

ICS 27.040
CCS K 54



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

GB/T 28559-2025

Replacing GB/T 28559-2012

Supercritical and ultra-supercritical turbine - Blades

超临界及超超临界汽轮机 叶片

Issued on: April 25, 2025

Implemented on: November 1, 2025

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

Table of Contents

Preface	III
1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 General requirements	2
5 Turbine Blade Material Selection	3
6 CNC milling static and dynamic blade manufacturing requirements	3
7 Manufacturing requirements for welded stationary blades	5
8 Test methods and inspection rules	7
9 Marking, packaging and quality certification	7
Appendix A (Normative) Clearance between the main structural surface of the CNC milled blade and the profile of the inspection sample	8
Appendix B (Informative) Moving blade structure type	11
Appendix C (Normative) Clearance between the main structural surface of welded stationary blades and the profile of the inspection sample	12
Appendix D (Informative) Static Blade Structure Type	15
Figure 1. Welding of the partition plate and the stationary blade grid Figure	6
Table 1 CNC milling blade steam channel height deviation	4
Table 2 Profile envelope deviation	4
Table 3 (bent) twisted blade profile line position deviation to the blade root axial and tangential directions	5
Table 4 Steam channel height deviation of welded stationary blades	6
Table 5 Deviation of pitch diameter of steam passage for welded stationary blades	6
Table A.1 Clearance between the inner and outer radial surfaces of the straight blade assembly and the profile of the inspection sample	8
Table A.2 Clearance between the inner arc of the straight blade steam channel and the profile of the test sample	8
Table A.3 Clearance between the back arc of the straight blade steam channel and the profile of the test sample	8
Table A.4 Clearance between the inner arc of the (bent) twisted blade steam channel and the profile of the test sample	9
Table A.5 (bent) twisted blade inner arc root top steam channel and test sample profile clearance	9
Table A.6 (bent) Twisted Blade Steam Channel Back Arc and Test Sample Profile Clearance	10

Table A.7 (bent) twisted blade back arc root top steam channel and test sample line clearance	10
Table C.1 Clearance between the inner and outer radial surfaces of the straight blade assembly and the profile of the inspection sample	12
Table C.2 Clearance between the inner arc of the straight blade steam channel and the profile of the test sample	12
Table C.3 Clearance between the back arc of the straight blade steam channel and the profile of the test sample	12
Table C.4 (bent) twisted blade steam channel inner arc and test sample profile clearance	13
Table C.5 (bent) twisted blade inner arc root top steam channel and test sample profile clearance	13
Table C.6 (bent) twisted blade steam duct back arc and test sample profile clearance	14
Table C.7 (bent) twisted blade back arc root top steam channel and test sample line clearance	14

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document replaces GB/T 28559-2012 "Supercritical and ultra-supercritical steam turbine blades" and is consistent with GB/T 28559-2012.

In addition to structural adjustments and editorial changes, the main technical changes are as follows.

- a) Forgings were deleted from the scope (see Chapter 1 of the 2012 edition);
- b) The term and definition of "guide vane" have been deleted (see 3.4 of the 2012 edition);
- c) The definitions of "straight blades" and "twisted blades" have been changed (see 3.4, 3.5, 3.5 and 3.6 of the 2012 edition);
- d) Added the definitions of "tension bar", "throat width" and "welded stationary blade" (see 3.9 to 3.11);
- e) The requirements for aerodynamic design have been changed (see 4.1, 4.1 of the 2012 edition);
- f) Added structural design requirements (see 4.2);
- g) The strength verification content has been changed (see 4.3, 4.2 of the 2012 edition);
- h) The requirements for blade protection measures have been changed (see 4.4, 5.2 of the

2012 edition);

i) The requirements for the selection of steel materials for steam turbine blades have been changed (see Chapter 5, Chapter 5 of the 2012 edition);

j) The requirements for blade forgings have been deleted (see Chapter 6 of the 2012 edition);

k) Added requirements for CNC milling of stationary blades (see Chapter 6);

l) The requirements for CNC milling of moving blades have been changed (see Chapter 6, Chapter 8 of the 2012 edition);

m) The manufacturing requirements for welded stationary blades have been changed (see Chapter 7, Chapter 7 of the 2012 edition);

n) The test methods and inspection rules have been changed (see Chapter 8, Chapter 9 of the 2012 edition);

o) The reference documents for labeling, packaging and quality certification have been changed (see 9.1, 10.1 of the 2012 edition);

p) Changed the clearance between the inner and outer radial surfaces of the CNC milled straight blade assembly and the test sample (see A.1, A.1, 2012 edition A.2);

q) The clearance between the inner and outer radial surfaces of welded straight blades and the profile of the inspection sample has been changed (see C.1, C.1 and C.2 of the 2012 edition).

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document was proposed by the China Electrical Equipment Industry Association.

This document is under the jurisdiction of the National Technical Committee for Standardization of Steam Turbines (SAC/TC172).

This document was drafted by: Harbin Steam Turbine Works Co., Ltd., Shanghai Power Generation Equipment Complete Design Institute Co., Ltd., Dongfang Steam Turbine Co., Ltd. of Shanghai Electric Power Plant Equipment Co., Ltd. Shanghai Steam Turbine Factory, Beijing Beizhong Steam Turbine and Electric Machine Co., Ltd.

Ren Company, Wuxi Turbine Blade Co., Ltd.

The main drafters of this document are Liu Yunfeng, Yang Yu, Liu Changchun, Guo Pengfei, Li Yin, Song Jingjing, Ma Xin and Wang Jin.

The previous versions of this document and the documents it replaces are as follows.

- First published in 2012 as GB/T 28559-2012;

- This is the first revision.

1 Scope

This document specifies the general requirements, materials and manufacturing requirements for the static and dynamic blades of supercritical and ultra-supercritical steam turbines, and describes the corresponding test It specifies the testing methods and packaging and labeling requirements.

This document is applicable to the manufacture of supercritical and ultra-supercritical steam turbine static and dynamic blades. Follow the instructions.

Note 1.Supercritical steam turbine refers to a steam turbine whose steam parameters exceed the critical pressure and temperature of water (the critical temperature of water is 374.15°C and the critical pressure is 22.129MPa).

Note 2.Ultra-supercritical steam turbine refers to a turbine with steam parameters higher than the conventional supercritical parameters of 24.2MPa/566°C/566°C, and its fresh steam temperature and/or reheat steam temperature Steam turbine with a temperature greater than or equal to 580°C, and/or a new steam pressure greater than or equal to 28MPa.

2 Normative references

GB/T 2900.46

GB/T 8732

GB/T 28558

3 Terms and definitions

The terms and definitions defined in GB/T 2900.46, GB/T 28558 and the following apply to this document.

3.1 blade

A component in the flow section that is used to change steam flow parameters to achieve energy conversion.

Note. A blade generally consists of a blade root and a blade body with a specific profile.

3.2 Stationary blade

Blades on stationary parts such as partitions and cylinders.