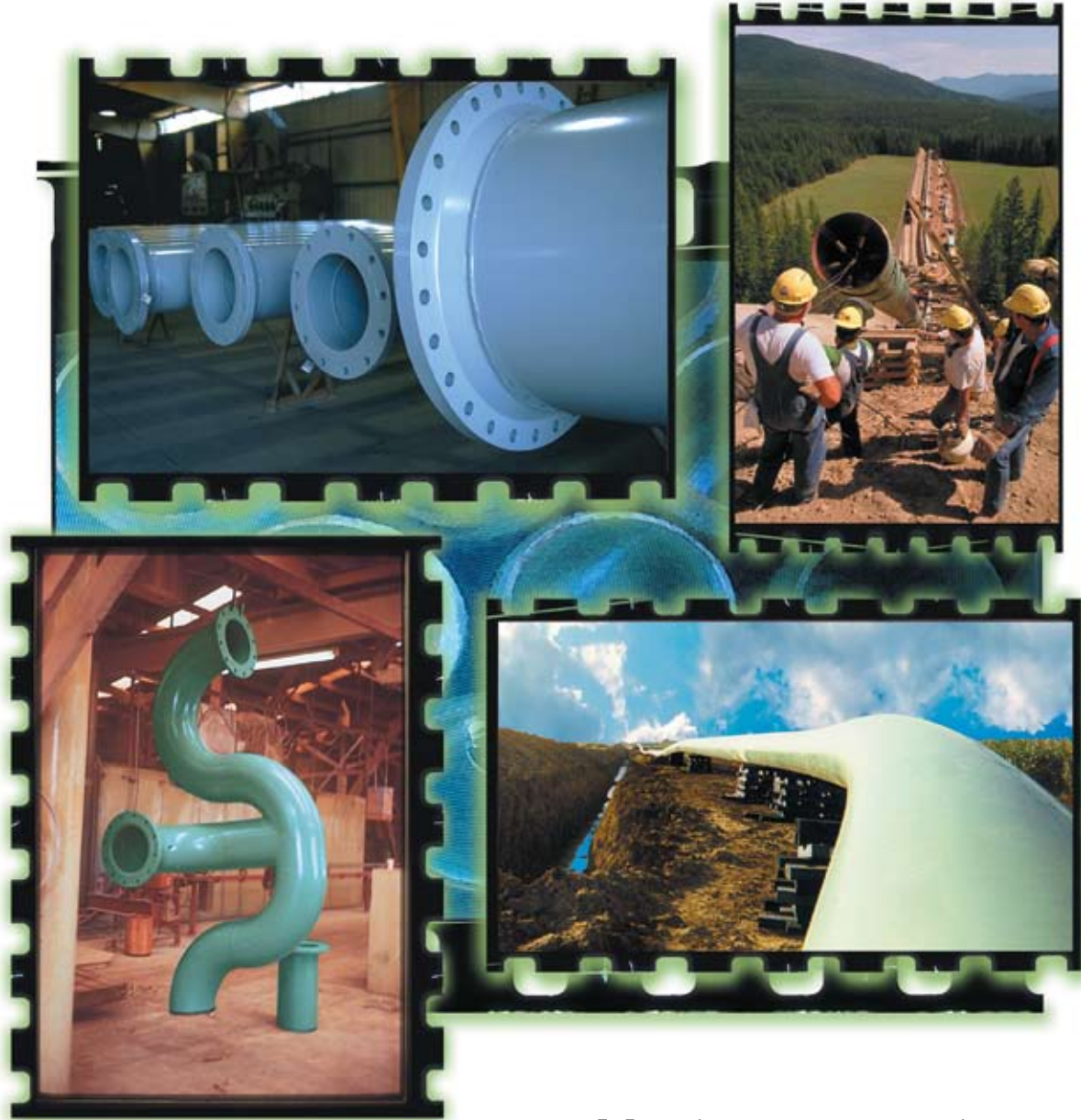


3M™ Scotchkote™

Corrosion Protection Products



*Meeting your coating needs
for more than 40 years.*

3M *Innovation*

Fusion Bonded for Proven Performance

Corrosion Protection

3M, the leader in functional epoxy coating technology, offers a complete line of 3M™ Scotchkote™ powder coatings engineered for optimum corrosion protection of metal in the harshest environments, including saltwater, wastewater, petrochemicals, solvents and corrosive gases. Several of these coatings also provide enhanced properties for operation at elevated temperature, mechanical damage protection, compression, wear, abrasion, and cavitation resistance. Scotchkote heat-cured fusion bonded epoxy coatings are 100 percent-solids; thermosetting materials that achieve a high bond to metal surfaces as a result of a heat generated chemical reaction. They can be applied by fluidized bed, flocking (air spray), or electrostatic spray and are available through a worldwide network of applicators.

3M also provides several Scotchkote high-build liquid epoxy coatings for field application as primary corrosion protection coatings or as easy field repair materials for Scotchkote Fusion Bonded Epoxy coatings. Surface primers are available to enhance chemical resistance and raise temperature-operating range.

Scotchkote Fusion Bonded Epoxy Coatings

Features	Benefits
Resistant to Cathodic Disbondment	Long term performance under a range of service conditions and temperatures.
Excellent chemical resistance	Long term performance in a variety of soil conditions.
Abrasion, gouge and impact resistant	Added protection for bores, river crossings, rough handling and applications requiring mechanical damage resistance.
High adhesion to metal	Resistant to soil stress.
Thermosetting	Resistant to penetration and will not cold flow under pressure. Does not soften at elevated temperature.
Balanced gel and flow characteristics	Enhanced coating continuity and application on metal.
Sag Resistant	Excellent coverage on sharp edges.
Machinable	Can meet close tolerances.
Lightweight	Lower shipping costs.
Compatible with other coating systems	Can be overcoated with other materials for UV protection. Provides an excellent base coat for multilayer pipe coating systems.
Plant Applied	Controlled application conditions.
NSF and AWWA Standard C213 Approved (Several specific products only)	Good for potable water applications.
