DURA PLATE 100 LINER CORROSION RESISTANT SYSTEM

Part 1. The Dura Plate 100 Liner System

The objective of this specification is to cover the supply and installation of a vacuum formed semi-rigid liner for use in wastewater and light industrial concrete structures to effectively shield the interior of the structure from corrosion.

The design of the liner system shall insure that it will conform to the contour of the structure and form a permanent mechanical bond to the concrete through use of preformed horizontal ribs and dovetails. The liner will be formed in such a manner that the joints between the structure sections will be afforded protection through the use of a continuous PVC return into the joint for a minimum of .50 of an inch. Provisions will be made to allow the pipe penetrations to be sealed by applying a cementitious corrosion resistant material to the unlined exposed areas within the openings.

Part 2. Material

2.1 Liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated, Tullytown, Pennsylvania.

2.2 Liner Composition - The liner, channel joints, H-joints and corner joints shall be manufactured from an Acrylic PVC Alloy.

All sheet compound will result in a semi-rigid material suitable for thermoforming to the contour of the structure and shall maintain a minimum wall thickness of .065 inches.

2.3 Rubber Joint Composition - The fabricated liner panels shall be joined together by a slotted strip of EPDM rubber according to the manufacturer's specification as illustrated in Figure 1A.

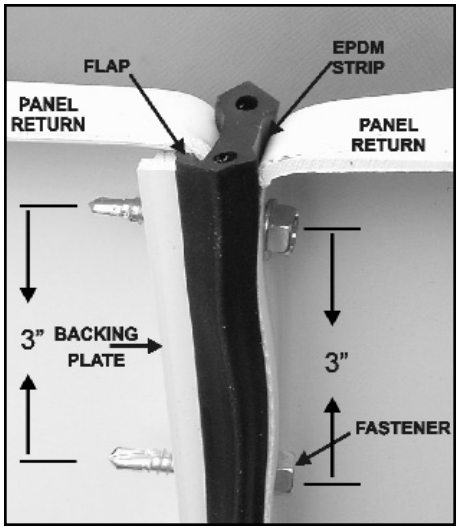

Figure 1A - Panel Joint Detail

2.4 Butyl Joint Composition - Sections of lined concrete structures shall be joined together by an approved butyl strip (A-LOK® Products, Inc. Tullytown, PA. MT-329) designed to produce sufficient squeeze-out between PVC returns.

Note: All EPDM and Butyl joint compound shall be formulated to meet the chemical resistant properties of Section 3.1.1.

Part 3. Physical Properties

3.1 General - All materials shall meet the physical and chemical resistant properties specified in the following appropriate section.

3.1.1 Physical Properties - All semi-rigid liner sheets, joint assembly components, corner and weld strips shall have the following properties when tested at 77 degrees +/- 5 degrees Fahrenheit.

Chemical Resistant:

Chemical	Solution
Sulfuric Acid (H2SO4)	20%
Sodium Hydroxide (NaOH)	5%
Ammonium Hydroxide (NH3OH)	5%
Nitric Acid (HNO3)	1%
Ferric Chloride (FeC13)	1%
Soap	0.10%
Detergent	0.10%

Physical Properties of Liner Panel:

Test	ASTM Method	Minimum Value
Tensile	D-638	6,100 psi
Elongation	D-638	28.5%
Tensile Modulus	D-638	325,000 psi
Flexural Strength	D-790	9,200 psi
Flexural Modulus	D-790	340,000 psi
Tensile Impact	D-1822	640 in-lb
Gardner Drop Dart	D-5420	90 ft-lb/in2

3.1.2 Antifungal and Antibacterial Properties - Dura Plate 100 Liner shall be made from Acrylic PVC Alloy sheets that resist bacteriological and fungal development. Sheet shall not readily provide a source of nutrients for bacteria and fungi. Plasticizers that allow a source of nutrients which support microbial growth for bacterial or fungal growth shall not be permitted.

Sheet shall be subjected to fungus resistance testing in accordance with ASTM G-21 and bacteria resistance testing in accordance with ASTM G-22, Procedure B.

Fungus Resistance Testing, ASTM G-21: Eighteen day cultures of the following pure culture fungi were harvested, washed and their spore counts adjusted to 1,000.000 (±200,000 per ml).

Organism	ATCC Number
Aspergillus niger	9642
Penicillium pinophilum	11797
Gliocladium virans	9645
Aureobasidum pullulans	15233
Chaetomium globosum	6205

The spore suspensions were combined and sprayed on the samples and controls which were placed on mineral salts agar and placed in the test chamber.

The samples, along with controls were incubated for 28 days and examined weekly.

Sample Designation	Observations (Rating*)			
Thermoplastic Sheet:	7 Days	14 Days	21 Days	28 Days
#1	0	0	0	0
#2	0	0	0	0
#3	0	0	0	0
#4	0	0	0	0
Controls:				
Filter Paper	4	4	4	4
Glass Slides	0	0	0	0

*Rating: 0=no growth. 1=traces, 2=light, 3=moderate, 4=heavy growth

Bacteria Resistance Testing, ASTM G-22: Conclusion of Fungus Resistance Testing: The sheet samples did not allow any fungus growth (rating of 0).

