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## Zinc Alloy Specification Guide

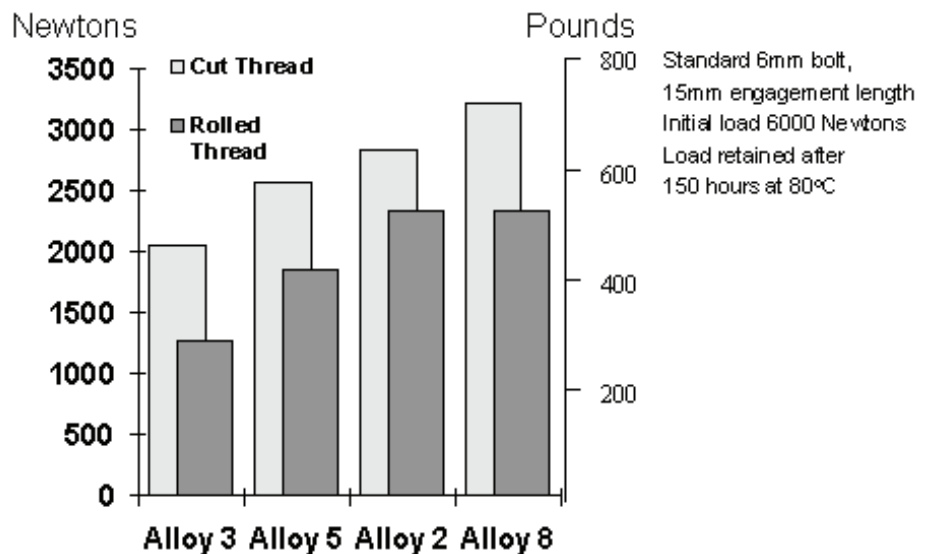
There are considerable differences in mechanical properties between the various internationally recognized zinc die casting alloys. The composition specifications and properties are given in the ILZRO publication "Engineering Properties of Zinc Alloys."

The clamping force retention characteristics of the hot chamber diecastable alloys are given in this publication. The individual alloys are widely known by a simple number designation. Some equivalent national and international specifications for these alloys are shown below:

	ISO H5301	ASTM B86	SAE	JIS H2201	AFNOR	BS1004	DIN1473	EN
Alloy 2	-	AC43A	921	-	ZA4U3G	-	Z430	ZC0430
Alloy 3	H5301	AC40A	903	ZDC2	ZA4G	1004A	Z400	ZC0400
Alloy 5	H5301	AC41A	925	ZDC1	ZA4UIG	1004B	Z410	ZC0410
Alloy 8	-	-	-	-	-	-	-	ZC0810

Variation of Retained Clamping Load with Alloy Specification

In very general terms, the clamping force retention characteristics increase in the order Alloy 3, Alloy 5, Alloy 2, Alloy 8. ie Alloy 8 shows the best clamping load retention. However, when a rolled rather than cut thread form is used, Alloy 2 and Alloy 8 give equal best performance, and the other alloys remain in the same order.



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## Alloy Data: Aluminum Die Casting Alloy Characteristics

NADCA

A-3-3-97

Guidelines

Die casting alloy selection requires evaluation not only of physical and mechanical properties, and chemical composition, but also of inherent alloy characteristics and their effect on die casting production as well as possible machining and final surface finishing.

This table includes selected die casting and other special characteristics which are usually considered in selecting an aluminum alloy for a specific application.

The characteristics are rated from (1) to

(5), (1) being the most desirable and (5) being the least. In applying these ratings, it should be noted that all the alloys have sufficiently good characteristics to be accepted by users and producers of die castings. A rating of (5) in one or more categories would not rule out an alloy if other attributes are particularly favorable, but ratings of (5) may present manufacturing difficulties.

The benefits of consulting a custom die caster experienced in casting the aluminum alloy being considered are clear.

**Table A-3-3 Die Casting and Other Characteristics: Al Alloys** (1 = most desirable, 5 = least desirable)

Commercial: ANSI/AA:	Aluminum Die Casting Alloys										
	360 360.0	A360 A360.0	380 380.0	A380 A380.0	383 383.0	384 384.0	390 B390.0	13 413.0	A13 A413.0	43 C443.0	218 518.0
Resistance to Hot Cracking <sup>Ⓐ</sup>	1	1	2	2	1	2	4	1	1	3	5
Pressure Tightness	2	2	2	2	2	2	4	1	1	3	5
Die-Filling Capacity <sup>Ⓑ</sup>	3	3	2	2	1	1	1	1	1	4	5
Anti-Soldering to the Die <sup>Ⓒ</sup>	2	2	1	1	2	2	2	1	1	4	5
Corrosion Resistance <sup>Ⓓ</sup>	2	2	4	4	3	5	3	2	2	2	1
Machining Ease & Quality <sup>Ⓔ</sup>	3	3	3	3	2	3	5	4	4	5	1
Polishing Ease & Quality <sup>Ⓕ</sup>	3	3	3	3	3	3	5	5	5	4	1
Electroplating Ease & Quality <sup>Ⓖ</sup>	2	2	1	1	1	2	3	3	3	2	5
Anodizing (Appearance) <sup>Ⓗ</sup>	3	3	3	3	3	4	5	5	5	2	1
Chemical Oxide Protective Coating <sup>Ⓙ</sup>	3	3	4	4	4	5	5	3	3	2	1
Strength at Elevated Temp. <sup>Ⓚ</sup>	1	1	3	3	2	2	3	3	3	5	4

**Note:**

Die castings are not usually solution heat treated. Low-temperature aging treatments may be used for stress relief or dimensional stability. A T2 or T5 temper may be given to improve properties. Because of the severe chill rate and ultra-fine grain size in die castings, their "as-cast" structure approaches that of the solution heat-treated condition. T4 and T-5 temper results in properties quite similar to those which might be obtained if given a full T-6 temper. Die castings are not generally gas or arc welded or brazed.

<sup>Ⓐ</sup> Ability of alloy to withstand stresses from contraction while cooling through hot-short or brittle temperature range. <sup>Ⓑ</sup> Ability of molten alloy to flow readily in die and fill thin sections. <sup>Ⓒ</sup> Ability of molten alloy to flow without sticking to the die surfaces. Ratings given for anti-soldering are based on nominal iron compositions of approximately 1%. <sup>Ⓓ</sup> Based on resistance of alloy in standard type salt spray test. <sup>Ⓔ</sup> Composite rating based on ease of cutting, chip characteristics, quality of finish, and tool life. <sup>Ⓕ</sup> Composite rating based on ease and speed of polishing and quality of finish provided by typical polishing procedure. <sup>Ⓖ</sup> Ability of the die casting to take and hold an electroplate applied by present standard methods. <sup>Ⓗ</sup> Rated on lightness of color, brightness, and uniformity of clear anodized coating applied in sulphuric acid electrolyte. Generally aluminum die castings are unsuitable for light color anodizing where pleasing appearance is required. <sup>Ⓙ</sup> Rated on combined resistance of coating and base alloy to corrosion. <sup>Ⓚ</sup> Rating based on tensile and yield strengths at temperatures up to 500°F (260°C), after prolonged heating at testing temperature. Sources: ASTM B85-92a; ASM; SAE