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High temperature carburizing steel for bearing

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High temperature carburizing steel for bearing

1 Scope

This Standard specifies the order content, dimensions, shape, weight, technical requirements, test methods, inspection rules, packaging, marking and quality certificates of high temperature carburizing steel for bearing.

This Standard applies to hot-rolled, forged, cold-drawn and silver-bright round steel (hereinafter referred to as steel) for the production of 300 °C ~ 400 °C temperature-resistant and impact-resistant bearing rings.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 222, Permissible tolerances for chemical composition of steel products

GB/T 223.5, Steel and iron - Determination of acid-soluble silicon and total silicon content - Reduced molybdenosilicate spectrophotometric method

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

GB/T 223.13, Methods for chemical analysis of iron, steel and alloy—The ammonium ferrous sulfate titration method for the determination of vanadium content

GB/T 223.19, Methods for chemical analysis of iron, steel and alloy - The neocuproine-chloroform extraction photometric 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 905-1994, Dimension, shape, weight and tolerance for cold-drawn round, square and hexagonal steels

GB/T 908-2019, Forged bars for dimensions, shape, weight and tolerances

GB/T 2101, General requirement of acceptance, packaging, marking and certification for section steel

GB/T 3207-2008, Bright steel

GB/T 4162-2008, Forged and rolled steel bars - Method for ultrasonic testing

GB/T 4336, Carbon and low-alloy steel - Determination of multi-element contents - Spark discharge atomic emission spectrometric method (routine method)

GB/T 6394, Determination of estimating the average grain size of metal

GB/T 10121, Steel products - Method for magnetic particle inspection of tower sample

GB/T 10561-2005, Steel - Determination of content of nonmetallic inclusions - Micrographic method using standards diagrams

GB/T 11261, Steel and iron - Determination of oxygen content - The pulse heating inert gas fusion-infra-red absorption method

GB/T 15711, Inspection of non-metallic inclusions of steel - Etching test method of tower samples

GB/T 20066, Steel and iron - Sampling and preparation of samples for the determination of chemical composition

GB/T 20123, Steel and iron - Determination of total carbon and sulfur content Infrared absorption method after combustion in an induction furnace (routine method)

GB/T 20125, Low-alloy steel - Determination of multi-element contents - Inductively coupled plasma atomic emission spectrometric method

GB/T 32548, Steel and iron - Determination of tin, antimony, cerium, lead and bismuth - Inductively coupled plasma mass spectrometric method

GB/T 36026-2018, High-strength corrosion-resistant alloy bars for oil and gas engineering

Cold-drawn round steel	Diameter ≤ 25	3	$0.4\% \times \text{length}$
	Diameter > 25	2	$0.3\% \times \text{length}$
Silver-bright round steel		2	$0.3\% \times \text{length}$
After negotiation between the supplier and the buyer and indicated in the contract, the bending of the steel can also be delivered in accordance with other regulations.			

4.2.3 Torsion

The steel shall not have significant torsion.

4.2.4 End shape

4.2.4.1 The ends of the steel shall be sawed or cut neatly; there shall be no flashes, burrs, beveling and flattening that affect the use. Steel must not be gas-cut.

4.2.4.2 If the steel needs to be chamfered, it shall be specified in the contract.

4.3 Weight

4.3.1 The steel is delivered according to actual weight.

4.3.2 When cold-drawn round steel is delivered in a plate shape, the weight of the plate shall be determined through negotiation between the supplier and the buyer and indicated in the contract.

5 Technical requirements

5.1 Designation and chemical composition

5.1.1 The steel designation and chemical composition (melting analysis) shall comply with the requirements of Table 4.

5.1.2 The chemical compositions Sn, As, Sb, Pb, Ti, Al, Ca shall be reported as actual-measured values.

5.1.3 The oxygen content of the finished steel (or billet) is reported as the actual-measured value.

5.1.4 The allowable deviation of chemical composition of the finished steel (or billet) shall meet the requirements of GB/T 222.

Table 4 -- Designation and chemical composition

Table 8 -- Allowable removal depth of harmful defects on the surface

in millimeters		
Steel processing method	Nominal diameter	Allowable removal depth of harmful defects on the surface
Pressure processing	≤80	Do not exceed half of the nominal size tolerance from the actual size
	>80	Do not exceed the nominal size tolerance from the actual size
Machining	≤80	Do not exceed half of the nominal size tolerance from the nominal size
	>80	Do not exceed the nominal size tolerance from the nominal size

5.11.3 The surface of cold drawn round steel for turning is allowed to have scratches, hard spots, and pits whose depth does not exceed 1% of the diameter from the nominal size.

5.11.4 The surface quality of silver-bright steel shall meet the requirements of GB/T 3207-2008.

6 Test method

6.1 The chemical analysis method shall be carried out in accordance with the general methods such as GB/T 4336, GB/T 20123, GB/T 32548, YB/T 4395, YB/T 4396; the arbitration shall be carried out in accordance with GB/T 223.5, GB/T 223.11, GB/T 223.13, GB/T 223.19, GB/T 223.23, GB/T 223.26, GB/T 223.40, GB/T 223.43, GB/T 223.59, GB/T 223.60, GB/T 223.63, GB/T 223.65, GB/T 223.68, GB/T 223.69, GB/T 223.77, GB/T 223.84, GB/T 223.85, GB/T 223.86, GB/T 20125.

6.2 The oxygen content is measured on the billet or steel. The oxygen content sample shall be tested after the decarburized layer is fully removed; its analysis method is performed according to GB/T 11261.

6.3 Tower sample shall be implemented according to the inspection regulations of GB/T 10121 or GB/T 15711; the arbitration shall be implemented according to GB/T 15711.

6.4 The grain size shall be implemented according to the inspection rules of GB/T 6394; the heat treatment system of the sample is: quenching temperature: $1\ 110\ ^\circ\text{C} \pm 10\ ^\circ\text{C}$, heat preservation time: preserve heat 1.5 min per millimeter, oil cooling. The polished surface shall be perpendicular to the rolling direction; magnify 100 times to observe.

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