

W 1.2714

W 1.2714: a HRC 40 prehardened tool steel

Material properties

40 HRC pre-hardened standard grade suitable for hot work tools and for the plastic mold industry. High resistance to wear, high toughness, good polishing properties.

For which applications

Forging dies, hot shear knives, hot punching tools, die holders.

Plastic injection or compression mould cores and cavities, large - size moulds with high quality finish, compression dies under high mechanical and thermal stresses.

Thermoplastics (PE, PS, PP), LFT, thermosetting plastics, ABS, transparent melts.

PROPERTIES

STANDARD

| | |
|-------------|--------------|
| > Afnor | 55 NCDV7 |
| > Euronorm | 55 NiCrMo V7 |
| > Werkstoff | W1.2714 |
| > AISI | L6 |

CHEMICAL ANALYSIS - WEIGHT%

Typical Industeel analysis is in accordance with international standards

| C | Smax | P max | Si | Mn | Ni | Cr | Mo | V |
|------|------|-------|-----|-----|-----|-----|-----|-----|
| 0.55 | .005 | .002 | 0.3 | 0.9 | 1.7 | 1.1 | 0.5 | 0.1 |

MECHANICAL PROPERTIES

2714 grade is delivered **quenched and tempered to 360 - 400 HB (37 - 41 HRC)**. Higher hardness available on demand

| Hardness | Rp 0.2 Yield Strength | | Rm Tensile strength | | Elongation | K _C V 20°C | Elastic modulus | |
|----------|-----------------------|-----|---------------------|-----|------------|--------------------------|-----------------|-------|
| | MPa | ksi | MPa | ksi | | | GPa | ksi |
| HB | | | | | % | J | | |
| 376 | 1045 | 151 | 1270 | 184 | 10 | 40 | 205 | 29733 |

2714 grade is also available in annealed condition. For more details please consult.

PHYSICAL PROPERTIES

| Thermal conductivity W.m-1.K-1 | | Thermal expansion Coefficient (10-6.K-1) | | | | Specific heat J/kg.°C |
|--------------------------------|--|--|----------|----------|----------|--------------------------|
| 20°C | | 20-100°C | 20-200°C | 20-300°C | 20-400°C | |
| 29 | | 11.9 | 12 | 12.7 | 13.4 | 460 |

Typical value

METALLURGICAL PROPERTIES

Internal soundness

All plates are ultrasonically tested, according to ASTM A578 - S9 specification.

Grain size

Uniform 7/8 grain size according to ASTM E 112 method.

Cleanliness

Due to the above mentioned steelmaking process, the content of non metallic inclusions is reduced to an extremely low level. This ensures a good polishability and chemical etching ability. Non metallic inclusions content is measured in accordance with ASTM E45A method («worst field»).

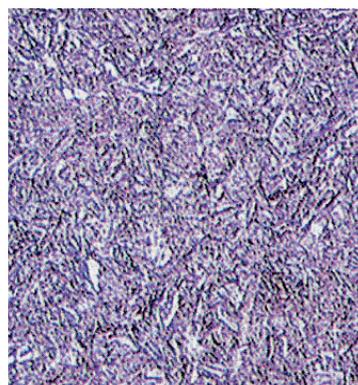
| A (sulfide) | | B (alumina) | | C (silicate) | | D (Globular oxides) | |
|-------------|-------|-------------|-------|--------------|-------|---------------------|-------|
| Thin | Heavy | Thin | Heavy | Thin | Heavy | Thin | Heavy |
| 1 | 1.5 | 1.5 | 1.5 | 1.0 | 1.0 | 2 | 1.5 |

Guaranteed levels



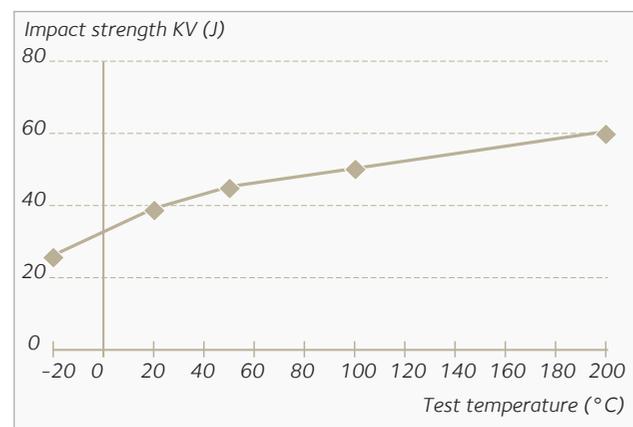
Homogeneity

W1.2714 has an excellent hardenability due to the Nickel addition resulting in good uniformity of hardness and microstructure. Hardness scatter is less than 30 HB all through thickness.



