ORVAR® SUPREME

Premium AISI H-13
Hot Work Die Steel

Heat Treatment Recommendations

	Vacuum	Salt Bath/Fluidized Bed	Atmosphere Furnace Muffle Furnace/Packed
Preheating Temperature	**1.** Bring up to 1200°F, equalize **2.** Heat up to 1550°F, equalize	**1.** 800-900°F, equalize **2.** 1100-1200°F, equalize **3.** 1500-1600°F, equalize Step 1 only for big blocks (cross section above 6")	**1.** Bring up to 1200°F, equalize **2.** Heat up to 1550°F, equalize
Hardening Temperature Austenitizing	1850-1920°F (Normally 1885°F) Holding time after the tool or part has fully heated through at the hardening temperature: minimum 30 minutes, maximum 1 hour. Alternatively hold 20 minutes for first 1" and then 15 minutes for each additional inch of wall thickness.		
Quenching IMPORTANT Quench as quickly as possible*	**Alt. 1** Inert gas, positive pressure **Alt. 2** Back-filled pressurized gas to 750-850°F, then equalize center and surface. (Maximum holding time 30 minutes) Continue forced cooling to 150°F.	**Alt. 1** Quench in salt 950-1050°F. **Alt. 2** Quench in oil 150°F until the die is black. **Alt. 3** Forced air circulation.	**Alt. 1** Oil 150°F until the die is black, then air cooling **Alt. 2** Circulated inert gas. **Alt. 3** Circulated air.
Tempering (minimum two times) **Temper immediately after quenching when the tool or part reaches 150°F**	**Temperature** / **Hardness** 1020°F — 48-52 HRC 1050°F — 46-50 HRC 1080°F — 44-48 HRC 1110°F — 42-46 HRC 1140°F — 40-44 HRC Time: 1 hour per inch of wall thickness, or hold at temperature a minimum of 2 hours.		
Average size change as a result of hardening and tempering should not exceed 0.3% overall (0.0015 inches per inch side) if the tool has been stress relieved before finish machining.			

* Cooling rate must be adequate to avoid any transformation products, with decreased properties as a result. However, also consider the risk of excessive distortion from very fast cooling. A minimum quench rate of 30°F/minute as measured at a depth of ~ 5/8" is recommended to optimize tool performance.

ORVAR SUPREME - Tougher than ever

- Isotropic mechanical properties – greater reliability in production
- Increased center-toughness – less sensitivity in heat treatment
- Higher hardness level in use – improved tool life

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