

KES

Aluminium Alloy Castings

KES B-F006

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1. Scope of Application

This standard specifies the aluminium alloy castings which are manufactured with the die casting, the sand moulding, the shell moulding (Hereinafter referred to as "casting").

2. Kind and Symbol

The casting shall be classified as shown in Table 1 according to its chemical elements and manufacturing method.

Table 1. Kind and Symbol

Kind	Symbol	Alloy series	Division of moulding	Reference		
				Pertinent alloy name	Chracteristics	Example of usage
Aluminium alloy casting Kind 1, A	AC 1A	Al-Cu series	Die casting Sand moulding Sell moulding	AA 295.0	Excellent mechanical properties and good cuttability, but poor castability	Parts for domestic wire use, bicycle parts, for aircraft use, oil pressure parts, electric parts
Aluminium alloy casting Kind 1, B	AC 1B	Al-Cu series	Die casting Sand moulding Sell moulding	NF AU5GT	Requires attention to solution casting by shape of casting because of excellent mechanical properties and good cuttability but poor castability	Parts for domestic wire use, heavy electric parts, bicycle parts, aircraft parts.
Aluminium alloy casting Kind 2, A	AC 2A	Al-Cu-Si series	Die casting Sand moulding Sell moulding		Good castability and tensile strength, but poor elongation generally good quality	Manifold, pump body, cylinder head, and housings for power train system of automobile
Aluminium alloy casting Kind 2, B	AC 2B	Al-Cu-Si series	Die casting Sand moulding Sell moulding	AA 319.0	Good castability, generally used.	Valve body, crank case clutch housing
Aluminium alloy casting Kind 3, A	AC 3A	Al-Si series	Die casting Sand moulding Sell moulding		Good fluidity and corrosiveresistance, but low yield strength	Thin case series, cover cseries, housing series and complex shaped cutain wall
Aluminium alloy casting Kind 4, A	AC 4A	Al-Si-Mg series	Die casting Sand moulding Sell moulding		Good castability and toughness, used for large size casting needing strength	Brake drum, mission case, crank case, gear box and engine parts for boat and vehicle

Kind	Symbol	Alloy series	Division of moulding alloy name	Reference		
				Pertinent	Characteristics	Example of usage
Aluminium alloy casting Kind 4, B	AC 4B	Al-Si-Cu series	Die casting Sand moulding Shell moulding	AA333.0	Good castability pressure-resistance and corrosive-resistance	Crank case, cylinder head, manifold and electric parts for aircraft use
Aluminium alloy casting Kind 4, C	AC 4C	Al-Si-Mg series	Die casting Sand moulding Shell moulding	AA356.0	Good castability pressure-resistance and corrosive-resistance	Oil pressure parts, mission case, flywheel housing, aircraft fitting series, curtain wall, engine parts for small boat use, body parts and electric parts for aircraft use
Aluminium alloy casting Kind 4, CH	AC 4CH	Al-Si-Mg series	Die casting Sand moulding Shell moulding	AA356.0	Good castability and mechanical properties, used for high class casting	Automobile wheel, engine parts and oil pressure parts for aircraft use
Aluminium alloy casting Kind 4, D	AC 4D	Al-Si-Cu-Mg series	Die casting Sand moulding Shell moulding	AA355.0	Good castability and mechanical properties, used for parts needing pressure-resistance.	Water cooling cylinder head, crank case, cylinder block, fuel pump body, blow housing, oil pressure parts and electric parts for aircraft use
Aluminium alloy casting Kind 5, A	AC 5A	Al-Cu-Ni-Mg series	Die casting Sand moulding Shell moulding	AA242.0	Good high temperature tensile strength poor castability	Air cooling cylinder head, piston for diesel engine use, engine parts for air craft
Aluminium alloy casting Kind 7, A	AC 7A	Al-Mg series	Die casting Sand moulding Shell moulding	AA514.0	Good corrosive-resistance and toughness, and also good polar oxidation, but poor castability	Boat parts, handle, rods for sculpture use, business tool, chair electric parts for aircraft use
Aluminium alloy casting Kind 7, B	AC 7B	Al-Mg series	Die casting Sand moulding Shell moulding	AA520.0	Good corrosive-resistance and mechanical properties but poor castability, changing mainly in elongation due to aging	Optical instrument frame case, aircraft parts, body parts for aircraft use

Kind	Symbol	Alloy series	Division of moulding alloy name	Reference		
				Pertinent	Chracteristics	Example of usage
Aluminium alloy casting Kind B, A	AC 8A	Al-Si-Cu-Ni-Mg series	Die casting	AAF332.0	Good heat resistance and wear-resistance, but low heat expansion coefficient high tensile strength	Piston for automobile diesel engine use, Piston for boat use pulley and bearing
Aluminium alloy casting Kind 8,B	AC 8B	Al-Si-Cu-Mg series	Die casting		Good heat resistance and wear-resistance, but low heat expansion coefficient high tensile strength	Piston for automobile use, pulley and bearing
Aluminium alloy casting Kind 8,C	AC 8C	Al-Si-Cu-Mg series	Die casting	AA A332.0	Good heat resistance and wear-resistance, but low heat expansion coefficient high tensile strength	Piston for automobile use, pulley and bearing
Aluminium alloy casting Kind 9, A	AC 9A	Al-Si-Cu-Ni-Mg series	Die casting		Good heat-resistance and low heat expansion coefficient good wear-resistance but poor castability and cuttability	Piston (for air cooling 2 cycle engines)
Aluminium alloy casting Kind 9, B	AC 9B	Al-Si-Cu-Ni-Mg series	Die casting		Good heat-resistance and low heat expansion coefficient good wear-resistance but poor castability and cuttability	Piston (for air cooling 2 cycle engines and) air cooling cylinder.

