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

GB/T 20564.10-2017

**Continuously cold-rolled high strength steel sheet and strip for
automobiles - Part 10: Twinning induced plasticity steel**

汽车用高强度冷连轧钢板及钢带 第10部分：孪晶诱导塑性钢

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Foreword

GB/T 20564 Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile can be divided into the following 11 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. This Part belongs to Part 10 of GB/T 20564. This Part was drafted as per the rules specified in GB/T 1.1-200. This Part was proposed by China Iron and Steel Industry Association. This Part shall be under the jurisdiction of National Technical Committee for Standardization of Steels (SAC/TC 183). Drafting organizations of

this Part. Shougang Corporation, China Metallurgical Information and Standardization Institute, and Angang Steel Company Limited. Chief drafting staffs of this Part. Kuang Shuang, Liu Jun, Zhang Weixu, Guo Jinyu, Tang Mu, Li Qian, Su Haolu, Shi Li, Lin Zhifeng, and Han Yun. Continuously Cold Rolled High Strength Steel Sheet and Strip for Automobile - Part 10. Twinning Induced Plasticity Steel

1 Scope

China's national standard for twinning induced plasticity steel sheet for automotive use. It is Part 10 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. TWIP steel is the extreme of the advanced high strength steels, and it works by a mechanism the others do not use. It is a high-manganese austenitic steel - typically some twenty per cent manganese - whose stacking fault energy is tuned so that when it deforms, it does so by mechanical twinning rather than by dislocation slip alone. Each twin boundary formed is a new obstacle to the dislocations that follow, so the material hardens continuously as it is strained instead of approaching a limit, and the result is a combination that no conventional steel reaches: tensile strength around a gigapascal with elongation of fifty per cent or more. That matters for the parts of a car body that must absorb energy in a crash by deforming a long way while resisting strongly - the crash boxes and the front rails - and for components too complex to press from a conventional high strength steel. The manganese content is what makes it difficult. It changes the casting, the rolling and the weldability, and the steel is susceptible to delayed fracture, a hydrogen-assisted cracking that appears hours or days after forming rather than during it. So the standard specifies the composition and the strength grades, but the elongation and the work hardening behaviour carry as much weight, and the surface and edge condition matter because delayed fracture starts from a cut edge. Issued on 7 September 2017 and in force since 1 June 2018.

This Part of GB/T 20564 specifies the terms and definitions, classification and grade expression method, ordering content, dimension, shape, weight, technical requirements, test methods, inspection rules, package, mark and quality certificate of continuously cold rolled twinning induced plasticity high strength steel sheet and strip. This Part is applicable to steel sheet and strip (hereinafter referred to as "steel sheet and strip") manufactured automotive complex structural parts, reinforcements, etc., with the thickness of 0.50mm~3.00mm.

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 223.4 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 223.59 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 223.68 Methods for Chemical Analysis of Iron, Steel and Alloy - The Potassium Iodate Titration Method after Combustion in the Pipe Furnace for the Determination of Sulfur Content

GB/T 223.71 Methods for Chemical Analysis of Iron, Steel and Alloy the Gravimetric Method after Combustion in the Pipe Furnace for the Determination of Carbon Content

GB/T 223.79 Iron and Steel - Determination of Multi-Element Contents - X-Ray Fluorescence Spectrometry

GB/T 228.1-2010 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 Plate and Strip

GB/T 2523 Measuring Method of Surface Roughness and Peak Count for Cold- Rolled Metal Sheet (Strip)

GB/T 2975 Steel and Steel Products - Location and Preparation of Test Pieces for Mechanical Testing

5 Ordering Content

5.1 The contract or ordering list that orders products as per this part include the following contents.

a) Product name (steel sheet and strip);

- b) This Part's number;
- d) Specification and dimension, roughness;
- e) Surface quality levels;
- f) Surface structure;
- h) Packaging mode;
- k) Other special requirements.

5.2 If the following information are not specified in the ordering contract, such as dimension, roughness, surface quality level, surface structure type, edge state and package, etc.; then the products in this Part shall be delivered as per the ordinal dimension, roughness accuracy, relative high surface, pitting surface structure, cutting edge state, and packaged as per the packaging mode provided by the supplier.