Chapter 9

SUB-MINIATURE AND SMALL MULTICORE CABLES

CONTENTS

Introduction

1 Sub-miniature cables are a range of light weight flexible cables for internal wiring and interconnection of ground and airborne instruments and electronic equipment in an operating temperature range from -40 °C to +70 °C or +85 °C for heat resisting types. They become brittle at low temperatures and should not be struck or bent below 0 °C. Flexibility is recovered as the temperature rises. These cables are suitable for use where the potential between conductors or between conductors and a screen or the aircraft structure does not exceed the ratings listed in Table 2. The frequency must not exceed 1600 Hz. These cables withstand fuel and mineral based fluids and lubricants but not ester based fluids and lubricants.

CAUTION

These cables are not designed for and must not be used to connect equipment to a mains supply.

Specification

2 Sub-miniature cables comply with the following standards:

DEF STAN 61-12 Part 4 for sub-miniature cables

DEF STAN 61-12 Part 5 for standard miniature cables.

Insulation materials comply with BS 16746 for poly vinyl chloride (PVC) compounds and BS 6234 for polythene.

Identification

3 There is no identification code marked on the wires. Coils and reels will be labelled when issued from stock. The appropriate Topic 3 will identify wires in a particular item of equipment. Otherwise they must be identified from the following description.

General description

4 The cables comprise tinned copper, bunched cores which have a primary insulation of poly vinyl chloride (PVC) for 250 and 440 volts low tension (LT) working or polythene for 2,000 high tension (HT) volts working in a range of colours within a black (or red for high voltage) PVC sheath. Some or all of the cores may be separately screened or there may be an overall screen over or under the sheath. Table 2 lists various conductor details.

5 A range of colours is provided to assist with core identification. Table 1 lists the various arrangements of the single and bicolours used. Note that the colours are always used in the same order. Where bicolours are indicated, the first named colour is the base colour, the second colour is a stripe. Cables having 50 or more cores are not provided with individual core identification but the cores are laid in layers over a centre of 3 cores. There is a red and a blue adjacent core at the centre and in each layer; the remainder of the cores are white. Thus cores may be identified in each layer by counting round from the red or blue cores.

Cable types (fig 1 to 4)

6 The cables are identified by a part number which encodes information concerning a particular cable. The part number format is as follows:

nn - n - nn L

Number of wires per conductor

Nominal diam of each conductor wire
- 1 = 0.1 mm (250 V working)
- 2 = 0.2 mm (440 V and 2000 V working)
- 3 = 0.315 mm (440 V working)

Number of cores

Type of cable
- A - PVC insulation, unscreened cores (fig 1).
- AA - as A but with heat resisting PVC.
- B - PVC insulation, unscreened cores, outer screen over sheath (fig 2).
- C - PVC insulation, unscreened cores, outer screen under sheath (fig 3).
- CC - as C but with heat resisting PVC.
- D - PVC insulation, screened cores (fig 4).
- DD - as D but with heat resisting PVC.
- E - polythene insulation for 2000 V working (fig 1).
- F - combination of type A cores for 440 V working and type E cores for 2000 V working.
- J - combination of type A cores for 440 V working and over-screened type E cores for 2000 V working.
- P - as A but high current core.
- R - as C but high current core.

The figures illustrate the various cable types of which, Type A, C and D may refer to both sub miniature and miniature cables. They are listed separately in Tables 3 and 4.

