

Bohler-Uddeholm BÖHLER W400 VMR® H11 Hot Work Tool Steel

Category : Metal , Ferrous Metal , Tool Steel , Hot Work Steel

Material Notes:

W400 VMR is a low silicon, chromium-vanadium hot work tool steel which has been vacuum remelted to obtain the highest uniformity, the best cleanliness of tool steel. The material is characterized:Extremely high toughness, with a minimum of 18 ft-lbs Room temperature Charpy V notch toughness levelsGood general wear resistance, capable of achieving up to 52 HRCGood hot wear resistance with higher hardnessVery good thermal conductivityExcellent polishabilityExtremely good uniformity of properties in all directionsApplications:Heavy duty hot work tools and dies, aluminum and zinc, where cracking is a major issueMandrels, dies, and containers for metal tube and rod extrusionHot extrusion diesHot shear bladesPlastic molds requiring high polishabilityMolds requiring improved cycle timesCold work tooling with severe cracking issues

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http://www.lookpolymers.com/polymer_Bohler-Uddeholm-BHLER-W400-VMR-H11-Hot-Work-Tool-Steel.php

Physical Properties	Metric	English	Comments
Density	7.60 g/cc	0.275 lb/in ³	
	@Temperature 600 °C	@Temperature 1110 °F	
	7.64 g/cc	0.276 lb/in ³	
	@Temperature 500 °C	@Temperature 932 °F	
	7.80 g/cc	0.282 lb/in ³	
	@Temperature 20.0 °C	@Temperature 68.0 °F	

Mechanical Properties	Metric	English	Comments
Hardness, Brinell	<= 205	<= 205	as delivered
Hardness, Rockwell C	52	52	hardened 990°C
	54	54	hardened 990°C then tempered 520°C
Modulus of Elasticity	165 GPa	23900 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	176 GPa	25500 ksi	
	@Temperature 500 °C	@Temperature 932 °F	
	215 GPa	31200 ksi	
	@Temperature 20.0 °C	@Temperature 68.0 °F	

Thermal Properties	Metric	English	Comments
	11.5 µm/m-°C	6.39 µin/in-°F	

CTE linear Thermal Properties	Metric @ Temperature 20.0 - 100 °C	English @ Temperature 68.0 - 212 °F	Comments
	12.0 µm/m-°C	6.67 µin/in-°F	
	@Temperature 20.0 - 200 °C	@Temperature 68.0 - 392 °F	
	12.2 µm/m-°C	6.78 µin/in-°F	
	@Temperature 20.0 - 300 °C	@Temperature 68.0 - 572 °F	
	12.5 µm/m-°C	6.94 µin/in-°F	
	@Temperature 20.0 - 400 °C	@Temperature 68.0 - 752 °F	
	12.9 µm/m-°C	7.17 µin/in-°F	
	@Temperature 20.0 - 500 °C	@Temperature 68.0 - 932 °F	
	13.0 µm/m-°C	7.22 µin/in-°F	
	@Temperature 20.0 - 600 °C	@Temperature 68.0 - 1110 °F	
	13.2 µm/m-°C	7.33 µin/in-°F	
	@Temperature 20.0 - 700 °C	@Temperature 68.0 - 1290 °F	
Specific Heat Capacity	0.460 J/g-°C	0.110 BTU/lb-°F	
	@Temperature 20.0 °C	@Temperature 68.0 °F	
	0.550 J/g-°C	0.131 BTU/lb-°F	
	@Temperature 500 °C	@Temperature 932 °F	
	0.590 J/g-°C	0.141 BTU/lb-°F	
	@Temperature 600 °C	@Temperature 1110 °F	
Thermal Conductivity	29.6 W/m-K	205 BTU-in/hr-ft²-°F	
	@Temperature 700 °C	@Temperature 1290 °F	
	30.5 W/m-K	212 BTU-in/hr-ft²-°F	
	@Temperature 600 °C	@Temperature 1110 °F	
	32.1 W/m-K	223 BTU-in/hr-ft²-°F	
	@Temperature 500 °C	@Temperature 932 °F	
	32.1 W/m-K	223 BTU-in/hr-ft²-°F	
	@Temperature 100 °C	@Temperature 212 °F	

Thermal Properties	Metric	English	Comments
	@Temperature 200 °C	@Temperature 392 °F	
	32.6 W/m-K	226 BTU-in/hr-ft ² -°F	
	@Temperature 400 °C	@Temperature 752 °F	
	32.8 W/m-K	228 BTU-in/hr-ft ² -°F	
	@Temperature 300 °C	@Temperature 572 °F	

Component Elements Properties	Metric	English	Comments
Carbon, C	0.37 %	0.37 %	
Chromium, Cr	5.0 %	5.0 %	
Iron, Fe	92.33 %	92.33 %	As Balance
Manganese, Mn	0.30 %	0.30 %	
Molybdenum, Mo	1.3 %	1.3 %	
Silicon, Si	0.20 %	0.20 %	
Vanadium, V	0.50 %	0.50 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000520 ohm-cm	0.0000520 ohm-cm	
	@Temperature 20.0 °C	@Temperature 68.0 °F	
	0.0000860 ohm-cm	0.0000860 ohm-cm	
	@Temperature 500 °C	@Temperature 932 °F	
	0.0000960 ohm-cm	0.0000960 ohm-cm	
	@Temperature 600 °C	@Temperature 1110 °F	

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