
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<tr>
<td>Description:</td>
<td>Drum Piercing Station</td>
<td>System No.:</td>
<td>410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function:</td>
<td>Piercing lidded drums.</td>
<td>SUMMARY DATA</td>
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<tr>
<td>Maximum Duty</td>
<td>hp</td>
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<tr>
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<td>15</td>
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<td></td>
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<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>0.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Capacity</td>
<td>drums per 24 hour</td>
<td>160 (max.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle Time</td>
<td>minute</td>
<td>1 (approx.)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-4 (Glovebox test depression)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>+4 (Test pressure)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>104</td>
<td></td>
<td></td>
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<tr>
<td>Piercing Station Dimensions</td>
<td>ft &amp; in.</td>
<td>See sheet 2.</td>
<td></td>
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<td>Estimated Weight</td>
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<td>200</td>
<td></td>
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<tr>
<td>Materials and Construction</td>
<td>Stainless Steel &amp; Painted Carbon Steel</td>
<td>Maintenance</td>
<td></td>
<td></td>
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</table>

Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.

Description:

A machine to pierce drums below the rim.

## Inputs:
- Lidded drums

## Outputs:
- Lidded, Pierced Drums

## Interfaces:
- Infeed Glovebox, Drum Handler

## Operating Environment:
- Zone 3, alpha contaminated

## Services:
- Electricity (Power & control), pneumatic supply (80 psig ± 5%)

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose of Issue</th>
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<td>J. Godak</td>
<td></td>
<td></td>
<td>For permit</td>
</tr>
<tr>
<td>1 June 01</td>
<td>02</td>
<td>M. Ogden</td>
<td>K. Shaw</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
<tr>
<td>12 Jan 01</td>
<td>01</td>
<td>M Green</td>
<td>E Calvert</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
<tr>
<td>22 Nov 00</td>
<td>00</td>
<td>S Mason</td>
<td>E Calvert</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
</tbody>
</table>
Mechanical Data Sheet

Description: Drum Piercing Station  Site: Idaho Falls  Data Sheet No: DZ410213

ELEVATION EAST  ELEVATION NORTH

DRUM PIERCING STATION

4'-4" Approx.  1'-6" Approx.

Glovebox

GLOVEBOX (REF.)

DRUM PIERCING TOOL

DRUM CLAMP

PIERCING STATION SUPPORT FRAME
### Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
<th>Site:</th>
<th>Idaho Falls</th>
<th>Data Sheet No.:</th>
<th>DZ410283</th>
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<td>Project No.:</td>
<td>K0105C</td>
<td>Area:</td>
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<td>No. Installed:</td>
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<td>PI No.:</td>
<td>Z-410-283</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
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<tr>
<td>Description:</td>
<td>Supercompactor Glovebox</td>
<td>System No.:</td>
<td>410</td>
<td></td>
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</table>

**Function:** To provide a Zone 3 containment to prevent release of radioactivity and toxic substances whilst the process is carried out.

### SUMMARY DATA

<table>
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<tr>
<th><strong>Summary</strong></th>
<th><strong>Units</strong></th>
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<td>Maximum Duty</td>
<td>hp</td>
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<tr>
<td>Design Life</td>
<td>year</td>
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<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Length</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

**Description:**

The supercompactor glovebox joins the top and bottom flanges of the press to form containment. The trolley passes over the bottom flange interface. The top edge to have a stainless steel bellows fitted to allow press expansion.

**Inputs:**

Lidded drums for compaction

**Outputs:**

Compacts (pucks)

**Interfaces:**

Infeed Glovebox, Puck recovery glovebox, and supercompactor press

**Operating Environment:**

Zone 3, alpha contaminated

**Services:**

Electricity (Power & Control), pneumatic supply (80 psig ± 5%)

---

04/23/07 02 J. Godak [Signature]  [Signature]  [Signature]  For permit
01/12/01 01 M. Green E. Calvert D. Yew  For permit
11/22/00 00 S. Mason E. Calvert D. Yew  For permit

Date  Issue  By  Checked  Approved  Purpose of Issue
**Mechanical Data Sheet**

<table>
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<th>Data Sheet No.:</th>
<th>DZ410284</th>
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<td>K0105C</td>
<td>Area:</td>
<td>Supercompaction Cell</td>
<td>No. Installed:</td>
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<tr>
<td>PI No.:</td>
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<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Puck Recovery Glovebox</td>
<td>System No.:</td>
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<tr>
<td>Function:</td>
<td>Connects the upper puck handler area glovebox and the press glovebox and allows a separate area for puck recovery.</td>
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**SUMMARY DATA**

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<th>Units</th>
<th>hp</th>
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<td>Design Life</td>
<td>year</td>
<td>15</td>
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<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>N/A</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-4 (Glovebox test depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>+4 (Test pressure)</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
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</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>104</td>
</tr>
<tr>
<td>Length</td>
<td>ft &amp; in.</td>
<td>4'-6&quot; Approx.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in.</td>
<td>3'-4&quot; Approx.</td>
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<tr>
<td>Height</td>
<td>ft &amp; in.</td>
<td>7'-6&quot; Approx.</td>
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<td>Estimated Weight</td>
<td>lb</td>
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<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
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<tr>
<td>Maintenance</td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.</td>
<td></td>
</tr>
</tbody>
</table>

**Description:**
The Puck Recovery Glovebox will contain puck transfer equipment and tools to allow re-working of puck to enable subsequent satisfactory puck handling operation.

**Inputs:**
Pucks, Liquid

**Outputs:**
Pucks, Liquid

**Interfaces:**
Supercompactor Glovebox, Post Compaction Glovebox

**Operating Environment:**
Zone 3, alpha contaminated, some puck spillage

**Services:**
Electricity (Power & Control), pneumatic supply (80 psig ± 5%)
# Mechanical Data Sheet

**Project**: AMWTP  
**Site**: Idaho Falls  
**Data Sheet No.**: DZ420200  
**Project No.**: K0105C  
**Area**: Supercompaction Cell  
**No. Installed**: 1  
**PI No.**: Z-420-200  
**Category**: UBC PC 2  
**% Duty**: On Demand  
**Description**: Puck Staging Area  
**System No.**: 420  
**Function**: To provide interim storage locations within glovebox.

### SUMMARY DATA

<table>
<thead>
<tr>
<th>Maximum Duty</th>
<th>hp</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Life</td>
<td>year</td>
<td>15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
<td>0.5%</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>pucks per 24 hour</td>
<td>160 (max.)</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
<td>-4 (Glovebox test depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
<td>+4 (Test pressure)</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
<td>50</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
<td>104</td>
</tr>
</tbody>
</table>

**Materials and Construction**: Stainless Steel  
**Maintenance**: Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.

### Description:

Total of 6 pucks; 4 pucks mounted directly on glovebox, 2 pucks set on integral support. Pucks to be easily removable to allow a flat glovebox floor to be used for other operations.

### Inputs:
Pucks

### Outputs:
Pucks

### Interfaces:
Pucks, Puck Handling Machine

### Operating Environment:
Zone 3, Dry, Alpha contaminated, some puck spillage.

### Services:
Electricity (Power & Control)

---

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose Of Issue</th>
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</thead>
<tbody>
<tr>
<td>12 Jan 01</td>
<td>M Green</td>
<td>E Calvert</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
<tr>
<td>10 Nov 00</td>
<td>K Parkinson</td>
<td>E Calvert</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
</tbody>
</table>
ELEVATION LOOKING NORTH ON POST COMPACTION
CLOVERBOX PUCK STAGING AREA
# Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DZ420215

<table>
<thead>
<tr>
<th>Project No: K0105C</th>
<th>Area: Supercompaction Cell</th>
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<tbody>
<tr>
<td>PI No: Z-420-215</td>
<td>Category: UBC PC 2</td>
<td>% Duty: On Demand</td>
</tr>
<tr>
<td><strong>Description:</strong> Post Compaction Glovebox</td>
<td><strong>System No:</strong> 420</td>
<td></td>
</tr>
</tbody>
</table>

**Function:** To provide a zone 3 containment to prevent release of radioactivity and toxic substances whilst the process is carried out.

## SUMMARY DATA

<table>
<thead>
<tr>
<th>Summary</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>pucks per 24 hour</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Length</td>
<td>ft. &amp; in.</td>
</tr>
<tr>
<td>Width</td>
<td>ft. &amp; in.</td>
</tr>
<tr>
<td>Height</td>
<td>ft. &amp; in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb.</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

**Maintenance:** Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.

**Description:**

The glovebox containment enclosure will include maintenance access ports, compaction trolley, puck handler, puck store, puck drum bagless transfer ports and recovery/maintenance hoist. The base of the glovebox will be fabricated from stainless steel, with fully welded, ground and polished joints. The integrity of the welds in the shell of the glovebox shall be dye penetration tested as a minimum. The floor of the glovebox will be sloped towards the sump.

**Inputs:** Pucks, Baskets, Liquid from compactions.

**Outputs:** Puck drum containing pucks or baskets

**Interfaces:** Puck Recovery Glovebox and Supercompactor Glovebox

**Operating Environment:** Zone 3, Alpha contaminated

**Services:** Electricity (Power & Control), Pneumatic supply (80 psig ± 5%).

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Purpose Of Issue</th>
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<tbody>
<tr>
<td>12 Jan 01</td>
<td>01</td>
<td>M Green</td>
<td>E Calvert</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
<tr>
<td>27 Nov 00</td>
<td>00</td>
<td>K Parkinson</td>
<td>E Calvert</td>
<td>D Yew</td>
<td>For permit</td>
</tr>
</tbody>
</table>

*Signature:*
VIEW ON GLOVEBOX FLOOR SHOWING FALLS TO HATCH AREA

ELEVATION ON POST COMPACTION GLOVEBOX
OUTER SKIN REMOVED FOR CLARITY

POST COMPACTION GLOVEBOX
# Mechanical Data Sheet

<table>
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<td>On Demand</td>
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<tr>
<td>Description:</td>
<td>Drum Handling Machine</td>
<td>System No.:</td>
<td>410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function:</td>
<td>To pick and place drums from the conveyor to the press trolley.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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## SUMMARY DATA

<table>
<thead>
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<th></th>
<th>UNITS</th>
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<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td></td>
</tr>
<tr>
<td>Design Capacity</td>
<td>drums per 24 hour</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
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<tr>
<td>Drum Handling Machine Dims:</td>
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</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
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<td>Materials and Construction</td>
<td>Stainless Steel and Painted Carbon Steel</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.</td>
</tr>
</tbody>
</table>

Description:
The Drum Handling Machine is used to pick and place drums from the conveyor to the press trolley. It incorporates a drum stop and Clamp Arms that centralize the drum.

