



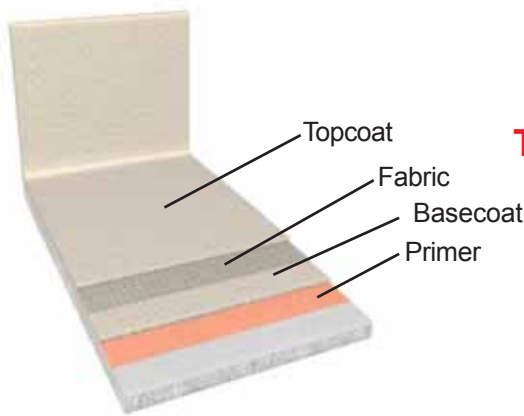
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## ChemPruf 2411 Series (Novolac Vinyl Ester)

This file contains the following literature for ChemPruf 2411 Lining System

- Pages 2 - 4 ..... Data Sheet
- Pages 5 - 10 ..... Installation Instructions - ChemPruf 2411 Lining System
- Pages 11 - 16 ..... Installation Instructions - ChemPruf 2411 AO Lining System



### The ChemPruf 2411 Series

- Primer
- Basecoat (1/16")
- Fabric Reinforcement
- Topcoat (1/16")

#### ChemPruf 2411 Series:

The trowel applied basecoat and topcoat are reinforced with an intermediate layer of fabric

#### Where to use the ChemPruf 2411 Series

- Storage Tanks
- Scrubbers & Absorbers
- Clarifiers
- Containment Dikes
- Trenches
- Sumps
- Floors



## CHEMPRUF 2411 SERIES

### ChemPruf 2411 Lining System ChemPruf 2411 AO Lining System

#### DESCRIPTION

CHEMPRUF 2411 SERIES of linings are highly chemical resistant fabric reinforced lining systems. Applied to concrete and steel substrates, the CHEMPRUF 2411 SERIES Lining Systems are composed of a **novolac vinyl ester** resin, an inert filled basecoat, fabric reinforcement and an inert filled topcoat. The 1/8" (3.2 mm.) linings can be used in immersion service to 180°F (82°C) and in intermittent service to 210°F (99°C).

The CHEMPRUF 2411 SERIES is designed for primary or secondary containment applications for tanks, trenches, containment dikes, absorbers, scrubbers and floors. The CHEMPRUF 2411 SERIES may be used as a lining or as a membrane in conjunction with chemically resistant brick sheathing. When used as a membrane, the lining can be used at higher process temperatures.

#### CHEMICAL RESISTANCE

The CHEMPRUF 2411 Lining System provides excellent resistance to bleaches, sodium hypochlorite, a wide range of organic solvents, organic acids and oxidizing and non-oxidizing acids. CHEMPRUF 2411 Lining System is specifically resistant to glacial acetic acid, chromic acid to 20%, nitric acid to 40%, sulfuric acid to 75%, benzene, methyl ethyl ketone and styrene. Refer to the CHEMPRUF 2000 SERIES Chemical Resistance Chart, 4-2000, for specific information.

**ChemPruf 2411** is a silica filled basecoat and topcoat with an intermediate layer of fiberglass reinforcement system.

**ChemPruf 2411 AO** is a silica filled basecoat, an intermediate layer of fiberglass reinforcement and an aluminum oxide filled topcoat system. This abrasion resistant system is preferred for service conditions with abrasive slurries, high velocity air containing particulate matter or environments exposed to flourides, flouride salts and sodium hydroxide.

#### CHEMPRUF 2411 SERIES Consists of:

##### PRIMER

**ChemPruf VE Primer**, a two-component, brush or roller applied penetrating primer.

#### PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	TYPICAL VALUE 2411
Density, Composite	ASTM C905	117 lb./cu. ft. (1.87 g./cc.)
Tensile Strength, Composite 7 days @ 77°F (25°C)	ASTM D638	3,000 psi. (20.7 MPa)
Compressive Strength, Mortar 7 days @ 77°F (25°C)	ASTM C579	10,000 psi. (68.9 MPa)
Flexural Strength, Composite 7 days @ 77°F (25°C)	ASTM C580	5,000 psi. (34.5 MPa)
Coefficient of Thermal Expansion, Composite in./in./°F (cm./cm./°C)	ASTM C531	1.5 x 10 <sup>-5</sup> (2.7 x 10 <sup>-5</sup> )
Temp. Resistance, Composite Immersion Continual, °F (°C) Immersion Intermittent, °F (°C) Dry Heat, °F (°C)		180°F (82°C) 210°F (99°C) 330°F (166°C)
Hardness, Barcol		45
Cure Rate @ 77°F (25°C), Max. Chemical Resistance		7 days

#### BASECOAT / TOPCOAT

**ChemPruf 2410**, a novolac vinyl ester resin and silica filler, trowel applied at a nominal thickness of 1/16" (1.6 mm.).

**ChemPruf 2410 AO**, a novolac vinyl ester resin and aluminum oxide filler, trowel applied at a nominal thickness of 1/16" (1.6 mm.).

#### REINFORCING FABRIC

**ChemPruf 10 oz. Reinforcing Fabric**, 10 oz./sq. yd. (339 g./m<sup>2</sup>) woven fiberglass reinforcing fabric

#### SATURANT

**ChemPruf 2410 Saturant**, a novolac vinyl ester resin, roller applied to the reinforcing fabric.

#### SMOOTHING LIQUID

**ChemPruf VE Smoothing Liquid**, a one-component, roller applied material used to smooth the basecoat and topcoat surface.

#### FINISHER\* (OPTIONAL)

**ChemPruf 410**, a two-component novolac vinyl ester resin, brush or roller applied sealer.

**ChemPruf 141**, a two-component, flake filled novolac vinyl ester resin, brush or roller applied sealer.

\*Depending on service conditions, ATLAS may recommend use of an optional finisher.

## AVAILABLE COLORS

**ChemPruf 2410** is available in natural and gray.

**ChemPruf 2410 AO** is available in brown.

**ChemPruf 410** is available in white and gray.

**ChemPruf 141** is available in white and gray.

## ADDITIONAL INFORMATION

For specific information pertaining to Surface Preparation, Packaging or Mixing and Application, refer to the following ATLAS literature:

- Surface Preparation Data Sheet (PS-30)
- ChemPruf 2411 Lining System Installation Instructions (I-4-2411)
- ChemPruf 2411 AO Lining System Installation Instructions (I-4-2411AO)
- ChemPruf 141 Data Sheet (4-141PI)
- Lining System Termination Drawing (4-3000DG)
- Termination at Drain Drawing (4-3001DG)
- Control Joint & Structural Crack Drawing (4-3003DG)
- Horizontal / Vertical Transition Drawing (4-3004DG)
- Pipe Outlets Drawing (4-3005DG)

## SURFACE PREPARATION

The substrate must be structurally sound, clean, dry and free of all contaminants, such as sealers, curing compounds, coatings, oil, dirt, dust and water. Previously applied coatings or paint must be removed.

**Concrete:** The prepared concrete substrate shall have a minimum tensile strength of 250 psi. (1.72 MPa). Concrete surface must be sufficiently cured and comply with moisture testing as prescribed by ACI Test Method 515 R-16 "Dryness of Surface". Concrete surfaces should be grit blasted to a finish similar to the profile of 100 to 120 grit sandpaper. Cracks in the concrete substrate 1/16" (1.6 mm.) wide or greater must be opened to a minimum 1/4" (6.4 cm.) cleaned, primed and filled with ChemPruf 2410.

**Carbon Steel:** Metal surfaces should be grit blasted to a SSPC-SP5 or NACE #1 white metal blast cleaned surface finish. Profile height must be 3 (0.076 mm.) to 4 mils (0.102 mm.).

## TEMPERATURE DURING APPLICATION

Store all materials referred to in this Data Sheet at 70°F (21°C) to 80°F (27°C) for 24 hours prior to use. Minimum temperature for installation is 65°F (18°C). Do not apply when the relative humidity is greater than 75% or the substrate temperature is less than 5°F (3°C) above the dew point.

## APPLICATION

1. Apply ChemPruf VE Primer with a brush or roller.
2. Trowel apply a 1/16" (1.6 mm.) WFT basecoat. Imbed the ChemPruf Fabric and roll into the wet basecoat. Apply ChemPruf 2410 saturant with a medium nap roller. Allow saturant coat to harden.

3. Trowel apply a 1/16" (1.6 mm.) WFT topcoat. Smooth with a short nap roller lightly wetted with ChemPruf VE Smoothing Liquid. Allow to harden.
4. If ATLAS recommends use of an optional finisher, apply ChemPruf 410 or ChemPruf 141 with a short nap roller. Depending on service conditions, two coats may be required.

Protect uncured primer, basecoat, saturant, topcoat and optional finisher coat(s) from moisture contamination until minimum cure time is attained.

## INSPECTION

1. Inspect lining for imperfections after basecoat, fabric and saturant have hardened. Repair defects and imperfections prior to application of the topcoat.
2. When specified or required, spark test for pinholes using 100 volts per mil (0.025 mm.) of lining thickness. Spark testing of ChemPruf 2411 and ChemPruf 2411 AO Lining Systems applied to concrete substrates requires ChemPruf VE Primer with ATLAS® Carbon Powder.

