3M™ Scotchkote™ Fusion Bonded Epoxy Coating 135

Data Sheet

Product Description

3M™ Scotchkote™ Fusion Bonded Epoxy Coating 135 is a one-part, heat curable, thermosetting powdered epoxy coating designed for application over phenolic primers to provide maximum corrosion protection of primary production tubing and gathering lines. It is specifically formulated for operation at elevated temperatures and pressures in the presence of H_2S, CO_2, CH_4, crude oil and brine. Scotchkote 135 FBEC can be used without a primer on nonproduction tubing applications such as valves, pumps, pipe drains, hydrants and porous castings. Scotchkote 135 coating is resistant to wastewater, corrosive soils, hydrocarbons, and sea water. Powder properties allow easy manual or automatic application by electrostatic or air-spray equipment.

Temperature Operating Range

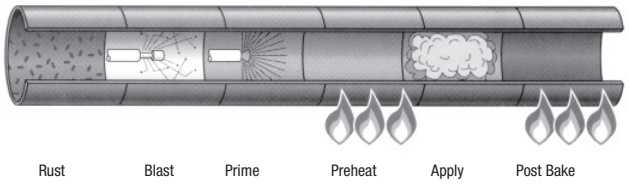
Scotchkote 135 coating, when properly applied to a nominal thickness of 15 mils, should perform in a satisfactory manner on pipelines operating between -100°F/-73°C to 203°F/95°C. For temperatures reaching 230°F/110°C thicker coatings, greater than 30 mils, may improve the service capability. However, it is difficult to accurately predict field performance from the laboratory data due to the wide variations in actual field conditions. Soil types, moisture content, temperatures, coating thickness, and other factors specific to the area all influence the coating performance and upper temperature operating limits.

Product Features

- Meets Mil Spec 23236C
- Excellent chemical resistance
- Protects over a wide temperature range
- Resistant to cracking during pipe coupler installation and splitting on upset ends from tubing string weight stress
- Resists cathodic disbondment
- Resists soil stress and backfill compaction
- Long-term storage under most climatic conditions
- High adhesion and toughness
- Will not sag, cold flow or become soft in storage
- Lightweight for lower shipping costs
- Particularly suitable for electrostatic, air-spray or blow application on production tubing
- Compatible with most phenolic primers
- Long gel time allows application without runs, sags, laminations, or overspray
- Can be machined by grinding or cutting to meet close tolerance requirements
- Allows easy inspection of coated articles

General Application Steps - Internal Pipe

1. Remove oil, grease and loosely adhering deposits
2. Abrasive blast-clean the surface to NACE No. 2 / SSPC-SP10 or white metal with a 1.5 mil (38 µ) surface profile
3. Apply mechanical masks, release agents or mask with Scotch® Glass Cloth Tape 361 or Scotch Aluminum Foil Tape 425 as required
4. Apply liquid phenolic primer to dry film thickness of 1 mil (25 µm), if specified
5. Preheat cleaned, primed pipe to 325° to 375°F (163° to 191°C) for 30 minutes
6. Deposit Scotchkote 135 FBEC by blow coating, lance or electrostatic spray to a minimum thickness of 12 mils (304 µm)
7. Post cure at 450°F (232°C) for 30 minutes
8. Electrically inspect for holidays after the coating has air cooled. Repair all defects.



Cure Specifications

Scotchkote 135 FBEC may be applied to metal articles which have been preheated to a temperature of 300° to 450°F (149° to 232°C). After application, Scotchkote 135 coating must be cured according to the times and temperatures listed in the cure guide to achieve maximum performance properties.

If Scotchkote 135 coating is electrostatically applied to unheated parts, the cure time should be measured from the time the coated part reaches the cure temperature. After cure, the coating may be force cooled using air or water to facilitate inspection and handling.

