

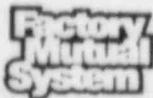
THERMALASTIC 83
FIRE RETARDANT COATING
FOR GROUPED ELECTRICAL CONDUCTORS

from

FIRE-STOP SYSTEMS
3727 EL JAMES DRIVE
SPRING, TEXAS 77373

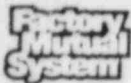
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AUGUST 22, 1983



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I INTRODUCTION

1.1 Fire-Stop Systems requested approval of their Thermalastic 83 Fire Retardant Cable Coating for use as a protective coating for electric power and control cables when applied at a minimum dry coating thickness of 1/16 in. (1.6 mm).

1.2 Thermalastic 83 is a water based, high solids elastomer with a service temperature range from -30°F (-34°C) to 195°F (91°C) after curing.

1.3 As the product contains water, precautions should be taken to ensure that any storage, transportation or application of the material is done at temperatures above freezing and in accord with the manufacturer's instructions.

1.4 This coating is intended to prevent flame spread in conductors when exposed to a moderate fire source that might occur from arcs or sparks falling or occurring in the cable tray, or from fire exposure of combustible trash or foreign material around the cable(s) in grouped or trayed condition. The coating is not intended to maintain cable protection under severe and extended fire exposure conditions.

1.5 When applied according to the manufacturer's instructions, the protective coating does not of itself require electrical de-rating.

II DESCRIPTION (See Attached Product Data Sheet)

2.1 Surfaces to be coated with Thermalastic 83 must be clean and free from oil, grease and dirt. Clean-up is accomplished with clean water before the material cures.

2.2 Application of Thermalastic 83 is by brush, spray, trowel or glove. The coating dries to the touch in four hours and cures thoroughly in 3 to 5 days. Thermalastic 83 applied at 1/8 in. (3.2 mm) wet to obtain the minimum 1/16 in. (1.6 mm) dry film thickness when cured.

2.3 After curing, the coating remains sufficiently pliable so that individual cables may be removed from a grouping if necessary and damaged portions of the protective coating may be repaired by spraying. The coating, as applied, has good adhesive properties and will stick readily to vertical and overhead surfaces. When cured and exposed to flame, it does not melt or drip, but merely carbonizes.

III MARKINGS

Thermalastic 83 is available in 5 gal. (18.9 liter) containers. The manufacturer's name and address, product name, production batch number, application and storage instructions, and the Factory Mutual mark of approval are shown on the container label.

IV TESTS

4.1 Four strips of Thermalastic 83, each 18 in. (457 mm) long, 3 in. (76 mm) wide and 1/16 in. (1.6 mm) thick (dry) were prepared and conditioned at room temperature. Two specimens were clamped vertically and parallel 1/2 in. (13 mm) apart to expose 17 in. (432 mm) below the clamp. Gage marks were made 3 in. (76 mm) and 17 in. (432 mm) from the free (lower) end. A Bunsen burner with a 2 in. (51 mm) total flame height with a 1 in. (25 mm) inner core was then positioned vertically under the free end of one specimen for a 2 min. period with the flame cone just touching the specimen. Examination at the end of the fire exposure period showed flames did impinge and scorch the specimens up to 2 in. (51 mm) above the lower gage mark. There was some disintegration of the specimen at the lower edge of the specimen when handled by squeezing lightly between the thumb and forefinger. The area above the 3 in. (76 mm) gage mark remained intact. Direct flame impingement did cause some loss of flexibility above the 3 in. (76 mm) gage mark, but this area was considered structurally sound.

4.2 The test outlined in Paragraph 4.1 was repeated with the second set of specimens and the results were similar. These test results satisfy approval requirements which allow no degradation of the specimen above the 3 in. (76 mm) gage mark and no scorching or burning above the 17 in. (432 mm) gage mark.

4.3 Ten 3 ft. (0.9 m) long samples of 2/0, 600 V, 90°C rated insulated cooper cables were given a high potential check of 1,000 V, plus 200% of rated voltage for 1 min. The cables were wrapped tightly in aluminum foil and the potential applied between the foil and the copper conductor and any leakage current in milliamps (mA) was recorded for each cable sample. Cables were then coated according to the manufacturer's instructions and after the recommended curing time, this high potential test was repeated to insure that no change or damage had occurred to the cable insulation prior to or during the coating application. (This test is also repeated after the fire test described below as an added means of determining any insulation breakdown).