| Inputs: | Lidded drums |
| Outputs: | Lidded drums |
| Interfaces: | Lidded drums, conveyor, press trolley |
| Operating Environment: | Zone 3, alpha contaminated, some puck spillage |
| Services: | Electricity (Power & Control) |

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>For permit</th>
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<tr>
<td>10/27/03</td>
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<td>R. Beck</td>
<td>P. Leatherbarrow</td>
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<td>K. Shaw</td>
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<tr>
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<td>00</td>
<td>K. Parkinson</td>
<td>E. Calvert</td>
<td>D. Yew</td>
<td>For permit</td>
<td>For permit</td>
<td>For permit</td>
<td>For permit</td>
<td>Purpose of Issue</td>
<td></td>
</tr>
</tbody>
</table>
# Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DQ420200

---

**Project No.:** K0105C  
**Area:** Supercompaction Cell  
**Category:** UBC PC 2

---

**PI No.:** Q-420-200  
**No. Installed:** 1  
**% Duty:** On Demand

---

**Description:** Puck Handler & Gripper  
**System No.:** 420

---

**Function:** Enables transfer of pucks from Supercompactor trolley to puck drum or other container.

## SUMMARY DATA

<table>
<thead>
<tr>
<th><strong>Maximum Duty</strong></th>
<th><strong>hp</strong></th>
<th>7.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Life</strong></td>
<td><strong>year</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong>Failure on Demand</strong></td>
<td>-</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Design Capacity</strong></td>
<td>drums per 24 hour</td>
<td>160 (max.)</td>
</tr>
<tr>
<td><strong>Load Capacity (Normal)</strong></td>
<td><strong>lb</strong></td>
<td>500</td>
</tr>
<tr>
<td><strong>Load Capacity (With Attachment)</strong></td>
<td><strong>lb</strong></td>
<td>1000</td>
</tr>
<tr>
<td><strong>Cycle Time</strong></td>
<td>minute</td>
<td>8 (Approx.)</td>
</tr>
<tr>
<td><strong>Minimum Design Pressure</strong></td>
<td>in. wg</td>
<td>-4 (Glovebox test depression)</td>
</tr>
<tr>
<td><strong>Maximum Design Pressure</strong></td>
<td>in. wg</td>
<td>+4 (Test pressure)</td>
</tr>
<tr>
<td><strong>Minimum Design Temperature</strong></td>
<td>°F</td>
<td>50</td>
</tr>
<tr>
<td><strong>Maximum Design Temperature</strong></td>
<td>°F</td>
<td>104</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>ft &amp; in.</td>
<td>See Sheet 2</td>
</tr>
<tr>
<td><strong>Estimated Weight</strong></td>
<td>lb</td>
<td>5600 (Unladen)</td>
</tr>
</tbody>
</table>

**Materials and Construction:** Stainless Steel

**Maintenance:** Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.

---

**Description:** Puck handler comprises twin railed, wheeled crab, mast stem, three jaw gripper. Measures height of puck. Facility to eject pucks. Facility to fit handling attachments for use instead of jaws.

The Puck Handler and Gripper also interfaces with the bagless transfer ports. It fills the drum with pucks.

**Inputs:** Pucks

**Outputs:** Pucks

**Interfaces:** Supercompactor Trolley, Puck Store, Bagless Transfer Ports

**Operating Environment:** Zone 3, alpha contaminated

**Services:** Electricity (Power & Control), pneumatic supply (80 psig ± 5%)

---

10/27/03 02  
01/12/01 01  
11/27/00 00  

Date  
**Issue**  
**By**  
**Checked**  
**Approved**

Issued for permit - CCR  
For permit  
For permit

Purpose of Issue
## Mechanical Data Sheet

**Project:** AMWTP  
**Site:** Idaho Falls  
**Data Sheet No.:** DM420207

<table>
<thead>
<tr>
<th>Project No.:</th>
<th>K0105C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area:</td>
<td>Supercompaction Cell</td>
</tr>
<tr>
<td>No. Installed:</td>
<td>2</td>
</tr>
<tr>
<td>PI No.:</td>
<td>M-420-207 &amp; M-420-208</td>
</tr>
<tr>
<td>Category:</td>
<td>UBC PC 2</td>
</tr>
<tr>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
</tbody>
</table>

**Description:** Puck Drum Bagless Transfer Mechanism  
**System No.:** 420

**Function:** Allows transfer of material from Zone 3 containment into puck drum.

### SUMMARY DATA

<table>
<thead>
<tr>
<th></th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp</td>
</tr>
<tr>
<td>Design Life</td>
<td>year</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>-</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>second</td>
</tr>
<tr>
<td>Maximum Design Capacity</td>
<td>drums/day</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F</td>
</tr>
<tr>
<td>Length</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb</td>
</tr>
<tr>
<td>Feeds</td>
<td>-</td>
</tr>
</tbody>
</table>

**Materials and Construction:** Stainless steel and Carbon steel

**Maintenance:** The equipment will be of modular construction; modules to be easily removable with the minimum number of fixings and fittings to allow dismantling within containment by glovebox operators via gloveports.

**Description:**

The bagless transfer system will be designed to interface and seal against a puck drum. Puck drums will be presented to the Post Compaction glovebox, the inner lid removed, pucks loaded and then the lid replaced. The sealed drum can then be removed from containment. The bagless transfer port consists of a sealing ring, a port door, a seal protecting ring and a maintenance bagging ring.

**Inputs:** Drum pucks and puck drum  
**Outputs:** Lidded puck drums  
**Interfaces:** Post Compaction Glovebox  
**Operating Environment:** Part Zone 3, dry, alpha contaminated, part Zone 2  
**Services:** Electricity (Power & Control), compressed air (80 psig ± 5%)

---

### Signature Matrix

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
<th>By</th>
<th>Checked</th>
<th>Approved</th>
<th>Updated for permit - CCR</th>
<th>For permit</th>
<th>Purpose of Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/27/03</td>
<td>01</td>
<td>S. Schulties</td>
<td>[Signature]</td>
<td>[Signature]</td>
<td>[Signature]</td>
<td>[Signature]</td>
<td>Updated for permit - CCR</td>
</tr>
<tr>
<td>01/24/01</td>
<td>00</td>
<td>J. McDonald</td>
<td>E. Calvert</td>
<td>D. Yew</td>
<td>[Signature]</td>
<td>[Signature]</td>
<td>For permit</td>
</tr>
</tbody>
</table>

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# Mechanical Data Sheet

<table>
<thead>
<tr>
<th>Project:</th>
<th>AMWTP</th>
<th>Site:</th>
<th>Idaho Falls</th>
<th>Data Sheet No.:</th>
<th>DW410204</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.:</td>
<td>K0105C</td>
<td>Area:</td>
<td>Supercompaction Cell</td>
<td>No. Installed:</td>
<td>1</td>
</tr>
<tr>
<td>PI No.:</td>
<td>W-410-204</td>
<td>Category:</td>
<td>UBC PC 2</td>
<td>% Duty:</td>
<td>On Demand</td>
</tr>
<tr>
<td>Description:</td>
<td>Supercompaction Trolley</td>
<td>System No.:</td>
<td>410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function:</td>
<td>Transfers lidded drums from Infeed glovebox to the Supercompactor and Post Compaction gloveboxes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SUMMARY DATA

<table>
<thead>
<tr>
<th>Item</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Duty</td>
<td>hp 2.0</td>
</tr>
<tr>
<td>Design Life</td>
<td>year 15</td>
</tr>
<tr>
<td>Failure on Demand</td>
<td>- 0.5%</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>drums per 24 hour 160 (max.)</td>
</tr>
<tr>
<td>Load Carrying Capacity</td>
<td>lb 1000</td>
</tr>
<tr>
<td>Linear Speed</td>
<td>ft/min 4</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>minute 3 (full length of travel)</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>in. wg -4 (Glovebox test depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>in. wg +4 (Test pressure)</td>
</tr>
<tr>
<td>Minimum Design Temperature</td>
<td>°F 50</td>
</tr>
<tr>
<td>Maximum Design Temperature</td>
<td>°F 104</td>
</tr>
<tr>
<td>Supercompaction Trolley Dimensions</td>
<td>ft &amp; in. See sheet 2</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb 2200</td>
</tr>
<tr>
<td>Materials and Construction</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

## Maintenance

Maintainable components shall be of modular design/construction and allow rapid access for maintenance and removal/replacement if necessary. Maintenance of components will be done through glove ports.

## Description:
The rectangular trolley body shall support a circular removable press plate. The trolley will travel on four wheel assemblies.

## Inputs:
- Lidded drums

## Outputs:
- Compacts (pucks)

## Interfaces:
- Drum Handler, Infeed Supercompactor, and Post Compaction Glovebox

## Operating Environment:
- Zone 3, alpha contaminated

## Services:
- Hydraulics, Electricity (Power and Control)

## Signatures:

04/23/07 03 J. Godak

10/27/03 02 S. Schulties R. Beck P. Leatherbarrow

01/12/01 01 M. Green E. Calvert D. Yew

11/22/00 00 S. Mason E. Calvert D. Yew

For permit

Updated for permit - CCR

For permit

For permit

Purpose of Issue
Mechanical Data Sheet

Description: Supercompaction Trolley  Site: Idaho Falls

Data Sheet No.: DW410204

Diagram of a compaction trolley and drive, showing:
- Lower Press Plate
- Drum Trolley
- Sectors in removable sections
- Pinion
- Wheel units contained in cartridge
- Zone 3
- 13'-8" Travel
- 0'-0" Floor Level
- Rack Drive Motor/Gearbox
APPENDIX XXII

DRUM REPACK SYSTEM MECHANICAL DATA SHEETS

<table>
<thead>
<tr>
<th>MDS Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-440-868</td>
<td>Drummed Waste Handling Enclosure</td>
</tr>
<tr>
<td>Z-440-870</td>
<td>Drum Opening Hood</td>
</tr>
<tr>
<td>Q-440-805</td>
<td>Drum Lift/Tipper</td>
</tr>
<tr>
<td>Z-440-871</td>
<td>Drum Waste Packaging Glovebox</td>
</tr>
</tbody>
</table>
## Mechanical Data Sheet

