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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 5013.8-2013

Replacing GB/T 5013.8-2006

Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 8: Cords for applications requiring high flexibility

额定电压450/750 V及以下橡皮绝缘电缆 第8部分：特软电线

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1 General

1.1 This part of GB/T 5013 lays down the technical requirements for cords with rubber insulation and a textile braid, of rated voltage 300/300 V, used where particular flexibility is required, for example in an electric iron.

1.1 Each type of cord shall comply with the requirements laid down in GB/T 5013.1-2008 and with the particular requirements of this part.

1.2 The normative references are: GB/T 2951.11-2008, common test methods for insulating and sheathing materials of electric and optical cables, part 11, methods for general application, measurement of thickness and overall dimensions and tests for determining the mechanical properties (IEC 60811-1-1:2001, IDT); GB/T 2951.12-2008, part 12, methods for general application, thermal ageing methods (IEC 60811-1-2:1985, IDT); GB/T 2951.21-2008, part 21, methods specific to elastomeric compounds, ozone resistance, hot set and mineral oil immersion tests (IEC 60811-2-1:2001, IDT); GB/T 3956-2008, conductors of insulated cables (IEC 60228:2004, IDT); GB/T 5013.1-2008, rubber insulated cables of rated voltages up to and including 450/750 V, part 1, general requirements (IEC 60245-1:2003, IDT); GB/T 5013.2-2008, part 2, test methods (IEC 60245-2:1998, IDT); and IEC 60719, calculation of the lower and upper limits for the average outer dimensions of cables with circular copper conductors and of rated voltages up to and including 450/750 V.

5 Ethylene propylene rubber (EPR) insulated braided cords

5.1 Type: 60245 IEC 89 (RQB).

5.2 Rated voltage: 300/300 V.

5.3.1 Conductor: the number of cores is 2 or 3. The conductor shall comply with the provisions for the sixth type of conductor in Table 4 of GB/T 3956-2008, except that the maximum value of the conductor resistance at 20 °C is 3 % higher than the value laid down in GB/T 3956-2008. The single wires may be plain or tinned.

5.3.2 Separator: a separator layer of suitable material may be applied over the conductor of each core.

5.3.3 Insulation: the insulation applied over the conductor of each core shall be a type IE4 ethylene propylene rubber (EPR) compound. The insulation shall be applied by extrusion. The thickness of the insulation shall comply with the values specified in column 2 of Table 8.

5.3.4 Filler: the filler is a textile material.

5.3.5 Laying up of cores and fillers: the cores and the fillers shall be laid up together. The maximum lay shall not exceed 7.5 times the diameter of the assembled cores, and the direction of lay shall be the same as the direction of lay of the conductors and of the insulated cores. A filler may be placed in the middle of the laid-up cores.

5.3.6 Braid: the cores and the fillers shall be covered under a textile braid, for which the number of threads shall not be fewer than 60, the minimum number of crossings per metre shall be 700, and the number of braiding carriers shall not be fewer than 24.

5.3.7 Overall diameter: the average overall diameter shall lie within the range specified in columns 3 and 4 of Table 8.

5.4 Tests: the inspections and tests specified in Table 9 shall be carried out and the requirements of 5.3 shall be met.

5.4.1 Check of consistency of construction: the lay shall be checked as in 5.3.5, that is, the length of 10 lays of the sample shall be measured and that value divided by 10 shall be recorded as the lay of the laid-up cores.

5.4.2 Three-pulley bending test: the test shall be carried out as laid down in 3.5 of GB/T 5013.2-2008. The number of reciprocating movements shall be 2 000, that is, 4 000 single movements, and the test voltage shall be applied as specified in Table 9.

5.4.3 Twisting test: the test shall be carried out as laid down in 3.6 of GB/T 5013.2-2008, except that the weight hung on the lower clamp shall comply with Table 7 and that each conductor shall carry the load current given in Table 7. To stop the weight from reaching the top or the bottom of the guide channel and from leaving it, the sample shall be prepared as follows: before being fitted into the test apparatus the sample shall first be twisted three times and fixed temporarily with tape; both ends of the sample shall be fixed in the clamps and the tape then removed; the two fixed clamps shall be separated slowly so as to make certain that when the sample is pulled fully straight the weight is still in the guide channel

and is raised by 50 mm as laid down in 3.6.4 of GB/T 5013.2-2008, and when the clamps are fully separated the weight shall not touch either end of the guide channel; if the sample cannot be pulled straight, it shall undergo at most 30 slow reciprocating movements so that the twist is spread evenly over the length of the sample during handling and no knot appears at the beginning of the test. The requirement is a total of 1 500 reciprocating movements.

