Amended MARK-UP FOR DCR 281

S.T — ~~27/3/08~~. 01/04/2008

TABLE 1(a) - TYPE VARIANTS

Variant	Z_0 (Ω)	AWG	Inner Conductor				Insul. Wire	Filler SC	Shield SC		Binder SC
			No. of Strands x ⌀ (mm)	Max. ⌀ (mm)	Nom. Sect. (mm^2)	Max. d.c. Resist. (Ω/km)	Max. ⌀ (mm)	⌀ (mm)	Constr.	Strand ⌀ (mm)	Nom. ⌀ (mm)
01	100	28	7x0.126	0.39	0.089	256	1.2	1.0	BS	0.079	—
02	100	26	7x0.160	0.49	0.141	159	1.4	1.0	BS	0.079	~~0.003~~ 0.076

Symmetric Cable Characteristics		Filler RC	Binder RC	Outer Shield RC		Round Cable Characteristics		Bend Radius
Max. ⌀ (mm)	Max. Weight (kg/km)	⌀ (mm)	Nom. ⌀ (mm)	Constr.	Strand ⌀ (mm)	Max. ⌀ (mm)	Max. Weight (kg/km)	Min. (mm)
2.7	12	1.0	~~0.004~~	BS	0.102	7.5	85	45
3.1	15	1.4	~~0.004~~ 0.102	BS	0.102	9.0	100	60

TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristics	Symbol	Maximum Ratings	Unit	Remarks
1	Operating Voltage (Continuous)	V_{op}	200	V_{rms}	-
2	Current	I	1.5 2.5	A	AWG 28 AWG 26
3	Operating Frequency	f_M	400	MHz	10 metres.
			~~100~~	~~Mbit/sec~~	~~Assembly~~
5 ~~4~~	Operating Temperature Range	T_{op}	−200 to +180	°C	T_{amb} Note 1
6 ~~5~~	Storage Temperature Range	T_{stg}	−200 to +180	°C	-
7 ~~6~~	Soldering Temperature	T_{sol}	+250	°C	Note 2

NOTES

1. Precautions shall be taken such that the aggregate temperature of the datalines (ambient plus rise), due to power dissipation, does not exceed the maximum operating temperature.
2. For 5 seconds maximum.

