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MINIATURE ELECTRIC CABLES

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GENERAL

Scope

1. This specification states the requirements for a range of Joint-Service cables for the local interconnection of ground, sea, and airborne instrument and electronic equipment. The low tension (l.t.) cores of these cables are insulated with P.V.C. and are suitable for operation up to 440V, r.m.s., 1600 c/s. High tension (h.t.) cores are insulated with polythene and are suitable for operation up to 2000V, r.m.s.

Related specifications

2. The latest issue of the following specifications shall be used in conjunction with this standard. British Standards are obtainable from the B.S.I. and G.D.E. and DEF Specifications from Her Majesty's Stationery Office.

B.S.7: Insulated Rubber Cables and Flexible Cords.
DEF-9 (replacing G.D.E.S. 18): Polyvinyl Chloride Insulating and Sheathing Compounds for Electric Cables.
G.D.E.S.27: Polythene Insulation and Sheathing for Electric Cables.

Identification of manufacture

3. The manufacturer shall not mark the cable itself with his name and address, but a marker thread or threads of cotton or other material insoluble in acetone shall be used, the colours being in accordance with the coding system issued by the British Standards Institution. An additional coloured marker thread made of cellulose acetate, or other similar material readily soluble in acetone, shall be included for identification of the year of manufacture of the cable. All manufacturers shall use the same colour for the current year, which shall be as stated in Table 2006. The marker thread colour to be used shall be that colour for the year in which the P.V.C. sheathing is applied. The marker threads shall be placed immediately beneath the barrier tape.

Packing and labelling of cable

4. The length of cable in one piece shall be 100 yd or as stated in the contract. After approval, the cable shall have the ends sealed to prevent the ingress of moisture and shall be labelled, packed and delivered in accordance with the contract.

MATERIALS AND CONSTRUCTION

General - all cables

5. (a) The type and number of cores and dimensions of each cable shall be as given in Table 2001.

(b) Successive layers of cores shall be laid-up in opposite directions as in Table 2002, with a lay of approximately 12.1/2 times the pitch diameter of the laid-up cores.

(c) Single, twin and multi laid-up cores shall be protected by a barrier of cellophane tape in such a manner that each turn of the tape shall overlap the proceeding turn by at least one fifth of the width of the tape. The tape shall not adhere to the cores and the individual cores shall be readily separable. The protective P.V.C. sheathing over the laid-up cores shall be free from surface irregularities and be completely regular in shape. In addition it shall not be possible to withdraw, easily, the individual cores from the sheath on short lengths of the cable.

(d) If required, a small amount of P.V.C. filling, which shall be General purpose insulation to DEF-9, may be used to assist in obtaining a circular formation.

Conductors

6. The conductors shall consist of stranded or bunched tinned annealed copper wires which shall comply with B.S.7 and the relevant clauses of this standard. Table 2001 gives the number and diameter of individual wires to be used to form the complete conductor. There shall be no kinks, broken wires, or other irregularities in the conductor.

Cores

7. (a) Polythene insulation for the h.t. cores shall be in accordance with G.D.E.S.27, grade 2N, with a nominal radial thickness of 0.045 in. P.V.C. insulation for the l.t. cores shall be in accordance with DEF-9, General purpose insulation, with a nominal radial thickness of 0.019 in. or 0.026 in. Both materials shall be extruded on to the conductors, to the dimensions given in Table 2001. The minimum thickness at any one point shall not be less than the value stated in Table 2001.

(b) The insulation shall not be loose on the conductor, but it shall be possible to strip the complete insulation from the conductor, leaving the conductor in a condition sufficiently clean to permit satisfactory connections to be made to terminations without further cleaning.

(c) The polythene and P.V.C. insulation shall be coloured in accordance with the scheme given in Table 2002. Where applicable these colours shall conform to G.D.E.S.27 and DEF-9 respectively.

