

Zinc and Magnesium Die Materials

Zinc and magnesium are the two die casting alloys poured at the lowest die temperatures, and the die material follows from that. The table collects the die material, hardness, core and slide practice, surface finish and typical die life for both.

Reference only. This is a reference summary of published practice and it is not a specification of ours. A different casting shape, wall thickness or production run will move these values. Final selection is made against the casting drawing and the machine the die runs on.

Die practice for the two alloys

In zinc die casting the die temperature is usually 160 to 245 °C, so hot work tool steels are not generally required. For extremely long runs and high dimensional accuracy, H13 will provide optimum die life. Typical die hardness is 29 to 34 HRC.

In magnesium die casting the dies and cores are typically H11 and H13 heat treated to 44 to 48 HRC, and nitriding the die surfaces is often done. A 0.38 µm finish lengthens die life, and stress relieving and repolishing after about 25,000 shots is sometimes carried out.

Item	Zinc alloys	Magnesium alloys
Die working temperature	160 to 245 °C (325 to 475 °F)	260 ± 14 °C (500 ± 25 °F)
Die and core material	Hot work tool steel such as H13 where the run is long or the accuracy is high. Elsewhere no hot work tool steel is required	Hot work tool steel such as H11 or H13
Working hardness	29 to 34 HRC (280 to 320 HB)	44 to 48 HRC
Cores and slides	Hardenable stainless such as type 440B, or H13, selectively nitrided	The same hot work tool steels as the dies
Die surface finish	Not named in this section	A 0.38 µm (15 µin.) finish lengthens die life
Die maintenance	A rigid program of machine and die maintenance keeps life up	Stress relieve and repolish after about 25,000 shots
Typical die life	Dies are not unusual at 1,000,000 shots	Two to three times the life of an aluminum die

Aobo Steel, tool steel supplier

Aobo Steel supplies tool steel to distributors and mold, tool and die shops, including H13, H11, H10, H21, D2, D3, O1, A2, S7, M2, M42, L6, P20 and 420 and 440C stainless. Forged or hot rolled, annealed or pre-hardened, cut to your sizes, with test certificates.

Source, the Zinc and Zinc Alloys article and the Magnesium and Magnesium Alloys article, in ASM Handbook, Volume 15, Casting, ASM International, 1988.

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