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

GB/T 221-2008

Replacing GB/T 221-2000

Notations for the designation of iron and steel products

钢铁产品牌号表示方法

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Foreword

This standard replaces GB/T 221-2000 "Notations for Designations of Iron and Steel". Compared with GB/T 221-2000, this standard has the main change as follows: --The requirements for notations for designation of products such as hot rolled plain bars, hot rolled ribbed bars, fine grain hot rolled ribbed bars, cold rolled ribbed bars, screw-thread steel bars for the prestressing of concrete, steel for coal machine, high-performance steel for building structure, low welding crack susceptibility steel and pure iron for raw material etc. (Table 3, Table 4 and

3.15 of this edition); --The requirements for notations for designations of free-cutting non-quenched and tempered steel, plastic dies steel, hot rolled silicon steel for electrician and high-magnetic-induction silicon steel for telecommunication are deleted (3.6, 3.7.3,

3.11.2 of 2000 edition); --Specifies that the capital letters shall be generally adopted while using Chinese phonetic alphabet or English letter to indicate the name, purpose, characteristic and process method of the product (

2.2 of 2000 edition,

2.2 of this edition); --The arrangement principles of each designation part are specified in "Basic Principles" (

2.4 of this edition); --Table 2 in GB/T 221-2000 is deleted, and examples of notations for designations in the same kind are summed up and uniformly listed in form of table (Table 2, Tables 5~8 of this edition) --Notations for designations of steel for pipeline and marine anchor chain steel are changed (Table 2 of 2000 edition, Table 3 of this edition); --The notation for designation of steel for bridge is changed (Table 2 of 2000 edition, Table 4 of this edition); --Notations for designations of high-carbon chromium stainless bearing steel and high-temperature bearing steel are modified (

3.8.3 of 2000 edition,

3.9.3 of this edition); --Notations for designations of stainless steel and heat-resisting steel

are modified (

3.9 of 2000 edition and

3.12 of this edition); --The notation for designation of high resistance alloys for electrical heating is modified (

3.13 of 2000 edition and

3.16 of this edition). This standard is proposed by China Iron and Steel Association. This standard is under the jurisdiction of the National Technical Committee on Iron and Steel of Standardization Administration of China. Drafting organization of this standard. China Metallurgical Information and Standardization Institute. Chief drafting staff of this standard. Dai Qiang, Ruan Yan, Liu Baoshi. The previous editions of the standard replaced by this standard are as follows: GB/T 221-1963, GB/T 221-1979, GB/T 221-2000. Notations for Designations of Iron and Steel

1 Scope

China's national rules for how the grade of an iron or steel product is written. It specifies the notation used to designate iron and steel products - the letters, the numbers and the order in which they are combined to form a grade. This is one of the most frequently cited standards in the entire Chinese system, because every steel product standard designates its grades according to it, and a reader who does not have it cannot fully decode a Chinese steel grade from first principles. The system is compositional and functional at the same time. A leading number generally carries the carbon content in hundredths of a per cent; letters carry the alloying elements, using the Chinese-derived element symbols rather than the international ones in the older forms; numbers after an element give its content where it is significant; and prefixes and suffixes carry the product class, the quality level, the deoxidation practice, the delivery condition and the intended use. So Q235 is a structural steel of 235 megapascals minimum yield, 45 is a carbon steel of 0.45 per cent carbon, and 20CrMnTi is a case-hardening steel of 0.20 per cent carbon with chromium, manganese and titanium. The standard sets out those rules systematically for every product family: structural steels, tool steels, spring steels, bearing steels, free-cutting steels, electrical steels, cast irons and the rest, together with the letters reserved for particular meanings and the conventions for showing quality grades and special requirements. Issued on 5 August 2008 and in force since 1 April 2009, it replaces GB/T 221-2000.

This standard specifies notations for designations of iron and steel. This standard is applicable to the preparation of designations for pig iron, carbon structural steels, low-alloy structure steel, quality carbon structural steel, free-cutting steel, alloy structure steel, spring steel, tool steel, bearing steel, stainless steel, heat-resisting steel, steel for welding, cold rolled electric steel, electromagnetic pure iron, pure iron for raw material, high resistance alloys for electrical heating and relevant steels for special use etc.. Notations for

designations of iron and steel which are not specified in this standard shall be prepared in accordance with principles specified in this standard. Notations for designations of powder metallurgical materials, cast iron (piece), cast steel (piece), ferroalloy, superalloys/high temperature intermetallic materials, corrosion-resisting alloy and precision alloy etc. shall respectively conform to provisions specified in the following national standards. GB/T 4309 "Classification and Designation for Powder Metallurgy Materials" GB/T 5612 "Code for Representing Cast Iron" GB/T 5613 "Code for Representing Cast Steels" GB/T 7738 "Notations for Designation of Ferroalloys" GB/T 14992 "Classification and Designation for Superalloys and High Temperature Intermetallic Materials" GB/T 15007 "Designations of Corrosion-resisting Alloy" GB/T 15018 "Designation of Precision Alloys"

2 Basic Principles

2.1 The designation of any iron or steel listed into the national/professional standards shall be prepared in accordance with the notations for designations specified in this standard.

