Baoshan Iron & Steel Co., Ltd. Enterprise Standards

Q/BQB 484 - 2023

in place ofQ/BQB 484 - 2019

Cold rolled steel plate and steel strip for water turbine generator magnet pole

Cold-rolled stee l sheet and str ip for magneticpole of water-whee l e lectr ic generator use

preface

This document is drafted in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules of Standardization Documents".

This document was prepared with reference to IEC 60404-8-5:2020.

This document replaces Q/BQB 484-2019 "Cold rolled steel plate and steel strip for magnetic poles of hydroelectric generators".

The main technical changes of this document compared with Q/BQB 484-2019 are as follows:

——— Revised normative reference documents;

——— Added terms and definitions;

——— The elongation after break of B500TF179 in Table 4 is increased;

——— The expression of magnetic polarization intensity unit subscript in Table 5 is revised;

———8.3 In the tensile test method, the second rate requirement is added (originally 7.3);

——— Appendix A plate number approximate comparison table has been revised;

——— File editability modification.

Appendix A to this document is an informative appendix.

This document was proposed by the Manufacturing Management Department of Baoshan Iron and Steel Co., LTD.

This document is under the control of manufacturing management department of Baoshan Iron and Steel Co., LTD.

This document was drafted by manufacturing management department of Baoshan Iron and Steel Co., LTD.

Main drafter of this document: Yuan Min.

The release history of this document and the replaced documents is as follows:

Q/BQB 484 - 2009，Q/BQB 484 - 2014，Q/BQB 484 - 2015，Q/BQB 484 - 2018，Q/BQB 484 - 2019

Cold rolled steel plate and steel strip for water turbine generator magnet pole

1. Scope

This document specifies the classification and code, size, shape, technical requirements, inspection and test, packaging, marking and inspection documents of cold rolled steel plate and steel strip for magnetic poles of hydroelectric generators.

This document applies to the cold rolled steel plate and steel strip produced by Baoshan Iron & Steel Co., LTD. for manufacturing magnetic poles of hydroelectric generating units (hereinafter referred to as steel plate and steel strip).

2. Normative references

The contents of the following documents shall constitute the essential terms and conditions of this document by means of normative references in the text. For dated references, only the version corresponding to that date shall apply to this document; for undated references, the latest version (including all amendments) shall apply to this document.

GB T 222 Permissible deviation of chemical composition of finished steel

GB T 223 Chemical analysis methods for steel and alloys

GB/T 228.1-2021 Tension Test of Metal Materials Part 1: Room temperature test methods

GB/T 2975 Sampling position and sample preparation for mechanical properties test of steel and steel products

GB/T 3655 Method for measuring magnetic properties of electrical steel sheets (with) with Epstein square ring

GB/T 4336 Determination of multi-element content in carbon steel and medium-low alloy steel Spark discharge atomic emission spectrometry (conventional method)

GB T 8170 Rules for the rounding of values and the expression and determination of limit values

GB/T 20066 Sampling and sample preparation methods for chemical composition determination of steel and iron

GB/T 20123 Determination of total carbon and sulfur content in steel infrared absorption method (conventional method) after combustion of high frequency induction furnace

GB/T 20125 Determination of multiple elements in low alloy steel Inductively coupled plasma atomic emission spectrometry

GB/T 20126 Determination of low carbon content in non-alloy steel Part 2: Infrared absorption method after combustion in induction furnace (preheated) Q/BQB 400 Packaging, marking and inspection documents for cold rolled products

Q/BQB 401 Dimensions, shape, weight and permissible deviations of cold rolled steel plates and steel strips

3 Terms and Definitions

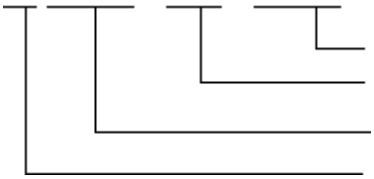
3.1 Magnetic polarization intensity (magnetic induction)

Magnetic polarization intensity refers to the peak magnetic polarization intensity of a specific magnetic field intensity when the sample is magnetized by an alternating magnetic field. Its symbol is J (H) and its unit is T (Tesla).

For example, J5000 represents the magnetic polarization strength corresponding to a magnetic field strength of H = 5000A/m (peak).

4 Classification and designations

4.1 The naming method of steel grades is as follows. B Kou Kou Kou Kou Kou Kou



When the magnetic field strength is 15000A/m, it is 100 times of the specified minimum magnetic polarization strength value. The delivery state of the material TF: cold rolled.
The minimum yield strength value specified, in MPa.
Baosteel is the first letter of the English name Baosteel.

Figure 1 Plate number naming method

Example 1: B250TF183 indicates that the minimum yield strength is 250MPa, delivered in cold rolled state, and the specified minimum magnetic polarization strength value is 1.83T when the magnetic field strength is 15000A/m.

