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

GB/T 20564.9-2016

**Continuously cold-rolled high strength steel sheet and strip for
automobiles - Part 9: Quenching and partitioning steel**

汽车用高强度冷连轧钢板及钢带 第9部分：淬火配分钢

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Quarantine;
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Foreword

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

- Part 1. Brake 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. This Part belongs to Part 9 of GB/T 20564. This Part was drafted as per the rules specified in GB/T 1.1-2009. This Part was proposed by China Iron and Steel Association. This Part shall be under the jurisdiction of National Technical Committee for Standardization of Steel (SAC/TC 183). Drafting organizations of this Part. Angang Steel Co., Ltd., China Metallurgical Information and Standardization Institute, Shougang Corporation, and Hebei Iron & Steel Co., Ltd. Tangshan Branch. Chief drafting staffs of this Part. Wang Xu, Su Haolu, Zhang Weixu, Tang Mu, Deng Cuiqing,

Wang Keqiang, Kuang Shuang, Liu Rendong, Huang Qiuju. Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile - Part 9. Quenching and Partitioning Steel

1 Scope

China's national standard for quenching and partitioning steel sheet for automotive use. It is Part 9 of GB/T 20564 and specifies the terms and definitions, the classification and code, the order content, the dimensions, shape and weight, the technical requirements, the test methods, the inspection rules, and the packaging, marking and quality certificate.

Quenching and partitioning is a heat treatment invented to solve a specific problem, and the steel is named after it. Quench a carbon steel and you get martensite: very strong and almost without ductility, because the carbon is trapped in a distorted lattice. The conventional remedy is tempering, which precipitates the carbon as carbides and buys ductility by giving up strength. Q and P does something different. The steel is quenched only part of the way, to a temperature between the martensite start and finish, so that a controlled fraction transforms and the rest remains austenite; it is then held while the carbon partitions out of the supersaturated martensite into that untransformed austenite, enriching it enough to remain stable at room temperature. The result is a matrix of strong martensite with a substantial fraction of stable retained austenite between the laths, and the austenite then transforms progressively during forming and during a crash, giving ductility exactly when it is needed. The combination of very high strength with usable elongation is what makes the steel suitable for cold-formed structural parts that would otherwise have to be hot stamped. Because everything depends on the quench stop temperature and the partitioning time, the delivery condition and the retained austenite are what the standard has to control, alongside the strength grades, the elongation and the composition. Issued on 13 October 2016 and in force since 1 September 2017.

This Part of GB/T 20564 specifies the terms and definitions, classification and code, ordering content, dimension, shape, weight, technical requirements, test method, inspection rules, package, marking and quality certificate of cold rolled quenching and partitioning high strength steel sheet and strip (hereinafter referred to as steel sheet and strip). This Part is applicable to the steel sheet and strip with thickness of 0.8mm ~ 2.5mm for manufacturing automotive structural parts and reinforcement parts.

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 222 Permissible Tolerances for Chemical Composition of Steel Products

GB/T 223.4 Iron, Steel and Alloy - Determination of Manganese Content - Potentiometric or Visual Titration Method

GB/T 223.8 Methods for Chemical Analysis of Iron, Steel and Alloy - The Sodium Fluoride Separation - EDTA Volumetric Method for the Determination of Aluminum Content

GB/T 223.9 Iron, Steel and Alloy - Determination of Aluminium Content - Chrome Azurol S Photometric Method

GB/T 223.11 Iron, Steel and Alloy - Determination of Chromium Content - Visual Titration or Potentiometric Titration Method

GB/T 223.23 Iron, Steel and Alloy - Determination of Nickel Content - The Dimethylglyoxime Spectrophotometric Method

GB/T 223.26 Iron, Steel and Alloy - Determination of Molybdenum Content - The Thiocyanate Spectrophotometric Method

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

GB/T 223.53 Methods for Chemical Analysis of Iron, Steel and Alloy. The Flame Atomic Absorption Spectrophotometric Method for the Determination of Copper Content

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 223.60 Methods for Chemical Analysis of Iron, Steel and Alloy - The Perchloric Acid Dehydration Gravimetric Method for the Determination of Silicon Content

GB/T 223.63 Methods for Chemical Analysis of Iron, Steel and Alloy - The Sodium(Potassium)Periodate Photometric Method for the Determination of Manganese Content

GB/T 223.67 Iron, Steel and Alloy - Determination of Sulfur Content - Methylene Blue Spectrophotometric Method

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Quenching and partitioning steel. QP The microstructure of steel is martensite, retained austenite and ferrite. During the forming process, the remained austenite can perform phase-transformation into martensite; and have higher work hardening rate, uniform elongation and tensile strength. Compared with the dual phase steel with the equivalent tensile strength, it has higher elongation; compared with the phase-transformation-induced plastic steel with equivalent tensile strength, it has lower carbon equivalent.