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Replacing JB/T 6887-1993, JB/T 6889-1993

Technical condition of cast iron for fans blower and compressors

风机用铸铁件 技术条件

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Foreword

This Standard is a revision to JB/T 6887-1993 *Technical Condition of Cast Iron for Fans Blower and Compressors*.

This Standard made modification on normative references and added relevant content. In technical content and writing format, it made necessary modification to the previous edition.

Compared with JB/T 6887-1993, the main changes in this Standard are as follows:

- merged the main content of JB/T 6887-1993 *Technical Condition of Cast Iron for Fans Blower and Compressors* into this Standard;
- re-specified that dimensional tolerances of casting and the level of machining allowance shall be in accordance with Gb/T 6414-1999, which improved quality level;
- the provisions on casting weight tolerance shall be in accordance with MT13 of GB/T 11351-1989; the only 7% weight deviation is not used;
- made higher requirements for channels of fans blower and compressors and external surface quality, so as to meet requirements of market for product quality;
- in the defect welding range, made a new division on casting classification; the one with the weight greater than 6300 kg is called as extra large piece to make casting of fans blower and compressors to meet the needs of large-scale development;
- as the new process of vibration aging matures, this Standard, for the first time, specified that it is equivalent with annealing method for eliminating internal stress;
- made further specific provisions on bearing boxes, gearbox and other casting kerosene test and casting primer coating for implementation;
- made a large deletion on welding process of original cast iron;
- Annex B is in accordance with the new machining allowance level value listed in GB/T 6414-1999 and added Annex D “Casting weight tolerance level value”.

Annex A, Annex B, Annex C, Annex D of this Standard are normative.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee on Fans Blower and Compressors of Standardization Administration of China.

The drafting organizations of this Standard: Shaanxi Blower (Group) Co., Ltd., Shenyang Blower (Group) Co., Ltd.

Main drafters of this Standard: Wang Kuiwang, Song Lili.

Versions of standard substituted by this Standard are:

- JB/T 6887-1993;
- JB/T 6889-1993.

Technical condition of cast iron for fans blower and compressors

1 Scope

This Standard specifies the technical requirements, test methods and acceptance rules of cast iron for fans blower and compressors.

This Standard is applicable to gray cast iron, ductile iron and the hammer wear-resistant ductile iron, high-silicon corrosion-resistant cast iron, cast iron and other alloyed cast irons used for turbines, blowers, compressors, expanders, Roots, Yip blowers (hereinafter referred to as casting).

2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 223.3~78, *Methods for chemical analysis of iron, steel and alloy*

GB/T 228, *Metallic materials - Tensile testing at room temperature* (GB/T 228-2002, eqv ISO 6892:1998 (E))

GB/T 229, *Metallic Charpy notched impact test* (GB/T 229-1994, eqv ISO 148:1983)

GB/T 230, *Metallic materials - Rockwell hardness test* (GB/T 230-1991, neq ISO 6508:1986)

GB/T 231.1~3, *Metallic materials - Brinell hardness test method*

GB/T 1348, *Spheroidal graphite iron castings*

GB/T 3180, *Specification for medium manganese wear-resistant spheroidal iron castings*

GB/T 6060.1, *Roughness comparison specimens - Cast surfaces* (GB/T

6060.1-1997, eqv ISO 2632-3:1979)

GB/T 6414, *Castings - System of Dimensional Tolerances and Machining Allowances* (GB/T 6414-1999, eqv ISO 8062:1994)

GB/T 7216, *Metallographic test for gray cast iron* (neq ISO 945:1975)

GB/T 8491, *Corrosion resistant high silicon iron castings*

GB/T 9437, *Heat resistant iron castings*

GB/T 9439, *Grey iron castings*

GB/T 9441, *Metallographic test for spheroidal graphite cast iron*

GB/T 11351, *Mass tolerances for castings*

GB/T 15056, *Evaluation method on cast surface roughness*

JB/T 5926, *Vibrating stress relief effect-Evaluation methods*

JB/T 6886, *Technical specification for draught fan application*

JB/T 7699, *Technical specifications for wooden model and core box for foundry*

JB/T 7945, *Methods for testing the mechanical properties of grey cast iron*

3 Technical requirements

3.1 Materials

All types of cast irons in this Standard shall use the material designations which comply with the provisions of GB/T 9439, GB/T 1348, GB/T 9437, GB/T 8491, GB/T 3180.