**No. Z-440-868**

<table>
<thead>
<tr>
<th>Rev</th>
<th>Reason for Revision</th>
<th>Originator &amp; Date</th>
<th>Checker &amp; Date</th>
<th>Verifier &amp; Date</th>
<th>LDE &amp; Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Final Design Issue - For Permit Use Only</td>
<td>TB Coleman (sign. on file) 1/18/01</td>
<td>D Horn (sign. on file) 1/18/01</td>
<td>N/A</td>
<td>A Zindel (sign. on file) 1/18/01</td>
</tr>
<tr>
<td>1</td>
<td>Final Design Issue – Incorporated Permit Review Comments – For Permit Use Only</td>
<td>TB Coleman (sign. on file) 2/23/01</td>
<td>D Horn (sign. on file) 2/23/01</td>
<td>N/A</td>
<td>A Zindel (sign. on file) 2/23/01</td>
</tr>
<tr>
<td>2</td>
<td>Final Design Issue – Incorporated Permit Review Comments – For Permit Use Only</td>
<td>/s/ M Maier 06/14/01</td>
<td>/s/ M Zukin 06/14/01</td>
<td>N/A</td>
<td>/s/ TB Coleman 06/14/01</td>
</tr>
<tr>
<td>3</td>
<td>Capacity revised (in bold)</td>
<td>[Signature] 10/1/07</td>
<td>[Signature] 10/1/07</td>
<td>[Signature] 10/1/07</td>
<td>[Signature] 10/2/07</td>
</tr>
</tbody>
</table>

**Project:** Advanced Mixed Waste Treatment Project (AMWTP)

**Site:** Idaho National Engineering and Environmental Laboratory (INEEL)

**System Number:** 440

**Plant Item Number:** Z-440-868

**Equipment Name:** Drummed Waste Handling Enclosure (DWHE)

**Associated Drawings:**
- 53-9744 Special Case Waste and Drum Repack System Area
- General Arrangement,
- 53-9781 Special Case Waste and Drum Repack System Elevation
- Sht 1 of 4,
- 53-9782 Special Case Waste and Drum Repack System Elevation
- Sht 2 of 4,
- 55-9568 Drum Repack System Block Flow Diagram

**Associated Documents:** 5232-P-012 Process Description for the Drummed Waste Handling Enclosure

### Description

The enclosure provides a containment area for drum repack operations during which there is a potential for contamination release. The enclosure provides a sub-change area and airlocks for personnel and material movement, all intended to minimize any potential spread of contamination. The enclosure is constructed of pre-fab, stainless steel panels.

The enclosure is equipped for receipt of drums, staging of drums, movement, drum opening, waste sorting, visual examination (VE), and drum repackaging. The enclosure contains: drum opening exhaust hood, hoists, bar code readers, DMS workstation, weighscale, drum turntable, VE CCTV Camera, hand tools, shielded drum staging area, glovebox loading/bagging platform, drum receipt conveyor, fire rated elevator shaft extension, drum crusher, drum lift/tipper, and breathing air supply.
Summary Data

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty:</td>
<td>days</td>
</tr>
<tr>
<td>Daily Duty:</td>
<td>hours</td>
</tr>
<tr>
<td>Design Capacity:</td>
<td>per 8hr. shift</td>
</tr>
<tr>
<td></td>
<td>in wg</td>
</tr>
<tr>
<td>Nominal Operating Pressure:</td>
<td></td>
</tr>
<tr>
<td>Nominal Operating Temperature:</td>
<td>°F</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>ft-in</td>
</tr>
<tr>
<td>Width:</td>
<td>ft-in</td>
</tr>
<tr>
<td>Height:</td>
<td>ft-in</td>
</tr>
<tr>
<td>Estimated Weight:</td>
<td>lb.</td>
</tr>
<tr>
<td>Materials and Construction:</td>
<td></td>
</tr>
<tr>
<td>Maintenance:</td>
<td></td>
</tr>
<tr>
<td>Inputs:</td>
<td></td>
</tr>
<tr>
<td>Outputs:</td>
<td></td>
</tr>
<tr>
<td>Interfaces:</td>
<td></td>
</tr>
<tr>
<td>Operating Environment:</td>
<td></td>
</tr>
<tr>
<td>Services:</td>
<td></td>
</tr>
</tbody>
</table>

Special Requirements

| Drum opening hood: | The drum opening hood exhausts Zone 3 air at 1590 cfm over and around the drums during opening and repack operations. Maintains a high velocity airflow. |
| Glovebox bagging platform: | The glovebox loading and bagging platform supports operator functions during drum bagging and initial drum unpacking. |

Sheet 2 of 4
<table>
<thead>
<tr>
<th><strong>Mechanical Data Sheet</strong></th>
<th><strong>No. Z-440-868</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drum crusher:</strong></td>
<td>The drum crusher is located in the DWHE and is used for size reducing 55 &amp; 83/85-gallon drums for export to LLW area.</td>
</tr>
<tr>
<td><strong>Man entry airlock:</strong></td>
<td>Allows man entryway with HVAC isolation.</td>
</tr>
<tr>
<td><strong>Subchange room:</strong></td>
<td>The subchange room supports enclosure decontamination, PPE prep and change in the event of spread of contamination.</td>
</tr>
<tr>
<td><strong>Material transfer airlock:</strong></td>
<td>Allows HVAC isolation for repacked drums from the DWPG to be transferred into the enclosure for disposal via elevator as well as transfer of LLW (crushed drums) out of enclosure for export to LLW area.</td>
</tr>
<tr>
<td><strong>Elevator airlock/fire box:</strong></td>
<td>The elevator airlock/fire boundary enclosure acts as an extended fire boundary from the cavern below as well as preventing HVAC interaction.</td>
</tr>
<tr>
<td><strong>Glovebox interface:</strong></td>
<td>The enclosure mates to the DWPG by a sealing flange attachment.</td>
</tr>
<tr>
<td><strong>Hoist structural support:</strong></td>
<td>Local enclosure pads/structure (tied to room ceiling structure) act as hoist structural support capable of supporting 1100 lb drum lift/movement.</td>
</tr>
<tr>
<td><strong>Penetrations:</strong></td>
<td>Control, Electrical &amp; Instrumentation (C, E &amp; I) and utility services require enclosure penetration panels/plates.</td>
</tr>
<tr>
<td><strong>Depression pressure gauge:</strong></td>
<td>The enclosure will operate at a nominal –0.8” wg requiring depression monitoring/alarm panel(s).</td>
</tr>
<tr>
<td><strong>Interlock switching:</strong></td>
<td>All airlock doors are interlocking.</td>
</tr>
<tr>
<td><strong>Conveyor:</strong></td>
<td>Waste drums transferred from the elevator into the enclosure are controlled and interlocked with the elevator and airlock doors.</td>
</tr>
</tbody>
</table>
**Data Sheet**

**Project:** Advanced Mixed Waste Treatment Project (AMWTP)

**Site:** Idaho National Engineering and Environmental Laboratory (INEEL)

**System Number:** 440

**Plant Item Number:** Z-440-870

**Equipment Name:** Drum Opening Hood

**Associated Drawing(s):**
- 53-9744 Special Case Waste and Drum Repack System Area General Arrangement
- 53-9842 DWHE Drum Opening Hood General Arrangement

**Associated Document(s):** 5232-P-012 Process Description for the Drummed Waste Handling Enclosure

**Description**

The Drum Opening Hood is a custom made Zone 3 exhaust hood providing high flow ventilation over and around a waste drum during opening and unpacking operations.

**Summary Data**

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty:</td>
<td>days 365</td>
</tr>
<tr>
<td>Daily Duty:</td>
<td>hours 24</td>
</tr>
<tr>
<td>Design Capacity:</td>
<td>n/a 83/85-gallon drum</td>
</tr>
<tr>
<td>Cycle Time:</td>
<td>min. n/a</td>
</tr>
<tr>
<td>Minimum Design Pressure:</td>
<td>in. wg n/a</td>
</tr>
<tr>
<td>Maximum Design Pressure:</td>
<td>in. wg n/a</td>
</tr>
<tr>
<td>Nominal Operating Temperature:</td>
<td>°F 66 - 81</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>See attached sketch</td>
</tr>
<tr>
<td>Depth</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Width</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Height</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Exhaust Flow Rate:</td>
<td>cfm 1590 (approximately)</td>
</tr>
<tr>
<td>Estimated Weight:</td>
<td>lb 400 (approximately)</td>
</tr>
<tr>
<td>Materials and Construction:</td>
<td>Stainless Steel and Polycarbonate assembly</td>
</tr>
<tr>
<td>Maintenance:</td>
<td></td>
</tr>
</tbody>
</table>

Sheet 1 of 3
<table>
<thead>
<tr>
<th>Inputs:</th>
<th>55-gallon metal drums and 83/85-gallon drums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs:</td>
<td>Repacked or empty 55-gallon and 83/85-gallon metal drums</td>
</tr>
<tr>
<td>Interfaces:</td>
<td>HVAC</td>
</tr>
<tr>
<td>Operating Environment:</td>
<td>Zone 3 (contaminated area) ventilation/extraction, operated as Zone 2</td>
</tr>
<tr>
<td>Services:</td>
<td>None</td>
</tr>
<tr>
<td>Safety Features:</td>
<td>Flow meter/alarm</td>
</tr>
</tbody>
</table>

**Special Requirements**

None
Description: Drum Opening Hood  Site: INEEL  Data Sheet No: Z-440-870

DRUM OPENING HOOD
GENERAL ARRANGEMENT

ALL DIMENSIONS ARE APPROXIMATE
**Mechanical Data Sheet**

**Project:** Advanced Mixed Waste Treatment Project (AMWTP)

**Site:** Idaho National Engineering and Environmental Laboratory (INEEL)

**System Number:** 440

**Plant Item Number:** Q-440-805

**Equipment Name:** Drum Lift/Tipper

**Associated Drawing(s):** 53-9744 Special Case Waste and Drum Repack System Area General Arrangement

**Associated Document(s):** 5232-P-012 Process Description for the Drummed Waste Handling Enclosure

**Description**

The drum lift/tipper is a custom designed/built manually operated device for lifting and tipping 55-gallon drums to a drum bag port on the Drummed Waste Packaging Glovebox.

