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Partially replacing GB/T 222-1984

Permissible Tolerances for Chemical Composition of Steel Products

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Foreword

This Standard is formulated based on the relevant parts about permissible variations for chemical composition in GB/T 222-1984 "Method of Sampling Steel for Determination of Chemical Composition and Permissible Variations for Product Analysis".

This Standard replaces the relevant parts of "permissible tolerances for chemical composition of steel products" in GB/T 222-1984; method of sampling steel for determination of chemical composition of steel will be specified in separate independent standard.

Compared the content of permissible tolerances of finished chemical composition in this Standard and in GB/T 222-1984, the main changes are as follows:

- Applicable scope of Table 1 is changed from common straight carbon steel and low alloy steel to unalloyed steel and low alloy steel; applicable scope of Table 2 is changed to alloy steel (see 6.1 in 1984 version, and 5.1 in this Standard).
- It is clarified that permissible tolerance values in Table 1 and Table 2 are applicable to steel products of which the cross-sectional area is not larger than 65000mm² (5.1 in this Standard).
- It is supplemented that analysis on finished products replace heat analysis (5.4 in this Standard).
- Permissible tolerance values of carbon and manganese elements in Table 1 and Table 2 are adjusted; and provisions on elements, such as aluminium, cobalt, nitrogen gas and calcium, are added.

This Standard was proposed by State Bureau of Metallurgical Industry.

This Standard shall be under the jurisdiction of National Technical Committee of Standardization for Steel.

Drafting organization of this Standard: China Metallurgical Information and Standardization Research Institute.

Main drafters of this Standard: Wu Qiansi, Luan Yan, Liu Baoshi and Dai Qiang.

The first edition of this Standard was issued in August 1984.

Permissible Tolerances for Chemical Composition of Steel Products

1. Scope

This Standard specifies the permissible tolerances of chemical composition of finished unalloyed steel (excluding boiling steel), low alloy steel and alloy steel products that are relative to the threshold value of melted chemical composition; and it provides the relevant terms and definitions.

2. Terms and Definitions

This following terms and definitions are applicable to this Standard.

2.1 Heat (or cast/ladle) analysis

It refers to a procedure that adopts ingot sample during molten steel casting to make test sample, and then carrying out chemical analysis. The analytic result refers to average chemical composition of molten steel of the same batch.

2.2 Product analysis

Product analysis refers to take sample from processed finished steel product (including steel feed), and then to analyze its chemical composition. Product analysis is mainly used to check chemical composition, and it is also called check analysis. Due to the fact that molten steel is distributed unevenly (segregation) during crystallization, composition value of product analysis is different from composition value of heat analysis sometimes.

2.3 Permissible tolerances for product analysis

It refers to that - although composition value of heat analysis is within the exceed composition threshold value specified in standards, however, because of segregation of steel composition, a permissible value of product analysis is possible to exceed the threshold value that is specified by the standard. The permissible value is the permissible tolerance for product analysis.

of threshold value of chemical composition as specified in the standard, or shall not exceed the result of lower limit of threshold value of chemical composition specified in the standards, subtracting lower deviation. In product analysis of the same batch, one element is only allowed to have one time deflected, and upper deviation and lower deviation shall not appear simultaneously.

Example: For high-quality carbon structure #20 steel, limit carbon content of smelting chemical composition specified in the standard is: upper limit 0.23%, lower limit 0.17%; if carbon content is 0.25% when adding steel with the same smelting number, it refers to that the value is 0.02% higher than the upper limit specified in standards; if carbon content of steel with another smelting number is 0.15%, it refers to that the value is 0.02% lower than the lower limit specified in standards; these two values of carbon content are deemed as qualified according to provisions of Table 1.

5.4 If test sample for heat analysis is not available or reliable result of smelting composition can not be obtained due to incorrect sample for heat analysis, then product analysis can replace heat analysis, however, the composition value of product analysis shall comply with provisions of smelting composition, and permissible tolerances for product analysis specified in Tables 1, 2 and 3 must NOT be adopted.

	>0.50~2.00	0.02	0.02
	>2.00~5.00	0.05	0.05
	>5.00~10.00	0.10	0.10
	>10.00~15.00	0.15	0.15
	>15.00~22.00	0.20	0.20
	>22.00~30.00	0.25	0.25
Nb + Ta	≤1.50	0.05	0.05
	>1.50~5.00	0.10	0.10
	>5.00	0.15	0.15
Ta	≤0.10	0.02	0.02
Cu	≤0.50	0.03	0.03
	>0.50~1.00	0.05	0.05
	>1.00~3.00	0.10	0.10
	>3.00~5.00	0.15	0.15
	>5.00~10.00	0.20	0.20
Al	≤0.15	0.01	0.005
	>0.15~0.50	0.05	0.05
	>0.05~2.00	0.10	0.10
	>2.00~5.00	0.20	0.20
	>5.00~10.00	0.35	0.35
N	≤0.02	0.005	0.005
	>0.02~0.19	0.01	0.01
	>0.19~0.25	0.02	0.02
	>0.25~0.35	0.03	0.03
	>0.35	0.04	0.04
W	≤1.00	0.03	0.03
	>1.00~2.00	0.05	0.05
	>2.00~5.00	0.07	0.07
	>5.00~10.00	0.10	0.10
	>10.00~20.00	0.15	0.15
V	≤0.50	0.03	0.03
	>0.50~≤1.50	0.05	0.05
	>1.50	0.07	0.07
Se	All	0.03	0.03

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