3.2 Production method and heat treatment

Casting should be annealed or use vibration aging method to eliminate internal stress. The production method and heat treatment of castings shall be decided by the supplier. However, it must satisfy the designation specified in this Standard and relevant technical performances. The repeated heat treatment of adjusting mechanical properties and processing properties must not exceed twice. If it uses vibration aging, it shall strictly follow the provisions of JB/T 5926. When there are special requirements for heat treatment and internal stress elimination, it shall indicate in drawing or order agreement.

3.3 Mechanical properties and chemical composition

3.5.1 General

The geometrical shape and dimensions of castings shall comply with the pattern or appearance when ordering and relevant agreement. The wood mold should be implemented according to the second grade of precision of JB/T 7699. The pattern draft not specified in the process shall comply with the provisions of Annex A.

3.5.2 Casting machining allowance

3.5.2.1 If there is no special requirements for drawing, order agreement, casting bottom and side machining allowance shall be implemented according to H grade provisions of GB/T 6414-RMA (see Annex B). The top surface machining allowance is 0.25 times of the corresponding bottom surface.

3.5.2.2 The purchaser shall specify on the drawings the surface to be pre-machined by the foundry and the machining allowance required for the final machining, in order to achieve the machining allowance required by the pre-machined state or meet requirements of re-finished casting after secondary aging. The machining allowance is 1.2 ~ 1.5 times of the grade H value of GB/T 6414-RMA.

3.5.3 Unnoted dimensional tolerance

The general dimensional tolerance not specially noted in the drawings shall be implemented according to CT12 of GB/T 6414. See Annex C for its tolerance value. General tolerance zone should be symmetrical distributed, i.e., half of the tolerance is positive and the other half is negative. For some special cases, based on agreement of the designer and the casting producer, the tolerance can be partially or wholly positive or negative.

3.5.4 Dimensional tolerance of special parts of cast iron for fans blower and compressors

3.5.4.1 The dimensional tolerance of casting wall thickness, rib thickness, web thickness and back room, diffuser blade thickness, when the basic size is less than 20 mm, shall be implemented according to CT11 of GB/T 6414; when the basic size is equal to or greater than 20 mm, it shall be implemented according to CT13 of GB/T 6414.

3.5.4.2 The thickness tolerance of facetted flanges and fluid inlet and outlet flanges in chassis, bearing body, gearbox and oil pump, shell and other castings shall be implemented according to CT13 of GB/T 6414.

3.5.4.3 Because the wrong box eccentric wheel, shaft and other rotating castings produce coaxial deviation, when ensuring sufficient processing capacity of the shaft hole and the outside of rim, the tolerance of concentricity

b) shaft holes of hub, wheel, coupling, etc.;

c) hub surface of fan, Roots blower impeller surface (except end surface);

d) the part of which the roughness of machined surface is R_a1.6 or less than R_a1.6, as well as metal and metal friction surface;

e) defects of lifting lug of chassis, speed transmission or other parts prone to accidents;

f) leakage-causing defects on thin oil storage and pressure bearing casting (the local leakage parts can be plugged with a threaded plug);

g) crack-like defects on castings under the impact load and of bearing a greater bending short, torque;

h) shrinkage defects on bearing gland casting.

3.9.2 small pores, trachoma, slag, shrinkage and shrinkage and other defects which do not require repairing on other castings other than 3.9.1, the specific provisions on defects which do not require repairing are as follows:

a) small defects not exceeding the limits specified in Table 4 do not require repairing;

b) each dense pore area shall not exceed 300 mm^2; see Table 4 for other parts and scope;

c) the depth of shrinkage defect of static casting, parts which do not store thin oil and non-pressure-bearing parts must not exceed 6 mm and half of the wall thickness; the defect area shall not exceed 15% of this shrinkage area (hot section) but the maximum does not exceed Φ 25mm;

d) for hubs, pulleys, semi-couplings and other rotating parts, after machining, on shaft hole surface, within the range of which the distance to both ends is radius length, no defects are allowed: the defect depth of other parts on shaft hole inner surface does not exceed 3 mm; the diameter does not exceed 1/5 of shaft diameter. When the circumferential distance between two defect edges is greater than the shaft diameter, its defects are allowed.