(d) The bi-colouring of cores, when specified, shall be obtained by the application of the other colour in the form of spiral marking. Identification shall be by one or more ink strips on a base colour, or by direct extrusion of two colours. The core, when viewed from any one side shall be readily identifiable in every 1 in. of length.

Screens

8. (a) All screens shall be of braided construction, and shall be formed of tinned copper wires in accordance with B.S.7. These screens shall be close fitting, but wherever the cable or core is cut it shall be possible to slide back the screen by hand. For types B, H and Q it shall be possible to slide the external metal braid a distance of 4 in. on a 24 in. length of cable, the other end of the cable being clamped.

(b) Where breaks in the individual wires occur, the ends shall be soldered or tucked out of the braid, and there shall be not more than one such break in any 1 in. length of cable.

(c) Where renewal of bobbins is necessary, the ends shall be tucked out of the braid, and there shall be not more than one bobbin renewal in any 12 in. length of cable.

(d) There shall be no joints in the complete braid.

(e) The diameter of wire, number of bobbins and ends per bobbin used shall be as stated in Table 2001. The Filling Factor shall be not less than 0.7.

The Filling Factor K_f is defined as $\frac{m \times n \times d}{2\pi D}\left(1 + \frac{\pi^2 D^2}{L^2}\right)^{\frac{1}{2}}$

Where D = mean diameter of braid in inches
d = diameter of braiding wire in inches
L = lay of braid in inches
m = total number of bobbins
n = number of ends per bobbin.

(f) The following alternative screen construction, however, may be used if desired:-

Standard		Permitted alternatives			
Number of bobbins	Ends per bobbin	Number of bobbins	Ends per bobbin	Number of bobbins	Ends per bobbin
16	5	24	3	-	-
24	4	16	6	-	-
24	5	16	7 or 8	-	-
24	6	16	9	36	4
24	8	16	12	36	5 or 6
24	10	36	7	48	5

Protective sheathing

9. All protective sheathing, whether inner or outer, shall be black P.V.C. which shall comply with DEF-9, General purpose sheath, and with the additional tests given in the relevant clauses of this specification. The sheathings shall be readily detachable from the other component parts of the cable and the nominal radial thickness shall be as stated in Table 2001. The thickness at any point shall not fall below the value stated in Table 2001 by more than 0.005 in.

PHYSICAL TESTS

Conductors

10. Wires, used to form the conductors shall be in accordance with B.S.7. These wires shall comply with the 'Tinning tests' specified in B.S.7 and the Tensile test specified below.

Tensile test

11. For this test the length of the test sample between the clamps of the testing machine shall be 10 in. and the clamps shall be separated at an approximate rate of 1 in. per minute. The ultimate tensile strength shall be calculated on the original cross-sectional area of the wire. The tensile strength, and minimum elongation in 10 in., of each wire, taken from the finished cable, shall conform to the figures given in Table 2005.

Completed cables

Resistance to fluids

12. A sample of the cable shall be bent into a loop, the internal diameter of which is six times the maximum specified diameter of the complete cable. Samples of the cable shall be immersed in the fluids listed in Table 2004, and maintained at 20° ±5°C for 2 hr, with the cable ends out of the fluid. At the conclusion of this period the cable shall be removed from the fluid and wrapped around a mandrel, the diameter of which is three times the maximum specified diameter of the complete cable. For flat twin cable, this dimension shall be that of the minor axis. The cable shall be kept on the mandrel for 1 min, then unwrapped, and shall show no signs of splitting or cracking, and the change in diameter shall not exceed the value given in Table 2004. During, or at the conclusion of the test, the colour of the cable shall not be appreciably affected.

Flexibility

13. A sample of the complete cable shall be wound under a load of 5 lb, or 10 lb for cables over 0.5 in. in diameter, 10 times into a close helix, the internal diameter of which is three times the maximum specified diameter of the cable. For flat twin cables this dimension shall be that of the minor axis. The direction of winding shall be reversed at alternate windings, so that the surface of the cable, which, on the previous winding, was on the inside of the helix, is then on the outside. No part of the cable shall show signs of damage after this test. The conditions of tapes and fillers may be ignored.