## MEMBRANE

When the ChemPruf 2411 Lining Systems are to be used as a membrane with chemical resistant masonry sheathing, a release agent, such as silicone or paste wax, must be applied to the surface of the lining system. Apply the release agent after the ChemPruf 2411 Lining Systems have attained the minimum drying time. The use of a release agent allows the masonry sheathing to move independent of the lining system.

## PRODUCT SPECIFICATION

The lining system shall be ChemPruf 2411 Series as manufactured by Atlas Minerals & Chemicals, Inc.

**ChemPruf 2411 Lining System**, a novolac vinyl ester resin lining system. The lining system shall consist of a silica filled basecoat and topcoat, each trowel applied at a nominal thickness of 1/16" (1.6 mm.), with an intermediate layer of 10 oz./yd<sup>2</sup> (339 g./m<sup>2</sup>) fiberglass fabric reinforcement. Service conditions as determined by the manufacturer may require the application of the optional ChemPruf 410 or ChemPruf 141.

**ChemPruf 2411 AO Lining System**, a novolac vinyl ester resin lining system. The lining system shall consist of a silica filled basecoat and aluminum oxide filled topcoat each trowel applied at a nominal thickness of 1/16" (1.6 mm.), with an intermediate layer of 10 oz./yd<sup>2</sup> (339 g./m<sup>2</sup>) fiberglass fabric reinforcement. Service conditions as determined by the manufacturer may require the application of the optional ChemPruf 410 or ChemPruf 141.

**CLEANING OF TOOLS AND EQUIPMENT**

Steel wool, soap and warm water will remove the materials referred to in this Data Sheet from mixing tools and equipment if cleaning is done immediately after use. Solvents, such as methyl ethyl ketone, toluene or xylene, will have to be used after the material has begun to harden. Fully hardened material will have to be removed by mechanical means.

Dispose of residues and wastes in accordance with the directions in the Material Safety Data Sheets and government regulations.

**STORAGE AND SHELF LIFE**

Store all materials in a cool, dry environment and out of direct sunlight. Store all ChemPruf Resins and Hardeners and ChemPruf VE Smoothing Liquid at a temperature between 40°F (4°C) and 60°F (16°C) and protect from freezing. In unopened original containers, ChemPruf VE Primer Resin and Hardener, ChemPruf 2400 Resin and Hardener, ChemPruf 400 Resin and Hardener and ChemPruf VE Smoothing Liquid have a shelf life of approximately three months. ChemPruf 2000 S Powder, ChemPruf 2000 AO Powder, ATLAS Carbon Powder and ChemPruf 10 oz. Reinforcing Fabric can be stored indefinitely.

**MAINTENANCE**

Should the liner be damaged in any way, it can be repaired by thoroughly cleaning and reapplying the ChemPruf 2411 Series Lining System.

**PRECAUTIONS**

The materials referred to in this Data Sheet are for Industrial Use Only. They contain materials that present handling and potential health hazards. Consult Material Safety Data Sheets and the container labels for complete precautionary information.

**TECHNICAL SERVICES**

ATLAS maintains a staff of Technical Service Representatives who are available to assist you with the use of ATLAS products. In the event of difficulties with the application of ATLAS materials, the installation should be stopped immediately and ATLAS' Technical Service Department consulted for assistance.

**WARRANTY**

ATLAS warrants that its products will be free from defects in workmanship and materials under normal use for a period of one (1) year from the date of shipment by ATLAS (provided the products are installed before the expiration of the shelf life). THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR THE PURPOSE FOR THIS PRODUCT WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. ATLAS' LIABILITY FOR ALLEGED BREACH OF THIS WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT (BUT NOT INCLUDING REMOVAL OF THE DEFECTIVE PRODUCT OR INSTALLATION OF REPLACEMENT PRODUCTS). ATLAS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES DURING THE WARRANTY PERIOD OR THEREAFTER. **ATLAS' WARRANTY IS VOIDED IF PAYMENT FOR PRODUCT IS NOT RECEIVED IN FULL.**

# atlas Installation Instructions

Atlas Minerals & Chemicals, Inc.



I-4-2411 (10-02<sup>2</sup>)  
Supersedes I-4-2411 (5-01)

## CHEMPRUF 2411 Lining System

### DESCRIPTION

CHEMPRUF 2411 Lining System consists of a 1/16" (1.6 mm.) trowel applied basecoat of ChemPruf 2410, an intermediate layer of fiberglass fabric reinforcement saturated with ChemPruf 2410 saturant and a 1/16" (1.6 mm.) trowel applied topcoat of ChemPruf 2410. If specified, roll apply an optional finisher of ChemPruf 410 or ChemPruf 141, Installation Instructions (I-4-141).

### ESTIMATED COVERAGE

#### CHEMPRUF VE PRIMER

1-Gallon Unit ..... 200 ft<sup>2</sup> (18.6 m<sup>2</sup>)  
5-Gallon Unit ..... 1,100 ft<sup>2</sup> (102 m<sup>2</sup>)

#### CHEMPRUF VE CONDUCTIVE PRIMER

1-Gallon Unit ..... 120 ft<sup>2</sup> (11.1 m<sup>2</sup>)  
5-Gallon Unit ..... 660 ft<sup>2</sup> (61.3 m<sup>2</sup>)  
ATLAS<sup>®</sup> Carbon Powder\* ..... 2,300 ft<sup>2</sup> (213.7 m<sup>2</sup>)  
\*Per pail for Conductive Primer

#### CHEMPRUF 2410 (Basecoat / Topcoat)

5-Gallon Unit  
Total System @ 1/8" (3.2 mm.) ..... 123 ft<sup>2</sup> (11.4 m<sup>2</sup>)  
Basecoat @ 1/16" (1.6 mm.) ..... 246 ft<sup>2</sup> (22.9 m<sup>2</sup>)  
Topcoat @ 1/16" (1.6 mm.) ..... 246 ft<sup>2</sup> (22.9 m<sup>2</sup>)

#### CHEMPRUF 2410 (Saturant)

5-Gallon Unit ..... 625 ft<sup>2</sup> (58.0 m<sup>2</sup>)

#### CHEMPRUF 10 OZ. REINFORCING FABRIC

1.1 ft<sup>2</sup> (0.1 m<sup>2</sup>) per ft<sup>2</sup> (0.09 m<sup>2</sup>)

#### CHEMPRUF VE SMOOTHING LIQUID

1-Gallon ..... 400 ft<sup>2</sup> (37.2 m<sup>2</sup>)  
5-Gallon ..... 2,000 ft<sup>2</sup> (185 m<sup>2</sup>)

#### CHEMPRUF 410 (Optional Finisher)

1-Gal. Unit @ 5 mils (0.13 mm.) ..... 300 ft<sup>2</sup> (27.9 m<sup>2</sup>)  
5-Gal. Unit @ 5 mils (0.13 mm.) ..... 1,628 ft<sup>2</sup> (151 m<sup>2</sup>)

#### CHEMPRUF FINISHER ADDITIVE\*

One - 4 oz. (113 g.) can per 1-gallon unit ChemPruf 410  
One - 20 oz. (567 g.) can per 5-gal. unit ChemPruf 410 or 5-gal. unit ChemPruf 2410 topcoat  
\*Combined with the final coat of ChemPruf 410 if optional ChemPruf 410 is specified or with the ChemPruf 2410 topcoat if the optional finisher is not specified.

**Note:** All references to application thickness and coverage per unit in this Installation Instructions are WFT (wet film thickness). Material estimating quantities may vary depending on project conditions and application techniques. Material quantities are theoretical and do not include a safety factor.

### PACKAGING

#### CHEMPRUF VE PRIMER

##### 1-Gal. Unit (8 lb. [3.6 kg.]) Consisting of:

One - 1-gal. can ChemPruf VE Primer Resin (7 lb. 13 oz. [3.5 kg.])  
One - bottle ChemPruf VE Primer Hardener (2.5 oz. [71 g.])

##### 5-Gal. Unit (43 lb. 14 oz. [19.9 kg.]) Consisting of:

One - 5-gal. pail ChemPruf VE Primer Resin (43 lb. [19.5 kg.])  
One - bottle ChemPruf VE Primer Hardener (14 oz. [397 g.])

#### ATLAS CARBON POWDER (for Conductive Primer)

5-gal. pail (38 lb. [17.2 kg.])

#### CHEMPRUF 2410 (Basecoat / Topcoat)

##### 5-Gal. Unit (150 lb. 2 oz. [68.1 kg.]) Consisting of:

One - 5-gal. pail ChemPruf 2410 Resin (41 lb. 8 oz. [18.8 kg.])  
One - bottle ChemPruf 2410 Hardener (10 oz. [284 g.])  
Two - bags ChemPruf 2000 S Powder (54 lb. [24.5 kg.]) ea.

