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

GB/T 20564.1-2017

Replacing GB/T 20564.1-2007

**Continuously cold-rolled high strength steel sheet and strip for
automobiles - Part 1: Bake hardening steel**

汽车用高强度冷连轧钢板及钢带 第1部分：烘烤硬化钢

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Foreword

GB/T 20564 Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile can be divided into 11 parts.

- 1.Bake Hardening Steel;
- 2.Dual Phase Steel;
- 3.High Strength Interstitial Free Steel;
- 4.High Strength Low Alloy Steel;
- 5.Isotropic Steel;
- 6.Transformation Induced Plasticity Steel;
- 7.Martensitic Steel;
- 8.Complex Phase Steel;
- 9.Quenching and Partitioning Steel;
- 10.Twinning Induced Plasticity Steel;
- 11.Carbon Manganese Steel. This Part belongs to Part 1 of GB/T 20564. This Part was

drafted as per the rules specified in GB/T 1.1-2009. This Part replaced GB/T 20564.1-2007 Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile - Part

1. Bake Hardening Steel; compared with GB/T 20564.1-2007, this Part has the major technical changes as follows:

--- Modify the nominal thickness range (see Clause 1 of this Edition; Clause 1 of Edition 2007);

1 Scope

China's national standard for bake hardening steel sheet for car bodies. It is Part 1 of GB/T 20564 and specifies the terms and definitions, the classification and grade designation, the dimensions, shape and weight, the technical requirements, the test methods, the inspection rules, and the packaging, marking and quality certificate of cold-rolled bake hardening steel sheet and strip. Bake hardening steel solves a contradiction that is peculiar to car body panels. An outer panel has to be soft enough to be drawn into a shape without splitting or showing strain marks, and then hard enough that the finished panel resists denting from a thumb, a hailstone or a trolley. Those are opposite requirements in an ordinary steel, and the usual compromise is a thicker, heavier panel. Bake hardening steel gets both by delaying the strengthening: the steel is delivered soft, is pressed in that condition, and then gains a substantial increase in yield strength during the paint bake cycle the body already goes through, as carbon in solution diffuses to and pins the dislocations introduced by the forming. That is why it exists, and it is also why it is difficult to make and to specify. The bake hardening effect depends on a small controlled amount of carbon remaining in solution, which decays with time and temperature during storage - a coil that sits too long, or too warm, loses part of its response and can also develop stretcher strain, the visible defect that bake hardening steel is otherwise designed to avoid. So the standard sets not only the strength grades, the elongation and the deep drawing properties but the bake hardening index itself, its determination, and the ageing behaviour and the shelf conditions implied by it. Issued on 7 September 2017 and in force since 1 June 2018, it replaces GB/T 20564.1-2007.

This Part of GB/T 20564 specifies the terms and definitions, classification and grade expression method, dimension, shape, weight, technical requirements, test methods, inspection rules, package, marking and quality certificate of cold rolled bake hardening high strength steel sheet and strip. This Part is applicable to the steel sheet and strip with thickness of 0.50mm ~ 3.00mm (hereinafter referred to as "steel sheet and strip") used for manufacturing automobile external and internal plates and partial structures.

2 Normative References

The following documents are essential to the application of 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) are applicable to this document.

GB/T 223.5 Steel and Iron - Determination of Acid-Soluble Silicon and Total Silicon Content - Reduced Molybdsilicate Spectrophotometric Method

GB/T 223.9 Iron Steel and Alloy - Determination of Aluminum Content - Chrom Azurol S Photometric Method

GB/T 223.16 Methods for Chemical Analysis of Iron, Steel and Alloy - The Chromotropic Acid Photometric Method for the Determination of Titanium Content

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

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Bake hardening steel; BH A certain amount of solid-solubilized carbon and nitrogen atoms are retained in the steel; meanwhile increase the strength by adding phosphorus, manganese and other strengthening elements.

4.1 Classification

4.1.1 The classification of steel sheet and strip as per the use can refer to Table 1.

4.1.2 The classification of steel sheet and strip as per the surface quality can refer to Table 2.

4.2 Grade expression method The grade of steel sheet and strip consists of three parts like initial of "Cold Rolled" of "CR", specified minimum yield strength value, initial of "Bake Hardening" of "BH".

5 Ordering Contents

5.1 The contract or purchasing list ordering products as per this Part shall include the following contents.

5.2 If the ordering contract doesn't specify the dimension and roughness accuracy, surface quality level, surface structure type, edge state and package, etc.; then the products in this Part shall be delivered as per the ordinary dimension and roughness accuracy, relative-high surface, pitting surface structure, cutting edge state; and the packaging mode shall abide by the packaging mode provided by the supplier.

6 Dimension, Appearance, Weight

The dimension, appearance, weight and allowable tolerance of steel sheet and strip shall conform to the provisions of GB/T 708.

7 Technical Requirements

7.1 Chemical compositions The reference values for the chemical compositions (smelting analysis) of steel can refer to Appendix A. If the purchaser has the requirements for the chemical compositions; it shall be negotiated when ordering. Approximate comparison between domestic and foreign standard grades can refer to Appendix B.

7.2 Smelting method The steel used for steel sheet and strip shall be smelted by oxygen converter or electric furnace; unless otherwise specified, the smelting method shall be selected by the supplier.

7.4 Mechanical properties

7.4.1 The supplier shall guarantee that the mechanical properties (excluding the bake hardening value) of steel sheet and strip shall conform to the provisions of Table 4 within 6 months since the completion date of production.

7.5 Stretcher strain mark Under the storage conditions at room temperature, for the steel sheet and strip with surface requirements of FC and FD, the use of it shall guarantee no stretcher strain mark occur within 3 months since the completion date of production.

7.6 Surface quality

7.6.1 The surface of steel sheet and strip shall be free of defects that are harmful to use, such as scars, cracks, inclusions, etc.; steel sheet and strip shall have no delamination.

7.7 Surface structure The surface structure of steel sheet and strip shall conform to the provisions of Table

6. If the purchaser has special requirements for the roughness, it shall be negotiated when ordering.

8 Test Methods

8.1 The analysis method for the chemical compositions of steel shall be performed as per the provisions of GB/T 223.5, GB/T 223.9, GB/T 223.16, GB/T 223.40, GB/T 223.59, GB/T 223.64, GB/T 223.86, GB/T 4336, GB/T 20123, GB/T 20125, GB/T 20126 or general method; while the arbitration shall be performed as per the provisions of GB/T 223.5, GB/T 223.9, GB/T 223.16, GB/T 223.40, GB/T 223.59, GB/T 223.64, GB/T 223.86.

8.2 The inspection items and test methods of steel sheet and strip shall conform to the