

Material Product Data Sheet

Sealers for Thermal Spray Coatings

Thermal Spray Products:

Metcoseal™ AP-70, Metcoseal APT-70 Thinner, Metcoseal ERS, Metcoseal SA-70, Metcoseal URS, Metco™ 185 Sealer, Metcoseal HT-10

1 Introduction

Sealers are materials that penetrate the pores of thermal spray coatings. Once dried and cured, they form a protective barrier to gases and liquids. This is especially important in situations where a galvanic potential between the coating and the substrate is a concern. Sealers are often recommended for porous coating systems, such as ceramics, that will be used in liquid or atmospheric chemical environments, and for metallic coatings that have higher nobility than the substrate. Coatings that are anodic with respect to the substrate may be sealed to improve coating service life.

In many applications, the porous nature of thermal sprayed coatings is an advantage, such as retaining lubricants to prevent wear. However, in some cases it is best to seal the porosity, such for thin coatings or when a corrosive reagent or damaging environment is present, such as sea water, steam, dilute acids, corrosive gases and/or elevated temperatures. Coating porosity can entrap corrosive elements, setting up an electrochemical attack of both the coating and the underlying substrate. This could lead to coating and/or bond failures. Metco sealers protect both the thermal sprayed coating and the metal substrate underneath. In machine element applications, Metco Sealers applied before finishing, prevent contamination of the coating pores and provides a cleaner initial ground finish.

Sealers can also be used to fill coating pores where high pressures are encountered, such as hydraulic rams and pump shafts, preventing fluid seepage through pores. Where ceramic materials are utilized for their dielectric properties, sealing of the coating helps to maintain dielectric constants. If left unprotected, coating porosity could lead to the absorption of moisture and contaminants, resulting in the form of unwanted conductive paths in the coating.

Quick Facts

Classification	Auxiliary, Sealers
Purpose	Seal porosity within thermal spray coatings
Process	All thermal spray processes



1.1 Typical Uses and Applications

- Bridges, trestles and other outdoor structures
- Hydraulic pistons
- Petrochemical plants
- Farm equipment
- Printing cylinders
- Pulp and paper machinery
- Marine equipment and structures
- Pump seals, shafts, plungers and housings
- Transformer cases
- Storage vessels, tanks and waste containers
- Boiler waterwalls

2 Material Information

2.1 Quick Selector

Sealer	Key Recommended Application	Recommended Environmental Conditions				Maximum Service Temperature
		Acidic	Basic	Solvents	Atmospheric	
Metcoseal AP-70	Renders coatings impermeable to high pressure; good heat resistance	✓	✓	many	✓	205 °C 400 °F
Metcoseal APT-70 Thinner	Thinner for Metcoseal AP-70	N/A	N/A	N/A	N/A	N/A
Metcoseal ERS	Recommended for more severe environments; VOC-free	✓	✓	many	✓	150 °C 302 °F
Metcoseal SA-70	Protects aluminum coatings exposed to high temperature atmospheric conditions	✗	✗	✗	✓	593 °C 1100 °F
Metcoseal URS	All-purpose sealer for corrosion protection; low VOC	✓	✓	many	✓	205 °C 400 °F
Metco 185 Sealer	Low temperature applications requiring sealing and lubrication	most	most	✗	✓	82 °C 180 °F
Metcoseal HT-10	High temperature, erosive and corrosive environments	✓	✓	✓	✓	1620 °C 2950 °F

