CHEMSEAL+5

Chemical-Resistant Watertight Joint System

TECH DATA

Product Description

Featuring a polysulfide-bellows sealing surface and backed by an integral, pressure-resisting impregnated foam backing, CHEMSEAL+5 provides a lasting solution to joint sealing applications where exposure to chemicals or solvents is expected in volumes up to 5-feet of liquid head pressure.

CHEMSEAL+5 is the first in an ongoing line of CHEMSEAL models being released by EMSEAL. Tested in a hydrostatic-head pressure simulator to continuously resist water pressure of various levels without product deflection or leaking, additional versions are expected to be made available shortly. Consult EMSEAL for status and for applications with head pressure greater than 5-feet.

CHEMSEAL+5 builds on a track record of over 30 years of sealing structural expansion joints with impregnated foam sealants and is an evolution of EMSEAL's DSM SYSTEM.

The system is comprised of *(see Figure 1)* precompressed, polysulfide-and-impregnated-foam hybrid installed into field-applied epoxy adhesive on the joint faces with the polysulfide bellows locked to the joint faces with a polysulfide sealant band.

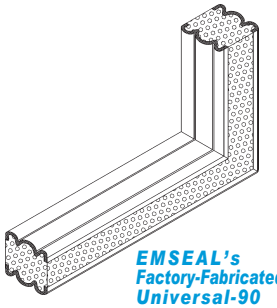
CHEMSEAL+5 features EMSEAL's patent-pending microsphere-modified acrylic adhesive infused into the cellular foam base material.

The polysulfide coating is Synthacalk™ GC2+ and is resistant to the effects of sunlight, rain, snow, ozone, aging, shrinkage, and daily and seasonal cycling changes caused by temperature fluctuation.

Features

Watertight — CHEMSEAL+5 is installed with the tensionless polysulfide bellows facing the liquid ensuring that watertightness is achieved.

Non-Invasive Anchoring — there are no hard metal-to-substrate connections with CHEMSEAL+5. This includes embedded pins, anchors, screws, bolts or tracks, trays or rails. The system is locked to the joint faces by means of the 1) backpressure of the foam; 2) the epoxy adhesive, and 3) the injected polysulfide sealant band at the joint face to foam-and-polysulfide-bellows interface.



EMSEAL's Factory-Fabricated Universal-90 (Patent Pending)

Continuity of Seal — as in all EMSEAL expansion joint systems, continuity of seal through changes in plane and direction is an essential performance differentiator. CHEMSEAL+5 is manufactured in straight-run sticks which are joined in the field with EMSEAL's exclusive "Universal- 90's" which are factory-fabricated single-piece 90-degree units. In addition to guaranteeing watertightness, EMSEAL's "Universal-90's" allow for much faster and secure installation by eliminating field cutting at angles. And because they are coated on both sides they can easily be installed at inside and outside corners as needed. *(See Figure 3. Page 2)*

Uses

Manufactured to resist the harsh conditions found when expansion joint systems contact non-purified water or liquid-suspended chemicals. Some examples are:

- **Waste Water Tanks**
- **Spill Containment**
- **Industrial Testing Tanks**
- **Cooling Towers**
- **HazMat Storage**
- **Chlorinated Water**
- **Fountains**
- **Pools**
- **Water Parks & Water Features**
- **Petrochemical Plants**

Figure 1: CHEMSEAL+5 SYSTEM in Typical Installation (Single-sided)

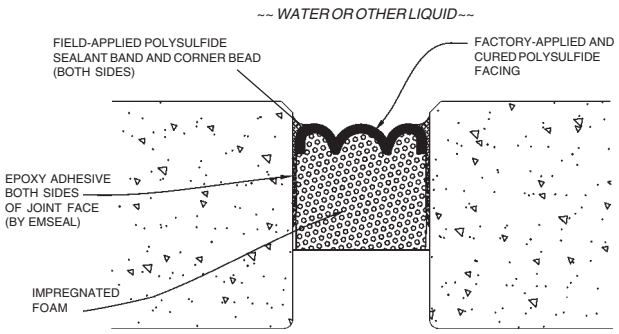
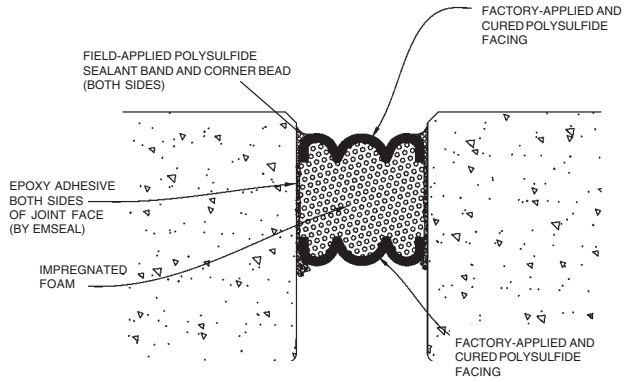