Colour stability

14. Coloured polythene cores shall meet the colour fastness clauses of G.D.E.S.27. Both the coloured and bi-coloured P.V.C. cores shall meet the colour fastness clauses of DEF-9. There shall be no apparent tendency for the colours to migrate and the spiralled marking shall be reasonably permanent.

Soldering test

15. Samples of the core 1 ft long shall have the insulation removed from the conductor for a distance of 3/4 in. from one end. They shall be bent to form a 90 deg bend with an inner radius of about 3/8 in., the heel of the bend being 1/2 in. from the bared conductor. Not less than 5 min after bending the sample,

a resin and methylated spirit flux shall be applied to the bared conductor which shall then be dipped vertically to a depth of 1/4 in. into a bath of molten solder held at a temperature between 250° and 270°C. The conductor shall remain immersed in the molten solder at the stated temperature and depth for 15 sec. The insulating material shall not split, or otherwise show unsuitability for use on soldered connections.

ELECTRICAL TESTS

Cores

Voltage test

16. All core, before metal braiding, shall be immersed in water at room temperature for not less than 12 consecutive hours, at the end of which time and whilst still immersed shall withstand the appropriate voltage shown in Table 2003, applied between the conductor and the water. The voltage shall be applied gradually and maintained continuously for 5 min. The output of the supply for the high voltage test shall be such as to maintain the specified voltage on the cable throughout the test. The peak value of the voltage wave shall be within ±2.5% of $\sqrt{2}$ x r.m.s. value and the frequency shall be approximately 50c/s (see also para 18).

Insulation resistance test

17. After the high voltage test, and whilst the core is still immersed, the insulation resistance of the cores per 1000 yd measured between the conductor and the water after 1 min electrification at 500V d.c. shall be not less than the appropriate value stated in Table 2003 at a temperature of 20°C. The change of apparent insulation resistance during the 1 min electrification shall be steady.

Spark test

18. If desired by the manufacturer, a spark test on all dry cable and a high voltage and insulation resistance test on 5% of all the cable may be carried out instead of a high voltage and insulation resistance test on all cable. The spark test shall be in accordance with B.S.7 and the high voltage and insulation resistance tests in accordance with para 16 and 17.

Completed cables

Voltage test on unscreened twin and multi-core types

19. All completed cable shall withstand, in the dry state, a high voltage applied between the cores for 1 min. The high voltage shall be 2000V r.m.s. for l.t. cores. For twin cables, the voltage shall be applied between the conductors and for multi-core cables between each conductor and the remainder connected together. The manufacturer, however, may group the cores in any convenient manner for this test.

Voltage test on screened cores and cables

20. In addition to the tests given in para 19, screened l.t. cores and l.t. cores of all overall screened cables in the dry state, shall withstand for 1 min 2000V r.m.s. applied between all the l.t. conductors connected together and all screens connected together. In the case of h.t. cores the applied voltage shall be 4000V r.m.s.

Conductor resistance test

21. The conductor resistance shall be measured on all completed cable and the resistance of each conductor per 1000 yd of cable at a temperature of 20°C shall not exceed the value stated in Table 2003.

TEST REQUIREMENTS FOR BATCH SAMPLING (AND PRODUCTION)

22. In the following details tests regarded as batch sampling tests are marked (b.s.t.) and normal production tests are marked (p.t.).

(a) Voltage test at 50c/s on core and completed cable (p.t.)

(b) Spark test (p.t.)

(c) Insulation resistance test on cores (p.t.)

(d) Conductor resistance test (p.t.)

(e) Tensile test on conductors (b.s.t.)

(f) Resistance to fluids (b.s.t.)

(g) Soldering test (b.s.t.) (P.V.C. only)

(h) Flexibility (b.s.t.)

(j) Tests on polythene to G.D.E.S.27 (b.s.t.)

(k) Tests on P.V.C. sheath to DEF-9 (b.s.t.)

