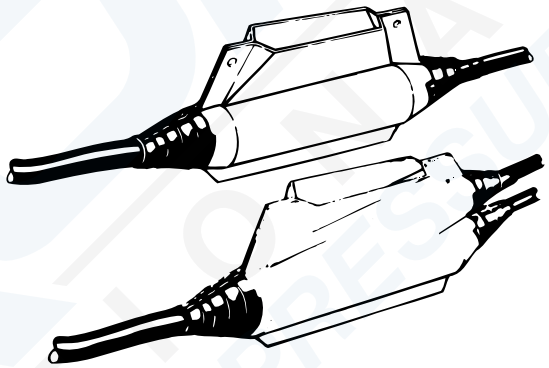
Scotchcast™
Flexible Power Cable Splicing Kits
82-F and 82-BF Series

Data Sheet



1.0 Product Description

3M™ Scotchcast™ 82-F and 82-BF Series Flexible Power Cable Splicing Kits are a series of flexible inline and tap splices for use on non-shielded portable power cables and cords. They are designed to be used on single and multiple conductor cables and cords rated up to 1000 Volts (600/2000 Volts mine portable cable rating). The 82-F Series will accommodate a single-conductor cable rated up to 5 kV. The splices will accommodate single-conductor cables sized up to 4/0 for inline splicing and up to 1/0 for tap splicing. Multi-conductor sizing is based on a cable diameter range of up to 1.2 inches for inline splicing and up to 0.8 inches for tap splicing.

The splice kits are based on Scotchcast™ 2130 Compound for toughness, flexibility, moisture sealing and flame retardancy. They are permanent splices as assigned by the Mine Safety and Health Administration (P-l42-5 MSHA). The completed splices are designed for use in weather-exposed, direct burial or submerged locations.

1.1 Kit Contents:

Each kit contains sufficient quantities of the following materials to make one splice or cable repair (connectors are not included in kit):

- One-piece removable mold
- Scotchcast 2130 Compound in “Unipak” container
- Scotch™ 23 Tape, for sealing mold ends
- Abrasive cloth (80J grit)
- Comprehensive instructions showing proper installation techniques for splicing non-shielded portable power cables and cords.

1.2 The Splice Features are:

- Factory quality “permanent” splice; MSHA accepted equal to shop or factory vulcanizing
- Flexible compound allows splice to bend with cable; for installation, handling, reeling, etc.
- Scotchcast 2130 Compound is self-curing; a cold cure requiring no torch, no heated mold and no cooking time
- Scotchcast 2130 Compound bonds to common jacket materials; neoprene, hypalon, PVC, nitrile/PVC, EPR, urethane, 2130 (itself).
- Scotchcast 2130 Compound forms a splice or repair that is abrasion resistant and flame retardant.
- Smooth tapered splice profile eliminates cable hang-ups and splice end-lifting.

2.0 Applications

To splice or rejacket non-shielded portable power cable and portable cords:

- For inline single-conductor cables rated up to 5 kV
- For tap single-conductor cables rated up to 1000 V
- For inline and tap multi-conductor cables rated up to 1000 V
- For mine portable cable rated 600/2000 V (P-142-5 MSHA)
- For use with compression inline connectors (82-F) and compression “C” tap connectors (82-BF)
- For indoor and outdoor applications:
    - Weather exposed
    - Direct burial
    - Submerged
    - Cable reels
- For jacket repairs

3.0 Data: Physical & Electrical Properties

Scotchcast 82-F and 82-BF Series Splicing Kits can be used on non-shielded power cables with a rated operating temperature of 90ºC and an emergency rating of 130ºC. The splice series is rated at 5 kV for single-conductor inline splicing, and 1000 V for multi-conductor and tap splicing. The splices are assigned P-142-5 MSHA by the Mine Safety and Health Administration.