A twenty-four hour culture of Pseudomonas aeruginosa (ATCC 13388) was harvested and washed three times by centrifugation using sterile distilled water. The bacterial suspension was added to sterile, melted minerals salts agar, mixed and plates poured. A sample of the inoculated agar was taken and a plate count to determine the number of viable pseudomonas present.

Sample Designation	Observations (Rating*)		
Thermoplastic Sheet:	7 Days	14 Days	21 Days
#1	0	0	0
#2	0	0	0
#3	0	0	0
#4	0	0	0
Controls:			
Inoculated Agar	0	0	0
Glass Slides	0	0	0
Plate Count Agar	1	1	1

*Rating: 0=no growth, 1=growth

Conclusion of Bacteria Resistance Testing: The sheet samples did not allow any bacterial growth (rating of 0).

Part 4. Details and Dimensions of Standard Liner

4.1 Liner panels shall have a minimum thickness of .065 inches. A combination of standing ribs and mechanical dovetails shall be used to secure the liner panels to the wall of the structure and shall be spaced a maximum of 6.0 inches apart.

4.2 Liner panels with a combination of standing ribs and dovetails in diameters of 48" through 60" shall be at least .50 inches high. Panels of 72" diameter and above shall be at least .75 inches high.

4.3 Liner with locking extensions shall be able to withstand a test pull of 100 pounds per linear inch applied perpendicular to the concrete surface for a period of 60 seconds. No rupture of the locking extensions or withdrawal from embedment shall be acceptable. This test shall be made at a temperature between 70 and 80 degrees Fahrenheit inclusive.

4.4 Liner panels shall be formed to the correct radius to assure a true diameter match between joined precast sections when assembled.

4.5 Liner panels shall be formed with a continuous return into the joint for a minimum of .50 of a inch which shall afford protection between the lined precast sections.

4.6 All radius panels shall be vacuum tested for pinholes during the molding process and shall withstand a minimum of 25 inches of mercury for a period of 60 seconds.

4.7 Panel sections shall be custom formed to a specified height not to exceed 6' in overall length. Lengths specified shall include a tolerance ratio of +/- .0625 per foot.

Part 5. Plant Installation of Liner

5.1 General - Installation of all lining shall be done in accordance with the manufacturer's recommendations.

5.2 Lining coverage shall not be less than the minimum shown on the approved shop drawings or construction plans.

5.3 The liner panels when assembled shall form a circular cylinder that fits snugly against the inner steel core of the form. A removable extruded rubber profile or suitable one-sided tape can be used to seal the liner against the core to prevent concrete fines from washing down between the liner and steel core.

5.4 Concrete poured around the liner shall be distributed evenly to prevent shifting of the liner.

5.5 Concrete poured against the liner shall be vibrated, or compacted in a manner to protect the liner and produce a dense homogenous concrete to securely anchor the assembly to the exposed surfaces on the interior of the structure.

5.6 When extracting the steel core, care should be taken to protect the liner from damage. Instruments with sharp or jagged edges should not be used to release the forms from the liner.

5.7 Visual inspection of the liner shall be made after demolding and any cuts or tears shall be repaired by following the manufacturer's repair recommendations.

5.8 The concrete producer shall take all necessary measures to prevent damage due to casting, demolding, and delivery of the lined concrete structure.

Part 6. Field Installation of Lining

6.1 General - Field installation of all lined precast sections shall be done in accordance with the recommendations of the manufacturer.

6.2 The horizontal joints between sections of lined concrete structures can be made by either butyl or a combination of butyl and rubber joint per the recommendation of the concrete manufacturer. (See Fig. 2)

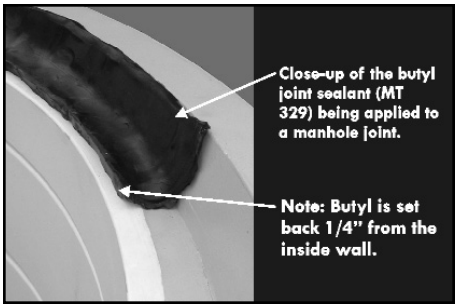

Figure 2 - Butyl Joint

6.3 Joint surfaces must be clean to ensure proper adhesion of the butyl. An application of a butyl based primer will produce the highest degree of adhesion to the joint surfaces.

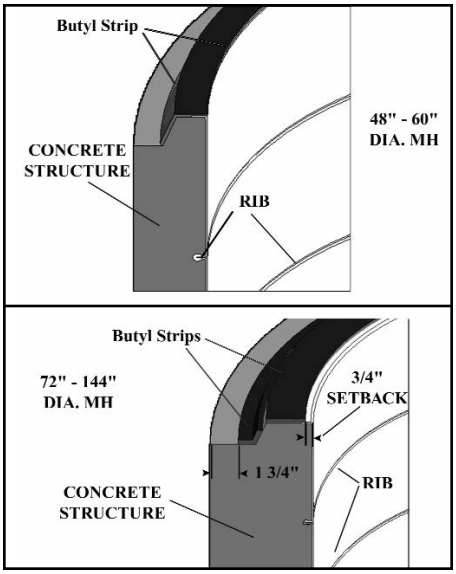

Figure 2A - Spigot Up Joint Detail

6.4 Place specified butyl material as indicated in Figures 2A and 3A. Butt ends of material together. Material should never be overlapped. Butyl material shall be an approved strip per Section 2.4.