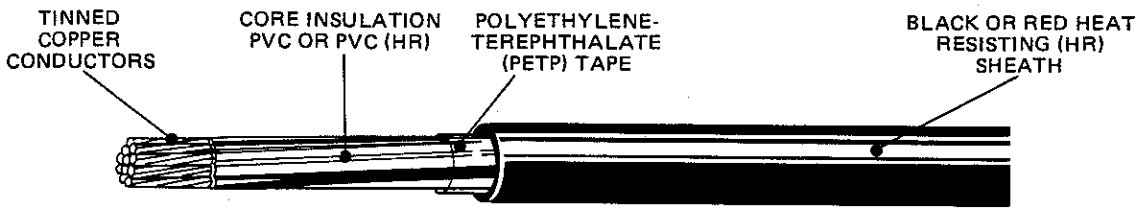

Fig 1 Cable types A, AA and P

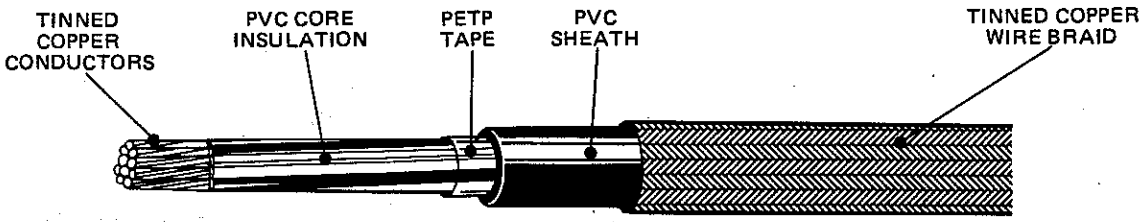

Fig 2 Cable type B

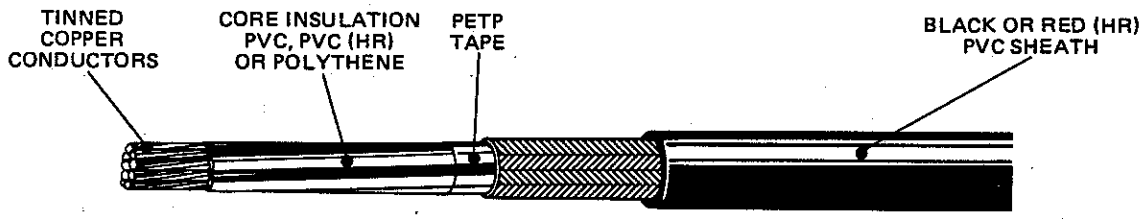

Fig 3 Cable type C, CC, J and R

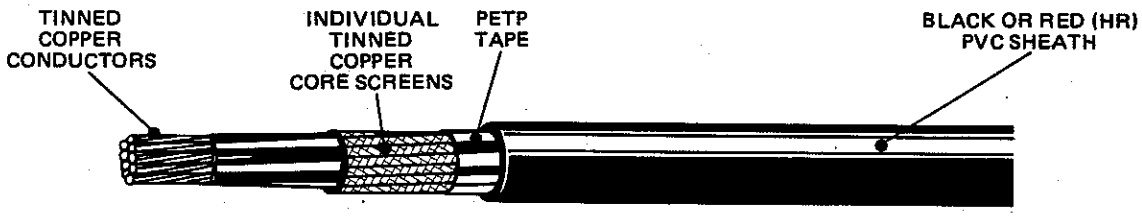

Fig 4 Cable type D, DD, E and F

Cable size and properties

7 Tables 1 to 4 list the cables with various electrical properties and their reference numbers. This cable is not sized using the American Wire Gauge (AWG) system. If there is any doubt concerning the exact conductor dimensions when fitting terminations then the wire must be measured and the circular mil area (CMA) or cross-sectional area (CSA) must be calculated as in Chapter 1, para 8.

TABLE 1 CABLE CORE COLOUR ARRANGEMENT

Cable type DEF STAN 61-12 Part 4	Part 5	Core colour rotation (C) = centre (1) = 1st layer (2) = 2nd layer (3) = 3rd layer
	-1	(C) red.
-2A,C,D	-2A,AA,B,C,CC,D,DD	(1) red, blue.
	-2P,R	(1) red, blue.
-3A,C,D	-3 all classes	(1) red, blue, green.
-4A,C,D	-4 all classes	(1) red, blue, green, yellow.
-6A,C,D	-6A,AA,B,C,CC,D,DD	(C) dummy. (1) red, blue, green, yellow, white, black.
	-6F,J	(C) dummy. (1) HT: red, blue, green, yellow. LT: white, black
	-7D	(C) red. (1) blue, green, yellow, white, black, brown.
	-10C	(1) 1st pair: white, blue. 2nd pair: white, orange. 3rd pair: white, green. 4th pair: white brown. 5th pair: white, grey.
-12A,C,D	-12A,AA,B,C,CC,D,DD,E	(C) red, blue, green. (1) yellow, white, black, brown, violet, orange, pink, turquoise, grey
	-12F	(C) HT: red, blue, green, yellow. (1) LT: red, blue, green, yellow, white, black, brown, violet.
-18A,C,D	-18A,AA,B,C,CC,D,DD	(C) dummy. (1) red, blue, green, yellow, white, black. (2) brown, violet, orange, pink, turquoise, grey, red/blue, green/red, yellow/red, white/red, red/black, red/brown.