(l) Constructional and dimensional check (p.t.)

23. Production tests (p.t.) shall be made on all cable. Batch sampling tests (b.s.t.) shall be made on each batch of 100,000 yd or the contract length, if less. For orders for small quantities, the production and batch sampling tests may be waived wholly or in part at the discretion of the inspector.

Note: The next page is Page 1001

Table 2001 - Cable details

Nomenclature Miniature electric cable	Number of cores	Nominal cross-sectional area of conductor	Number and dia of wires in conductor	Nominal diameter of conductor	Thickness of insulation		Overall dia of core		Details of core screen			Dia of screened core		Nominal thickness of sheath	Details of outer screen			Diameter over sheath		Diameter over screen		Diameter over sheath		Joint Service Catalogue Number
					Nominal	Minimum at any one point	Minimum	Maximum	Diameter of wire	Number of bobbins	Ends per bobbin	Minimum	Maximum		Diameter of wire	Number of bobbins	Ends per bobbin	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	
		sq.in.	in.	in.	in.	in.	in.	in.	in.			in.	in.	in.	in.			in.	in.	in.	in.	in.	in.	
No 1C	1	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	-	-	0.025	-	-	-	-	-	0.090	0.095	0.140	0.150	6145 100001
No 2A	2	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.215	0.235	-	-	-	-	6145 100002
No 2B	2	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	4	0.215	0.235	0.245	0.275	-	-	6145 100003
No 2C	2	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	16	5	-	-	0.180	0.200	0.245	0.275	6145 100004
No 2D	2	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.245	0.275	-	-	-	-	6145 100005
No 2P	2	0.0042	37/.012	0.084	0.026	0.021	0.133	0.140	-	-	-	-	-	0.035	-	-	-	0.340x 0.200	0.370x 0.230	-	-	-	-	6145 100006
No 2Q	2	0.0042	37/.012	0.084	0.026	0.021	0.133	0.140	-	-	-	-	-	0.035	0.0076	24	6	0.340x 0.200	0.370x 0.230	0.375x 0.240	0.405 0.270x	-	-	6145 100007
No 2R	2	0.0042	37/.012	0.084	0.026	0.021	0.133	0.140	-	-	-	-	-	0.035	0.0076	24	4	-	-	0.305 x0.165	0.335 x0.190	0.375 x0.235	0.405 x0.275	6145 100008
No 3A	3	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.225	0.245	-	-	-	-	6145 100009
No 3B	3	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	4	0.225	0.245	0.255	0.285	-	-	6145 100010
No 3C	3	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	16	5	-	-	0.190	0.210	0.255	0.285	6145 100011
No 3D	3	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.255	0.285	-	-	-	-	6145 100012
No 4A	4	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.245	0.265	-	-	-	-	6145 100013
No 4B	4	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	5	0.245	0.265	0.275	0.305	-	-	6145 100014
No 4C	4	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	16	5	-	-	0.210	0.230	0.275	0.305	6145 100015
No 4D	4	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.285	0.315	-	-	-	-	6145 100016
No 4P	4	0.0042	37/.012	0.084	0.026	0.021	0.133	0.140	-	-	-	-	-	0.035	-	-	-	0.395	0.435	-	-	-	-	6145 100017
No 4Q	4	0.0042	37/.012	0.084	0.026	0.021	0.133	0.140	-	-	-	-	-	0.035	0.0076	24	8	0.395	0.435	0.435	0.475	-	-	6145 100018
