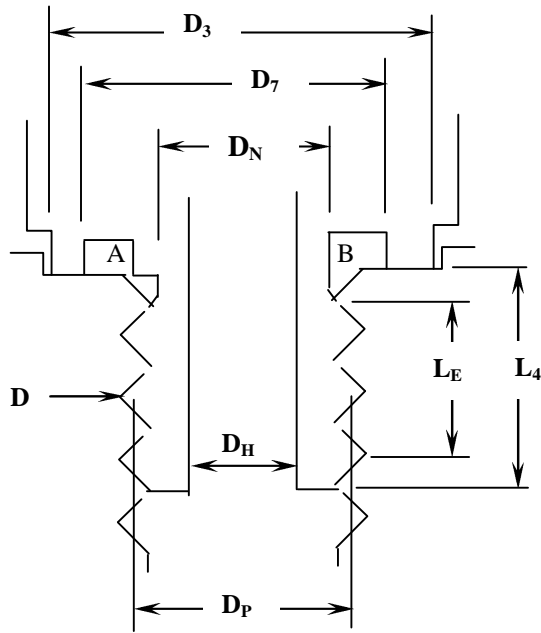


TORQUE STRESS ANALYSIS

ISO 16030 Proposal

5 June 2000



Stress Analysis Equations

Let T = Torque on stud thread joint.

$$T = (0.2) DF \quad F = T/(0.2)D$$

Tension in neck of stud:

$$S_T = \frac{F}{A} = \frac{(0.2)D}{\frac{\pi}{4}(D_N^2 - D_H^2)} = \frac{(6.366)T}{D(D_N^2 - D_H^2)}$$

Shear of threads:

$$S_S = \frac{F}{A} = \frac{(0.2)D}{(.85)\frac{\pi}{2}D_P L_E} = \frac{(3.745)T}{DD_P L_E}$$

Compression on shoulder:

$$S_C = \frac{F}{A} = \frac{(0.2)D}{\frac{\pi}{4}(D_3^2 - D_7^2)} = \frac{(6.366)T}{D(D_3^2 - D_7^2)}$$

Material strengths:

For studs, consider ASTM B-16 brass as follows :

Hex 0 to 25 mm: Y.P. = 170 MPa, Shear = 119 MPa
Hex > 25 mm Y.P. = 140 MPa, Shear = 98 MPa

For ports, consider sand cast aluminum UNS A03550:

Y.P. = 138 MPa, Shear = 97 MPa; for all sizes.

Size	D mm	pitch	L _E	D _P	D _N	D _H	D ₃	D ₇		Failure Torque - Nm												
										ISO 228-1	p mm	L ₄ - p mm	Ref. DIN 3852	(try !)	New DIS prop.	In Stud		In Port				
																mm		Tension In neck	Shear of thd.	Shear of thd.	Compression	
																note below	A				B	A
M3x0.5	3	0.500	2.50	2.675	2.1	0.8	7	6.0		0.302	0.638	0.520	0.8									
M5x0.8	5	0.800	2.40	4.480	3.7	1.6	10	8.0		1.49	1.71	1.39	3.9									
M7 x 1	7	1.000	3.50	6.350	5.5	2.5	12	10.0		4.49	4.94	4.03	6.7									
G1/8-28	9.73	0.907	3.69	9.15	8.1	6.0	17	13.7	12.1	10.6	10.4	8.5	21.2	30.1								
G¼ -19	13.16	1.337	4.36	12.30	11.0	8.0	19	17.2	16.7	25.3	22.4	18.3	19.0	23.4								
G3/8-19	16.66	1.337	5.86	15.81	14.5	11.0	24	20.7	19.1	53.4	49.1	40.0	53.9	76.3								
G½ -14	20.95	1.814	6.89	19.79	18.2	13.5	27	25.0	24.1	98	91	73.9	48.4	67.3								
G¾ -14	26.44	1.814	7.89	25.28	23.7	17.0	36	30.4	29.4	159	138	136	211	247								
G 1-11	33.25	2.309	7.89	31.77	29.7	23.0	41	37.3	36.1	258	218	216	212	272								
G1¼-11	41.91	2.309	11.89	40.43	38.4	29.0	50	45.9	46.1	584	527	522	356	340								
G1½-11	47.80	2.309	12.89	46.32	44.3	34.0	60	51.8	51.1	848	747	739	950	1024								
G 2 -11	59.61	2.309	14.89	52.27	56.1	45.0	70	63.6		1471	1214	1202	1103									

L₄ from proposal DIS N 32 at min. tol. length; except ¼ & 1" are 1 thd. shorter.

D₇ for design A is a 1.5 mm wide groove from diameter D for M sizes; 2 mm for G.
D₇ for design B is from DIN 3852, part 11.

Shaded cells are lowest value (highest stress).