

## Torque Recommendations

Unified thread

HEICO-LOCK® material:	<b>carbon steel</b>	C45E, through-hardened, zinc flake coated (flZnnc)
thread type:	<b>UNC</b>	unified coarse thread acc. to ASME B1.1
screw product standard:	ASTM B18.2.1	hex. cap screw
strength class:	<b>Grade 5</b>	acc. to SAE J429
surface coating (bolt/nut):	<b>phosphated</b>	

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 [inch]	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]
UNC 1/4" - 20	1/4"	HL-1/4"	10.0	12.6	2 255	9.3	8.3	12.6	1 864	9.3
UNC 5/16" - 18	5/16"	HL-8	16.5	24.5	3 703	18.1	13.6	24.5	3 061	18.1
UNC 3/8" - 16	3/8"	HL-3/8"	24.3	42.1	5 461	31.0	20.1	42.3	4 515	31.2
UNC 7/16" - 14	7/16"	HL-11	33.3	65.3	7 491	48.2	27.5	65.8	6 193	48.5
UNC 1/2" - 13	1/2"	HL-1/2"	44.4	101.2	9 983	74.6	36.7	102.0	8 253	75.2
UNC 9/16" - 12	9/16"	HL-14	56.9	143.5	12 792	105.8	47.0	144.9	10 575	106.9
UNC 5/8" - 11	5/8"	HL-16	70.6	200.3	15 867	147.7	58.3	202.1	13 117	149.1
UNC 3/4" - 10	3/4"	HL-3/4"	104	351	23 460	259	86	355	19 393	262
UNC 7/8" - 9	7/8"	HL-22	144	562	32 361	414	119	569	26 751	420
UNC 1" - 8	1"	HL-1"	189	858	42 445	632	156	868	35 088	640
UNC 1 1/8" - 7	1 1/8"	HL-30	210	1 080	47 099	796	173	1 092	38 936	805
UNC 1 1/4" - 7	1 1/4"	HL-33	266	1 499	59 696	1 106	220	1 520	49 349	1 121
UNC 1 3/8" - 6	1 3/8"	HL-36	317	1 968	71 208	1 452	262	1 994	58 865	1 471
UNC 1 1/2" - 6	1 1/2"	HL-39	385	2 582	86 526	1 904	318	2 622	71 528	1 934

### Symbols:

$\mu_G$ :	Coefficient of friction in the thread
$\mu_K$ :	Coefficient of friction on the bearing surface (HEICO-LOCK®)
$\eta$ :	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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HEICO-LOCK® material:	<b>carbon steel</b>	C45E, through-hardened, zinc flake coated (fIZnnc)
thread type:	<b>UNC</b>	unified coarse thread acc. to ASME B1.1
screw product standard:	ASTM B18.2.1	hex. cap screw
strength class:	<b>Grade 8</b>	acc. to SAE J429
surface coating (bolt/nut):	<b>phosphated</b>	

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 [inch]	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]
UNC 1/4" - 20	1/4"	HL-1/4"	14.2	17.8	3 187	13.2	11.7	17.7	2 634	13.1
UNC 5/16" - 18	5/16"	HL-8	23.3	34.6	5 232	25.5	19.2	34.6	4 325	25.6
UNC 3/8" - 16	3/8"	HL-3/8"	34.3	59.4	7 717	43.8	28.4	59.7	6 379	44.0
UNC 7/16" - 14	7/16"	HL-11	47.1	92.2	10 586	68.0	38.9	93.0	8 751	68.6
UNC 1/2" - 13	1/2"	HL-1/2"	62.7	143.0	14 106	105.5	51.9	144.1	11 661	106.3
UNC 9/16" - 12	9/16"	HL-14	80.4	202.8	18 076	149.6	66.5	204.8	14 943	151.0
UNC 5/8" - 11	5/8"	HL-16	99.7	283.0	22 421	208.7	82.4	285.6	18 534	210.6
UNC 3/4" - 10	3/4"	HL-3/4"	147	495	33 150	365	122	501	27 404	370
UNC 7/8" - 9	7/8"	HL-22	203	794	45 727	586	168	805	37 801	593
UNC 1" - 8	1"	HL-1"	267	1 212	59 977	894	221	1 226	49 581	905
UNC 1 1/8" - 7	1 1/8"	HL-30	336	1 733	75 592	1 278	278	1 752	62 489	1 292
UNC 1 1/4" - 7	1 1/4"	HL-33	426	2 406	95 809	1 775	352	2 440	79 202	1 800
UNC 1 3/8" - 6	1 3/8"	HL-36	508	3 159	114 285	2 330	420	3 200	94 475	2 360
UNC 1 1/2" - 6	1 1/2"	HL-39	618	4 144	138 869	3 056	511	4 208	114 798	3 103

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## Torque Recommendations

Unified thread

HEICO-LOCK® material:	<b>stainless steel</b>	1.4404 (316L), surface hardened
thread type:	<b>UNC</b>	unified coarse thread acc. to ASME B1.1
screw product standard:	ASTM B18.2.1	hex. cap screw
strength class:	<b>Alloy Group 1/2</b> <b>Condition SH</b> <b>(materials e.g. 304, 316)</b>	acc. to ASTM F593
surface coating (bolt/nut):	<b>none</b>	

			lubrication: <b>molybdenum disulfide (MoS2)</b>			
			$\mu_G =$	0.14		
			$\mu_K =$	0.15		
			$\eta =$	0.65		
Thread designation	nominal diameter d [inch]	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]
UNC 1/4" - 20	1/4"	HL-1/4"S	9.0	12.1	2 018	8.9
UNC 5/16" - 18	5/16"	HL-8S	14.7	23.6	3 314	17.4
UNC 3/8" - 16	3/8"	HL-3/8"S	21.7	40.7	4 887	30.0
UNC 7/16" - 14	7/16"	HL-11S	29.8	63.4	6 704	46.7
UNC 1/2" - 13	1/2"	HL-1/2"S	39.7	98.0	8 934	72.3
UNC 9/16" - 12	9/16"	HL-14S	50.9	139.3	11 448	102.8
UNC 5/8" - 11	5/8"	HL-16S	63.2	194.1	14 200	143.2
UNC 3/4" - 10	3/4"	HL-3/4"S	74	269	16 575	198
UNC 7/8" - 9	7/8"	HL-22S	102	431	22 863	318
UNC 1" - 8	1"	HL-1"S	133	656	29 988	484
UNC 1 1/8" - 7	1 1/8"	HL-30S	134	750	30 237	553
UNC 1 1/4" - 7	1 1/4"	HL-33S	170	1 044	38 324	770
UNC 1 3/8" - 6	1 3/8"	HL-36S	153	1 028	34 285	758
UNC 1 1/2" - 6	1 1/2"	HL-39S	185	1 350	41 661	996

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