

Assab Steels HOTVAR Hot Work Steel

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

Material Notes:

HOTVAR is a high performance molybdenum-vanadium alloyed hot-work tool steel which is characterized by: High hot wear resistance Very good high temperature properties High resistance to thermal fatigue Very good temper resistance Very good thermal conductivity Applications: Warm forging, dies and punches Roll forging, rolling segments Rock orbital forging, punches and dies Upset forging, clamping tools Progressive forging, dies Axial closed die rolling, top and bottom dies Cross forming, segments Hot bending, tools Hot calibration, tools Zinc die casting, dies Al-tube extrusion

Order this product through the following link:

http://www.lookpolymers.com/polymer_Assab-Steels-HOTVAR-Hot-Work-Steel.php

Physical Properties	Metric	English	Comments
Density	7.78 g/cc	0.281 lb/in ³	
	7.58 g/cc	0.274 lb/in ³	
	@Temperature 600 °C	@Temperature 1110 °F	
Density	7.67 g/cc	0.277 lb/in ³	
	@Temperature 400 °C	@Temperature 752 °F	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell C	52	52	600°C tempering temperature (2 + 2hours). Austenitizing temperature 1050°C
	54	54	600°C tempering temperature (2 + 2hours). Austenitizing temperature 1070°C
	58	58	550°C tempering temperature (2 + 2hours). Austenitizing temperature 1070°C
	58	58	550°C tempering temperature (2 + 2hours). Austenitizing temperature 1050°C
	31	31	Initial hardness after tempering 58. Testing temperature 650°C. Holding time 100 hours
	@Temperature 650 °C	@Temperature 1200 °F	
	31	31	Initial hardness after tempering 56. Testing temperature 650°C. Holding time 100 hours
	@Temperature 650 °C	@Temperature 1200 °F	
	31	31	Initial hardness after tempering 54. Testing temperature 650°C. Holding time 100 hours
	@Temperature 650 °C	@Temperature 1200 °F	
39	39	Initial hardness after tempering 58.	

Mechanical Properties	Metric @ Temperature 600 °C	English @ Temperature 1110 °F	Comments Testing temperature 600°C. Holding time 100 hours
	39 @Temperature 600 °C	39 @Temperature 1110 °F	Initial hardness after tempering 54. Testing temperature 600°C. Holding time 100 hours
	39 @Temperature 650 °C	39 @Temperature 1200 °F	Initial hardness after tempering 54. Testing temperature 650°C. Holding time 10 hours
	39 @Temperature 650 °C	39 @Temperature 1200 °F	Initial hardness after tempering 56. Testing temperature 650°C. Holding time 10 hours
	39 @Temperature 650 °C	39 @Temperature 1200 °F	Initial hardness after tempering 58. Testing temperature 650°C. Holding time 10 hours
	39 @Temperature 600 °C	39 @Temperature 1110 °F	Initial hardness after tempering 56. Testing temperature 600°C. Holding time 100 hours
	50 @Temperature 650 °C	50 @Temperature 1200 °F	Initial hardness after tempering 54. Testing temperature 650°C. Holding time 1 hour
	51 @Temperature 550 °C	51 @Temperature 1020 °F	Initial hardness after tempering 54. Testing temperature 550°C. Holding time 100 hours
	51 @Temperature 550 °C	51 @Temperature 1020 °F	Initial hardness after tempering 56. Testing temperature 550°C. Holding time 100 hours
	51 @Temperature 550 °C	51 @Temperature 1020 °F	Initial hardness after tempering 58. Testing temperature 550°C. Holding time 100 hours
	52 @Temperature 650 °C	52 @Temperature 1200 °F	Initial hardness after tempering 56. Testing temperature 650°C. Holding time 1 hour
	52 @Temperature 600 °C	52 @Temperature 1110 °F	Initial hardness after tempering 54. Testing temperature 600°C. Holding time 10 hours
	52 @Temperature 600 °C	52 @Temperature 1110 °F	Initial hardness after tempering 56. Testing temperature 600°C. Holding time 10 hours
	52 @Temperature 600 °C	52 @Temperature 1110 °F	Initial hardness after tempering 58. Testing temperature 600°C. Holding time 10 hours
	52 @Temperature 650 °C	52 @Temperature 1200 °F	Initial hardness after tempering 58. Testing temperature 650°C. Holding time 1 hour
	53 @Temperature 600 °C	53 @Temperature 1110 °F	Initial hardness after tempering 54. Testing temperature 600°C. Holding time 1 hour

