MARYLAND METRICS
P.O.Box 261 Owings Mills, MD 21117 USA
(410)358-3130 (800)638-1830 Faxes: (410)358-3142 (800)872-9329
http://mdmetric.com techinfo@mdmetric.com

TECHNICAL INFORMATION and DATA

Coefficients of friction for the bearing area (bolt or nut) and the thread μ_{total}

		type of joint	**Nut** A2 or A4	
			plain or slighly lubricated	MoS_2 lubricated
Bolt: cold formed A2/A4 rolled thread	plain	hard	0,20 (to 0,30)	0,10 (to 0,14)
		soft	0,30 (to 0,50)	0,16 (to 0,20)

Preload F_v and tightening torque Ma for screws and nuts with bearing surfaces according to ISO 4762/4014, 4017, resp. 4032/DIN 912, 931, 933 resp. 934

	μ tot. = 0,10						μ tot. = 0,20 (μ thr = 0,25, μ hd = 0,16)					
Thread diameter	Preload F_v in N			Tightening torque M_A in Nm			Preload F_v in N			Tightening torque M_A in Nm		
	A2-50 A4-50	A2-70 A4-70	A2-80 A4-80	A2-50 A4-50	A2-70 A4-70	A2-80 A4-80	A2-50 A4-50	A2-70 A4-70	A2-80 A4-80	A2-50 A4-50	A2-70 A4-70	A2-80 A4-80
M4	1400	3000	4000	0,8	1,7	2,3	1110	1700	3200	1,2	2,6	3,5
M5	2260	4800	6500	1,6	3,4	4,5	1790	2700	5100	2,4	5,1	6,8
M6	3200	6800	9100	2,7	5,8	7,8	2560	5500	7500	4,1	8,7	12
M8	5900	12500	16800	6,6	14	19	4720	10200	13500	10	22	29
M10*	9400	20000	26700	13	28	36	7520	16800	21400	21	43	57
M12*	13600	29200	38900	23	49	65	10900	23400	31200	35	75	99
M14*	18700	40000	53400	36	77	103	15000	32100	42800	55	119	157
M16	25800	55200	73600	56	120	160	20500	44000	58600	86	189	249
M18	32200	69000	91800	80	175	230	26000	55600	74100	124	265	351
M20	41300	88600	118000	112	240	320	33200	71100	94800	173	373	497
M22**	51800	109000 A)	–	150	315 A)	–	41500	88000 A)	–	238	495 A)	–
M24	59700	128000 A)	–	195	412 A)	–	48000	102000 A)	–	297	641 A)	–
M27	78400	–	–	285	–	–	63100	–	–	443	–	–
M30	95500	–	–	400	–	–	76900	–	–	605	–	–
M8 x1	6400	13800	18400	7,2	15	21	5150	11000	14700	11	24	31
M10 x1,25*	10000	21500	28700	14	30	39	8100	17300	23000	22	46	60
M12 x1,25*	15300	32800	43700	25	53	70	12300	26400	35300	38	82	108
M12 x1,5*	14400	31000	41300	24	51	68	11700	24910	33200	37	78	104
M14 x1,5*	20700	44300	45900	39	84	113	16600	35700	47600	61	130	173
M16 x1,5	28000	60000	80200	60	126	170	22700	48200	64300	91	195	259
M18 x1,5	37400	80000	107000	90	190	255	30400	65200	86800	141	303	400
M20 x1,5	47300	100000	1350000	125	265	350	38300	82000	109100	200	421	562
M22 x1,5**	58400	122000 A)	–	165	351 A)	–	47200	100000 A)	–	265	556 A)	–
M24 x2	66600	140000 A)	–	210	446 A)	–	54000	115000 A)	–	330	709 A)	–
M27 x2	86600	–	–	300	–	–	70000	–	–	486	–	–
M30 x2	109000	–	–	430	–	–	88600	–	–	681	–	–

*, **: refer to page T 21

A) **Note: For M22 and M24 screws according old DIN standard use 45% lower torque values (preload also 45% lower)**

Minimum breaking torques ($M_{B\ min}$) for bolts and screws of stainless steel grades A1, A2, A3, A4, A5

Thread diameter	Minimum breaking torques in Nm		
	class 50	class 70	class 80
M 1,6	0,15	0,2	0,24
M 2	0,3	0,4	0,48
M 2,5	0,6	0,9	0,96
M 3	1,1	1,6	1,8
M 4	2,7	3,8	4,3
M 5	5,5	7,8	8,8
M 6	9,3	13,0	15,0
M 8	23,0	32,0	37,0
M 10	46,0	65,0	74,0
M 12	80,0	110,0	130,0
M 16	210,0	290,0	330,0