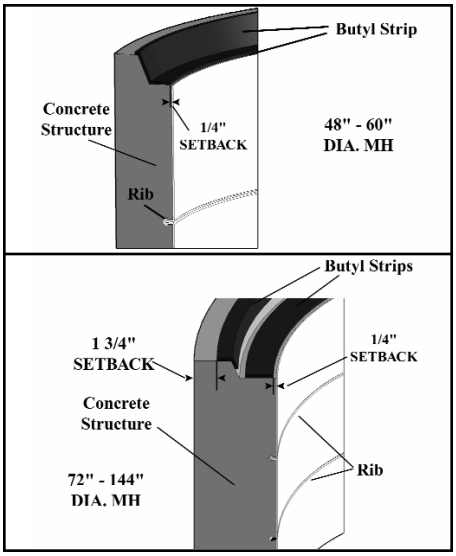

Figure 3A - Bell Up Joint Detail

6.5 Lined sections should be carefully centered and lowered to complete coupling process. Apply sufficient pressure to properly seat joint and achieve squeeze out.

6.6 After structure is in place, care should be taken to properly plug all lift pin inserts or holes with a suitable non-shrink grout.

6.7 The installing contractor shall take all necessary measures to prevent damage to the liner due to material handling, installation, or equipment or material used in installing, or used in or taken through the structure.

Part 7. Testing and Inspection

7.1 General - This section covers the in-plant and field inspection and testing method of lined concrete sections.

7.2 The liner manufacturer shall test each panel to withstand a constant vacuum of 25 inches of mercury for a period of 60 seconds. Any sections failing to meet this requirement shall be rejected.

7.3 In-plant inspections of panels cast into concrete sections shall be visually inspected for cuts or tears and shall be repaired following the manufacturers recommendations.

Part 8. Liner Appurtenances

8.1 Steps or Ladders

8.1.1 Steps shall be attached by either casting a preformed polypropylene insert to accept a polypropylene drive in step (Fig. 4), or by casting or drilling a precise hole to accept a polypropylene press fit step (Fig. 4A), as per the recommendations of the step manufacturer.

8.1.2 After installation of either the steps or ladders, the junction point of the device and the liner shall be sealed by applying an approved butyl caulking material (A-LOK® Products, Inc., Tullytown, Pennsylvania, Lap Sealant).

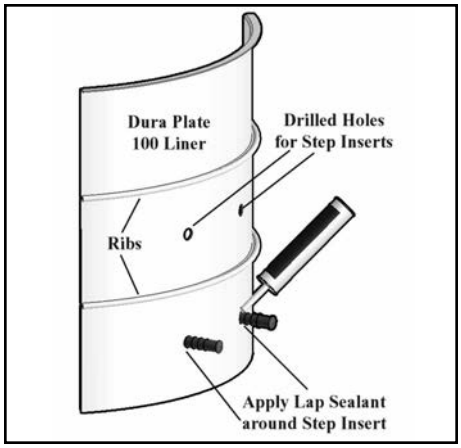

Figure 4 - Casting in Polypropylene Step Insert

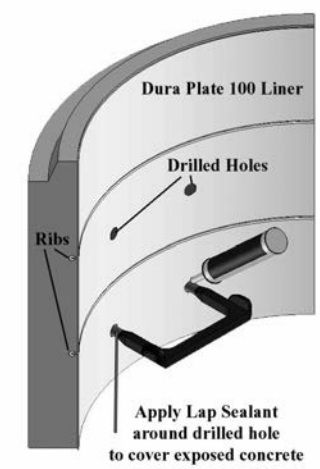

Figure 4A - Drilled Hole Detail for Steps or Ladders

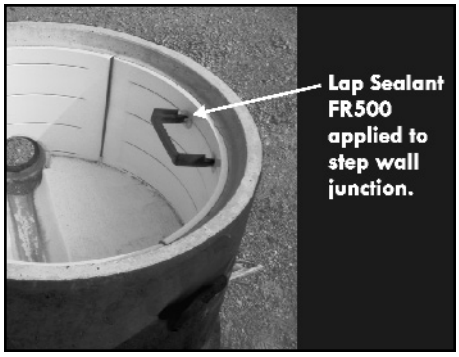

Figure 5

8.2 Hole Liners

8.2.1 Pipe penetrations through the lined wall shall be afforded protection by applying .125 inch trowelable, chemical and corrosion resistant epoxy mortar to the unlined exposed areas within the openings and shall overlap the liner wall a minimum of 1.50 inches as illustrated in Figure 5A.