#### CHEMPRUF 2410 (Saturant)

##### 5-Gal. Unit (42 lb. 2 oz. [19.1 kg.]) Consisting of:

One - 5-gal. pail ChemPruf 2410 Resin (41 lb. 8 oz. [18.8 kg.])  
One - bottle ChemPruf 2410 Hardener (10 oz. [284 g.])

#### CHEMPRUF 10 OZ. REINFORCING FABRIC

10 oz./yd.<sup>2</sup> (339 g./m<sup>2</sup>) fabric (38" [97 cm.] wide roll)

#### CHEMPRUF VE SMOOTHING LIQUID

1-gal. can (7 lb. 4 oz. [3.3 kg.])  
5-gal. pail (36 lb. 4 oz. [16.4 kg.])

**CHEMPRUF 410 (Optional Finisher)****1-Gallon Unit (8 lb. 10 oz. [3.9 kg.]) Consisting of:**

One - 1-gal. can ChemPruf 410 Resin  
(8 lb. 8 oz. [3.9 kg.])  
One - bottle ChemPruf 410 Hardener  
(2 oz. [57 g.])

**5-Gal. Unit (46 lb. 11 oz. [21.2 kg.]) Consisting of:**

One - 5-gal. pail ChemPruf 410 Resin  
(46 lb. [20.9 kg.])  
One - bottle ChemPruf 410 Hardener  
(11 oz. [312 g.])

**CHEMPRUF FINISHER ADDITIVE**

4 oz. [113 g.] can  
1-qt. can (1 lb. 4 oz. [567 g.])

**AVAILABLE COLORS**

**ChemPruf 2410** is available in natural and gray.  
**ChemPruf 410** is available in white and gray.

**SURFACE PREPARATION**

ChemPruf 2411 Lining System can be applied to concrete and steel surfaces. The substrate must be structurally sound, clean, dry and free of all contaminants, such as sealers, curing compounds, coatings, oil, dirt, dust and water. Previously applied coatings or paint must be removed.

**Concrete:** Finished concrete must be free of ridges, protrusions, fins, mortar splatter and have a tight laitance-free steel trowel finish. Abrasive grit blasting is recommended. Where impractical, chemical preparation by acid washing is acceptable. A finish similar to the profile of 100 to 120 grit sandpaper is suggested.

The prepared concrete substrate shall have a minimum tensile strength of 250 psi. (1.72 MPa). Concrete surface must be sufficiently cured and comply with moisture testing as prescribed by ACI Test Method 515 R-16 "Dryness of Surface".

**Carbon Steel:** Metal surfaces should be grit blasted to a SSPC-SP5 or NACE #1 white metal blast cleaned surface finish. Profile height must be 3 (0.076 mm.) to 4 mils (0.102 mm.).

The primer will hold the finish on carbon steel for approximately two weeks at relative humidity of 75%. Should flash rusting occur at any time before ChemPruf 2410 basecoat is applied, the surface must be grit blasted again and reprimed.

For additional information, refer to Surface Preparation, Data Sheet PS-30.

**TEMPERATURE / HUMIDITY DURING APPLICATION**

Store all materials referred to in this Installation Instructions at 70°F (21°C) to 80°F (27°C) for 24 hours prior to use. The best working characteristics of the materials will be attained when the temperature of the substrate, air and ChemPruf 2411 Lining System components are between 65°F (18°C) and 85°F (29°C).

Minimum temperature for installation is 65°F (18°C). At temperatures below 65°F (18°C), the product may not set or cure properly.

Do not apply when the relative humidity is greater than 75% or the substrate temperature is less than 5°F (3°C) above the dew point.

**CONSTRUCTION DETAILS**

For additional information on Construction Details, refer to the following ATLAS literature:

- Surface Preparation Data Sheet (PS-30)
- Horizontal / Vertical Transition Drawing (4-3004DG)
- Structural Crack Drawing (4-3006DG)
- Control Joint Drawing (4-3003DG)
- Lining System Termination Drawing (4-3000DG)
- Termination at Drain Drawing (4-3001DG)
- Pipe Outlets Drawing (4-3005DG)

Protect uncured primer, basecoat, saturant, topcoat and optional finisher coat(s) from moisture contamination until minimum cure time is attained.

When applying ChemPruf 2411 Lining System directly to a latex modified concrete substrate, apply a barrier coat of Ureklad® Primer (7-23PI) before applying ChemPruf VE Primer.

Do not apply the ChemPruf 2411 Lining System to substrates that flex.

**INSTALLATION EQUIPMENT AND SUPPLIES\***

- KOL type mixer & Jiffy type mixer
- 5-gallon (18.9 liter) plastic or metal containers
- Cement finishing, margin & pointing trowels
- Short (3/16" to 1/4") & medium (3/8") nap paint rollers
- Paint brushes
- Rubber & cotton gloves
- Organic respirator, Safety goggles
- Electric grinder
- Scissors, measuring tape, chalk line, felt tip marker

\*The safety equipment listed above is the minimum required to install the ChemPruf 2411 Lining System. The installer must provide any equipment necessary to comply with existing federal, state, local and customer safety regulations.

**APPLICATION OF THE CHEMPRUF 2411 LINING SYSTEM**

1. **Primer:** All substrates must be primed with ChemPruf VE Primer. Apply ChemPruf VE Primer with a brush or medium nap roller. Do not allow puddling. Work ChemPruf VE Primer into the pores of concrete substrates.

The primed surface should be tacky or dry before applying ChemPruf 2410 basecoat. If the primer is allowed to dry for longer than the maximum drying time, the surface must be sanded and the area reprimed before proceeding.

**Conductive Primer:** When the ChemPruf 2411 Lining System is applied to concrete substrates, spark testing of the lining may be specified or required. Apply ChemPruf VE Primer with ATLAS Carbon Powder. Stir the mixed components frequently during the application to avoid settlement of the carbon powder. Apply as described above.

Temperature	CHEMPRUF VE PRIMER		
	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	40 min.	8 hours	7 days
75°F (24°C)	30 min.	6 hours	6 days
85°F (29°C)	20 min.	4 hours	5 days

2a. **Basecoat:** Trowel apply a basecoat of ChemPruf 2410 at a thickness of 1/16" (1.6 mm.) with a plaster's or concrete finishing trowel.

2b. **Fabric:** Immediately apply the ChemPruf 10 oz. Reinforcing Fabric into the wet basecoat. Roll the fabric with a medium nap roller to imbed the fabric into the ChemPruf 2410 basecoat. Roll the fabric from the center to the edges to smooth the surface and remove entrapped air.

2c. **Saturant:** Immediately apply a mixture of ChemPruf 2410 Resin and Hardener as a saturant over the fabric. Apply the mixed saturant to the fabric from the center toward the edges with a medium nap roller. Use only enough saturant to remove the whiteness and produce a uniform darker appearance to the fabric. A brush may be used to apply saturant in corners and around appurtenances.

Allow saturant coat to harden sufficiently so that the fabric will not be disturbed before continuing with the topcoat application.

If the saturant is allowed to dry for longer than the maximum drying time, the surface must be sanded, cleaned and reprimed before applying the ChemPruf 2410 topcoat.

Temperature	CHEMPRUF 2410 (Saturant)		
	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	35 min.	16 hours	24 hours
75°F (24°C)	30 min.	12 hours	24 hours
85°F (29°C)	20 min.	8 hours	16 hours

3. **Inspection:** Inspect lining for imperfections after basecoat, fabric and saturant have hardened. Repair defects and imperfections prior to application of the topcoat.

When specified or required, spark test for pinholes using 100 volts per mil (0.025 mm.) of lining thickness. Spark testing of ChemPruf 2411 Lining System applied to concrete substrates requires ChemPruf VE Primer with ATLAS Carbon Powder.

4. **Topcoat:** Trowel apply a topcoat of ChemPruf 2410 at a thickness of 1/16" (1.6 mm.) with a plaster's or concrete finishing trowel.

Smooth trowel marks with a short nap roller lightly wetted with ChemPruf VE Smoothing Liquid. Before rolling, shake the wet roller to remove excess ChemPruf VE Smoothing Liquid. Use only enough smoothing liquid to prevent picking up of the topcoat. Excess smoothing liquid may cause the lining to remain soft.

Allow the ChemPruf 2410 topcoat to harden sufficiently so that the surface will not be disturbed before continuing with the optional finisher application, if specified.

**Note:** Refer to the "Special Mixing Instructions" for the ChemPruf 2410 topcoat if the optional finisher is not specified.

If the ChemPruf 2410 topcoat is allowed to dry for longer than the maximum drying time, the surface must be sanded, cleaned and reprimed if applying the optional finisher.

Temperature	CHEMPRUF 2410 (Basecoat / Topcoat)		
	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	35 min.	16 hours	24 hours
75°F (24°C)	30 min.	12 hours	24 hours
85°F (29°C)	20 min.	8 hours	16 hours

5. **Optional Finisher:** If specified, apply a 5 mil (0.13 mm.) coat of ChemPruf 410 with a short nap roller. If ChemPruf 141 is specified, refer to Installation Instructions, I-4-141. Depending on service conditions, two coats may be required. If the ChemPruf 410 is allowed to dry for longer than the maximum drying time, the surface must be sanded, cleaned and reprimed before applying a second finisher coat.