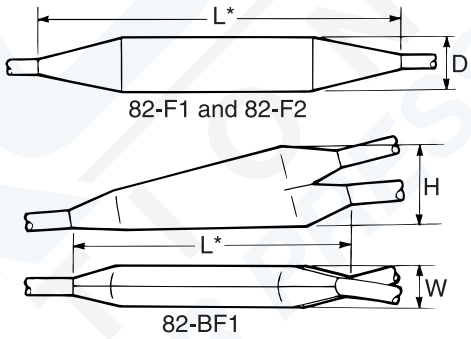
3.1 Splice Selection Table

Kit No.	Cable O.D. Range inches (mm)	Connector Type	No. of Conductors	Connection Max. O.D. inches (mm)	Voltage Rating (Max. V.)	Conductor Size Range (AWG)
82-Fl	0.25—0.80 (6—20)	Compression Inline	1	0.62 (16) connector	5000	6-1/0
			Multi	0.90 (23) connector bundle	1000*	**
82-F2	0.80—1.20 (20—30)	Compression Inline	1	0.82 (21) connector	5000	2/0—4/0
			Multi	1.30 (33) connector bundle	1000*	**
82-BF1	0.25—0.80 (6—20)	Compression "C" Tap	1 Multi	— —	1000* 1000*	up to 1/0 **

*Mine portable cable rating of 600/2000 V.
**Base multi-conductor selection on cable O.D. range.

3.2 Typical Dimensions

Kit No.	Dimension inches (mm)			
	L*	D	H	W
82-F1	8.0 (203)	1.1 (29)	—	—
82-F2	11.5 (292)	1.6 (40)	—	—
82-BF1	8.3 (211)	—	2.2 (56)	1.1 (28)



* "L" based on length of untrimmed mold. Trimming of mold ends to fit cable dia. reduces this dimension accordingly.

3.3 Typical Physical and Electrical Properties

Scotchcast 2130 Flame Retardant Compound

Physical Properties

Test Method	Typical Value*
•Color	Black
•Hardness (ASTM D-2240) Shore A	80
•Tensile Strength (ASTM D-412)	845 psi (1.32 g/cm^3)
•Elongation (ASTM D-412)	250%
•Glass Transition Temperature	-80°C
•Maximum Exotherm (3M Test Method, 100 g. sample)	62°C (144°F)
•Moisture Absorption (wt. gain, 168 hrs.@100°C)	3%
•Adhesion (3M Test Method, Peel Test)	
Jacket Materials:	
Neoprene	45 psi (0.31 MPa)
Hypalon	45 psi (0.31 MPa)
Nitrile/PVC	40 psi (0.28 MPa)
PVC	40 psi (0.28 MPa)
EPR	10 psi (0.07 MPa)
Urethane (itself)	45 psi (0.31 MPa)
Metals:	
Steel	35 psi (0.24 MPa)
Aluminum	35 psi (0.24 MPa)
Copper	35 psi (0.24 MPa)

Electrical Properties

Test Method		Typical Value*
•Dielectric Strength (ASTM D-l49)		350 V/mil (13.8 MV/m)
•Dielectric Constant (ASTM D-l50)		
(60 Hz)	23°C (73°F)	4.6
	60°C (140°F)	4.9
	90°C (194°F)	5.4
•Dissipation Factor (ASTM D-l50)		
(60 Hz)	23°C (73°F)	3.8%
	60°C (140°F)	4.9%
	90°C (194°F)	7.5%

Curing Times

To test for cure, the compound in the splice mold filler spout is checked for tack. When it is no longer tacky, the splice or repair is considered ready to demold. This occurs when the compound is at approximately 50% of full cure. Full strength and bond are attained at 100% cure.

Ambient Temp.	Typical Minimum Times	
	Demold	Cure
70°F (21°C)	1½–2 hrs	16–24 hrs
50°F (10°C)	3½–4 hrs	24–30 hrs
32°F (0°C)	6–8 hrs	36 hrs
Below 32°F (0°C)	—Not recommended	

*All values are averages, based on several determinations and are not intended for specification purposes.

