TECHNOLOGY DATA SHEET · HIGH-PRESSURE DIE CASTING

Aluminum high-pressure die casting

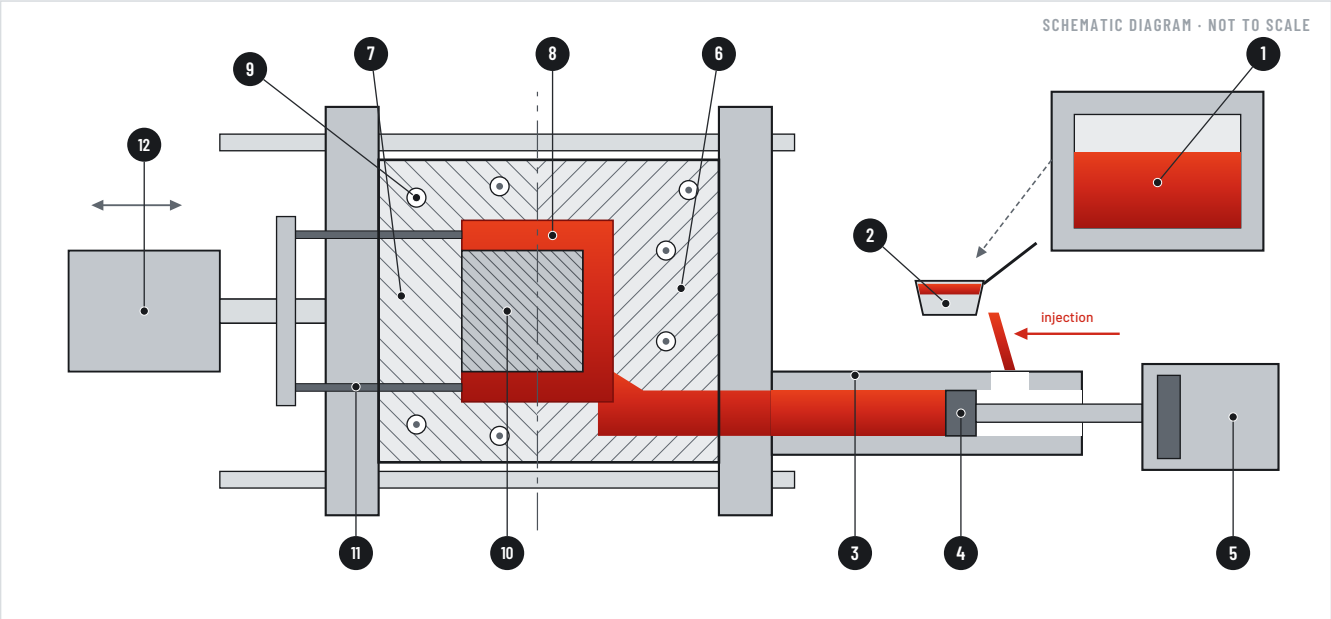
We inject molten aluminum alloy into a steel die under high pressure. Parts with complex shapes come out of the die with an excellent surface finish and high dimensional repeatability – often ready for assembly or light machining. We design dies in CAD/CAM with alloy flow simulation and manufacture them from tool steel on our own CNC machines.

±0.1 mm
tolerances often achievable – depending on part geometry

CAD/CAM + CNC
die design and manufacturing in our facility

short and long
runs – including prototypes and specialty runs

Al-Si-Cu
alloys per PN-EN 1706, e.g., EN AC-46200, 46500, 47100



1. Furnace with molten aluminum alloy
2. Ladle – metering the alloy into the shot sleeve
3. Shot sleeve (cold-chamber machine)
4. Shot plunger – forces the alloy in under high pressure
5. Injection unit cylinder
6. Fixed mold half made of tool steel on the fixed platen
7. Moving die half on the moving platen
8. Mold cavity filled with alloy – casting
9. Mold cooling channels (channel cooling)
10. Metal core
11. Ejector pins – remove the casting from the open mold
12. Mold clamping unit and machine tie bars

Fig. 1. High-pressure die casting in a cold-chamber machine – the alloy from the furnace is transferred by ladle into the shot sleeve, and the plunger forces it into the mold cavity.

