

Translated English of Chinese Standard: GB12528.11-2003

Translated by: www.ChineseStandard.net

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GB

ICS 29.060.20

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**NATIONAL STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA**

GB 12528.11-2003

**Insulated cables (wires) for railway vehicles
of rated voltages up to and including 3 kV**

**Amendment 1: Cross-linked polyolefin insulated cables (wires)
for railway vehicles**

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Issued on: June 9, 2003

Implemented on: July 1, 2003

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China**

Table of Contents

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Operational performance.....	6
4 Model, name and specification of the product	6
5 Technical requirements	7
6 Test method.....	14
7 Inspection rules	15
8 Mark and packaging	16

Foreword

This Amendment is the supplement to GB 12528.1-1990 *Insulated cables (wires) for railway vehicles of rated voltages up to and including 3 kV -- Part 1: General rules*. It is used to supplement the provisions related to the cross-linked polyolefin insulated cables (wires) for railway vehicles that are not covered in GB 12528.1-1990.

This Amendment shall be under the jurisdiction of the National Electric Wire Electric Cable Standardization Committee.

The drafting organizations of this Amendment: Shanghai Nan Yang Electrical Appliance Co., Ltd., and Tianjin Jinshan Wire & Cable Co., Ltd.

The main drafters of this Amendment: Zhang Guoping, and Zheng Guojun.

**Insulated cables (wires) for railway vehicles
of rated voltages up to and including 3 kV**

**Amendment 1: Cross-linked polyolefin insulated cables (wires)
for railway vehicles**

1 Scope

This document specifies the models, specifications, technical requirements and test methods, marks and packaging of the cross-linked polyolefin insulated cables (wires) for railway vehicles of rated voltages up to and including 3 kV.

This document applies to the cables for various vehicles of rated voltages up to and including 3 kV and the electric equipment used in the power distribution system, control system and signal system of the urban railway vehicles. It is especially applicable to narrow-space and places where require low smoke, halogen-free or flame retardant.

2 Normative references

The articles contained in the following documents have become part of this standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this standard.

GB/T 2951.1 Common test methods for insulating and shielding materials of electric cables Part 1: Methods for general application Section one: Measurement of thickness and overall dimensions -- Tests for determining the mechanical properties (GB/T 2951.1-1997, idt IEC 811-1-1:1993)

GB/T 2951.2 Common test methods for insulating and shielding materials of electric cables -- Part 1: Methods for general application -- Section two: Thermal ageing methods (GB/T 2951.2-1997, idt IEC 811-1-2:1985)

GB/T 2951.4 Common test methods for insulating and shielding materials of electric cables Part 1: Methods for general application (GB/T 2951.4-1997, idt IEC 81-1-4:1985)

GB/T 2951.5 Common test methods for insulating and shielding materials of electric cables -- Part 2: Methods specific to elastomeric compounds section one -- Ozone resistance test -- Hot set test--Mineral oil immersion test (GB/T 2951.5-1997, idt IEC 811-2-1:1986)

GB/T 2951.6 Common test methods for insulating and shielding materials of electric cables Part 3: Methods specific to PVC compounds section one: Pressure test at high temperature -- Test for resistance to cracking (GB/T 2951.6-1997, idt IEC 811-3-1:1985)

GB/T 3048.4 Test methods for determining electrical properties of electric cables and wire -- Measurement of D.C. resistance of conductors

GB/T 3048.5 Test methods for determining electrical properties of electric cables and wires -- Determining insulation resistance-Comparison-galvanometer method

GB/T 3048.8 Test methods for determining electrical properties of electric cables and wires -- A.C. voltage tests

GB/T 3048.9 Test methods for determining electrical properties of electric cables and wires -- A.C. spark test of insulated cores

GB/T 3956 Conductors of insulated cables (GB/T 3956-1997, idt IEC 228:1978 IEC 288A:1982)

GB/T 4909.2 Test methods for bare wires; Measurement of dimensions

GB/T 4910 Tinned round copper wire

GB 6995.1 Markings for electric cables and wires. Part 1: General requirements

GB 6995.3 Markings for electric cables and wires. Part 3: Identifications of cables and wires

GB 12528.1 Insulated cables (wires) for railway vehicles of rated voltages up to and including 3 kV -- General

GB/T 17650 (All parts) Test on gases evolved during combustion of materials from cables (idt IEC 60754)

GB/T 17651 (All parts) Measurement of smoke density of cables burning under defined conditions. Part 1: Test apparatus (idt IEC 61034)

GB/T 18380.1 Tests on electric cables under fire conditions -- Part 1: Test on a single vertical insulated wire or cable (GB/T 18380.1-2001, idt IEC 60332-1-1993)

JB/T 8137 (All parts) Delivery drums for wires and cables

TB/T 1484.1-2001 Specification for cables on board rolling stock -- Part 1: Standard wall insulation cables up to AC 3 kV

NFF 63-808/5:1992 Railway rolling stock -- Halogen free, electrical conductors and cables with thin insulation and protective layers.

