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

GB/T 29631-2025

Replacing GB/T 29631-2013

**Flexible torsion-resistant cables of rated voltages up to and
including 1.8/3 kV for wind power generation**

额定电压1.8/3 kV及以下风力发电用耐扭曲软电缆

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1 Scope

GB/T 29631-2025 is the Chinese standard for the torsion-resistant flexible cables used inside wind turbines. The cable running from the nacelle down the tower is twisted every time the nacelle yaws, and over a turbine's life that is tens of thousands of torsion cycles at temperatures from well below freezing to well above ambient; an ordinary flexible cable fails in that duty, and replacing it means shutting down the machine and hiring a crane. The standard specifies the cables of rated voltages up to and including 1.8/3 kV: the classification and designation, the conductor, insulation, screening and sheath construction and materials, the dimensional requirements, the electrical requirements, the mechanical and thermal requirements, and above all the torsion test that gives the cable its name, together with the cold bend and cold impact, the ozone and oil resistance and the flame propagation requirements, the test methods, the inspection rules and the marking, packaging and delivery. The 2025 edition replaces GB/T 29631-2013. For a cable maker, a turbine manufacturer or an operator in China, this is the acceptance text.

This document specifies the product code, marking, technical requirements, inspection rules, test methods, packaging of flexible and torsion resistant cables of rated voltages up to and including 1.8/3 kV for wind turbine for use at the connection between turbines and towers in wind power generation equipment or similar occasions. This document is applicable to flexible and torsion resistant cables of rated voltages U_0/U up to and including 1.8/3 kV for wind turbine.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in the text. Among them, for dated references, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB/T 2423.17 Environmental testing - Part

3 Terms and definitions

The terms and definitions defined in GB/T 2900.10, as well as the following terms and definitions, apply to this document.

3.1 Rated voltage The reference voltage for cable design, use, electrical performance testing.

3.2 Batch Products of the same model and specification ordered at one time.

3.3 Routine tests Tests performed by the manufacturer on all manufactured lengths of finished cables, to verify whether all cables meet the specified requirements.

3.4 Sample tests Tests performed by the manufacturer on finished cable samples or on certain parts taken from finished cables at a specified frequency, to verify whether the cables meet the specified requirements.

3.5 Type tests Tests performed on a type of cable included in this document before delivery according to general commercial principles, to prove that the cable has satisfactory performance that can meet the expected conditions of use.

4 Usage characteristics

4.1 Rated voltage The rated voltage U_0/U of the cable in this document is marked as. 450/750 V, 0.6/1 kV, 1.8/3 kV. The maximum temperature of conductor during normal operation of cable is.

4.3 Minimum bending radius The minimum bending radius of the cable is 6 times the cable diameter.

4.4 Ambient temperature The ambient temperature that the cable is suitable for is.

4.5 Insulating mixture The maximum conductor temperature of various insulating mixture cables is shown in Table 1.

4.6 Sheath mixture The maximum conductor temperature of cables with different types of sheath mixtures is shown in Table 2.

5 Code, model, specification, product representation method

5.1 Code See Table 3 for product code.

5.2 Common cable models and names See Table 4 for common cable models and names.

5.3 Common cable specifications See Table 5 for common cable specifications.

5.4 Product representation method Products are represented by model, specification and this document number. Specifications include rated voltage, number of cores, conductor nominal cross-sectional area.

6 Technical requirements

6.1 Conductor The conductor shall be the 5-th type of conductor in GB/T 3956. The conductor material shall be annealed soft copper wire; the copper single wire can be untinned or tinned. The conductor surface can be wrapped with non-hygroscopic tape for repeated overlapping or longitudinal wrapping.

6.2 Insulation

6.2.1 Material The insulation shall be one of the extruded insulation mixtures listed in Table

1. The mechanical and physical properties of the insulation shall comply with the provisions of Appendix A.

6.2.2 Thickness The nominal thickness of the insulation is shown in Table 6.

6.2.4 Spark test The insulated wire core shall be subjected to the power frequency spark test specified in Table 7, as an intermediate inspection, in accordance with the provisions of GB/T 3048.9. For single-core cables with sheath and insulation extruded at one time, spark test is not required.

6.2.6 Identification of insulated cores with more than 5 cores

6.4 Metal shielding The metal shielding is composed of soft round copper wire or tinned round copper wire. In order to improve the torsion resistance, high mechanical strength non-metallic wire can be added to the braided layer. The nominal diameter of the soft copper round wire or tinned round copper wire for braiding is shown in Table 8.

6.5 Sheath

6.6 Cable outer diameter The upper and lower limits of the average outer diameter of the finished cable are shown in Table 9.

6.7 Finished cable marking The surface of the sheath of the finished cable shall have a continuous mark of the manufacturer's name, product model and specification. The mark shall be clear, legible, resistant to abrasion. The distance between the end of a complete mark on the sheath surface and the beginning of the next mark shall not exceed 500 mm.

7.2 Structural dimension inspection

7.2.1 Conductor inspection The conductor structure shall be inspected by inspection or feasible measurement methods; the conductor structure shall comply with the provisions of GB/T 3956.

7.2.2 Measurement of insulation and sheath thickness

7.3 Conductor DC resistance measurement The finished cable or the specimen removed from the finished cable shall be stored in a laboratory maintained at an appropriate temperature for at least 12 hours before testing. If there is doubt whether the conductor temperature is consistent with the room temperature, the cable shall be stored in the laboratory for 24 hours before measurement. The conductor specimen can also be placed in a temperature-controlled liquid tank; the resistance can be measured after at least 1 hour.

7.4 Insulation resistance measurement When measuring insulation resistance, the DC test voltage shall be 80 V ~ 500 V and applied for a long enough time, to achieve a reasonably stable measurement; however, it shall not be less than 1 min and shall not exceed 5 min.

7.5 Finished cable voltage test The voltage test shall be carried out at ambient temperature using power frequency AC voltage; the voltage shall be gradually increased to the specified value.

7.6 Insulated core voltage test The insulated core of the finished cable, which has a rated voltage of 450/750 V, shall be subjected to voltage test. The specimen length is 10 m ~ 15 m. For single-core cables with sheath and insulation extruded at one time, if the sheath and insulation cannot be separated, the sheath does not need to be removed during the test.

7.7 4 h voltage test The insulated core of the finished cable with rated voltage of 0.6/1 kV and 1.8/3 kV shall be subjected to a 4h voltage test. The specimen length is 10 m ~ 15 m. For single-core cables with sheath and insulation extruded at one time, if the sheath and insulation cannot be separated, the sheath does not need to be removed during the test.

7.8 Impulse voltage test The finished cable with rated voltage of 1.8/3 kV shall be subjected to an impulse voltage test. The specimen length is 10 m ~ 15 m.