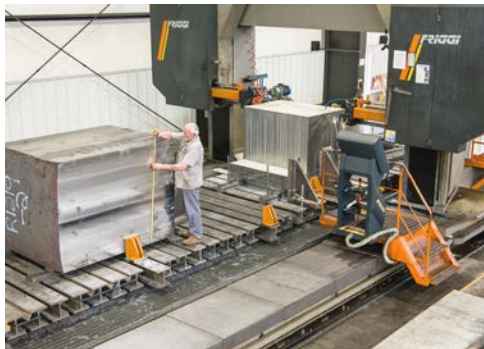




**EXELL™ 2714** | **Tool Steel**



**ELLWOOD**

YOUR METALS PARTNER, FROM MELT TO DISTRIBUTION

## EXELL 2714

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

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

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

## 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
- Die Inserts
- Sow Blocks
- Hammer Rams
- Bolster Plates
- Holders

ExELL™ 2714 is generally supplied prehardened at 331-375 HB (36-40 HRC). Other temper hardness ranges are available.

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

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

## 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/ft hr F

- 70 F - 17
- 400 F - 17.5
- 750 F - 18

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

### 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.

TENSILE STRENGTH VS HARDNESS AT ROOM TEMP	
HARDNESS HRC	TENSILE STRENGTH (PSI)
48	230,000
46	215,000
44	200,000
42	190,000
40	185,000
38	155,000

## HEAT TREATMENT (General Recommendations)

### STRESS RELIEVING

- To minimize movement during service, a stress relief can be used between the rough and 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:

Protect against oxidation and decarburization. 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 & GAS QUENCHING		
HARDENING TEMPERATURE	HOLD TIME*	AS-QUENCHED HARDNESS
1530-1590F	30 minutes	57 ± 2 HRC

AIR QUENCHING		
HARDENING TEMPERATURE	HOLD TIME*	AS-QUENCHED HARDNESS
1580-1640F	30 minutes	55 ± 2 HRC

\* Hold Time = time at temperature after tool is fully heated through

## TEMPERING

Temper immediately after quenching to 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 adjust temperature for additional temper operations.

TYPICAL TEMPERING TEMPERATURE RESPONSES		
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

Use for approximate guideline only

## TOOLMAKING

For additional information including welding, machining, grinding or EDM processing, please contact ELLWOOD Specialty Steel direct at 800.932.2188.

## 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 be chrome plated or nitrided by typical or standard methods.



## CAPABILITIES

ELLWOOD Specialty Steel is a fully integrated producer of a wide range of specialty tool steels.

Our ExELL™ grades are made with advanced steel making capabilities which include an ultra high powered electric arc furnace and subsequent state of the art ladle refining and vacuum degassing equipment for the most complete and modern ladle metallurgy.

Our steel making expertise and capability is further enhanced from a long forging history with optimum forging and heat treating practices to develop 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 consistently meet or exceed your quality and performance expectations. We will provide customer and technical service that will ensure complete satisfaction.

ELLWOOD Specialty Steel will establish product programs to fully support industry or customer requirements. Our extensive stock programs are supported by short mill lead times of custom forged products.

Customized stock programs can be available for specific customer needs.



This information is intended to provide general data on our products, 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 procedures 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.



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