

**AUTOMOTIVE INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

QC/T 272-2025

**Technical specifications of aluminum alloy castings for
automobiles
(English Translation)**

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1 Scope

This document specifies the classification, technical requirements, inspection methods, inspection criteria, marks, and packaging of aluminum alloy castings for automobiles.

This document applies to sand-cast and metal-cast aluminum alloy castings for automotive applications (excluding high-pressure castings).

2 Normative references

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

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

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

GB/T 1173, Casting aluminum alloy

GB/T 3075, Metallic materials -- Fatigue testing -- Axial force-controlled method

GB/T 6414, Castings -- Dimensional tolerances and geometrical tolerances and machining allowances

GB/T 7999, Optical Emission Spectrometric Analysis Method of Aluminum and Aluminum Alloys

GB/T 11351, Mass tolerances of casting

GB/T 13298, Inspection Methods of Microstructure for Metals

GB/T 15056, Casting surface roughness -- Appraising method

GB/T 20975 (all parts), Methods for chemical analysis of aluminium and aluminium alloys

GB/T 25745, Heat treatment of cast aluminium alloys

GB/T 36589, Casting -- Industrial computed tomography (CT) testing

JB/T 7946.1, Metallograph of cast aluminium alloys -- Part 1.Cast aluminium- silicon alloys modification

JB/T 7946.2, Metallograph of cast aluminium alloys -- Part 2.Cast aluminium- silicon alloys burning

JB/T 7946.3, Metallograph of cast aluminium alloys -- Part 3.Cast aluminium alloys pinhole

HB/Z 61, Penetration testing

ASTM E155, Standard reference radiographs for inspection of aluminum and magnesium castings

ASTM E2422, Standard digital reference images for inspection of aluminum castings

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 1800.1 apply.

3.1

high stress zone

The area in the CAE stress analysis cloud map of the casting where the value is greater than or equal to 60% of the minimum yield strength of the material.

3.2

functional zone

The area that castings require sealing and assembly, such as threaded holes and bearing mounting surfaces.

3.3

non-critical zone

Areas on the casting other than high stress zones and functional zones.

3.4

separately cast test sample

Standard casting samples that are obtained by using the same furnace of molten aluminum as the production castings, and by employing the same casting method and heat treatment process as the production castings.

3.5

cast-on test sample

A sample cut and processed from a test block attached to a casting or gating system.

3.6

test sample from casting

A sample cut directly from the casting body and machined.

3.7

porosity

The percentage of the total area of pores within the reference envelope shape to the area of the selected reference surface.

3.8

maximum pore size

The maximum circumscribed circle diameter of a single hole.

4.1 Heat treatment state codes

To achieve the desired properties, castings undergo heat treatment in the as-cast state or using different heat treatment methods. The heat treatment state codes are as follows.

F - As-cast state;

O - Annealed state;

T4 - Solution treatment plus natural aging;

T5 - Controlled cooling plus artificial aging;

T6 - Solution treatment plus fully artificial aging;

T64 - Solution treatment plus insufficient aging;

T7 - Solution treatment plus stabilization treatment.

4.2 Alloy casting methods and modification treatment codes

Different castings may employ different casting processes or undergo modification treatments. The codes for these casting processes and modification treatments are shown below.

S - Sand casting;

J - Metal mold casting;

LP - Low-pressure casting;

CP - Differential pressure casting;

B - Modification treatment.

5 Casting classification

Aluminum alloy castings are classified into the following three categories according to the load they bear and the working conditions. They shall meet the requirements of

Table 1.

6.1 Casting method and heat treatment condition

6.1.1

The casting method and heat treatment condition of the casting shall be agreed upon by the supplier and the purchaser.

6.1.2

The heat treatment process for castings shall be carried out in accordance with

GB/T 25745 or the process specifications agreed upon by both the supplier and the purchaser.

6.1.3 The heat treatment state code, alloy casting method, and modification treatment

code shall be marked on the drawings or technical agreements in accordance with 4.1 and 4.2.

6.2 Chemical composition

The chemical composition and permissible impurities of cast aluminum alloys shall conform to GB/T 1173 or the relevant material standards and technical agreements agreed upon by both the supplier and the purchaser. Annex A lists a comparison table of commonly used domestic and international codes and designations of major cast aluminum and silicon alloys.

6.3.1 When using separately cast test samples for testing, their mechanical properties

shall be in accordance with Annex B or the relevant material standards and technical