FST™ Foam Sealant

American Polywater® Corporation

TECHNICAL DATA SHEET

Description:

FST™ Sealant is a two-part, high-expansion foam duct sealant. It keeps water, acids, dust, gases, insects, and rodents out of the duct. FST™ Sealant expands and hardens to a "closed cell", rigid structure. This permanent, but removable, seal blocks both water and gas under moderate pressure.

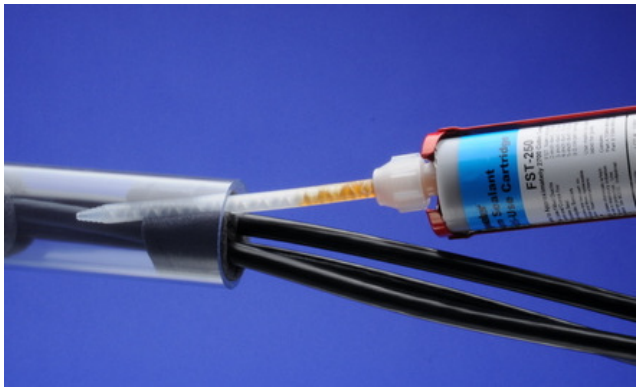
FST™ Sealant comes in a multi-use single plunger caulking tube package. The foam wets and adheres to metals, plastics, and concrete, and can seal ducts of different sizes, base materials, and shapes. It will conform around complex cable fill configurations. A kit contains everything required to install the duct block (application tool available separately).

Water Blockage:

FST™ Sealant is an excellent water block. To test water blocking performance, it is installed into a conduit according to standard procedures, forming a 3-inch plug. Water is added to the system and then pressurized to create a "water-head".

Condition	Result
HDPE Duct, (SDR 13.5) No Cables	Holds 7 days at 30 psi (70 feet of water)
PVC Conduit, No Cables	Holds 450 days at 10 psi (22 feet of water)
PVC Conduit, 3 MDPE Cables	Holds 15 min at 40 psi (90 feet of water)
PVC Conduit, 3 MDPE Cables *bent* 45°, opposite directions for 5 minutes	Holds 15 min at 40 psi (90 feet of water)
PVC Conduit, 3 MDPE Cables *pulled* with 15 lbs axial force for 4 hours	Holds 15 min at 40 psi (90 feet of water)

FST™ Sealant blocks considerable water-head pressure, even when forces are placed on the cable to stress the seal.



The FST™ Sealant comes in a caulking style (one plunger) tube. Package allows multiple seals. Mixing is done in the nozzle as the sealant is injected.

Product Benefits:

- Meets 2011 NEC Articles 225.27, 230.8, and 300.5(G) Raceway Seals
- Creates a strong, resilient, chemically resistant seal
- Holds 20 feet water-head pressure continuous; 70 feet water-head intermittent
- Expands, cures and seals even when water is present
- Controlled injection quantity – no waste
- Seal tolerates cable movement and environmental extremes
- Compatible with common cable and wire jackets
- Single cartridge can seal multiple ducts
- Re-enterable – seal can be removed

Official Approvals:

- UL Recognized

  Passes UL94
  Class HBF fire retardant rating

Component Properties:

FST™ Sealant is a two-part, urethane foam. The liquid Part A and B are formulated to be mixed at a 1/1 ratio using the two-part coaxial caulking tube with the static mixing nozzle provided.

Property	Part A (Resin)	Part B (Curing Agent)
Color	Amber	Clear
Form	Liquid 250 cps	Liquid 650 cps
VOC Content:	0 g/L	0 g/L
Specific Gravity	1.2	1.1

Cured Properties:

FST™ Foam Sealant cures to solid, closed-cell foam.

Property	Typical Result
Appearance	Light yellow color with small, even cells
Closed Cell Percent	98%
Density	6 lbs/cu. ft.
Compressive Strength (ASTM D1691)	330 psi
Tensile Strength (ASTM 1623)	270 psi
Flexural Strength (ASTM D790)	460 psi
Seal Strength - Water	70 feet intermittent 20 feet continuous
Seal Strength - Air	>5 psi

Seal Strength - Air and Other Gases:

FST™ Sealant can seal out manhole gases. To test seal strength, a 3-inch FST™ seal is installed into conduit according to standard directions. The conduit is sealed and pressurized with both air and helium. Helium is a small molecule, less than half the size of methane gas, and was used in place of methane.

Condition	Result
Air, 10 psi, 168 hours	Holds Seal
Helium, 5 psi, 72 hours	Holds Seal

The FST™ Sealant closed cell foam will block air and other gases for an extended period of time.

Cable Removal/Theft Deterrent Testing

FST™ Sealant acts as a theft deterrent by sealing cables into the conduit. To test this, a 3-inch plug of FST is used to seal 3 cables in a conduit according to standard procedures. The force to pull out each cable is measured.

Cable Type	Average Pull Out Tension (lb_f)
2 AWG THHN	171
4/0 XHHW	320

Draka *prelubricated* HDPE Cable in Conduit (CIC)	Average Pull-Out Tension (lb_f)
1-¼ inch with (2) RHW-2 awg cables and ground	188*
1-½ inch with (3) RHW-2 awg cables and ground	179*

**Entire foam core pulled out of the conduit.*

FST™ Sealant increases the cable holding force, making removal by hand very difficult.

Cable Compatibility

FST™ Sealant is compatible with common cable jacket materials. It does not change physical or electrical property of cable, based on tensile - elongation and volume resistivity testing. The cured foam is an inert solid that does not affect cable components.

Chemical Resistance

FST™ Sealant is chemically resistant to gasoline, oils, dilute acids and bases, and most unsaturated hydrocarbons.

