

# DATA SHEET

## SHELLEX®

~ W.Nr. 1.2367 - X38CrMoV5-3

## HOT WORK TOOL STEEL



# Finkl Steel

### TYPICAL APPLICATIONS

- Tooling for Die Casting
- Aluminum and magnesium extrusion dies
- Die inserts and forging dies
- Plastic Mold Dies
- Cores, sleeves and slides

### GENERAL

Delivery Condition:

Annealed to 235 BHN Max.

EFVD or EFVD + VAR

**Finkl ShelleX®** is a remarkably tough, long lasting, Cr-Mo-V steel with excellent high temperature physical properties and a patented chemistry that reduces primary carbide formation for improved fracture toughness. **ShelleX®** was designed for those applications that need greater wear, tempering resistance, and heat checking resistance than can be obtained from standard H11, H13 or 1.2367 die steels.

**ShelleX®** exhibits higher strength and surface hardness at room temperature than H11, H13 or 1.2367 type alloys when tempered at identical tempering temperatures. **ShelleX®** also better resists softening at elevated operating temperatures (see figure). The high temperature strength and tempering resistance, in conjunction with its heat checking resistance, enables **ShelleX®** to achieve increased production quantities before maintenance is required.

### Typical Chemical Analysis\* - % weight

C	Mn	Si	Cr	Mo	V
0.36	0.35	0.90	5.00	2.85	0.25

\*Covered under U.S. Patent: 6,019,938

**ShelleX®** is available in single-melt (EFVD) or remelt (EFVD+VAR) quality. The VAR process creates a highly refined structure with exceptionally low levels of microsegregation (banding) and nonmetallic inclusions. The result is a product with the highest possible toughness at all strength levels.

**ShelleX®** is forged using a special densifying process which assures optimum consolidation of centers.

**ShelleX®** is forged on our largest presses equipped with wide dies assuring maximum deformation during forging process.

**ShelleX®** is characterized by:

- Improved wear resistance
- Improved temper resistance
- Improved fracture toughness
- High temperature strength
- High impact resistance

**ShelleX®** is 100% ultrasonic tested to very high standards. It is defect free.

®Finkl Steel Trademark

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## HOT WORK TOOL STEEL

### ShelleX®

#### HEAT TREATMENT

##### ANNEALING

Temperature: 1525-1575°F (829-857°C)  
 Rate of cooling: 25°F (15°C) max per hour  
 Typical annealed hardness: 235 BHN Max

##### HARDENING

Preheat slowly in two stages; first to 1000-1225°F (540-660°C) and then 1500-1600°F (815-870°C)  
 Austenitizing Temperature: 1850-1885°F (1010-1030°C)  
 Soak: 30-45 minutes at temperature  
 Quench: Vacuum furnace with 2 bar min backfill or hot oil; quench to 300°F (150°C)

##### TEMPERING

Temperature: See figure for temperature-hardness relationship; a minimum tempering temperature of 1050°F (565°C) is recommended  
 Soak: Hold a minimum of 1 hour per inch (25 min. per cm) of cross section for each tempering operation  
 Cooling: Air cool  
 Double-tempering is recommended

##### STRESS RELIEVING

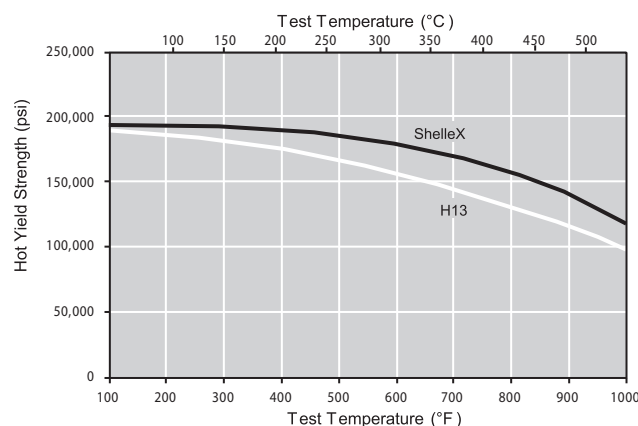
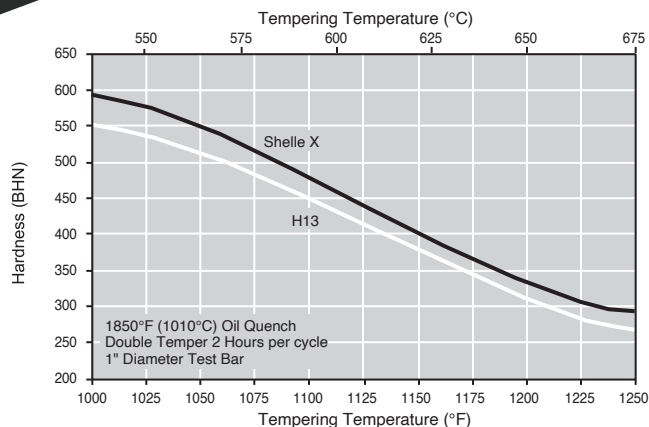
Temperature: 50-100°F (30-55°C) below the final tempering temperature  
 Cooling: Slow cool to 875°F (470°C) and then air cool

**Note:** Provided technical data and information in this data sheet are typical values. Normal variations in chemistry, size and conditions of heat treatment may cause deviations from these values. We suggest that information be verified at time of enquiry or order. For additional data or metallurgical assistance, please contact us.

##### SIZE

(Finished / approx.)

Max weight	16 330 kg	36 000 lbs
Max section	0.90 m <sup>2</sup>	1 400 sq in
Max width	1 270 mm	50"
Max thickness	760 mm	30"



Contact your Finkl representative to learn more about online business services.

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