



PERMACAST® PL-8,000

Technical Data Sheet

CENTRIFUGALLY CAST CONCRETE PIPE

High strength, factory blended, fine aggregate concrete designed for creating a new pipe within old storm culverts and sanitary sewer pipe by centrifugally compacting a structural liner at the thickness engineered for the size, shape, ground water, and dynamic loading of each specific pipe.

The extremely dense, concrete liner contains crystalline waterproofing additives that continuously heal cracks and seal out infiltration. For sanitary sewer conditions, Con^{MIC}Shield®, a proven additive is added to prevent biogenic corrosion.

PHYSICAL PROPERTIES

Color	Gray
Special Handling	None-keep dry
Shelf Life	One year
Water Demand	118 - 128 fl. oz./bag
Coverage	50# bag yields .42 cu. ft.
Working Time:	60-120 minutes

NOMINAL VALUES

Set Time at 70°F ASTM C-266	
Initial Set	Approx. 170 minutes
Final Set	Approx. 300 minutes
Compressive Strength ASTM C-109	
24 hours	4,000 psi
28 days	8,000 psi
Flexural Strength ASTM C-293	
24 hours	1,200 psi
28 days	1,530 psi
Slant Shear Bond ASTM C-882	
28 days	2,900 psi
Tensile Strength ASTM C-496	
28 days	835 psi
Sulfate Resistance ASTM C-267	No damage
*5% Solution H ₂ SO ₄	30 days
*Samples received two coats of CS Identifier 300 sf per gallon coverage rate.	
Freeze Thaw ASTM C-666	300 Cycle Pass
Freeze Thaw Chloride Solution	300 Cycle Pass
Modulus of Elasticity ASTM C-469	
28 days 4-inch cylinder	5.26 X 10 ⁶ psi
Rapid Chloride Permeability	< 50 Coulombs
ASTM C-1202 (AASHTO T-277)	

The Physical properties contained herein were obtained under laboratory conditions at 72° F. Physical properties obtained under field conditions may be different due to environmental variables. Data is subject to reasonable deviation.

GENERAL

This information establishes the minimum standard for material and method of application for restoring and sealing leaking and deteriorated sewer pipe, culvert pipe and manholes by centrifugally casting PERMACAST® PL-8,000, onto its interior in one or more passes at a specified thickness.

MATERIAL

The material, PERMACAST® PL-8,000, is a high strength, high build, abrasion resistant and corrosion resistant fine aggregate concrete, based on advanced cements and additives. When mixed with the appropriate amount of water, a paste-like material will develop which may be sprayed, centrifugally cast or pumped into any prepared surface including metal, wood, plastics brick, block, stone and other construction materials.

The hardened liner is dense and highly impermeable due to a complex formulation of mineral, organic and densifying agents and sophisticated chemical additives including rust inhibitors. Graded quartz sands are used to enhance particle packing and further improve the hardened density and abrasion resistance. The composition also possesses excellent thin-section toughness, high modulus of elasticity, extremely low permeability and superior bonding. Unique fibers are added for crack control, increased cohesion, and structural reinforcement and to enhance flexural strength. All components are covered by long standing ASTM standards.

Crystalline waterproofing membrane technology is a vital component of the material because in the presence of moisture, it continuously combines with hydration by-products in the micro-capillaries and permanently reseals cracks against infiltration and damage from the resulting soil settlement.

EQUIPMENT

Mortar mixers, compressors and pumps are standard commercial models. Please contact AP/M for

equipment specifications. The high speed, rotating applicator and specialty equipment is licensed to certified applicators.

MIXING

Combine 50 pounds of the packaged dry mix with 118-128 fl. oz. of clean (50°-70°F) water while mixing with a high-speed shear mixer until proper consistency is obtained. Continue to agitate the concrete to prevent thickening beyond the desired fluidity. The working time is approximately 60-120 minutes depending upon field conditions such as wind and humidity.

PREPARATION

Pressure wash the interior surface with a high-pressure water-blast sufficient to remove all laitance and loose material and flush debris from the pipe. Plug active leaks and fill voids; use PL-12,000 for fast setting, high-strength invert/base replacement.

APPLICATION

Position the rotating applicator within the center of the sewer pipe and commence pumping the material. As the fine aggregate concrete begins to be centrifugally cast evenly around the interior, the applicator head is retrieved at the best speed for applying the thickness that has been selected. If flows are interrupted for any reason, stop its retrieval until flows are restored. The retrieval speed can be adjusted to create different thickness as engineered for the best structural thickness. Because of the even application throughout the interior, the thickness may be verified at any point. If additional thickness is desired, the rotating applicator is placed at that level and pumping and retrieval is recommenced until that area is thickened. Built-in bonding agents allow additional layers to be applied at any time without cold joints exceeding split tensile values.