4.0 Specifications

4.1 Product

The non-shielded portable power cable and portable cord splices shall be rated for continuous operation at 1000 Volts or 600/2000 Volts (mine portable cable rating) for inline or tap, single or multi-conductor applications and shall be rated at 5 kV for inline single-conductor applications. The splices must be capable of splicing single-conductor cables sized up to 4/0 for inline connections and up to l/0 for tap connections, and multi-conductor cables sized up to 1.2 inches in diameter for inline and up to 0.8 inches in diameter for tap connections.

The splice must be flexible with fully tapered ends. Its jacket shall be constructed of a flame-retardant, non-vulcanizing polyurethane compound, black in color. The completed splice must be MSHA accepted as a permanent splice, with the acceptance number permanently embossed in the splice jacket. The splice must be rated by the manufacturer for weather-exposed, direct burial and submerged locations.

4.2 Engineering/Architectural

Splicing of all portable power cable and portable cords, listed as follows, shall be performed in accordance with the instructions included with the Scotchcast Flexible Power Cable Splicing Kit 82-Fl, 82-F2 or 82-BF1: single conductor cable rated up to 5 kV and sized up to 4/0 for inline splicing; single-conductor cable rated up to 1000 V or 600/2000 V and sized up to l/0 for tap splicing; multi-conductor cable rated up to 1000 V or 600/2000 V and sized up to 1.2 inches diameter for inline splicing and 0.80 inch diameter for tap splicing.

5.0 Performance Tests

A. IMMERSION (reference: UL486D) 24 hours in 25°C (77°F) tap water, submerged 3 feet.

B. INSULATION RESISTANCE (reference: UL 486D)—greater than 6 megohms at 1000 Vdc for 1 minute.

C. DIELECTRIC WITHSTAND (reference: UL 486D)—1 minute at 2200 Volts (Combined with insulation resistance test listed per B above.)

D. HEAT CONDITIONING (reference: UL 486D)—72 hours at 90°C (194°F). (Follows dielectric withstand test listed per C above.)

E. FLEXING AND TWISTING (reference: UL 486D)—9 flexes of 90 degrees and 4 twists of 15 degrees. (Follows heat conditioning test listed per D above.)

F. COLD CONDITIONING (reference: UL 486D)—4 hours in air at -18°C (0°F). Immersion and insulation resistance tests (A and B above) are performed before and after Cold Conditioning.

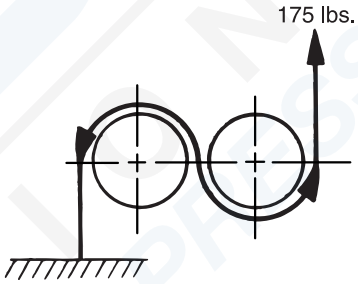
G. HEAT-CYCLING AND SUBMERSION (reference: UL 486D) 50 cycles of 1 hour "on" (current determined per UL 486A), and ½ hour "off" submerged. Insulation resistance greater than 6 megohms after 25 and 50 cycles. Dielectric withstand of 1 minute at 2200 Volts.

H. LEAKAGE CURRENT (reference: UL 486D)—less than 1 milliAmpere at 600 Volts, 60 Hz. (Immediately follows the dielectric withstand test per C above.)

I. MOISTURE RESISTANCE (Western Underground Guide 2.5 Part 6) test criterion is insulation resistance greater than 1 megOhm. Scotchcast samples exceed this with an average measurement of 12,000 megohms. Test is completed with the application of a 2.2 kV 1 minute withstand test. (Note: Scotchcast samples had previous test history with flexibility test of more than 1500 cycles.)

J. FLAME RESISTANCE (MSHA CFR 30 Part 18.64)—the flame resistance test is required by the Mine Safety and Health Administration. MSHA has tested and accepted the Scotchcast splices for flame resistance, and assigned them acceptance marking P-l 42-5 MSHA.

K. FLEXIBILITY—82-F Series Splices (reference: Bureau of Mines Grants G0101729 and G0133077)—the flexibility test measures the bending performance of a tensioned splice or repair around tandem sheave wheels. A figure-S testing machine places the sample cable through 180 degree reverse bending cycles at 175 lbs. tension (illustration). Testing is performed to the industry accepted criterion of 1500 flex cycles.



