

ICS 77.140.80
CCS J31



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

GB/T 37682-2019

Large exposed gear steel castings - Technical specification

大型开式齿轮铸钢件 技术条件

Issued on: June 4, 2019

Implemented on: June 4, 2019

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

- 1 Scope
- 2 Normative references
- 3 Ordering requirements...
- 4 Manufacturing process...
- 4.4 Defect removal and repair welding
- 5 Technical requirements
 - 5.1 Chemical composition
 - 5.4 Surface quality
 - 5.5 Shape, dimensional tolerances, mass tolerances
- 6 Inspection rules and test methods
 - 6.1 Chemical composition
- 7 Quality certification

1 Scope

China's national technical specification for large cast steel gears running exposed. It specifies the ordering requirements, the manufacturing process, the technical requirements, and the inspection rules and test methods. These are the girth gears that drive rotary kilns, ball mills and large converters - rings several metres across, cast in segments and bolted together around the vessel they turn. They are cast rather than forged because of their size and because the tooth section is not the highly stressed part; and they run exposed because nothing could enclose them. Both facts shape the specification. Casting means the tooth flanks are machined from material whose soundness must be demonstrated where the teeth will be, not merely in a test bar. Running exposed means the surface is lubricated intermittently with an adhesive compound, contaminated by whatever the process produces, and inspected by eye - so surface quality and hardness uniformity across the flank matter more than they would in a closed drive.

This Standard specifies the ordering requirements, manufacturing process, technical requirements, inspection rules and test methods, acceptance and quality certification, identification and packaging of large exposed gear steel castings. This Standard applies to the ordering, manufacture, and inspection of large gear steel castings in the form of exposed drive, which are cast using the sand mold.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 222 Permissible Tolerances for Chemical Composition of Steel Products

GB/T 223 (all parts) Methods for chemical analysis of iron, steel and alloy

GB/T 228.1 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 229 Metallic Materials - Charpy Pendulum Impact Test Method

GB/T 231.1 Metallic materials - Brinell hardness test - Part 1: Test method

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

GB/T 5678 Sampling methods of spectrochemical analysis for cast alloys

GB/T 6414 Castings - Dimensional Tolerances and Geometrical Tolerances and Machining Allowances the supplier.

4.4 Defect removal and repair welding

4.4.1 Casting defects are allowed to be repaired by repair welding. Before repair welding, the defects shall be cleaned, and confirmed by magnetic particle testing or penetrant testing whether to meet the requirements of repair welding.

4.4.2 The repair welding of casting defects shall be carried out by qualified operators in accordance with the process requirements. Before repair welding, generally, it shall carry out the welding procedure qualification.

4.4.3 After the defect is removed, if the depth exceeds 25 mm or exceeds 40% of the section thickness, it shall be regarded as a major defect. It shall record the repair welding of the major defect.

4.4.4 After the repair welding of the defect, it shall carry out the stress relief heat treatment. The repair welding zone shall be tested according to the non- destructive testing standard of the casting, to confirm the quality of the repair welding.

4.4.5 Upon agreement between the supplier and the purchaser, the defect treatment after casting finishing may be carried out with reference to Appendix A.

5.1 Chemical composition

5.1.1 The chemical composition of each cast steel designation shall comply with the requirements of Table 1.

5.1.2 Unless otherwise specified, the residual element content is not used as the basis for acceptance.

5.1.3 When required by the purchaser, the chemical composition analysis of the product may be carried out. The permissible tolerances for chemical composition of products shall meet the requirements of GB/T 222. According to the ordering requirements of the purchaser, the castings may be subjected to magnetic powder, penetrant, and ultrasonic testing. The required testing methods, testing positions, and acceptance quality levels are mutually agreed by the supplier and the purchaser.

5.4 Surface quality

5.4.1 It shall clean the casting surface. There shall be no defects such as burnt-on sand, cracks, cold shut. It shall correct the burr of the casting and remove the scale.

5.4.2 The surface roughness R_a shall be less than or equal to 50 μm . The surface to be non-destructively tested shall meet the requirements of non-destructive testing.

5.5 Shape, dimensional tolerances, mass tolerances

5.5.1 The casting shape shall meet the requirements of the ordering drawings. The dimensional tolerances of the casting shall meet the requirements of GB/T 6414. The tolerance grade is generally Grade DCTG14. The special grade is agreed by the supplier and the purchaser.

5.5.2 The rim wall thickness and joint plate wall thickness of the casting shall be uniform. The thinnest shall not be less than 5% of the wall thickness required by the drawing. The thickest shall not be greater than 10% of the wall thickness required by the drawing.

5.5.3 If a process supplement is finally retained, the mass tolerances of the casting are not used as the basis for acceptance. In special cases, the mass tolerances of the casting are agreed by the supplier and the purchaser.

6.1 Chemical composition

6.1.1 The melting chemical composition shall be sampled and inspected according to the melting heat. Samples for chemical composition analysis of products may be taken from the test lug or the position at least 6 mm below the casting surface. When a casting is cast in multiple ladle, it shall analyze each ladle. The analysis results of each ladle shall meet the composition requirements of the selected designation.

6.1.2 Chemical analysis sampling shall be in accordance with the provisions of GB/T 20066; the analysis shall be in accordance with the provisions of GB/T 223. Spectrochemical analysis sampling shall be in accordance with the

6.6.2 When the tensile test fails, 2 standby tensile samples are taken from the same heat to

be tested. If the 3 test results are in accordance with Table 2, the tensile properties of the castings of this heat are still qualified. If 1 of the samples still fails the retest, the supplier may handle as specified in 6.7.

6.6.3 When the impact test fails, 3 standby impact samples are taken from the same heat to be tested. The result is added to the previous result to recalculate the average, which shall meet the requirements of Table 2. No more than 2 of the 6 impact values is lower the specified average. No more than 1 is lower 70% of the specified average. Otherwise, it will be judged as unqualified; the supplier may handle as specified in 6.7.

6.6.4 In the hardness inspection, if there is a value below the specified minimum hardness value on any prime line or the hardness difference between the points exceeds 40 HBW, on both sides of the prime line, the test shall be doubled. If the test results meet the requirements of Table 2, the casting hardness is qualified. Otherwise, the supplier shall submit the actual distribution of the hardness value to the purchaser for evaluation. If the purchaser evaluation is not passed, it shall be handled according to 6.7.

6.7 Reheat treatment When the retest result of mechanical properties still does not meet the requirements of Table 2, the casting and the test bar may be heat treated again and then retested in accordance with

6.2 and 6.3. Without the consent of the purchaser, the number of reheat treatment shall not exceed 2 times (except tempering).

7 Quality certification

7.1 The supplier shall provide the purchaser with a quality certification. The quality certification shall include the following:

- a) Supplier name;
- b) Casting number or lot number;
- c) Casting drawing number or ordering contract number;
- d) Product executed standard number and material designation;
- e) Melting furnace number and heat treatment state, heat;
- f) Date or number of manufacture;