(continued)

TABLE 1 CABLE CORE COLOUR ARRANGEMENT (continued)

Cable type DEF STAN 61-12 Part 4	Part 5	Core colour rotation (C) = centre (1) = 1st layer (2) = 2nd layer (3) = 3rd layer
	-18F,J	(C) LT: red, blue, green. (1) LT: yellow, white, black, brown, violet, orange, pink, turquoise. (2) HT: Red, blue, green, yellow, white, black, brown.
-25A,C,D	-25 all classes	(C) red, blue, green. (1) yellow, white, black, brown, violet, orange, pink, turquoise. (2) grey, red/blue, green/red, yellow/red, white/red, red/black, red/brown, yellow/blue, white/blue, blue/black, orange/blue, yellow/green, white/green, orange/green.
-36A,C,D	-36C,CC	(C) dummy (1) red, blue, green, yellow, white, black. (2) brown, violet, orange, pink, turquoise, grey, red/blue, green/red, yellow/red, white/red, red/black, red/brown. (3) yellow/blue, white/blue, blue/black, orange/blue, green/blue, grey/blue, yellow/green, white/green, black/green, orange/green, grey/green, yellow/brown, white/brown, brown/black, grey/brown, yellow/violet, violet/black, white/violet.

TABLE 2 CONDUCTOR RATING

Number/nom diam of conductor wires (mm)	Current rating, one core in free air (amps)	Maximum resistance at 20 °C (ohm/km)	Voltage rating at 1600 Hz	Cable type DEF STAN 61-12 Part 4	Part 5
7/0.1	0.25	384	250	A,C,D	
7/0.2	1	92	440	A,C,D	
16/0.2	2.5	40.1	440		A,AA,B,C,CC,D,DD,E,F
37/0.315	13	6.79	440		P,R
16/0.2 ht	0.5	40.1	2000		

TABLE 3 SUB-MINIATURE CABLE TYPES (DEF STAN 61-12, PART 4)

Type Number	No of cores	Number/nom diam of conductor wires (mm)	Overall cable diam min/max (mm)	Maximum mass (g/m)	Ref No: 5E/ or NATO Stock No: 6145-99-
Type A, unscreened, PVC cores, PVC sheath, 250 V					
7-1-2A	2	7/0.1	2 /2.5	5.4	1108582
7-1-3A	3	7/0.1	2.1/2.6	6.5	1108585
7-1-4A	4	7/0.1	2.3/2.8	8	1108588
7-1-6A	6	7/0.1	2.8/3.3	12	1108591
7-1-12A	12	7/0.1	3.6/4.1	19	1108594
7-1-18A	18	7/0.1	4.2/4.7	27	1108597
7-1-25A	25	7/0.1	5.2/5.8	36	1108600
Type A, unscreened, PVC cores, PVC sheath, 440 V					
7-2-2A	2	7/0.2	3.1/3.6	13	1108621
7-2-3A	3	7/0.2	3.3/3.8	16	1108624
7-2-4A	4	7/0.2	3.6/4.1	20	1108627
7-2-6A	6	7/0.2	4.3/4.8	30	1108630
7-2-12A	12	7/0.2	5.8/6.4	53	1108633
7-2-18A	18	7/0.2	7.1/7.7	80	1108636
7-2-25A	25	7/0.2	8.4/9	100	1108639
7-2-36A	36	7/0.2	9.5/10.1	140	1108642
7-2-50A	50	7/0.2	11.2/12	200	1108645
7-2-60A	60	7/0.2	12 /12.8	230	1108648
7-2-85A	85	7/0.2	14.3/15.1	330	1108651
7-2-108A	108	7/0.2	15.9/16.9	410	1108654
Type C, PVC cores, overall screen, PVC oversheath, 250 V					
7-1-2C	2	7/0.1	2.5/3	13	1108583
7-1-3C	3	7/0.1	2.7/3.2	15	1108586
7-1-4C	4	7/0.1	2.9/3.4	17	1108589
7-1-6C	6	7/0.1	3.3/3.8	21	1108592
7-1-12C	12	7/0.1	4.1/4.6	31	1108595
7-1-18C	18	7/0.1	5.2/5.8	50	1108598
7-1-25C	25	7/0.1	6 /6.6	62	1108601
Type C, PVC cores, overall screen, PVC oversheath, 440 V					
7-2-2C	2	7/0.2	3.6/4.1	23	1108622
7-2-3C	3	7/0.2	3.8/4.3	27	1108625
7-2-4C	4	7/0.2	4.1/4.6	32	1108628
7-2-6C	6	7/0.2	5.3/5.9	55	1108631

(continued)

TABLE 3 SUB-MINIATURE CABLE TYPES (DEF STAN 61-12, PART 4) (continued)