4	Data Transmission Rate Variant 01 Variant 02	DTR	 100 200	Mbit/sec	Assembly

FIGURE 1 - PARAMETER DERATING INFORMATION

FIGURE 1(a) - ALLOWABLE CURRENT VERSUS TEMPERATURE

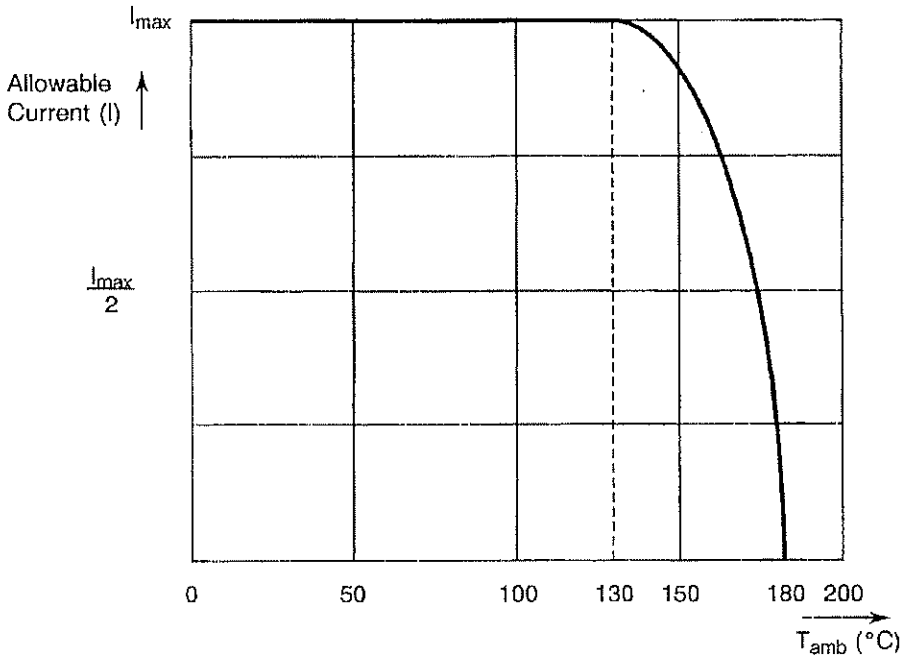
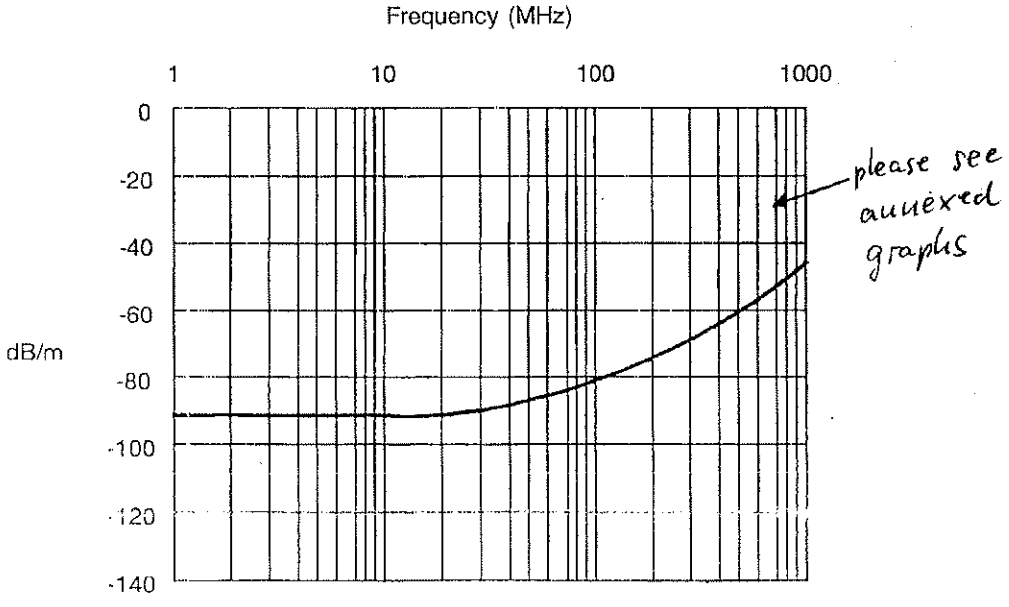
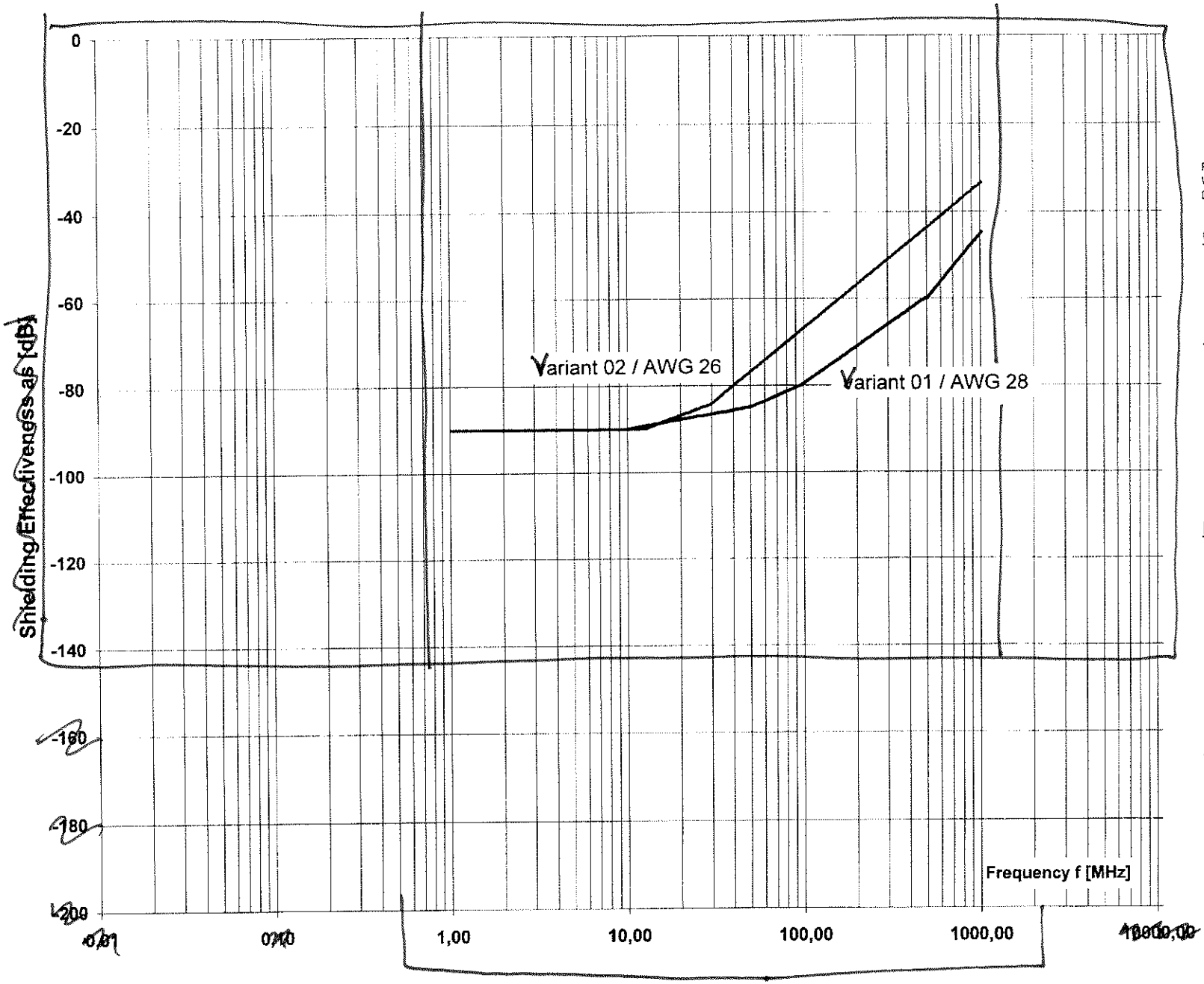


