

Torque Recommendations

ISO metric thread

HEICO-LOCK® material: **carbon steel** C45E (1.1191), through-hardened, zinc flake coated (flZnc)
 thread type: metric ISO coarse thread acc. to ISO 261
 screw product standard: ISO 4017 hex. cap screw
 strength class: **8.8** acc. to ISO 898-1
 surface coating (bolt/nut): **phosphated (uncoated)**

lubrication:	assembly paste	dry (delivery state)
$\mu_G =$	0.10	0.15
$\mu_K =$	0.16	0.18
$\eta =$	0.75	0.62

Thread designation	nom. diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units		SI Units		Imperial Units	
			Assembly preload F_M	Assembly torque M_A	Assembly preload F_M	Assembly torque M_A	Assembly preload F_M	Assembly torque M_A	Assembly preload F_M	Assembly torque M_A
			[kN]	[Nm]	[lbf]	[lb ft]	[kN]	[Nm]	[lbf]	[lb ft]
M3x0.5	3	HL-3	2.4	1.3	543	1.0	2.0	1.3	449	1.0
M3.5x0.6	3.5	HL-3.5	3.3	2.1	731	1.5	2.7	2.1	604	1.5
M4x0.7	4	HL-4	4.2	3.1	947	2.3	3.5	3.1	783	2.3
M5x0.8	5	HL-5	6.8	6.0	1 530	4.4	5.6	6.0	1 265	4.5
M6x1	6	HL-6	9.7	10.5	2 171	7.7	8.0	10.5	1 795	7.8
M8x1.25	8	HL-8	17.6	25.1	3 950	18.5	14.5	25.3	3 265	18.6
M10x1.5	10	HL-10	27.8	49.5	6 258	36.5	23.0	49.9	5 173	36.8
M12x1.75	12	HL-12	40.4	84.8	9 093	62.5	33.4	85.7	7 517	63.2
M14x2	14	HL-14	55.4	135.8	12 457	100.2	45.8	137.3	10 297	101.3
M16x2	16	HL-16	75.2	207.0	16 906	152.7	62.2	210.2	13 975	155.0
M18x2.5	18	HL-18	95	300	21 418	221	79	303	17 706	224
M20x2.5	20	HL-20	121	418	27 241	308	100	424	22 519	313
M22x2.5	22	HL-22	150	569	33 762	419	124	578	27 910	426
M24x3	24	HL-24	174	732	39 225	540	144	742	32 426	547
M27x3	27	HL-27	227	1 062	51 121	783	188	1 079	42 260	796
M30x3.5	30	HL-30	277	1 447	62 383	1 067	229	1 469	51 570	1 084
M33x3.5	33	HL-33	343	1 943	77 180	1 433	284	1 978	63 802	1 459

Symbols:

μ_G : Coefficient of friction in the thread
 μ_K : Coefficient of friction on the bearing surface (HEICO-LOCK®)
 η : Utilization factor of the yield strength of the bolt by the preload

Conversion factors:

force: factor N → lbf : 0.22481
 torque: factor Nm → lb ft : 0.73756

The friction affects the torque/preload ratio to a special degree. In critical cases of application a torque/preload test (e. g. acc. to ISO 16047) is strongly recommended. The calculated torque and preload values are recommendations which are made on the basis of assumed coefficients of friction especially those in the thread which are obtained from standards, specialist literature or internal testings. This does not release the user from the testing that is inevitable, given the diversity of possible influences in the processing and application of our products. Any legal guarantee of specific properties of suitability for any concrete operational purpose may not be assumed from the information provide. Status as of 01/2018

