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**Technical specifications of aluminum-alloy die casting for
automobiles
(English Translation)**

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1 Scope

This document specifies the technical requirements, inspection methods, inspection rules, marks, and packaging of aluminum alloy die castings.

This document applies to aluminum alloy die castings for automotive applications.

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 6060.3, Butadiene for industrial use -- Determination of trace water --Coulometric Karl
Fischer 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 13822, Test samples for nonferrous diecasting alloys GB/T 15056, Casting surface roughness -- Appraising method GB/T 15114, Aluminum alloy die castings GB/T 20975 (all parts), Methods for chemical analysis of aluminium and aluminium alloys GB/T 36589, Casting -- Industrial computed tomography (CT) testing JB/T 7946.2, Metallograph of cast aluminium alloys -- Part 2: Cast aluminium-silicon alloys burning HB/Z 61, Penetration testing ISO 3522, Aluminium and aluminium alloys - Castings -- Chemical composition and mechanical properties JIS H5302, Aluminium alloy die castings ASTM B85/B85M, Standard specification for aluminium-alloy die castings ASTM E505, Standard reference radiographs for inspection of aluminum and magnesium die castings EN 1706, Aluminium and aluminium alloys -- Castings -- Chemical composition and mechanical properties

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.

NOTE: 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 Test sample from casting

A sample cut directly from the casting body and machined.

3.6 Porosity

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

3.7 Maximum pore size

The maximum circumscribed circle diameter of a single hole.

4 Heat treatment state codes

Typically, die-cast parts are supplied in the as-cast state. However, some vacuum die-cast parts require heat treatment to achieve specific mechanical properties. The heat treatment condition designations 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.

5 Die casting classification

Aluminum alloy die castings are classified into the following three categories according to the load they bear and working conditions, and shall meet the requirements of Table 1.

6.1 Die casting method and heat treatment state

6.1.1

The die casting method (high pressure casting, vacuum high pressure casting) and heat treatment condition of the casting shall be agreed upon by the supplier and the purchaser.

6.1.2 Die castings are typically supplied in the as-cast state. For die castings that require

heat treatment to meet special application requirements, the heat treatment process shall be agreed upon by the supplier and the purchaser.

6.1.3 Mark the heat treatment state code on the drawings or technical agreement as per Chapter 4.

6.2 Chemical composition

The chemical composition of die-cast aluminum alloys shall conform to GB/T 15114 or the relevant material standards and technical agreements agreed upon by both the supplier

and the purchaser. Annex A lists the composition requirements for commonly used die-cast aluminum alloys in the automotive industry.

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

shall conform to GB/T 15114 or other standards and technical agreements agreed upon by the supplier and the purchaser. Annex B contains the mechanical property values of commonly used die-cast aluminum alloys in the automotive industry.

6.3.2 When testing with test samples from casting, their mechanical properties shall

meet the requirements of the drawings or technical agreements agreed upon by both the supplier and the purchaser.

6.3.3 Perform hardness testing on designated areas of the die casting. The hardness

value shall conform to the standards, drawings, or technical agreements adopted by both the supplier and the purchaser.

6.3.4 For Class III die castings, mechanical properties may not be used as an acceptance criterion. Whether mechanical properties are used as an acceptance criterion for other types of die castings shall be agreed upon by the supplier and the purchaser based on the usage requirements of the die castings.

6.4.1 Whether the microstructure of the die-cast parts shall be used as an acceptance

criterion shall be agreed upon by the supplier and the purchaser.

6.8.1 The airtightness requirements of die castings shall comply with the provisions of the drawings or technical agreements agreed upon by both the supplier and the purchaser.

6.8.2 Subject to the consent of the purchaser, the supplier may perform one

impregnation or leakage repair treatment on the die casting without affecting its use.

6.9 Repair and correction of die-cast parts

6.9.1

Surface defects in die-cast parts may be removed by grinding. However, the dimensions after grinding must meet the dimensional tolerances of the die-cast parts.

Furthermore, the roughness of the ground area must conform to the specifications agreed