FIGURE 1(b) - MINIMUM SHIELDING EFFECTIVENESS





Paratron®

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Der W.L. Gore & ASSOCIATES GmbH

Construction:

Lot no.:

06.09.2006

K. Opitz

Remark:

variant 01 / AWG 28
variant 02 / AWG 26

measured according to IEC 61196-1 EN 50289-1-6

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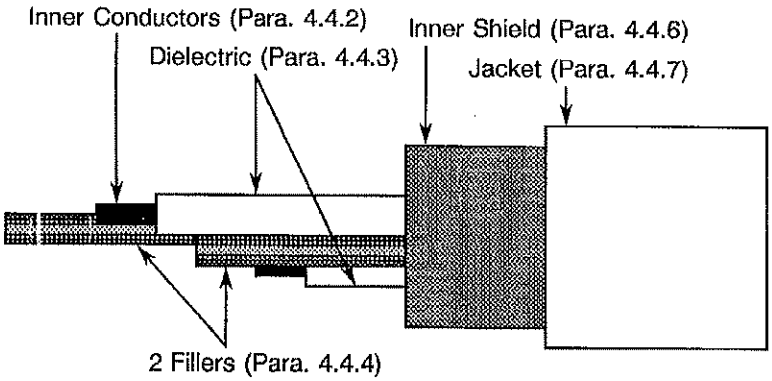
FIGURE 2 - PHYSICAL CHARACTERISTICS