Established network of applicators	Widely available for pipeline (external and internal), reinforcing steel and custom coating applications.



1 Header piping for a water purification plant illustrates the types of complex shapes that can be coated with 3M™ Scotchkote™ coating.



2 Valve cutaway illustrates total coverage capability of 3M™ Scotchkote™ FBE coating.



3 3M™ Scotchkote™ coating protects this pump housing from salt water and cavitation damage.



4 Application of 3M™ Scotchkote™ epoxy coating on rebar.



5 Stacked pipe with 3M™ Scotchkote™ coating ready for installation.

To The Specifying Engineer

How to Specify 3M™ Scotchkote™ Coatings

It is possible for applicators to apply powder coatings by various methods. Please consult your 3M Corrosion Protection Products Sales Representative or customer service representative for the names and capabilities of local applicators. Key application steps to consider when writing specifications are as follows:

- Remove oil and grease
- Abrasive blast to near white metal
- Remove blast media dust
- Inspect for surface imperfections, such as weld spatter and smooth by grinding (does not apply to reinforcing steel)
- Acid or deionized water wash (optional) to remove residual inorganic contaminants.
- Preheat parts to suggested application temperature



Pipe rehabilitation project completed using 3M Scotchkote coating — and repaired with Scotchkote hotmelt patchsticks. 6

- Apply Scotchkote coating to the specified thickness
- Electrically inspect for continuity
- Repair as required

Industry Standards and Specifications*

Pipe (External)

- **CSA Z245.20/06** - Canadian Standards Association External Fusion Bond Epoxy Coating for Steel Pipe/External Polyethylene Coating for Pipe
- **NFA 49-711** - French standard for steel tubes, three-layer external coating based on polypropylene by extrusion
- **DIN 30670** - German standard for polyethylene coatings for steel pipe fittings
- **NACE RP0394** - National Association of Corrosion Engineers Standard Recommended Practice, Application, Performance, and Quality Control of Plant-Applied, Fusion bonded Epoxy External Pipe Coating
- **NAPCA Bulletin 12-78** - National Association of Pipe Coating Applicators External Application Procedures for Plant Applied Fusion bonded Epoxy (FBE) To Steel Pipe
- **AWWA C213** - American Water Works Association Standard for Fusion-Bonded Epoxy Coating For The Interior and Exterior of Steel Water Pipelines