2.2 Physical Properties

Property	Metcoseal AP-70	Metcoseal APT-70 Thinner	Metcoseal ERS	Metcoseal SA-70	Metcoseal URS	Metco 185 Sealer	Metcoseal HT-10
Base Composition (non-volatile)	Phenolic Resin	N/A	Epoxy (2 component)	Silicone Resin with Aluminum Flake	Urethane (1 component)	Petroleum-Based Wax	Inorganic Aluminum Phosphate (1 component)
Appearance	Clear	Clear	Clear	Metallic	Black	White	White ^a
Coverage (approximate)	2.82 m ² /l 115.1 ft ² /gal	N/A	3.5 m ² /l 37.6 ft ² /qt	7.16 m ² /l 292 ft ² /gal ^d	3.5 m ² /l 8.1 ft ² /qt	10.4 m ² /kg 50 ft ² /lb	21.1 m ² /l 861 ft ² /gal ^d
Cure Method	Air Dry / Heat Cure	N/A	Polymerization	Air Dry / Heat Cure	Polymerization	Solid at < 85 °C < 185 °F	Air Dry + Heat Cure
Dielectric Strength	---	N/A	173 kV/cm 440 V/0.001 in	---	98 kV/cm 250 V/0.001 in	---	67.3 kV/cm 171 V/0.001 in
Flash Point ^b	23 °C TCC 73 °F TCC	35 °C TCC 95 °F TCC	> 93 °C PM > 200 °F PM	44 °C TCC 111 °F TCC	60 °C TCC 140 °F TCC	274 °C TOC 525 °F TOC	none
Max. Service Temperature	205 °C 400 °F	N/A	150 °C 302 °F	593 °C 1100 °F	205 °C 400 °F	82 °C 180 °F	1620 °C 2950 °F
Shelf Life ^c	12 months	18 months	12 months	12 months	12 months	---	6 months
Volatile Organic Compounds (VOC)	n-Butanol 90 wt. %	n-Butanol 100 wt. %	none	Propylene Glycol Monomethyl Ether Acetate 75 wt. %	Petroleum-Based 4 wt. %	none	none

^a Other colors available on a special order basis (red, blue, grey, black) to volume buyers

^b TCC = Tag Closed Cup per ASTM D56, TOC = Tag Open Cup per ASTM D1310, PM = Pensky-Martens per ASTM D93

^c At room temperature

^d At 25 µm (0.001 in) dry film thickness (DFT)

2.3 Key Selection Criteria

■ Metcoseal AP-70

Recommended for sealing sprayed coatings for high pressure applications where the coating must be impermeable, such as hydraulic rams and shaft seals. For temperatures up to 205 °C (400 °F) continuous service or intermittently up to 260 °C (500 °F). Resists boiling water, salt spray, acids, oils, gasoline, greases and most organic chemicals.

■ Metcoseal APT-70 Thinner

Thinner for Metcoseal AP-70.

■ Metcoseal ERS

Recommended for increased corrosion protection of metallic and ceramic thermal spray coatings up to 150 °C (302 °F). Contains no volatile organic compounds (VOC) and resists many corrosive environments including inorganic and organic acids, alkalies, water and many organic solvents and aromatic hydrocarbons.

■ Metcoseal SA-70

For corrosion resistance when used as a top sealing coat over sprayed aluminum on iron and steel. Can be used at temperatures up to 593 °C (1100 °F). The high heat resistance of this material makes it an excellent sealer for atmospheric exposure in rural, industrial and salt environments.

■ Metcoseal URS

An all-purpose sealer designed for increased corrosion protection of metal or ceramic thermal spray coatings at service temperatures up to 205 °C (400 °F). Resistant to many corrosive environments including inorganic and organic acids, alkalies, water and many organic solvents and aromatic hydrocarbons. The sealer is impact and abrasion resistant. However, prolonged exposure to sunlight should be avoided.

■ Metco 185 Sealer

For sealing and lubrication of sprayed coatings at service temperatures up to 82 °C (180 °F). It is useful in sealing shafts and parts to insure a cleaner initial finish when machined or ground. The sealer prevents grit from the grinding operation from entering the pores of the coating, contributing to an easier cleaning operation and longer bearing life. Has excellent high pressure lubrication properties and is sometimes used for “dry” applications, which cannot be adequately lubricated in service. It is resistant to salt and freshwater and to nearly all acids and bases. It does not resist solvents and hydrocarbons. It will gradually be displaced from the coating by oils and greases when used in lubricated service.