Type Number	No of cores	Number/nom diam of conductor wires (mm)	Overall cable diam min/max (mm)	Maximum mass (g/m)	Ref No: 5E/ or NATO Stock No: 6145-99-
Type C, PVC cores, overall screen, PVC oversheath, 440 V (continued)					
7-2-12C	12	7/0.2	6/6/7.2	83	1108634
7-2-18C	18	7/0.2	7.9/8.5	110	1108637
7-2-25C	25	7/0.2	9.2/9.8	150	1108640
7-2-36C	36	7/0.2	10.4/11.2	200	1108643
7-2-50C	50	7/0.2	12.2/13	270	1108646
7-2-60C	60	7/0.2	13 /13.8	310	1108649
7-2-85C	85	7/0.2	15.2/16.2	420	1108652
7-2-108C	108	7/0.2	17.2/18.2	520	1108655
Type D individual core screens, PVC sheath 250 V					
7-1-2D	2	7/0.1	2.8/3.3	11	1108584
7-1-3D	3	7/0.1	3 /3.5	14	1108587
7-1-4D	4	7/0.1	3.3/3.8	17	1108590
7-1-6D	6	7/0.1	3.9/4.4	24	1108593
7-1-12D	12	7/0.1	5.3/5.9	43	1108596
7-1-18D	18	7/0.1	6.2/6.8	61	1108599
7-1-25D	25	7/0.1	7.6/8.2	83	1108602
Type D individual core screens, PVC sheath 440 V					
7-2-2D	2	7/0.2	4 /4.5	22	1108623
7-2-3D	3	7/0.2	4.3/4.8	29	1108626
7-2-4D	4	7/0.2	4.8/5.4	40	1108629
7-2-6D	6	7/0.2	5.8/6.4	58	1108632
7-2-12D	12	7/0.2	7.9/8.5	110	1108635
7-2-18D	18	7/0.2	9.3/9.9	150	1108638
7-2-25D	25	7/0.2	11.3/12.1	210	1108641
7-2-36D	36	7/0.2	12.7/13.5	290	1108644
7-2-50D	50	7/0.2	15.1/16.1	410	1108647
7-2-60D	60	7/0.2	16.2/17.2	470	1108650
7-2-85D	85	7/0.2	19.2/20.2	680	1108653
7-2-108D	108	7/0.2	21.9/23.1	860	1108656

TABLE 4 SUB-MINIATURE CABLE TYPES (DEF STAN 61-12, PART 5)

Type Number	No of cores	Number/nom diam of conductor wires (mm)	Overall cable diam min/max (mm)	Maximum mass (g/m)	Ref No: 5E/ or NATO Stock No: 6145-99-
Type A, unscreened, PVC cores, PVC sheath, 440 V					
16-2-2A	2	16/0.2	5.1/5.9	34	1116715
16-2-3A	3	16/0.2	5.4/6.2	42	1116722
16-2-4A	4	16/0.2	5.9/6.7	52	1116726
16-2-6A	6	16/0.2	6.9/7.7	75	1116733
16-2-12A	12	16/0.2	9.1/9.9	120	1116743
16-2-18A	18	16/0.2	10.5/11.5	180	1116749
16-2-25A	25	16/0.2	12.6/13.6	230	1116756
Type AA, unscreened lt cores, PVC sheath, heat resisting, 440 V					
16-2-2AA	2	16/0.2	5.1/5.9	32	1116762
16-2-3AA	3	16/0.2	5.4/6.2	40	1116765
16-2-4AA	4	16/0.2	5.9/6.7	49	1116768
16-2-6AA	6	16/0.2	6.9/7.7	71	1116771
16-2-12AA	12	16/0.2	9.1/9.9	120	1116774
16-2-18AA	18	16/0.2	10.5/11.5	170	1116777
16-2-25AA	25	16/0.2	12.6/13.6	230	1116780
16-2-60AA	60	16/0.2	18.1/19.1	500	1116784
Type B, overall screen on PVC sheath, 440 V					
16-2-2B	2	16/0.2	6.1/6.9	74	1116716
16-2-3B	3	16/0.2	6.4/7.2	84	1116723
16-2-4B	4	16/0.2	6.9/7.7	96	1116727
16-2-6B	6	16/0.2	7.9/8.7	130	1116734
16-2-12B	12	16/0.2	10 /11	190	1116744
16-2-18B	18	16/0.2	11.5/12.5	250	1116750
16-2-25B	25	16/0.2	13.6/14.6	320	1116757
Type C, lt core overall screen, PVC sheath, 440 V					
16-2-1C	1	16/0.2	3.3/3.8	24	0161682
16-2-2C	2	16/0.2	6.1/6.9	69	1116717
16-2-3C	3	16/0.2	6.4/7.2	79	1116724
16-2-4C	4	16/0.2	6.9/7.7	92	1116728
16-2-6C	6	16/0.2	7.9/8.7	120	1116735
16-2-10C	5 pair	16/0.2	10.8/11.8	190	1116742
16-2-12C	12	16/0.2	10 /11	190	1116745
16-2-18C	18	16/0.2	11.5/12.5	250	1116751
16-2-25C	25	16/0.2	13.6/14.5	320	1116758
16-2-36C	36	16/0.2	15.5/16.7	450	1116760
16-2-60C	60	16/0.2	19.1/20.3	670	1116761