2.2 Capitalized Chinese phonetic letters, chemical element symbols and Arabic numerals are generally used to indicate the designations of iron and steel. For the convenience of international communication and trade, capitalized English letters or international practices may be adopted as well. Symbols of common chemical elements are detailed in Table 1.

2.3 If the Chinese phonetic alphabet or English letter is used to express the product name, purpose, characteristics and process method, generally the first letter of the phonetic transcription or the English word of the product is adopted. If the first letter is the same with that of another product, the second or third letter shall be adopted; or first letters of two (or more) phonetic transcriptions or English words shall be adopted at the same time. If Chinese phonetic letters or English letters are adopted, in principle, only one letter is adopted; in general, the number of adopted letters shall not exceed 3.

2.4 The notation for each part of the product designation shall meet the corresponding provisions. Each part shall be arranged in the right sequence and the unnecessary ones may be omitted. Except for special regulations, no gap shall be reserved between letters, symbols and numerals.

2.5 The mass fraction is used to express the element content of the product designation.
Table

1	Element names	Symbols of chemical elements	Element names	Symbols of chemical elements	Element names	Symbols of chemical elements	Element names	Symbols of chemical elements
	Iron	Fe	Lithium	Li	Samarium	Sm	Aluminum	Al
	Manganese	Mn	Beryllium	Be	Actinium	Ac	Niobium	Nb
	Chromium	Cr	Magnesium	Mg	Boron	B	Tantalum	Ta
	Nickel	Ni	Calcium	Ca	Carbon	C	Lanthanum	La
	Cobalt	Co	Zirconium	Zr	Silicon	Si	Cerium	Ce
	Cuprum	Cu	Stannum	Sn	Selenium	Se	Neodymium	Nd
	Wolfram	W	Plumbum	Pb	Tellurium	Te	Nitrogen	N
	Molybdenum	Mo	Bismuth	Bi	Arsenic	As	Oxygen	O
	Vanadium	V	Caesium	Cs				

Sulfur S Hydrogen H Titanium Ti Barium Ba Phosphorus P - -

Note. The "RE" is used as the element symbol of the misch metal.

3 Notations for Designations

3.1 Pig iron The pig iron's designation is generally composed of two parts. Part 1. The capitalized Chinese phonetic letter to express the product purpose, characteristic and process method; Part 2. The Arabic numerals to express the average content (in parts per thousand) of major elements, which is the average content of silicon when it comes to pig iron for steel making, foundry iron, pig iron for spheroidal graphite cast iron and wear-resistant pig iron, the average content of carbon when it comes to for decarbonized low-phosphorous iron, and the average content of vanadium when it comes to vanadium pig iron. Example. See Table 2. Part 4 (if necessary). The deoxidation mode to express the symbol, namely, the rimmed steel, semi-killed steel and killed steel are respectively expressed as the "F" "b" "Z", but the symbol of the killed steel may be generally omitted; Part 5 (if necessary). The symbols of the product purpose, characteristic or process method, which are detailed in Table 4. Example. See Table 6.

3.3.2 Notations for designations of quality carbon spring steel and quality carbon structural steel are the same. Examples are given in Table 6. Table

4 Part

5 Designation example Quality carbon structural steel Carbon content, 0.05%~0.11% Manganese content, 0.25%~0.50% Quality steel Rimmed steel - 08F Quality carbon structural steel Carbon content, 0.47%~0.55% Manganese content, 0.50%~0.80% High-grade quality steel Killed steel - 50A Quality carbon structural steel Carbon content, 0.48%~0.56% Manganese content, 0.70%~1.00% Special-grade quality steel Killed steel - 50MnE Steel subject to end-quench hardenability requirements Carbon content, 0.42%~0.50% Manganese content, 0.50%~0.85% High-grade quality steel Killed steel "H", the symbol of steel subject to end-quench hardenability requirements 45AH Quality carbon spring steel Carbon content, 0.62%~0.70% Ma...