



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

GB/T 713.6-2023

**Steel plate, sheet and strip for pressure equipments - Part 6:
Quenched and tempered high strength steel**

承压设备用钢板和钢带 第6部分：调质高强度钢

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Foreword

This document was drafted in accordance with the rules provided in GB/T 1.1-2020 Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents. This document is Part 6 of GB/T 713, Steel plate, sheet and strip for pressure equipments. The following parts have been issued for GB/T 713: -- Part 1: General requirements; -- Part 2: Non-alloy and alloy steel with specified temperature properties; -- Part 3: Low alloy steel with specified low temperature properties; -- Part 4: Nickel-alloy steels with specified low temperature properties; -- Part 5: High manganese steel with specified low temperature properties; -- Part 6: Quenched and tempered high strength steel; -- Part 7: Stainless steel and heat resisting steel. This document replaces GB/T 19189-2011 Quenched and tempered high strength steel plates for pressure vessels. Compared with GB/T 19189-2011, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) Rename the designation according to the yield strength (see Chapter 4; Chapter 4 of GB/T 19189-2011);
- b) Add the designations 690 MPa and 800 MPa (see Table 1 and Table 2);
- c) Change the upper limits of P and S contents of each designation (see Table 1; Table 1 of GB/T 19189-2011);
- d) Add requirements for side expansion values of 690 MPa and 800 MPa grade steels (see

Table 2). Please note that some of the contents of this document may involve patents. The issuing organizations of this document are not responsible for identifying patents. This document was proposed by China Iron and Steel Industry Association. This document shall be under the jurisdiction of National Technical Committee on Iron and Steel of Standardization Administration of China (SAC/TC 183). Drafting organizations of this document: Wuhan Iron and Steel Co., Ltd., China Metallurgical Information and Standardization Institute, Xinyu Iron & Steel Co., Ltd., Steel plate, sheet and strip for pressure equipments - Part 6: Quenched and tempered high strength steel

1 Scope

GB/T 713.6-2023 is Part 6 of the Chinese series on steel plate, sheet and strip for pressure equipment, and covers quenched and tempered high strength steels. These are the grades that let a large vessel be built with a thinner wall - a reactor, a hydrogen storage sphere or a pipeline valve body - and the saving in weight is paid for in fabrication discipline, because the properties come from a heat treatment that welding heat can undo and because the toughness at low temperature has to be demonstrated rather than assumed. The standard sets the designation, the order content, the dimensions, shape and mass, the technical requirements, the test methods, the inspection rules and the packaging, marking and quality certificate provisions. It took effect on 1 March 2024.

This document specifies the designation representation, order content, size, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificate of quenched and tempered high strength steel plates for pressure equipment. This document applies to quenched and tempered high strength steel plates (hereinafter referred to as steel plates) for pressure equipment with a thickness of 10 mm ~ 80 mm.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 223.3, Methods for chemical analysis of iron, steel and alloy - The diantipyrylmethane phosphomolybdate gravimetric method for the determination of phosphorus content

GB/T 223.11, Iron, steel and alloy - Determination of chromium content - Visual titration or potentiometric titration method

GB/T 223.14, Methods for chemical analysis of iron, steel and alloy - The N-benzoyl-N-phenylhydroxylamine extraction photometric method for the determination of vanadium content

GB/T 223.17, Methods for chemical analysis of iron, steel and alloy - The

diantipyrylmethane photometric method for the determination of titanium content

GB/T 223.18, Methods for chemical analysis of iron steel and alloy - The sodium thiosulfate separation iodimetric method for the determination of copper content

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 223.60, 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, Iron, steel and alloy - Determination of manganese content - Sodium (potassium) periodate spectrophotometric method

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 223.69, Iron, steel and alloy - Determination of carbon contents - Gas- volumetric method after combustion in the pipe furnace

GB/T 223.78, Methods for chemical analysis of iron, steel and alloy - Curcumin spectrophotometric method for the determination of boron content

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 713.1 apply.

4 Designation representation

The designation of steel consists of the Chinese Pinyin initial "Q" of "Qu" representing the yield strength, the specified minimum yield strength value, the Chinese Pinyin initial "R" of "Rong" representing the pressure vessel or the Chinese Pinyin initials "DR" of "Di Rong" representing the low temperature pressure vessel, and "L" of the temperature level.

Example: Q490DRL1. Where: Q - the first letter of the Chinese pinyin of the word "Qu" for yield strength; 490 - the specified lower limit of yield strength, in megapascals (MPa); DR - the first letters of the Chinese pinyin of "Di Rong" for low temperature pressure vessel. L - temperature level, L1 for requirements of -40 °C, L2 for requirements of -50 °C; For steel that requires high input energy welding, the first letter "W" of the English word "Weld" representing the word "welding" for high input energy welding is added to the above specified designation, for example: Q490RW.