The pressure application from the centrifugal casting of the concrete produces a finely textured surface that requires no additional troweling or finishing. The interior dimension is uniform and all corrugations are filled.

Work is performed in compliance with ASTM A979 STANDARD SPECIFICATION FOR CONCRETE

PAVEMENTS AND LININGS INSTALLED IN CORRUGATED STEEL PIPE IN THE FIELD.

CURING

Use an ASTM C309 conforming curing compound or 1315 Sealer as required in the standard.

QUALITY ASSURANCE & ACCEPTANCE

All work shall be performed by factory certified applicators only. Mortar cube test samples for material strengths may be taken randomly as directed by the inspector for testing at the owner's expense. Thickness can be verified with a wet gage at any random point of the new interior surface. Any areas found to be thinner than minimum tolerances shall immediately receive additional material. Visual inspection should verify a leak-free, uniform appearance.

SAFETY

Observe OSHA standards for confined space entry.

WARRANTY and DISCLAIMER

The technical data herein provided is compiled from laboratory specimens in accordance with ASTM Standards. Test results from specimens made in the field may vary. Although this data is believed to be reliable, AP/M PERMAFORM makes no warranty express or implied, and further disclaims any liability as to the suitability of this information to a particular end use. This product is intended for use solely by our certified applicators.

AP/M PERMAFORM warrants its product to be free of manufacturing defects for one year from the date of purchase. ALL OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED. In no event will manufacturer be liable for special, incidental or consequential damages or personal injury. Our sole obligation and therefore the sole and exclusive remedy under this limited warranty whether in contract, tort, under any warranty, in negligence or otherwise shall be the replacement of nonconforming products at our factory.

PERMACAST® US patent 5,452,853 foreign patents pending. Con^{MIC}Shield® and Crystal-X® are registered trademarks of ConShield Technologies, Inc.

AP/M Permaform

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MATERIAL SAFETY DATA SHEET

Issue Date: 9-5-2014

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name: PERMACAST® PL-8000
Company: ACTION PRODUCTS MARKETING CORP.
P. O. BOX 555
JOHNSTON, IA 50131

HAZARD RATINGS	
HEALTH	1
FIRE	0
REACTIVITY	0
PERSONAL PROTECTION:	G

EMERGENCY TELEPHONE: 800-662-6465; 515-276-9610 (24 HOURS)

SECTION 2: HAZARDS IDENTIFICATION

Emergency Overview: PERMACAST PL-8000 is a blended cement repair mortar. It is a powder with a sandy/granular texture, which is grayish in color, and has no odor. It is not combustible or explosive. A single, short-term exposure to dust presents little or no hazard. Exposure of sufficient duration to wet material or dust or dry material on moist areas of the body, can cause serious, potentially irreversible tissue (skin, eye, respiratory tract) damage due to chemical (caustic) burns, including third degree burns.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dust, dry powder or with wet mortar can cause moderate eye irritation, chemical burns and blindness. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Cement mortar and cement may cause dry skin, discomfort, irritation, severe burns, and dermatitis.

Burns: Exposure of sufficient duration to wet mortar, or to dust or dry mortar on moist areas of the body, can cause serious, potentially irreversible damage to skin, eye, respiratory and digestive tracts due to chemical (caustic) burns, including third degree burns. A skin exposure may be hazardous even if there is no pain or discomfort.

Dermatitis: Cement and mortar dust are capable of causing dermatitis by irritation and allergy. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling, and cracking.

Irritant dermatitis is caused by the physical properties of the mortar dust and cement including alkalinity and abrasion.

Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate) present in cement. The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with cement. Others may develop allergic dermatitis after years of repeated contact with mortar dust or cement.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure. Inhalation of high levels of mortar dust can cause chemical burns to the nose, throat and lungs.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: This product contains crystalline silica and trace amounts of hexavalent chromium which are classified by IARC and NTP as known human carcinogens.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Ingestion: Do not ingest mortar containing cement. Although ingestion of small quantities of mortar or cement is not known to be harmful, large quantities can cause chemical burns in the mouth, throat, stomach, and digestive tract.

