Bohler-Uddeholm UDDEHOLM ORVAR® SUPERIOR (Premium AISI H13) Hot Work Tool Steel

Category : Metal , Ferrous Metal , Alloy Steel , Chrome-moly Steel , Tool Steel , Hot Work Steel

Material Notes:

Chromium-molybdenum-vanadium alloyed steelA premium Cr-Mo-V-alloyed hot work die steel with good resistance to thermal fatigue. The steel is produced by a special melting and refining technique in order to give mechanical properties with maximum isotropy and is certified to meet a minimum Charpy V-notch test result of 10 ft-lbs (13.6 J). Suitable for a wide variety of hot work applications, including tools for high pressure die casting, hot extrusion and press forging, Orvar® Superior meets or exceeds the NADCA 207-97 and the 207-2003 Superior Specification in dimensions up to 18" in thickness.Orvar Superior is characterized by: A high level of resistance to thermal shock and thermal fatigue Good high-temperature strength Excellent toughness and ductility in all directions Good machinability and polishability Excellent through-hardening properties Good dimensional stability during hardeningApplicationsTools for die casting - Dies, Fixed inserts cores, Sprue parts, Nozzles, Ejector pins(nitrided), Plunger, shot-sleeve (normal nitrided)Tool for extrusion - Dies, Backers, die-holders, liners, dummy blocks, stemsTools for forging - Aluminum, magnesium, Copper alloys, Steel

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http://www.lookpolymers.com/polymer_Bohler-Uddeholm-UDDEHOLM-ORVAR-SUPERIOR-Premium-AISI-H13-Hot-Work-Tool-Steel.php

Physical Properties	Metric	English	Comments
Density	7.78 g/cc	0.281 lb/in³	hardness of 45 HRC
	7.58 g/cc @Temperature 599 °C	0.274 lb/in³ @Temperature 1110 °F	hardness of 45 HRC
	7.67 g/cc @Temperature 399 °C	0.277 lb/in³ @Temperature 750 °F	hardness of 45 HRC

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	180	180	Soft annealed (Delivery condition)
Tensile Strength, Ultimate	1420 MPa	206000 psi	hardness of 45 HRC
	1810 MPa	263000 psi	hardness of 52 HRC
Tensile Strength, Yield	1280 MPa @Strain 0.200 %	185000 psi @Strain 0.200 %	hardness of 45 HRC
	1520 MPa @Strain 0.200 %	220000 psi @Strain 0.200 %	hardness of 52 HRC
Modulus of Elasticity	210 GPa	30500 ksi	(hardness of 45 HRC)
	140 GPa @Temperature 599 °C	20300 ksi @Temperature 1110 °F	hardness of 45 HRC

Mechanical Properties	Metric	English	Comments
	@Temperature 399 °C	@Temperature 750 °F	
Charpy Impact	27.1 J @Temperature 98.9 °C	20.0 ft-lb @Temperature 210 °F	V-notch (hardness of 45 HRC)
	74.6 J @Temperature 499 °C	55.0 ft-lb @Temperature 930 °F	V-notch (hardness of 45 HRC)

Thermal Properties	Metric	English	Comments
CTE, linear	12.6 µm/m-°C @Temperature 399 °C	7.00 µin/in-°F @Temperature 750 °F	hardness of 45 HRC
	13.1 µm/m-°C @Temperature 599 °C	7.30 µin/in-°F @Temperature 1110 °F	hardened to 45 HRC
Thermal Conductivity	25.0 W/m-K @Temperature 20.0 °C	174 BTU-in/hr-ft²-°F @Temperature 68.0 °F	hardness of 45 HRC
	29.0 W/m-K @Temperature 399 °C	201 BTU-in/hr-ft²-°F @Temperature 750 °F	hardness of 45 HRC
	30.0 W/m-K @Temperature 599 °C	208 BTU-in/hr-ft²-°F @Temperature 1110 °F	hardness of 45 HRC

Component Elements Properties	Metric	English	Comments
Carbon, C	0.39 %	0.39 %	
Chromium, Cr	5.2 %	5.2 %	
Manganese, Mn	0.40 %	0.40 %	
Molybdenum, Mo	1.4 %	1.4 %	
Silicon, Si	1.0 %	1.0 %	
Vanadium, V	0.90 %	0.90 %	

Processing Properties	Metric	English	Comments
Processing Temperature	1024 °C	1875 °F	heated for 30 min, then quenched in air and tempered 2 + 2 h at 1130°F (hardness = 45 HRC)

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