3. Chemical Element

The chemical element of the casting shall be as shown in Table 2.

Table 2. Chemical Element

Symbol	Chemical element (%)					
	Cu	Si	Mg	Zn	Fe	Mn
AC1A	4.0 - 5.0	1.2 or less	0.15 or less	0.30 or less	0.50 or less	0.30 or less
AC1B	4.0 - 5.0	1.20 or less	0.15-0.35	0.10 or less	0.35 or less	0.10 or less
AC2A	3.0-4.5	4.0-6.0	0.25 or less	0.55 or less	0.8 or less	0.55 or less
AC2B	2.0-4.0	5.0-7.0	0.50 or less	1.0 or less	1.0 or less	0.50 or less
AC3A	0.25 or less	10.0-13.0	0.15 or less	0.30 or less	0.8 or less	0.35 or less
AC4A	0.25 or less	8.0-10.0	0.30-0.6	0.25 or less	0.55 or less	0.30-0.6
AC4B	2.0-4.0	7.0-10.0	0.50 or less	1.0 or less	1.0 or less	0.50 or less
AC4C	0.20 or less	6.5-7.5	0.25-0.45	0.35 or less	0.55 or less	0.35 or less
AC4CH	0.20 or less	6.5-7.5	0.20-0.40	0.10 or less	0.20 or less	0.10 or less
AC4D	1.0-1.5	4.5-5.5	0.40-0.6	0.30 or less	0.6 or less	0.50 or less
AC5A	3.5-4.5	0.6 or less	1.2-1.8	0.15 or less	0.8 or less	0.35 or less
AC7A	0.10 or less	0.20 or less	3.5-5.5	0.15 or less	0.30 or less	0.6 or less
AC7B	0.10 or less	0.20 or less	9.5-11.0	0.10 or less	0.30 or less	0.10 or less
AC8A	0.8-1.3	11.0-13.0	0.7-1.3	0.15 or less	0.8 or less	0.15 or less
AC8B	2.0-4.0	8.5-10.5	0.50-1.5	0.50 or less	1.0 or less	0.50 or less
AC8C	2.0-4.0	8.5-10.5	0.50-1.5	0.50 or less	1.0 or less	0.50 or less
AC9A	0.50-1.5	22 ~ 24	0.50-1.5	0.20 or less	0.8 or less	0.50 or less
AC9B	0.50-1.5	18 ~ 20	0.50-1.5	0.20 or less	0.8 or less	0.50 or less

Table 2 Chemical element (Continued)

Symbol	Chemical element (%)					
	Ni	Ti	Pb	Sn	Cr	Al
AC1A	0.05 or less	0.25 or less	0.05 or less	0.05 or less	0.05 or less	remainder
AC1B	0.05 or less	0.50-0.30	0.05 or less	0.05 or less	0.05 or less	remainder
AC2A	0.30 or less	0.20 or less	0.15 or less	0.05 or less	0.15 or less	remainder
AC2B	0.35 or less	0.20 or less	0.20 or less	0.05 or less	0.20 or less	remainder
AC3A	0.10 or less	0.20 or less	0.10 or less	0.10 or less	0.15 or less	remainder
AC4A	0.10 or less	0.20 or less	0.10 or less	0.10 or less	0.15 or less	remainder
AC4B	0.35 or less	0.20 or less	0.20 or less	0.05 or less	0.20 or less	remainder
AC4C	0.10 or less	0.20 or less	0.10 or less	0.10 or less	0.10 or less	remainder
AC4CH	0.05 or less	0.20 or less	0.05 or less	0.05 or less	0.05 or less	remainder
AC4D	0.20 or less	0.20 or less	0.10 or less	0.05 or less	0.15 or less	remainder
AC5A	1.7-2.3	0.20 or less	0.05 or less	0.05 or less	0.15 or less	remainder
AC7A	0.05 or less	0.20 or less	0.05 or less	0.05 or less	0.15 or less	remainder
AC7B	0.05 or less	0.20 or less	0.05 or less	0.05 or less	0.15 or less	remainder
AC8A	0.8-1.5	0.20 or less	0.05 or less	0.05 or less	0.10 or less	remainder
AC8B	0.10-1.0	0.20 or less	0.10 or less	0.10 or less	0.10 or less	remainder
AC8C	0.50 or less	0.20 or less	0.10 or less	0.10 or less	0.10 or less	remainder
AC9A	0.50-1.5	0.20 or less	0.10 or less	0.10 or less	0.10 or less	remainder
AC9B	0.50-1.5	0.20 or less	0.10 or less	0.10 or less	0.10 or less	remainder

Remark: The content of vanadium and wismut shall be 0.05% or less respectively.

However, the analysis of vanadium, wismut and elements others than Table 2, shall be performed only if requested by KIA.

4. Mechanical Properties

- (1) Unless otherwise specified, the mechanical properties of the casting shall be obtained using the test piece manufactured by die casting or sand moulding.
- (2) The mechanical properties of the test piece given by tensile test according to paragraph 5.2 shall conform to Table 3 for die casted one and Table 4 for sand moulded one. Also, the mechanical properties of the shell moulded one shall comply with that of the sand moulded one (Table 4).