3M™ Scotchkote™ Fusion Bonded Epoxy Coating 135 Cure Guide

Temperature of the Article at Time of Powder Application	Typical Gel Time	Cure Time
475°F (246°C)	40 seconds	7 minutes
450°F (232°C)	60 seconds	10 minutes
400°F (204°C)	120 seconds	15 minutes
350°F (177°C)	330 seconds	25 minutes

Typical Properties

Property	Value
Color	Gray
Specific Gravity - Powder (Air Pycnometer)	1.51
Coverage	127 ft^2/lb/mil (0,66 m^2/kg/mm)
Fluidized Bed Density	33 lbs/ft^3 (530 kg/m^3)
Shelf Life at 80°F (27°C)	18 months
Average Gel Time at 400°F (204°C)	134/70 seconds 135/45 seconds
Pill Flow	75 - 100 mm
Edge Coverage	12% - 18%
Minimum Explosive Concentration	0.03 oz/ft^3 (30,6 g/m^3)
Ignition Temperature	986°F (530°C)

3M™ Scotchkote™ Fusion Bonded Epoxy Coating 135 Test Data - without Primer

Property	Test Description	Results
Adhesion	Elcometer	< 3000 psi (210 kg/cm^2)
Adhesion to Steel (Shear)	ASTM D 1002 10 mil (254 micron) glue line	4300 psi (302 kg/cm^2)
Impact	Gardner 5/8 in (1,6 cm) diameter tup 1/8" x 3" x 3" (0,32 cm x 7,6 cm x 7,6 cm) steel panel	160 in•lbs 1,8 kg•m
Hardness	Barcol ASTM D 2583	23
Abrasion Resistance	ASTM D 1044 CS-17 1000 g weight / 5000 cycles	0,07 g loss
Thermal Shock	310° to -100°F (154° to -73°C) 4" x 4" (10,2 cm x 10,2 cm) coated panel	10 cycles, no effect
Penetration	ASTM G 17 -40° to 240°F (-40° to 116°C)	0.0
Tensile Strength	ASTM D 2370	7300 psi (512 kg/cm^2)
Elongation	ASTM D 2370	4.2%
Compressive Strength	ASTM D 695	12800 psi (900 kg/cm^2)
Coefficient of Friction	API RP5L2-1968, App 8	23°
Electric Strength	ASTM D 149	1000 volts/mil (39,4 kv/mm)
Hot Water Resistance	160°F (71°C) immersion / 120 days	Good adhesion, no blistering
Electrical Resistivity	ASTM D 257	1.2 x 10^{15} ohm•cm
Thermal Conductivity	MIL-I-16923E	7 x 10^{-4} cal/sec/cm^2/C°/cm
Water Absorption	3M 10 mil (254 micron) free film 30 days	6,5 g/m^2
Fungus Resistance	MIL-STD 810-B Method 508	Funginert
Salt Fog	MIL-E-5272C	No effect
Weatherometer	ASTM G 23 5000 hours	Surface chalk
Soil Stress - Burial	Bureau of Reclamation 25 cycles	No effect
Salt Crock	30 day, 5 volt, 5% NaCl sand crock 230°F (110°C)	10 mmr
Bendability	3/8" (9,5 mm) coupon four point bender at 73°F (23°C)	30 pipe diameters 1.90°/diameter length