No 4R	4	0.0042	37/.012	0.084	0.026	0.021	0.133	0.140	-	-	-	-	-	0.035	0.0076	24	6	-	-	0.365	0.390	0.435	0.475	6145 100019
No 6A	6	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.290	0.310	-	-	-	-	6145 100020
No 6B	6	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	6	0.290	0.310	0.320	0.350	-	-	6145 100021
No 6C	6	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	4	-	-	0.255	0.275	0.320	0.350	6145 100022
No 6D	6	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.335	0.365	-	-	-	-	6145 100023
No 6E	6	0.0006	14/.0076	0.034	0.045	0.038	0.120	0.130	0.006	24	4	0.150	0.160	0.035	-	-	-	0.520	0.560	-	-	-	-	6145 100024
No 6F	6 (2 (4	0.0006 0.0006	14/.0076 14/.0076	0.034 0.034	0.019 0.045	0.015 0.038	0.070 0.120	0.075 0.130	0.004 0.006	16 24	5 4	0.090 0.150	0.095 0.160	)0.035)	-	-	-	0.475	0.505	-	-	-	-	6145 100025
No 6H	6 (2 (4	0.0006 0.0006	14/.0076 14/.0076	0.034 0.034	0.019 0.045	0.015 0.038	0.070 0.020	0.075 0.130	- 0.006	- 24	- 4	- 0.150	- 0.160	) 0.035)	0.0076	24	8	0.475	0.505	0.505	0.545	-	-	6145 100026
No 6J	6 (2 (4	0.0006 0.0006	14/.0076 14/.0076	0.034 0.034	0.019 0.045	0.015 0.038	0.070 0.120	0.075 0.130	- 0.006	- 24	- 4	- 0.150	- 0.160	)0.035)	0.0076	24	8	-	-	0.435	0.460	0.505	0.545	6145 100027
No 7D	7	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.335	0.365	-	-	-	-	6145 100028
No 10C	10 (5 pair)	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	6	-	-	0.360	0.380	0.430	0.470	6145 100029
No 12A	12	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.365	0.395	-	-	-	-	6145 100030
No 12B	12	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	8	0.365	0.395	0.395	0.435	-	-	6145 100031
No 12C	12	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	6	-	-	0.330	0.350	0.395	0.435	6145 100032
No 12D	12	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.440	0.480	-	-	-	-	6145 100033
No 12E	12	0.0006	14/.0076	0.034	0.045	0.038	0.120	0.130	0.006	24	4	0.150	0.160	0.035	-	-	-	0.690	0.735	-	-	-	-	6145 100034
No 12F	12 (8 (4	0.0006	14/.0076	0.034	0.019 0.045	0.015 0.038	0.070 0.120	0.075 0.130	0.004 0.006	16 24	5 4	0.090 0.150	0.095 0.160	)0.035)	-	-	-	0.620	0.660	-	-	-	-	6145 100035
No 18A	18	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.440	0.470	-	-	-	-	6145 100036
No 18B	18	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	8	0.440	0.470	0.470	0.510	-	-	6145 100037
No 18C	18	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	8	-	-	0.400	0.425	0.470	0.510	6145 100038
No 18D	18	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.515	0.555	-	-	-	-	6145 100039
No 18F	18 (11 (7	0.0006 0.0006	14/.0076 14/.0076	0.034 0.034	0.019 0.045	0.015 0.038	0.070 0.120	0.075 0.130	0.004 0.006	16 24	5 4	0.090 0.150	0.095 0.160	)0.035)	-	-	-	0.745	0.795	-	-	-	-	6145 100040
No 18H	18(11 (7	0.0006 0.0006	14/.0076 14/.0076	0.034 0.034	0.019 0.045	0.015 0.038	0.070 0.120	0.075 0.130	- 0.006	- 24	- 4	- 0.150	- 0.160	) 0.035)	0.0076	24	10	0.675	0.705	0.705	0.750	-	-	6145 100041
No 18J	18 (11 (7	0.0006	14/.0076	0.034	0.019 0.045	0.015 0.038	0.070 0.120	0.075 0.130	- 0.006	- 24	- 4	- 0.150	- 0.160	)0.035)	0.0076	24	10	-	-	0.635	0.665	0.705	0.750	6145 100042

Table 2001 - (cont)