Reinforcing Steel

- **AASHTO M 284/M 284M** - Standard Specification for Epoxy Coated Reinforcing Bars
- **AASHTO T 253** - Standard Method of Test for Coated Dowel Bars
- **ASTM A 775/A 775M** - American Society for Testing Materials Standard Specification For Epoxy-Coated Reinforcing Steel
- **ASTM A 884/A 884M** - American Society For Testing Materials Standard Specification For Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcing Steel
- **ASTM A 934/A 934M** - American Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- **ASTM D 3963/D 3963M - 01**
- **NACE RP0395** - National Association of Corrosion Engineers Standard Recommended Practice Epoxy-Coated Steel Reinforcing Bars

Piles

- **ASTM A 950/A 950M** - American Society For Testing Materials Standard Specification For Fusion bonded Epoxy-Coated Structural H-Piles and Sheet Piles
- **ASTM A 972//A 972M** - American Society For Testing Materials Standard Specification For Fusion bonded Epoxy-Coated Pipe Piles

Pipes (Internal)

- **NSF/ANSI Standard 61**, Drinking Water System Components, for use with potable water.

**Specifications and Standards usually include the year in which they were last changed as part of the specification designator. These dates have not been included in the list.*

3M™ Scotchkote™ Pipe Coatings

3M has been the primary global supplier of fusion bonded epoxy coatings for pipelines since 1960, and Scotchkote materials have been used to coat more pipelines worldwide than any other fusion bonded epoxy product. Since 1960, the Scotchkote brand of products have changed significantly with major improvements in flexibility, adhesion, high temperature performance and damage protection. New systems are available that provide more choices to handle specific operating conditions than ever before. Application standards and overall quality of the applied coating have also increased substantially, and 3M has been intimately involved in this ongoing process at every step through extensive technical service activities, involvement in industry associations, and end

user support. Take advantage of this expertise by using Scotchkote products on your next pipe coating project.

Scotchkote 6233

Scotchkote 6233 is a significantly advanced, high-performance fusion bonded epoxy coating. It incorporates 3M's latest formulation technology, utilizing special adhesion promoting agents to enhance cathodic disbondment resistance in all conditions, especially elevated temperatures/wet environments.



The Alliance Pipeline in Minnesota, coated with 3M™ Scotchkote™ 6233. 7

Scotchkote 6233 adheres under the stress of changing temperatures and soil compaction. It bonds to line pipe, girth welds and associated fittings, and provides one of the best coatings available for use in corrosive soils, hydrocarbons, harsh chemicals and sea water.

Another important benefit of the coating is its ability to provide consistently high quality control test results under a broad range of application conditions. Comparative test results from The Alberta Research Council* confirm Scotchkote 6233 passes specification test requirements with uniformly higher marks on cathodic disbondment and water immersion testing than other available fusion

bonded epoxy coating evaluated in a 1998 study. These special characteristics provide a substantial upgrade in performance expectations not only from the application but from field performance as well. Scotchkote 6233 meets the requirements of CAN/CSA-Z245.20/06.

Scotchkote 226N/226N+

Scotchkote 226N/226N+ provides the same advanced properties as Scotchkote 6233. It meets the requirements of CAN/CSA-Z245.20/06, BG PS/CW6 without pretreatment.

Scotchkote 6258

Scotchkote 6258 is a one part, heat curable, thermosetting fusion bonded epoxy coating designed for corrosion protection of pipes. Scotchkote 6258 utilizes special ingredients that promote superior adhesion to steel and epoxy novolak resins that significantly raise the glass transition temperature of the coating. These benefits make this a suitable standalone coating and as a liner for downhole tubing.

Scotchkote 206N

Scotchkote 206N, has been a pipe coating benchmark since 1974. It is available in a variety of gel/cure time ranges for automatic or manual application to external and internal surfaces of pipe, associated appurtenances and field joints. The coating exceeds all industry pipe-coating standards. Scotchkote 206N Standard, Extra Long Gel, and Fluid Bed Grade products conform to AWWA C213 and 550, and they meet the requirements of NSF Standard 61 for use as a coating in contact with potable water.

