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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 4012-2013

Replacing GB/T 4012-1983

2.6/9.5 mm composite coaxial cable for telecommunication use

2.6/9.5 mm 同轴综合通信电缆

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1 Scope

The standard lays down the type designations, the sizes, the electrical performance, the delivery length, the acceptance rules, the test methods and the marking and packaging of 2.6/9.5 mm composite coaxial cable for telecommunication use.

It applies to the manufacture, the acceptance and the use of 2.6/9.5 mm composite coaxial cable.

The cable covered by the standard is intended for analogue trunk communication systems of 24 MHz and below, or for digital and analogue wideband information transmission systems such as high speed data, image facsimile and television. The high/low frequency quads and the high frequency twisted pair groups are used in analogue communication systems of 123 kHz and below, and the low frequency quads are used in voice frequency communication systems.

2 Normative references

The documents referred to are GB/T 2952.1 to 2952.3-2008 on outer protective coverings of cables; GB/T 3048.4-2007, GB/T 3048.5-2007 and GB/T 3048.8-2007 on the d.c. resistance of conductors, on insulation resistance and on the a.c. voltage test; GB/T 3953-2009 on round copper wire for electrical purposes; GB/T 4909.2-2009 on dimensional measurement of bare wires; GB/T 5441.2-1985, GB/T 5441.3-1985, GB/T 5441.4-1985, GB/T 5441.6-1985, GB/T 5441.7-1985, GB/T 5441.8-1985 and GB/T 5441.9-1985 on test methods for communication cables, covering working capacitance by the bridge method, capacitance coupling and capacitance unbalance to earth, terminal impedance and internal impedance irregularity of a coaxial pair by the pulse method, crosstalk attenuation by the comparison method, the attenuation constant by the open and short circuit method, the frequency characteristic of the attenuation constant of a coaxial pair by the comparison method, and the ideal screening factor under power frequency conditions; JB/T 8137 (all parts) on cable drums; and YD/T 760-1995 on polyolefin insulating compound for indoor communication cables.

Dated references apply in the dated version only; undated references apply in their latest version, amendments included.

3 Product type designation

3.1 The type designations of the cable are given in Table 1.

3.2 A cable is designated by its type, its size and the number of the standard.

3.3 The example given reads: a composite coaxial cable with an aluminium sheath and a polyethylene jacket containing 4 coaxial pairs, 4 high/low frequency quads, 1 low frequency quad and 4 signal wires is written HOL03 4 x 2.6/9.5 + 4 x 4 x 0.9 (high/low) + 1 x 4 x 0.9 (low) + 4 x 1 x 0.6 (signal) GB/T 4012-2013.

Table 1 lists the type letters with their names and their main uses. HOL is the bare aluminium sheathed composite coaxial cable for fixed laying on land, for aerial, duct and tunnel installation. HOL02 and HOL03 are the aluminium sheathed types with a polyvinyl chloride jacket and with a polyethylene jacket, used as HOL and also suitable for direct burial. HOL22 and HOL23 add steel tape armour and are used as HOL02 and HOL03, for electrified railways and places with strong electrical interference. HOL32 and HOL33 have fine round steel wire armour and are for fixed laying on land, for water crossings. HOQ is the bare lead sheathed type, used as HOL, and HOQ02 and HOQ03 are its jacketed versions. HOQ21, HOQ22 and HOQ23 are lead sheathed with steel tape armour, with a fibrous outer covering or with a polyvinyl chloride or polyethylene jacket. HOQ31, HOQ32, HOQ33, HOQ41, HOQ42 and HOQ43 are lead sheathed with fine or heavy round steel wire armour and the same three outer coverings. A note says that cables with other types of outer covering may be supplied by agreement, and a footnote marks several of the lead sheathed types as products that are not recommended.

4 Sizes

4.1 The sizes of the cable are given in Table 2.

Table 2 sets out the permitted make-up of the cable in five columns: coaxial pairs of 2.6/9.5 mm, high/low frequency quads of 4 x 0.9 mm, high frequency twisted pair groups of 2 x 0.9 mm, low frequency quads of 4 x 0.9 mm and signal wires of 1 x 0.6 mm. A cable with 4 coaxial pairs carries 4 high/low frequency quads, no high frequency twisted pair group, 1 low frequency quad and either no signal wires, 2 or 4 of them. A cable with 8 coaxial pairs carries no high/low frequency quad, 7 low frequency quads, and its high frequency twisted pair groups and signal wires are combined in three ways, which the scan shows as no group with no signal wire or with 2 or 4 signal wires, 4 groups, and 8 groups with 6 signal wires; the pairing of the rows in the last two columns of this table could not be established with certainty and the combinations are therefore not restated as a list. A footnote states that the green and blue insulated cores are the high frequency working pair and the white and red insulated cores the low frequency working pair.