FIGURE 2(a) - SINGLE SYMMETRIC CABLE - VARIANT 01



NOTES

1. See Table 1(a) for dimensions.

FIGURE 2(b) - ROUND CABLE - VARIANT 01

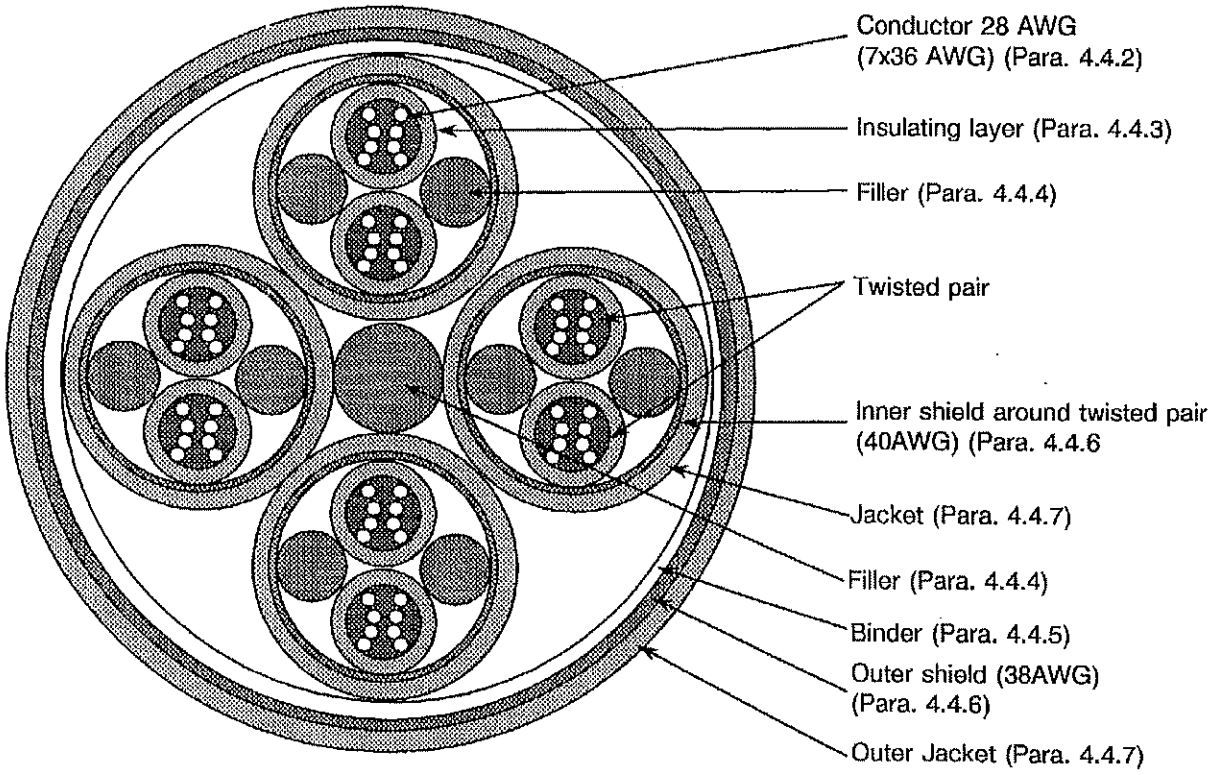
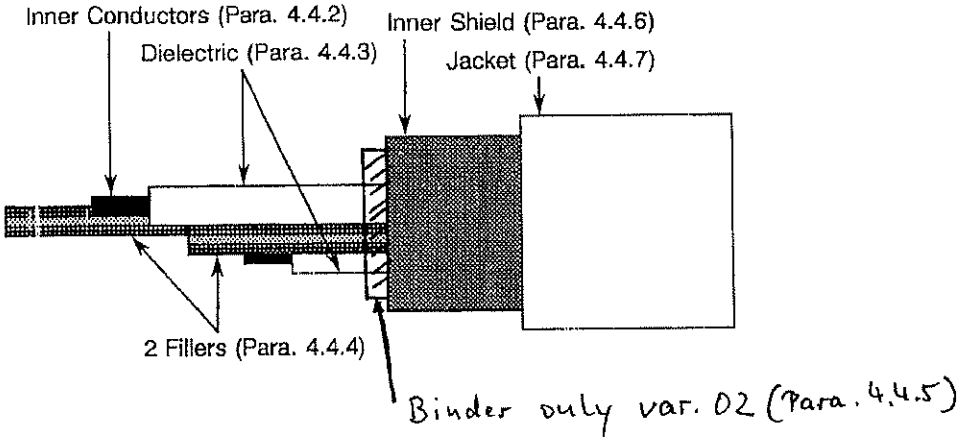