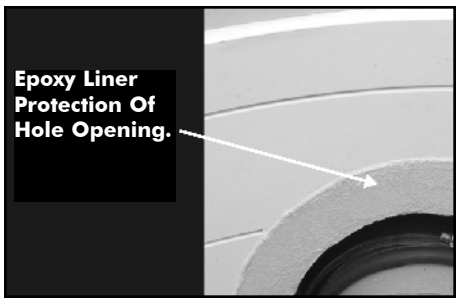

Figure 5A - Hole Liner Detail

8.3 Grade Work Protection

8.3.1 Corrosion protection between the lined concrete structure and the cast iron frame and cover shall be obtained through the use of a telescoping Liner System (A-LOK® Products, Inc.,

Tullytown, Pennsylvania, Water-LOK Connector) illustrated in Figure 6A below.

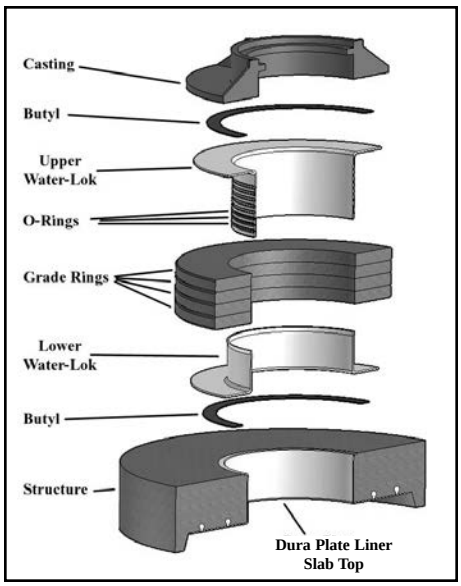

Figure 6A - Water-LOK Components and Duraplate Slab Top Liner

8.3.2 Corrosion protection shall be afforded for aluminum entry frames and doors by fabricating a semi-rigid riser to match the inside dimensions of the access frame.

Part 9. Warranty

A-LOK® Products, Incorporated warrants that the product described in this bulletin meets that material, quality, and workmanship conformable to the recommended use.

A-LOK® Products, Incorporated liability is limited to replacement or repair of defective parts, excluding cost of removal, installation or unauthorized repairs. A-LOK® Products will not be responsible for incidental or consequential damages or for products which have been altered or modified. No representative of the company, or any other person, has the authority to waive, alter or add to this guarantee or to assume for the company any obligation or liability in connection with the sale or installation of A-LOK® Products, Inc. products. This warranty is in lieu of all other warranties, express or implied.

A-LOK® Products, Inc. Standard Terms and Conditions of Sale apply to purchase of this product.

All information is subjected to change without notice.

Part 10. Specifications of Manhole Coatings and Linings

Interior Lining

(1) The concrete structure shall have a liner that is integrally cast with the precast section, at the time of manufacture.

(2) The liner shall be manufactured from an acrylic modified PVC alloy.

(3) The liner shall be thermo-vacuum formed to create a semi-rigid liner.

(4) The liner shall conform to the interior diameter of the structure.

(5) The liner shall be formed with dovetail ribs so that it is securely anchored to the concrete structure.

(6) The liner shall be formed with returns into the bell and spigot joints to allow for butyl sealant to be placed and to eliminate the need for any field welding of the joint.

(7) The liner shall be light in color to reflect light.

(8) The liner shall have both antifungal and antibacterial properties that will not readily provide a source of nutrients for bacteria or fungi.

(9) The liner shall be a minimum of .065" thick.

(10) The liner panels shall be joined together by an EPDM slotted rubber strip.

(11) All materials shall meet the physical and chemical properties specified in the appropriate ASTM specification.

(12) The liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated. Tullytown, PA, or approved equal.

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FLATWALL DURA PLATE 100 LINER CORROSION RESISTANT SYSTEM

Part 1. Interior of Duraplate lined box

The objective of this specification is to cover the supply and installation of a vacuum formed semi-rigid liner for use in wastewater and light industrial concrete structures to effectively shield the interior of the structure from corrosion.

The design of the liner system shall insure that it will conform to the contour of the structure and form a permanent mechanical bond to the concrete through use of dovetails, welded to the flat sheet. The liner will be formed in such a manner that the joints between the structure sections will be afforded protection through the use of a continuous PVC return into the joint for a minimum of .50 of an inch. Provisions will be made to allow the pipe penetrations to be sealed by applying a cementitious corrosion resistant material to the unlined exposed areas within the openings.

Part 2. Material

2.1 Liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated, Tullytown, Pennsylvania.

2.2 Liner Composition - The liner, channel joints, and corner joints shall be manufactured from an Acrylic PVC Alloy.

All sheet compound will result in a semi-rigid material suitable for thermoforming to the contour of the structure and shall maintain a minimum wall thickness of .065 inches.

2.3 Rubber Joint Composition - The fabricated liner panels shall be joined together by a slotted strip of EPDM rubber according to the manufacturer's specification as illustrated in Figure 1A.