L. FIGURE-S TESTING MACHINE ABRASION TEST—82-F Series Splices—this test is performed on neoprene jacketed reel type cables in conjunction with the flexibility test (K above). A 90 degree abrading head is applied to the specimen cable and splice or repair with a force of 20 lbs. Splice or repair abrasion is measured against that of the cable, the optimum criteria being to equal or exceed the cable's performance. Scotchcast samples tested equal to the cable, averaging 0.00001 inch of wear per abrading pass.

ABRASION TEST—82-F Series Splices (reference: MIL-C-00915D and MIL-C-2194E)—splice or repair abrasion is gauged against that of a vulcanized shop repair. Average test results for abrasion wear per test revolution are 0.0015 inch for Scotchcast samples versus 0.0050 inch for vulcanized control samples; the Scotchcast samples test more than three times better that the vulcanized control samples.

M. PRESSURE AND HEAT—82-F Series Splices—the pressure and heat test measures the effect of cable reel tension and temperature on a reeled cable splice or repair. Cable is wound onto a 12 inch diameter reel at constant winding tensions of 100 and 200 lbs., with the splice or repair positioned in the third wrap of seven layers. Heat is provided by load cycling the cable (140 Amps for 2-conductor 2 AWG) for 2 hours "on" and 2 hours "off." Splice or repairs are measured for dimensional changes after 400 hrs. at 100 lbs. and 525 hrs. at 200 lbs. Test results show negligible effect on the Scotchcast samples, with maximum dimensional changes of only 1.2% and 4.1%, respectively.

6.0 Installation Techniques

Detailed instruction sheets are included in each kit to provide the installer with the information required to properly install the appropriate Scotchcast Splicing Kit. A brief summary of the installation steps for the 82-F Series and 82-BF Series Splicing Kits are outlined as follows:

A. PREPARE CABLE—using standard industry procedures.
B. CONNECT CABLES—use compression inline connectors for 82-F Series Kits and compression "C" tap connectors for 82-BFl Kits.
C. INSULATE CONNECTION(S) with vinyl electrical tape (not required if insulated butt connectors are used).
D. INSTALL MOLD—trim ends to fit cable, Figure 1, center over splice and tape ends to hold in place.
E. POUR COMPOUND—mix Scotchcast 2130 in "Unipak" and pour into mold. Figure 2.
F. DEMOLD—when compound in filler spout is no longer tacky; trim off excess compound from filler spout.

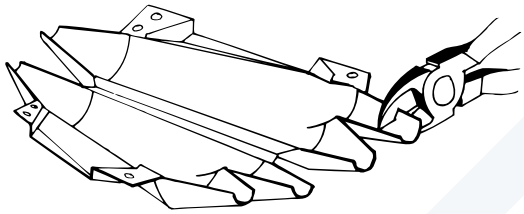


Figure 1. 82-BF1

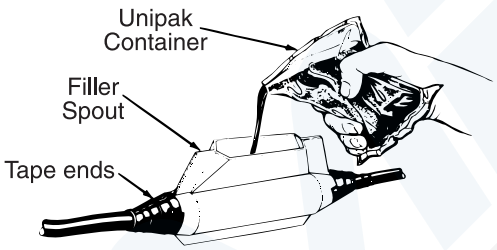


Figure 2. 82-F Series

7.0 Maintenance

Components within this kit are stable under normal storage conditions. Normal stock rotation practices are recommended. Scotchcast 2130 is not impaired by freezing. However, it should be warmed to at least 0ºC (32ºF) before being mixed and poured. After installation, 82-F and 82-BF Series splices can be checked periodically by visual inspection or by normal cable testing procedures.

8.0 Availability

Scotchcast 82-F and 82-BF Series Flexible Power Cable Splice Kits are available as kits for splicing portable power cable and cord for inline and tap splicing. They are available from your local authorized 3M electrical distributor.

3M

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