FIGURE 2 - PHYSICAL CHARACTERISTICS

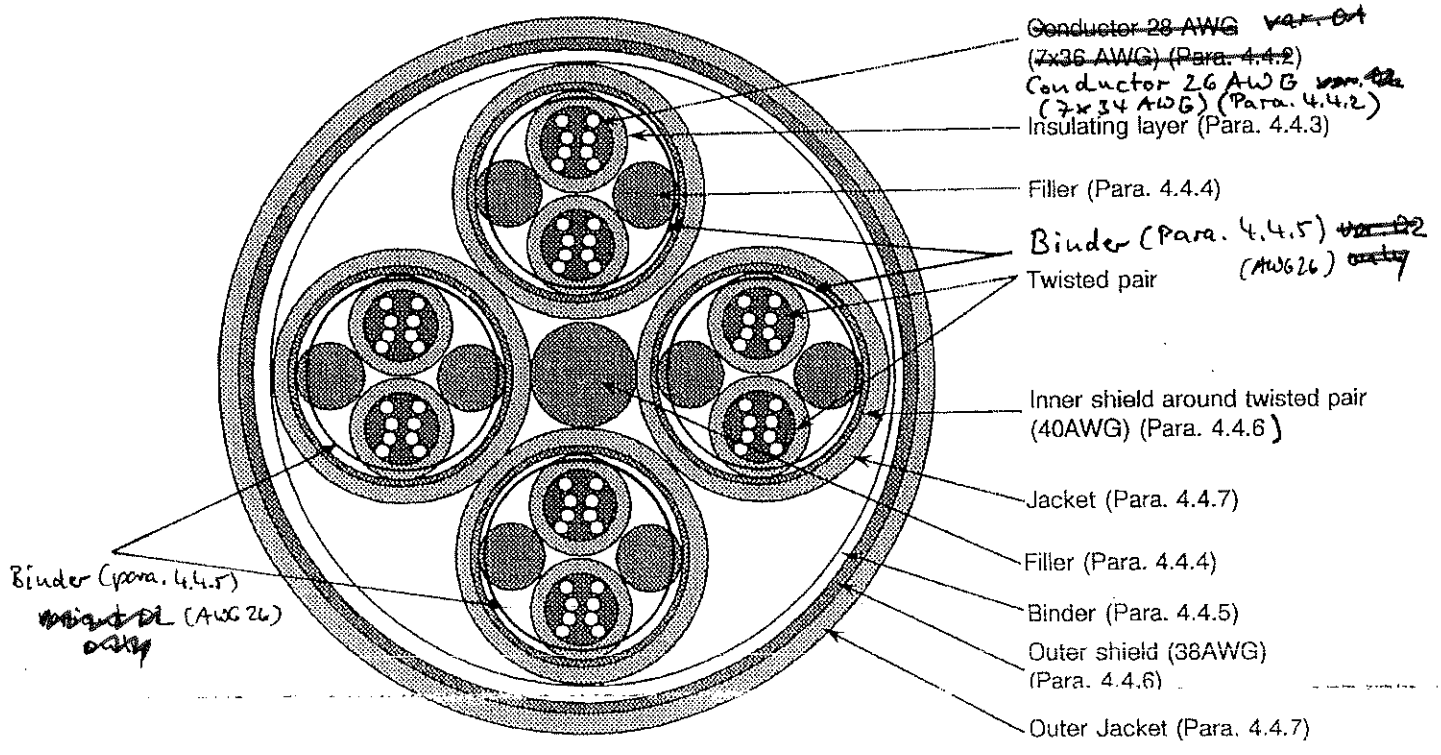
FIGURE 2(c) - SINGLE SYMMETRIC CABLE – VARIANT 02



NOTES

1. See Table 1(a) for dimensions.

FIGURE 2(d) - ROUND CABLE – VARIANT 02



4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.7, Voltage Test: To be performed in accordance with Para. 4.8.13 of this specification.

(b) Para. 9.10, Characteristic Impedance: To be performed in accordance with Para. 4.8.14 of this specification.

(c) Para. 9.11, Attenuation: Shall not be performed.

(d) Para. 9.12, Structural Return Loss: Shall not be performed.

(e) Shielding Effectiveness: Shall be performed in accordance with Para. 4.8.17 of this specification at any point in Chart IV.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.11, Attenuation: Shall not be performed.

(b) Para. 9.12, Structural Return Loss: Shall not be performed.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the datalines specified herein shall be checked. They shall conform to those shown in Table 1(a), Figure 2 and Para. 4.4 of this specification (see the Table following for list of parameters to be checked).

4.3.2 Weight

The maximum weight of the datalines specified herein shall be measured in accordance with Para. 9.2 of ESCC Generic Specification No. 3902 and shall be as specified in Table 1(a) of this specification.