**Summary Data**

<table>
<thead>
<tr>
<th>SUMMARY DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty:</td>
<td>days 365</td>
</tr>
<tr>
<td>Daily Duty:</td>
<td>hours 24 (On demand)</td>
</tr>
<tr>
<td>Design Capacity:</td>
<td>lb 1200</td>
</tr>
<tr>
<td>Cycle Time:</td>
<td>min. n/a</td>
</tr>
<tr>
<td>Minimum Design Pressure:</td>
<td>in. wg n/a</td>
</tr>
<tr>
<td>Maximum Design Pressure:</td>
<td>in. wg n/a</td>
</tr>
<tr>
<td>Normal Operating Temperature Range:</td>
<td>°F 66 – 81</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>ft &amp; in.</td>
</tr>
<tr>
<td>Length:</td>
<td>77” which is 6’ 5’’ (approximately)</td>
</tr>
<tr>
<td>Width:</td>
<td>50” which is 4’ 2’’ (approximately)</td>
</tr>
<tr>
<td>Height:</td>
<td>70” which is 5’ 10’’ (approximately)</td>
</tr>
<tr>
<td>Estimated Weight:</td>
<td>lb 311 (approximately)</td>
</tr>
<tr>
<td>Materials and Construction:</td>
<td>Carbon Steel</td>
</tr>
<tr>
<td><strong>Maintenance:</strong></td>
<td>The equipment is of modular construction; modules are easily removable with minimum number of fittings to allow disassembly.</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Inputs:</strong></td>
<td>55 - gallon drums</td>
</tr>
<tr>
<td><strong>Outputs:</strong></td>
<td>55 - gallon drums</td>
</tr>
<tr>
<td><strong>Interfaces:</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Operating Environment:</strong></td>
<td>Zone 3</td>
</tr>
<tr>
<td><strong>Services:</strong></td>
<td>480VAC/60HZ/ three phase</td>
</tr>
<tr>
<td><strong>Safety Features:</strong></td>
<td>Pinch point guards, interlocked enclosure, fail safe motor brake</td>
</tr>
</tbody>
</table>

**Special Requirements**

| **Tilt angle:**        | 360°                                                                                                                        |
| **Lift mechanism:**    | Hand pump – hydraulic                                                                                                       |
| **Tilt mechanism:**    | Hand wheel                                                                                                                  |
DRUMMED WASTE HANDLING ENCLOSURE
(REF)

DRUM/LIFTER ASSEMBLY
(1185-003)
The glovebox is designed for maximum visibility, maintainability and operational efficiency. The glovebox incorporates a receipt/sort and preparation/export area and it has a platform around the perimeter for operator access. The glovebox system includes: a chain fall to handle heavy items within the glovebox, alpha hand monitors to detect contamination, bar code readers, drum lifts, and turntables to handle the export drums, a CCTV System to record visual examination of drum debris and a fire suppression system.
## Summary Data

<table>
<thead>
<tr>
<th>SUMMARIZED DATA</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Duty</td>
<td>day 365</td>
</tr>
<tr>
<td>Daily Duty</td>
<td>Hour 24 (On Demand)</td>
</tr>
<tr>
<td>Design Capacity Per 8 hr shift</td>
<td>18 drums</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>Hour Variable (depends on waste stream)</td>
</tr>
<tr>
<td>Minimum Design Pressure</td>
<td>In wg -2 (Depression)</td>
</tr>
<tr>
<td>Maximum Design Pressure</td>
<td>In wg +2</td>
</tr>
<tr>
<td>Normal Operating Temperature Range:</td>
<td>°F 66 - 81</td>
</tr>
<tr>
<td>Dimensions:</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Ft &amp; in 15'-1&quot; (approx.)</td>
</tr>
<tr>
<td>Width</td>
<td>Ft &amp; in 3'-6&quot; (approx.)</td>
</tr>
<tr>
<td>Height</td>
<td>Ft &amp; in 11'-6&quot; (approx.)</td>
</tr>
<tr>
<td>Estimated Weight</td>
<td>lb. 3,000 (equipment not included)</td>
</tr>
</tbody>
</table>

### Materials and Construction

| Stainless Steel |

### Maintenance

The equipment is of modular construction, modules are easily removable with a minimum number of fittings to allow dismantling within the containment by operators via glovecaps.

### Inputs:

- Repack waste through horizontal 55-gallon drum bag port.
- Process equipment, consumables, absorbents, wipes & reagents through bag port.

### Outputs:

- Repack waste through two vertical 55-gallon drum bag ports.
- Other waste through bag port.

### Interfaces:

- Drummed Waste Handling Enclosure (DWHE)

### Operating Environment:

- Zone 2-Operating Area; Zone 3-Glovebox (Contaminated Area)

### Services

- Electricity (Power and Control), Ventilation

## Special Requirements

None
APPENDIX XXIII

EXAMPLE WASTE PROFILE FORM
<table>
<thead>
<tr>
<th>Profile ID No.:</th>
<th>Rev.</th>
<th>IDCs:</th>
<th>Approval Date:</th>
<th>Section 1. Waste Generator Information</th>
<th>Generator completes this section</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Section 1 References: AMWTP HWMA/RCRA Permit, Attachment 2, C-2e; 40 CFR 262.12, EPA Identification Numbers.</td>
<td></td>
</tr>
<tr>
<td>1a. Generator Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1b. Generator EPA ID Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c. Generator Street Address City, State, Zip Code:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1d. Name and location of waste generating facility:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1e. Current Waste Storage Area:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1f. EPA ID Number of Current Waste Storage Area, if different:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1g. Technical Contact(s):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>Work: (   ) -</td>
<td>Mobile: (   ) -</td>
<td>Fax: (   ) -</td>
<td>Name:</td>
<td>Work: (   ) -</td>
</tr>
<tr>
<td>1h. I am a contractor representing the waste generator (e.g., CCP):</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1i. Contractor Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1j. Contractor Address City, State, Zip Code:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments relevant to Section 1:</td>
<td>No comments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2. Waste Stream Information</th>
<th>Generator completes this section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2 References: AMWTP HWMA/RCRA Permit, Attachment 2, C-2e; Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC); Quality Assurance Program Plan for TRUPACT-II Gas Generation Test Program (DOE/WIPP 01-3187); CH-TRU Payload Appendices, Appendix 3.0.</td>
<td></td>
</tr>
<tr>
<td>2a. Waste stream name:</td>
<td></td>
</tr>
<tr>
<td>2b. This waste is a solid:</td>
<td>Yes</td>
</tr>
<tr>
<td>If no, explain:</td>
<td></td>
</tr>
<tr>
<td>2c. Summary Category Group:</td>
<td>S3000</td>
</tr>
<tr>
<td>2d. Waste Matrix Code Group:</td>
<td></td>
</tr>
<tr>
<td>2e. Waste Matrix Code:</td>
<td></td>
</tr>
<tr>
<td>2f. IDC(s):</td>
<td></td>
</tr>
<tr>
<td>2g. Waste Form:</td>
<td>Debris</td>
</tr>
<tr>
<td>Other, Describe:</td>
<td></td>
</tr>
<tr>
<td>Profile ID No.:</td>
<td>Rev.</td>
</tr>
<tr>
<td>----------------</td>
<td>------</td>
</tr>
<tr>
<td>2h. Is this a TRU mixed waste stream? (Is it radioactive waste that also meets the EPA definition of hazardous waste?)</td>
<td></td>
</tr>
<tr>
<td>2i. Provide an estimated range of organic materials in this waste stream:</td>
<td></td>
</tr>
<tr>
<td>2j. Organic range is based on:</td>
<td></td>
</tr>
<tr>
<td>2k. Describe the waste generating process: (Include building numbers as applicable)</td>
<td></td>
</tr>
<tr>
<td>2l. Total Waste Stream Volume:</td>
<td>______ m³</td>
</tr>
<tr>
<td>2m. Volume planned for shipment to AMWTP:</td>
<td>______ m³</td>
</tr>
<tr>
<td>2n. Estimated generation rate for this waste stream:</td>
<td>______ m³/year</td>
</tr>
<tr>
<td>2o. Period of generation (list dates in months and years):</td>
<td>From / to /</td>
</tr>
<tr>
<td>2p. Has this waste been treated?</td>
<td>Yes</td>
</tr>
<tr>
<td>2q. If yes, how has this waste been treated?</td>
<td>N/A</td>
</tr>
<tr>
<td>2r. Will AMWTP treat this waste?</td>
<td>Yes</td>
</tr>
<tr>
<td>2s. If yes, how will AMWTP treat this waste?</td>
<td>Supercompaction</td>
</tr>
<tr>
<td>2t. If AMWTP will not treat this waste, how will AMWTP manage this waste?</td>
<td>solids sampling</td>
</tr>
<tr>
<td>2u. Will this waste be shipped to WIPP by the AMWTP?</td>
<td>Yes</td>
</tr>
<tr>
<td>2v. If yes, which contractor will ship this waste to WIPP?</td>
<td></td>
</tr>
<tr>
<td>2w. If no, explain final waste disposition:</td>
<td>N/A</td>
</tr>
<tr>
<td>Comments relevant to Section 2:</td>
<td>No comments</td>
</tr>
</tbody>
</table>
**Section 3. Waste Stream Data**

*Generator completes this section*

**Section 3 References:** AMWTP HWMA/RCRA Permit, Attachment 2, C-2e and C-2f; MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, current revision; 49 CFR 173, Transportation; Idaho Department of Environmental Quality Rules and Regulations, Idaho Administrative Code, IDAPA 58, Title 1, Chapter 5, “Rules and Standards for Hazardous Waste”; 40 CFR 763, Asbestos; other references as specifically listed.

**Section 3a. Preliminary Data**

Do any of the following apply to this waste stream or to containers within this waste stream? If yes, explain:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

- **3a1.** Accountable nuclear material as prescribed by DOE M 470.4-6
- **3a2.** Non-radionuclide forms of pyrophoric materials (e.g., elemental potassium)
- **3a3.** Pyrophoric forms of radionuclides >1 wt% (e.g., elemental plutonium)
- **3a4.** Pyrophoric radionuclides > 1 wt%
- **3a5.** Oxidizers as defined by 49 CFR 173.127
- **3a6.** DOT Class 1 explosives
- **3a7.** Reactive metals
- **3a8.** Forbidden materials as defined by 49 CFR §173.21
- **3a9.** Ignitables, Corrosives, or Reactives (EPA HWNs D001, D002 or D003)
- **3a10.** Shock sensitive materials
- **3a11.** Biological or etiological agents
- **3a12.** Unprotected sharps or blades
- **3a13.** Compressed Gases
- **3a14.** Aerosol cans that have not been verified empty
- **3a15.** Hazardous Only Waste (non-radioactive)
- **3a16.** Waste incompatible with other waste within this waste stream
- **3a17.** Incompatible wastes within a single container
- **3a18.** Elemental mercury
- **3a19.** Containerized elemental mercury (e.g., bottles, thermometers)
- **3a20.** Elemental lead (lead solids, not including shielding)
- **3a21.** Lead shielding
- **3a22.** High-level waste (defined as waste created by the reprocessing of spent nuclear fuel)
- **3a23.** Sealed inner containers > 4 liters
### AMWTP OFFSITE
**WASTE STREAM PROFILE**

<table>
<thead>
<tr>
<th>Profile ID No.:</th>
<th>Rev.</th>
<th>IDCs:</th>
<th>Approval Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **3a24.** Containers currently managed as non-TRU waste (<100 nCi/g TRU isotopes)
- **3a25.** Drums (e.g., 55 gal, 85 gal) greater than 200 FGE $^{239,240}$Pu, including 2-Sigma
- **3a26.** Boxes (e.g., SWBs) greater than 325 FGE $^{239}$Pu, including 2-Sigma
- **3a27.** Hazardous waste from non-specific sources with EPA F-listed HWNs other than F001-F007 and F009
- **3a28.** Hazardous waste from specific sources with EPA K-listed HWNs
- **3a29.** Unused, discarded chemical products, or their residues (EPA P-listed and U-listed wastes)
- **3a30.** Containers of PCB-contaminated waste that also contains detectable liquids
- **3a31.** Non-defense related TRU waste
- **3a32.** Waste from sources other than the Department of Energy (DOE)
- **3a33.** Waste not included in a Site Treatment Plan or other regulatory tracking system
- **3a34.** Containers not vented with filtered vents
- **3a35.** Overpacked containers

**Comments relevant to Section 3a:** No comments

### Section 3b. Liquids Information

#### 3b1. Does this waste stream contain liquids?
- Yes
- No

If the answer is no, skip to Section 3c.