Medical Conditions
Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) or sensitivity to hexavalent chromium can be aggravated by exposure.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

A. Chemical Composition:

Component	Percent (By Weight)	CAS Number	OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)	LD ₅₀	LC ₅₀
Portland Cement	15.0-40.0	65997-15-1	5	5	NA	NA
Silica Fume	5.0-15.0	69012-64-2	Not Established	Not Established	NA	NA
Polypropylene	<1	9003-07-0	NA	NA	NA	NA
Crystalline Silica	40.0-70.0	14808-60-7	[(10)/(%SiO ₂ +2)]	10	NA	NA

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions and burns.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, burns, irritation, dermatitis, and prolonged unprotected exposures to wet cement, cement mixtures or liquids form wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis - which results from long-term exposure (more

than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).

- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method:	Non-combustible
General Hazard:	Avoid breathing dust. Wet mortar and cement are caustic.
Extinguishing Media:	Use extinguishing media appropriate for surrounding fire.
Fire fighting Equipment:	Cementitious mortar and cement poses no fire related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.
Combustion Products:	None.

Section 6: ACCIDENTAL RELEASE MEASURES

General:	Keep spilled material into a container. Avoid actions that cause the cement mortar dust or cement to become airborne. Avoid inhalation of mortar dust or cement and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet mortar and place in container. Allow material to dry or solidify before disposal. Do not wash cement mortar or cement down swage and drainage systems or into bodies of water (e.g. streams).
Waste Disposal Method:	Dispose of cement mortar according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General:	Keep mortar dry until used. Avoid dust formation. The cement contained in this product reacts alkaline when in contact with water or humidity. This may cause severe irritation of the skin or mucous membranes. The humidity of the skin or mucous membranes is enough of this reaction. Prolonged direct contact to the dry product should be avoided.
Usage:	Avoid inhalation of dusts. Avoid skin contact. Pour downwind and allow as little free fall as possible while emptying bags into equipment. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.
Housekeeping:	Avoid actions that cause the cement mortar dust and cement to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE

described in Section 8 below.

Storage: Store in a cool, dry area. Excessive moisture or pressures from stacking may cause some consolidation of powder in areas with temperatures exceeding 90 degrees Fahrenheit.

Clothing: Promptly remove and launder clothing that is dusty or wet with mortar. Thoroughly wash skin after exposure to dust or wet mortar.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits in enclosed buildings.

Personal Protective Equipment (PPE):

- **Respiratory Protection:** Under ordinary conditions Respiratory Protection is not generally required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.
- **Eye Protection:** Wear ANSI approved glasses or safety goggles when handling dust or wet mortar to prevent contact with eyes. Wearing contact lenses when using cement or cement mortar, under dusty conditions, is not recommended.
- **Skin Protection:** Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet mortar and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Dry powder
Color:	Gray
Odor:	None
Vapor Pressure:	NA
Vapor Density:	NA
Evaporation Rate:	NA
pH (in water):	11-13
Boiling Point:	NA
Freezing Point:	NA
Viscosity:	None, solid.
Solubility in Water:	Negligible

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Avoid contact with incompatible materials.

Incompatibility: Wet mortar and cement are alkaline and are incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None

Hazardous Decomposition: None

Section 11: TOXICOLOGICAL INFORMATION

Acute Toxicity: None
Local effects: Skin contact causes irritation. May cause severe damage to the eyes.

Section 12: ECOLOGICAL INFORMATION

Possible Environmental Effects:
After hydration (a few hours or days in moist conditions) the product is stable in soil and in water, with a negligible mobility of its constituents.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal of Substance:

Dispose of waste and containers according to Federal, State, Provincial and Local regulations. Residues should be disposed of in the same manner as the substance/product.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product contains components considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product qualifies as a hazardous substance with delayed health effects under Sections 311 and 312 of the Superfund Amendment and authorization Act of 1986.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

TSCA: Some substances are on the TSCA inventory list.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) is a substance known by the State of California to cause cancer.

WHMIS/DSL: Products containing crystalline silica and Portland cement are classified as D2A, E-corrosive material and are subject to WHMIS requirements.



Section 16: OTHER INFORMATION

Action Products Marketing Corp. (APM) believes the information contained herein is accurate; however, APM makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein which is not intended to be and should not be construed as legal advice or as insuring compliance with any National, State, Provincial or local laws or regulations. Any party using this product should review all such laws, rules, or regulations prior to use, including but not limited to US and Canada Federal, Provincial and State regulations.

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May 16th, 2017

Mr. Drew O'Connor
Municipal & Contractors Sealing Products
7740 Reinhold Drive
Cincinnati, OH 45237

Dear Mr. O'Connor:

Please consider this letter as confirmation that Municipal & Contractors Sealing Products is a certified applicator of our PERMACAST and COR+GARD systems. The license was issued in April of 2017.

Sincerely,

A handwritten signature in black ink, appearing to read "W E Shook".

William E. Shook
President