4.2 The grade and use of steel plates and steel strips shall comply with the provisions of Table 1.

Table 1

category of the product	the name of a shop	use
Cold rolled magnetic steel plate and steel strip	B250TF183 B300TF182 B350TF181 B400TF180 B450TF179 B500TF179 B550TF179	Used for manufacturing the magnetic pole part of large hydroelectric generator set rotor

5. Information required for ordering

5.1 The user shall provide the following information when ordering:

a) Product name (steel plate or steel strip)

b) The enterprise standard number of this product;

c) the name of a shop ;

d) Order weight;

e) Specifications and dimensions;

f) Inner diameter of steel coil;

g) Edge state;

h) Oiling requirements;

i) else 。

5.2 If the edge condition, oiling requirements and packaging method are not specified in the order contract, the standard products shall be supplied with cutting edges and normal oiling, and packaged according to the packaging method provided by the supplier.

6 dimensions, shape, weight and permissible deviations

6.1 The nominal size of steel plate and steel strip shall comply with the provisions in Table 2.

Table 2

category of the product	normal thickness mm	nominal width mm	Nominal length mm	Inner diameter mm
Cold rolled magnetic steel plate and steel strip	0.7 ~ 2.3	900 ~ 1400	1000 ~ 6000	508 or 610

6.2 Dimensional allowable deviation of steel plate and steel strip

6.2.1 The transverse thickness difference of steel plate and steel strip is the difference between the maximum and minimum thickness measured in the direction of band width.

6.2.2 The allowable deviation of the thickness of steel plate and steel strip shall be ±5% of the nominal thickness; the lateral thickness difference shall not be greater than 5% of its nominal thickness.

6.2.3 For edge-cut steel plates, the unevenness should not be greater than 8mm and the sickle bend should not be greater than 3mm for any 1m measuring length.

6.2.4 Other dimensions, shapes, weights and allowable deviations of steel plates and steel strips shall comply with the provisions of Q/BQB 401.

7 Technical requirements

7.1 Chemical composition

7.1.1 The chemical composition of steel (smelting analysis) shall comply with the provisions of Table 3.

7.1.2 The allowable deviation of chemical composition of finished steel plates and steel strips shall comply with the provisions of GB/T 222.

7.2 Smelting method

The steel used in the steel plate and steel strip is the calm steel smelted in the oxygen converter.

Table 3

the name of a shop	Chemical composition (smelting analysis)% (mass fraction)					
	C	Si	Mn	P	S	Alt
B250TF183	≤0.18	≤0.30	≤1.20	≤0.025	≤0.015	≥0.015
B300TF182	≤0.18	≤0.35	≤1.60	≤0.025	≤0.015	≥0.015
B350TF181	≤0.18	≤0.40	≤1.60	≤0.025	≤0.015	≥0.015
B400TF180	≤0.18	≤0.40	≤1.60	≤0.025	≤0.015	≥0.015
B450TF179	≤0.20	≤1.00	≤1.70	≤0.050	≤0.015	≥0.015
B500TF179	≤0.20	≤1.00	≤1.70	≤0.050	≤0.015	≥0.015
B550TF179	≤0.20	≤1.00	≤1.70	≤0.050	≤0.015	≥0.015

7.3 Delivery status

7.3.1 Magnetic pole steel plates and steel strips shall be delivered in cold rolled annealed and flat condition.

7.3.2 Magnetic pole steel plates and strips are typically supplied coated with oil, which must be removable using alkaline solutions. Under standard packaging, transportation, handling, and storage conditions, the supplier shall ensure that the surfaces of these materials remain rust-free for six months from the date of manufacturing completion. Upon mutual agreement between both parties and as specified in the contract, oil-free supply may also be provided upon request. The supplier shall not be held liable for defects such as corrosion, scratches, or friction marks occurring during handling, storage, or use of non-oiled products.

Note: The issue date in the product inspection document is usually defined as the date of manufacture completion of the product.

7.4 Mechanical properties

7.4.1 The supplier warrants that the mechanical properties of steel plates and steel strips shall comply with the provisions of Table 4 for a period of 6 months from the date of completion of manufacture.

7.4.2 When the steel plate and steel strip are supplied according to the specified parts, the supply and demand parties may agree on a mechanical property range that meets the processing requirements of the parts as the acceptance benchmark. In this case, the mechanical properties specified in Table 4 will no longer be used as the basis for delivery.

Table 4

the name of a shop	Tensile tests a, b		
	yield strength MPa	tensile strength MPa	Breakback elongation% A_{80mm}
B250TF183	≥250	≥350	≥16
B300TF182	≥300	≥400	≥15
B350TF181	≥350	≥450	≥13
B400TF180	≥400	≥500	≥10
B450TF179	≥450	≥550	≥10
B500TF179	≥500	≥580	≥10

B550TF179	≥550	≥600	≥8
a If the yielding phenomenon is not obvious, Rp0.2 is used; otherwise, ReL is used. b The specimen is P6 specimen in GB/T 228.1, and the specimen direction is transverse.			

7.5 Magnetic properties

The magnetic properties of steel plates and steel strips shall comply with the provisions in Table 5.

Note: Magnetic induction intensity has been used for many years, but in fact the Epstein square and single chip tester measure magnetic polarization intensity.

