KMSI

KUSHAL METAL & STEEL INDUSTRIES PVT. LTD.

A LEGACY FORGED IN STEEL SINCE 1968

2714 PRIME

Hot work tool steel with good combination of high toughness and hot properties for general hot work and demanding molding applications

2714 PRIME;

- is produced by a process that ensures a good level of cleanliness and homogeneity.
- has an excellent toughness and ductility associated with a good enough hot strength and tempering back resistance.
- has a good polishability, is good for texturing.
- can be used at temperatures over 250°C with long contact and also for hot temperature applications with thermal shock or thermal cycling.
- can also be welded and exhibits good machinability
- is delivered at a hardness of 400 HB and can be machined without further heat treatment.
- has a very good suitability for surface treatments such as gas, ionic or salt bath nitriding, as well as PVD or CVD coatings.

Applications

2714 PRIME can be used for all press forging dies and cores, low pressure die casting dies, secondary areas in die casting dies, shot sleeve in HPDC.

2714 PRIME can be used for all the secondary parts in forging applications.

2714 PRIME can also be used for precision plastic injection molds, molds for abrasive polymers and reinforced plastics.

Main properties

- Excellent toughness
- Suitable for uses at temperatures over 250°C with long contact
- Good polishability
- Ready to be machined at 400 HB without extra heat treatment
- High hardenability
- Suitable for surface treatments

Chemical composition *(typical)*

C	Mn	Si	P	S	Cr	Ni	Mo	V
0.55	0.8	0.20	< 0.020	< 0.005	1.10	1.70	0.50	0.10

Designation

Werkstoü Nr	ISO	China GB	JIS Japan	UK	AISI USA	Russia Gost	AFNOR	Other / Special
1.2714	55NiCrMoV7	5CrNiMo	SKT4	BH224/5	L6	5KHNM / 5KHNV	55NCDV7	-

Structure

The structure of the 2714 PRIME is óne and homogeneous without precipitation or alignments of carbides. The heat treatment *(quench and tempering)* is optimized for high homogeneity of hardness from surface to core even for thicker blocks.

Hardness at the time of delivery

Heat treated for 380 - 420 HB.

Typical mechanical properties in hardened conditions *(results from internal tests not indicated on the* certiócates)

Temperature °C	TS MPa	YS 0.2% MPa	Elongation %	Hardness HRC
20	1400	1300	11	410
400	1200	900	12	360
500	1050	850	15	310
600	500	300	20	ç160

The impact test values are strongly depending on the thickness of the product

Thickness *(mm)*	100	250	500	750	1000
Typical KV *(J at 20°C)*	40	35	25	20	18

Physical properties

Temperature	20°C	200°C	400°C	600°C
Volumic mass kg/m^3	7800	7740	7710	7680
Young Modulus N/mm^2	215000	200000	198000	180000
Thermal conductivity W/m.K	32	32.5	32.6	33
Coeώcient of linear expansion 10^{-6}/K	13	13.1	13 .5	14.0

Heat treatment

The 2714 PRIME is delivered heat treated at 380 - 420 HB and there is no need for further heat treatment.

SOFT ANNEALING

Temperature: 700 - 720°C, duration 1h + 1h for 25mm thickness. slow cooling in the furnace *(10 to 20°C/h)*. The atmosphere in the furnace must be reducing to avoid decarburization of the steel.

STRESS RELIEVING

After machining, it is recommended to perform stress relieving at 520°C maximum for a minimum of 2 hours, followed by slow cooling in the furnace to 450°C.

AUSTENITIZATION

In order to avoid any risk of cracking it is recommended to preheat in 2 steps.

- 1st preheating step:
  temperature: 450°C time: 30 s/mm of thickness
- 2nd preheating step:
  temperature: 650°C time: 30 s/mm of thickness

Recommended austenitizing temperature: 830 - 870°C. The holding time should not be too long to avoid a risk of grain coarsening and a loss of toughness. It is recommended to keep the part at the austenitizing temperature 30 minutes per inch of thickness as soon as the temperature of the surface reach the austenitization temperature.

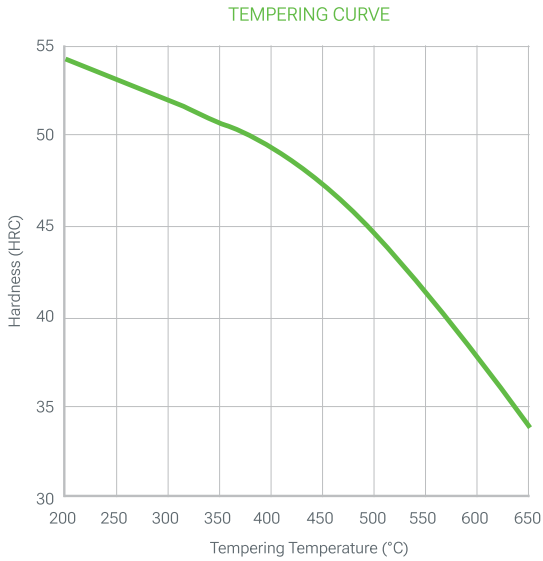
QUENCHING MEDIUM

Oil at 80°C, vacuum *(pressure > 6 bars*), salt bath 500 - 550°C.
To ensure good toughness, treatment with oil or salt bath is preferable.

TEMPERING

To ensure a minimum residual austenite rate as well as greater tool stability, it is essential to perform a double tempering. Each tempering is followed by a cooling under 100°C.