Figure 2: CHEMSEAL+5 SYSTEM in Installation Where Contamination from Both Sides is Possible (Double-sided)



™- Synthacalk is a trademark of Pecora Corporation, Harleysville, PA

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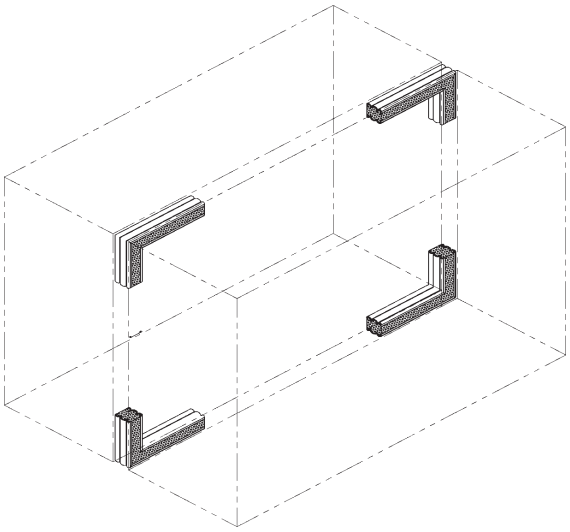


Figure 3: EMSEAL's warranted-watertight, factory-fabricated Universal-90's at inside and outside corners ensure continuity of seal while eliminating field execution of directional changes.

Double-Sided Straight-Run Option — CHEMSEAL+5 is also available with double-sided protection manufactured with the chemical-resistant bellows on both sides of straight lengths for use in applications where contamination from two sides is possible. *(See Figure 2)*

Movement Capability +25% and -25% (50% total) of nominal material size. *(See "Performance")*

Versatility — The standard CHEMSEAL+5 color is gray. Uniform bellows appearance, chemical resistance, and ability to handle variations in joint size through size-switching are among other system features.

Performance

Capable of movements of +25%, -25% (50% total) of nominal material size.

CHEMSEAL+5 will maintain its watertight capabilities and shape under a constant submerged depth (headwater pressure) of up to 5 feet.

Standard sizes from 1/2" (12mm) to 2" (50mm). Sizes up to 4" (100mm) available subject to review of application. Consult EMSEAL.

Substrates must be solid, parallel, plumb and capable of resisting approximately 2.5 psi backpressure from the foam.

Chemical Resistance: The polysulfide sealant is not degraded by contact with chemicals. *(See Chemical Resistance Chart)*

Applicable Standards: The polysulfide coating meets or exceeds all aspects of Federal Specification TT-S-00227E, Type II, Class A in all respects except Section 3.5.7, "Stain and Color Change", ASTM C920, Type M, Grade NS, Class 25, Use NT, M, G, A with the exception of ASTM C510 "Stain and Color Change". Also exceeds the test requirements of ASTM C1247 for sealants exposed to continuous immersion in liquids and NSF Standars 61, Section 6 for Joining and Sealing Materials.

Composition

- CHEMSEAL+5 is produced by coating an impregnated cellular foam with a chemical-resistant polysulfide liquid sealant.
- The polysulfide external facing is factory-applied to the foam at a width greater than the maximum offered extension and is cured before final compression.
- Polysulfide application and curing takes place in a factory-controlled environment. In contrast to field-applied liquid sealant and backer rod installations, no movement takes place during curing that can cause deformation or stresses in the material.
- When compressed, a bellows is created in the coating. As joint movement occurs the bellows simply folds and unfolds free of tension on the bondline, and virtually free of tensile stresses in the polysulfide material.
- The foam provides a resilient backing to the polysulfide coating, making the system capable of resisting head pressure and reasonable transient point loads.
- CHEMSEAL+5 is supplied in 6.56 LF (2m) shrink-wrapped lengths (sticks). "Universal-90" factory-fabricated corners with a standard length of 6-inches (one leg) and 12-inches (other leg) are also available. CHEMSEAL+5 is precompressed to less than the joint size for easy insertion. After removal from the shrink-wrap and hard board restraining packaging, it expands gradually.