■ Metcoseal HT-10

Inorganic sealer for high temperature applications. Recommended for metallic thermal spray coatings in corrosive and/or erosive environments. Stable for temperatures up to 1620 °C (2950 °F), thereby achieving an extremely dense, hard coating. It is particularly suitable for sealing coatings on boiler waterwalls.

2.4 Customer Specifications

Product	Customer Specification
Metcoseal AP-70	GE A8B35A1
Metcoseal APT-70 Thinner	GE A8B35B1

3 Key Processing Information

3.1 General Sealer Preparation and Application

As a general rule, all sealers should be applied after spraying and prior to finishing. Sealers have maximum performance when surfaces are clean, dry and free of oil, grease, dirt, corrosives, paint, mill scale and any other foreign matter. Containers should be tumbled before opening to ensure the solvent and all ingredients are properly remixed.

With the exception of Metco 185 Sealer, the part temperature should be below 80 °C (175 °F) before applying the sealer. This will prevent rapid evaporation of the solvent or

premature curing. All sealers should be cured prior to finishing. The heat generated during machining may cause premature and non-uniform curing of the sealer. Grinding uncured sealers may clog grinding wheels.

It is recommended that a light coat of sealer be reapplied after finishing to assure optimum sealing. For maximum resistance to corrosion, all sealers must be fully cured before placing in service. Product specific preparation and application procedures are listed below.

3.2 Metcoseal AP-70

Metcoseal AP-70 may be applied by brush or suitable spray equipment. When spraying, dilute the sealer in the proportion of 2 or 3 parts Metcoseal AP-70 to 1 part Metcoseal APT-70 Thinner.

Curing Schedules	Time After Application (at room temperature unless otherwise noted)
Touch	30 to 60 min (dry but remains tacky)
Air Dry	1 to 10 h; depending on the thickness of the coating
Heat Cure	15 to 30 min @ 135 °C (275 ° F) This method is recommended for effectively curing the sealer

3.3 Metcoseal ERS

Metcoseal ERS can be applied by a brush or by dipping up to 0.1 mm (0.004 in) wet film thickness. Substrate temperature should be 24 to 35 °C (75 to 95 °F) at time of application.

Mix part A with part B using a 100:40 ratio by weight. The blend may be heated to 38 °C (100 °F) for about 2 minutes to reduce viscosity and increase penetration depth. To shorten the cure cycle, apply a thicker wet film.

Mixed product life is 8 to 12 hours. Mix part A with part B using a 100:40 ratio by weight. The blend may be heated to 38 °C (100 °F) for about 2 minutes to reduce viscosity and increase penetration depth. To shorten the cure cycle, apply a thicker wet film. Mixed product life is 8 to 12 hours.

Curing Schedules	Time After Application (at room temperature unless otherwise noted)
Touch	2 h
Recoat	1 h minimum; recoat in semi-gel form
Handling	3 h @ 21 °C (70 °F)
Final Cure	■ Finalize cure @ 27 °C (80 °F) in the presence of moisture ■ 90% of maximum strength develops in 5 to 6 h @ 27 °C (80 °F) ■ 100% of maximum strength develops in 3 d @ 27 °C (80 °F).
Heat Cure	90% of maximum strength develops in 3 h @ 88 °C (190 °F)

3.4 Metcoseal SA-70

Metcoseal SA-70 can be applied by brush directly from the container without thinning.

Curing Schedules	Time After Application (at room temperature unless otherwise noted)
Air Dry (required prior to heat cure)	1 h minimum @ room temperature

Curing Schedules	Time After Application (at room temperature unless otherwise noted)
Heat Cure	45 min @ 250 °C (480 °F)

3.5 Metcoseal URS

Metcoseal URS can be applied by a brush, airless sprayer or dipping. Airless spray has shown the best results. Apply with a SA-70treated brush using the fewest possible strokes in one direction. When using a spray gun, be careful not to spray directly into corners. Allow the edge of the fan pattern to coat corners.

