

Bolt, Conrod

			A	B	C	D	
S. No.	Parameter	Unit	12.9	12.9	12.9	12.9	Remark
1	No. of Bolts	nos	1	1	1	1	
2	Major Dia (D / d)	mm	9.974	9.794	10.0	9.0	Special Metric Thread
3	Pitch (p)	mm	1.00	1.00	1.00	1.00	Fine Threads
4	Lead (l)	mm	1.00	1.00	1.00	1.00	Single Helix
5	PCD (D ₂ / d ₂)	mm	9.324	9.212	9.350	8.350	Pitch Circle Dia
6	Minor Dia (D ₁ / d ₁)	mm	8.747	8.563	8.917	7.917	
7	Root Dia (D ₃ / d ₃)	mm	8.603	8.419	8.773	7.773	=D ₁ - SQRT(3)*Pitch/12
8	Thread Angle (α)	deg	60	60	60	60	ISO Thread
9	Helix Angle (β)	deg	1.96	1.98	1.95	2.18	=tan ⁻¹ (l/πD ₂)
Mating Hole Dimension							
10	Counterbore OD	mm	10.5	10.5	10.5	9.5	Finish: H8
11	Counterbore Depth	mm	6.0	6.0	6.0	5.0	
12	Total Thread Engagement	mm	18.0	18.0	17.0	21.0	
13	Collar OD (D _O)	mm	14.0	14.0	17.0	16.0	±0.2 typically
14	Collar OD Chamfer (Longitudinal)	mm	0.0	0.0	0.0	0.0	
15	Collar OD Chamfer Angle	deg	45.0	45.0	45.0	45.0	
16	Effective Collar OD	mm	14.0	14.0	17.0	16.0	
17	Collar ID (Dia of hole in the Washer) (D _i)	mm	11.6	11.6	10.0	NA	(=Screw stem diameter)
18	Head Fillet Radius, MIN	mm	0.6	0.6	0.8	0.6	
19	Head Fillet Radius, MAX	mm	NA	NA	NA	NA	
20	Effective Collar ID, MAX	mm	10.0	10.0	11.6	10.2	
21	Mean friction Diameter for Bolt Collar	mm	12.1	12.1	14.5	13.3	
22	Stress Area per Bolt	mm ²	63.1	61.0	64.5	51.0	=π/16*(D ₂ +D ₃) ²
23	Bearing Area	mm ²	75	75	121	119	=π/4*(D _O ² -D _i ²)
24	Nominal TS	N/mm ²	1200	1200	1200	1200	JIS Standard
25	0.2 % Proof Stress	N/mm ²	1080	1080	1080	1080	
26	0.2 % Proof Load	kN	68.2	65.9	69.7	55.1	=Proof Stress x Stress Area
27	μ _{Thread} , MAX	---	0.14	0.14	0.14	0.14	
28	μ _{Thread} , MIN	---	0.10	0.10	0.10	0.10	
29	μ _{Collar} , MAX	---	0.14	0.14	0.14	0.14	
30	μ _{Collar} , MIN	---	0.10	0.10	0.10	0.10	

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Bolt Induced Pre-load Estimation from Torque Applied							
31	External Tightening Torque Applied (MAX): T_{fast}	N-m	80	80	80	80	
		kg-cm	816	816	816	816	
32	Flank Angle at the Ridge Perp section of the thread ridge, β'	rad	0.52	0.52	0.52	0.52	$\tan^{-1}(\tan(\alpha/2) \cos(\beta))$
		deg	29.99	29.99	29.99	29.98	
Torque Co-efficient: K_{thread}							
33	MAX	---	0.092	0.092	0.091	0.093	Bosch and JIS B 1803 $0.5/D (\text{pitch}/\pi + \mu_{thread} \text{PCD}/\cos(\beta'))$
	MIN	---	0.070	0.071	0.070	0.071	
Torque Co-efficient: K_{collar}							
34	MAX	---	0.085	0.087	0.101	0.104	$0.5/D (\mu_{collar} D_{mean})$
	MIN	---	0.061	0.062	0.072	0.074	
Bolt Pre-load: F							
35	MIN	kg	4637	4661	4235	4623	$=\text{MAX T.T.} / \text{Nom. Dia.} / K_{max}$
	MAX	kg	6265	6296	5739	6246	$=\text{MAX T.T.} / \text{Nom. Dia.} / K_{min}$
36	MIN	kN	45.4	45.7	41.5	45.3	
	MAX	kN	61.4	61.7	56.2	61.2	
Bolt Breaking Torque Calculation							
37	Polar Moment of Resistance	mm^3	131.4	123.3	139.2	97.5	$= \pi \times d_3^3 / 16$
38	Strength Ratio (X) (JIS B 1058)	---	0.75	0.75	0.75	0.75	$= \text{Torsional Strength} / \text{Tensile Strength}$
39	MIN Torsional Strength	N/mm^2	900	900	900	900	$=\text{X} * \text{Tensile Strength}$
40	MIN breaking torque for the Bolt	N-m	118.3	111.0	125.3	87.7	JIS Standard: B 1058
		kg-cm	1207	1132	1279	895	