4.4 Three of the above 3 ft. (0.9 m) long coated cables were individually heated electrically with 150% of rated current (430 A) until the conductor (wire) temperature stabilized at 197°F (92°C). A flame from a Meeker gas burner, adjusted to give an overall natural gas flame height of 5 in. (127 mm) with a 3 in. (76 mm) inner cone, was applied to the horizontally positioned cable for 2 min. with the tip of the inner cone touching the bottom of the coated cable. At the end of a 2 min. flame exposure, there was simultaneous burner flame cutoff and electrical shutdown. All flaming extinguished immediately. After cooling, the charred and scorched area of the first sample exposed to the burner flame was measured and found to be less than 4 in. (102 mm) in length. This satisfies approval requirements that burning shall not continue longer than 1 min. after flame cutoff and the burned (exposed) area shall not exceed 9 in. (228 mm) in length.

4.5 Results of the second and third cables exposed to the test described in Paragraph 4.4 were similar. The three cables were then given a repeat of the high potential test described in Paragraph 4.3 and current leakage averaged 0.65 mA. This satisfies the approval requirement that leakage current shall not exceed 5.0 mA when measured between a conductor and the outer jacket during this high potential test.

4.6 A 3 ft. (0.9 m) length of cable coated with Thermalastic 83 was subjected to a salt water test consisting of 8 hr. submerged, alternating with 16 hr. of drying in a 24 hr. span over a 30 day period using a 1% salt solution with a water temperature of 150°F (66°C). At the end of this period, the sample was allowed to dry for 36 hours. There was no disintegration or deterioration of the coating from this exposure. The cable sample was then subjected to the fire test described in Paragraph 4.4 and a high potential test (see Paragraph 4.3); the results of these tests were satisfactory.

4.7 Two 3 ft. (0.9 m) lengths of cable covered with Thermalastic 83 were subjected to alternating temperatures of 160°F (71°C) and -40°F (-40°C) for 24 hr. period over a 2 week duration. At the end of this accelerated aging test, the sample cables were then subjected to the fire test described in Paragraph 4.4 and the high potential test (see Paragraph 4.3). The results of these tests were satisfactory.

4.8 A coated cable section was subjected to an ampacity test prior to which a Hewlett-Packard No. hp-0837-0614 thermistor was imbedded in the base copper conductor. The cable was then subjected to its rated current carrying capacity of 285 amperes (according to the National Electrical Code) until the temperature indicated by the thermistor had stabilized, in approximately one hour at 135°F (57°C). This is well below the 90°C maximum temperature rating of the cable insulation; therefore, no electrical derating is necessary when a cable is sprayed with Thermalastic 83 according to the manufacturer's recommendations.

4.9 A sample cable length coated with Thermalastic 83 has been under actual weather exposure test conditions for approximately four months. The coated cable sample appears satisfactory at this time; however, continued observation of this sample is planned to supplement present field experience.

V CONCLUSION


Fire-Stop Systems Thermalastic 83 fire retardant cable coating meets Factory Mutual approval requirements. Approval is effective when the Approval Agreement is signed and returned to Factory Mutual.

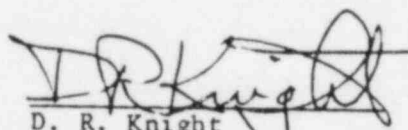
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W. Pelrine and D. C. Smith

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ORIGINAL TEST DATA: Test Notebook 83-44

ATTACHMENTS: Product Data Sheet

FIRE-STOP SYSTEMS

Thermalastic 83™

DATA SHEET

PRODUCT DESCRIPTION

THERMALASTIC 83™ is a single package, water based, high solids, fire protection elastomer coating. THERMALASTIC 83™ coating is designed to prevent propagation of fire in grouped electrical cables and protect electrical cables from fire. Constant service temperature range is from -30°F (-34°C) to 195°F (91°C) after curing.

THERMALASTIC 83™ coating contains no asbestos or chlorinated hydrocarbons, and meets all applicable OSHA and EPA regulations. THERMALASTIC 83™ will not support combustion.

RECOMMENDED USES

At approximately 1/16 inch (1.6mm) dry film thickness, THERMALASTIC 83™ will halt fire spread in grouped electrical cables and protect cables from fire exposure. Protection endurance from fire exposure will depend on coating thickness and greater thickness will provide more endurance. No electrical derating of the cables is necessary at 1/16 inch (1.6 mm) dry film thickness of coating.