Table 4 Range of defects which require no repairing

mm

Casting type	Part	Hole name	Hole size	Hole depth	Pitch	Distance from the edge of the face	The number of hole at per 100 cm^2

training in the welding of castings and have qualification certificates. After welding, in general, it should carry out stress relief annealing. For defects appearing during machining, when welding area is small and welding stress is small, annealing can be exempted after welding;

c) for defects on machining surface, it shall use hot-welding method for cast iron. Carry out local or integral preheating of the castings before welding (450°C ~ 600°C) then gas welding or welding. After welding, immediately cover it with insulation materials (such as straw ash or charcoal). Small local defects after finishing can be cold-welded by use of nickel-iron or nickel-copper cast iron welding rod. Hole defects on non-machined surface can be cold-welded or semi-heat welded by use of nickel-free cast iron welding electrodes (pre-heated to around 400°C);

d) cracks, cold compartments on ribs of casting and parts of not storing oil, of non-pressure bearing, when defect length is not greater than 3 times wall thickness, can be welded. Drill Φ4 mm ~ Φ8 mm stop holes at its ends before welding;

e) for parts of not storing oil, of non-pressure bearing on casting, when single through-hole appears and the pore size is less than 1.5 times the wall thickness (the maximum does not exceed Φ35 mm), it can be welded;

f) for defects such as stomata, trachoma, slag, shrinkage on the casting blank, its welding size and quantity must not exceed the provisions of Table 5. The defect depth of stationary one must not exceed 2/3 of the wall thickness. The defect depth of moving one must not exceed 1/3 of the wall thickness. The distance between the two defects shall not be less than 2.5 times the maximum defect size;

g) castings are allowed to used after welding repair when defects such as stomata, trachoma, slag, shrinkage during machining of casting, do not affect using performance and processing performance and comply with the following provisions after repairing. The defect welding size and quantity must not exceed the provisions of Table 6. The defect depth of stationary one is not greater than 1/2 of the wall thickness. The defect depth of moving one is not greater than 1/4 of the wall thickness. The distance between the two defects shall not be less than 2.5 times the maximum defect size.

Table 5 The range of allowable welding for blank casting defects

Casting classification		Small	Medium	Large	Extra-large
Weight kg		≤ 400	> 400 ~ 1600	> 1600 ~ 6300	> 6300
	Defect size Φ mm	≤ 40	≤ 60	≤ 80	≤ 100

When the product standard or order agreement has no special requirements for casting's leakage test, the leakage test shall be carried out according to the provisions of 3.11.1 ~ 3.11.3.

3.11.1 The leakage test brushed with kerosene should be carried out for gearbox of thin oil storage, bearing box, fuel tank and chassis of which the working pressure is less than or equal to 0.25 MPa (gage pressure), pump, shell, flesh, before priming (preferably prior to annealing). After cleaning the inner and outer surface of the casting wall, it shall apply kerosene evenly to one side of the test surface (at least three times), so as to make the surface sufficiently infiltrated. After 30 min, observe the other side. It would be qualified if it has no oil stain. If there is no special requirements for kerosene filling test, it shall be indicated in the drawing or order agreement.

3.11.2 The hydraulic test should be carried out for water-cooled bearing runner section under pressure and various chassis of which the working pressure is greater than 0.25 MPa (gage pressure), pump housing, valve body. The test pressure is 1.5 times the maximum working pressure. There is no leakage within 30 min of pressure holding.

3.11.3 For castings used for fan housing of toxic or flammable gases, it should use an inert gas. After applying pressure to the rated pressure (1.5 times the maximum working pressure of chassis), hold the pressure for 30 min. Use bubbling liquid to examine for no gas leakage.

3.12 Primer

3.12.1 After finishing, heat treatment and examination as qualified for casting, it shall carry out the shot blasting or roller cleaning to non-machined surface according to relevant provisions in JB/T 6886, so as to achieve the cleanliness of Sa21/2 level.

3.12.2 Within 24h of shot peening treatment, the casting should be primed. Before priming, it should use the water-free compressed air or vacuum cleaner to clean the dusts on the castings.

