

ICS 77.140.65

CCS H49



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

GB/T 21839-2019

Replacing GB/T 21839-2008

Test methods for steel for prestressed concrete

预应力混凝土用钢材试验方法

Issued on: June 4, 2019

Implemented on: May 1, 2020

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 21839-2008 "Test methods of steel for prestressing concrete". Compared with GB/T 21839-2008, the main technical changes except for editorial changes are as follows: - MODIFY the normative references (see Chapter 2; Chapter 2 of the 2008 edition); - MODIFY and ADD some symbols (see Chapter 3; Chapter 3 of the 2008 edition); - MODIFY the general provisions of the specimen (see Chapter 4; Chapter 4 of the 2008

edition); - MODIFY the tensile test; ADD the requirements for tensile specimens; ADD the parameters A and Z to the tensile test measurement; ADD that the measurement of Agt can use manual methods according to GB/T 228.1; REFINE the measurement of elastic modulus (E) (see 5.3.2); - MODIFY the determination of the bending test results (see 6.4, 6.4 of the 2008 edition); - ADD the content of repeated bending test equipment (see 7.2) - ADD the coating adhesion test (see Chapter 9); - MODIFY the relevant technical requirements for extensometers (see Chapter 5 and Appendix C; Chapter 5 and Appendix A of the 2008 edition); - In the stress corrosion test solution, ADD the safety tips for chemical reagents (see 12.3.5); - ADD the requirements for notch length (see 15.3.2.4); - ADD the testing of the anti-corrosion grease content (see Chapter 18); - ADD the sheath thickness measurement (see Chapter 19); - ADD the coating uniformity test (see Chapter 20); - ADD the zinc layer quality test (see Chapter 21). This standard uses the redrafting method to amend and adopt ISO 15630-3:2010 "Steel for the reinforcement and prestressing of concrete - Test methods - Part

3.Prestressing steel". Compared with ISO 15630-3:2010, this standard has many adjustments in structure. Appendix A lists the comparison of clause numbers between this standard and ISO 15630-3:2010. Compared with ISO 15630-3:2010, there are technical differences between this standard. The terms of these differences have been marked by a vertical single line (|) on the outer margin of the standard. Appendix B gives a list of corresponding technical differences and their reasons. This standard also made the following editorial changes. - ADD the informative Appendix A. List of comparisons of clause numbers between this standard and ISO 15630-3:2010. - ADD the informative Appendix B. The technical differences between this standard and ISO 15630-3:2010 and their reasons. - ADD the informative Appendix C. Tensile test method of steel strand for prestressing concrete. This standard was proposed by the China Iron and Steel Association. This standard shall be under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC 183). Drafting organizations of this standard. China Metallurgical Construction Research Institute Co., Ltd., Changshu Longteng Rolling Element Manufacturing Co., Ltd., Liaoning Tongda Building Material Industry Co., Ltd., Tianjin Yinlong Prestressed Material Co., Ltd., Tianjin Metallurgical Group Zhongxing Shengda Steel Co., Ltd., Beijing Tieke Shougang Rail Technology Co., Ltd., Huludao North Metal Products Co., Ltd., Tianjin Iron and Steel Group Co., Ltd., Metallurgical Industry Information Standards Research Institute. The main drafters of this standard. Zhu Jianguo, Zhang Ying, Ren Cuiying, Zhao Hui, Xu Sheng, Li Weiwei, Xie Zhian, Lin Xiuyan, Wang Shuyi, Lu Yuheng, Xu Qian, Li Xiaoliang, Tao Ran, Wang Lingjun, Xu Li, Zhou Ning, Yan Chongjian, Wang Wenxi, Zhao Haifeng, Liu Shiwang, Wu Jianguo, Yang Guiyu, Leng Mingjian. This standard replaces the standard previously issued as follows: - GB/T 21839-2008. Test methods of steel for prestressing concrete

1 Scope

GB/T 21839 specifies the test methods for prestressing steel: the wire, strand and bar that is tensioned inside a concrete structure and that holds a bridge or a floor slab together for its whole life. Prestressing steel is the most highly stressed material in ordinary civil engineering, at around seventy per cent of its tensile strength permanently, and it fails in ways ordinary reinforcement does not, by relaxation, by stress corrosion and by fatigue at the anchorage. The standard is the document behind every certificate: the tensile test and the determination of the 0.2 per cent proof force, the maximum force and the elongation at maximum force, the isothermal stress relaxation test that gives the relaxation class, the fatigue test, the stress corrosion test, the bend and reverse bend tests, the deflected tensile test, the modulus of elasticity, and the measurement of the geometry and the mass. This is the clear-print edition. For a producer, a post-tensioning contractor or a testing laboratory, this is the reference method.

This standard specifies the test methods for the tensile, bending, repeated bending, torsion, winding and coating adhesion, isothermal relaxation, axial force fatigue, stress corrosion in thiocyanate solution, deflection tensile, chemical analysis, measurement of geometric dimensions, determination of relative rib area, determination of nominal mass deviation per meter, detection of anti-corrosion grease content, measurement of sheath thickness, coating uniformity, zinc layer quality and so on, of the steel for prestressing concrete.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 228.1 Metallic materials - Tensile testing - Part

3 Symbols and description

The symbols and descriptions given in Table 1 apply to this document.

4 General requirements for specimen

Unless otherwise specified in other agreements or product standards, specimens are generally taken from the finished product before packaging. When the sample is a packaged product (such as rolls or bundles), the interception of the specimen shall prevent the specimen from changing its properties due to plastic deformation.

5 Tensile test

The test equipment shall be checked and calibrated according to GB/T 16825.1. It shall have at least level 1 accuracy. In addition to the requirements specified in 5.3.1, when determining the elastic modulus, the stress rate shall remain unchanged within the force range.

6 Bending test

The determination of the results of the bending test shall meet the requirements of the relevant product standards. When the product standard does not specify, if there are no visible cracks in the bent part, the specimen is judged to be qualified.

7 Repeated bending test

The repeated bending test shall be carried out according to the requirements of GB/T 238.

8 Torsion test

Torsion test shall be carried out in accordance with GB/T 239.1. The torsion rate used is not more than 30 r/min. The axial tension used is 0.5% ~ 2% of the corresponding tensile load of the nominal tensile strength of the specimen.

9 Winding and coating adhesion test

The test equipment shall comply with the relevant requirements in GB/T 2976. The winding and coating adhesion test shall be carried out in accordance with the requirements of GB/T 2976.

10 Isothermal relaxation test

The isothermal stress relaxation test is to keep the specimen at a certain length ($L_0 + \Delta L_0$) at a given temperature (unless otherwise specified, usually 20 °C); starting from the initial force F_0 , measure the change of the force on the specimen (see Figure 3).