Each tempering time must be at least equal to 1h + 1h for 25 mm of thickness of the treated part *(equivalent thermal thickness).*



Surface treatment

NITRIDING

2714 PRIME can be nitrided at temperatures less than or equal to 20°C below tempering temperatures without risk of deterioration of the mechanical characteristics.

With gas nitriding at 520°C *(25h)* the surface hardness is 1080HV1 with a diüusion layer of 0.2mm.

PVD, CVD

2714 PRIME is suitable for all kinds of PVD and CVD treatment as soon as the treatment temperature is 30°C lower than the last tempering temperature.

Polishing

2714 PRIME is perfectly suitable for polishing in the treated state and can be used for applications requiring a suώcient level of polish for translucent - transparent parts (Rt χ 20 ɲm, CNOMO level 2, Rugotest N7).

Optimal polishing is achieved by performing consecutive steps with similar roughness and stopping each step as soon as the last scratch from the previous step disappears.

Texturing

2714 PRIME is suitable for chemical or laser texturing.

Induction or laser hardening

2714 PRIME can be surface hardened up to 58 HRC by induction or laser. Please consult us for more details. A stress relieving at 150°C for minimum 2h is mandatory after surface hardening.

Machining

The machining parameters below are given for information only and must be adapted according to the equipment and usual machining conditions.

TURNING

	Carbide tool	Finishing
	Rough machining	120 - 160
Cutting speed m/min	90 - 120	0.05 - 0.2
Feed mm/r	0.15 - 0.35	1
Depth of cut mm	2 - 4	

MILLING: SURFACING

	Milling with carbide tools		Solid tool
	Rough machining	½ Finishing	Finishing
Cutting speed m/min	70 - 150	140 - 180	50 - 100
Feed mm/r	0.15 - 0.35	0.1 - 0.2	0.005 - 0.15
Depth of cut mm	2 - 4	2	

DRILLING: HSS TWIST DRILL

Drill diameter mm	Cutting speed m/min	Feed mm/t
< 5	10	0.05 - 0.10
5 - 10	10	0.10 - 0.15
10 - 15	10	0.18 - 0.25
15 - 20	10	0.22 - 0.29

DRILLING: CARBIDE DRILL

	Carbide type		
	Indexable insert	Solid carbide	Carbide tip
Cutting speed m/min	150 - 170	90 - 120	50 - 70
Feed mm/t	0.05 - 0.10	0.10 - 0.25	0.15 - 0.25

FINE GRINDING

General indications for grinding wheels to be used on 2714 PRIME in the heat treated condition. Usually, rather soft vitrióed aluminum oxide grinding wheels *(grades G for plane grinding to K for cylindrical grinding)* are used.

Particular attention will be paid to eüective cooling of the surface during grinding to prevent degradation of the material surface.

ELECTRO-DISCHARGE MACHINING

2714 PRIME is also suitable for EDM machining *(wire or electrode)*. Preferably, the machining will be carried out with a low current density and a high frequency in order to limit the thickness of the white layer as much as possible.

Then it is necessary to carry out a stress relieving at 25°C below the last tempering in order to reduce the level of residual stresses *(which could lead to a risk of cracking)* and to carry out a polishing to completely remove the white layer formed during the discharge machining process.

Welding

It is not recommended to weld 2714 PRIME but if this is mandatory it could be welded in the heat treated condition.

- Method: TIG
- Filler wire: UTP A73
- Preheating: 250°C

Hold at 200°C during the welding operation with a maximum interpass temperature at 350°C. Slow cooling *(max 20°C/h)* after welding.

- Post treatment:
  At 250°C, duration 1h + 1h for 25 mm of thickness. slow cooling in the furnace *(10 to 20°C/h)*. Hardness of the welded area: ç350 - 400 HB.

OUR PRESENCE

CONTACT DETAILS:

Kushal Doshi | Director
+91 9920475123 / 8591775123
kushal@kushalmetal.net
kushalmetal09@gmail.com

Nitin Doshi | Chairman
+91 22 68520014
kushalmetal09@gmail.com

LK Pandey | Manager
+91 9321604504
kushalmetal09@gmail.com

Rujiv Shah | Sales
+91 9930203399
rujiv@kushalmetal.net

Purnam Zota | Sales
+91 8828049949
kushalmetal09@gmail.com

Darshan Shah | Sales
+91 9820360902
darshan@kushalmetal.net

Keval Shah Partner (Gujarat Region)
+91 9224640506
kushalmetal07@gmail.com

Nirav Desai Partner (South Region)
+91 9167234000
nirav@kushalmetal.net

Kushal Metal and Steel Industries Pvt. Ltd.

OFFICE: 8th Floor, Majestic Shopping Centre Premises Co-op. Society Ltd, 144 JSS Road, Girgaon, Mumbai - 400 004.
TEL: +91-22-68520000/10-30

UNIT 1: Gala No. 3A/3B & 3, Bldg. No. 188 & 183, Indian Corporation Compound, Mouje Gundavli (Mankholi - Phata), Taluka: Bhiwandi - 421 302. Dist: Thane. (Maharashtra). India.

UNIT 2: Plot No.14, Swayam Industrial Park, Opp. Old Age Home, Near Petro Valve Company, Indore Highway, Kuha, Ahmedabad - 382433

WEB:
www.kushalmetal.net / www.berylliumcopper.in