

## SA 453M 665

## NICKEL ALLOY

### CLASS A

BOLTING MATERIAL FOR HIGH TEMPERATURE SERVICE

SA 453M covers five grades of bolting materials such as grade 660, 651, 662, 665 & 668 with Twelve classes of yield strength ranging from 50 to 120 ksi for use in high-temperature service such as fasteners for pressure vessel and valve flanges. The term "bolting material" as used in SA 453M 665 Class A, covers rolled, forged, or hot-extruded bars; bolts, nuts, screws, washers, studs and stud bolts. SA 453M 665 Class A expressed in both inch-pound units and in SI units. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

#### Chemical Properties

C	Mn	P	S	Si	Cr	Mo	Ni	Cu	Ti	Al	B
0.08 Max	1.25-2.00	0.040 Max	0.030 Max	0.1-0.80	12.0-15.0	1.25-2.25	24.0-28.0	0.25 Max	2.70-3.30	0.25 Max	0.01-0.07

#### Mechanical Properties

Yield strength	Tensile strength	Elongation	Reduction	Hardness		
Mpa	Mpa	%	%	BHN	HRB	HRC
min	min	min	min			
830	1170	12	15	311-388	-	32-41

#### STREE RUPTURE REQUIREMENTS

Grade	Class	Test Temperature	Stress, Min		Time to Rupture	Elongation
		Deg F [ Deg C ]	Ksi	Mpa	Min, h*	Min %
665	A	1200 [650]	75	515	100	5

#### Heat Treatment

Solution treated @ 980°C ± 14°C hold 3 h, & liquid quenched, and Hardened @ 730°C to 760°C, hold 20 h, furnace cool to 1200 ± 25°F (650 ± 14°C) hold 20 h, air cool

#### Equivalent Designation

UNS S63198

CUSTOMER ASSISTANCE : [customer@TorqBolt.com](mailto:customer@TorqBolt.com)