Temperature	CHEMPRUF 410		
	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	35 min.	12 hours	24 hours
75°F (24°C)	30 min.	8 hours	24 hours
85°F (29°C)	25 min.	7 hours	16 hours

## MEMBRANE

When applying a masonry sheathing over the ChemPruf 2411 Lining System, a release agent must be applied to the surface of the lining system. The use of a release agent allows the masonry sheathing to move independent of the lining system. Silicone or paste wax can be applied after the maximum drying time.

## MIXING OF THE CHEMPRUF VE PRIMER

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be done with a hand drill equipped with a "Jiffy" type mixer at a mixing speed between 300 and 500 RPM. During mixing, move the mixing blade in circular and up and down motions scraping all sides and the bottom of the mixing container.

**1-Gallon Unit of ChemPruf VE Primer**

The following mixing instructions are for a batch size of 0.9 gallons (3.5 liters). Estimated coverage of the batch size is 200 ft<sup>2</sup> (18.6 m<sup>2</sup>). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Combine the contents of the 7 lb. 13 oz. (3.5 kg.) can of ChemPruf VE Primer Resin with the contents of the 2.5 oz. (71 g.) bottle of ChemPruf VE Primer Hardener.
- Mix thoroughly for two minutes as described above.

**5-Gallon Unit of ChemPruf VE Primer**

The following mixing instructions are for a batch size of 0.9 gallons (3.5 liters) or 8 lb. (3.6 kg.). Estimated coverage of the batch size is 200 ft<sup>2</sup> (18.6 m<sup>2</sup>). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Combine 116 fluid ounces (3.45 liters) of ChemPruf VE Primer Resin with 2.4 fluid ounces (71 ml.) ChemPruf VE Primer Hardener\* in a suitable mixing container.  
\*2.4 fluid ounces equals 4.7 tablespoons.
- Mix thoroughly for two minutes as described above.

**MIX RATIO OF THE CHEMPRUF VE PRIMER**

	by Weight	by Volume
ChemPruf VE Primer Resin	100	100
ChemPruf VE Primer Hardener	2	2.1

**Conductive Primer**

- Mix the ChemPruf VE Primer Resin and Hardener as described above.
- Add 1 lb. 15 oz. (879 g.) or approximately 36 fluid ounces (1.1 liters) of ATLAS Carbon Powder. Mix thoroughly for approximately two minutes. During application, stir the mixed components frequently to avoid settlement of the carbon powder.

**MIX RATIO OF THE CONDUCTIVE PRIMER**

	by Weight	by Volume
ChemPruf VE Primer Resin	100	100
ChemPruf VE Primer Hardener	2	2.1
ATLAS Carbon Powder	25	31

**MIXING OF THE CHEMPRUF 2410 (Basecoat / Topcoat)**

**Note:** Refer to the "Special Mixing Instructions" for the ChemPruf 2410 topcoat if the optional finisher is not specified.

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be with a KOL type mixer with a 5-gallon capacity. Mixing speed should be between 60 and 75 RPM.

The following mixing instructions are for a batch size of 37 lb. 10 oz. (17.1 kg.) or 0.32 ft<sup>3</sup> (9.1 liters).

Estimated coverage of the batch size is 61 ft<sup>2</sup> (5.7 m<sup>2</sup>) @ 1/16" (1.6 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Evenly divide the contents of one of the 54 lb. (24.5 kg.) bags of ChemPruf 2000 S Powder into two equal parts by volume using two clean, dry 5-gallon pails. Each pail should contain 27 lb. (12.2 kg.) or approximately 301 fluid ounces (8.9 liters) of powder.
- Combine 148 fluid ounces (4.39 liters) of ChemPruf 2410 Resin with 2.4 fluid ounces (71 ml.) ChemPruf 2410 Hardener\* in the 5-gallon capacity mechanical mixer. Mix thoroughly for approximately two minutes.  
\*2.4 fluid ounces equals 4.7 tablespoons.
- Slowly add a 1/2 bag of ChemPruf 2000 S Powder, 27 lb. (12.2 kg.), as prepared in Step (a.).
- Mix the combined components for approximately two minutes or until all the powder is thoroughly dispersed.

The amount of the powder may be varied slightly to obtain the desired consistency. Decreasing the powder component will decrease the estimated unit coverage. The amount of powder must be within 5%, by weight, of the suggested amount.

**MIX RATIO OF THE CHEMPRUF 2410 (Basecoat / Topcoat)**

	by Weight	by Volume
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6
ChemPruf 2000 S Powder	260	203

**MIXING OF THE CHEMPRUF 2410 (Saturant)**

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components may be done with a hand drill equipped with a "Jiffy" type mixer at a mixing speed between 300 and 500 RPM. During mixing, move the mixing blade in circular and up and down motions scraping all sides and the bottom of the mixing container.

The following mixing instructions are for a batch size of 1.2 gallons (4.5 liters) or 10 lb. 10 oz. (4.8 kg.). Estimated coverage of the batch size is 157 ft<sup>2</sup> (14.6 m<sup>2</sup>). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Combine 148 fluid ounces (4.39 liters) of ChemPruf 2410 Resin with 2.4 fluid ounces (71 ml.) ChemPruf 2410 Hardener\* in a suitable mixing container.  
\*2.4 fluid ounces equals 4.7 tablespoons.
- Mix thoroughly for two minutes as described above.

**MIX RATIO OF THE CHEMPRUF 2410 (Saturant)**

	by Weight	by Volume
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6

**MIXING OF THE CHEMPRUF 410 (Optional Finisher)**

Add ChemPruf Finisher Additive to the final coat of ChemPruf 410. If a single coat is specified, apply ChemPruf 410 mixed with ChemPruf Finisher Additive. Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components may be done with a hand drill equipped with a "Jiffy" type mixer at a mixing speed between 300 and 500 RPM. During mixing, move the mixing blade in circular and up and down motions scraping all sides and the bottom of the mixing container.

**1-Gallon Unit of ChemPruf 410**

The following mixing instructions are for a batch size of 0.9 gallons (3.6 liters). Estimated coverage of the batch size is 300 ft<sup>2</sup> (27.9 m<sup>2</sup>) @ 5 mils (0.13 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

Coat(s) without ChemPruf Finisher Additive

- Combine the contents of the 8 lb. 8 oz. (3.9 kg.) can of ChemPruf 410 Resin with one 2 oz. (57 g.) bottle of ChemPruf 410 Hardener in a suitable mixing container.
- Mix thoroughly for two minutes as described above.

Final Coat with ChemPruf Finisher Additive

- Combine the 8 lb. 8 oz. (3.9 kg.) can of ChemPruf 410 Resin with one 4 oz. (113 g.) can of ChemPruf Finisher Additive in a suitable mixing container and mix thoroughly for two minutes.
- Add the 2 oz. (57 g.) bottle of ChemPruf 410 Hardener and mix thoroughly for two minutes as described above.

**5-Gallon Unit of ChemPruf 410**

The following mixing instructions are for a batch size of 1.0 gallons (3.8 liters) or 9 lb. 5 oz. (4.2 kg.). Estimated coverage of the batch size is 325 ft<sup>2</sup> (30.2 m<sup>2</sup>) @ 5 mils (0.13 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

Coat(s) without ChemPruf Finisher Additive

- Combine 128 fluid ounces (3.79 liters) of ChemPruf 410 Resin with 2.1 fluid ounces (63 ml.) ChemPruf 410 Hardener.  
\*2.1 fluid ounces equals 4.2 tablespoons.
- Mix thoroughly for two minutes as described above.

Final Coat with ChemPruf Finisher Additive

- Combine 128 fluid ounces (3.79 liters) of ChemPruf 410 Resin with 4.3 fluid ounces (127 ml.) of ChemPruf Finisher Additive\* and mix thoroughly for two minutes.  
\*4.3 fluid ounces equals 8.5 tablespoons.
- Add 2.1 fluid ounces (63 ml.) ChemPruf 410 Hardener\* and mix thoroughly for two minutes as described above.  
\*2.1 fluid ounces equals 4.2 tablespoons.

**MIX RATIO OF THE CHEMPRUF 410**

	by Weight	by Volume
ChemPruf 410 Resin	100	100
ChemPruf 410 Hardener	1.5	1.7
ChemPruf Finisher Additive	2.7	3.4

**SPECIAL MIXING INSTRUCTIONS****CHEMPRUF 2410 (Topcoat)****If optional finisher is not specified**

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be with a KOL type mixer with a 5-gallon capacity. Mixing speed should be between 60 and 75 RPM.