TOUGHNESS

KCV impact strength in the longitudinal direction for a prehardened 400 HB, 100 mm thick (4")



HEAT TREATMENT

For particular applications requiring higher resistance, hardening can be performed in the following way:

- > Heating around 870 °C (1600 °F) with holding time 1 hour/inch
- > If necessary, protect the tool against decarburization and oxidation during hardening
- > Quenching media: Oil or air depending on thickness (see CCT diagram hereafter). High speed gas or circulating atmosphere
- > Tempering temperature depends on the required mechanical characteristics (see tempering curve hereafter)
- > Immediate tempering is advised after the tool has reached 50 - 80 °C (120/180 °F)

Following instructions should be followed to obtain an efficient tempering:

- > Holding time one hour per inch of total thickness
- > Double tempering with cooling to room temperature between them is recommended

Note that complicated shapes require accurate control of steel temperature and holding times.

CHEMICAL ETCHING

W1.2714 is well adapted for texturing. Its composition, uniform microstructure and hardness ensure accurate and consistent pattern reproduction.

E.D.M.

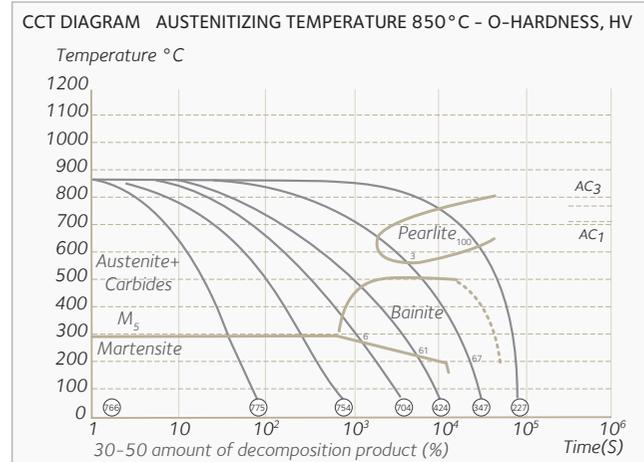
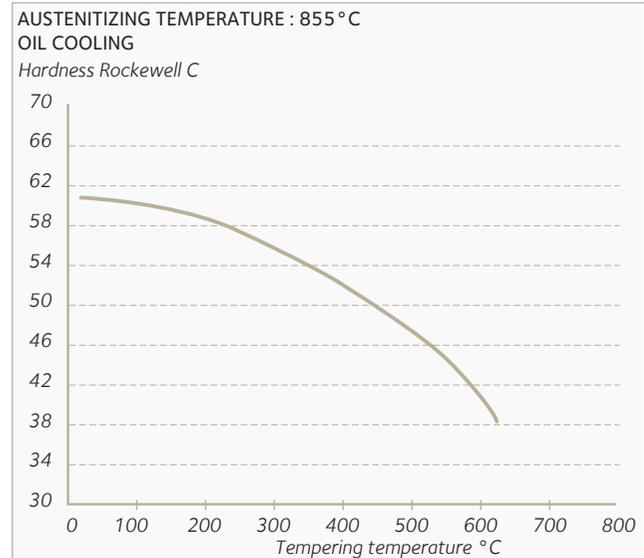
Electrical Discharge Machining: This method of machining can be used on W1.2714 grade. It is advisable to remove completely the rehardened white layer by grinding and polishing.

SURFACE TREATMENT

Quality of surface treatment is largely dependent on the surface roughness after polishing. Homogeneity of hardness, microstructure and good cleanliness ensure a good behavior for chromium plating, nickel plating or nitriding. After hard - chromium plating, the steel should be tempered for about 4 hours at 180 °C (356 °F) in order to avoid hydrogen embrittlement.

Tempering curve

Selection of tempering conditions in terms of required mechanical properties



The Continuous Cooling Transformation diagram reveals the identity and quantity of microstructural constituents obtained at different cooling rates.

POLISHING

W1.2714 has a good polishability in the quenched and tempered condition. After grinding, polishing should proceed with aluminium oxide or diamond paste be :

Avoid overpolishing (high pressure or polishing time) which can lead to defects on the polished surface (orange peel, waves...).

DIMENSIONAL PROGRAM

| Thickness | Width |
|--------------|----------------|
| 8 - 120 mm | 1000 - 2100 mm |
| 120 - 350 mm | 1500 - 2000 mm |

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