Table 1: Typical Physical Properties of CHEMSEAL+5 Impregnated Foam

Property	Value	Test Method
Base Material	Cellular, high density, polyurethane foam	N/A
Impregnation	Proprietary, modified, water-based, acrylic	N/A
Temp. Service Range **High** **Low**	 185°F (85°C) -40°F (-40°C)	ASTM C711
UV Resistance*	No Changes--2000 hours	ASTM G155-00A
Resistance to Aging*	No Changes--2000 hours	ASTM G155-00A
Bleeding: **-40°F to 180°F** **(-40°C to 85°C)**	No bleeding when compressed to minimum of claimed movement, i.e. -25% of nominal size and when simultaneously heated to 185°F (85°C) for 3 hours	
Compression Set	Material recovers to +25% of nominal size within 24 hours after compression to -25% and simultaneous heating to 180°F (85°C) for 3 hours	

*(*Accelerated Weatherometer)*

Table 2: Typical Physical Properties of Polysulfide Coating

Property	Value	Test Method
Specific Gravity, mixed (3/ml)	1.70	ASTM D70
Solids	100%	ASTM C1250
Hardness (Shore A)	25 - 30	ASTM C661
Work Hours	2 - 3 hours	
Tack-Free	<24 hours	ASTM C679
Elongation	500-550 %	ASTM D412
Tensile Strength	150 - 200 psi	ASTM D412
UV Resistance	No Changes (250 hours)	ASTM C-793
100% Modulus	50 psi	ASTM D412
200% Modulus	80 psi	ASTM D412

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Chemical Resistance Chart

This data should only be used as a guide for chemicals at room temperature. It is recommended to test the material under actual (or at least simulated) service conditions before specification and/or use.

RECOMMENDED

Aluminum Sulfate Solution, 50%
Ammonium Chloride Solution, 50%
Ammonium Perchlorate, 15%
Ammonium Perchlorate, 50%
Ammonium Polysulfate
Ammonium Sulfate Solution, 30%
Amyl Alcohol
ASTM Fuel A
ASTM Fuel B
ASTM Fuel C
ASTM Fuel D
Barium Hydroxide, 10%
Borax Solutions, 25%
Boric Acid Solution, 20%
Borohydride Solution
1-4 Butanediol
Butyl Cellosolve
Butyl Dioxitol
Butyl Oxitol
Calcium Chloride Solutions, 50%
Calcium Hydroxide, 20%
Calcium Hypochlorite, 50%
Caustic Potash, 45%
ChlorinatedWater, 1ppm
ChlorinatedWater, 10ppm
ChlorinatedWater, 100ppm
Copper Sulfate Solution, 20%
Cyclohexane
Dibutyl Carbotol
Diethylene Glycol
Ethyl Alcohol
2-Ethyl Hexyl Acrylate
Ethylene Glycol
Ferrous Sulfate, 10%
Fluoboric Acid, 10%
Fuel Oil/Diesel Fuel
Gasoline, Leaded
Gasoline, Unleaded
Gashol
Heptane
Herbicides
— Marksman
— Banvel
— Aatrex 4L
— Prowl 3.3 EC
— Tri-4
— Treflan
— Serve 24E
— Sonalan E.C.
Hexane
Hexane Glycol
Hydrofluoric Acid, 5%
Hydroflouric Acid, 10%
Hydroflouric Acid, 23%
Hydrogen Peroxide, 3%
Hydrogen Peroxide, 20%
Hydrogen Peroxide, 35%
Isobutyl Alcohol
Isobutyl Isobutryate
Isopropyl Alcohol
Isotearic Acid
Jet Fuel (See ASTM Fuels)
Kerosene
Lacquer Solvents
Linseed Oil
Lubricating Oils
Magnesium Chloride Solution, 20%
Magnesium Hydroxide Solution, 30%
Maleic Anhydride, 25% Slurry
Methanol
Methyl Tert-Butyl Ether, 98%
Mineral Spirits
Motor Oil 10W/40
N-Butyl Acrylate
N-Butyl Alcohol
NaphthaVM & P
Naphthalene Oil
Oleic Acid
Oxalic Acid, 20%
Paraffinic Oil
Pesticides
— Arrosolo 3.3E
— Eradicane 6.7E
Phenolic Resins
Phosphoric Acid, 50%
Phthalic Andydride, 38% slurry
Potassium Carbonate
Potassium Hydroxide Solution, 25%
Potassium Hydroxide, 50%
Propylene Glycol
SAE 10 Oil
Shell Tellus Oil 46
Skydrol 500B
Soap Solutions
Sodium Bicarbontae Solution, 25%
Sodium Chloride Solution, 25%
Sodium Hydroxide, 50%
Sodium Hydroxide, 50% @ 120°F
Sodium Sulfide, 25%
Stearic Acid, 20%
Sulfuric Acid, 20%
Texanol
Transmission Fluid
Urea, 10%
Urea Ammonium Nitrate, 32%
Vinyl Acetate
Zinc Chloride, 10%
Zinc Nitrate, 17%

