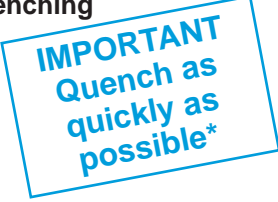


ORVAR[®] SUPREME

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  | 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 1020°F 1050°F 1080°F 1110°F 1140°F Time: 1 hour per inch of wall thickness, or hold at temperature a minimum of 2 hours. | Hardness 48-52 HRC 46-50 HRC 44-48 HRC 42-46 HRC 40-44 HRC | |
| 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

This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should not therefore be construed as a warranty of specific properties of the products described or a warranty for fitness for a particular purpose.



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