



CABLE, PRIMARY LOW TENSION
105 °C - CHLOROSULFONATED POLYETHYLENE INSULATED

ESB-M1L54-A

1. SCOPE

The material defined by this specification is a low tension stranded cable. The cable is similar to SAE J 1128 Type HTS (heavy duty thermoset). The insulation will have a 105 °C classification.

NOTE: The assemblers of electrical wire harnesses shall use the bulk wire suppliers as shown in the Ford Motor Company Materials Approved Source List.

2. APPLICATION

The material specified is to be used primarily for fusible links in automotive electrical harnesses.

3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.2 CONDUCTOR

3.2.1 Unless otherwise specified on the component drawing, the individual strands of the conductor shall be bare or tin-coated copper (soft or annealed) conforming to, respectively, ASTM B3 or ASTM B33, except strand dimensions. These dimensions shall be controlled to yield the cross-sectional area listed for the conductor of the finished cable per Table 1. Conductor area shall be determined by measuring individual strand diameters and calculating the sum of the individual strand areas. As an alternate method, conductor area may also be determined in accordance with ASTM B263.

3.2.2 The strands shall be bunched per ASTM B174. The maximum lay length shall be as specified in ASTM B174 Table 2, Column A. Conductor strand count shall comply with Table 1. Missing strands are not allowed.

3.3 SEPARATOR

A suitable barrier between the insulation and the copper conductor shall be used that will prevent any adverse or detrimental interaction from taking place between those two components. Unless otherwise indicated on the component drawing, this barrier will consist of an inner sheath or a tin coating as specified below. In either case, the insulation (and inner sheath, if used) shall strip readily from the conductors, leaving them reasonably clean and in suitable condition for terminating.

3.3.1 If bare copper wire is employed, an inner sheath or separator shall be applied between the conductor and the insulation.

3.3.2 If tinned copper wire per ASTM B33 is employed, the use of the separator as specified in 3.3.1 is optional.

Date	Action	Revisions
2005 02 15	Revised	Inserted 3.0; Deleted 3.1, 3.6, 4
1987 11 17	Updated	CAR1-PA183212 Incorporated ESB-M1L55-A (Tinned)
1963 07 01	Released	AS1 #964



3.4 INSULATION

- 3.4.1 The insulation material shall be chlorosulfonated polyethylene. The color of the insulation shall be specified on the engineering drawing of the component utilizing this material. Base color codes shall correspond to SAE J 1128.
- 3.4.2 Insulation thickness shall comply with the requirements of Table 2. Insulation thickness shall be measured in accordance with ANSI/UL-1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords, Paragraphs 240 through 250.11. A 0.51 mm diameter pin will be used for determining minimum insulation thickness at any point.

3.5 CABLE QUALITY (TESTS)

The following tests: Insulation Physical Properties Test, Dielectric Test, Cold Bend Test, Oil Absorption Test, Overload Test, Short Circuit Test, and Pinch Test correspond respectively to sections 4.2, 4.3, 4.4, 4.6, 4.7, 4.8, and 4.9 of SAE J 1128. Results of these tests shall comply with the requirements of SAE J 1128, type HTS.

The tests listed below shall be conducted in addition to the tests listed above.

3.5.1 Controlled Current Test

Remove 13 mm of insulation from each end of a 300 mm specimen of finished cable. Eyelet terminals of the proper strand grip size shall be crimped and soldered to each end of the specimen. The specimen shall then be subjected to the overload values specified in Table 3. Each specimen must fail "open" with no evidence of flame.

3.5.2 Flame Test

Flame Test shall be conducted per SAE J 1128, Section 4.5 except that the specimen shall be suspended vertically.



TABLE 1 - CONDUCTOR CONSTRUCTION

SAE Wire Size	No. of Wires	Nominal Strand Size Mm	Approx. Dia. of Stranded Conductor mm	Area of Conductor	
				Nominal mm	Minimum mm
20	7	0.320	0.97	0.554	0.543
18	16	0.254	1.17	0.795	0.779
18	19	0.234	1.17	0.804	0.788
16	19	0.287	1.44	1.186	1.162
16	16	0.320	1.47	1.186	1.162
14	26	0.320	1.88	1.914	1.876
14	19	0.361	1.81	1.914	1.876
12	41	0.320	2.36	3.013	2.953
12	19	0.455	2.28	3.013	2.953
10	65	0.320	2.97	4.785	4.689
10	49	0.361	2.90	4.785	4.689
10	19	0.574	2.88	4.785	4.689
8	103	0.320	3.74	7.654	7.501
8	49	0.455	3.66	7.654	7.501
8	19	0.724	3.63	7.654	7.501
6	133	0.361	4.78	13.397	13.129
6	49	0.574	4.62	12.347	12.100
6	37	0.724	5.06	14.909	14.611

TABLE 2 - DIMENSIONAL REQUIREMENTS

SAE Wire Size	Insulation Thickness		Maximum Diameter of Finished Cable mm
	Nominal (a)	Minimum (b)	
	Mm	mm	
20	0.94	0.76	3.05
18	0.94	0.76	3.43
16	1.02	0.82	3.81
14	1.04	0.84	4.19
12	1.17	0.94	5.08
10	1.22	0.98	5.72
8	1.40	1.12	6.80
6	1.57	1.26	8.51

(a) Average insulation thickness shall not be less than 90% of the nominal thickness.

(b) Refer to Para. 3.4.2. No individual thickness reading may be less than shown.



TABLE 3 - CONTROLLED CURRENT TEST

<u>Gage Size</u>	<u>D-C Current for 2 min.</u>	<u>D-C Current after 2 min. and until failure</u>
20	35	75
18	40	90
16	55	110
14	70	150
12	90	200
10	120	260
8	160	325
6	200	375