INTERMITTENT CONTACT

Acetic Acid, 10%
Acetic Acid, 50%
Acetone
Acrylonitrile
Ammonium Hydroxide Solution, 28%
Carbon Tetrachloride
Ethyl Acetate
Ethyl Acrylate
Ferric Chloride, 50%
Herbicides
— Dual 8E
— Bicep 6L
Hydrochloric Acid, 20%
Isopropylamine
Methyl Acrylate
Methyl Carbitol
Methyl Ethyl Ketone
Methyl Methacrylate
Methyl n-Amyl Ketone
Phosphoric Acid, 60%
Phosphoric Acid, 75%
Sodium Cyanide, 5%
1, 1, 1 Trichloroethane
Triton X100
Vinylidene Chloride
Xylene

NOT RECOMMENDED

Acetic Acid, Glacial
Arcosolv PM Acetate
Benzene
Benzoflex 9-88
Benzoic Acid, 5%
Butyl Benzyl Phthalate
Butyl Cellosolve Acetate
Carbon Disulfide
Carbitol Acetate
Cellosolve Acetate
Chromic Acid, 15%
Chromic Acid, 35%
Creosote
Cumene Hydroperoxide
Dimethyl Formanide
Epichlorohydrin
Ethylene Dichloride
Formic Acid, 90%
2-Furaldehyde
Glycol Ether EM
Hydrochloric Acid, 37%
Isophorone, 97%
Malathion 50
2-Mercaptoethanol
Methyl Cellosolve Acetate
Methylene Chloride
Nitric Acid, 10%
Nitric Acid, 30%
Nitric Acid, 60%
Pickling Solution
— 20% Nitric Acid, 4% HF
— 17% Nitric Acid, 4% HF
Potassium Permanganate, 6%
Propylene Oxide
Sodium Hypochlorite, 5%
Sodium Hypochlorite, 8%
Solvent 150
Styrene
Sulfuric Acid, 50%
Sulfuric Acid, 66%
Sulfuric Acid, 8% @ 120°F
Tetrahydrofuran
Tetrahydrofurfuryl Alcohol
Toulene

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Installation

IMPORTANT: The following instructions are a summary. Refer to "CHEMSEAL Install Data" and job-specific instructions of an EMSEAL technician for complete procedures. FOR PROFESSIONAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

