

Assab Steels QRO 90 SUPREME Hot Work Steel

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

Material Notes:

QRO 90 SUPREME is a high-performance, chromium-molybdenum-vanadium alloyed hot-work tool steel which is characterized by: Excellent high temperature strength and hot hardnessVery good temper resistanceResistance to thermal fatigueExcellent thermal conductivityGood toughness and ductility in longitudinal and transverse directionsUniform machinabilityGood heat treatment properties

The name "SUPREME" implies that by special manufacturing techniques, including electro-slag remelting the steel attains high purity and good mechanical properties. The combination of high temperature strength, temper resistance and thermal conductivity exhibited by QRO 90 SUPREME is good. Thus QRO 90 SUPREME has given improved service life in die casting and extrusion of non-ferrous metals and forging and extrusion of steel. Applications: Die casting dies and associated tooling: cores, core pins, inserts, small to medium sized dies, shot sleeves, moving parts for aluminum, brass, and copper die casting. Extrusion dies and extrusion tooling: Dies for simple profiles to be produced in long series requiring more than one dieDies for complicated or thin walled profilesHollow diesDies for difficult-to-extrude alloys. For extrusion components: liners, dummy blocks, mandrels and stems. Forging dies: small and medium sized dies for pressforging of steel, and brass. This product is also eminently suitable for progressive forging, upset forging, extrusion forging, powder forging and all processes where heavy water cooling is used.

Order this product through the following link:

http://www.lookpolymers.com/polymer_Assab-Steels-QRO-90-SUPREME-Hot-Work-Steel.php

Physical Properties	Metric	English	Comments
Density	7.78 g/cc	0.281 lb/in ³	
	7.53 g/cc	0.272 lb/in ³	
	@Temperature 800 °C	@Temperature 1470 °F	
	7.67 g/cc	0.277 lb/in ³	
	@Temperature 400 °C	@Temperature 752 °F	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell C	39	39	holding time 10 hours at 650°C. Austenitizing temperature 1020°C
	39	39	holding time 100 hours at 600°C. Austenitizing temperature 1020°C
	42	42	tempering temperature 650°C. Austenitizing temperature 1020°C
	45	45	tempering temperature 650°C. Austenitizing temperature 1050°C
	47	47	holding time 1 hour at 650°C. Austenitizing temperature 1020°C
	48	48	holding time 10 hours at 600°C. Austenitizing temperature 1020°C

Mechanical Properties	⁵⁰ Metric	⁵⁰ English	holding time 1 hour at 600°C. Austenitizing temperature 1020°C Comments
	50	50	tempering temperature 350°C. Austenitizing temperature 1020°C
	51	51	tempering temperature 350°C. Austenitizing temperature 1050°C
	49 - 53	49 - 53	Hardness before tempering. Austenitizing temperature: 1020°C. Soaking time 30 minutes.
	51.5	51.5	Average hardness as a function of austenitizing temperature. At 1010°C austenitizing temperature
	50 - 54	50 - 54	Hardness before tempering. Austenitizing temperature: 1050°C. Soaking time 15 minutes.
	52	52	holding time 1-100 hours at 550°C. Austenitizing temperature 1020°C
	52.5	52.5	Average hardness as a function of austenitizing temperature. At 1050°C austenitizing temperature
Hardness, Vickers	325	325	Austenitized 1020°C, tempered 630°C to 48 HRC; holding time at temperature before indentation = 30 minutes.
	@Temperature 600 °C	@Temperature 1110 °F	
	475	475	
	@Temperature 400 °C	@Temperature 752 °F	Austenitized 1020°C, tempered 630°C to 48 HRC; holding time at temperature before indentation = 30 minutes.
	540	540	Austenitized 1020°C, tempered 630°C to 48 HRC; holding time at temperature before indentation = 30 minutes.
	@Temperature 200 °C	@Temperature 392 °F	
	550 MPa	79800 psi	
Tensile Strength at Break	@Temperature 700 °C	@Temperature 1290 °F	R _m . austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	1150 MPa	167000 psi	R _m . austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 550 °C	@Temperature 1020 °F	
Tensile Strength, Ultimate	1470 MPa	213000 psi	R _m . 45 HRC.
	1620 MPa	235000 psi	R _m . 48 HRC.
	1250 MPa	181000 psi	
	@Temperature 23.0 °C	@Temperature 73.4 °F	
Tensile Strength, Yield	1270 MPa	184000 psi	R _{p0.2} . 45 HRC.
	1400 MPa	203000 psi	R _{p0.2} . 48 HRC.

Mechanical Properties	350 MPa Metric	50800 psi English	Comments ^{sub>02}
	@Temperature 700 °C	@Temperature 1290 °F	
	900 MPa	131000 psi	R _p 0.2. austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 500 °C	@Temperature 932 °F	
	1100 MPa	160000 psi	
	@Temperature 23.0 °C	@Temperature 73.4 °F	
Elongation at Break	10 %	10 %	austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 500 °C	@Temperature 932 °F	
	13 %	13 %	austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 600 °C	@Temperature 1110 °F	
	19 %	19 %	austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 700 °C	@Temperature 1290 °F	
Reduction of Area	50 %	50 %	500°C. austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	60 %	60 %	austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 600 °C	@Temperature 1110 °F	
	80 %	80 %	austenitized 1020°C, tempered 630°C to 48 HRC. Holding time = 30 minutes.
	@Temperature 700 °C	@Temperature 1290 °F	
Modulus of Elasticity	202.5 GPa	29370 ksi	
	130 GPa	18900 ksi	
	@Temperature 800 °C	@Temperature 1470 °F	
	175 GPa	25400 ksi	
	@Temperature 400 °C	@Temperature 752 °F	
Impact Test	16.0 J	11.8 ft-lb	tempering temperature 400°C. Austenitizing temperature 1020°C.
	20.0 J	14.8 ft-lb	tempering temperature 400°C. Austenitizing temperature 1020°C.
	22.0 J	16.2 ft-lb	tempering temperature 200°C. Austenitizing temperature 1020°C.

Thermal Properties	Metric	English	Comments
CTE, linear	7.00 µm/m-°C	3.89 µin/in-°F	
	@Temperature 20.0 - 400 °C	@Temperature 68.0 - 752 °F	

Thermal Properties	7.70 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$ Metric	4.28 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$ English	Comments
	@Temperature 20.0 - 800 $^\circ\text{C}$	@Temperature 68.0 - 1470 $^\circ\text{F}$	
Thermal Conductivity	30.0 W/m-K	208 BTU-in/hr-ft ² - $^\circ\text{F}$	
	@Temperature 800 $^\circ\text{C}$	@Temperature 1470 $^\circ\text{F}$	
	31.0 W/m-K	215 BTU-in/hr-ft ² - $^\circ\text{F}$	
	@Temperature 20.0 $^\circ\text{C}$	@Temperature 68.0 $^\circ\text{F}$	
	32.0 W/m-K	222 BTU-in/hr-ft ² - $^\circ\text{F}$	
	@Temperature 400 $^\circ\text{C}$	@Temperature 752 $^\circ\text{F}$	

Component Elements Properties	Metric	English	Comments
Carbon, C	0.38 %	0.38 %	
Chromium, Cr	2.6 %	2.6 %	
Iron, Fe	92.82 %	92.82 %	
Manganese, Mn	0.75 %	0.75 %	
Molybdenum, Mo	2.25 %	2.25 %	
Silicon, Si	0.30 %	0.30 %	
Vanadium, V	0.90 %	0.90 %	

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