CALDIE®

Premium Cold Work Tool Steel

Heat Treatment Recommendation

	Vacuum	Salt Bath / Fluidized Bed	Atmosphere Furnace Muffle Furnace / Packed
Preheating Temperature	1. Bring up to 1200°F, equalize 2. Heat up to 1525°F, equalize	1. 1100 – 1200°F, equalize 2. 1500 - 1550°F, equalize	1. Bring up to 1200°F, equalize 2. Heat up to 1550°F, equalize
	3. For Cross section larger than 8" thick use a 1510°F second preheat and a third preheat at 1650°F		
Hardening Temperature (Austenitizing)	**1830 – 1875°F (Normally 1870°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*	**Alt. 1** Inert gas, positive pressure **Alt. 2** Back-filled pressurized gas to 1050°F, then equalize center and surface. Continue to 600°F and equalize. Then cool in circulating air.	**Alt. 1** Quench in Salt 390-930°F **Alt. 2** Circulated high speed inert gas	**Alt. 1** Circulated inert gas **Alt. 2** Circulated air
Tempering (minimum two times) Temper immediately after quenching when the complete tool reaches 150°F	Tempering Temperatures (°F)	Hardening Temperature 1830°F*	1870°F
	980	58-60 HRC	60-62 HRC
	1020	56-58 HRC	58-60 HRC
	1050	55-57 HRC	56-58 HRC
	1250		34-36 HRC
	Tempering Times: 1 hour per inch of wall thickness, or hold at temperature a minimum of 2 hours. * The 1830°F hardening temperature should be used for larger cross sections above 8" thick		
Stress Temper performed on hardened tools after EDM.	Temperature: Shall be 50°F (25°C) below the previous tempering temperature. Time: Soak 2 hours once tool comes to temperature. Cool in still air.		
Dimensional Stability	Average size change as a result of hardening and tempering may not exceed 0.0016 inch per inch per dimension if the tool has been stress relieved before finish machining. If Stress relieving is not performed as recommended, dimensional stability maybe inconsistent and cannot be guaranteed.		

* 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.

Caldie

Designed to Meet Customers Demanding Needs

- Excellent toughness and ductility - improved tooling performance
- Excellent hardenability – improved heat treatment response
- High working hardness – improved tool life

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