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ENTERPRISE STANDARD OF

BAOSHAN IRON & STEEL CO., LTD.

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Replacing Q/BQB 419-2021

Cold-rolled conventional high strength steel sheet and strip

冷轧普通高强钢钢板及钢带

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Cold-rolled conventional high strength steel sheet and strip

1 Scope

This document specifies the terms and definitions, classification and code, size, shape, weight, technical requirements, inspection and test, packaging, marking and inspection documents of cold-rolled conventional high-strength steel sheets and strips.

This document applies to cold-rolled conventional high-strength steel sheets and strips (hereinafter referred to as steel sheets and strips), which have a thickness of 0.40 mm ~ 3.5 mm, as produced by Baoshan Iron and Steel Co., Ltd.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, 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) is applicable to this standard.

GB/T 222 Method of sampling steel for determination of chemical composition and permissible variations for product analysis

GB/T 223 Methods for chemical analysis of iron, steel and alloy

GB/T 228.1-2021 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 2523 Measuring method of surface roughness, peak count and waviness for cold-rolled metal sheet and strip

GB/T 2975 Steel and steel products - Location and preparation of samples and test pieces for mechanical testing

GB/T 4336 Carbon and low-alloy steel - Determination of multi-element contents - Spark discharge atomic emission spectrometric method (routine method)

GB/T 5027 Metallic materials - Sheet and strip - Determination of plastic strain ratio

GB/T 5028 Metallic materials - Sheet and strip - Determination of tensile strain hardening exponent

GB/T 8170 Rules of rounding off for numerical values & expression and judgement

of limiting values

GB/T 20066 Steel and iron - Sampling and preparation of samples for the determination of chemical composition

GB/T 20123 Steel and iron - Determination of total carbon and sulfur content Infrared absorption method after combustion in induction furnace (routine method)

GB/T 20125 Low-alloy steel - Determination of multi-element contents - Inductively coupled plasma atomic emission spectrometric method

GB/T 20126 Unalloyed steel - Determination of low carbon content - Part 2: Infrared absorption method after combustion in an induction furnace (with preheating)

GB/T 24174 Steel - Determination of bake-hardening-index (BH_2)

Q/BQB 400 Package mark and inspection document for cold-rolled product

Q/BQB 401 Dimension, shape, weight and tolerances for cold-rolled steel sheet and strip

3 Terms and definitions

3.1 Rephoshorized steels (P)

In low carbon steel or ultra-low carbon steel, the strength of steel is mainly increased, by adding solid solution strengthening elements, such as phosphorus, which does not exceed 0.12%. This steel has high strength and good cold-forming properties, as well as good impact resistance and fatigue resistance; it is usually used in the production of automotive panels and structural parts.

3.2 High strength interstitial free steels (Y)

The plastic strain ratio (r value) and strain hardening exponent (n value) of the steel are improved, by controlling the chemical components in the steel. Due to the solid solution strengthening of the elements in the steel and the interstitial free microstructure, this steel combines high strength with very good cold formability; it is usually used to make complex parts, that require deep drawing.

3.3 Bake hardening steels (B)

A certain amount of solid solution carbon and nitrogen atoms are retained in the steel, meanwhile strengthening elements such as phosphorus and manganese can be added to increase the strength. After processing and forming, after baking at a certain temperature, the yield strength of the steel is further increased due to age hardening. It is typically applied to automotive exterior panels.

Note: Usually, the date of issue in the product inspection document is specified as the date of completion of the manufacture of the product.

7.4 Mechanical properties

7.4.1 The supplier guarantees that within 6 months from the date of completion of manufacture, the mechanical properties of steel sheets and strips shall comply with the corresponding provisions in Table 5, Table 6, Table 7.

7.4.2 When steel sheets and steel strips are supplied as specified parts, the supplier and the purchaser can agree on a range of mechanical properties, that meets the processing requirements of the parts, as the acceptance benchmark. At this time, the mechanical properties, which are specified in Table 5, Table 6, Table 7, will not be used as a basis for delivery.

7.4.3 Due to the influence of aging, the mechanical properties of steel sheets and steel strips will deteriorate, with the prolongation of storage time, such as the increase of yield strength and tensile strength, the decrease of elongation at break, the deterioration of formability, the appearance of tensile strain marks, etc. So, it is recommended that users use it as soon as possible.

7.5 Tensile strain marks

7.5.1 The requirements for tensile strain marks are only applicable to steel sheets and strips, which have the surface quality requirements of FC and FD, under room temperature storage conditions.

7.5.2 If the temperature of the storage place can be guaranteed to be below 50 °C, the high-strength rephoshorized steels shall be guaranteed to have no tensile strain marks, when used within 3 months from the date of completion of manufacture; the high-strength bake hardening steels shall be guaranteed to have no tensile strain marks, when used within 6 months from the date of completion of manufacture.

7.5.3 For the high-strength interstitial free steel and high-strength isotropic steel, it shall ensure that no tensile strain marks appear, during use within 6 months from the date of completion of manufacture.

7.5.4 Under some service conditions, high-strength low-alloy steel (LA) may have the risk of tensile strain marks, which can be determined through negotiation, if the user has special requirements.

Note: The single measurement length cutoff is generally selected as 0.8 mm. If it chooses 2.5 mm or other lengths, it shall be specified in the contract.

7.7.2 Surface structure suitable for environmental coating (BAOTEX^{TM})

BAOTEX^{TM} products can meet the technical requirements of advanced environmental protection coating technology. If users have needs, they can be negotiated when ordering.

7.7.3 Surface structure with high corrosion resistance (N or C)

The product can meet higher technical requirements for corrosion resistance. If the user has requirement, it can be negotiated when ordering.

8 Inspection and test

8.1 The appearance of steel sheets and strips shall be inspected with naked eyes.

8.2 The size and shape of steel sheets and strips shall be measured, by appropriate measuring tools.

8.3 The tensile test shall be in accordance with method B of GB/T 228.1-2021. In order to improve the reproducibility of the measurement results, it is recommended to adopt the beam displacement rate control method; the beam displacement rate for determining the yield strength is 0.00083 × L_c (mm/s) (L_c is the parallel length of the tensile specimen, in mm, the same as below) or 0.05 × L_c (mm/min); after the yield strength is measured, the beam displacement rate is 0.0067 × L_c (mm/s) or 0.4 × L_c (mm/min).

8.4 The r value is calculated in the range of 15% plastic strain. When the plastic elongation under maximum force A_g is less than 15%, it shall be calculated, according to the strain value at the end of A_g. The n value is calculated within the plastic strain range of 10% ~ 20%. When the plastic elongation under maximum force A_g is less than 20% but not less than 12%, the calculated strain range is from 10% to A_g. When A_g is less than 12%, the strain hardening exponent shall be reported as the true strain value ($\varepsilon_{p,\,Agt}$), which is calculated from the total elongation at maximum force (A_{gt}) ($n_{Agt} = \varepsilon_{p,Agt}$).

8.5 The steel sheets and strips shall be inspected and accepted in batches. Each inspection batch shall consist of not more than 30 tons of steel sheets and strips of the same designation, specification, processing status. For steel strips weighing more than 30 tons, each coil constitutes an inspection batch.

8.6 The inspection items, specimen quantity, sampling method, test method of each batch of steel sheets and strips shall comply with the provisions in Table 10.

8.7 The supplier may use different inspection and test methods for acceptance test. In

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