RNE22- 01: 2005
Cable Twin Type
Testing Specification

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Contents

1. General

This specification defines the pass/fail criteria for the testing of cable twin type and references the relevant sections of BS EN 50117-1: 1997 where appropriate. The methods of BS EN 50117-6: 1997 are used as appropriate.

All details, where applicable, will be recorded on QMF17e: Cable Testing Result Sheet. When a cable fails any section, the details of the failure will be fully recorded.

High quality connectors are to be used to test the cable as required throughout this procedure, referencing the correct method of connection in the VHF/UHF Handbook.

2. Mechanical Specification

The mechanical specifications for the cable as follows:

Diameter Of Inner Conductor	:	0.65 +/- 0.03mm
Diameter Of Outer Conductor	:	Not less than 3.5mm
External Diameter Of Sheath	:	4.7 +/-0.2mm
Bending Radius	:	35mm
Flexing Radius	:	75mm

3. Cable Measuring

Physically measure and cut 100m(+/- 25cm) and 30m(+/- 6cm) from the cable to be tested using a tape measure, when required. Once measured, put onto reels as necessary for the tests to be carried out.

4. Testing (Electrical)

Carry out the following tests with 100m of cable on the drum

4.1 Conductor Resistance

(Reference BS EN 50117-1: 1997 Section 11.1)

Calculate the DC resistance of the cable under test, at 20^0 C, of both the inner and outer conductors.

Measure the volt drop across the inner and outer conductors and convert the reading to Ω/km.

Express the result to the standard temperature of 20^0 C using BS EN 50117-1: 1997 Section 11.1.5 equation (7)

The DC resistance of the inner conductor should be < 55 Ω/km.

The DC resistance of the outer conductor should be < 16 Ω/km.

4.2 Regularity Of Impedance

(Reference BS EN 50117-1: 1997 Section 11.9)

Using a TDR, enter the velocity ratio of the cable under test as specified by the manufacturer into the TDR, and observe the cable regularity of impedance.

Regularity of Impedance should be < 1% throughout the test specimen.

4.3 Longitudinal Loss (Attenuation)

(Reference BS EN 50117-1: 1997 Section 11.8)

The attenuation of the cable under test should meet the following:

5 MHz	:	< 2.7 dB/100m
50 MHz	:	< 7.5 dB/100m
100 MHz	:	< 10.0 dB/100m
200 MHz	:	< 13.8 dB/100m
460 MHz	:	< 21.4 dB/100m
860 MHz	:	< 30.0 dB/100m
1000 MHz	:	< 32.5 dB/100m
1750 MHz	:	< 42.2 dB/100m
2150 MHz	:	< 47.0 dB/100m

4.4 Return Loss

(Reference BS EN 50117-1: 1997 Section 11.6)

The return loss of the cable under test should meet the following:

5 - 30 MHz	:	> 23 dB
30 - 470 MHz	:	> 23 dB
470 - 862 MHz	:	> 20 dB
862 - 2150 MHz	:	> 16 dB

In each frequency band, 3 peak return loss values up to 4dB lower than the stated specified limit are permissible.

Carry out the following tests with 30m of cable cut from the drum

4.5 Capacitance

Measure the capacitance of the cable under test using a capacitance meter and convert the reading to give pF/m.

4.6 Relative Propagation Velocity

(Reference BS EN 50117-1: 1997 Section 11.7)

Calculate the required values using BS EN 50117-1: 1997 Section11.7.4 equation (15) & (17).

Express the final value using BS EN 50117-1: 1997 Section 11.7.5 equation (18).

4.7 Characteristic Impedance

(Reference BS EN 50117-1: 1997 Section 11.5)

Using the values obtained in section 4.6 above, and capacitance value obtained in section 4.5 above. Apply the values using BS EN 50117-1: 1997 section 11.5.1.2 equation (9) to calculate the impedance of the cable under test.

The Characteristic Impedance should be 75Ω +/- 4Ω.

Carry out the following tests using new cable from the drum

4.8 Static Bend Test

(Reference BS EN 50117-1: 1997 Section 10.2.4)

Using a 20m (minimum) piece of the cable under test, wrap a section 180^0 around a 70mm diameter mandrel vertically - ensuring the cable touches all the required parts of the mandrel.

Using a TDR, ensure that the regularity of impedance is < 1%.

After testing, there should be no cracks, or breaks in the dielectric, metallic elements or sheath.