The following mixing instructions are for a batch size of 37 lb. 10 oz. (17.1 kg.) or 0.32 ft<sup>3</sup> (9.1 liters). Estimated coverage of the batch size is 61 ft<sup>2</sup> (5.7 m<sup>2</sup>) @ 1/16" (1.6 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Evenly divide the contents of one of the 54 lb. (24.5 kg.) bags of ChemPruf 2000 S Powder into two equal parts by volume using two clean, dry 5-gallon pails. Each pail should contain 27 lb. (12.2 kg.) or approximately 301 fluid ounces (8.9 liters) of powder.
- Combine 148 fluid ounces (4.39 liters) of ChemPruf 2410 Resin with 5.4 fluid ounces (160 ml.) ChemPruf Finisher Additive\* in a suitable mixing container and mix thoroughly for two minutes as described above.  
\*5.4 fluid ounces equals 10.7 tablespoons.
- Add 2.4 fluid ounces (71 ml.) ChemPruf 2410 Hardener\* and mix thoroughly for two minutes as described above.  
\*2.4 fluid ounces equals 4.7 tablespoons.
- Slowly add a 1/2 bag of ChemPruf 2000 S Powder, 27 lb. (12.2 kg.), as prepared in Step (a.).
- Mix the combined components for approximately two minutes or until all the powder is thoroughly dispersed.

The amount of the powder may be varied slightly to obtain the desired consistency. Decreasing the powder component will decrease the estimated unit coverage. The amount of powder must be within 5%, by weight, of the suggested amount.

**MIX RATIO OF THE CHEMPRUF 2410 (Topcoat)**

(If optional finisher is not specified)

	by Weight	by Volume
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6
ChemPruf 2000 S Powder	260	203
ChemPruf Finisher Additive	3	3.6

**CLEANING OF TOOLS AND EQUIPMENT**

Steel wool, soap and warm water will remove the materials referred to in this Data Sheet from mixing tools and equipment if cleaning is done immediately after use.

Solvents, such as methyl ethyl ketone, toluene or xylene, will have to be used after the material has begun to harden. Fully hardened material will have to be removed by mechanical means.

Dispose of residues and wastes in accordance with the directions in the Material Safety Data Sheets and government regulations.

### STORAGE AND SHELF LIFE

Store all materials in a cool, dry environment and out of direct sunlight. Store all ChemPruf Resins and Hardeners and ChemPruf VE Smoothing Liquid at a temperature between 40°F (4°C) and 60°F (16°C) and protect from freezing. In unopened original containers, ChemPruf VE Primer Resin and Hardener, ChemPruf 2410 Resin and Hardener, ChemPruf 410 Resin and Hardener and ChemPruf VE Smoothing Liquid have a shelf life of approximately three months. ChemPruf Finisher Additive has a shelf life of approximately nine months. ChemPruf 2000 S Powder, ATLAS Carbon Powder and ChemPruf 10 oz. Reinforcing Fabric can be stored indefinitely.

### MAINTENANCE

Should the lining be damaged in any way, it can be repaired by thoroughly cleaning and reapplying the ChemPruf 2411 Lining System. Mix and apply in accordance with the instructions provided in this Installation Instructions sheet.

1. Determine all areas that have been damaged.
2. Grind or sand to expose the substrate 1" (25.4 mm.) to 2" (50.8 mm.) beyond the damaged area.
3. Grind or sand the surface of the ChemPruf 2411 Lining System. Taper the ChemPruf Lining to expose 2" (50.8 mm.) to 4" (101.6 mm.) of each layer of the ChemPruf 2411 Lining System.
4. Clean and remove all debris from Step (2.) and Step (3.).
5. Apply ChemPruf Tie-Coat, Data Sheet 4-90PI, to the exposed tapered edges of the ChemPruf 2411 Lining System. Allow the ChemPruf Tie-Coat to dry.
6. Apply ChemPruf VE Primer to the substrate and exposed tapered edges of the ChemPruf 2411 Lining System.
7. Apply the ChemPruf 2410 basecoat, ChemPruf 10 oz. Reinforcing Fabric and ChemPruf 2410 saturant. Allow to harden.
8. Apply the ChemPruf 2410 topcoat.
9. Apply ChemPruf 410 or ChemPruf 141 if specified.

Rezklad® VE-Primer and Atlastacrete® VE Primer are substitutes for ChemPruf VE Primer.

### PRECAUTIONS

The materials referred to in this Data Sheet are for Industrial Use Only. They contain materials that present handling and potential health hazards. Consult Material Safety Data Sheets and the container labels for complete precautionary information.

### TECHNICAL SERVICES

ATLAS maintains a staff of Technical Service Representatives who are available to assist you with the use of ATLAS products. In the event of difficulties with the application of ATLAS materials, the installation should be stopped immediately and ATLAS' Technical Service Department consulted for assistance.

### WARRANTY

ATLAS warrants that its products will be free from defects in workmanship and materials under normal use for a period of one (1) year from the date of shipment by ATLAS (provided the products are installed before the expiration of the shelf life). THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR THE PURPOSE FOR THIS PRODUCT WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. ATLAS' LIABILITY FOR ALLEGED BREACH OF THIS WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT (BUT NOT INCLUDING REMOVAL OF THE DEFECTIVE PRODUCT OR INSTALLATION OF REPLACEMENT PRODUCTS). ATLAS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES DURING THE WARRANTY PERIOD OR THEREAFTER. **ATLAS' WARRANTY IS VOIDED IF PAYMENT FOR PRODUCT IS NOT RECEIVED IN FULL.**

# atlas Installation Instructions

Atlas Minerals & Chemicals, Inc.



I-4-2411AO (10-02<sup>2</sup>)  
Supersedes I-4-2411AO (5-01)

## CHEMPRUF 2411 AO Lining System

### DESCRIPTION

CHEMPRUF 2411 AO Lining System consists of a 1/16" (1.6 mm.) trowel applied basecoat of ChemPruf 2410, an intermediate layer of fiberglass fabric reinforcement saturated with ChemPruf 2410 saturant and a 1/16" (1.6 mm.) trowel applied topcoat of ChemPruf 2410 AO. If specified, roll apply an optional finisher of ChemPruf 410 or ChemPruf 141, Installation Instructions (I-4-141).

### ESTIMATED COVERAGE

#### CHEMPRUF VE PRIMER

1-Gallon Unit ..... 200 ft<sup>2</sup> (18.6 m<sup>2</sup>)  
5-Gallon Unit ..... 1,100 ft<sup>2</sup> (102 m<sup>2</sup>)

#### CHEMPRUF VE CONDUCTIVE PRIMER

1-Gallon Unit ..... 120 ft<sup>2</sup> (11.1 m<sup>2</sup>)  
5-Gallon Unit ..... 660 ft<sup>2</sup> (61.3 m<sup>2</sup>)  
ATLAS® Carbon Powder\* ..... 2,300 ft<sup>2</sup> (213.7 m<sup>2</sup>)

\*Per pail for Conductive Primer

#### CHEMPRUF 2410 (Basecoat)

5-Gallon Unit  
Basecoat @ 1/16" (1.6 mm.) ..... 246 ft<sup>2</sup> (22.9 m<sup>2</sup>)

#### CHEMPRUF 2410 AO (Topcoat)

5-Gallon Unit  
Topcoat @ 1/16" (1.6 mm.) ..... 289 ft<sup>2</sup> (26.8 m<sup>2</sup>)

#### CHEMPRUF 2410 (Saturant)

5-Gallon Unit ..... 625 ft<sup>2</sup> (58.0 m<sup>2</sup>)

#### CHEMPRUF 10 OZ. REINFORCING FABRIC

1.1 ft<sup>2</sup> (0.01 m<sup>2</sup>) per ft<sup>2</sup> (0.09 m<sup>2</sup>)

#### CHEMPRUF VE SMOOTHING LIQUID

1-Gallon ..... 400 ft<sup>2</sup> (37.2 m<sup>2</sup>)  
5-Gallon ..... 2,000 ft<sup>2</sup> (185 m<sup>2</sup>)

#### CHEMPRUF 410 (Optional Finisher)

1-Gal. Unit @ 5 mils (0.13 mm.) ..... 300 ft<sup>2</sup> (27.9 m<sup>2</sup>)  
5-Gal. Unit @ 5 mils (0.13 mm.) ..... 1,628 ft<sup>2</sup> (151 m<sup>2</sup>)

#### CHEMPRUF FINISHER ADDITIVE\*

One - 4 oz. (113 g.) can per 1-gallon unit ChemPruf 410  
One - 20 oz. (567 g.) can per 5-gal. unit ChemPruf 410  
or 5-gal. unit ChemPruf 2410 AO topcoat

\*Combined with the final coat of ChemPruf 410 if optional ChemPruf 410 is specified or with the ChemPruf 2410 AO Topcoat if the optional finisher is not specified.

**Note:** All references to application thickness and coverage per unit in this Installation Instructions are WFT (wet film thickness). Material estimating quantities may vary depending on project conditions and application techniques. Material quantities are theoretical and do not include a safety factor.

### PACKAGING

#### CHEMPRUF VE PRIMER

##### 1-Gal. Unit (8 lb. [3.6 kg.]) Consisting of:

One - 1-gal. can ChemPruf VE Primer Resin  
(7 lb. 13 oz. [3.5 kg.])

One - bottle ChemPruf VE Primer Hardener  
(2.5 oz. [71 g.])