Apply 0.1 mm (0.004 in) wet film thickness. Avoid moisture and high humidity conditions while working with Metcoseal URS. Substrate temperature should be 24 to 35 °C (75 to 95 °F) at time of application. Apply 0.1 mm (0.004 in) wet film thickness to yield 0.05 mm (0.002 in) dry film thickness.

Curing Schedules	Time After Application (at room temperature unless otherwise noted)
Touch	4 to 6 h
Recoat	3 to 7 h; wet SA-70nd with 600 grit paper before applying subsequent coat.
Handling	6 to 8 h
Air Cure or Heat Cure	24 h 1 h @ 121 °C (250 °F) Do not cover for a minimum of 24 h

3.6 Metco 185 Sealer

Metco 185 Sealer is supplied in the form of a stick of wax and applied by melting it into the work. Simply preheating the part to approximately 93 °C (200 °F) and then rub the wax into the coating. If the work is not hot enough, the wax will not melt but simply mark like a pencil.(0.004 in) wet film thickness to yield 0.05 mm (0.002 in) dry film thickness.

3.7 Metcoseal HT-10

Metcoseal HT-10 is preferably applied using a pneumatic spray system. The sealer may also be applied by brushing or rolling, but may result in greater thickness variation.

Prior to use, remix the sealer thoroughly. Thin the sealer if necessary, with either distilled or deionized water up to 20% to 30% by volume and then mix again.

Curing Schedules	Time After Application (at room temperature unless otherwise noted)
Air Cure	30 min
Heat Cure	2 h @ 205 °C (400 °F) ■ May be heat cured in-situ in a dry environment ■ Do not expose to water until properly cured
Dry Film Thickness	50.5 µm (0.002 in) or higher is possible

4 Commercial Information

4.1 Ordering Information and Availability

	Order No.	Container Size	Availability	Distribution
Metcoseal AP-70	2353787	1 gal (approx. 3.8 l)	Stock	Global
Metcoseal APT-70 Thinner	2353788	1 gal (approx. 3.8 l)	Stock	Global
Metcoseal ERS	1001607	1 qt (approx. 0.95 l) per component (2 components / kit)	Special Order	Global
Metcoseal SA-70	2305672	1 gal (approx 3.8 l)	Stock	Global
Metcoseal URS	1001608	1 qt (approx. 0.95 l)	Stock	Global
Metco 185 Sealer	1000022	1 lb (approx. 0.45 kg)	Stock	Global
Metcoseal HT-10	1485519	1 gal (approx 3.8 l)	Special Order	Global

Note: All sealers supplied in cans except Metcoseal HT-10 (supplied in plastic jugs) and Metco 185 Sealer (supplied as a wax stick).

4.2 Handling Recommendations

- Sealers should be stored and handled with the same precautions as used for ordinary paints and thinners. Consult the SDS for specific safe handling for each product.
- Storage in environmentally-controlled conditions. Avoid extremely hot or cold storage conditions.
- As some settling may occur, liquid sealers should be stirred or mixed thoroughly prior to use.
- Ensure that opened containers of liquid sealers are tightly sealed when not in use.
- Do not use past the stated shelf life listed in Section 2.2. Shelf life is based on date of manufacture.

4.3 Safety Recommendations

See the SDS (Safety Data Sheet) for the applicable product and localized for the country where the material will be used. SDS are available from the Oerlikon web site at www.oerlikon.com/metco (Resources – Safety Data Sheets).

Product	SDS No.
Metcoseal AP-70	50-2918
Metcoseal APT-70 Thinner	50-2917
Metcoseal ERS	
Part A	50-634
Part B	50-635
Metcoseal SA-70	50-2866
Metcoseal URS	50-633
Metco 185 Sealer	50-249
Metcoseal HT-10	50-2427