Uddeholm Orvar Supreme

Superior H13 ESR per NADCA 207 Grade B

	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*	**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 part is black, then air cool **Alt. 2** Circulated inert gas **Alt. 3** Circulated air
	*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 50°F/minute as measured at a depth of ~5/8“ is recommended to optimize tool properties.		
Tempering **(minimum two times)** **Temper immediately after quenching when the tool or part reaches 150°F**	Hardening Temperature: 1885 °F **Tempering 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. Check hardness between tempers.		
Stress Temper performed on hardened tools after EDM, welding with QRO 90 or DIEVAR TIG Rods, or during preventative maintenance	Check hardness to confirm tool status. **Temperature:** Shall be 50°F below the lowest tempering temperature or 1020°F minimum, whichever is higher. **Time:** Soak 30 minutes per inch of maximum section with a minimum of 2 hours once tool comes to temperature. Cool in still air for simple shapes. For complex shapes furnace cool to 800°F, then air cool. Caution: Stress tempering in an unprotected atmosphere will oxidize the tool. For hot work applications, this can prove beneficial to protect the tooling surface during operation. However, in other applications where surface finish condition is a concern, consult your heat treater on options for protective atmospheres or finish the surface after stress tempering.		
Dimensional Stability	Average size change as a result of hardening and tempering may not exceed .005 inch/inch/maximum dimension if the tool has been stress relieved before finish machining. If stress relieving is not performed as recommended, dimensional stability may be inconsistent and cannot be guaranteed.		

Characteristics

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

UDDEHOLM
a voestalpine company

USA/Canada: 1-800-METAL20
Mexico: +52 442-349-7946
Website: www.uddeholm.com