



ELLWOOD
SPECIALTY
STEEL

ExELL 2714 TOOL STEEL



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CAPABILITIES

Ellwood Specialty Steel is a fully integrated producer of a wide range of specialty tool steels. Our ExELL grades are made with the advanced ASEA-SKF steel making capabilities which include an ultra high powered electric arc furnace with subsequent state of the art ladle refining and vacuum degassing equipment for the most complete and modern ladle metallurgy technology.

Our steel making expertise and capability is further enhanced from a long forging history with optimum forging and heat treating practices to develop very special material characteristics of product uniformity, cleanliness, machinability, polishability, strength, toughness, hardenability and other steel properties. All this from production facilities certified to ISO 9002.

QUALITY ASSURANCE

Ellwood Specialty Steel is committed to providing products and services which will consistently meet or exceed all quality and performance expectations. We will provide customer and technical service that will ensure complete satisfaction

Being a very flexible provider, Ellwood Specialty

Steel will establish product programs to fully support industry or customer requirements. Our extensive stock programs are supported by very short mill lead times of custom forged products. Customized stock programs are and can be available for specific customer needs.

This information is intended to provide general data on our products and their uses and is based on our knowledge at the time of publication. No information should be construed as a guarantee of specific properties of the products described or suitability for a particular application. Ellwood Specialty steel reserves the right to make changes in practices which may render some information outdated or obsolete. Ellwood Specialty Steel should be consulted for current information and/or capabilities.

ELLWOOD SPECIALTY STEEL

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ExELL 2714 TOOL STEEL

ExELL 2714 was developed by Ellwood Specialty Steel as a special tooling quality nickel-chromium-molybdenum-vanadium steel from international standards for use in mostly hot work tools.

ExELL 2714 is characterized by excellent through hardening properties, good toughness and ductility, good hot strength and good hot hardness.

APPLICATIONS

ExELL 2714 is specifically manufactured for forging applications and a general upgrade to the more traditional die block steel grades and is recommended for:

- Die blocks
- Inserts
- Sow blocks
- Piston rods/heads
- Hammer rams
- Bolster plates
- Holders
- Trim dies

ExELL 2714 is generally supplied prehardened at a hardness of 331-375 HB. However, other temper hardness ranges are readily available.

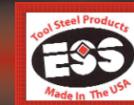


ExELL 2714 is a very versatile alloy tool steel and performs well in other tooling and engineering applications. These include:

- Die casting dies for lower production runs
- Tools for hot shearing
- Plastic molds
- Support tools in aluminum extrusion

TYPICAL ANALYSIS

C	0.55	Ni	1.60
Mn	0.80	Cr	1.15
Si	0.25	Mo	0.50
		V	0.10





CHARACTERISTICS

Physical Properties

Coefficient of Thermal Expansion, in/in/F

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

Thermal Conductivity, BTU in/ft² hr F

70 F.....202
650 F.....210
1300 F.....215

Machinability: In the annealed condition, ExELL 2714 exhibits a machinability rating of 80% compared to a 1% carbon tool steel. This rating shows the material is easier to machine than AISI H-13.

Critical Temperatures

Ac₁ - 1350 F
Ac₃ - 1420 F
Ms - 445 F

HEAT TREATMENT (General Recommendations)

STRESS RELIEVING

To minimize movement during service or heat treatment, a stress relieve can be used between the rough finish machine operations of tool making for prehardened material or annealed material before heat treatment.

After rough machining, heat the part to 950F (for prehardened material) or 1200F (annealed material), equalize and hold 1-2 hours. Furnace cool to 800F and then air cool.

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.

HARDENING AND QUENCHING

Preheating : Heat to 1200-1250F and equalize. Continue heating to hardening temperature.

Hardening: Protect against oxidation and decarburization. Austenitizing (hardening) temperature is adjusted to accommodate quenching medium and required hardness response, temper-resistance, etc.

(Oil quenching increases the risk of cracking. Avoid thin and heavy sections and use very generous fillets and radii).

Oil Quenching

Hardening Temperature	Hold Time*	As-Quenched Hardness
1530-1590F	30 min.	57 ± 2 HRC

Air Quenching

Hardening Temperature	Hold Time*	As-Quenched Hardness
1580-1640F	30 min.	55 ± 2 HRC

*Hold time = time at temperature after tool is fully heated through
Temper as soon as quenching temperature reaches 120 - 150F.

TEMPERING

Temper immediately after quenching to about 150F.

Temper two times with intermediate cooling to room temperature.

ExELL 2714 should be heated to the desired tempering temperature and held a minimum of two hours. Select the tempering temperature based on required hardness and prior quenching medium. Air cool to room temperature. Check hardness and

Typical tempering temperature responses are:
(Use for approximate guideline only)

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

SURFACE TREATMENTS

If a locally higher hardness is required, **ExELL 2714** lends itself readily to flame or induction hardening to 54 - 58 HRC (air cooling). Surfaces of **ExELL 2714** can also be easily chrome plated or nitrided by typical or standard methods.

MECHANICAL PROPERTIES

Approximate tensile strength versus hardness at room temperature:

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

Typical elevated temperature tensile properties of material hardened and tempered to 46 HRC include:

Test Temp F	Yield Strength psi	Tensile Strength psi	RA %
600	158,000	185,000	45
700	145,000	172,000	50
950	90,000	130,000	65
1100	32,000	72,000	85

TOOLMAKING

For any additional information including welding, machining, grinding or EDM processing, please contact Ellwood Specialty Steel direct at: **800-932-2188**

