

WM 2714 HOT WORK

WM 2714 is a nickel-chromium-molybdenum hot work steel that exhibits high impact toughness and good resistance to softening at elevated temperature. The high nickel content impacts the toughness as well as good through hardening in large section thicknesses. The steel also exhibits good resistance to thermal shock and thermal fatigue cracking.

TYPICAL ANALYSIS

Carbon.....	0.55
Manganese.....	0.85
Silicon.....	0.25
Sulfur	Max 0.015
Nickel.....	1.65
Chromium.....	1.15
Molybdenum.....	0.50
Vanadium.....	0.10

TYPICAL APPLICATIONS

Hot extrusion tooling such as die rings, bolsters, sub-bolsters, wedge blocks and holders. Hot forging and hammer dies, hot heading dies, hot punches hot gripper die and hot shear blades and holders.

PHYSICAL PROPERTIES

Critical Temperatures

Ac1	-	1350F
Ac3	-	1420F
Ms	-	445F

Thermal Conductivity

Temp.F*	Btu	Temp C*	W/m-c
68	20.8	20	36
662	21.9	350	38
1292	20.2	700	35

Coefficient of Thermal Expansion

70-400F	0.0000070
70-600F	0.00000725
70-800F	0.0000075

Machinability: 75-80% of a 1% carbon steel

THERMAL PRACTICE

ANNEALING- With a protective atmosphere or vacuum furnace, heat slowly to 1300F. Equalize and hold one hour per inch of thickness. Furnace cool 20F/hr to 1000F and equalize. Air cool to room temperature. Hardness 250 HB max.

PREHEATING: Heat to 1200-1250F and equalize.

AUSTENITIZING (High Heat): Heat rapidly from the preheat. Soak at the austenitizing temperature for 45 minutes

for thickness up to 1 inch plus 15 minutes for each additional inch of thickness over 1 inch.

For oil quenching: Heat to 1525-1600F

For air cooling: Heat to 1580-1600F.

QUENCHING: Air, pressurized gas, or warm oil, approximately 50F per minute to below 1000F is required to obtain the optimum properties in the steel. For oil, quench until black, about 900F then cool in still air to 150-125F.

TEMPERING: Temper immediately after quenching. Typical temperature range is 800-1100F. Hold at temperature for 2 hours then air cool to ambient temperature. Double tempering is recommended.

Material is available in the prehardened condition.

Typical Tempering Temperature Responses Are:

Tempering*	HRC Oil Quench	HRC Air Quench
800F	49	47
900F	47	44
1000F	43	40
1100F	40	36
1200F	36	32

Mechanical Properties:

Approximate tensile strength versus hardness at room temperature:

Hardness HRC	Tensile Strength
48	230,000 psi
46	215,000 psi
44	200,000 psi
42	190,000 psi
40	185,000 psi
38	155,000 psi

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