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$\mu_G =$			0.10				0.15			
$\mu_K =$			0.16				0.18			
$\eta =$			0.75				0.62			
Thread designation	nom. diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units		SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]	Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M36x4	36	HL-36	404	2 505	90 887	1 848	334	2 549	75 133	1 880
M39x4	39	HL-39	483	3 226	108 584	2 380	399	3 288	89 763	2 425
M42x4.5	42	HL-42	555	3 990	124 735	2 943	459	4 063	103 114	2 997
M45x4.5	45	HL-45	646	4 961	145 332	3 659	534	5 059	120 141	3 731
M48x5	48	HL-48	729	6 005	163 933	4 429	603	6 117	135 518	4 512
M52x5	52	HL-52	870	7 671	195 612	5 658	719	7 831	161 706	5 776
M56x5.5	56	HL-56	1 005	9 554	225 902	7 047	831	9 749	186 746	7 191
M60x5.5	60	HL-60	1 169	11 795	262 847	8 700	967	12 059	217 287	8 894
M64x6	64	HL-64	1 325	14 215	297 785	10 485	1 095	14 532	246 169	10 718
M68x6	68	HL-68	1 512	17 538	339 996	12 935	1 250	17 915	281 064	13 214
M72x6	72	HL-72	1 713	20 874	385 004	15 396	1 416	21 353	318 270	15 749
M76x6	76	HL-76	1 925	24 600	432 809	18 144	1 592	25 197	357 789	18 584
M85x6	85	HL-85	2 449	33 448	550 595	24 670	2 025	34 451	455 159	25 410

Symbols:

μ_G : Coefficient of friction in the thread
 μ_K : Coefficient of friction on the bearing surface (HEICO-LOCK®)
 η : Utilization factor of the yield strength of the bolt by the preload

Conversion factors:

force: factor N → lbf : 0.22481
 torque: factor Nm → lb ft : 0.73756

The friction affects the torque/preload ratio to a special degree. In critical cases of application a torque/preload test (e. g. acc. to ISO 16047) is strongly recommended. The calculated torque and preload values are recommendations which are made on the basis of assumed coefficients of friction especially those in the thread which are obtained from standards, specialist literature or internal testings. This does not release the user from the testing that is inevitable, given the diversity of possible influences in the processing and application of our products. Any legal guarantee of specific properties of suitability for any concrete operational purpose may not be assumed from the information provide. Status as of 01/2018

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 thread type: metric ISO coarse thread acc. to ISO 261
 screw product standard: ISO 4017 hex. cap screw
 strength class: **10.9** acc. to ISO 898-1
 surface coating (bolt/nut): **phosphated (uncoated)**

lubrication:		assembly paste	dry (delivery state)
$\mu_G =$		0.10	0.15
$\mu_K =$		0.16	0.18
$\eta =$		0.75	0.62

Thread designation	nom. diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units		SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]	Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M3x0.5	3	HL-3	3.5	2.0	797	1.5	2.9	2.0	659	1.5
M3.5x0.6	3.5	HL-3.5	4.8	3.0	1 074	2.2	3.9	3.0	888	2.2
M4x0.7	4	HL-4	6.2	4.5	1 391	3.3	5.1	4.5	1 150	3.3
M5x0.8	5	HL-5	10.0	8.8	2 248	6.5	8.3	8.9	1 858	6.5
M6x1	6	HL-6	14.2	15.4	3 189	11.4	11.7	15.5	2 636	11.4
M8x1.25	8	HL-8	25.8	36.8	5 802	27.2	21.3	37.1	4 796	27.4
M10x1.5	10	HL-10	40.9	72.7	9 191	53.6	33.8	73.3	7 598	54.1
M12x1.75	12	HL-12	59.4	124.5	13 355	91.9	49.1	125.9	11 040	92.9
M14x2	14	HL-14	81.4	199.5	18 296	147.1	67.3	201.7	15 124	148.8
M16x2	16	HL-16	110.4	304.0	24 830	224.2	91.3	308.7	20 526	227.7
M18x2.5	18	HL-18	136	427	30 505	315	112	432	25 217	318
M20x2.5	20	HL-20	173	595	38 797	439	143	604	32 073	446
M22x2.5	22	HL-22	214	810	48 086	597	177	823	39 751	607
M24x3	24	HL-24	249	1 043	55 866	769	205	1 057	46 183	780
M27x3	27	HL-27	324	1 512	72 809	1 115	268	1 537	60 189	1 134
M30x3.5	30	HL-30	395	2 061	88 849	1 520	327	2 093	73 448	1 544
M33x3.5	33	HL-33	489	2 767	109 923	2 041	404	2 818	90 870	2 078