Chemical Resistance Exposure at 73°F (23°C)*		
Acetic Acid up to 25%	Ferric Nitrate	Potassium Borate
Acetone (softened)	Ferric Sulfate	Potassium Carbonate
Aluminum Chloride	Ferrous Nitrate	Potassium Chloride
Aluminum Hydroxide	Ferrous Sulfate	Potassium Dichromate up to 10%
Aluminum Nitrate	Formaldehyde up to 100%	Potassium Hydroxide
Aluminum Sulfate	Formic Acid up to 10%	Potassium Nitrate
Ammonium Carbonate	Freon; Gas and Liquid	Potassium Sulfate
Ammonium Chloride	Gas (Mfg)	Propylene Glycol
Ammonium Hydroxide up to 100%	Gas (Natural)	Sewage
Ammonium Nitrate	Gasoline Leaded	Silver Nitrate
Ammonium Phosphate	Gasoline Unleaded	Soap Solution
Ammonium Sulfate	Glycerine	Soaps
Amyl Alcohol	Heptane	Sodium Bicarbonate
Barium Carbonate	Hexane	Sodium Bisulfate
Barium Chloride	Hexylene Glycol	Sodium Carbonate
Barium Hydroxide	Hydrochloric Acid up to 25%	Sodium Chlorate
Barium Nitrate	Hydrofluoric Acid up to 40%	Sodium Chloride
Barium Sulfate	Hydrogen Sulfide	Sodium Hydroxide
Benzene	Isopropyl Alcohol	Sodium Meta Silicate up to 5%
Boric Acid	Jet Fuel	Sodium Nitrate
Borax	Kerosene	Sodium Sulfate
Butyl Alcohol	Linseed Oil	Sodium Thiosulfate up to 5%
Cadmium Chloride	Lubricating Oil	Stannic Chloride
Cadmium Nitrate	Magnesium Carbonate	Sulfur
Cadmium Sulfate	Magnesium Chloride	Sulfuric Acid up to 60%
Calcium Carbonate	Magnesium Hydroxide	Synthetic Sea Fuel (60% Naphtha,
Calcium Chloride	Magnesium Nitrate	20% Toluene, 15% Xylene,
Calcium Hydroxide	Magnesium Sulfate	5% Benzene)
Calcium Nitrate	MEK (softened)	Synthetic Silage
Calcium Sulfate	Mercuric Chloride	Tetrapropylene
Calcium Disulfide	Methanol (softened)	Toluene
Carbon Tetrachloride	MIBK (Methyl Isobutyl Ketone)	Triethylene Glycol
Caustic Potash	Mineral Oil	Trisodium Phosphate
Caustic Soda	Mineral Spirits	Turpentine
Chlorine 2%	Molasses	Undecanol
Citric Acid up to 25%	Motor Oil	Urea
Copper Chloride	Muriatic Acid	Urine
Copper Nitrate	Naphtha	Vinegar
Copper Sulfate	Nickel Chloride	Water
Crude Oil	Nickel Nitrate	Chlorinated
Cyclohexane	Nickel Sulfate	Demineralized
Cyclohexene	Nitric Acid up to 30%	Distilled
Cyclopentane	Nonane	Salt
Detergent	Octane	Sea
Diesel Fuel	Oxalic Acid	Xylol
Diethylene Glycol	Pentane	Zinc Chloride
Dipropylene Glycol	Perchloroethylene	Zinc Nitrate
Ethanol (softened)	Phosphoric Acid up to 50%	Zinc Sulfate
Ethylbenzene	Phosphorous Trichloride	10-10-10 Fertilizer, Saturated
Ethylene Glycol	Potassium Aluminum Sulfate	
Ferric Chloride up to 50%	Potassium Bicarbonate	

***Tests conducted for two years on similar products. No effect unless otherwise stated.**

Chemical/Pressure/Temperature Resistance

All tests performed on Scotchkote™ Fusion Bonded Epoxy Coating 135 applied over a 1 mil (25,4 microns) phenolic primer. Liquid phase for all test conditions: 33% kerosene, 33% toluene, 34% brine solution 5% NaCl.

Operating Results

Test Conditions	Gas Phase	Results
Autoclave, 120°F (49°C) 48 hours, 1500 psi (10.3 MPa)	99.5% CO_2 0.5% H_2S	Excellent adhesion, no coating loss or blisters in aqueous, hydrocarbon, or gas phase
Autoclave, 150°F (66°C) 24 hours, 2200 psi (15.2 MPa)	80% CH_4 12% CO_2 8% H_2S	Excellent adhesion, no coating loss or blisters in aqueous, hydrocarbon, or gas phase
Autoclave, 200°F (93°C) 24 hours, 3300 psi (22.8 MPa)	86% CH_4 8% CO_2 6% H_2S	Excellent adhesion, no coating loss or blisters in aqueous, hydrocarbon, or gas phase
Autoclave, 300°F (149°C) 24 hours, 3000 psi (20.7 MPa)	90% CH 10% CO_2 Trace H_2S	Excellent adhesion, no coating loss or blisters inaqueous, hydrocarbon, or gas phase

Handling and Safety Precautions

Read all Health Hazard, Precautionary and First Aid, Material Safety Data Sheet, and/or product label prior to handling or use.

Ordering Information/Customer Service

For ordering technical or product information, or a copy of the Material Safety Data Sheet, call:
Phone: 800/722-6721
Fax: 877/601-1305

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