4.3.3 Adhesion of the Inner Conductor

Minimum stripping force: 1.0N.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the components specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Construction of Round Cable

4.4.1.1 Generic Construction

The round cable with symmetric cables consists of four impedance controlled datalines with an overall shield and jacket. The datalines are constructed such that two conductors, each evenly centred within a dielectric, are twisted together with two fillers and then covered by a shield and jacket in accordance with Figure 2(a), Variant 02 also includes a binder under the shield and Figure 2(c).

4.4.1.2 Lay Length of Symmetric Cables

The lay length of all symmetric cables twisted together shall not be less than 12 times and not more than 16 times the outside diameter of the unshielded and unjacketed cable. This requirement will lead to the following lay length and/or twist per metre respectively.

variant	Lay Length (mm)		Twists/Metre	
	Min.	Max.	Min.	Max.
01	24	32	32	41
02	27	35	29	37

4.4.1.3 Lay Length of the complete Cable

Four sets of symmetric cables twisted together shall not be less than 12 times and not more than 16 times the outside diameter of two symmetric cables. This construction shall be the core to be covered by a binder and a braided shield, i.e. outer conductor. This construction is then covered by an outermost jacket in accordance with Figure 2(b).

variant	Lay Length (mm)	
	Min.	Max.
01	57	77
02	74	98

4.4.2 Inner Conductor

4.4.2.1 Material Characteristics

All strands used in the manufacture of the conductor shall be silver-coated high strength copper alloy.

On silver-coated strands, the thickness of silver shall be 2.0µm minimum.

For high strength copper alloy conductors, the tensile characteristics shall be not less than 6.0% in elongation and 35kg/mm^2 in tensile strength.

For determination of the conductor resistance at +20°C, as mentioned in Para. 9.5 of ESCC Generic Specification No. 3902, the α coefficient for copper alloy is 0.0035.

4.4.2.2 Stranding

The conductors shall be constructed of concentrically laid strands so as to produce a smooth and uniform conductor of circular cross-section and free from any high strands or other surface irregularities.

The length of lay of the external layer shall be not less than 8, nor more than 16 times the maximum conductor diameter specified in Table 1(a).

4.4.3 Dielectric

4.4.3.1 Material

Any dielectric material shall be virgin material, i.e. expanded, microporous PTFE or wrapped PTFE with only those additives that are necessary for processing and pigmentation.

Material
Expanded, microporous PTFE

4.4.3.2 Construction

The dielectric shall have a uniform cross-section throughout the length of the inner core or wire and the conductor shall be evenly centred in the dielectric.

The nominal diameter of the dielectric shall be in accordance with Table 1(a).

4.4.4 Filler

Fillers shall be used so as to ensure a smooth and uniform diameter under the shielding in order to contribute to a uniform impedance over the length of the cable.

4.4.4.1 Material

The filler material as used for the symmetric cables shall be expanded, microporous PTFE with only those additives necessary for processing.

The filler material as used for the round cable shell shall be PTFE with only the additives necessary for processing.

4.4.4.2 Construction

The filler material shall be extruded or wrapped from tapes to the diameters as given in Table 1(a).

4.4.5 Binder

~~Applicable to completed round cable only.~~ core for Variant 02 only and the symmetric cables for Variant 01 and 02

Binders shall be used as appropriate over ~~completed round cable core.~~ over the completed round cable core for both variants.

4.4.5.1 Material

The material shall be virgin, wrapped, expanded, microporous PTFE with only those additives necessary for processing.

4.4.5.2 Construction

The material shall be wrapped with an overlap of 50% maximum.

4.4.6 Shield

The terms "inner shield" and "outer shield" shall be used.

1 type of shield shall be used:-

(a) Braided Shield (BS).

4.4.6.1 Material Characteristics

All strands shall meet the requirements for silver-coated annealed copper as outlined in Para. 4.4.2.1 of this specification, but the thickness of silver shall be 2.5µm minimum.

Any strand shall show a 10% minimum elongation.

4.4.6.2 Construction

The strand size shall be as specified in Table 1(a) of this specification.