* "Laboratory Evaluation of Seven Fusion Bond Epoxy Pipeline Coatings", December 23, 1998, prepared for Enbridge Pipelines, Inc. and 3M Canada by Alberta Research Council, Advanced Industrial Materials and Process Group, Edmonton, Alberta.

Fusion Bonded Epoxy Overcoating

(Dual Layer Systems)

3M™ Scotchkote™ FBE overcoatings possess select characteristics that impart unique properties for special applications and service conditions. They are compatible with all Scotchkote FBE corrosion protection coatings and are applied immediately after the primary coating in a continuous process. When properly applied, the result is a Dual Layer System that is chemically bonded at the layered interface. Most pipe coating applicators have the capability of providing these systems.

Topcoats consist of:

Scotchkote 6352

Scotchkote 6352 is an extremely hard, mechanically strong overcoating designed to protect the primary corrosion coat from damage during pipeline directional drilling applications, bores, river crossing, and installation in rough terrain. Gouge (see figure 8) and abrasion-resistance properties have been maximized in the development of this dense coating material. Scotchkote 6352 also retains a high degree of flexibility that easily exceeds specification limits of steel for field bending. Scotchkote 6352 over a corrosion coating also provides enhanced performance in hot wet applications.

Scotchkote 207R

Scotchkote 207R is a rough overcoating. Restricted flow and optimized components produce a granular finish on all Scotchkote pipe-coating products where increased surface roughness is required. Scotchkote 207R overcoating was specifically developed to provide added traction for guide/feed wheels used in the installation of offshore pipelines. It reduces slippage between fusion bonded epoxy and a concrete overcoat and provides safer footing.



Gouge test simulates the stresses on a coating during a horizontal pipe pull. The coating sample is dragged under a weighted bit and the gouge depth is measured. Photo courtesy of Technical Inspection Services, Inc. (TISI), Houston, Texas 8



Application of topcoat 3M™ Scotchkote™ 207R to pipe. 9

Multi-layer Polyolefin Coating Systems

Multilayer polyolefin systems consist of a base corrosion-protection layer of fusion bonded epoxy, a polyethylene or polypropylene copolymer adhesive intermediate layer, and a topcoat of polyethylene or polypropylene. These combinations take advantage of the low moisture permeation and toughness characteristics of polyolefins and the low oxygen permeation and adhesion properties of fusion bonded epoxy. Selection of the proper base coating is critical because it is the foundation of the system and significant to its overall performance capability. During application, an adhesive layer is extruded onto 3M™ Scotchkote™ FBE primer. A second extruder applies the topcoat to the specified thickness while the adhesive is still molten.

Suggested Scotchkote Multi-Layer Base Coatings for Best Corrosion Protection Performance

Scotchkote 226N/226N+

Scotchkote 226N/226N+ is the premier, high-performance epoxy coating powder base coating for three-layer polyolefin coating systems. Scotchkote 226N/226N+ employs special adhesion promoting agents that improve cathodic disbondment performance in all service conditions, especially hot, wet environments. A range of gel and cure times are available for optimum bonding of the polyolefin adhesive layer. Scotchkote 226N/226N+ also offers superior protection as a stand alone coating.



Pipe coated with 3M™ Scotchkote™ Fusion Bonded Epoxy as the primary layer, polypropylene copolymer adhesive and polypropylene overcoating.

Internal Linings

3M™ Scotchkote™ FBE coatings are available with extended gel, flow and cure characteristics for application to the interior surfaces of pipe. In some cases, existing pipeline or custom coating products may have been adapted for internal use by modifying these properties. Scotchkote products that have been adapted for internal pipe coating use and described in other sections of this brochure are Scotchkote 134, 135, and 206N Extra Long Gel and 6258. Other 3M coatings not listed, such as Scotchkote 6171 are available to meet special service requirements. Liquid primers are sometimes used with these coatings to enhance performance properties in particularly severe environments, such as those encountered in downhole oil production. Proper selection of internal coatings depends upon pipe size, type and service conditions. Contact your 3M sales or customer service representative for further information.