Mechanical Properties	Metric	English	Comments
	@Temperature 550 °C	@Temperature 1020 °F	Initial hardness after tempering 54. Testing temperature 550°C. Holding time 0-10 hours
	55 @Temperature 600 °C	55 @Temperature 1110 °F	Initial hardness after tempering 56. Testing temperature 600°C. Holding time 1 hour
	56 @Temperature 600 °C	56 @Temperature 1110 °F	Initial hardness after tempering 58. Testing temperature 600°C. Holding time 1 hour
	58 - 60 @Diameter 25.4 mm	58 - 60 @Diameter 1.00 in	Hardness before tempering in Air. Austenitizing temperature: 1050°C. Soaking time 30 minutes.
	59.5 @Diameter 25.4 mm	59.5 @Diameter 1.00 in	HRC_{air}. Austenitizing temperature 1050°C
	59 - 61 @Diameter 25.4 mm	59 - 61 @Diameter 1.00 in	Austenitizing temperature: 1070°C. Soaking time 20 minutes.
	60 @Diameter 25.4 mm	60 @Diameter 1.00 in	HRC_{air}. Austenitizing temperature 1080°C
	61 @Diameter 25.4 mm	61 @Diameter 1.00 in	HRC_{oil}. Austenitizing temperature 1050°C
	60 - 62 @Diameter 25.4 mm	60 - 62 @Diameter 1.00 in	Hardness before tempering in Air. Austenitizing temperature: 1050°C. Soaking time 30 minutes.
	61 - 63 @Diameter 25.4 mm	61 - 63 @Diameter 1.00 in	Austenitizing temperature: 1070°C. Soaking time 20 minutes.
	62 @Diameter 25.4 mm	62 @Diameter 1.00 in	HRC_{oil}. Austenitizing temperature 1080°C
Tensile Strength at Break	400 MPa @Temperature 700 °C	58000 psi @Temperature 1290 °F	R_m
	1900 MPa @Temperature 300 °C	276000 psi @Temperature 572 °F	R_m
Tensile Strength, Ultimate	2100 MPa	305000 psi	R_m. 54 HRC.
	2200 MPa	319000 psi	R_m. 56 HRC.
	2300 MPa @Temperature 23.0 °C	334000 psi @Temperature 73.4 °F	

Tensile Strength, Yield Mechanical Properties	1800 MPa Metric	261000 psi English	R_p</sub>02. 54 HRC. Comments
	1820 MPa	264000 psi	R_p</sub>02. 56 HRC.
	250 MPa	36300 psi	R_p</sub>02
	@Temperature 700 °C	@Temperature 1290 °F	
	1700 MPa	247000 psi	R_p</sub>02
	@Temperature 300 °C	@Temperature 572 °F	
	1850 MPa	268000 psi	
	@Temperature 23.0 °C	@Temperature 73.4 °F	
Elongation at Break	13 %	13 %	
	@Temperature 300 °C	@Temperature 572 °F	
	25 %	25 %	
	@Temperature 700 °C	@Temperature 1290 °F	
Reduction of Area	20 %	20 %	
	@Temperature 300 °C	@Temperature 572 °F	
	55 %	55 %	
	@Temperature 500 °C	@Temperature 932 °F	
	85 %	85 %	
	@Temperature 700 °C	@Temperature 1290 °F	
Modulus of Elasticity	210 GPa	30500 ksi	
	140 GPa	20300 ksi	
	@Temperature 600 °C	@Temperature 1110 °F	
	180 GPa	26100 ksi	
	@Temperature 400 °C	@Temperature 752 °F	
Impact Test	12.0 J	8.85 ft-lb	Charpy-V specimens, transverse direction.
	@Temperature 100 °C	@Temperature 212 °F	
	15.5 J	11.4 ft-lb	Charpy-V specimens, transverse direction.
	@Temperature 300 °C	@Temperature 572 °F	

Thermal Properties	Metric	English	Comments
CTE, linear	12.6 µm/m-°C	7.00 µin/in-°F	
	@Temperature 20.0 - 400 °C	@Temperature 68.0 - 752 °F	

Thermal Properties	Metric	English	Comments
	13.2 $\mu\text{m}/\text{m}\cdot\text{C}$	7.22 $\mu\text{m}/\text{in}\cdot\text{F}$	
	@Temperature 20.0 - 600 °C	@Temperature 68.0 - 1110 °F	
Thermal Conductivity	31.0 W/m-K	215 BTU-in/hr-ft ² -°F	
	@Temperature 20.0 °C	@Temperature 68.0 °F	
	33.0 W/m-K	229 BTU-in/hr-ft ² -°F	
	@Temperature 400 °C	@Temperature 752 °F	
	33.0 W/m-K	229 BTU-in/hr-ft ² -°F	
	@Temperature 600 °C	@Temperature 1110 °F	

Component Elements Properties	Metric	English	Comments
Carbon, C	0.55 %	0.55 %	
Chromium, Cr	2.6 %	2.6 %	
Iron, Fe	91.99 %	91.99 %	
Manganese, Mn	0.75 %	0.75 %	
Molybdenum, Mo	2.25 %	2.25 %	
Silicon, Si	1.0 %	1.0 %	
Vanadium, V	0.85 %	0.85 %	

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