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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 20564.14-2023

Continuously cold-rolled high strength steel sheet and strip for automobiles - Part 14: Low density steel

汽车用高强度冷连轧钢板及钢带 第14部分：低密度钢

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Foreword

GB/T 20564 aims to standardize the designation expression and classification, ordering content, size, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificates of continuously cold-rolled high-strength steel sheet and strip for automobile. GB/T 20564 consists of 14 parts.

--- Part 1: Bake Hardening Steel. It aims to determine the technical requirements for continuously cold-rolled bake-hardening high-strength steel sheets and strips with a thickness of 0.50mm~3.00mm, which are mainly used to make outer panels, inner panels and some structural parts of the automobile.

--- Part 2: Dual Phase Steel. It aims to determine the technical requirements for continuously cold-rolled dual-phase high-strength steel sheets and strips with a thickness of 0.50mm~3.00mm, which are mainly used to make structural parts, reinforcements and some internal and external panels of automobile.

--- Part 3: High Strength Interstitial Free Steel. It aims to determine the technical requirements for continuously cold-rolled high-strength interstitial-free steel sheets and strips with a thickness of 0.50mm~3.00mm, which are mainly used to make outer panels, inner panels and some structural parts of the automobile.

--- Part 4: High Strength Low Alloy Steel. It aims to determine the technical requirements for continuously cold-rolled low-alloy high-strength steel sheets and strips with a thickness of no more than 3.0mm, which are mainly used to make structural parts and reinforcements of

the automobile.

--- Part 5: Isotropic Steel. It aims to determine the technical requirements for continuously cold-rolled isotropic high-strength steel sheets and strips with a thickness of no more than 2.5mm, which are mainly used to make outer panels of the automobile.

--- Part 6: Transformation Induced Plasticity Steel. It aims to determine the technical requirements for continuously cold rolled transformation induced plasticity high-strength steel sheets and strips with a thickness of 0.50mm~2.5mm, which are mainly used to make structural parts and reinforcements of the automobile.

--- Part 7: Martensitic Steel. It aims to determine the technical requirements for continuously cold-rolled martensitic high-strength steel sheets and strips with a thickness of 0.50mm~2.1mm, which are mainly used to make structural parts, reinforcements and anti-collision parts of the automobile.

--- Part 8: Complex Phase Steel. It aims to determine the technical requirements for continuously cold-rolled complex phase high-strength steel sheets and strips with a Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile - Part 14: Low Density Steel

1 Scope

China's national standard for low density steel sheet for automotive use. It is Part 14 of GB/T 20564 and specifies the terms and definitions, the classification and grade designation, the order content, the dimensions, shape and weight, the technical requirements, the test methods, the inspection rules, and the packaging, marking and quality certificate. Every other advanced high strength steel saves weight the same way: it is stronger, so the panel can be thinner. Low density steel attacks the other term in the equation. By alloying with aluminium - typically several per cent, sometimes considerably more, along with manganese and carbon - the density of the steel itself is reduced, since aluminium is about a third as dense as iron and each per cent added takes roughly one and a third per cent off the density. A steel that weighs ten per cent less than ordinary steel saves that ten per cent on every part made from it regardless of how thin the part can be made, and the saving compounds with the thickness reduction that strength allows. The aluminium also raises the specific stiffness, which matters for panels whose limit is deflection rather than strength, and it improves oxidation resistance. The price is metallurgical complexity: high aluminium changes the phase equilibria completely, forms ordered intermetallic phases such as kappa carbide that can embrittle the material, and makes casting, hot rolling and coating difficult, while galvanizing a high-aluminium steel is a problem in itself. This part gives the resulting material a national specification - the grades, the composition ranges, the mechanical requirements including density itself as a specified property, the dimensional tolerances and the surface classes. Issued on 6 August 2023 and in force since 1 March 2024.

This Document specifies the designation expression and classification, ordering content, size, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificates of continuously cold-rolled low-density high-strength steel sheets and strips for automobiles. This Document applies to continuously cold-rolled low-density high-strength steel sheets and strips (hereinafter referred to as "steel sheets and strips") with a thickness of 0.6mm~3.0mm, which are mainly used to make structural parts and reinforcement parts of the automobile.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in 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) is applicable to this Document.

GB/T 223.4 Alloyed steel - Determination of manganese content - Potentiometric or visual titration method

GB/T 223.5 Steel and iron - Determination of acid-soluble silicon and total silicon content - Reduced molybdosilicate spectrophotometric method

GB/T 223.9 Iron steel and alloy - Determination of aluminum content - Chrom azurol S photometric method

GB/T 223.40 Iron, Steel and Alloy - Determination of Niobium Content by the Sulphochlorophenol S Spectrophotometric Method

GB/T 223.59 Iron, Steel and Alloy - Determination of Phosphorus Content - Bismuth Phosphomolybdate Blue Spectrophotometric Method and Antimony Phosphomolybdate Blue Spectrophotometric Method

GB/T 223.76 Methods for chemical analysis of iron, steel and alloy The flame atomic absorption spectrometric method for the determination of vanadium content

GB/T 223.84 Steel and iron - Determination of titanium content - Diantipyrylmethane spectrophotometric method

GB/T 223.85 Steel and iron - Determination of sulfur content - Infrared absorption method after combustion in an induction furnace

GB/T 223.86 Steel and iron - Determination of total carbon content - Infrared absorption method after combustion in an induction furnace

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

GB/T 247 General rule of package mark and certification for steel plates (sheets) and strips

GB/T 708 Dimension, shape, weight and tolerance for cold-rolled steel strip and sheet

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

3 Terms and Definitions

For the purposes of this Document, the following terms and definitions apply.

3.1 Low density steel A high strength steel that, through adding different contents of lightweight elements such as Al, Mn, and Si to steel, obtains excellent mechanical properties and a density reduction amplitude of no less than 4%.

4 Designation Expression and Classification

4.1 Designation expression The designations of steel sheets and strips are composed of three parts, such as the initials "CR"

d) Specification, dimension, and unevenness accuracy;

e) Surface quality level;

f) Surface structure;

h) Packaging method;

k) Other special requirements.

5.2 If the size and unevenness accuracy, surface quality level, surface structure type, edge condition, packaging and other information are not specified in the order contract, the products in this Document shall be supplied as per the cutting-edge steel sheets and strips based on ordinary size and unevenness accuracy, higher surface, and pitting surface structure. They are packaged according to the packaging method provided by the supplier.

6 Size, Shape and Weight

The size, shape, weight and tolerance of steel sheets and strips shall comply with the provisions of GB/T 708.

7 Technical Requirements

7.1 Chemical composition See Appendix A for reference values of chemical composition (smelting analysis) of steel. If there are other special requirements for chemical composition, they shall be negotiated when ordering.

7.2 Smelting method The steel used for steel sheets and strips shall be smelted by oxygen converters or electric furnaces. Unless otherwise specified, the smelting method is chosen by the supplier.