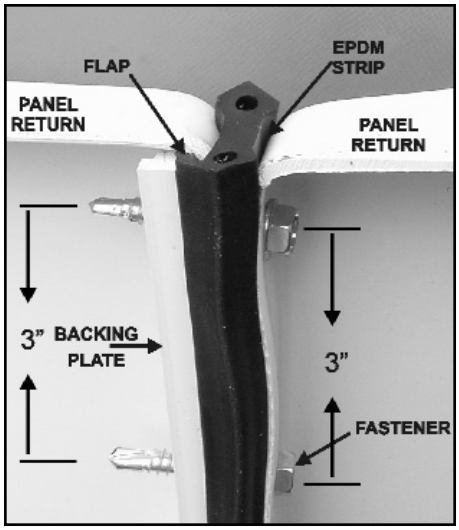

Figure 1A - Panel Joint Detail

2.4 Butyl Joint Composition - Sections of lined concrete structures shall be joined together by an approved butyl strip (A-LOK® Products, Inc. Tullytown, PA. MT-329) designed to produce sufficient squeeze-out between PVC returns.

Note: All EPDM and Butyl joint compound shall be formulated to meet the chemical resistant properties of Section 3.1.1.

Part 3. Physical Properties

3.1 General - All materials shall meet the physical and chemical resistant properties specified in the following appropriate section.

3.1.1 Physical Properties - All semi-rigid liner sheets, joint assembly components, corner and weld strips shall have the following properties when tested at 77 degrees +/- 5 degrees Fahrenheit.

Chemical Resistant:

Chemical	Solution
Sulfuric Acid (H2SO4)	20%
Sodium Hydroxide (NaOH)	5%
Ammonium Hydroxide (NH3OH)	5%
Nitric Acid (HNO3)	1%
Ferric Chloride (FeC13)	1%
Soap	0.10%
Detergent	0.10%

Physical Properties of Liner Panel:

Test	ASTM Method	Minimum Value
Tensile	D-638	6,100 psi
Elongation	D-638	28.5%
Tensile Modulus	D-638	325,000 psi
Flexural Strength	D-790	9,200 psi
Flexural Modulus	D-790	340,000 psi
Tensile Impact	D-1822	640 in-lb

3.1.2 Antifungal and Antibacterial Properties - Dura Plate 100 Liner shall be made from Acrylic PVC Alloy sheets that resist bacteriological and fungal development. Sheet shall not readily provide a source of nutrients for bacteria and fungi. Plasticizers that allow a source of nutrients which support microbial growth for bacterial or fungal growth shall not be permitted.

Sheet shall be subjected to fungus resistance testing in accordance with ASTM G-21 and bacteria resistance testing in accordance with ASTM G-22, Procedure B.

Fungus Resistance Testing, ASTM G-21: Eighteen day cultures of the following pure culture fungi were harvested, washed and their spore counts adjusted to 1,000.000 (±200,000 per ml).

Organism	ATCC Number
Aspergillus niger	9642
Penicillium pinophilum	11797
Gliocladium virans	9645
Aureobasidum pullulans	15233
Chaetomium globosum	6205

The spore suspensions were combined and sprayed on the samples and controls which were placed on mineral salts agar and placed in the test chamber.

The samples, along with controls were incubated for 28 days and examined weekly.

Sample Designation	Observations (Rating*)			
Thermoplastic Sheet:	7 Days	14 Days	21 Days	28 Days
#1	0	0	0	0
#2	0	0	0	0
#3	0	0	0	0
#4	0	0	0	0
Controls:				
Filter Paper	4	4	4	4
Glass Slides	0	0	0	0

*Rating: 0=no growth. 1=traces, 2=light, 3=moderate, 4=heavy growth

Bacteria Resistance Testing, ASTM G-22: Conclusion of Fungus Resistance Testing: The sheet samples did not allow any fungus growth (rating of 0).

A twenty-four hour culture of Pseudomonas aeruginosa (ATCC 13388) was harvested and washed three times by centrifugation using sterile distilled water. The bacterial suspension was added to sterile, melted minerals salts agar, mixed and plates poured. A sample of the inoculated agar was taken and a plate count to determine the number of viable pseudomonas present.

Sample Designation	Observations (Rating*)		
Thermoplastic Sheet:	7 Days	14 Days	21 Days
#1	0	0	0
#2	0	0	0
#3	0	0	0
#4	0	0	0
Controls:			
Inoculated Agar	0	0	0
Glass Slides	0	0	0
Plate Count Agar	1	1	1

*Rating: 0=no growth, 1=growth

Conclusion of Bacteria Resistance Testing: The sheet samples did not allow any bacterial growth (rating of 0).

Part 4. Details and Dimensions of Standard Liner

4.1 Liner panels shall have a minimum thickness of .065 inches. A combination of standing ribs and mechanical dovetails shall be used to secure the liner panels to the wall of the structure and shall be spaced a maximum of 6.0 inches apart.

4.2 Liner panels with horizontal and vertical dovetails in custom sizes up to a 50" (W) x 90" (H) panel.

4.3 Liner with locking extensions shall be able to withstand a test pull of 100 pounds per linear inch applied perpendicular to the concrete surface for a period of 60 seconds. No rupture of the locking extensions or withdrawal from embedment shall be acceptable. This test shall be made at a temperature between 70 and 80 degrees Fahrenheit inclusive.

4.4 Liner panels shall be formed to the correct size of each flat wall structure.

4.5 Liner panels shall be formed with a continuous return into the joint for a minimum of .50 of a inch which shall afford protection between the lined precast sections.

4.6 All panels shall be vacuum tested for pinholes during the molding process and shall withstand a minimum of 25 inches of mercury for a period of 60 seconds.