#### 3b2. Liquids configuration (within waste drum or box): check all that apply.
- free interstitial
- free on top of waste
- free on bottom of waste
- containerized

#### 3b3. Estimated maximum percent liquids present in containers within this waste stream:

- % free
- % containerized

#### 3b4. Are liquids aqueous or organic?
- Aqueous
- Organic
- Not Known

#### 3b5. Are containerized liquids present in this waste stream?
- No (Move to question 3b6)
- Yes

About how many internal containers are expected to be present in this waste stream? This may be averaged over the waste stream. What are the expected volumes of the internal containers? A range may be used. Use milliliters or liters.

What is the maximum volume of liquid expected to be present within each internal container?
- <60 mL
- <3%
- >60 mL

Estimated volume in mL: ______

Estimated volume in %: ______
<table>
<thead>
<tr>
<th>Profile ID No.:</th>
<th>Rev.</th>
<th>IDCs:</th>
<th>Approval Date:</th>
<th>3b6. Does the waste contain liquids that exhibit the characteristic of ignitability in accordance with 40 CFR §261.21?</th>
<th>3b7. Does the waste contain liquids that exhibit the characteristic of corrosivity in accordance with 40 CFR §261.22?</th>
<th>3b8. Does the waste contain liquids that exhibit the characteristic of reactivity in accordance with 40 CFR §261.23?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ Yes ☐ No ☐ N/A</td>
<td>☐ Yes ☐ No ☐ N/A</td>
<td>☐ Yes ☐ No ☐ N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>If yes, what is the flash point? _____ °F</td>
<td>If yes, what is the pH? _____</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ Yes ☐ No ☐ N/A</td>
<td>☐ Yes ☐ No ☐ N/A</td>
<td>☐ Yes ☐ No ☐ N/A</td>
</tr>
</tbody>
</table>

Comments relevant to Section 3b: ☐ No comments

Section 3c. Beryllium Information

| 3c1. Is the waste contaminated with beryllium? | ☐ Yes ☐ No |
| 3c2. Is the beryllium in oxide form? | ☐ Yes ☐ No |
| 3c3. Does the waste contain > 1 wt % beryllium? | ☐ Yes ☐ No |

Comments relevant to Section 3c: ☐ No comments

Section 3d. TSCA Information

Section 3d1. Polychlorinated Biphenyls (PCBs)

| 3d1a. Does this waste contain regulated PCBs as defined in 40 CFR Part 761? | ☐ Yes ☐ No |
| 3d1b. Out-of-Service date (dd/mm/yy) (Attach additional sheets if multiple containers have multiple OOS dates.) | ___/___/___ |
| 3d1c. Do any containers within this PCB waste stream have detectible liquids? | ☐ Yes ☐ No |
| 3d1d. What is the maximum concentration of PCBs present in this waste stream? | ___ ppm |
| NOTE: Unless analytical data is provided with this profile, PCB concentration must be assumed to be ≥ 500 ppm. |
| 3d1e. Is this waste subject to a site-specific PCB risk-based disposal authorization? | ☐ Yes ☐ No |
| 3d1f. Does this waste meet the definition of PCB remediation waste as prescribed in 40 CFR Part 761? | ☐ Yes ☐ No |
| 3d1g. Does this waste meet the definition of PCB bulk product waste as prescribed in 40 CFR §761.62? | ☐ Yes ☐ No |
| 3d1h. Does this waste stream contain PCB equipment? | ☐ Yes ☐ No |
| 3d1i. Equipment type: | ☐ Transformers ☐ Capacitors ☐ Other: ___ ☐ Light ballasts |
| 3d1j. Configuration: | ☐ Liquid-filled ☐ Dry-type equipment ☐ N/A |
### AMWTP OFFSITE
### WASTE STREAM PROFILE

<table>
<thead>
<tr>
<th>Profile ID No.:</th>
<th>Rev.</th>
<th>IDCs:</th>
<th>Approval Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 3d1k. Have liquids associated with liquid-filled PCB equipment been completely drained?
- [ ] Yes
- [ ] No
- [ ] N/A

#### 3d1l. Has adequate absorbent been added to drained equipment to ensure the absence of residual liquids?
- [ ] Yes
- [ ] No
- [ ] N/A

### Section 3d2. Asbestos

#### 3d2a. Does this waste contain asbestos greater than 1 wt%?
- [ ] Yes
- [ ] No

*If the answer is no, skip to Section 4.*

#### 3d2b. Is the asbestos friable or non-friable?
- [ ] Friable
- [ ] Non-Friable

#### 3d2c. List the maximum percentage of asbestos expected to be present in this waste stream:

---

### Comments relevant to Section 3d:  
[ ] No comments

### Section 4. Physical Characteristics

#### 4a. Physical state:
- [ ] Solid
- [ ] Other: ____

#### 4b. How will this waste be packaged for shipment to the AMWTP?
- Drums:
  - [ ] 55 gal
  - [ ] 85 gal
  - [ ] 110 gal
  - [ ] Other: ____
- Boxes:
  - [ ] SWB
  - [ ] FRP
  - [ ] BR90
  - [ ] No boxes
  - [ ] Other: ____

#### 4c. Overpacks:
- [ ] 55 gal within 85 gal
- [ ] 55 gal within SWB
- [ ] 85 gal within SWB
- [ ] Other: ____
- [ ] No Overpacks

### Section 4a. Container-Specific Information

#### 4a1. Average container gross weight: ____ kg

#### 4a2. Average container gross volume: ____ m$^3$

#### 4a3. Average container fill factor (vol %): ____

#### 4a4. Provide the average bulk density of this waste stream:

*Density must be calculated using net weight and net volume, and must be based solely on waste planned for shipment under this profile.*

____ kg/m$^3$

- [ ] Avg
- [ ] Actual

#### 4a5. If known, provide a description of outer drum condition. Identify dents, gouges, rust, paint bubbling/flaking, bulging, and general container condition.

---

### Comments relevant to Section 4a:  
[ ] No comments
## Section 4b. Waste Stream Parameters

4b1. Provide a physical description of this waste stream. Include description and amount of inner containers, drum liners, and bags. *Physical description should only include waste planned for shipment under this profile. It should not describe waste other than what is specifically reported in the waste stream parameters in Section 4b2.*

4b2. Directions:
- Estimate the materials in this waste stream in weight or volume percents.
- Include internal container materials (such as 5-gal metal pails, small bags, and cardboard liners) as debris waste parameters.
- Weight or volume percentages should be reported for the waste stream as a whole. It is recognized that individual containers within this waste stream may exceed one or more of the percentages listed.
- Total must equal 100 percent.

### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Estimated Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Debris Parameters</strong></td>
<td><strong>Weight Percent</strong></td>
</tr>
<tr>
<td>Iron-Based Metals/Alloys</td>
<td></td>
</tr>
<tr>
<td>Aluminum-Based Metals/Alloys</td>
<td></td>
</tr>
<tr>
<td>Other Metals (e.g., lead, copper, brass, bronze)</td>
<td></td>
</tr>
<tr>
<td>Cellulosics (e.g., paper)</td>
<td></td>
</tr>
<tr>
<td>Rubber</td>
<td></td>
</tr>
<tr>
<td>Plastic Waste Materials (e.g., sheets, tarps, HDPE)</td>
<td></td>
</tr>
<tr>
<td>Other Inorganic Materials (e.g., glass, concrete, insulation)</td>
<td></td>
</tr>
<tr>
<td>Other - Describe:</td>
<td></td>
</tr>
<tr>
<td>Other - Describe:</td>
<td></td>
</tr>
<tr>
<td>Other - Describe:</td>
<td></td>
</tr>
<tr>
<td>Other - Describe:</td>
<td></td>
</tr>
<tr>
<td><strong>Non-Debris Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>Inorganic Matrix (e.g., cemented sludge, cemented ash)</td>
<td></td>
</tr>
<tr>
<td>Organic Matrix (e.g., solidified solvents)</td>
<td></td>
</tr>
<tr>
<td>Other Inorganic Materials (e.g., absorbents, salts, ash)</td>
<td></td>
</tr>
<tr>
<td>Soils/Gravel</td>
<td></td>
</tr>
<tr>
<td>Other - Describe:</td>
<td></td>
</tr>
<tr>
<td>Other - Describe:</td>
<td></td>
</tr>
</tbody>
</table>

| Percent Total | 100 | 100 |

Comments relevant to Section 4b: □ No comments
### Section 5. Radionuclides

**Profile ID No.:** \_\_\_\_  \hspace{1cm} **Rev.** \_\_\_\_  \hspace{1cm} **IDCs:** \_\_\_\_  \hspace{1cm} **Approval Date:** \_\_\_/ \_\_/ \_\_

**Section 5 References:** RPT-DSA-02, Documented Safety Analysis, current revision; MP-TRUW-8.1, Certification Plan for INL Transuranic Waste, current Revision; 49 CFR 173, Transportation.

5a. Profiled radioactivity concentrations are derived from:

- Process Knowledge
- NDA Results
- Other (e.g., material balance, dose conversion) \__\_

5b. Describe specifically how radioactive material constituents were derived and the rationale used to determine activity concentrations.

5c. Directions:

- List all radionuclides associated with this waste stream.
- Include both the average and maximum concentration of each radionuclide in Ci/m³.
- Concentrations must be calculated based on the average gross volume reported in Section 4.
- If this waste stream is packaged within multiple container types (e.g., 55-gal drums and direct-load SWBs), then calculate the maximum concentration based on the maximum curie content and actual associated container volume.

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Average Concentration (Ci/m³)</th>
<th>Maximum Concentration (Ci/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Add additional lines as needed.
### Section 6. RCRA Determinations

**Generator completes this section**

*Section 6 References: AMWTP HWMA/RCRA Permit, Attachment 2, C-2e; MP-TRUW-8.2, Quality Assurance Project Plan, current revision; Idaho Department of Environmental Quality Rules and Regulations, Idaho Administrative Code, IDAPA 58, Title 1, Chapter 5, “Rules and Standards for Hazardous Waste.”*

#### Section 6a. Toxicity Characteristic

6a1. Does the waste associated with this profile contain Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D, 2,4,5-TP (Silvex), Chlordane, o-Cresol, m-Cresol, p-Cresol, Heptachlor (or its epoxide), 2,4,5-Trichlorophenol or 2,4,6-Trichlorophenol?