4.9 Multiple Bending Test

(Reference BS EN 50117-1: 1997 Section 10.2.1)

Using a 10m (minimum) piece of the cable under test, bend a section 90^0 around the 70mm diameter mandrel vertically, then straighten and bend again 3 times. Wind the same section of cable three turns around the same mandrel. Ensure the cable touches all the required parts of the mandrel for these tests.

Using a TDR, ensure that the regularity of impedance is < 1%.

After testing, there should be no cracks, or breaks in the dielectric, metallic elements or sheath.

Carry out the following test using a new 30m section of cable.

4.10 Crosstalk

The cable under test should meet the following crosstalk levels:

22 kHz	:	> 65 dB
5 MHz	:	> 110 dB
30 - 470 MHz	:	> 120 dB
470 - 1000 MHz	:	> 120 dB
1000 - 2150 MHz	:	> 120 dB

4.11 Flexing Test

(Reference BS EN 50117-1: 1997 Section 10.2.2)

Mark the middle 10m (minimum) of the cable under test as the test area, and pull the cable through the 150 mm diameter pulleys backwards and forwards 5 times, with a force of 10 to 20 N, at a rate of not less than 1m/minute.

Using a TDR, ensure that the regularity of impedance is < 1%.

Re-check the crosstalk on a 30m length of the cable using the set up in Section 4.10, the cable under test should meet the following crosstalk levels:

22 kHz	:	> 65 dB
5 MHz	:	> 110 dB
30 - 470 MHz	:	> 120 dB
470 - 1000 MHz	:	> 120 dB
1000 - 2150 MHz	:	> 120 dB

After testing, there should be no cracks, or breaks in the dielectric, metallic elements or sheath.

4.12 Crush Resistance

(Reference BS EN 50117-1: 1997 Section 10.4)

Using a TDR and a torque wrench set to 13.6Nm, ensure the cable has no lateral movement and apply a crush load to the cable vertically for 2 minutes.

Ensure that the regularity of impedance is < 1% and record any magnitude variations.

Benchmark Summary : RNE22-01 2005 Cable Twin Type

STANDARD : **BS EN50117-1: 1997** *Coaxial Cables used in cabled distribution networks*

Sections : **10.2.1, 10.2.2 , 10.2.4 , 10.4 , 11.1 , 11.5 , 11.6 , 11.7 , 11.8 , 11.9**

MECHANICAL SPECIFICATION

Diameter Of Inner Conductor	:	0.65 +/- 0.03mm
Diameter Of Outer Conductor	:	Not less than 3.5mm
External Diameter Of Sheath	:	4.7 +/-0.2mm
Bending Radius	:	35mm
Flexing Radius	:	75mm

ELECTRICAL SPECIFICATION

Nominal Impedance	:	75 Ω +/- 4 Ω
DC Resistance (20° C)	:	Inner < 55 Ω/km
		Outer < 16 Ω/km

Attenuation :

5 MHz	:	< 2.7 dB / 100 m
50 MHz	:	< 7.5 dB / 100 m
100 MHz	:	< 10.0 dB / 100 m
200 MHz	:	< 13.8 dB / 100 m
460 MHz	:	< 21.4 dB / 100 m
860 MHz	:	< 30.0 dB / 100 m
1000 MHz	:	< 32.5 dB / 100 m
1750 MHz	:	< 42.2 dB / 100 m
2150 MHz	:	< 47.0 dB / 100 m

Return Loss :

5 - 30 MHz	:	> 23 dB
30 - 470 MHz	:	> 23 dB
470 - 862 MHz	:	> 20 dB
862 - 2150 MHz	:	> 16 dB

Crosstalk :

22 kHz	:	> 65 dB
5 MHz	:	> 110 dB
30 - 470 MHz	:	> 120 dB
470 - 1000 MHz	:	> 120 dB
1000 - 2150 MHz	:	> 120 dB

Crosstalk following Flexing Test :

22 kHz	:	> 65 dB
5 MHz	:	> 110 dB
30 - 470 MHz	:	> 120 dB
470 - 1000 MHz	:	> 120 dB
1000 - 2150 MHz	:	> 120 dB

Flexing : Maintain minimum impedance regularity <1%, and screening performance

Static Bend Test : Maintain minimum impedance regularity <1%

Crush Resistance : Maintain impedance regularity <1%