4.7 Panel sections shall be custom formed to a specified height not to exceed 90" in overall length. Lengths specified shall include a tolerance ratio of +/- .0625 per foot.

Part 5. Plant Installation of Liner

5.1 General - Installation of all lining shall be done in accordance with the manufacturer's recommendations.

5.2 Lining coverage shall not be less than the minimum shown on the approved shop drawings or construction plans.

5.3 The liner panels when assembled shall form a flat wall that fits snugly against the inner steel core of the form. A removable extruded rubber profile or suitable one-sided tape can be used to seal the liner against the core to prevent concrete fines from washing down between the liner and steel core.

5.4 Concrete poured around the liner shall be distributed evenly to prevent shifting of the liner.

5.5 Concrete poured against the liner shall be vibrated, or compacted in a manner to protect the liner and produce a dense homogenous concrete to securely anchor the assembly to the exposed surfaces on the interior of the structure.

5.6 When extracting the steel core, care should be taken to protect the liner from damage. Instruments with sharp or jagged edges should not be used to release the forms from the liner.

5.7 Visual inspection of the liner shall be made after demolding and any cuts or tears shall be repaired by following the manufacturer's repair recommendations.

5.8 The concrete producer shall take all necessary measures to prevent damage due to casting, demolding, and delivery of the lined concrete structure.

Part 6. Field Installation of Lining

6.1 General - Field installation of all lined precast sections shall be done in accordance with the recommendations of the manufacturer.

6.2 The horizontal joints between sections of lined concrete structures can be made by either butyl or a combination of butyl and rubber joint per the recommendation of the concrete manufacturer. (See Fig. 2)

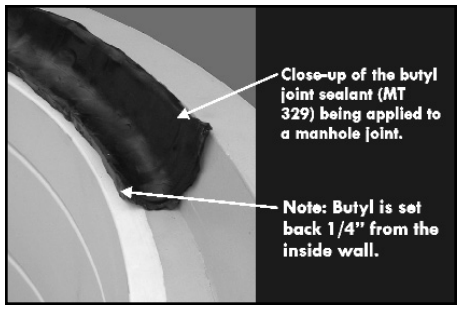

Figure 2 - Butyl Joint

6.3 Joint surfaces must be clean to ensure proper adhesion of the butyl. An application of a butyl based primer will produce the highest degree of adhesion to the joint surfaces.

6.4 Place specified butyl material. Butt ends of material together. Material should never be overlapped. Butyl material shall be an approved strip per Section 2.4.

Figure 3 - Duraplate Liner attached to box bottom

6.5 Lined sections should be carefully centered and lowered to complete coupling process. Apply sufficient pressure to properly seat joint and achieve squeeze out.

6.6 After structure is in place, care should be taken to properly plug all lift pin inserts or holes with a suitable non-shrink grout.

6.7 The installing contractor shall take all necessary measures to prevent damage to the liner due to material handling, installation, or equipment or material used in installing, or used in or taken through the structure.

Part 7. Testing and Inspection

7.1 General - This section covers the in-plant and field inspection and testing method of lined concrete sections.

7.2 The liner manufacturer shall test each panel to withstand a constant vacuum of 25 inches of mercury for a period of 60 seconds. Any sections failing to meet this requirement shall be rejected.

7.3 In-plant inspections of panels cast into concrete sections shall be visually inspected for cuts or tears and shall be repaired following the manufacturers recommendations.

Part 8. Liner Appurtenances

8.1 Steps or Ladders

8.1.1 Steps shall be attached by either casting a preformed polypropylene insert to accept a polypropylene drive in step (Fig. 4), or by casting or drilling a precise hole to accept a polypropylene press fit step (Fig. 4A), as per the recommendations of the step manufacturer.

8.1.2 After installation of either the steps or ladders, the junction point of the device and the liner shall be sealed by applying an approved butyl caulking material (A-LOK® Products, Inc., Tullytown, Pennsylvania, Lap Sealant).

