



A-633 Grades A, C, D, E

Overview

This is a high-strength / low alloy grade produced in the normalized condition. It is predominantly used in environments where superior notch toughness is needed at low ambient temperatures. Typical applications is in the areas of construction equipment, offshore support structures, and other construction areas where additional strength is critical.

Chemical Requirements

*Elements represented in percentage
Where “-” appears in this table, there is no requirement

Element	Grade A, %	Grade C, %	Grade D, %	Grade E, % ^A	
	Carbon, max	0.18	0.20	0.20	0.22
Manganese:					
1½ in. [40 mm] and under in thickness	1.00-1.35	1.15-1.50 ^B	0.70-1.35	1.15-1.50	
Over 1½ in. to 4 in. [40 to 100 mm], incl	1.00-1.35	1.15-1.50 ^B	1.00-1.60	1.15-1.50	
Over 4 in. to 6 in. [100 to 150 mm], incl	c	c	c	1.15-1.50	
Phosphorus, max	0.030	0.030	0.030	0.030	
Sulfur, max	0.030	0.030	0.030	0.030	
Silicon	0.15-0.50	0.15-0.50	0.15-0.50	0.15-0.50	
Vanadium	—	—	—	0.04-0.11	
Columbium	0.05 max	0.01-0.05	—	d	
Nitrogen, max	—	—	—	0.03	
Copper, max	—	—	0.35	—	
Nickel, max	—	—	0.25	—	
Chromium, max	—	—	0.25	—	
Molybdenum, max	—	—	0.08	—	



Tensile Requirements

	Grade A	Grades C and D	Grade E
Yield point, min, ksi [MPa]:			
2.5 in. [65 mm] and under	42 [290]	50 [345]	60 [415]
Over 2.5 in. to 4 in. [65 to 100 mm], incl	42 [290]	46 [315]	60 [415]
Over 4 in. to 6 in. [100 to 150 mm], incl	B	B	55 [380]
Tensile strength, ksi [MPa]:			
2.5 in. [65 mm] and under	63 to 83 [430 to 570]	70 to 90 [485 to 620]	80 to 100 [550 to 690]
Over 2.5 in. to 4 in. [65 to 100 mm], incl	63 to 83 [430 to 570]	65 to 85 [450 to 590]	80 to 100 [550 to 690]
Over 4 in. to 6 in. [100 to 150 mm], incl	B	B	75 to 95 [515 to 655]
Elongation in 8 in. [200 mm], min, %^c	18	18	18
Elongation in 2 in. [50 mm], min, %^c	23	23	23