

Miniature Die Casting Die Materials and Hardness

Miniature die casting makes small zinc parts on machines that cycle up to around a hundred times a minute, holding dimensions under a thousandth of an inch. The die is a set of slides rather than two blocks, and every component in that set has its own material and its own hardness. The tables below give the component list with the material and hardness published for it, and which of those grades are hot work steels and which are not.

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How a miniature die is assembled

Component material and hardness

Component	Material	Hardness and condition
Die	T-1	56 to 58 HRC
Inserts and subinserts	H-13	46 to 48 HRC
Shank	S-7	54 to 56 HRC
Ejector plate and carrier	S-7	54 to 56 HRC
Ejector pins	H-13	65 to 74 HRC, case hardened
Core pins	H-13	50 to 55 HRC, hardened through
Crosshead and frame	Gray cast iron	Not applicable

Construction materials and hardness requirements for typical miniature die components, as published in the miniature die casting section of the NADCA product specification standards. The source prints the hardness values on the Rockwell C scale, and the material designations are the American grade designations.

The three stocks in the list

Grade	What the grade is	What it does in a miniature die
H-13	A 5 percent chromium hot work tool steel	Carries the working surfaces and the small pins, at three different hardness levels in the same die
S-7	A shock resisting tool steel	Carries the components that close against the machine, where impact toughness matters more than hot hardness
T-1	A tungsten type high speed steel	Carries the die head, where the impression is small and must hold its shape

The tool steels named in the miniature die component list and the role each one takes in the assembly.

Why the inserts run softer than the shank

Grades and stock

Where to go next

Aobo Steel, tool steel supplier

Aobo Steel supplies tool steel to distributors and mold, tool and die shops, including D2, D3, DC53, A2, O1, H13, H11, H10, H21, 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, NADCA Product Specification Standards for Die Castings, North American Die Casting Association, 2009.

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