5 Coaxial pair

5.1 The inner conductor is a round copper wire of nominal diameter 2.6 mm and shall meet GB/T 3953-2009.

5.2 The insulation is of foamed or foam skin polyolefin and shall meet YD/T 760-1995.

5.3 The outer conductor is formed by longitudinally applying a soft copper tape of nominal thickness 0.25 mm. The nominal diameter of the outer conductor is 9.5 mm.

5.4 Two tinned steel tapes of nominal thickness 0.15 mm and two layers of insulating paper tape shall be applied over the outer conductor with a gap.

5.5 The performance of the coaxial pair shall meet Table 3.

Table 3 fixes four items. The d.c. resistance of the inner conductor at 20 °C is not greater than 3.5 ohm/km, converted with the factor l/1000. The terminal impedance at 2.5 MHz has a nominal value of 75 ohm, and the table sets deviation limits and limits on the difference between the impedances of the A and B ends, each quoted against a percentage figure. The impedance irregularity is limited in parts per thousand, with the equivalent value in decibels given in brackets, again against a percentage figure. The attenuation constant at 13 °C is not greater than 1.32 dB/km at 0.3 MHz, 2.37 dB/km at 1 MHz, 3.74 dB/km at 2.5 MHz, 4.73 dB/km at 4 MHz, 7.09 dB/km at 9 MHz, 8.19 dB/km at 12 MHz and 10.59 dB/km at 20 MHz, and is 11.60 +/- 0.10 dB/km at 24 MHz. The footnotes state that the terminal impedance is calculated at both ends of the coaxial pair, that the impedance irregularity is calculated from the larger of the values measured at the two ends and that steel wire armoured cables are allowed a lower figure, and that the maximum nominal value of the attenuation constant is the average of a full band test on 20 single coaxial pairs of about 3

km taken at random from not less than 60 km of cable.

6 High/low frequency quad

6.1 The conducting core is a soft copper wire of nominal diameter 0.9 mm and shall meet GB/T 3953-2009.

6.2 The insulation is of foamed polyethylene and shall meet YD/T 760-1995.

6.3 Four insulated cores coloured red, green, white and blue are stranded into a quad; the colour arrangement at the A end is shown in Figure 1. The white and red cores form the low frequency working pair and the green and blue cores the high frequency working pair. The lay length shall be not greater than 300 mm, all the high/low frequency quads in one cable shall have different lay lengths, and cotton yarn, plastic yarn or tape of different colours shall be spirally lapped over them with a gap.

6.4 The electrical performance of the high/low frequency quad shall meet Table 4.

Table 4 fixes the d.c. resistance of each conducting core at 20 °C as not greater than 28.5 ohm/km, converted with the factor l/1000; the ratio of the d.c. resistance difference of a working pair to the loop resistance as not greater than 1.0 %; the average working capacitance at 0.8 kHz as 29.5 +/- 2.2 nF/km, converted with the factor l/1000; and the attenuation constant at 13 °C and 123 kHz as not greater than 3.4 dB/km.

7 High frequency twisted pair group

7.1 The conducting core is a soft copper wire of nominal diameter 0.9 mm and shall meet GB/T 3953-2009.

7.2 The insulation is of foamed polyethylene or of foamed polyolefin and shall meet YD/T 760-1995.

7.3 Two insulated cores of different colours are stranded into a twisted pair group; the lay length shall be not greater than 150 mm and all the high frequency twisted pair groups in one cable shall have different lay lengths.

7.4 The electrical performance of the high frequency twisted pair group shall meet Table 5.

Table 5 fixes the same four items as Table 4, with the d.c. resistance of each conducting core at 20 °C not greater than 28.5 ohm/km, the ratio of the d.c. resistance difference of a working pair to the loop resistance not greater than 1.0 %, the average working capacitance at 0.8 kHz equal to 34 +/- 2.5 nF/km and the attenuation constant at 13 °C and 123 kHz not greater than 3.4 dB/km.

8 Low frequency quad

8.1 The conducting core is a soft copper wire of nominal diameter 0.9 mm and shall meet