Nomenclature Miniature electric cable	Number of cores	Nominal cross-sectional area of conductor	Number and dia of wires in conductor	Nominal diameter of conductor	Thickness of insulation		Overall dia of core		Details of core screen			Dia of screened core		Nominal thickness of sheath	Details of outer screen			Diameter over sheath		Diameter over screen		Diameter over sheath		Joint Service Catalogue Number
					Nominal	Minimum at any one point	Minimum	Maximum	Diameter of wire	Number of bobbins	Ends per bobbin	Minimum	Maximum		Diameter of wire	Number of bobbins	Ends per bobbin	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	
		sq.in.	in.	in.	in.	in.	in.	in.	in.			in.	in.	in.	in.			in.	in.	in.	in.	in.	in.	
No 25A	25	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	-	-	-	0.500	0.530	-	-	-	-	6145 100043
No 25B	25	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	8	0.500	0.530	0.530	0.570	-	-	6145 100044
No 25C	25	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.035	0.0076	24	8	-	-	0.460	0.485	0.530	0.570	6145 100045
No 25D	25	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	0.004	16	5	0.090	0.095	0.035	-	-	-	0.620	0.660	-	-	-	-	6145 100048
No 36C	36	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.045	0.0076	24	8	-	-	0.530	0.570	0.620	0.660	6145 100046
No 60C	60	0.0006	14/.0076	0.034	0.019	0.015	0.070	0.075	-	-	-	-	-	0.045	0.0076	24	10	-	-	0.670	0.720	0.750	0.810	6145 100047

Key to nomenclature of miniature electric cable range

Numbers 1, 2, 3, 4, 6, 7, 10, 12, 18, 25, 36 and 60 represent the number of cores in the cable.

The following letters denote the construction,* as follows:-

A P.V.C. sheath; l.t. (14/.0076 in.) unscreened cores.

B Outer screen; inner P.V.C. sheath; l.t. (14/.0076 in.) unscreened cores.

C Outer P.V.C. sheath; inner screen; l.t. (14/.0076 in.) unscreened cores.

D P.V.C. sheath; l.t. (14/.0076 in.) screened cores.

E P.V.C. sheath; h.t. screened cores.

F P.V.C. sheath; mixed h.t. and l.t. (14/.0076 in.) screened cores.

G P.V.C. sheath; mixed cores, h.t. screened; l.t. (14/.0076 in.) unscreened.

H Outer screen; inner P.V.C. sheath; mixed cores, h.t. screened; l.t. (14/.0076 in.) unscreened.

J Outer P.V.C. sheath; inner screen; mixed cores, h.t. screened; l.t. (14/.0076 in.) unscreened.

P P.V.C. sheath; l.t. (37/.012 in.) unscreened cores.

Q Outer screen; inner P.V.C. sheath; l.t. (37/.012 in.) unscreened cores.

R Outer P.V.C. sheath; inner screen; l.t. (37/.012 in.) unscreened cores.

*Note: The construction is given in the following order:-

(1) Outer screen or sheath; (2) Inner screen or sheath; (3) Cores.

