VANADIS® 6

SUPERCLEAN

Powder Metallurgy Tool Steels

Heat Treatment Recommendations
General Applications

	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 (optional)	**1.** 1100-1200°F, equalize **2.** 1500-1600°F, equalize	**1.** Bring up to 1200°F, equalize **2.** Heat up to 1550°F, equalize
Hardening Temperature Austenitizing	1800-2010°F (Normally 1920°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 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** Forced air circulation.	**Alt. 1** Circulated inert gas. **Alt. 2** Circulated air.

Tempering (minimum two times)

Temper immediately after quenching when the tool or part reaches 150°F

	Hardening Temperature:		
	1870°F	1920°F	2010°F
Temperature	**Hardness**	**Hardness**	**Hardness**
480°F	61-63 HRC	61-63 HRC	60-62 HRC
980°F	60-62 HRC	61-63 HRC	–
1000°F	–	–	63-65 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, with decreased properties as a result. However, also consider the risk of excessive distortion from very fast cooling.

VANADIS® SUPERCLEAN…the new generation of P/M tool steels

- Isotropic mechanical properties - greater reliability in production
- Increased toughness - less down time
- Higher wear resistance - longer tool life

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U.S.A and Canada: 1-800-833-4656
Mexico: (5) 576-5422
Web site: www.uddeholmtooling.com
e-mail: info@uddeholmtooling.com

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