

ICS 77.140.50

CCS H 46



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

GB/T 20564.13-2023

**Continuously cold-rolled high strength steel sheet and strip for
automobiles - Part 13: Medium manganese steel**

汽车用高强度冷连轧钢板及钢带 第13部分：中锰钢

Issued on: August 6, 2023

Implemented on: March 1, 2024

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

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Foreword

This Document was drafted as per the rules specified in GB/T 1.1-2020 Directives for Standardization - Part 1: Rules for the Structure and Drafting of Standardizing Documents. This Document is Part 13 of GB/T 20564 Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile. GB/T 20564 consists of the following parts:

- Part 1: Bake Hardening Steel;
- Part 2: Dual Phase Steel;
- Part 3: High Strength Interstitial Free Steel;
- Part 4: High Strength Low Alloy Steel;
- Part 5: Isotropic Steel;
- Part 6: Transformation Induced Plasticity Steel;
- Part 7: Martensitic Steel;
- Part 8: Complex Phase Steel;
- Part 9: Quenching and Partitioning Steel;
- Part 10: Twinning Induced Plasticity Steel;
- Part 11: Carbon Manganese Steel;
- Part 12: Dual Phase Steel with high Formability;

--- Part 13: Medium Manganese Steel;

1 Scope

China's national standard for medium manganese steel sheet for automotive use. It is Part 13 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. Medium manganese steel is the third generation of advanced high strength steel, and it exists to occupy the gap the first two generations left. The first generation - dual phase, TRIP, martensitic - is affordable and processable but tops out in the combination of strength and elongation it can offer. The second generation, TWIP, reaches a far better combination but needs some twenty per cent manganese, which makes it expensive, difficult to cast and roll, and awkward to weld. Medium manganese steel uses roughly five to twelve per cent, and gets its properties from a fine microstructure of ultrafine ferrite with a substantial fraction of retained austenite, produced by intercritical annealing of a cold-rolled martensitic structure. The retained austenite transforms to martensite progressively during forming, which sustains work hardening over a large strain range - the TRIP effect, but engineered far more aggressively. The result approaches TWIP properties at a manganese level the mills and the body shops can live with. What the standard has to pin down is the retained austenite, since the whole behaviour depends on how much there is and how stable it is, and both are set by a narrow annealing window. So the requirements cover the strength grades, the elongation and the work hardening, with composition and delivery condition specified tightly, and with attention to the delayed fracture and edge sensitivity these steels share. Issued on 6 August 2023 and in force since 1 March 2024.

This Document specifies the designation expression method and classification, ordering content, size, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificate of continuously cold-rolled medium-manganese high-strength steel sheets and strips for automobile. This Document applies to continuously cold-rolled medium-manganese high-strength steel sheets and strips (hereinafter referred to as "steel sheets and strips") with a thickness of 1.0mm~2.5mm, 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 Medium manganese steel The steel with manganese content of 3% ~ 10%; it forms a complex phase structure containing metastable austenite through reverse transformation of austenite; its strength and plasticity are improved through phase change induced plasticity or twin induced plasticity; and its strong plastic product is generally no less than 30 GPa%.

5 Order Contents

5.1 A contract or order based on this Document includes the following contents:

- a) Product name (steel sheet or strip);
- b) This Document number;
- 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.