**NOTE:** Ortho-, meta-, and para-Cresols are prohibited at the Waste Isolation Pilot Plant (WIPP) above the regulatory limit (RL). When present above RL, these contaminants must be reported as total Cresol (EPA HWN D026).

**Yes**  **No**

6a2. If yes, list specific compound(s):

**N/A**

6a3. Are any of the compounds listed in 6a1 present in the waste above the RL?

**Yes**  **No**  **N/A**

6a4. If yes, list assigned EPA HWN(s):

**N/A**

6a5. For each toxicity characteristic contaminant present in this waste, indicate whether the EPA HWN is assigned, the contaminant is present but not assigned (provide justification in comment Section 6) or the contaminant is present below RL. If the contaminant is not present in this waste stream, indicate in the appropriate column.

<table>
<thead>
<tr>
<th>EPA HWN</th>
<th>Contaminant</th>
<th>CAS</th>
<th>TCLP RL (mg/L)</th>
<th>Totals RL (mg/kg)</th>
<th>EPA HWN Assigned</th>
<th>Contaminant Present, Not Assigned</th>
<th>Contaminant Present Below RL</th>
<th>Contaminant Not Present in Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>D004</td>
<td>Arsenic</td>
<td>7440-38-2</td>
<td>5.0</td>
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<tr>
<td>D005</td>
<td>Barium</td>
<td>7440-39-3</td>
<td>100.0</td>
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<tr>
<td>D006</td>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>1.0</td>
<td>20</td>
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<td>D007</td>
<td>Chromium</td>
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<tr>
<td>D008</td>
<td>Lead</td>
<td>7439-92-1</td>
<td>5.0</td>
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<tr>
<td>D009</td>
<td>Mercury</td>
<td>7439-97-6</td>
<td>0.2</td>
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<tr>
<td>D010</td>
<td>Selenium</td>
<td>7782-49-2</td>
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<td>D011</td>
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<td>D018</td>
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<td>71-43-2</td>
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<td>D019</td>
<td>Carbon Tetrachloride</td>
<td>56-23-5</td>
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<td>D021</td>
<td>Chlorobenzene</td>
<td>108-90-7</td>
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<td>D022</td>
<td>Chloroform</td>
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<td>D026</td>
<td>Cresol</td>
<td>N/A</td>
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<td>D027</td>
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<td>D028</td>
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<td>D029</td>
<td>1,1-Dichloroethylene</td>
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<td>D030 2,4-Dinitrotoluene</td>
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<td>D032 Hexachlorobenzene</td>
<td>118-74-1</td>
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<td>D033 Hexachlorobutadiene</td>
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<td>D034 Hexachloroethane</td>
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<td>D035 Methyl Ethenyl Ketone</td>
<td>78-93-3</td>
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<td>D036 Nitrobenzene</td>
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<td>D037 Pentachlorophenol</td>
<td>87-86-5</td>
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<tr>
<td>D038 Pyridine</td>
<td>110-86-1</td>
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<td>100</td>
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<td>D039 Tetrachloroethylene</td>
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<td>D040 Trichloroethylene</td>
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<tr>
<td>D043 Vinyl Chloride</td>
<td>75-01-4</td>
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### Section 6b. Listed Waste

#### 6b1. Indicate which F-listed contaminants are associated with this waste stream.

**F001 Spent Halogenated Solvents Used In Degreasing**

<table>
<thead>
<tr>
<th>Assigned</th>
<th>Not Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrachloroethylene</td>
<td>☐</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>☐</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>☐</td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
<td>☐</td>
</tr>
<tr>
<td>Carbon tetrachloride</td>
<td>☐</td>
</tr>
<tr>
<td>Chlorinated fluorocarbons</td>
<td>☐</td>
</tr>
</tbody>
</table>

**F002 Spent Halogenated Solvents**

<table>
<thead>
<tr>
<th>Assigned</th>
<th>Not Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrachloroethylene</td>
<td>☐</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>☐</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>☐</td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
<td>☐</td>
</tr>
<tr>
<td>Chlorobenzene</td>
<td>☐</td>
</tr>
<tr>
<td>1,1,2-trichloro-1,2,2-trifluoroethane</td>
<td>☐</td>
</tr>
<tr>
<td>Ortho-dichlorobenzene (1,2-dichlorobenzene)</td>
<td>☐</td>
</tr>
<tr>
<td>Trichlorofluoromethane</td>
<td>☐</td>
</tr>
<tr>
<td>1,1,2-trichloroethane</td>
<td>☐</td>
</tr>
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</table>

**F003 Spent Non-Halogenated Solvents**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Xylene</td>
<td>☐</td>
</tr>
<tr>
<td>Acetone</td>
<td>☐</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>☐</td>
</tr>
<tr>
<td>Ethyl benzene</td>
<td>☐</td>
</tr>
<tr>
<td>Ethyl ether</td>
<td>☐</td>
</tr>
<tr>
<td>Methyl isobutyl ketone</td>
<td>☐</td>
</tr>
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</table>
## AMWTP OFFSITE
### WASTE STREAM PROFILE

<table>
<thead>
<tr>
<th>Profile ID No.:</th>
<th>Rev.</th>
<th>IDCs:</th>
<th>Approval Date: / /</th>
</tr>
</thead>
</table>

### N-butyl alcohol
- Not assigned

### Cyclohexanone
- Not assigned

### Methanol
- Not assigned

### F004
#### Spent Non-Halogenated Solvents

<table>
<thead>
<tr>
<th>Name</th>
<th>Assigned</th>
<th>Not Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cresols</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cresylic acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrobenzene</td>
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</table>

### F005
#### Spent Non-Halogenated Solvents

<table>
<thead>
<tr>
<th>Name</th>
<th>Assigned</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isobutanol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyridine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-ethoxyethanol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-nitropropane</td>
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<td></td>
</tr>
</tbody>
</table>

### F006
#### Wastewater Treatment Sludges from Electroplating Operations

<table>
<thead>
<tr>
<th>Sludges as described in 40 CFR §261.31</th>
<th>Assigned</th>
<th>Not Assigned</th>
</tr>
</thead>
</table>

### F007
#### Spent Cyanide Plating Bath Solutions from Electroplating Operations

<table>
<thead>
<tr>
<th>Solutions as described in 40 CFR §261.31</th>
<th>Assigned</th>
<th>Not Assigned</th>
</tr>
</thead>
</table>

### F009
#### Spent Stripping and Cleaning Bath Solutions from Electroplating Operations where Cyanides are Used

<table>
<thead>
<tr>
<th>Solutions as described in 40 CFR §261.31</th>
<th>Assigned</th>
<th>Not Assigned</th>
</tr>
</thead>
</table>

### Section 6c. HWNs

6c1. List all EPA HWNs associated with this waste stream.

6c2. Toxicity Characteristic EPA HWNs: None
AMWTP OFFSITE
WASTE STREAM PROFILE

Profile ID No.: ______  Rev. ______  IDCs: ______  Approval Date: _____ / _____ / _____

6c3. F-listed EPA HWNs:  □  None

6c4. Other EPA HWNs: (Include state-specific waste codes as applicable.)  □  None

Comments relevant to Section 6:  □  No comments

Section 7. Chemical Constituents

Generator completes this section

Section 7 References:  AMWTP HWMA/RCRA Permit, Attachment 2, C-2e; MP-TRUW-8.2, Quality Assurance Project Plan, current revision; Idaho Department of Environmental Quality Rules and Regulations, Idaho Administrative Code, IDAPA 58, Title 1, Chapter 5, “Rules and Standards for Hazardous Waste.”

NOTE:  When PK is used solely to complete this section, maximum concentrations are not required.

7a. Profiled concentrations are based on (check one or both):  □  AK/PK  □  Analysis

NOTE:  Generator must provide analytical results if concentrations are analysis-based, whether in part or in whole.

7b. Directions:
Provide a comprehensive list of chemical constituents present in this waste stream, including RCRA contaminants identified in Section 6.
Include CAS Registry Numbers.
Provide the average and maximum concentration present in mg/kg and in mg/m³. Also provide average weight percent. When trace concentrations are expected based on process knowledge, a weight percent of 0.01 is recommended, unless otherwise specified in Section 6.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>CASRN</th>
<th>Avg (mg/kg)</th>
<th>Avg (mg/m³)</th>
<th>Max (mg/kg)</th>
<th>Max (mg/m³)</th>
<th>Avg Weight (%)</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

Add additional lines as needed.
7c. How were chemical constituents derived?

Comments relevant to Section 7: □ No comments

Section 8. Waste Compatibility and Stability

8a. Provide a waste compatibility and stability statement and the reactivity group number using the EPA compatibility guidelines (e.g., A Method for Determining the Compatibility of Hazardous Wastes [EPA-600/2-80-076, April 1980]). List any special handling requirements. For TRU or MTRU waste, TRUCON codes may be used.

Section 9. Supporting Documentation

9a. List all source documents and supporting documentation used to complete this profile. Examples include process knowledge reports, procedures, source terms, and analytical data. Include Document IDs if applicable. Revisions, as applicable, must be current.

<table>
<thead>
<tr>
<th>Item</th>
<th>Title</th>
<th>Revision</th>
<th>Description</th>
<th>Date</th>
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Comments relevant to Section 9: □ No comments

Section 10. USQ Determination


10a. Chemical Constituents

FRM-2118 result – Waste Stream Basis □ Pass □ Fail

Result is based on: □ Average mg/m³ □ Maximum mg/m³ □ Both
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<th>Profile ID No.:</th>
<th>Rev.</th>
<th>IDCs:</th>
<th>Approval Date:</th>
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<th>No</th>
<th>N/A</th>
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<td>Will a separate FRM-2118 be completed on container basis?</td>
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<tr>
<td>If yes, describe individual results:</td>
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<tr>
<td>Does this waste stream require a Nuclear Safety Technical Basis (NSTB) evaluation?</td>
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<td>☐ Yes</td>
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<tr>
<td>NSTB No.:</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>N/A</td>
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<td>Does this waste stream require a USQ evaluation for chemical constituents?</td>
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<tr>
<td>USQ Categorical Exclusion Review No.:</td>
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<td>USQ Determination No.:</td>
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Summary of Chemical Safety Basis Evaluation:

10b. Radionuclides

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<th>☐ Fail</th>
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<td>FRM-2119 result is based on:</td>
<td>☐ Average PE-Ci(^{239})Pu</td>
<td>☐ Maximum PE-Ci(^{239})Pu</td>
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<td>Does this waste stream require a NSTB evaluation?</td>
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<td>☐ No</td>
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<tr>
<td>NSTB No.:</td>
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<td>☐ No</td>
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<tr>
<td>Does this waste stream require a USQ evaluation for radionuclides?</td>
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<tr>
<td>USQ Categorical Exclusion Review No.:</td>
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Summary of Radiological Safety Basis Evaluation:

Section 11. Restrictions

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### Section 12. Generator Certification

Generator completes this section

I hereby certify that, to the best of my knowledge, all information submitted contains true, accurate, and complete descriptions of this waste. Samples analyzed and data submitted are representative as defined in 40 CFR 261, Appendix I, as applicable. Information regarding known or suspected hazards in the waste described herein has been disclosed by the AMWTP customer and generator.