Table 2002 - Lay-up and colour rotation of cores

Type (Miniature electric cable)	Lay-up	Colour rotation		
		Centre (r.h. lay where applicable)	First layer (l.h. lay)	Second layer (r.h. lay)
No 1C	Single core	red	-	-
No 2A, B, C, D	Twisted pair	-	red; blue	-
No 2P, Q, R	Two l.t. unscreened cores laid parallel	-	red; blue	-
No 3, All classes	Three cores twisted	-	red; blue; green	-
No 4, All classes	Four cores laid-up	-	red; blue; green; yellow	-
No 6A, B, C, D, E	Six cores laid-up around central dummy	dummy	red; blue; green; yellow; white; black	-
No 6F, H, J	Two screened or unscreened l.t. and four h.t. screened cores, laid-up around central dummy	dummy	red; blue; green; yellow: h.t. cores white; black: l.t. cores	-
No 7D	Six cores laid-up around one central core	red	blue; green; yellow; white; black; brown	-
No 10C	Five pairs of l.t. unscreened, laid-up	-	1st pair: red; white 2nd pair: blue; white 3rd pair: orange; white 4th pair: green, white 5th pair: brown, white	-
No 12, A, B, C, D, E	Three central cores twisted, nine cores in 1st layer	red; blue; green	yellow; white; black; brown; violet; orange; pink; light green; grey	-
No 12F	Four h.t. screened cores central; eight l.t. screened cores for 1st layer	red; blue; green; yellow	red; blue; green; yellow; white; black; brown; violet	-
No 18A, B, C, D	18 screened or unscreened l.t. cores, laid-up as follows: central dummy core; 1st layer six cores; 2nd layer 12 cores	dummy	red; blue; green; yellow; white; black	brown; violet; orange; pink; light green; grey; red/blue; red/green; red/yellow; red/white; red/black; red/brown
No 18F, H, J	Three l.t. cores central; 1st layer 8 l.t. cores; 2nd layer seven h.t. cores plus dummy cores	red; blue; green	yellow; white; black; brown; violet; orange; pink; light green	red; blue; green; yellow; white; black; brown
No 25, All classes	Three central; 1st layer eight cores; 2nd layer 14 cores	red; blue; green	yellow; white; black; brown; violet; orange; pink; light green	grey; red/blue; red/green; red/yellow; red/white; red/black; red/brown; blue/yellow; blue/white; blue/black; blue/orange; green/yellow; green/white; green/orange
No 36C	36 unscreened l.t. cores laid-up as follows: central dummy core; 1st layer six cores; 2nd layer 12 cores; 3rd layer 18 cores	dummy	red; blue; green; yellow; white; black	brown; violet; orange; pink; light green; grey; red/blue; red/green; red/yellow; red/white; red/black; red/brown. 3rd layer: blue/yellow; blue/white; blue/black; blue/orange; blue/green; blue/grey; green/yellow; green/white; green/black; green/orange; green/grey; brown/yellow; brown/white; brown/black; brown/grey; violet/yellow; violet/black; violet/white
No 60C	60 unscreened l.t. cores laid-up as follows: central dummy core; 1st layer six cores; 2nd layer 12 cores; 3rd layer 18 cores; 4th layer 24 cores	dummy	A red and blue core shall be laid-up adjacent to each other in each layer, the remainder of the cores in each layer being white	

Table 2003 - Details of electrical performance of cores

Conductor size	High voltage test (Volts (r.m.s.))	Equivalent spark test (Volts (r.m.s.))	Min insulation resistance (MΩ/1000 yd at 20°C)	Max conductor resistance of finished cable (Ω/1000 yd at 20°C)	
				Single and flat twin	Multi-core
L.T. 14/.0076 in.	2000	6000	20	42.1	44.1
L.T. 37/.012 in.	2000	6000	15	6.19	6.49
H.T. 14/.0076 in.	4000	10,000	20,000*	42.1	44.1

*Note: This value is applicable to production tests only.

Table 2004 - Resistance to fluids

Fluid	Specification	Max change in diameter (%)
Petrol	80% Hexane 20% Toluene by volume	15
Hydraulic	80% Cellosolve (Ethylene glycol monoethyl ether,) +20% Blown castor oil	5

Table 2005 - Tensile tests on conductors

Material	Diameter (in.)	Ultimate tensile strength (lb/sq.in.)	Minimum elongation (%)
Copper	0.020 to 0.012	Not greater than 42,900	13.5
Copper	0.011 to 0.003	Not greater than 44,000	9

Table 2006 - Colours of cellulose acetate marker thread for the identification of the year of manufacture

Date of manufacture	Colour of marker thread	Date of manufacture	Colour of marker thread
1952	brown	1960	yellow/black
1953	green	1961	yellow/white
1954	black	1962	yellow/red
1955	white	1963	blue/brown
1956	red	1964	blue/green
1957	yellow/blue	1965	blue/black
1958	yellow/brown	1966	blue/white
1959	yellow/green	1967	blue/red

EME8c/1101
57/Maint/2953

END