Table 7 gives the test current under the condition of the cord carrying a weight. It has four columns: nominal cross-sectional area of the conductor in mm2, test current in A, and the weight on the cord in N for the 2-core and for the 3-core construction. Its three rows read: 0.75 mm2, 6 A, 15 N and 20 N; 1.0 mm2, 10 A, 20 N and 25 N; and 1.5 mm2, 16 A, 25 N and 30 N.

5.5 Informative guide to use: in normal use the maximum conductor temperature is 60 °C. A note adds that further guidance is under consideration.

Table 8 gives the dimensions of the 60245 IEC 89 (RQB) cord. It has four columns: number of cores and nominal cross-sectional area of the conductor in mm2, specified value of the insulation thickness in mm, and the lower and the upper limit of the average overall diameter in mm. Its six rows read: 2 x 0.75, 0.8, 5.5 and 7.2; 2 x 1, 0.8, 5.7 and 7.6; 2 x 1.5, 0.8, 6.2 and 8.2; 3 x 0.75, 0.8, 5.9 and 7.7; 3 x 1, 0.8, 6.2 and 8.1; and 3 x 1.5, 0.8, 6.7 and 8.8.

Table 9 lists the tests on the 60245 IEC 89 (RQB) cord, giving for each item the type of test, T for a type test and S for a sampling test, and the standard and clause that give the test method. The items are: electrical performance tests, namely conductor resistance, a 2 000 V voltage test on the finished cord and a 2 000 V voltage test on the insulated core, all of type T and S to GB/T 5013.2-2008 clauses 2.1, 2.2 and 2.3; checks of construction and dimensions, namely the check of construction (T and S, to GB/T 5013.1-2008, by inspection and manual test), measurement of the insulation thickness (T and S, to GB/T 5013.2-2008 clause 1.9), the coverage of the braid (T and S, to Annex B of this standard), measurement of the overall diameter for the mean value and for the ovality (both T and S, to GB/T 5013.2-2008 clause 1.11), and the solderability test on the bare conductor (T, to GB/T 5013.2-2008 clause 1.12); mechanical properties of the insulation, namely the tensile test before ageing (T, to GB/T 2951.11-2008 clause 9.1), the tensile test after ageing in an air oven (T, to GB/T 5013.2-2008 clause 4), the tensile test after ageing in an air bomb (T, to GB/T 2951.12-2008 clause 8.2) and the hot set test (T, to GB/T 2951.21-2008 clause 9); mechanical properties of the finished cord, namely the abrasion test (T, to GB/T 5013.2-2008 clause 3.3), the three-pulley bending test (T, clause 3.5) and the twisting test (T, clause 3.6), for both of which the test voltage of the water immersion voltage test on the insulated core is the one given in item 1.3 of the same table; the heat resistance test of the fibre braid (T, to GB/T 5013.2-2008 clause 6); and the ozone resistance test (T, to GB/T 2951.21-2008 clause 8).

B Annex B (normative) Test method for the coverage of the braid

B.1.1 Thread: a single braid unit, usually combined with other units to form the braid of a cable.

B.1.2 Carrier: a unit made up of wound thread; one carrier may contain several threads.

B.1.3 Crossing: the arrangement of all the threads on a carrier so that the braid covers the cable.

B.2.1 Number of threads: the number of threads on each braiding carrier shall be counted, and the number of threads shall be the sum of the number of threads on each carrier.

B.2.2 Number of crossings per metre: two reference points shall be marked on the cable sample along its length at a spacing of 20 mm. The number of crossing points shown in Figure B.1 shall be measured and recorded. Three samplings shall be taken and the mean value N of the three samplings, each value being converted to the number of crossings over 1 000 mm, shall be taken as the datum for the number of crossings per metre. The number of crossings per metre is calculated with formula B.1, in which P is the number of braid crossings per unit length in crossings per metre, and N is the number of braid stripes between the reference points 20 mm apart. The equation itself is printed as a formula and is not reproduced here.