<table>
<thead>
<tr>
<th>Full Name and Title</th>
<th>Signature</th>
<th>Date</th>
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### Section 13. AMWTP Approvals

AMWTP completes this section

Environmental Compliance Manager or Designee:

<table>
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<tr>
<th>Full Name and Title</th>
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Offsite Waste Coordinator:

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<tr>
<th>Full Name and Title</th>
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APPENDIX XXIV

ADVANCED MIXED WASTE TREATMENT PROJECT
WASTE CHARACTERIZATION QUALITY ASSURANCE PROJECT PLAN
# ADVANCED MIXED WASTE TREATMENT PROJECT
## WASTE CHARACTERIZATION
### QUALITY ASSURANCE PROJECT PLAN

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ACRONYMS

1. AMWTP: Advanced Mixed Waste Treatment Project
2. ASTM: American Society for Testing and Materials
3. DCSRS: drum core sample retrieval system
4. DEQ: Department of Environmental Quality
5. DMS: data management system
6. DOE: Department of Energy
7. EPA: Environmental Protection Agency
8. GC/MS: gas chromatography/mass spectrometry
9. HSGS: headspace gas sample
10. HWMA: Hazardous Waste Management Act
11. HWN: EPA hazardous waste number
12. IDC: item description code
13. QA: quality assurance
14. QAPjP: quality assurance project plan
15. QC: quality control
16. RCRA: Resource Conservation and Recovery Act
17. RTR: real-time radiography
18. SCW: special case waste
20. SWEPP: Stored Waste Examination Pilot Plant
21. TSA-RE: Transuranic Storage Area-Retrieval Enclosure
22. WG: waste group
23. WIPP: Waste Isolation Pilot Plant
24. WMF: Waste Management Facility
GLOSSARY

Special Case Waste = Waste that must have special handling prior to treatment in the Advanced Mixed Waste Treatment Facility. This may be an item that requires removal from a container, a liquid requiring solidification, etc. This waste is generally handled in the special case waste glovebox system.
1.0 PROJECT DESCRIPTION AND OBJECTIVES

This quality assurance project plan (QAPjP) describes the quality objectives for the waste characterization activities to be performed for the Advanced Mixed Waste Treatment Project (AMWTP) to meet the requirements of the Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA). The AMWTP has the ultimate goal of treating Department of Energy (DOE) waste to produce final waste forms that are certified for disposal at the Waste Isolation Pilot Plant (WIPP) in New Mexico or other off-Site disposal facility. The AMWTP is designed to process debris and non-debris waste. The majority of debris waste is treated via supercompaction in Waste Management Facility (WMF) – 676, but debris waste may also be treated via macroencapsulation of waste in WMF-628 through WMF-635 and WMF-610. Waste is characterized at the AMWTP using process knowledge, real-time radiography (RTR), visual examination, assay, and various sampling and analysis techniques.

1.1 Purpose of the QAPjP

This QAPjP provides the quality assurance (QA) requirements associated with the AMWTP, which includes the following areas:

- WMF-676;
- AMWTP Outside Storage Area;
- WMF-636 Pad 2;
- AMWTP Characterization Facilities, WMF-628, WMF-634, WMF-635, and the Stored Waste Examination Pilot Plant (SWEPP);
- Type II Modules WMF-629 through WMF-633; and
- Transuranic Storage Area-Retrieval Enclosure (TSA-RE).

To adequately characterize waste, representative samples must be collected, handled, and analyzed in a manner that ensures the accuracy and defensibility of the analytical data. This QAPjP provides the information needed to ensure that sample results meet these criteria. Samples are taken to support the following waste characterization activities:

- Waste-to-waste compatibility testing,
- Headspace gas sampling (HSGS),
- Non-debris waste sampling,
- Homogeneous debris sampling, and
- Liquid waste sampling.

In addition to sampling, process knowledge and non-invasive examination (e.g., RTR, visual examination) may be used to support waste characterization. While process knowledge reviews, examination, sampling activities, and HSGS are performed by AMWTP personnel, the chemical analysis of the waste is primarily performed by a contracted analytical laboratory.

1.2 Project Objectives

Several objectives exist for the characterization activities. These are:

- Assign item description code (IDC) / waste group (WG) to waste,
- Assign Environmental Protection Agency (EPA) hazardous waste numbers (HWNs) to waste,
- Identify prohibited items,
- Complete data package preparation required for waste disposition,
- Facilitate safe and compliant project operations, and
- Prepare for safe and compliant shipping.
2.0 SAMPLING AND ANALYSIS

This section discusses sampling and analysis requirements for waste managed at the AMWTP. As mentioned previously, the AMWTP manages non-debris and debris waste. Sampling and analysis of both non-debris and debris waste relies heavily on using process knowledge to differentiate waste containers into various homogeneous waste streams. Using process knowledge, the AMWTP classifies the entire waste stream, rather than individual waste containers, as either hazardous or non-hazardous. Individual waste containers serve as convenient, representative units for characterizing the waste stream of interest through sampling and analysis.

Special case waste (SCW) items, liquids, and squeezants that are collected or generated, are characterized as individual containers versus the entire waste stream. It is expected that these wastes will contain different waste characterization parameters between containers, and therefore characterization on a waste stream basis is not appropriate. Characterization of SCW, liquids, and squeezants is performed through process knowledge, when available. When process knowledge is insufficient to assign HWNs, sampling and analysis is performed on the waste container.

Except as provided in Sections 3.1–3.3, all sampling and analysis methods and procedures for AMWTP waste streams are performed using the method(s) specified in the following:


Any method or procedure not specified in the above documents shall be compatible with the requirements listed in the AMWTP HWMA/RCRA Permit, and be approved by the State of Idaho Department of Environmental Quality (DEQ). All deviations to documents specified above shall also be approved by the DEQ.
2.1 Sampling Design for Non-Debris Waste Drums

The sampling design for homogeneous solids and soil/gravel waste relies on using process knowledge to differentiate waste containers into the relatively homogeneous waste stream. Individual waste containers serve as convenient, representative units for characterizing the waste stream of interest. Once assigned to a waste stream, random selection and sampling of the waste containers are performed to estimate the concentrations of contaminants in each waste stream. The AMWTP maintains documentation to verify that the samples collected from within a waste stream were selected randomly.

For non-debris sludge drums that are not designated for disposal at WIPP, an initial five drums per waste stream are sampled and analyzed. For the purpose of this section only, a waste stream is defined as wastes which have similar physical composition and HWNs. The initial sampling frequency may be revised based upon a statistical re-evaluation. Additional samples are randomly determined, collected, and analyzed, if required by the statistical evaluation.

Alternatively, if historical information is available, preliminary estimates of the concentration and variance of each HWMA/RCRA-regulated contaminant in the waste may be used to determine the number of waste containers to select for sampling and analysis. If information is not available to make preliminary estimates, then the preliminary estimate is a minimum of five waste containers. The drums selected for the preliminary estimate are selected by simple random selection. The preliminary estimates are determined in accordance with the following equations:

\[
\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i \tag{Equation 2-1}
\]

\[
s^2 = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2 \tag{Equation 2-2}
\]

Where:

- \(\bar{x}\) is the calculated mean,
- \(s^2\) is the calculated concentration variance,
- \(n\) is the number of samples analyzed,
- \(x_i\) is the concentration determined in the \(i^{th}\) sample, and
- \(i\) is an index from 1 to \(n\).
Based upon the preliminary estimates of $\bar{x}$ and $s^2$ for each chemical contaminant of concern, the estimate or the appropriate number of samples ($n$) required to be collected for each contaminant are calculated using the following formulas from “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” current edition (SW-846):

$$n = \frac{t^2_{n_0-1}s^2}{(RT - x)^2}$$

Equation 2-3.

Where:

- $n$ = the calculated number of samples in the preliminary estimate,
- $t^2$ = the 90th percentile for a t distribution with $n_0$-1 degrees of freedom,
- $n_0$ = the initial number of samples used to calculate the preliminary sample estimate, and
- $RT$ = regulatory threshold of the contaminant [toxicity characteristic limit for TC wastes, program required quantitation limit for listed wastes].

The number of samples to be collected is based upon the largest $n$ calculated for each of the contaminants of concern. The actual number of samples collected shall be adjusted as necessary to ensure that an adequate number of samples are collected to allow for acceptable levels of completeness.

All calculations should be rounded up to the nearest integer. A minimum of five containers shall be sampled and analyzed in each waste stream.

For all contaminants where the number of samples analyzed was equal to or greater than the number of samples statistically determined to be required, no further analyses are required. For those contaminants of concern where the largest $n$ statistically determined was greater than the number of samples analyzed, then additional samples are required if the intent is to classify the waste as non-hazardous for those contaminants of concern.

Upon collection and analysis of the preliminary samples, or at any time after the preliminary samples have been analyzed, the AMWTP may assign HWNs to a waste stream rather than collecting additional samples. For waste streams with calculated upper confidence limits below the regulatory threshold, the AMWTP shall collect the required number of samples if the AMWTP intends to establish that the constituent is below the regulatory threshold.
2.2 Sampling Design for Debris Waste

Debris waste is primarily characterized by the identification of and IDC or WG via RTR and process knowledge. Headspace gas analysis is performed for debris drums with an unassigned IDC/WG or unknown HWNs.
3.0 AMWTP-SPECIFIC CHARACTERIZATION METHODS

3.1 Process Knowledge

Process knowledge, also referred to as acceptable knowledge, refers to using knowledge of the waste to assign IDCs/WGs and HWNs to waste. Process knowledge includes information regarding the physical form of the waste, the base materials composing the waste, and the process generating the waste. The collection and use of process knowledge information applies to all waste forms.

Process knowledge documentation provides primarily qualitative information that cannot be assessed according to specific quality assurance objectives that are used for analytical techniques. Process knowledge includes: records; management, procedural, and quality controls associated with the process generating the waste; historical sampling and analytical data; information about material inputs to the waste generating process; and information on the time period during which the waste was generated. The purpose of process knowledge documentation is to provide a clear and convincing argument to support the characterization of the waste.

Characterization, using process knowledge, starts at the IDC level to take advantage of the most detailed information available. IDCs are grouped into WGs as indicated by process knowledge and characterization data.