- Store indoors at room temperature. Expansion is quicker when warm, slower when cold. Substrate temperature must range between 50°F (10°C) and 110°F (43°C). Shelf Life: One year in original unopened packaging stored at temperatures not to exceed 80°F (26°C).
- **Precautions:** Wear chemical-resistant gloves and/or barrier hand cream when handling liquid polysulfide sealant or epoxy. Remove promptly from skin with a commercial hand cleaner before eating or smoking. Avoid inhaling vapors.
- **Sequencing:** Install factory-fabricated transition and/or termination pieces first. Connect straight run material to in-place terminations and transitions. Cut closing pieces 3/8-inch (10mm) longer than the opening to be joined. Compress material longitudinally to fit.
- Ensure nominal material size matches joint size.
- Mix epoxy and trowel a thin layer onto the joint faces to at least the depth of the CHEMSEAL+5 foam.
- Remove shrink-wrap packaging and hardboard.
- Wipe polysulfide facing using clean lint-free rag made damp with solvent.
- Insert material into joint to determined depth below the substrate surface.
- The polysulfide liquid sealant is shipped in 1.5 gallon kits in two components. Thorough blending of the base and activator components is essential for optimum sealant performance. Remove the Activator (part A) from the Base (part B) container. Also be sure to remove the polyethylene sheet or tray from the B container. Before adding Part A, mix Part B with a mixing paddle with a low-speed, heavy-duty electric drill. Then add Part A to Part B and mix for 6-minutes, or until the material is completely blended, scraping down the sides of the container and mixing paddle periodically during mixing. DO NOT mix base and activator components from one shipment with components from another. DO NOT divide or split a kit--The full 1.5 gallon kit must be mixed and the mixed sealant drawn up into a bulk gun from which it will be dispensed. The working time on a mixed kit is about 1 hour at 70-deg F. (21-deg C). Some wastage should be expected and extra kits may need to be ordered by the applicator depending on the total quantity, temperature at time of installation and staging of the work.
- Inject a band of liquid polysulfide between mating bellows' faces.
- Join lengths by pushing polysulfide-coated ends firmly together.
- Before the epoxy or the mixed polysulfide cures, force the tip of the bulk-gun cone between the foam and the substrate and inject a polysulfide sealant band. Tool the overflow sealant into a cover bead between the top of the polysulfide bellows and the substrate.
- Tool the polysulfide between joined lengths so that the bellows are not restrained by excess polysulfide.

NOTE: It is critical that any exposed foam ends or any other foam exposed during installation be field coated with the liquid polysulfide sealant supplied. The resilient foam backing is not resistant to chemical exposure.

- Clean Up: Remove polysulfide sealant from equipment before it cures using MEK*, Toluene*, or Xylene*. These solvents are not effective after the polysulfide has cured. Cured material may be removed by cutting it away with sharp tools, sandpapering or softening with chlorinated solvents*.
  **(Solvents mentioned or referred to are toxic and flammable. Observe solvent manufacturer's precautions and refer to Material Safety Data Sheets as well as local and federal requirements for same handling and use).*

***IMPORTANT*: Allow liquid polysulfide to attain a complete cure before filling area with liquid (7 days minimum).**

- **Maintenance:** If the polysulfide bellows or sealant bands are damaged but remain intact, cut out the damaged area and recaulk. No primer is required. If the bond has been affected or the foam backing of the CHEMSEAL is compromised, remove the damaged area, clean and prepare the substrates in accordance with instructions and reinstall new material.

Table 3: CHEMSEAL+5 Sizing

Nominal* Material Size at Mean T°	Minimum (closes to)	Maximum (opens to)	Total Movement	Depth of Seal
1/2 in (12mm)	3/8 in (10mm)	5/8 in (16mm)	1/4 in (6mm)	1 1/2 in (40mm)
5/8 (15)	1/2 (12)	3/4 (20)	5/16 (8)	1 1/2 (40)
3/4 (20)	1/2 (12)	7/8 (22)	3/8 (10)	1 1/2 (40)
1 (25)	3/4 (20)	1 1/4 (30)	1/2 (13)	2 (50)
1 1/4 (30)	7/8 (22)	1 5/8 (42)	5/8 (15)	2 (50)
1 1/2 (40)	1 1/8 (28)	1 7/8 (47)	3/4 (20)	2 3/8 (60)
1 3/4 (45)	1 1/4 (30)	2 1/8 (53)	7/8 (22)	2 3/8 (60)
2 (50)	1 1/2 (40)	2 1/2 (65)	1 (25)	2 1/2 (65)

*Corresponds to joint size at mean temperature.

Warranty

Standard or project-specific warranties are available from EMSEAL on request.

CAD Details and Specs

Guide specifications and CAD details are available online at **emseal.com** or by email. Contact EMSEAL.

Availability and Price

CHEMSEAL+5 is available for shipment internationally. Prices are available from local representatives and/or directly from the manufacturer. The product range is continually being updated, and accordingly EMSEAL® reserves the right to modify or withdraw any product without prior notice.