

D2 Austenitizing in Salt Bath and Atmosphere Furnaces

D2 is an air hardening cold work tool steel, and a heat treater can austenitize it in a molten salt bath or in an endothermic atmosphere furnace. The austenitizing temperature is the same in both routes. The table below gives the published cycle for a bending die insert and a trim die insert in each route.

Reference only. This is a reference summary of published practice and it is not a specification of ours. The cycles were recorded for the two D2 inserts described in the source, and a different section, insert geometry or furnace will move them. Final cycle parameters are set by the heat treater.

Austenitizing procedures for D2 inserts

D2 insert	Salt bath route	Endothermic atmosphere route
Bending die inserts	Preheat in air furnace at 650 °C (1200 °F) for 1.5 h; austenitize at 1010 °C (1850 °F) for 35 min; air cool; remove salt	Charge directly into furnace at 705 °C (1300 °F) and preheat for 1.5 h; austenitize at 1010 °C (1850 °F) for 2 h; air cool
Trim die inserts	Preheat in air furnace at 650 °C (1200 °F) for 4 h, then in salt bath at 845 °C (1550 °F) for 1 h; austenitize at 1010 °C (1850 °F) for 1 h; air cool; remove salt	Charge directly into furnace at 705 °C (1300 °F) and preheat for 4 h; raise furnace temperature and austenitize at 1010 °C (1850 °F) for 4 h; air cool

Austenitizing procedures for two D2 die inserts, by furnace route. After austenitizing, the bending die inserts were double tempered and then nitrided, and the trim die inserts were double tempered. The inserts measured 200 by 305 by 38 mm (8 by 12 by 1.5 in.). Source, Table 7 of Heat Treating of Tool Steels, in ASM Handbook, Volume 4, Heat Treating.

What the two routes change

The austenitizing temperature is identical in all four cycles. The time at temperature is not. On the bending die insert, the salt bath holds the part at 1010 °C (1850 °F) for 35 min while the endothermic atmosphere furnace takes 2 h. On the trim die insert the gap is wider, 1 h against 4 h.

The salt bath also leaves salt on the part, and the published cycle lists a salt removal step after the quench. The atmosphere route has no equivalent step.

Equipment the procedures were recorded on

Description	Salt bath furnace	Endothermic atmosphere furnace
Furnace type	Immersed electrode salt bath	Radiant tube furnace
Working chamber	380 by 760 by 915 mm (15 by 30 by 36 in.) deep	610 by 915 by 455 mm (24 by 36 by 18 in.) high
Manual loading	1.5 min per piece	1.5 min per piece

Furnace and handling details recorded with the cycles above. Source, Table 7 of Heat Treating of Tool Steels, in ASM Handbook, Volume 4, Heat Treating.

After austenitizing

The published procedures continue past the quench. The bending die inserts were double tempered, 2 h at 510 °C (950 °F) and an air cool, then the same cycle again, and then nitrided for 48 h at 510 °C (950 °F). The trim die inserts were double tempered at a much lower temperature, 4 h at 190 °C (375 °F) and an air cool, then the same cycle again.

Aobo Steel, tool steel supplier

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