The relationship between magnetic induction intensity B and magnetic polarization intensity J:

B = J +μ0 ×H (where μ0 is the permeability in vacuum, taken as 4 π × 10^-7 H/m; H is the magnetic field strength, in units of A/m)

Table 5

the name of a shop	Theoretical density kg/dm3	Magnetic polarization intensity a,T ≥	
		J5000	J15000
B250TF183	7.85	1.60	1.83
B300TF182		1.55	1.82
B350TF181		1.52	1.81
B400TF180		1.50	1.80
B450TF179		1.50	1.79
B500TF179		1.50	1.79
B550TF179		1.50	1.79
J5000 denotes the magnetic polarization intensity corresponding to a magnetic field strength of 5000 A/m (also expressed as magnetic induction intensity B50). J15000 represents the magnetic polarization intensity corresponding to a magnetic field strength of 15000 A/m (also expressed as magnetic induction intensity B150). J15000 is a reference value and not provided as a measured parameter.			

7.6 Surface quality

7.6.1 The surface of steel plates and steel strips shall be smooth and clean, free from grease, burrs and other defects such as scratches, pores and cracks. Some dispersed defects that are not harmful to the final use may be allowed to exist if they are within the permissible thickness tolerance.

7.6.2 For steel strip, as there is no opportunity to remove the defective part of the strip, it is allowed to have some abnormal parts, but the defective part shall not exceed 3% of the total length of each coil. If the customer has special requirements, it can be agreed when ordering.

8. Inspection and testing

8.1 The appearance of steel plate and steel strip shall be visually inspected.

8.2 The size and shape of steel plates and steel strips shall be checked with appropriate measuring tools.

8.3 Tensile tests shall be conducted according to Method B of GB/T 228.1-2021. To improve the reproducibility of measurement results, it is recommended to use the beam displacement rate control method. For yield strength determination, the beam displacement rate should be 0.00083×Lc (mm/s) (where Lc is the parallel length of the tensile specimen, unit: mm; same below) or 0.05×Lc (mm/min). After yield strength measurement, the beam displacement rate should be 0.0067×Lc (mm/s) or 0.4×Lc (mm/min).

8.4 Steel plates and steel strips shall be accepted by batch, each inspection batch shall consist of steel plates and steel strips of the same furnace number, the same grade, the same thickness specification and the same product form not exceeding 30 tons. For steel strips with a weight of more than 30 tons, each steel coil shall constitute an inspection batch.

8.5 The inspection items, sample quantity, sampling method, test method and sampling direction of each batch of steel plate and steel strip shall comply with the provisions in Table 6.

8.6 The supplier may use different inspection and test methods for acceptance testing. In case of dispute, the inspection and test methods and relevant technical requirements specified in this standard shall be used for testing.

Table 6

inspecting item	Number of samples	Sampling direction	specimen size	sampling method	experimental method

chemical analysis	1/ furnace	—	—	GB/T 20066	GB/T 223、GB/T 4336 GB/T 20123、GB/T 20125 GB/T 20126
Magnetic polarization intensity a, b	Group/batch 1	horizontal and vertical Half of each	Length: 280mm ~ 320 mm width: 30mm	Width of steel plate or steel strip 1/4 place	GB/T 3655
mechanical property	1 per batch	broadwise	GB/T 228.1-2021	GB/T 2975	GB T 228.1-2021 Method B
A The arbitration of magnetic polarization strength test shall adopt GB/T 3655. b The magnetic polarization strength is measured by the DC method. The sample preparation requirements are according to the grain oriented electrical steel sheet in GB/T 3655.					

8.7 If any test result fails to meet the requirements of this standard, double the quantity of samples from the same batch shall be selected for retesting of the non-conforming item. If the retest results (including all required indicators) are qualified, the entire batch shall be deemed qualified. However, if even one indicator in the retest results (including all required indicators) is non-compliant, the entire batch shall be deemed unqualified. If the retest is non-conforming, the individual samples that have undergone testing and whose results were non-compliant shall not be accepted for delivery. Nevertheless, untested samples within the same batch may be individually resubmitted for retesting and acceptance.

9 The packaging, marking and inspection documents of cold rolled steel plates and steel strips shall comply with the provisions of Q/BQB 400.

The rounding value comparison method is used for the determination of 10 values, and the rounding value shall comply with the provisions of GB/T 8170.

11. Similar comparison of plate numbers

The comparison table of similar nameplate numbers between this standard document and relevant domestic and foreign standards is shown in Appendix A.

appendix A

(Informational)

This document standard and the comparison table of similar brand numbers with relevant domestic and foreign standards

Table A.1

Q/BQB 484-2023	IEC 60404-8-5:2020	JIS C2555:2000
B250TF183	TF250-...-183	PCYC250
B300TF182	TF300-...-182	PCYC300
B350TF181	TF350-...-181	PCYC350
B400TF180	TF400-...-180	PCYC400
B450TF179	TF450-...-179	PCYC450
B500TF179	TF500-...-178	PCYC500
B550TF179	-	-