##### 5-Gal. Unit (43 lb. 14 oz. [19.9 kg.]) Consisting of:

One - 5-gal. pail ChemPruf VE Primer Resin  
(43 lb. [19.5 kg.])

One - bottle ChemPruf VE Primer Hardener  
(14 oz. [397 g.])

#### ATLAS CARBON POWDER (for Conductive Primer)

5-gal. pail (38 lb. [17.2 kg.])

#### CHEMPRUF 2410 (Basecoat)

##### 5-Gal. Unit (150 lb. 2 oz. [68.1 kg.]) Consisting of:

One - 5-gal. pail ChemPruf 2410 Resin  
(41 lb. 8 oz. [18.8 kg.])

One - bottle ChemPruf 2410 Hardener  
(10 oz. [284 g.])

Two - bags ChemPruf 2000 S Powder  
(54 lb. [24.5 kg.]) ea.

#### CHEMPRUF 2410 AO (Topcoat)

##### 5-Gal. Unit (204 lb. 2 oz. [92.6 kg.]) Consisting of:

One - 5-gal. pail ChemPruf 2410 Resin  
(41 lb. 8 oz. [18.8 kg.])

One - bottle ChemPruf 2410 Hardener  
(10 oz. [284 g.])

Three - bags ChemPruf 2000 AO Powder  
(54 lb. [24.5 kg.]) ea.

#### CHEMPRUF 2410 (Saturant)

##### 5-Gal. Unit (42 lb. 2 oz. [19.1 kg.]) Consisting of:

One - 5-gal. pail ChemPruf 2410 Resin  
(41 lb. 8 oz. [18.8 kg.])

One - bottle ChemPruf 2410 Hardener  
(10 oz. [284 g.])

#### CHEMPRUF 10 OZ. REINFORCING FABRIC

10 oz./yd.<sup>2</sup> (339 g./m<sup>2</sup>) fabric (38" [97 cm.] wide roll)

**CHEMPRUF VE SMOOTHING LIQUID**

1-gal. can (7 lb. 4 oz. [3.3 kg.])

5-gal. pail (36 lb. 4 oz. [16.4 kg.])

**CHEMPRUF 410 (Optional Finisher)****1-Gallon Unit (8 lb. 10 oz. [3.9 kg.]) Consisting of:**

One - 1-gal. can ChemPruf 410 Resin

(8 lb. 8 oz. [3.9 kg.])

One - bottle ChemPruf 410 Hardener

(2 oz. [57 g.])

**5-Gal. Unit (46 lb. 11 oz. [21.2 kg.]) Consisting of:**

One - 5-gal. pail ChemPruf 410 Resin

(46 lb. [20.9 kg.])

One - bottle ChemPruf 410 Hardener

(11 oz. [312 g.])

**CHEMPRUF FINISHER ADDITIVE**

4 oz. [113 g.] can

1-qt. can (1 lb. 4 oz. [567 g.])

**AVAILABLE COLORS**

**ChemPruf 2410** is available in natural and gray.

**ChemPruf 2410 AO** is available in brown.

**ChemPruf 410** is available in white and gray.

**SURFACE PREPARATION**

ChemPruf 2411 AO Lining System can be applied to concrete and steel surfaces. The substrate must be structurally sound, clean, dry and free of all contaminants, such as sealers, curing compounds, coatings, oil, dirt, dust and water. Previously applied coatings or paint must be removed.

**Concrete:** Finished concrete must be free of ridges, protrusions, fins, mortar splatter and have a tight laitance-free steel trowel finish. Abrasive grit blasting is recommended. Where impractical, chemical preparation by acid washing is acceptable. A finish similar to the profile of 100 to 120 grit sandpaper is suggested.

The prepared concrete substrate shall have a minimum tensile strength of 250 psi. (1.72 MPa).

Concrete surface must be sufficiently cured and comply with moisture testing as prescribed by ACI Test Method 515 R-16 "Dryness of Surface".

**Carbon Steel:** Metal surfaces should be grit blasted to a SSPC-SP5 or NACE #1 white metal blast cleaned surface finish. Profile height must be 3 (0.076 mm.) to 4 mils (0.102 mm.).

The primer will hold the finish on carbon steel for approximately two weeks at relative humidity of 75%. Should flash rusting occur at any time before ChemPruf 2410 basecoat is applied, the surface must be grit blasted again and reprimed.

For additional information, refer to Surface Preparation, Data Sheet PS-30.

**TEMPERATURE / HUMIDITY DURING APPLICATION**

Store all materials referred to in this Installation Instructions at 70°F (21°C) to 80°F (27°C) for 24 hours prior to use. The best working characteristics of the materials will be attained when the temperature of the

substrate, air and ChemPruf 2411 AO Lining System components are between 65°F (18°C) and 85°F (29°C). Minimum temperature for installation is 65°F (18°C). At temperatures below 65°F (18°C), the product may not set or cure properly.

Do not apply when the relative humidity is greater than 75% or the substrate temperature is less than 5°F (3°C) above the dew point.

**CONSTRUCTION DETAILS**

For additional information on Construction Details, refer to the following ATLAS literature:

- Surface Preparation Data Sheet (PS-30)
- Horizontal / Vertical Transition Drawing (4-3004DG)
- Structural Crack Drawing (4-3006DG)
- Control Joint Drawing (4-3003DG)
- Lining System Termination Drawing (4-3000DG)
- Termination at Drain Drawing (4-3001DG)
- Pipe Outlets Drawing (4-3005DG)

Protect uncured primer, basecoat, saturant, topcoat and optional finisher coat(s) from moisture contamination until minimum cure time is attained.

When applying ChemPruf 2411 AO Lining System directly to a latex modified concrete substrate, apply a barrier coat of Ureklad® Primer (7-23PI) before applying ChemPruf VE Primer.

Do not apply the ChemPruf 2411 AO Lining System to substrates that flex.

**INSTALLATION EQUIPMENT AND SUPPLIES\***

- KOL type mixer & Jiffy type mixer
- 5-gallon (18.9 liter) plastic or metal containers
- Cement finishing, margin & pointing trowels
- Short (3/16" to 1/4") & medium (3/8") nap paint rollers
- Paint brushes
- Rubber & cotton gloves
- Organic respirator, Safety goggles
- Electric grinder
- Scissors, measuring tape, chalk line, felt tip marker

\*The safety equipment listed above is the minimum required to install the ChemPruf 2411 AO Lining System. The installer must provide any equipment necessary to comply with existing federal, state, local and customer safety regulations.

**APPLICATION OF THE CHEMPRUF 2411 AO LINING SYSTEM**

1. **Primer:** All substrates must be primed with ChemPruf VE Primer. Apply ChemPruf VE Primer with a brush or medium nap roller. Do not allow puddling. Work ChemPruf VE Primer into the pores of concrete substrates.

The primed surface should be tacky or dry before applying ChemPruf 2410 basecoat. If the primer is allowed to dry for longer than the maximum drying time, the surface must be sanded and the area reprimed before proceeding.

**Conductive Primer:** When the ChemPruf 2411 AO Lining System is applied to concrete substrates,

spark testing of the lining may be specified or required. Apply ChemPruf VE Primer with ATLAS Carbon Powder. Stir the mixed components frequently during the application to avoid settlement of the carbon powder. Apply as described above.

CHEMPRUF VE PRIMER			
Temperature	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	40 min.	8 hours	7 days
75°F (24°C)	30 min.	6 hours	6 days
85°F (29°C)	20 min.	4 hours	5 days

2a. **Basecoat:** Trowel apply a basecoat of ChemPruf 2410 at a thickness of 1/16" (1.6 mm.) with a plaster's or concrete finishing trowel.

2b. **Fabric:** Immediately apply the ChemPruf 10 oz. Reinforcing Fabric into the wet basecoat. Roll the fabric with a medium nap roller to imbed the fabric into the ChemPruf 2410 basecoat. Roll the fabric from the center to the edges to smooth the surface and remove entrapped air.

2c. **Saturant:** Immediately apply a mixture of ChemPruf 2410 Resin and Hardener as a saturant over the fabric. Apply the mixed saturant to the fabric from the center toward the edges with a medium nap roller. Use only enough saturant to remove the whiteness and produce a uniform darker appearance to the fabric. A brush may be used to apply saturant in corners and around appurtenances.

Allow saturant coat to harden sufficiently so that the fabric will not be disturbed before continuing with the topcoat application.

If the saturant is allowed to dry for longer than the maximum drying time, the surface must be sanded, cleaned and reprimed before applying the ChemPruf 2410 AO topcoat.

CHEMPRUF 2410 (Saturant)			
Temperature	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	35 min.	16 hours	24 hours
75°F (24°C)	30 min.	12 hours	24 hours
85°F (29°C)	20 min.	8 hours	16 hours

3. **Inspection:** Inspect lining for imperfections after basecoat, fabric and saturant have hardened. Repair defects and imperfections prior to application of the topcoat.

When specified or required, spark test for pinholes using 100 volts per mil (0.025 mm.) of lining thickness. Spark testing of ChemPruf 2411 AO Lining System applied to concrete substrates requires ChemPruf VE Primer with ATLAS Carbon Powder.