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$\mu_G =$			0.10				0.15			
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Thread designation	nom. diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units		SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]	Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M36x4	36	HL-36	576	3 568	129 445	2 632	476	3 630	107 008	2 677
M39x4	39	HL-39	688	4 595	154 650	3 389	569	4 682	127 844	3 454
M42x4.5	42	HL-42	790	5 683	177 652	4 191	653	5 787	146 859	4 268
M45x4.5	45	HL-45	921	7 066	206 988	5 211	761	7 205	171 110	5 314
M48x5	48	HL-48	1 039	8 553	233 480	6 308	859	8 712	193 010	6 426
M52x5	52	HL-52	1 239	10 926	278 599	8 058	1 024	11 154	230 309	8 227
M56x5.5	56	HL-56	1 431	13 607	321 739	10 036	1 183	13 885	265 971	10 241
M60x5.5	60	HL-60	1 665	16 800	374 358	12 391	1 377	17 175	309 470	12 667
M64x6	64	HL-64	1 887	20 246	424 118	14 933	1 560	20 697	350 604	15 265
M68x6	68	HL-68	2 154	24 978	484 237	18 423	1 781	25 516	400 303	18 820
M72x6	72	HL-72	2 439	29 729	548 339	21 927	2 016	30 412	453 294	22 431
M76x6	76	HL-76	2 742	35 036	616 425	25 841	2 267	35 886	509 578	26 468
M85x6	85	HL-85	3 448	47 638	784 181	35 136	2 884	49 067	648 256	36 190

Symbols:

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Thread designation	nom. diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units		SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]	Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M3x0.5	3	HL-3	4.2	2.3	933	1.7	3.4	2.3	771	1.7
M3.5x0.6	3.5	HL-3.5	5.6	3.6	1 257	2.6	4.6	3.6	1 039	2.6
M4x0.7	4	HL-4	7.2	5.3	1 628	3.9	6.0	5.3	1 346	3.9
M5x0.8	5	HL-5	11.7	10.3	2 630	7.6	9.7	10.4	2 175	7.7
M6x1	6	HL-6	16.6	18.0	3 732	13.3	13.7	18.1	3 085	13.4
M8x1.25	8	HL-8	30.2	43.1	6 789	31.8	25.0	43.4	5 612	32.0
M10x1.5	10	HL-10	47.8	85.1	10 756	62.7	39.6	85.8	8 892	63.3
M12x1.75	12	HL-12	69.5	145.7	15 628	107.5	57.5	147.3	12 919	108.7
M14x2	14	HL-14	95.2	233.5	21 410	172.2	78.7	236.1	17 699	174.1
M16x2	16	HL-16	129.2	355.8	29 056	262.4	106.8	361.2	24 020	266.4
M18x2.5	18	HL-18	159	499	35 697	368	131	505	29 510	373
M20x2.5	20	HL-20	202	697	45 401	514	167	707	37 532	522
M22x2.5	22	HL-22	250	948	56 271	699	207	964	46 517	711
M24x3	24	HL-24	291	1 220	65 375	900	240	1 237	54 044	912
M27x3	27	HL-27	379	1 769	85 202	1 305	313	1 799	70 434	1 327
M30x3.5	30	HL-30	462	2 411	103 972	1 779	382	2 449	85 950	1 806
M33x3.5	33	HL-33	572	3 238	128 633	2 388	473	3 297	106 337	2 432

Symbols:

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 η : Utilization factor of the yield strength of the bolt by the preload

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 strength class: **12.9** acc. to ISO 898-1
 surface coating (bolt/nut): **phosphated (uncoated)**

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$\mu_G =$			0.10				0.15			
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Thread designation	nom. diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units		SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]	Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M36x4	36	HL-36	674	4 175	151 478	3 080	557	4 248	125 222	3 133
M39x4	39	HL-39	805	5 377	180 973	3 966	665	5 479	149 604	4 041
M42x4.5	42	HL-42	925	6 650	207 891	4 905	764	6 772	171 856	4 995
M45x4.5	45	HL-45	1 077	8 268	242 220	6 098	891	8 432	200 235	6 219
M48x5	48	HL-48	1 215	10 009	273 221	7 382	1 005	10 195	225 863	7 520
M52x5	52	HL-52	1 450	12 785	326 021	9 430	1 199	13 052	269 510	9 627
M56x5.5	56	HL-56	1 675	15 923	376 503	11 744	1 384	16 249	311 243	11 985
M60x5.5	60	HL-60	1 949	19 659	438 079	14 500	1 611	20 098	362 145	14 824
M64x6	64	HL-64	2 208	23 692	496 309	17 474	1 825	24 220	410 282	17 863
M68x6	68	HL-68	2 521	29 229	566 660	21 558	2 084	29 859	468 439	22 023
M72x6	72	HL-72	2 854	34 789	641 674	25 659	2 360	35 588	530 450	26 249
M76x6	76	HL-76	3 209	40 999	721 348	30 240	2 653	41 995	596 315	30 974
M85x6	85	HL-85	4.081.9	55 746	917 659	41 116	3 374	57 418	758 598	42 350