(continued)

TABLE 4 SUB-MINIATURE CABLE TYPES (DEF STAN 61-12, PART 5) (continued)

Type Number	No of cores	Number/nom diam of conductor wires (mm)	Overall cable diam min/max (mm)	Maximum mass (g/m)	Ref No: 5E/ or NATO Stock No: 6145-99-
Type CC, lt cores overall screen, outer sheath, heat resisting PVC, 440 V					
16-2-2CC	2	16/0.2	6.1/6.9	66	1116763
16-2-3CC	3	16/0.2	6.4/7.2	76	1116766
16-2-4CC	4	16/0.2	6.9/7.7	89	1116769
16-2-6CC	6	16/0.2	7.9/8.7	120	1116772
16-2-12CC	12	16/0.2	10 /11	180	1116775
16-2-18CC	18	16/0.2	11.5/12.5	250	1116778
16-2-25CC	25	16/0.2	13.6/14.6	320	1116781
16-2-36CC	36	16/0.2	15.5/16.7	430	1116783
16-2-60CC	60	16/0.2	19.1/20.3	660	1116785
Type D, individual core screens, PVC sheath, 440 V					
16-2-2D	2	16/0.2	6 /6.8	47	1116718
16-2-3D	3	16/0.2	6.4/7.2	60	1116725
16-2-4D	4	16/0.2	7 /7.8	75	1116729
16-2-6D	6	16/0.2	8.3/9.1	110	1116736
16-2-7D	7	16/0.2	8.3/9.1	120	1116741
16-2-12D	12	16/0.2	10.8/11.8	190	1116746
16-2-18D	18	16/0.2	12.8/13.8	270	1116752
16-2-25D	25	16/0.2	15.3/16.5	360	1116759
Type DD, lt cores individual screens, PVC sheath, heat resisting 440 V					
16-2-2DD	2	16/0.2	6 /6.8	44	1116764
16-2-3DD	3	16/0.2	6.4/7.2	58	1116767
16-2-4DD	4	16/0.2	7 /7.8	72	1116770
16-2-6DD	6	16/0.2	8.3/9.1	110	1116773
16-2-12DD	12	16/0.2	10.8/11.8	180	1116766
16-2-18DD	18	16/0.2	12.8/13.8	270	1116779
16-2-25DD	25	16/0.2	15.3/16.5	350	1116782
Type E, screened, ht polythene cores, PVC sheath, 2000 V					
16-2-6E	6	16/0.2	13 /14	210	1116737
16-2-12E	12	16/0.2	17.4/18.6	350	1116747
Type F, screened, 440V lt cores, polythene 2000V ht cores, PVC sheath					
16-2-6F	21t, 4ht	16/0.2	12.1/13.1	130	1116738
16-2-12F	81t, 4ht	16/0.2	15.2/16.4	290	1115748
16-218F	111t, 7ht	16/0.2	18.5/19.7	420	1118753

(continued)

TABLE 4 SUB-MINIATURE CABLE TYPES (DEF STAN 61-12, PART 5) (continued)

Type Number	No of cores	Number/nom diam of conductor wires (mm)	Overall cable diam min/max (mm)	Maximum mass (g/m)	Ref No: 5E/ or NATO Stock No: 6145-99-
Type J, screened, 440V lt cores, screened 2000 V ht cores, PVC sheath					
16-2-6J	21t, 4ht	16/0.2	12.9/13.9	250	1116740
16-2-18J	111t, 7ht	16/0.2	17.6/18.8	470	1116755
Type P, unscreened, lt cores, PVC sheath, 440 V					
37-3-2P	2 flat	16/0.2	8.6x5/9.3x5.8	98	1116719
37-3-4P	4	16/0.2	9.8/10.8	180	1116730
Type R, lt cores, overall screen, PVC sheath, 440 V					
37-3-2R	2 flat	37/0.35	9.5x6/10.3x6.8	150	1116721
37-3-4R	4	37/0.35	10.8/11.8	250	1116732