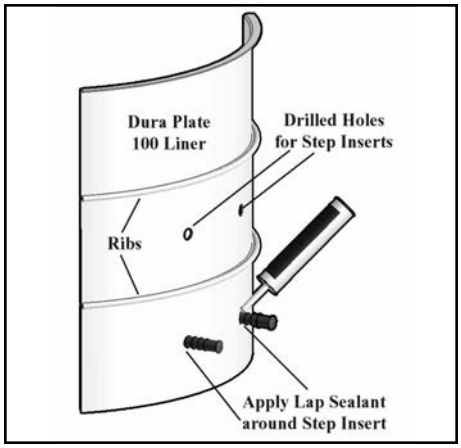

Figure 4 - Casting in Polypropylene Step Insert

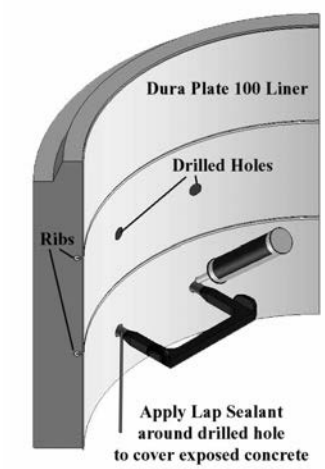

Figure 4A - Drilled Hole Detail for Steps or Ladders

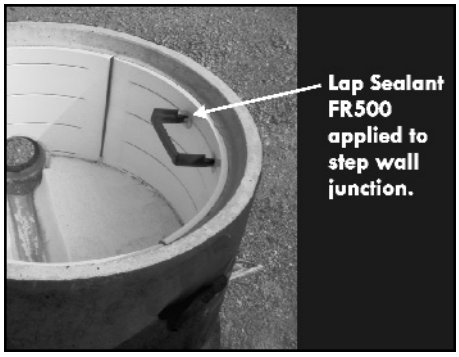

Figure 5

8.2 Hole Liners

8.2.1 Pipe penetrations through the lined wall shall be afforded protection by applying .125 inch trowelable, chemical and corrosion resistant epoxy mortar to the unlined exposed areas within the openings and shall overlap the liner wall a minimum of 1.50 inches as illustrated in Figure 5A.

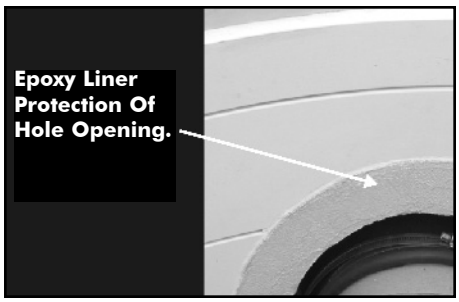

Figure 5A - Hole Liner Detail

8.3 Grade Work Protection

8.3.2 Corrosion protection shall be afforded for aluminum entry frames and doors by fabricating a semi-rigid riser to match the inside dimensions of the access frame.

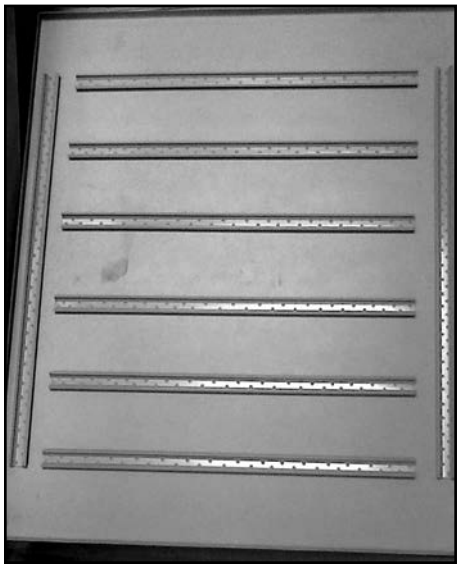

Figure 7A - Dovetailed shaped ribs secure each panel when cast into the concrete structure.

Part 9. Warranty

A-LOK® Products, Incorporated warrants that the product described in this bulletin meets that material, quality, and workmanship conformable to the recommended use.

A-LOK® Products, Incorporated liability is limited to replacement or repair of defective parts, excluding cost of removal, installation or unauthorized repairs. A-LOK® Products will not be responsible for incidental or consequential damages or for products which have been altered or modified. No representative of the company, or any other person, has the authority to waive, alter or add to this guarantee or to assume for the company any obligation or liability in connection with the sale or installation of A-LOK® Products, Inc. products. This warranty is in lieu of all other warranties, express or implied.

A-LOK® Products, Inc. Standard Terms and Conditions of Sale apply to purchase of this product.

All information is subjected to change without notice.

Part 10. Specifications of Manhole Coatings and Linings

Interior Lining

(1) The concrete structure shall have a liner that is integrally cast with the precast section, at the time of manufacture.

(2) The liner shall be manufactured from an acrylic modified PVC alloy.

(3) The liner shall be thermo-vacuum formed to create a semi-rigid liner.

(4) The liner shall conform to the interior size of the structure.

(5) The liner shall be formed with dovetail ribs so that it is securely anchored to the concrete structure.

(6) The liner shall be formed with returns into the bell and spigot joints to allow for butyl sealant to be placed and to eliminate the need for any field welding of the joint.

(7) The liner shall be light in color to reflect light.

(8) The liner shall have both antifungal and antibacterial properties that will not readily provide a source of nutrients for bacteria or fungi.

(9) The liner shall be a minimum of .065" thick.

(10) The liner panels shall be joined together by an EPDM slotted rubber strip.

(11) All materials shall meet the physical and chemical properties specified in the appropriate ASTM specification.

(12) The liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated. Tullytown, PA, or approved equal.

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Dura-Plate 100 Manhole Liner

Precast Installation Guidelines

1. Warehousing Dura-Plate Sections Prior to Casting
2. Assembly of Dura-Plate Riser and Base Components
3. Assembly of Slab Top Components
4. Installing Assembling Components on Forms
5. Installing Lifting Provisions
6. Curing of Cast Components without Steam
7. De-Molding Dura-Plate from Molds
8. Lining Pipe Penetrations
9. Storage and Handling of Cast Dura-Plate Sections
10. Shipping of Dura-Plate Sections
11. Installing Dura-Plate Structures / Joint Surface Preparation
12. Testing and Inspection

Note: Information supplied as a quick reference for Dura-Plate projects to be used in conjunction with Standard Specification for Corrosion Protection copyright 1994.

