

Shear and Tension Capacity of Stainless Steel Bolts

Introduction

The shear capacity of a bolt, P_{sb} , should be taken as:

$$P_{sb} = p_{sb} A_s$$

where:

p_{sb} is the shear strength of bolt

A_s is the shear area, usually taken as the tensile stress area, unless it can be guaranteed that the threaded portion will be excluded from the shear plane, in which case it can be taken as the unthreaded shank area.

The tension capacity P_{nom} is given by $P_{nom} = 0.8 p_{tb} A_t$ where:

$$p_{tb} = 0.7 U_{sb} \text{ (} U \text{ is the tensile strength)}$$

The following tables gives the shear strengths (in N/mm²) of stainless steel bolts and shear capacities (in kN) for bolts of diameter M10 to M24.

Shear strengths of bolts in clearance holes

Bolt grade (BS EN ISO 3506)	Property class (BS EN ISO 3506)	Shear strength p_{sb} (N/mm ²)
A1, A2 and A4	50	145
	70	311
	80	384

Shear and tension capacities of bolts in clearance holes

Bolt size	Property class	Shear capacity ⁽¹⁾	Tension Capacity
	(BS EN ISO 3506)	P_{sb} (kN)	P_{nom} (kN)
M10	50	8.4	9.8
	70	18.0	20.9
	80	22.3	26.0
M12	50	12.2	14.2
	70	26.2	30.3
	80	32.4	37.8
M16	50	22.7	26.4
	70	48.7	56.5
	80	60.3	70.3
M20	50	35.5	41.2
	70	76.1	88.2
	80	94.1	109.8
M24	50	51.1	59.3
	70	109.6	127.1
	80	135.6	158.1
M27	50	66.4	77.1
	70	142.5	165.3
	80	176.3	205.6
M30	50	81.2	94.2
	70	174.2	202.0
	80	215.5	251.3

Shear and Tension Capacity of Stainless Steel Bolts

M33	50	100.5	116.6
	70	215.5	249.9
	80	266.6	310.8
M36	50	118.3	137.2
	70	253.7	294.2
	80	313.8	365.9
M39	50	141.3	164.0
	70	303.0	351.4
	80	374.9	437.1

(1) The shear area A_s has been taken as the tensile stress area of the bolt, A_t

Note: These values of shear capacity should be used in conjunction with **FACTORED** loads. The relevant load factors can be obtained from **BS 5950 *The structural use of steelwork in building, Part 1 Code of practice for design - rolled and welded sections.***