5 Technical requirements

5.1 Conductor

5.1.1 The conductor of the WDZ-DCYJ-125 Type cables shall comply with the provisions of the fifth kind of soft copper conductor, as specified in GB/T3956. The conductor of the WDZ-DCYJ/B-125 and WDZ-DCYJ/B-150 cables shall comply with the provisions of the second kind of stranded conductor, as specified in GB/T3956.

5.1.2 The tinned round copper wire which is in line with GB/ T4910 is used in the single conductor. The conductor structure is specified in Table 2.

5.1.3 The conductor surface shall be smooth and clean, free from oil stains, no burrs and sharp edges that may damage the insulation, no raised or fractured single line.

5.1.4 A layer of isolation layer made of suitable materials is allowed on the conductor surface.

5.2 Insulation

5.2.1 The insulating layer of the WDZ-DCYJ-125 Type cables is made of 125°C cross-linked polyolefin insulated materials. The insulating layer of the WDZ-DCYJ/B-125 Type cables is made of high strength 125°C cross-linked polyolefin insulated materials. The insulating layer of the WDZ-DCYJ/B-150 Type cables is made of high strength 150°C cross-linked polyolefin insulated materials. The insulation thickness shall meet the requirements in Table 2, with the mean value not less than the specified nominal value. The thickness of the thinnest point shall not be less than 90% of the nominal value - 0.1 mm.

5.2.2 Non-electrical performance of the insulation shall comply with the provisions in Table 3.

5.2.3 Insulation surface shall be round, smooth and no bump. The insulation layer of Model WDZ-DCYJ-125 Type cable is black. The insulating layer of the WDZ-DCYJ/B-125 Type and WDZ-DCYJ/B-150 Type cables, in general, shall be light brown and it is allowed to determine the color according to the Agreement between the Supplier and the Purchaser.

5.3 Finished cable

5.3.1 External diameter of cable

The cable's external diameter shall comply with the provisions in Table 2.

5.3.2 Out-of-roundness of the cable

The difference (f value) between the maximum and minimum external diameters

measured on the same cross section of the cable shall not exceed 15% of upper limit of the specified nominal external diameter.

5.3.3 Conductor DC resistance

DC resistance of the conductor at 20°C shall comply with the provisions of Table 2.

The insulation of the cable shall be remained stable even in the moist condition. And the cable shall withstand the voltage value in direct-current test specified in Table 7 without any breakdown.

Table 7

Rated voltage V of the cable	Applied voltage V
500	330
1,000, 750	1,000
1,500	1,800
3,000	3,600

5.3.16 Vertical flame test for single-cable

Under the specified condition, after stopping of fire supply, the cable shall be extinguished by itself. It can be concluded as qualified if the scorched part is less than 50mm away from the lower-edge of upper-jig.

5.3.17 Test on smoke density of the cable

Under the specified condition, the light transmission rate shall comply with the provisions of Table 3.

5.3.18 Acidity test of combustion gas

The pH value, conductivity and halogen acid content shall comply with the provisions of Table 3.

5.4 Delivery length

5.4.1 The length of looped cable shall be 100 m or integer multiples of 100 m. And the plated cable shall not be less than 100 m.

5.4.2 It is allowed to deliver short-length cable of not less than 30 m, but the quantity of such cable shall not be more than 10% of total length of delivered cable.

5.4.3 Any length delivery is allowed according to the mutual agreement.

5.4.4 The length metering shall use length-counter, and the error shall not exceed $\pm 0.5\%$.

6 Test method

The test method shall be in consistent with the provisions of Table 8.

Table 8

Serial No.	Item name	Provisions No.	Test type	Test method
1	Structure size			
1.1	Conductor structure	5.1.2	T, S	GB/T4909.2
1.2	Insulation thickness	5.2.1	T, S	GB/T2951.1

When the test result of the samples being tested is unqualified, the quantity of samples to be tested shall be doubled. If it is still unqualified, such batch shall be concluded as unqualified.

7.4 The product appearance shall be checked piece by piece with eyesight (normal eyesight).

8 Mark and packaging

8.1 Mark

8.1.1 The outside surface of the cable shall be identified with continuous-marks, such as the name of the manufacturer, its brand, type, nominal cross section and voltage etc. The marking method shall be in accordance with the requirements of GB6995.3.

8.1.2 The mark shall be clear and not easy to be wiped off. Even it is slightly wiped ten times with wet absorbent cotton, it shall still be visible.

8.2 Packaging

8.2.1 Delivery of the cable shall be in plate or loop. And it shall be looped properly and with good packaging. The cable plate shall be in accordance with the provisions of JB/T8137.

8.2.2 Each package shall be attached with labels, indicating:

- a) Name of the manufacturer;
- b) Product model;
- c) Specification, mm²;
- d) Rated voltage, V or kV;
- e) Length, m;
- f) Mass, kg;
- g) The manufacturing date - year, month;
- h) The number of this Amendment.

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