THERMALASTIC 83™ provides a barrier that has excellent resistance to water, fire, corrosion, toxic or corrosive gasses and fuels or lubricants.

COVERAGE

THERMALASTIC 83™, applied at approximately 1/8 inch (3.2 mm) wet film thickness, will be approximately 1/16 inch (1.6 mm) thick (dry) and coverage is approximately 12 square feet (1.1m²) of cable tray surface per gallon.

SURFACE PREPARATION

No surface preparation is normally required. THERMALASTIC 83™ has adequate adhesion to all types of cable jackets, without any surface preparation, and application may be

KEEP FROM FREEZING:

THERMALASTIC 83™, like most waterbase coatings, can conduct electricity until it is thoroughly dry. Appropriate caution should be exercised when the material is applied to energized cables or equipment. In any instance, the material should never be applied without the supervision of plant safety personnel. Hazards that may be encountered include, but are not limited to, open buss ducts, cable potheads, exposed conductors, faulty cable insulation and transformer bushings.

The information presented herein is based on data believed to be reliable. FIRE-STOP SYSTEMS makes specific recommendations for the use and application of THERMALASTIC 83™ which are important factors in its performance. Since FIRE-STOP SYSTEMS may not have control over the use and application, it cannot insure that your results will be the same as those described.

It is necessary as a condition of sale that FIRE-STOP SYSTEMS only responsibility is to replace such quantity of THERMALASTIC 83™ as is proved to be defective by our laboratory. FIRE-STOP SYSTEMS shall not be liable for injury, loss or damage, direct or consequential, arising out of the use or inability to use THERMALASTIC 83™.

considered permanent. THERMALASTIC 83™ coating can be removed from the cable where necessary.

APPLICATION

THERMALASTIC 83™ can be applied with air atomized or airless spray equipment. It can also be applied by brush, trowel or hand gloving techniques. Manufacturer should be consulted for recommendations on exact equipment specifications. THERMALASTIC 83™ has good adhesive properties and will readily adhere to vertical or overhead surfaces. THERMALASTIC 83™ may be applied within a temperature range of 40°F (4°C) to 100°F (38°C). THERMALASTIC 83™ should be pre-conditioned to a minimum of 50°F (10°C) for 24 to 72 hours prior to spraying to achieve optimum results. Best spray results are obtained by applying a thin (fog) coat and allowing this to dry to the touch before building up to the recommended 1/8 inch (3.2 mm) wet thickness which, when completely dry, will be approximately 1/16 inch (1.6 mm) thick.

Application should be performed by an experienced FIRE-STOP SYSTEMS factory approved applicator.

THERMALASTIC 83™ coating is normally dry to the touch in 10 minutes to 4 hours. This, of course, depends upon the coating thickness, temperature and relative humidity. Curing is normally complete in 3 to 5 days. After curing, the coating remains very pliable and individual cables may be removed from a grouping, if necessary; any damaged portions of the protective coating may be repaired by spraying, brushing or gloving.

Clean-up is accomplished with clean water.

THINNING

Material is supplied at spraying

consistency. If thinned, material may lose its thixotropic (no drip) properties.

SPECIFICATIONS AND PHYSICAL DATA

Average Solids Content of Material: 69%

Color: White

Weight: Per Gallon (3.78 litres), 11.5 lbs. (5.2 kg)
Per 5 Gallon (18.92 litres) Pail, 61 lbs. (27.7 kg)

Elongation: 150%

Impact Resistance: Excellent

Vibration Resistance: Excellent

Thermal Shock: Freeze thaw cycling, consisting of seven cycles of 24 hours each at 160°F (71°C) and -40°F (-40°C). Samples retained original appearance.

Salt Water Immersion: Thirty cycles of eight hours being immersed in 150°F (66°C) salt water and 16 hours of drying. Sample showed no deterioration.

RECOMMENDED FILM THICKNESS:

Approx. 1/16 inch (1.6 mm) Dry.
Approx. 1/8 inch (3.2 mm) Wet.

SHELF LIFE: 24 months minimum when stored between 40°F and 90°F.

Coverage: (per Gallon) 12 sq. ft. (1.1 m²) of cable tray at approx. 1/8 inch (3.2 mm) wet.

Consistency: Thixotropic

Packaging: 5 Gallon containers.
18.92 litres

Flash Point: (Pensky-Martens Closed Cup) None