01 · Technical parameters

Material	aluminum alloys per PN-EN 1706 – mainly with silicon and copper; we select the alloy according to the function of the part, required strength and corrosion resistance
Tolerances	often on the order of ±0.1 mm – depending on part geometry
Molds	tool steel and alloys with increased heat resistance and wear resistance; channel cooling and metal cores; CAD/CAM design with alloy flow simulation
Mold maintenance	mold cooling and refurbishment at our plant
Shot sleeves	in various capacities – selected to meet project requirements
Process	automated line; control of temperature, pressure and cycle time; real-time parameter monitoring; part traceability system
Inspection	dimensional verification and structural tests of every batch; dimensional measurements, structural examinations and strength tests
Production runs	series production as well as short, specialized runs and prototypes

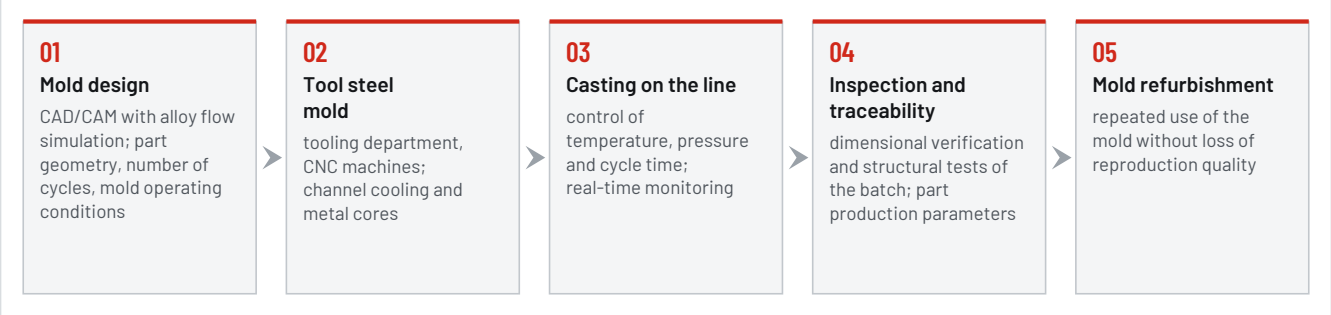


Fig. 2. Preparing and running die casting production.

02 · Alloys for high-pressure die casting

High-pressure die casting mainly uses aluminum alloys with silicon and copper – examples are listed below. When quoting, we confirm which of them is best suited to the given part. EN AC-42000 and 51300 alloys are cast in permanent molds.

Designation	Symbol	Main alloying elements*	Properties	Typical applications
EN AC-46200	AlSi8Cu3	Si 7.5–9.5 % Cu 2.0–3.5 %	high strength, good castability, limited corrosion resistance	engine housings, structural components, fittings
EN AC-46500	AlSi9Cu3(Fe)(Zn)	Si 8–11% Cu 2–4% Zn up to 3%	very good castability and machinability, limited corrosion resistance	electronics housings, automotive parts, household appliances
EN AC-47100	AlSi12Cu1(Fe)	Si 10.5–13.5 % Cu 0.7–1.2 %	very good castability – also in thin walls, good leak tightness	automotive parts, engine components, electrical equipment

* Chemical composition ranges (wt %) are given as a guide – the composition according to PN-EN 1706 and the material certificate is binding.

03 · Where our die castings are used

Industry	Application
Automotive	series-produced parts, housings and technical components
Home appliances and electronics	housings and components with complex shapes
Technical fittings and industrial automation	leak-tight parts ready for assembly
Aerospace	lightweight, high-strength aluminum components

04 · When to choose high-pressure die casting

High-pressure die casting is cost-effective for large runs of parts with complex shapes and tight tolerances – the mold cost is then spread over many pieces. For smaller runs with repeatable dimensions, permanent mold casting is a good fit, and for prototypes and large parts – sand casting.

Feature	Permanent mold casting	Sand casting	High-pressure die casting
Mold	metal (cast iron or steel), reusable	sand, single-use, made on a pattern	die casting mold made of tool steel
Pouring	gravity pouring – in an automatic cycle or manually	gravity die casting	high-pressure die casting
Best suited for	series with repeatable dimensions	prototypes, short runs, large and complex castings	large series of parts with complex shapes
Dimensions and surface	stable dimensions, smooth surface	depends on the molding material; usually with a machining allowance	very good surface finish, tolerances often ±0.1 mm
Mold cost	medium	lowest	highest
Offer data	castings 0.1–50 kg; molds up to 1400 × 1200 × 750 mm	castings 1–100 kg; flasks up to 1000 mm	tolerances often ±0.1 mm – depending on part geometry

Data for quotation

- 2D drawing in PDF or 3D model in STEP format
- aluminum alloy
- quantity per batch and per year (planned batch size)
- machining and coating requirements

In response, we will send a proposed technology, a mold concept and a quotation. We will complement the casting with CNC machining, grinding, polishing and powder coating.

Contact and quotation

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permanent mold, sand and high-pressure die castings, patterns and molds

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