Symbols:

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 η : Utilization factor of the yield strength of the bolt by the preload

Conversion factors:

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Torque Recommendations

ISO metric thread

HEICO-LOCK® material: **stainless steel** 1.4404 (316L), surface hardened
 thread type: metric ISO coarse thread acc. to ISO 261
 screw product standard: ISO 4017 hex. cap screw
 strength class: **A2-70** acc. to ISO 3506-1
A4-70
 surface coating (bolt/nut): **blank**

			lubrication: molybdenum disulfide (MoS2)			
			$\mu_G =$	0.14		
			$\mu_K =$	0.15		
			$\eta =$	0.65		
Thread designation	nominal diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M3x0.5	3	HL-3S	1.5	0.9	331	0.6
M3.5x0.6	3.5	HL-3.5S	2.0	1.4	445	1.0
M4x0.7	4	HL-4S	2.6	2.0	577	1.5
M5x0.8	5	HL-5S	4.1	4.0	933	2.9
M6x1	6	HL-6S	5.9	6.9	1 323	5.1
M8x1.25	8	HL-8S	10.7	16.5	2 407	12.2
M10x1.5	10	HL-10S	17.0	32.7	3 813	24.1
M12x1.75	12	HL-12S	24.6	56.1	5 541	41.4
M14x2	14	HL-14S	33.8	89.9	7 591	66.3
M16x2	16	HL-16S	45.8	137.4	10 302	101.3
M18x2.5	18	HL-18S	56	192	12 656	142
M20x2.5	20	HL-20S	72	269	16 097	198
M22x2.5	22	HL-22S	89	366	19 950	270
M24x3	24	HL-24S	103	470	23 179	347
M27x3	27	HL-27S	134	683	30 208	504
M30x3.5	30	HL-30S	164	930	36 863	686
M33x3.5	33	HL-33S	203	1 252	45 606	923

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 thread type: metric ISO coarse thread acc. to ISO 261
 screw product standard: ISO 4017 hex. cap screw
 strength class: **A2-70** acc. to ISO 3506-1
A4-70
 surface coating (bolt/nut): **blank**

lubrication:	molybdenum disulfide (MoS2)
$\mu_G =$	0.14
$\mu_K =$	0.15
$\eta =$	0.65

Thread designation	nominal diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M36x4	36	HL-36S	239	1 613	53 706	1 190
M39x4	39	HL-39S	285	2 079	64 163	1 533
M42x4.5	42	HL-42S	328	2 571	73 707	1 896
M45x4.5	45	HL-45S	382	3 199	85 878	2 359
M48x5	48	HL-48S	431	3 869	96 869	2 853
M52x5	52	HL-52S	514	4 951	115 589	3 652
M56x5.5	56	HL-56S	594	6 165	133 487	4 547
M60x5.5	60	HL-60S	691	7 623	155 319	5 622
M64x6	64	HL-64S	783	9 189	175 964	6 778
M68x6	68	HL-68S	894	11 312	200 907	8 343
M72x6	72	HL-72S	1 012	13 479	227 502	9 942
M76x6	76	HL-76S	1 138	15 902	255 751	11 729
M80x6	80	HL-80S	1 271	18 363	285 652	13 544

Symbols:

μ_G : Coefficient of friction in the thread
 μ_K : Coefficient of friction on the bearing surface (HEICO-LOCK®)
 η : Utilization factor of the yield strength of the bolt by the preload