Scotchkote 345 Liquid Phenolic Primer

Scotchkote 345 Liquid Phenolic Primer is designed specifically for application to metal surfaces prior to top coating with Scotchkote FBE coatings. When properly applied, Scotchkote 345 primer and topcoat systems provide excellent resistance to CO₂, H₂S, CH₄, petroleum distillates, and brine at elevated temperatures and pressures.

Scotchkote 500N Water Base Primer

Scotchkote 500N Water Base Primer is a water-based metal treatment designed to increase adhesion of fusion bonded epoxy coatings. Properly applied to blast-cleaned steel, it provides protection for metal surfaces and a uniform bonding base for increased coating performance. This primer significantly improves hot water resistance, autoclave resistance, and cathodic disbondment and salt spray resistance of the coating. It is easily applied with minimal application equipment and promotes a chemically uniform steel surface condition.



Pipe internally coated with 3M™ Scotchkote™ coating.



Pump volutes protected against corrosion with 3M™ Scotchkote™ 134.

12



Application of 3M™ Scotchkote™ 134 custom coating on a turbine.

13



Fluid bed dip application of 3M™ Scotchkote™ 206N.

14



Pipe fittings coated with 3M™ Scotchkote™ 206N.

15

Custom Coating

3M™ Scotchkote™ FBE coatings can be applied to a variety of parts for corrosion protection. Example applications include valves, pumps, tapping saddles, pipe appurtenances, manifolds, sewage aerators, tanks, pipe hangars, ladders, hydrants, cast iron risers and flow meters. Coating is accomplished by manual flocking (air spray), electrostatic spray, or fluid bed dip application.

Scotchkote 134 and Scotchkote 135

Scotchkote 134 (green) and Scotchkote 135 (gray) are both designed for flock or electrostatic spray application. Because of their long gel time (upto 2.5 minutes at 350°F/177°C), Scotchkote 134 and 135 maximize the time of application so that large surface areas or parts with complex recesses can be coated without overspray or laminations. Balanced formula and controlled viscosity allow high thickness build and edge coverage without sag or drips. The coatings can also be applied cold electrostatically. Scotchkote 134 conforms to the requirements of NSF Standard 61, for use as a coating in contact with potable water and has been used extensively in the water/wastewater industry since 1965. Scotchkote 134 and 135 meet the requirements of AWWA Standard C213, for valves and appurtenances. A custom coating grade with Scotchkote 6171 is also available.

Scotchkote 206N Fluid Bed Grade

Scotchkote 206N Fluid Bed Grade is specifically designed for the fluidized bed application process. Product gel and flow are carefully controlled to produce a smooth, continuous coating film with high edge coverage. Special fluidizing materials have been thoroughly blended to enable even dispersion of product and optimum fluidization in the largest of fluid beds. The coating cures quickly from residual heat retained in the part and does not usually require postbaking. Scotchkote 206N Fluid Bed Grade has a growing list of international approvals for use as a coating in contact with potable water, including conformance to the requirements of NSF Standard 61.

Reinforcing Steel Coatings

3M has been the market leader for epoxy coated reinforcing steel since its inception in 1972. More reinforcing steel in roads, bridges and structures have been coated with 3M™ Scotchkote™ coatings than any other epoxy coating product. 3M provides materials that exceed prequalification test requirements in accordance with industry standards and apply consistently in all types of coating plants. These important features translate to optimum corrosion protection performance at low cost.

Scotchkote 413

Scotchkote 413 is formulated to provide superior flexibility for shop or field fabrication that exceeds current AASHTO and ASTM bend requirements. Scotchkote 413 is resistant to corrosive agents such as deicing salts, airborne salt spray, seawater, harsh chemicals, acid rain, carbonation, contaminated aggregate and concrete additives. Components have been carefully selected and balanced to maintain consistency and productivity control in all application plants. Cure is by residual heat. Scotchkote 413 meets/exceeds all standards for coating of reinforcing steel prior to fabrication.

Scotchkote 426

Scotchkote 426 meets the rigid prequalification standards of ASTM A 934/934 M for coating of reinforcing steel after fabrication. Like Scotchkote pipe-coating materials, Scotchkote 426 also incorporates special adhesion promoting agents for enhanced corrosion protection and chemical resistance properties. High edge coverage helps protect sharp corners on rebar ends caused by the shearing operation. Scotchkote 426 is available in two gel/cure times for application to straight or prebent rebar sections.