4. **Topcoat:** Trowel apply a topcoat of ChemPruf 2410 AO at a thickness of 1/16" (1.6 mm.) with a plaster's or concrete finishing trowel.

Smooth trowel marks with a short nap roller lightly wetted with ChemPruf VE Smoothing Liquid. Before rolling, shake the wet roller to remove excess ChemPruf VE Smoothing Liquid. Use only enough

smoothing liquid to prevent picking up of the topcoat. Excess smoothing liquid may cause the lining to remain soft.

Allow the ChemPruf 2410 AO topcoat to harden sufficiently so that the surface will not be disturbed before continuing with the optional finisher application, if specified.

**Note:** Refer to the "Special Mixing Instructions" for the ChemPruf 2410 AO topcoat if the optional finisher is not specified.

If the ChemPruf 2410 AO topcoat is allowed to dry for longer than the maximum drying time, the surface must be sanded, cleaned and reprimed if applying the optional finisher.

#### CHEMPRUF 2410 AND CHEMPRUF 2410 AO (Basecoat / Topcoat)

Temperature	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	35 min.	16 hours	24 hours
75°F (24°C)	30 min.	12 hours	24 hours
85°F (29°C)	20 min.	8 hours	16 hours

5. **Optional Finisher:** If specified, apply a 5 mil (0.13 mm.) coat of ChemPruf 410 with a short nap roller. If ChemPruf 141 is specified, refer to Installation Instructions, I-4-141. Depending on service conditions, two coats may be required.

If the ChemPruf 410 is allowed to dry for longer than the maximum drying time, the surface must be sanded, cleaned and reprimed before applying a second finisher coat.

CHEMPRUF 410			
Temperature	Working Time	Minimum Drying Time	Maximum Drying Time
65°F (18°C)	35 min.	12 hours	24 hours
75°F (24°C)	30 min.	8 hours	24 hours
85°F (29°C)	25 min.	7 hours	16 hours

## MEMBRANE

When applying a masonry sheathing over the ChemPruf 2411 AO Lining System, a release agent must be applied to the surface of the lining system. The use of a release agent allows the masonry sheathing to move independent of the lining system. Silicone or paste wax can be applied after the maximum drying time.

## MIXING OF THE CHEMPRUF VE PRIMER

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be done with a hand drill equipped with a "Jiffy" type mixer at a mixing speed between 300 and 500 RPM. During mixing, move the mixing blade in circular and up and down motions scraping all sides and the bottom of the mixing container.

## 1-Gallon Unit of ChemPruf VE Primer

The following mixing instructions are for a batch size of 0.9 gallons (3.5 liters). Estimated coverage of the batch size is 200 ft<sup>2</sup> (18.6 m<sup>2</sup>). Proportionally increase or decrease component quantities to attain larger or

smaller batch sizes.

- Combine the contents of the 7 lb. 13 oz. (3.5 kg.) can of ChemPruf VE Primer Resin with the contents of the 2.5 oz. (71 g.) bottle of ChemPruf VE Primer Hardener.
- Mix thoroughly for two minutes as described above.

#### 5-Gallon Unit of ChemPruf VE Primer

The following mixing instructions are for a batch size of 0.9 gallons (3.5 liters) or 8 lb. (3.6 kg.). Estimated coverage of the batch size is 200 ft<sup>2</sup> (18.6 m<sup>2</sup>). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Combine 116 fluid ounces (3.45 liters) of ChemPruf VE Primer Resin with 2.4 fluid ounces (71 ml.) ChemPruf VE Primer Hardener\* in a suitable mixing container.  
\*2.4 fluid ounces equals 4.7 tablespoons.
- Mix thoroughly for two minutes as described above.

#### MIX RATIO OF THE CHEMPRUF VE PRIMER

	by Weight	by Volume
ChemPruf VE Primer Resin	100	100
ChemPruf VE Primer Hardener	2	2.1

#### Conductive Primer

- Mix the ChemPruf VE Primer Resin and Hardener as described above.
- Add 1 lb. 15 oz. (879 g.) or approximately 36 fluid ounces (1.1 liters) of ATLAS Carbon Powder. Mix thoroughly for approximately two minutes. During application, stir the mixed components frequently to avoid settlement of the carbon powder.

#### MIX RATIO OF THE CONDUCTIVE PRIMER

	by Weight	by Volume
ChemPruf VE Primer Resin	100	100
ChemPruf VE Primer Hardener	2	2.1
ATLAS Carbon Powder	25	31

#### MIXING OF THE CHEMPRUF 2410 (Basecoat)

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be with a KOL type mixer with a 5-gallon capacity. Mixing speed should be between 60 and 75 RPM.

The following mixing instructions are for a batch size of 37 lb. 10 oz. (17.1 kg.) or 0.32 ft<sup>3</sup> (9.1 liters). Estimated coverage of the batch size is 61 ft<sup>2</sup> (5.7 m<sup>2</sup>) @ 1/16" (1.6 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Evenly divide the contents of one of the 54 lb. (24.5 kg.) bags of ChemPruf 2000 S Powder into two equal parts by volume using two clean, dry 5-gallon pails. Each pail should contain 27 lb. (12.2 kg.) or approximately 301 fluid ounces (8.9 liters) of powder.
- Combine 148 fluid ounces (4.39 liters) of ChemPruf 2410 Resin with 2.4 fluid ounces (71 ml.) ChemPruf 2410 Hardener\* in the

5-gallon capacity mechanical mixer. Mix thoroughly for approximately two minutes.

\*2.4 fluid ounces equals 4.7 tablespoons.

- Slowly add a 1/2 bag of ChemPruf 2000 S Powder, 27 lb. (12.2 kg.), as prepared in Step (a.).
- Mix the combined components for approximately two minutes or until all the powder is thoroughly dispersed.

The amount of the powder may be varied slightly to obtain the desired consistency. Decreasing the powder component will decrease the estimated unit coverage. The amount of powder must be within 5%, by weight, of the suggested amount.

#### MIX RATIO OF THE CHEMPRUF 2410 (Basecoat)

	by Weight	by Volume
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6
ChemPruf 2000 S Powder	260	203

#### MIXING OF THE CHEMPRUF 2410 (Saturant)

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components may be done with a hand drill equipped with a "Jiffy" type mixer at a mixing speed between 300 and 500 RPM. During mixing, move the mixing blade in circular and up and down motions scraping all sides and the bottom of the mixing container.

The following mixing instructions are for a batch size of 1.2 gallons (4.5 liters) or 10 lb. 10 oz. (4.8 kg.). Estimated coverage of the batch size is 157 ft<sup>2</sup> (14.6 m<sup>2</sup>). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Combine 148 fluid ounces (4.39 liters) of ChemPruf 2410 Resin with 2.4 fluid ounces (71 ml) ChemPruf 2410 Hardener in a suitable mixing container.  
\*2.4 fluid ounces equals 4.7 tablespoons.
- Mix thoroughly for two minutes as described above.

#### MIX RATIO OF THE CHEMPRUF 2410 (Saturant)

	by Weight	by Volume
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6

#### MIXING OF THE CHEMPRUF 2410 AO (Topcoat)

**Note:** Refer to the "Special Mixing Instructions" for the ChemPruf 2410 AO topcoat if the optional finisher is not specified.

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be with a KOL type mixer with a 5-gallon capacity. Mixing speed should be between 60 and 75 RPM.

The following mixing instructions are for a batch size of 34 lb. 14 oz. (15.8 kg.) or 0.26 ft<sup>3</sup> (7.3 liters). Estimated coverage of the batch size is 49 ft<sup>2</sup> (4.6 m<sup>2</sup>) @ 1/16" (1.6 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- Evenly divide the contents of one of the 54 lb. (24.5 kg.) bags of ChemPruf 2000 AO Powder into two equal parts by volume using two clean, dry

5-gallon pails. Each pail should contain 27 lb. (12.2 kg.) or approximately 232 fluid ounces (6.9 liters) of powder.

- b. Combine 110 fluid ounces (3.26 liters) of ChemPruf 2410 Resin with 1.7 fluid ounces (51 ml.) ChemPruf 2410 Hardener\* in the 5-gallon capacity mechanical mixer. Mix thoroughly for approximately two minutes.

\*1.7 fluid ounces equals 3.4 tablespoons.

- c. Slowly add a 1/2 bag of ChemPruf 2000 AO Powder, 27 lb. (12.2 kg.), as prepared in Step (a.).
- d. Mix the combined components for approximately two minutes or until all the powder is thoroughly dispersed.

The amount of the powder may be varied slightly to obtain the desired consistency. Decreasing the powder component will decrease the estimated unit coverage. The amount of powder must be within 5%, by weight, of the suggested amount.