1. Warehousing Dura-Plate Sections Prior to Casting

A) Material should be kept in a dry secure location and moved into production as needed.

2. Assembly of Dura-Plate Riser and Base Components

A) Riser and Base Components shall be assembled in accordance with Figure 1A of the standard specification.

B) Form required as a fixture.

C) A level area will be required for assembly.

D) Fasteners shall be placed on 3” centers.

3. Assembly of Slab Top Components

A) Slab Tops 48” diameter are shipped in one piece.

B) Slab Tops 60” and 72” require assembly as illustrated. Can be assembled prior to shipment by A•LOK Products if advised.

4. Installing Assembled Components on Forms

A) Follow general installation procedures outlined in section 5 of the standard specifications.

B) When pouring base sections shorter than core height, duct tape and seal liner to core to prevent excessive bleeding between liner and core.

C) Installing steps can be accomplished either by drilling after casting, or making provisions in the liner prior to casting for step pins. Follow procedures as illustrated in Figure 5A in standard specification under section 9 for installing steps.

D) Openings for pipe penetrations should be jigsaw cut prior to casting. Use hole former as template for opening. Follow procedures as illustrated in Figure 6A in standard specification under section 9 for lining holes.

E) Tools with sharp or jagged edges should not be used to release the forms from the liner.

5. Installing Lifting Provisions

A) Preferred lifting provisions shall be of a non-penetrating type (i.e. swift lift).

B) If penetrating lift provisions are used, **they must be filled and properly sealed after contractor installation as not to provide a point of infiltration.**

6. Curing of Cast Components without Steam

A) Curing of lined sections shall be done **without** steam.

B) Temperature should never exceed 170°F., No direct heat should be applied to the core surface of the form.

7. De-Molding Dura-Plate from Molds

A) When extracting steel core from cured lined sections follow recommendations outlined in section 5 of the standard specification.

B) Tools with sharp or jagged edges should not be used to release the forms from the liner.

8. Lining Pipe Penetrations

A) All pipe penetrations requiring lining shall be treated following recommendations outlines in section 9.2.1 of the standard specification as illustrated in Figure 6A.

9. Storage and Handling of Cast Dura-Plate Sections

A) Care shall be taken to yard all material in a manner to protect liner from coming in direct contact with frozen ground, or submerging liner in prolonged ice. Lined sections should never be placed on surface that would puncture the liner.

10. Shipping of Dura-Plate Sections

A) When shipping Dura Plate lined structure components, care should be taken to protect liner from chains and binders.

B) Care shall be taken on delivered components in a manner to protect liner from coming in direct contact with frozen ground or

submerging liner in prolonged ice. Lined sections should **NEVER** be placed on a surface that would puncture the liner.

C) Do not allow lined structures to sit unprotected outdoors in wet or freezing temperatures for extended periods of time.

11. Installing Dura-Plate Structures / Joint Surface Preparation

A) Structures shall be installed following recommendations outlined in section 6 of the standard specification.

B) Highly recommended an application of a butyl-based primer be applied as outlined in section 6.3 of standard specification when using an all butyl joint design as illustrated in Figure 2A.

C) Butyl shall be of proper size as dictated by annular space.

D) If lifting provisions are of a penetrating type, it is recommended that all pins be plugged and filled with materials to prevent infiltration prior to backfill.

12. Testing and Inspection

A) In-plant testing of lined sections shall be conducted as outlined in section 7.3 of the standard specification.

B) If vacuum testing of installed structure is required, liner shall be properly supported as not to put excessive force on liner. It would be recommended to have an A•LOK representative assist contractor on initial test as to instruct on proper procedures of supporting liner.

Note: Information supplied as a quick reference for Dura-Plate projects to be used in conjunction with Standard Specification for Corrosion Protection copyright 1994.

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LABORATORY REPORT

Date: December 15, 2017

Purpose:

To determine the acid resistance of Dura-Plate 100 Epoxy Mortar.

Description:

A cured sample of material is weighed and examined for its color and texture. It is then immersed in 20% sulfuric acid and allowed to soak at room temperature for 2724 days. At the end of the 2724 days, the sample is rinsed for 10 seconds in deionized water and allowed to air dry for 4 hours. The sample is then reweighed and reexamined for color and texture. Changes in any properties are to be noted.

Results:

	Dura-Plate 100 w/ Colorant		Dura-Plate 100 w/o Colorant	
	Before Acid Soak	After Acid Soak	Before Acid Soak	After Acid Soak
Weight	15.4256 g	15.4261 g	21.6233 g	21.6238 g
Color	Uniform gray	Uniform gray	Dark sand	Dark sand
Texture	Smooth/rough	Smooth/rough	Smooth/rough	Smooth/rough

Smooth/rough for texture refers to the two-sided nature of the samples where one side is very smooth where it was cast against release liner and the other side was very rough. The results show no discernable change in either sample as a result of the acid soak.

Conclusions:

Dura-Plate 100 meets or exceeds the acid resistance requirement for the application. The acid soak will continue and this report will be revised at a later date.

Prepared By:
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