3.12.3 If the drawing or order agreement has no special requirements, the iron red anti-rust primer should be evenly applied on the non-machined surface of casting.

4 Test methods and inspection rules

4.1 The castings shall be inspected and accepted by the technical inspection department of the supplier according to technical requirements of Clause 3. The purchaser has right to inspect the castings. If the purchaser checks the implementation on site, the supplier should provide all reasonable convenience.

4.2 The method of specimen selecting is carried out according to 3.3.3. If castings require heat-treatment, its specimen and casting shall use heat treatment of same furnace. If only the internal stress is eliminated, the specimen may not be subjected to heat treatment.

4.3 Test method for mechanical properties of castings, tensile test on gray iron castings and RT type heat resistant castings, bending test of high-silicon corrosion-resistant pieces shall be carried out according to JB/T 7945. Tensile test of ductile cast iron and heat-resistant ductile cast iron (RQT) shall be carried out according to the provisions of GB/T 228. Impact test of medium manganese nodular cast iron is carried out according to GB/T 229. Its Rockwell hardness test is accordance with GB/T 230. Brinell hardness test of other various castings shall be carried out according to the provisions of GB/T 231.1 ~ 3. When the hardness is directly determined on the casting surface, it shall remove a thickness of not less than 2 mm from the casting surface and carefully flatten. The position for determination should be selected at the working surface of which the distance to the casting edge is not less than 10 mm.

4.4 The chemical analysis of castings shall be in accordance with the provisions of GB/T 223. Sample for chemical analysis can be taken from the same batch of hot metal rod (block) or casting body. The sampling site should be at the position 6 mm below the surface layer.

4.5 Batch division

a) Castings cast from the same pack of molten iron are one batch;

b) The maximum weight per batch casting is clear shoveled 2000 kg casting in good condition. If the weight of one casting is greater than 2000 kg, it shall become a batch separately;

c) When it continuously melts a large number of molten iron of same designation, the maximum weight of each batch must not exceed the casting weight cast within 2h. If the volume of one designation of molten iron is very large, and under the fixed raw materials, melting process and stable production conditions, agreed by the supplier and the purchaser, it shall also combine several batches into one group for acceptance;

d) Once a pack of ductile cast iron is treated, it should make this pack of molten iron as a batch;

e) If the casting attached with cast test rod (block), each piece can be determined as a batch separately.

4.6 The material acceptance of castings shall be performed according to the provisions of 3.3. Each batch shall at least take a group (three pieces) of specimens. Carry out relevant mechanical properties tests and chemical

composition analysis. In the test, use one specimen to carry out the test at first. If it meets requirements, this batch of castings shall be qualified in material. If test results cannot meet the requirements, two specimens shall be allowed to extracted from same batch of specimens for re-inspection. If all meet requirements, this batch of castings shall be regarded as qualified in material.

4.7 Visually inspect the surface, appearance of casting piece by piece. For the first piece and the important castings, it shall carry out the size and geometry inspection piece by piece according to 3.5. General castings and castings which are produced by the method ensuring the dimensional stability can be selectively examined. The roughness of casting surface shall be inspected according to GB/T 15056. If it fails to meet requirements, grinding and reworking is permitted.

4.8 Inspection of welding quality

a) It should inspection the preparation of welding defects one by one according to the requirements of 3.10.2.1 b) and 3.10.2.1 d);

b) The welding method and welding rod used shall be in accordance with relevant provisions of 3.10.2.1 c);

c) After defect welding, it shall inspect the quality of each welding area one by one, in accordance with requirements of 3.10.2.3. Use hammer or Shore hardness tester to inspect the hardness;

d) The number, size and area of the welding defects shall not exceed the provisions of this Standard;

e) It shall use effective method to inspect defects like cracks on the castings.

4.9 For castings which require leakage test according to drawing, technical document or order agreement, it shall carry out the test one by one according to requirements of 3.11. If the specimen test is unqualified, re-working is allowed. Re-carry out the leakage test after re-working.

5 Mark and certificate

5.1 Qualified castings after inspection should have mark of the production technology inspection department. The mark can be printed or painted (in general, it should use white paint to mark the qualified product).

5.2 When castings are delivered or leave factory, it should have product certificate complying with this Standard, including:

a) the supplier’s name;

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