

# SA 453M 660

# NICKEL ALLOY

## CLASS D

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 660 Class D, covers rolled, forged, or hot-extruded bars; bolts, nuts, screws, washers, studs and stud bolts. SA 453M 660 Class D 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	Ti	W	B	Al
0.08 Max	2.00 Max	0.04 Max	0.03 Max	1.00 Max	13.5-16.0	1.00-1.50	24.0-27.0	1.90-2.35	0.1-0.5	0.001-0.01	0.35 Max

### Mechanical Properties

Yield strength	Tensile strength	Elongation	Reduction	Hardness		
Mpa	Mpa	%	%	BHN	HRB	HRC
min	min	min	min			
725	895	15	18	248-341	99	37

### Heat Treatment

Solution treated @ 900°C ± 14°C hold 2h min & liquid quench and Hardened @ 720°C ± 14°C hold 16h & air cooled Hardened @ 775°C ± 14°C & air cooled Hardened @ 650°C ± 14°C hold 16h & air cooled

### Equivalent Designation

UNS S66286
AISI 660
JIS G4312/ SUH 660
Werkstoff.No. 1.4844/1.4980
AMS 5525
AFNOR X15CrNiSi25-20
BS HR52/560

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