Scotchkote 413SG

Scotchkote 413SG Spray Grade Coating is designed for application on welded wire fabric, mesh, chair assemblies, dowel baskets, cable-tensioning hardware, screw anchors and coupling devices. The coating possesses high flow capability without sag for maximum penetration into wire intersections and coverage on sharp weld cusps. Gel and cure time and have been extended to aid in this process, therefore the coating must be postbaked. Scotchkote 413 Spray Grade meets/exceeds all standards for coating of reinforcing steel prior to fabrication



3M™ Scotchkote™ coated rebar ready for installation. 16



Rebar coated with 3M™ Scotchkote™ 413. 17



3M™ Scotchkote™ 413 spray grade being applied to wire mesh. 18



3M™ Scotchkote™ 426 coated rebar in naval pier prior to concrete pour. 19

Field Applied Liquids and Patch Compounds

Pipeline Patch, Repair, and Rehabilitation

3M provides a complete line of patch/repair compounds for all 3M™ Scotchkote™ FBE coatings. Some are high build liquid epoxy coatings that may also be used as field applied stand-alone coatings for general corrosion protection. Applications include pipeline rehabilitation, pipe joints, water piping, fittings, valves, structural members, and tanks.

Scotchkote 323/323i are ambient-temperature cure, 100% solids, two-part thermosetting epoxy liquid coatings designed to protect metal, concrete and other surfaces from corrosion deterioration. They may be applied in the field by cartridge, brush, roller, or plural component spray equipment. These products are certified to ANSI/NSF Standard 61, Drinking Water System Components.

Scotchkote 306 & Scotchkote 314 are ambient-temperature cure, two-part thermosetting 80% solids liquid epoxy coatings designed to protect metal and other surfaces from corrosion and deterioration. Scotchkote 306 and 314 may be applied in the field by brush, roller, or conventional or airless spray equipment. Scotchkote 306 is color matched for repair of Scotchkote 206N; Scotchkote 314 for Scotchkote 134. These products are certified to ANSI/NSF Standard 61, Drinking Water System Components.

Scotchkote 324 liquid epoxy coating possesses enhanced corrosion protection capability and is particularly useful in coating tanks, valves, piping and special fabrications. It provides extraordinary chemical resistance, high adhesion, and resists cathodic disbondment. The coating is a heat-cured, 1:1 mix ratio, two-part, thermosetting, 83% solids liquid epoxy applied with conventional air or airless spray equipment. A coating thickness up to 10 mils/254 µm can be obtained in one application without sag. At room temperature, it has a 16-hour potlife. The applied coating B-stages at ambient temperature to a hard gel, allowing inspection and repair prior to cure.

Scotchkote 352 is a plural component coating system designed to protect buried steel structures from the harsh effects of corrosion. It also allows applications to be performed in difficult conditions that require fast turn around time and good chemical resistance.

Rebar Patch Compound

Scotchkote 413/215 PC and 413/215 PC Cold Weather Grade Patch Compounds

Scotchkote 413/215 PC and 413/215 PC Cold Weather Grade (CWG) Patch Compounds are two-part, ambient-temperature cure, thermosetting, liquid epoxy coatings. They are designed for the repair of damage to Scotchkote 413, 413-spray grade FBE coatings. Scotchkote 413/215 PC can be applied by brush or spray. The coating has a long potlife (8 hrs at 70°F/21°C) and is easily applied in the plant or field. Scotchkote 413/215 PC (CWG) is applied primarily by brush and can used at temperatures as low as 5°F/-15°C.

Hot Melt Patch Compounds

Scotchkote 226P Hot Melt Patch Compound

Scotchkote 226P Hot Melt Patch Compound is a heat-bondable polymeric repair material in stick form for plant or field touch up and repair of Scotchkote FBE coatings. It is designed for minor damage, small pinholes and nicks. Scotchkote 226P is easily applied in all conditions and is quick setting for immediate installation and handling.