<b>MIX RATIO OF THE CHEMPRUF 2410 AO (Topcoat)</b>		
	<b>by Weight</b>	<b>by Volume</b>
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6
ChemPruf 2000 AO Powder	350	210

### **MIXING OF THE**

#### **CHEMPRUF 410 (Optional Finisher)**

Add ChemPruf Finisher Additive to the final coat of ChemPruf 410. If a single coat is specified, apply ChemPruf 410 mixed with ChemPruf Finisher Additive. Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components may be done with a hand drill equipped with a "Jiffy" type mixer at a mixing speed between 300 and 500 RPM. During mixing, move the mixing blade in circular and up and down motions scraping all sides and the bottom of the mixing container.

#### **1-Gallon Unit of ChemPruf 410**

The following mixing instructions are for a batch size of 0.9 gallons (3.6 liters). Estimated coverage of the batch size is 300 ft<sup>2</sup> (27.9 m<sup>2</sup>) @ 5 mils (0.13 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

##### Coat(s) without ChemPruf Finisher Additive

- a. Combine the contents of the 8 lb. 8 oz. (3.9 kg.) can of ChemPruf 410 Resin with one 2 oz. (57 g.) bottle of ChemPruf 410 Hardener in a suitable mixing container.
- b. Mix thoroughly for two minutes as described above.

##### Final Coat with ChemPruf Finisher Additive

- a. Combine the 8 lb. 8 oz. (3.9 kg.) can of ChemPruf 410 Resin with one 4 oz. (113 g.) can of ChemPruf Finisher Additive in a suitable mixing container and mix thoroughly for two minutes.
- b. Add the 2 oz. (57 g.) bottle of ChemPruf 410 Hardener and mix thoroughly for two minutes as described above.

#### **5-Gallon Unit of ChemPruf 410**

The following mixing instructions are for a batch size of 1.0 gallons (3.8 liters) or 9 lb. 5 oz. (4.2 kg.). Estimated coverage of the batch size is 325 ft<sup>2</sup> (30.2 m<sup>2</sup>) @ 5 mils (0.13 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

##### Coat(s) without ChemPruf Finisher Additive

- a. Combine 128 fluid ounces (3.79 liters) of ChemPruf 410 Resin with 2.1 fluid ounces (63 ml.) ChemPruf 410 Hardener\*.
  - \*2.1 fluid ounces equals 4.2 tablespoons.
- b. Mix thoroughly for two minutes as described above.

##### Final Coat with ChemPruf Finisher Additive

- a. Combine 128 fluid ounces (3.79 liters) of ChemPruf 410 Resin with 4.3 fluid ounces (127 ml.) of ChemPruf Finisher Additive\* and mix thoroughly for two minutes.
  - \*4.3 fluid ounces equals 8.5 tablespoons.
- b. Add 2.1 fluid ounces (63 ml.) ChemPruf 410 Hardener\* and mix thoroughly for two minutes as described above.
  - \*2.1 fluid ounces equals 4.2 tablespoons.

#### **MIX RATIO OF THE CHEMPRUF 410**

	<b>by Weight</b>	<b>by Volume</b>
ChemPruf 410 Resin	100	100
ChemPruf 410 Hardener	1.5	1.7
ChemPruf Finisher Additive	2.7	3.4

### **SPECIAL MIXING INSTRUCTIONS**

#### **CHEMPRUF 2410 AO (Topcoat)**

##### **If optional Finisher is not specified**

Stir the contents of the individual resin and hardener containers prior to blending. Mixing of the components should be with a KOL type mixer with a 5-gallon capacity. Mixing speed should be between 60 and 75 RPM.

The following mixing instructions are for a batch size of 34 lb. 14 oz. (15.8 kg.) or 0.26 ft<sup>3</sup> (7.3 liters). Estimated coverage of the batch size is 49 ft<sup>2</sup> (4.6 m<sup>2</sup>) @ 1/16" (1.6 mm.). Proportionally increase or decrease component quantities to attain larger or smaller batch sizes.

- a. Evenly divide the contents of one of the 54 lb. (24.5 kg.) bags of ChemPruf 2000 AO Powder into two equal parts by volume using two clean, dry 5-gallon pails. Each pail should contain 27 lb. (12.2 kg.) or approximately 232 fluid ounces (6.9 liters) of powder.
- b. Combine 110 fluid ounces (3.26 liters) of ChemPruf 2410 Resin with 4.0 fluid ounces (119 ml.) ChemPruf Finisher Additive\* in a suitable mixing container and mix thoroughly for two minutes as described above.
  - \*4.0 fluid ounces equals 7.9 tablespoons.
- c. Add 1.7 fluid ounces (51 ml.) ChemPruf 2410 Hardener\* and mix thoroughly for two minutes as described above.
  - \*1.7 fluid ounces equals 3.4 tablespoons.
- d. Slowly add a 1/2 bag of ChemPruf 2000 AO Powder, 27 lb. (12.2 kg.), as prepared in Step (a.).

- e. Mix the combined components for approximately two minutes or until all the powder is thoroughly dispersed.

The amount of the powder may be varied slightly to obtain the desired consistency. Decreasing the powder component will decrease the estimated unit coverage. The amount of powder must be within 5%, by weight, of the suggested amount.

**MIX RATIO OF THE CHEMPRUF 2410 AO (Topcoat)  
(If optional finisher is not specified)**

	by Weight	by Volume
ChemPruf 2410 Resin	100	100
ChemPruf 2410 Hardener	1.5	1.6
ChemPruf 2000 AO Powder	350	210
ChemPruf Finisher Additive	3	3.6

**CLEANING OF TOOLS AND EQUIPMENT**

Steel wool, soap and warm water will remove the materials referred to in this Data Sheet from mixing tools and equipment if cleaning is done immediately after use. Solvents, such as methyl ethyl ketone, toluene or xylene, will have to be used after the material has begun to harden. Fully hardened material will have to be removed by mechanical means.

Dispose of residues and wastes in accordance with the directions in the Material Safety Data Sheets and government regulations.

**STORAGE AND SHELF LIFE**

Store all materials in a cool, dry environment and out of direct sunlight. Store all ChemPruf Resins and Hardeners and ChemPruf VE Smoothing Liquid at a temperature between 40°F (4°C) and 60°F (16°C) and protect from freezing. In unopened original containers, ChemPruf VE Primer Resin and Hardener, ChemPruf 2410 Resin and Hardener, ChemPruf 410 Resin and Hardener and ChemPruf VE Smoothing Liquid have a shelf life of approximately three months. ChemPruf Finisher Additive has a shelf life of approximately nine months. ChemPruf 2000 S Powder, ChemPruf 2000 AO Powder, ATLAS Carbon Powder and ChemPruf 10 oz. Reinforcing Fabric can be stored indefinitely.

**MAINTENANCE**

Should the lining be damaged in any way, it can be repaired by thoroughly cleaning and reapplying the ChemPruf 2411 AO Lining System. Mix and apply in accordance with the instructions provided in this Installation Instructions sheet.

1. Determine all areas that have been damaged.
2. Grind or sand to expose the substrate 1" (25.4 mm.) to 2" (50.8 mm.) beyond the damaged area.
3. Grind or sand the surface of the ChemPruf 2411 AO Lining System. Taper the ChemPruf Lining to expose 2" (50.8 mm.) to 4" (101.6 mm.) of each layer of the

ChemPruf 2411 AO Lining System.

4. Clean and remove all debris from Step (2.) and Step (3.).
5. Apply ChemPruf Tie-Coat, Data Sheet 4-90PI, to the exposed tapered edges of the ChemPruf 2411 AO Lining System. Allow the ChemPruf Tie-Coat to dry.
6. Apply ChemPruf VE Primer to the substrate and exposed tapered edges of the ChemPruf 2411 AO Lining System.
7. Apply the ChemPruf 2410 basecoat, ChemPruf 10 oz. Reinforcing Fabric and ChemPruf 2410 saturant. Allow to harden.
8. Apply the ChemPruf 2410 AO topcoat.
9. Apply ChemPruf 410 or ChemPruf 141 if specified.

Rezklad® VE-Primer and Atlastacrete® VE Primer are substitutes for ChemPruf VE Primer.

**PRECAUTIONS**

The materials referred to in this Data Sheet are for Industrial Use Only. They contain materials that present handling and potential health hazards. Consult Material Safety Data Sheets and the container labels for complete precautionary information.

**TECHNICAL SERVICES**

ATLAS maintains a staff of Technical Service Representatives who are available to assist you with the use of ATLAS products. In the event of difficulties with the application of ATLAS materials, the installation should be stopped immediately and ATLAS' Technical Service Department consulted for assistance.

**WARRANTY**

ATLAS warrants that its products will be free from defects in workmanship and materials under normal use for a period of one (1) year from the date of shipment by ATLAS (provided the products are installed before the expiration of the shelf life). THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR THE PURPOSE FOR THIS PRODUCT WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. ATLAS' LIABILITY FOR ALLEGED BREACH OF THIS WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT (BUT NOT INCLUDING REMOVAL OF THE DEFECTIVE PRODUCT OR INSTALLATION OF REPLACEMENT PRODUCTS). ATLAS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES DURING THE WARRANTY PERIOD OR THEREAFTER. **ATLAS' WARRANTY IS VOIDED IF PAYMENT FOR PRODUCT IS NOT RECEIVED IN FULL.**