The process knowledge information is compiled in an auditable record. This information is confirmed using one or more of the following: RTR, sampling and analysis, visual examination, or other methods as appropriate or required. Process knowledge records shall also be assessed for completeness.

3.2 Real-Time Radiography

RTR has been developed by the DOE specifically to aid in the examination and identification of containerized waste. There is no equivalent or associated method found in EPA sampling and analysis guidance documents. The primary goal of RTR is to verify the physical form, presence of prohibited items, and confirm process knowledge.

RTR is a radiography system that normally consists of an x-ray producing device, an imaging system, an enclosure for radiation protection, a container handling system, an
audio/video recording system, and a control and data acquisition station. The RTR equipment utilizes controls in order to control image quality. The system allows personnel to vary the voltage to provide an optimum degree of penetration through the container. The container is scanned while personnel view the image on a monitor. An audio/videotape or equivalent recording on non-alterable media is made of the waste within the container. Typically, the RTR equipment is used to identify or confirm the waste stream description, packaging configuration, and identify WMF-676 prohibited items.

If radiography indicates that the waste does not match the waste stream description, a nonconformance report is completed and the inconsistency is resolved. The proper waste stream assignment is determined, the correct HWNs are assigned, and the resolution is documented.

### 3.3 Headspace Gas Sampling

Gas chromatography/mass spectrometry (GC/MS) is the principal method used to analyze the headspace gas. Headspace gas sampling may be used for characterizing non-debris drums with an unknown IDC/WG or unknown HWNs that is not destined for disposal at WIPP, if the off-Site disposal facility will accept headspace gas sampling as a characterization method.

### 3.4 Drum Coring

Drum core sampling may be used to analyze the non-debris waste drums. Drum core samples can be collected primarily in the drum core sample retrieval system (DCSRS) located within WMF-634. The DCSRS is used to extract a core from the waste in a drum at a randomly selected location. After the core has been extracted, a sample(s) is collected, which can be sent to a laboratory for analysis. The results from the sampling and analysis are used either to determine or verify HWNs for a given IDC/WG.
4.0 QUALITY ASSURANCE / QUALITY CONTROL

4.1 Quality Assurance

The quality assurance criteria for method accuracy, method precision, reporting limits, completeness, and sampling accuracy are identified through the method chosen for performing characterization in accordance with DEQ-approved methods or one of the resources listed in Section 3.0 (e.g., SW-846).

4.2 Quality Control

The quality control (QC) criteria for AMWTP characterization techniques are identified through the method chosen for performing characterization in accordance with DEQ-approved methods or one of the resources listed in Section 3.0 (e.g., SW-846). However, unlike most analytical techniques (e.g., GC/MS), standards and knowns are not readily available for RTR.

4.2.1 Quality Control of Real-Time Radiography

The RTR system involves qualitative and semi-quantitative evaluations of visual displays. QC during RTR is assured by operator training, equipment standards, and subsequent independent visual examinations of the waste to verify RTR results.

4.2.1.1 Real-Time Radiography Operator Training

Operator training and experience are the most important considerations for ensuring QC with regard to the operation of the RTR equipment and for interpretation and application of radiography results. Only trained personnel are allowed to operate RTR equipment.

RTR operators are instructed in the specific waste generating practices, typical packaging configurations, and associated waste material parameters expected to be found in each WG. On-the-job training and apprenticeship is conducted by an experienced, qualified operator prior to qualification of the training candidate.
A specific training program is used to assess operator performance before actual waste characterization. This training program employs exercises such as evaluation of simulated waste (non-radioactive materials), identification of waste drums containing greater than 50 volume percent debris waste, review of audio/videotapes of previous RTR examinations, and familiarization with estimating techniques. Standard nomenclature is established to ensure that all operators recognize waste by the same descriptors.

4.2.1.2 Quality Control Checks for Real-Time Radiography

Independent RTR examination is performed by the off-Site receiving facility, or the off-Site receiving facility’s designated representative. The data obtained from RTR verification shall be used to verify the IDC and/or WG and identify all discernable waste items, waste parameter weights, residual materials, and other appropriate waste material parameters.
5.0 DATA REPORTING, REDUCTION, AND VALIDATION

5.1 Reporting Requirements

All handwritten documentation is legible, made with indelible ink, signed, and dated. Corrections are marked with a single line, dated, and initialed. All documentation, including voided entries, are maintained within the AMWTP operating record. Electronic and video data are stored appropriately to ensure waste container identification, sample information, and associated QC data are readily retrievable.

Sampling records are kept during sampling operations. Daily activities are recorded in either bound notebooks or the data management system (DMS). Information recorded includes:

- Date, time, and place of sampling;
- Name of sampler;
- Samples collected;
- Sample preservation procedures used;
- Sampling procedures used and anomalies encountered; and
- Observations about samples (appearance, etc.).

All original laboratory data are recorded in a permanent manner, and are readily traceable through all steps of the data generation/reduction/validation/review process. Any anomalies in the samples or in the analytical methodology are immediately reported to the laboratory supervisor. The laboratory report may include associated raw data, laboratory logs, non-conformance records, memoranda, communication records, and any other documentation for the analysis of the reported samples. These data are reviewed and approved by the laboratory.

The results of the RTR examination for each waste container are documented. Audio/video recordings are stored as quality records. The RTR results and the visual examinations are recorded in the operating record/DMS, and any items that require removal prior to downstream treatment are noted. The DMS incorporates this information to update IDC-specific waste profiles to ensure that future containers with the same IDC are screened for similar SCW and/or prohibited items.
5.2 Data Deliverables

Contract laboratory personnel are required to perform the following minimum requirements for raw data collection and management:

- Sign and date all handwritten raw data;
- Record clearly, legibly, and accurately all waste characterization data, and include applicable sample identification numbers;
- Line out, initial, and date all changes to original data, include justification for changing the original data, and do not obliterate or otherwise mark original data so as to be unreadable;
- Transfer and reduce from field and laboratory records all data completely and accurately;
- Organize data into a standard format for reporting purposes; and
- Store all electronic and video data to ensure waste container, sample, and associated QC data are readily retrievable.

The documentation required to be delivered to the AMWTP includes tabulated results, case narrative, raw data, chromatograms, instrument printouts, and QC data. Laboratory results from contract laboratories include tabulated results of all samples, along with a cross reference of laboratory identification. The case narrative includes method summaries that detail any deviations from, or modifications to, the proposed methods, as applicable. Data are submitted in a report with sufficient detail, such that, independent validation of the data can occur and the report is organized into a standard format for reporting purposes.

5.3 Data Reduction

All measurement system outputs are reduced into units that are consistent with the methods and that meet the comparability objective. In general, all raw data are recorded in laboratory notebooks by the analyst performing the test, or on worksheets in standardized format, except for data electronically captured by instrument computers. Each analytical method contains detailed instructions and equations for calculating the respective analyte concentrations.

All computer programs used for data reduction or transmitting electronic data are controlled. Procedures are used that, at a minimum, control the version of the program being used.
5.4 Data Validation

Data validation assesses the quality of waste characterization data based upon project data quality indicators. The AMWTP performs validation (qualitative as well as quantitative) so that data used for compliance programs are of known and acceptable quality. Validation includes a quantitative determination of precision, accuracy, completeness, and method detection limits (as appropriate) for analytical data (volatile organic compounds, semi-volatile organic compounds, and metals data). Data validation is utilized to ensure that accurate information is generated and reported. Laboratory QA is used to ensure that the data are correctly reported. Any items affecting the quality of the data are identified, and the data are flagged accordingly.

If minor data package errors or omissions are identified, the AMWTP QA Officer and AMWTP management evaluate the nature of the problem and the data package is revised as necessary. If the problem cannot be rectified by correcting the data package or if the problem is of a recurring nature, a nonconformance report is generated.

Data validation is a systematic process of reviewing data against a set of criteria to identify outliers or errors and to delete suspect values or to flag them for the user. The data are checked for errors in transcription, calculations, and dilution factors and for compliance with QC requirements. Failure to meet method performance QC criteria results in reanalysis of the sample lot. After the initial review is completed, the data are collected from summary sheets, workbooks, or computer files and assembled into a data package.

The data generated for the AMWTP must be of a quality so as to be legally defensible. This requires that the analysis of the samples be precise and accurate, and the documentation generated during the sampling and analysis be precise and accurate.

5.5 Data Storage Requirements

The preferred method of data recording is electronic, whenever possible. Electronic data are transferred to hard copy when required. Electronic media are backed up as required in specific procedures.
6.0 QUALITY PROTOCOLS

The initial responsibility for assuring the quality of data lies with the sampling personnel. The lead sampler/operator is responsible for verifying that all QA procedures associated with waste sampling are followed. This requires that the lead sampler/operator assess the correctness of procedures and their ability to meet project objectives, and make a subjective assessment of the impact that a procedure has on sampling objectives and subsequent data quality.

If a quality problem occurs during characterization, the sampler/operator tries to correct the problem. If the problem cannot be corrected without loss of field data or samples, AMWTP environmental personnel are immediately contacted for additional instructions.

If a problem occurs that might jeopardize the integrity of the characterization process, cause an objective not to be met, or jeopardize data quality, the sampler/operator immediately stops, then notifies the AMWTP environmental personnel. The sampler/operator documents the situation, the objectives affected, the corrective action taken, and the results of that action. Copies of the documentation are provided to management and AMWTP environmental personnel. Management then notifies or consults with the appropriate individuals, including the AMWTP environmental personnel and the QA Engineer, who make recommendations for corrective actions.

6.1 Audits

Audits are conducted by the AMWTP QA Engineer, with outside assistance, as required. The laboratories are audited on all applicable areas (sample receipt, analysis, computer control, etc.) related to analysis, and in all disciplines (inorganic, organic, etc.) of the laboratory. Sampling activities are audited, as required. Audits are also performed to evaluate QA programs for off-Site generators.

An audit is an independent means of confirming the operation or capability of a measurement system and of documenting the use of QC measurements designed to generate valid data of known and acceptable quality. An audit is performed by a technically-qualified person who is not directly involved with the measurement system being evaluated.
6.2 Performance Audits

In addition to audits, method performance samples and blind audit samples may be used to evaluate the laboratory, as necessary.

6.3 Nonconformances

Nonconformances are uncontrolled and unapproved deviations from an approved plan, procedure, or expected result. All personnel are responsible for identifying and reporting nonconforming items and processes. Management is responsible for evaluating nonconformances and taking appropriate corrective action. A nonconformance report is prepared by the individual identifying the nonconformance, and the report is included in the Operating Record.

6.4 Corrective Action

Primary responsibility for corrective actions lies with the appropriate manager (operations, laboratory, etc.). These actions are initiated after coordination with the appropriate manager and auditing personnel, along with the AMWTP QA Manager, as necessary.
7.0 REFERENCES


