



### SHELLEX™

~ W.Nr. 1.2367 - X38CrMoV5-3

### HOT WORK TOOL 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, ESR or VAR

Non-NADCA: **SX®**

NADCA Grade C: **SXQ® ESR or VAR**

**ShelleX™** exhibits higher strength and surface hardness at room temperature than H13 and H11 type alloys when tempered at identical tempering temperatures. **ShelleX™** also resists softening at elevated operating temperatures better than H13 and H11 (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.

**SX®** is a 1.2367 modified type steel with higher molybdenum for added heat resistance over standard 1.2367 and H11. Alloy composition is balanced in order to reduce primary carbide formation for improved fracture toughness.

#### Typical Chemical Analysis - % weight

C	Mn	Si	Cr	Mo	V
0.36	0.40	0.45	5.00	2.85	0.45

**SX®** has an excellent combination of high strength and toughness and can reach hardnesses typically in the 42 to 52 HRC with standard hardening procedures by most vacuum heat treating operations.

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

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

**SX®** is characterized by :

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

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

**SX®** can be supplied pre-certified to NADCA standard #207 Grade C (**SXQ® ESR or VAR**) on request.

®Finkl Steel Trademark

# DATA SHEET

## HOT WORK TOOL STEEL

### SX<sup>®</sup>

#### HEAT TREATMENT

##### ANNEALING

Temperature: 1500-1550°F (815-845°C)  
Rate of cooling: 25°F (15°C) max per hour  
Typical annealed hardness: 235 BHN Max.

Key parameter of the NADCA recommended procedure for hardening dies for die casting service are:

##### HARDENING

Rate of heating: slow  
Preheat Temperature: 1200-1300°F (650-705°C)  
Hardening Temperature: 1850-1885°F (1010-1030°C)  
Time at temperature: 30-45 minutes  
Quenching to 300°F (150°C)

##### TEMPERING

Tempering Temperature: 1050°F (565°C) minimum

##### STRESS RELIEVING

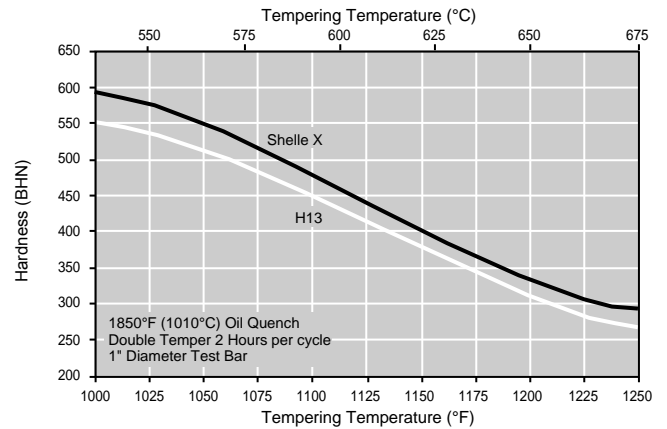
Temperature: 50-100°F (30-55°C) below final tempering temperature and slow cool to 875°F (470°C), then air cool.

**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 SX<sup>®</sup>

(Finished / approx.)

Max weight	16330 kg	36000 lbs
Max section	0.90 m <sup>2</sup>	1400 sq in
Max width	1270 mm	50"
Max thickness	760 mm	30"



FINKL STEEL offers select customers the opportunity to participate in the Finkl Partner Program, a Web-based system that allow for:

- Online quoting and ordering
- Real-time order tracking
- Customized report generation

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

#### Finkl Steel—Chicago

1355 E. 93rd Street  
Chicago, IL 60619

773.975.2510  
TOLL-FREE: 800.621.1460  
FAX: 773.348.5347  
www.finkl.com

#### Finkl Steel—Sorel

100 McCarthy Street  
St-Joseph-de-Sorel  
Quebec, Canada J3R 3M8

450.746.4122  
TOLL-FREE: 800.363.9484  
www.sorelforge.com

#### Finkl Steel—Composite

2300 W. Jefferson Avenue  
Detroit, MI 48216

313.496.8599  
www.compforge.com



# FINKL STEEL