

NADCA 229 Die Steel Acceptance Criteria

A die casting die is bought to a price and to a set of castings, and in North America the quality of the steel inside it is normally written to one document, NADCA 229. That document sets what a special quality die steel has to be before it is accepted, and what its heat treatment has to prove afterwards. The tables below give the grades the standard names for each family of cast metal, the lines a die specification should carry, and what the acceptance covers on the steel and on the heat treatment.

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What the document is

The tooling requirement for each family of cast metal

Cast metal	Grade the standard names	What it means at the quotation stage
Zinc alloys	P-20, H-11, H13, Premium Grade H13 or Superior Grade H13 (per NADCA 229)	Zinc casts at the lowest temperature in the nonferrous family and wears its tooling least, so P-20 is permitted where the part design is simple. The same passage warns that non premium tooling on a zinc part expires if production volumes later rise, and that the replacement die then costs far more than the premium material would have at the start.
Aluminium, magnesium and ZA alloys, noncritical part design, low volume	H-10, H-11, H13	These dies need high quality tool steel as a minimum. Where part features are critical or a long run is planned, the standard points to premium grade tooling instead of the minimum.
Aluminium, magnesium, ZA-12 and ZA-27, critical part design, higher volume	Premium Grade H13 or Superior Grade H13 (per NADCA 229)	For intricate features and tight specifications at volume the standard expects premium or superior grade steel, and states that non premium tooling will nearly always fail early.
Brass alloys	H13	Copper alloys are cast at the highest temperature in the nonferrous family, and only H13 high grade tool steel is recommended for brass die casting dies.

The tooling requirement named for each family of die cast metal in the tooling section of the NADCA product specification standards. The grades are quoted as the standard prints them, and the wording of each note follows the reasoning given in the same passage.

The lines a die specification should carry

Specification line	What the buyer states	What the supplier then has to prove
Cavity steel	H13, Premium Grade H13, Superior Grade H13, or another grade written into the specification	The grade supplied, backed by the mill certificate for the block
Steel acceptance	Whether a NADCA 229 certificate is required	The criteria the standard sets for the steel, from composition through to the properties tested on the block
Hardness	The hardness required in the finished die	A measured hardness inside the range asked for
Toughness	The impact requirement in ft.-lbs	A measured impact result at the specified hardness
Heat treatment	Whether a NADCA 229 certificate is required for the heat treat	That the treatment was carried out to give the hardness and the microstructure asked for

The die steel lines carried on the NADCA checklist for die casting die specifications, and what each line asks the supplier to prove when a certification is required.

What the acceptance covers

Acceptance area	On the steel	On the heat treatment
Identity	Chemical composition must match the grade	Not applicable
Hardness	A hardness range for the block	Hardness measured after the treatment
Cleanliness	Microcleanliness levels	Not applicable
Soundness	Ultrasonic requirements	Not applicable
Structure	Microstructural requirements	Microstructural requirements after treatment
Toughness	Impact strength capability	Hardness and impact strength testing
Furnace and cycle	Not applicable	Furnace requirements, preheating, austenitizing and tempering temperatures and times, and quenching requirements

The acceptance areas listed for the current NADCA 229 document, which covers both the special quality steel as procured and the heat treatment applied to it.

Why the heat treatment is inside the same document

How to read a supplier certificate

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.

CONTACT

EMAIL

sales@aobosteel.com

WHATSAPP

+86 180 6294 5370

WEB

aobosteel.com



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