Environmental Resistance:

FST™ Sealant withstands the rigors of the conduit exposure environment.

Cured Sealant Temperature Use Range
-20° F to 200° F (-29° C to 93° C) Continuous
-40° F to 250° F (-40° C to 121° C) Peak

FST™ Sealant does not lose function in direct sunlight. Reacted foam that is exposed to uv will yellow. This discoloration does not affect performance, the foam seal retains its hardness and continues to act as a duct block.

The foam sealant can be protected with a weather proofing paint. Both urethane and epoxy based products have been tested with good results and excellent adhesion to the foam.

Application:

Field-Ready Kit
The FST™ Sealant kit includes all materials required to install a finished duct block.

Seal Length
It is most important to make a seal of adequate length by using and properly spacing the damming strips. A 3-inch plug will meet performance guidelines.

Application Temperature
Working temperature for Polywater® FST™ Sealant is 35° F to 95° F (2° C to 35°C).

Water in Duct
FST™ Sealant will cure and seal duct with small amounts of water present. The water should not be flowing, and should be relatively clean. The FST™ foam will incorporate water into its cure. However, excessive water will weaken the seal.

For full installation information, please see the FST™ Installation Instructions.
(www.polywater.com/FSTuse.pdf)

Cure Rate:

The FST™ Sealant can be used in temperatures down to 35° F (2° C). At low temperatures, the reaction is slow, but the sealant will completely foam and cure with time. At cold temperatures, the sealant components become more viscous and flow through the mixing nozzle at a slower rate. Cure times are as follows:

	Reaction Time (Minutes)	
	40° F (4° C)	70° F (21° C)
Foaming, Expansion Complete	8 - 9	4 – 5
Hard, Non-sticky Skin Formation	15 – 18	7 – 9

Installation
Once a skin has formed, the foam may be visually inspected to determine whether the seal has completely filled the void. After the sealant has cured, the positioning rod or a screwdriver can be used to check for voids in the finished seal.

To decrease cure time in cold temperatures, warm FST™ Sealant cartridges prior to use.

Clean-up

Any unreacted material may be cleaned from surfaces with a solvent wipe such as Polywater's Type HP™ Cleaner/Degreaser. The part A amber resin will react with water if surfaces are washed with a soap and water solution. Once reacted, the foam has strong adhesion, and may be scraped or cut from surface.

Removal:

FST™ Sealant can be mechanically removed with some effort. Use a long screwdriver to puncture holes throughout the seal. With a hammer, punch the screwdriver through the foam, twist it to enlarge the cavity, and pull out. Once the foam is weakened, it can be chipped away, and the cable should break free.

Safety:

FST™ Sealant is a two-part urethane foam containing reactive chemicals. Polyurethanes are common in the construction industry and have been used for many years. Some individuals may become sensitized to components in the unreacted resin. Precautions must be observed during use and handling of these materials.

The use of FST™ in the prepackaged cartridge controls and reduces exposure. Once reacted, the foam is solid, closed-cell polyurethane. The finished product may be considered non-toxic. See MSDS for more information.

Combustion of Cured Foam
Irritating and toxic smoke and vapors may form during combustion of cured FST™ Foam Sealant. If burning the sealant material cannot be avoided, provide appropriate ventilation/respiratory protection against decomposition products during flame cutting operations.

Storage and Handling:

Keep containers cool, dry and away from sunlight. Leave cartridges in the protective foil pouch until ready to use/reuse.

Product shelf life is one year. Shelf life is one month after the product is opened.

Model Specification:

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

The foam duct sealant shall be FST™ Sealant. The foam duct sealant shall be a two-part "blown" urethane foam with 98% closed cell content. The foam duct sealant shall have a compressive strength of 300 pounds (ASTM D1691), and shall have a tensile strength of 250 pounds (ASTM D1623). The foam duct sealant shall have a flexural strength of 450 pounds (ASTM D790), and shall withstand temperatures from -20° F to 200° F. The foam duct sealant shall be chemically resistant to gasoline, oils, dilute acids and bases.

The foam duct sealant shall be available as a kit suitable for sealing various sized ducts. The product shall foam and react in five to ten minutes at 70° F.

When installed, the sealant shall be capable of holding 10 psi water pressure continuously (equivalent of 22 feet water-head pressure).

Order Information:

Cat #	Package Description
FST-250 (12 units/case)	8½-oz two-part Foam Sealant caulking tube style with resealing cap 1 ea Static mixing nozzle
FST-250KIT1 (1 unit/case)	8½-oz two-part Foam Sealant caulking tube style with resealing cap 3 ea Static mixing nozzles 4 ea 24-inch Foam damming strips
FST-250KIT (6 units/case)	1 24-inch Abrasive strip 1 pair Disposable gloves 1 Position rod 1 Pre-treating wipe 1 Instruction sheet
FST-KITCOM (1 unit/case)	8½-oz two-part Foam Sealant caulking tube style with resealing cap 5 ea Static mixing nozzles 4 ea 24-inch Foam damming strips
FST-KITCOMB6 (6 units/case)	5 pairs Disposable gloves 1 Position rod 5 Pre-treating wipe 1 Instruction sheet
FST-TOOL250 (1 unit/case)	Ratchet application tool for FST-250
FST-10NOZZLE (1 unit/case)	Mixing nozzle 10-pack
FST-DAM (24 units/case)	24-inch Foam damming strip

***Custom kits available. Call factory for details.*

Quantity Calculator located online:
http://www.polywater.com/calculators/fstcalculator.asp

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Important Notice: The statements here are made in good faith based on tests and observations we believe to be reliable. However, the completeness and accuracy of the information is not guaranteed. Before using, the end-user should conduct whatever evaluations are necessary to determine that the product is suitable for the intended use.

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Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software

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