Girthweld Field Application

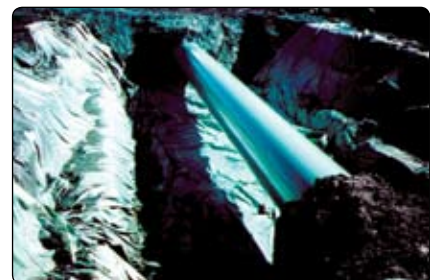
Field application of FBE coating on girth welds provides a matching level of performance quality as plant-applied materials-the pipeline can be protected with the same coating from end to end.



Cleaning pipe to a white finish for a rehab project. 20



3M™ Scotchkote™ liquid epoxy being applied to a pipe for a rehabilitation project. 21



Completed pipe coating rehabilitation using 3M™ Scotchkote™. 22

Fusion Bonded Epoxy

Preheating

After cleaning, parts are normally preheated to a temperature of 350⁰F/177⁰C to 488⁰F/253⁰C, then coated.

Applying

Flocking

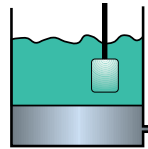
Flocking is the application of air atomized powder.

Flock spray can be used to maximum advantage when coating parts with deep recesses and crevices. All 3M[™] Scotchkote[™] FBE coatings readily adapt to this method of forced-air application.



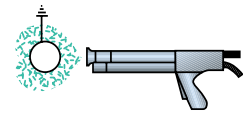
Fluidized Bed

The fluidized bed consists of two chambers separated by a porous membrane that diffuses air throughout the coating powder. In operation, the powder volume expands and preheated objects are coated by a dip process. Scotchkote coatings applied by this method encapsulate parts without sags, runs or pinholes.



Electrostatic Coating

Electrostatic coating is accomplished by charging powder particles with high voltage as they are sprayed onto an object at ground potential. This coating method is ideal for flat, angular, or irregular shaped objects. Scotchkote coatings applied electrostatically have excellent edge coverage and coating continuity.

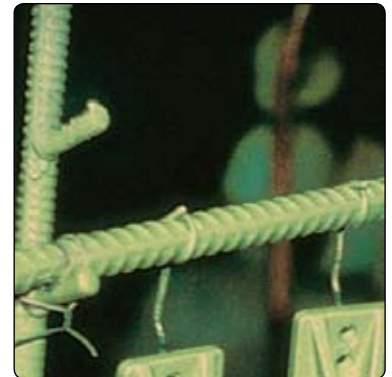


Curing

Curing after application is an easy process with Scotchkote. Many of the coatings are designed for quick cure, high-speed application in automated plants. These products are cured by residual heat imparted during the preheat cycle and do not require a postbake. Coatings that are applied by manually spraying and some internal coatings that have long gel/melt cycles require postbake. Exact temperature and time cycles may vary, depending on the objects coated and the Scotchkote[™] coating used.

Testing

3M tests Scotchkote products for properties such as adhesion, impact strength, hardness, thermal shock, abrasion resistance, penetration and chemical resistance. In many cases, results are confirmed by independent laboratory investigation. For more information on test results please refer to the specific product data sheet. Before use, you must evaluate the coating to determine if it is suitable for your intended application.



Post-tensioning hardware coated in accordance with AASHTO and ASTM specifications with 3M[™] Scotchkote[™] 413 spray grade. 23

Shipping and Storage
Scotchkote FBE Powder Coatings are finely ground powders that react when heated. They do not contain solvents. Products are very shelf stable but may become unusable if exposed to temperatures above 80⁰F/27⁰C for extended periods of time. Handling precautions for individual Scotchkote coatings are described on product data sheets and materials safety data sheets.

Handling & Safety Precautions

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

Important Notice

All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M's current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

Ordering Information/Customer Service

For ordering technical or product information, or a copy of the Material Safety Data Sheet, call:

Phone: 800/722-6721 or 512/984-9393

Fax: 877/601-1305 or 512/984-6296

Data sheets and MSDS can be found on the website.

Warranty; Limited Remedy; Limited Liability.

This product will be free from defects in material and manufacture for a period of 6 months from the time of purchase. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any indirect, special, incidental or consequential loss or damage arising from this 3M product, regardless of the legal theory asserted.**



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