

ICS 27.020

CCS J 92



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

GB/T 1148-2010

**Internal combustion engines - Aluminium pistons -
Specifications**

(English Translation)

Issued on: November 10, 2010

Implemented on: March 1, 2011

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine**

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1 Scope

This Standard specifies the internal combustion engine casting aluminium piston's each part's name, technical requirements, test methods, inspection rules, mark, package, transport and storage.

This Standard is applicable to reciprocating-piston internal combustion engine casting aluminium piston of which the cylinder diameter is not greater than 200 mm (hereinafter referred to as piston).

2 Normative references

The following referenced documents are indispensable for the application of this Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. 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 228 Metallic materials - Tensile testing at ambient temperature (GB/T 228-2002, eqv ISO 6892:1998)

GB/T 893.1 Circlips for holes - Type A

GB/T 893.2 Circlips for holes - Type B

GB/T 1149.1 Internal combustion engines - Piston rings - Part 1: General specifications (GB/T 1149.1-2008, ISO 6621-4:2003)

GB/T 1800.1-2009 Geometrical product specifications (GPS) - Limits and fits

- Part 1: Bases of tolerances deviations and fits (ISO 286-1:1988,MOD)

GB/T 1958-2004 Geometrical product Specifications (GPS) - Geometrical tolerance - Verification prescription

GB/T 2828.1 Sampling procedures for inspection by attribute - Part 1:

Sampling schemes indexed by acceptance mass limit (AQL) for lot-by-lot inspection (GB/T 2828.1-2003, ISO 2859-1:1999, IDT)

17f Lower side face angle of keystone ring-groove 33 Wear-resistant ring carrier

18 Combustion chamber 34 Serrated top lands

18a Inner diameter of combustion chamber 35 Oil accumulation groove

18b

Outer diameter (also known as throat) of combustion chamber

36 Scrape oil groove

18c Depth of combustion chamber 37 Steel control strut

25 Circlip-groove 44 Longitudinal slot hole

25a Circlip grooves distance 45 Located pin

25b Bottom diameter of circlip groove 46 Notch for circlip

25c Width of circlip-groove 47 Skirt scavenging gas zone

28 Outlet of cooling gallery 50 Center hole

4.5.3 The diameter tolerance of pin-bore shall comply with the following provisions:

- a) When diameter of pin-bore is greater than 18 mm, its diameter tolerance shall comply with IT5 specified by GB/T 1800.1; when diameter of pin-bore is not greater than 18 mm, its diameter tolerance shall be IT6.
- b) The diameter of piston pin-bore shall be divided into groups according to the minimum size. The groups shall be represented by 1, 2, 3, ... and ordered from the minimum size to the maximum one. The pin-bore of which the diameter tolerance is less than 0.01 mm shall not be divided into groups.

4.5.4 Compression height tolerance: gasoline machining piston on crown-

surface is 0.2 mm; diesel machining piston is 0.1 mm; non-gasoline machining piston on crown-surface is 0.4 mm.

4.5.5 Tolerance of ring-groove width: the width tolerance of parallel ring-groove is 0.03 mm; the width tolerance of keystone ring-groove is 0.02 mm.

4.6.1 Perpendicularity OF each tessellation line on both upper and lower sides of ring-groove TO skirt axis is 25: 0.07.

4.6.2 The end surface round run-out OF each tessellation line on both upper and lower sides of ring-groove TO skirt axis is 0.05 mm.

4.6.3 The flatness of lower side of ring-groove shall comply with provisions of Table 4.

Table 4 Unit: mm

Piston diameter Flatness

≤ 150 0. 015

> 150 0. 025

4.6.4 Axiality OF head's outer circle and outer circle of ring-land TO skirt axis is $\Phi 0.06$ mm.

4.6.5 Radial round run-out OF root circle of ring-groove TO skirt axis is 0.20 mm.

4.6.6 Axiality OF inner surface axis of skirt TO skirt axis shall comply with provisions of Table 5.

Table 5 Unit: mm

Wall thickness Axiality

≤ 3 Φ 0.4

$> 3 \sim 5$ Φ 0.5

> 5 Φ 0.7

4.6.7 Position of pin-bore axis to skirt axis and perpendicular to skirt axis is 0.20 mm.

4.6.8 Perpendicularity of pin-bore axis to skirt axis is 100: 0.035.

4.6.9 Cylindricity of pin-bore shall comply with provisions of Table 6.

Table 6 Unit: mm

Pin-bore diameter Cylindricity

≤ 18 0.0035 0.005 a

>18 0.0050 0.008 a a

In case of intermittent cutting in processing on the circumferential surface of the pin-bore due to decompression chamber and oil hole, it shall adopt this value.

4.6.10 Straightness of pin-bore axis is $\Phi 0.006\text{-M}$ mm.

4.6.11 Round run-out of root circle of circlip-groove to pin-bore axis is 0.30 mm.

4.6.12 When skirt is oval, the longitudinal axis of oval shall be perpendicular to the pin-bore axis. Its maximum offset shall comply with provisions of Table 7.

Table 7

Piston diameter / mm Offset

≤ 150 $\leq 5^\circ$

> 150 $\leq 3^\circ$

4.7 Roughness parameters of machining surface

4.7.1

Outer circle surface

Ra is $1\text{ }\mu\text{m}\sim 5\text{ }\mu\text{m}$.

4.7.2

Pin-bore surface

Ra shall not be greater than $0.63\text{ }\mu\text{m}$.

4.7.3

Upper and lower sides of ring-groove

Ra shall not be greater than 0.63

μm ; upper and lower sides of wear-resistant ring carrier shall not be greater than $1.25\text{ }\mu\text{m}$.

4.7.4

Root circle surface of ring-groove

Ra shall not be greater than $0.63\text{ }\mu\text{m}$.

4.7.5

Other machining surface

Follow the provisions of product drawings.

4.8 Appearance quality