Conversion factors:

force: factor N → lbf : 0.22481
 torque: factor Nm → lb ft : 0.73756

The friction affects the torque/preload ratio to a special degree. In critical cases of application a torque/preload test (e. g. acc. to ISO 16047) is strongly recommended. The calculated torque and preload values are recommendations which are made on the basis of assumed coefficients of friction especially those in the thread which are obtained from standards, specialist literature or internal testings. This does not release the user from the testing that is inevitable, given the diversity of possible influences in the processing and application of our products. Any legal guarantee of specific properties of suitability for any concrete operational purpose may not be assumed from the information provide. Status as of 01/2018

Torque Recommendations

ISO metric thread

HEICO-LOCK® material: **stainless steel** 1.4404 (316L), surface hardened
 thread type: metric ISO coarse thread acc. to ISO 261
 screw product standard: ISO 4017 hex. cap screw
 strength class: **A4-80** acc. to ISO 3506-1
 surface coating (bolt/nut): **blank**

			lubrication: molybdenum disulfide (MoS2)			
			$\mu_G =$	0.14		
			$\mu_K =$	0.15		
			$\eta =$	0.65		
Thread designation	nominal diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M3x0.5	3	HL-3S	2.0	1.2	441	0.9
M3.5x0.6	3.5	HL-3.5S	2.6	1.8	594	1.3
M4x0.7	4	HL-4S	3.4	2.7	770	2.0
M5x0.8	5	HL-5S	5.5	5.3	1 243	3.9
M6x1	6	HL-6S	7.8	9.2	1 764	6.8
M8x1.25	8	HL-8S	14.3	22.1	3 209	16.3
M10x1.5	10	HL-10S	22.6	43.6	5 085	32.1
M12x1.75	12	HL-12S	32.9	74.8	7 388	55.2
M14x2	14	HL-14S	45.0	119.9	10 121	88.4
M16x2	16	HL-16S	61.1	183.2	13 736	135.1
M18x2.5	18	HL-18S	75	256	16 875	189
M20x2.5	20	HL-20S	95	359	21 462	264
M22x2.5	22	HL-22S	118	488	26 601	360
M24x3	24	HL-24S	137	627	30 905	462
M27x3	27	HL-27S	179	911	40 277	672
M30x3.5	30	HL-30S	219	1 240	49 150	915
M33x3.5	33	HL-33S	270	1 669	60 808	1 231

Symbols:

μ_G : Coefficient of friction in the thread
 μ_K : Coefficient of friction on the bearing surface (HEICO-LOCK®)
 η : Utilization factor of the yield strength of the bolt by the preload

Conversion factors:

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 torque: factor Nm → lb ft : 0.73756

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Torque Recommendations

ISO metric thread

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thread type:		metric ISO coarse thread acc. to ISO 261
screw product standard:	ISO 4017	hex. cap screw
strength class:	A4-80	acc. to ISO 3506-1
surface coating (bolt/nut):	blank	

			lubrication: molybdenum disulfide (MoS2)			
			$\mu_G =$	0.14		
			$\mu_K =$	0.15		
			$\eta =$	0.65		
Thread designation	nominal diameter d [mm]	HEICO-LOCK®	SI Units		Imperial Units	
			Assembly preload F_M [kN]	Assembly torque M_A [Nm]	Assembly preload F_M [lbf]	Assembly torque M_A [lb ft]
M36x4	36	HL-36S	319	2 150	71 608	1 586
M39x4	39	HL-39S	381	2 772	85 551	2 044
M42x4.5	42	HL-42S	437	3 428	98 276	2 528
M45x4.5	45	HL-45S	509	4 265	114 504	3 146
M48x5	48	HL-48S	575	5 158	129 159	3 804
M52x5	52	HL-52S	686	6 601	154 119	4 869
M56x5.5	56	HL-56S	792	8 219	177 983	6 062
M60x5.5	60	HL-60S	921	10 163	207 092	7 496
M64x6	64	HL-64S	1 044	12 253	234 619	9 037
M68x6	68	HL-68S	1 192	15 082	267 876	11 124
M72x6	72	HL-72S	1 349	17 972	303 337	13 255
M76x6	76	HL-76S	1 517	21 203	341 001	15 639
M80x6	80	HL-80S	1 694	24 484	380 869	18 058

Symbols:

μ_G :	Coefficient of friction in the thread
μ_K :	Coefficient of friction on the bearing surface (HEICO-LOCK®)
η :	Utilization factor of the yield strength of the bolt by the preload

Conversion factors:

force:	factor N → lbf :	0.22481
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