(a) **Braided Shield**

The braided shield type shall be of push-back type and provide not less than 90% coverage. The coverage factor K is calculated as follows:-

$$K = (2F - F^2)$$

$$F = \frac{N \times P \times d}{\sin \alpha}$$

$$\tan \alpha = 2\pi \frac{(D \times 2d) \times P}{C}$$

K = coverage (%).
N = number of strands.
d = shield strand diameter (mm).
α = angle of shield with cable axis in degrees.
D = effective diameter of core under shield (mm).
C = number of carriers.
P = serving pitch/mm.

4.4.7 Jacket

The cable shall have jackets for each of the inner symmetric cables and an outer jacket for the complete round cable.

4.4.7.1 Material Characteristics

The material shall be a layer of extruded fluoropolymer PFA, with only those additives that are necessary for processing and pigmentation.

4.4.7.2 Construction

The PFA shall be extruded such that the construction underneath is centred evenly within the jacket. The wall thickness for the inner jackets shall be ~~0.18~~ 0,20mm maximum, and for the outer jacket 0.25mm maximum.

4.4.8 Colours

The dielectric material, the fillers and ~~the jackets~~ binders shall be white.

The jacket colour for variant 01 shall be white.
The jacket colour for variant 02 shall be blue.

4.6.3 Circuits for Electrical Measurements

Not applicable.

4.7 BURN-IN TESTS

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION NO. 3902)

4.8.1 Mechanical Properties of Conductor

As detailed in Paras. 4.4.2.1 and 4.4.6.1 of this specification.

4.8.2 Alternate Bending Resistance

The applied weights and bending diameter for alternate bending resistance are given in Table A.

Number of cycles : 500 minimum.

TABLE A - ALTERNATE BENDING RESISTANCE, LOAD AND DIAMETER

Type	Z_0 (Ω)	Weight (kg)	Bending Diameter (mm)
RC var.01	100	1.3	70
RC var. 02	100	1.5	90

4.8.3 Accelerated Ageing Stability

Ageing temperature : +200 ± 5 °C.
Shrinkage/Protrusion : See Table B.
Wrap Test : Mandrel diameters as per Table C.

TABLE B - SHRINKAGE/PROTRUSION

Type	Z_0 (Ω)	Max. Shrinkage or Protrusion (mm)
RC	100	2.0

Maximum Capacitance Change : +7.0%.

4.8.4 Cold Bend Test

Chamber temperature : −80 ± 5 °C.
Mandrel diameter and load : See Table C.

TABLE C - COLD BEND TEST, MANDREL DIAMETERS AND LOADS

Type	Z_0 (Ω)	Weight (kg)	Mandrel Diameter (mm)
RC var.01	100	1.3	70
RC var. 02	100	1.5	90

4.8.5 Solderability

No particular conditions are applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE
ROUND CABLES

Type	ESCC Gen. Spec. No. 3902						
	Para. 9.6	Para. 9.6	Para. 9.7	Para. 9.9		Para. 9.10	Para. 9.20
	No. 1	No. 2	No. 3	No. 4		No. 5	No. 6
	Characteristic Diel. Strength of Inner Jacket (kVac)	Characteristic Diel. Strength of Outer Jacket (kVac)	Characteristic Voltage Test (Diel. Core) (kVdc)	Characteristic Capacitance (Max.) (pF/m)		Characteristic Impedance (Ω)	Characteristic Corona Extinction Voltage (Vac)
				Cond. - Cond.	Cond. - Shield		
RC var.01	1.5	2.0	1.4	50	90	100 ± 6	500
RC var.02	1.5	2.0	1.4	45	79	100 ± 6	500

No.	Characteristic	ESCC Gen. 3902	This Specification	Limits
7	Inner Conductor Resistance	Para. 9.5	-	See Table 1(a)
8	Insulation Resistance	Para. 9.8	-	5000MΩ × km
9	Shielding Effectiveness	-	Para. 4.8.17	See Figure 1(b)

SYMMETRIC CABLES

This Specification		
Para. 4.8.18	Para. 4.8.19	Para. 4.8.19
No. 10	No. 11	No. 12
Characteristic Time Delay (Max.) (nsec/m)	Characteristic Conductor Time Delay Difference (Max.) (nsec/m) Per Pair	Characteristic Conductor Time Delay Difference (Max.) (nsec/m) Pair to Pair
4.3	0.08	0.13