

# SANDMEYER'S SSC INVAR 36

(UNS K93603, W. Nr. 1.3912)

For Aerospace Composite  
Tooling and Dies



Sandmeyer Steel Company is offering the dimensionally stable nickel-iron alloy from stock in full plate or custom cut sizes.

Sandmeyer Steel Company is stocking SSC INVAR 36 for applications in the aerospace composite tooling and die market. The alloy is used extensively in these demanding conditions where dimensional stability is essential.

## Any Way You Want It!

At Sandmeyer Steel Company, we have over 100 pieces of Value Added Plate Processing equipment all under one roof. You can purchase any custom shape or configuration you require to maximize plate yields. We can cut patterns utilizing abrasive waterjet, bandsaw, or plasma-arc cutting systems. We can also offer *Machinist* rings and discs up to

124" (3150mm) OD. Send us your drawings for finished or near-net shape parts, or we'd be happy to sell you full-size plates. At Sandmeyer Steel Company, we work with the customer!

## Stock Thicknesses

SSC INVAR 36 is available from our stock of Stainless Steel and Nickel Alloy Plate. We maintain the largest inventory of specialty plate in North America – over 16 million pounds! We stock SSC INVAR 36 in thicknesses from .250" (6.3mm) through 4.00" (101.6mm).

## Material Certifications

**ASTM** .....F1684-06  
**BOEING** .....D-33028-2

A complete specification sheet for SSC INVAR 36 can be found on the reverse side of this document.

**Material In Stock for Immediate Delivery  
.250" (6.3mm) through 4.00" (101.6mm)**

## Applications

SSC INVAR 36 is utilized extensively in other industrial applications where dimensional stability is essential.

- Cryogenic Components and Piping
- Laser Components
- Liquefied Natural Gas (LNG)
  - Production and Storage Equipment
  - LNG Tanker Membranes
- Marine Components
- Wind Turbines

## Learn More About Sandmeyer Steel Company

Visit our website at [www.SandmeyerSteel.com](http://www.SandmeyerSteel.com) for a complete review of our alloy technical data, stock levels, and Value Added Plate Processing capabilities.



**SANDMEYER STEEL COMPANY**

ONE SANDMEYER LANE • PHILADELPHIA, PA 19116-3598  
800-523-3663 • +1-215-464-7100 • FAX +1-215-677-1430

[www.SandmeyerSteel.com](http://www.SandmeyerSteel.com)

*Providing Solutions, With Materials and  
Value Added Products, for Process Industries*

# Specification Sheet: SSC INVAR 36

## (UNS K93603) W. Nr. 1.3912

### Nickel-Iron Alloy with a Very Low Coefficient of Thermal Expansion from Cryogenic Temperatures to 400°F (200°C)

SSC INVAR 36 (UNS K93603) is an austenitic nickel-iron alloy containing 36% nickel. It has an extremely low coefficient of thermal expansion from -418°F (-250°C) to 392°F (200°C). The alloy has good fatigue and mechanical properties at cryogenic temperatures. It exhibits moderately high strength along with good ductility and toughness. These properties along with good fabrication characteristics make SSC INVAR 36 ideal for applications requiring precise dimensional stability.

SSC INVAR 36 can be hot and cold worked, machined, and formed. Fabrication processes are similar to austenitic stainless steels. The alloy can be welded using filler wire with expansion rates similar to those of the base metal.

SSC INVAR 36 resists corrosion in dry atmospheres at room temperature. In humid or moist atmospheres, corrosion can occur in the form of rust.

#### Applications

- Tooling and Dies for Aerospace Composite Tooling
  - Thermoset Epoxy Systems
  - Resin Transfer Molded Tools
- Cryogenic Components and Piping
- Laser Components
- Liquefied Natural Gas (LNG)
  - Production and Storage Equipment
  - LNG Tanker Membranes
- Marine Components
- Wind Turbines

#### Standards

ASTM ..... F1684-06

BOEING ..... D-33028-2

#### Chemical Analysis

NI	Cr	C	Mn	Si	Co	
36.00%	0.25% max	0.05% max	0.60% max	0.40% max	0.50% max	
P	S	Al	Mg	Zr	Ti	Fe
0.015% max	0.015% max	0.10% max	0.10% max	0.10% max	0.10% max	Balance

#### Physical Properties

<b>Density</b>	<b>Melting Point</b>	<b>Specific Heat</b>
0.293 lb/in <sup>3</sup>	2606°F	0.123 BTU/lb-°F
8.11 g/cm <sup>3</sup>	1430°C	515 J/kg-°C

#### Typical Thermal Expansion of SSC INVAR 36

Temperature Range		Total Expansion (10 <sup>-3</sup> )	Mean Linear Coefficient (10 <sup>-6</sup> )	
°C	°F		/°C	/°F
-200 - 20	-328 - 68	-0.33	1.5	0.8
-100 - 20	-148 - 68	-0.16	1.3	0.7
20 - 100	68 - 212	0.12	1.5	0.8
20 - 150	68 - 302	0.26	2.0	1.1
20 - 200	68 - 392	0.47	2.6	1.4
20 - 250	68 - 482	0.80	3.5	1.9
20 - 300	68 - 572	1.54	5.5	3.1
20 - 350	68 - 662	2.37	7.2	4.0
20 - 400	68 - 752	3.19	8.4	4.7
20 - 450	68 - 842	4.01	9.3	5.2
20 - 500	68 - 932	4.85	10.1	5.6

#### Electrical Resistivity

Temperature		Microhm cm (ohm.circ mil/ft)
°C	°F	
<b>SSC INVAR 36</b>		
20	68	80 (481)
100	212	86 (517)
200	392	97 (583)
300	572	105 (632)
400	752	111 (668)
500	932	117 (704)
600	1112	121 (728)

#### Mechanical Properties

##### Typical Room Temperature Mechanical Properties, Mill Annealed

Temperature		Tensile Strength		Yield Strength (0.2% Offset)		Elongation on 50 mm (2 inch) %	Reduction of Area %
°C	°F	MPa	ksi	MPa	ksi		
20	68	490	71.0	240	35.0	42	70



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