Tightening Torques

for self-locking hexagon nuts

BMW N
113 49.0

Applicable only to nuts according to BMW N 113 48.0 and DIN 985.

Surface condition: Phosphate treated or galvanized bolts/screws, galvanized or unwaxed nuts.
Lubricated condition: either non-lubricated or lubricated with light coat of oil.

For cadmium plated bolts/screws or nuts the tightening torque must be ≈ 30% less than value given in table when utilization factor of bolt material is the same.

Not applicable when surface or lubricated condition of threads is different, property class of bolt/screw is less than 8.8 (e.g. 6.9), in conjunction with expansion bolts/screws.

In such cases values will have to be determined separately.

Threads	Tightening Torque M_A					
	Nuts acc. to BMW N 113 48.0 Property Class			Nuts acc. to DIN 985 Property Class		
	8	10	12	8	10	12
M 6	$1,1^{+0,1}$	$1,5^{+0,2}$	$1,8^{+0,2}$	$1,0^{+0,1}$	$1,3^{+0,2}$	$1,6^{+0,2}$
M 8 M 8 x 1	$2,5^{+0,3}$	$3,4^{+0,4}$	$4,0^{+0,5}$	$2,5^{+0,2}$	$3,3^{+0,3}$	$3,9^{+0,4}$
M 10 M 10 x 1,25	$4,9^{+0,5}$	$6,8^{+0,8}$	$8,0^{+0,9}$	$4,7^{+0,5}$	$6,4^{+0,7}$	$7,7^{+0,8}$
M 12 M 12 x 1,5	$8,1^{+0,9}$	$11,4^{+1,3}$	$13,5^{+1,5}$	$7,8^{+0,8}$	$10,9^{+1}$	$12,6^{+1,5}$
M 14 M 14 x 1,5	$13,0^{+1,5}$	$18,0^{+2}$	$22,0^{+2}$	$12,7^{+1,5}$	$17,0^{+2}$	$21,0^{+2}$
M 16 M 16 x 1,5	$22,5^{+2}$	$28,0^{+3}$	$33,0^{+4}$	$19,5^{+2}$	$26,0^{+3}$	$31,0^{+4}$
M 18 M 18 x 1,5	$27,0^{+3}$	$38,0^{+4}$	$44,0^{+5}$	$26,0^{+3}$	$36,0^{+4}$	$42,0^{+5}$

Pertinent preload forces Pv (kp), corresponding with different property classes, are shown in "Tightening Torques and Preload Forces" table of BMW N 600 02.0.

Values given in this table shall apply to bolts/screws or nuts having the above mentioned properties. Tightening torque values including tolerances will only be given on layout or assembly drawings if operations require a value deviating from standards.

Bolts/screws or nuts subjected to high dynamic loads will have their tightening torque value determined by exact calculations and tests.

Conversion:

1 kpm x 7.233 = tightening torque in ft. lbs.

Tightening Torques and Preload Forces

Applicable only to bolts/screws according to DIN 912, 931, 933, 960, 961, 6912 and nuts having a nut height of 0.8 x d according to DIN 934 and exclusively for μ tot. = 0.14.
(Phosphate treated bolts/screws, nuts without final treatment or galvanized. Lubricated condition: either non-lubricated or lubricated with oil.)

For cadmium plated bolts/screws or nuts (μ tot. $\approx$ 0.08 to 0.09) the tightening torque must be $\approx$ 30% less than value given in table when utilization factor of bolt material is the same.

Not applicable when a different surface or lubricated condition of the threads is used of if there is a deviation in nut height. In such cases values will have to be determined separately.

Not applicable to bolts/screws with expansion shanks, self-locking screws or screws used to hold parts made of different materials.

Utilization factor of a bolt/screw with standard metric threads:

$$\sigma_{red} = 0{,}09 \cdot \sigma_{0{,}2}$$

	Tightening Torque M_A (kpm)						Preload force P_V (kp)					
	Property Class acc. to DIN 267						Property Class acc. to DIN 267					
Threads	5.6	6.8	6.9	8.8	10.9	12.9	5.6	6.8	6.9	8.8	10.9	12.9
M 6	$0{,}4^{+0{,}1}$	$0{,}6^{+0{,}1}$	$0{,}7^{+0{,}1}$	$0{,}9^{+0{,}1}$	$1{,}2^{+0{,}2}$	$1{,}5^{+0{,}2}$	425	600	685	855	1210	1440
M 8	$1{,}0^{+0{,}1}$	$1{,}6^{+0{,}2}$	$1{,}8^{+0{,}2}$	$2{,}2^{+0{,}2}$	$3{,}0^{+0{,}3}$	$3{,}6^{+0{,}4}$	740	1190	1330	1570	2170	2630
M 10	$2{,}0^{+0{,}2}$	$3{,}2^{+0{,}4}$	$3{,}6^{+0{,}4}$	$4{,}3^{+0{,}5}$	$6{,}0^{+0{,}7}$	$7{,}3^{+0{,}8}$	1160	1880	2090	2500	3480	4200
M 8x1	$1{,}0^{+0{,}1}$	$1{,}0^{+0{,}2}$	$1{,}8^{+0{,}2}$	$2{,}2^{+0{,}2}$	$3{,}0^{+0{,}3}$	$3{,}6^{+0{,}4}$	740	1190	1330	1610	2200	2670
M 10x1,25	$2{,}0^{+0{,}2}$	$3{,}2^{+0{,}4}$	$3{,}6^{+0{,}4}$	$4{,}3^{+0{,}5}$	$6{,}0^{+0{,}7}$	$7{,}3^{+0{,}8}$	1160	1900	2120	2520	3530	4250
M 12x1,25	$3{,}4^{+0{,}4}$	$5{,}4^{+0{,}6}$	$6{,}1^{+0{,}7}$	$7{,}2^{+0{,}8}$	$10{,}3^{+1}$	$12{,}0^{+1{,}5}$	1720	2710	3070	3610	5100	6090
M 12x1,5	$3{,}4^{+0{,}4}$	$5{,}4^{+0{,}6}$	$6{,}1^{+0{,}7}$	$7{,}2^{+0{,}8}$	$10{,}3^{+1}$	$12{,}0^{+1{,}5}$	1690	2670	3030	3570	5040	6000
M 14x1,5	$5{,}4^{+0{,}6}$	$8{,}6^{+1}$	$9{,}8^{+1}$	$11{,}5^{+1{,}5}$	$16{,}0^{+2}$	$20{,}0^{+2}$	2330	3720	4180	5030	6970	8510
M 16x1,5	$8{,}3^{+1}$	$13{,}5^{+1{,}5}$	$15{,}5^{+1{,}5}$	$18{,}0^{+2}$	$25{,}0^{+3}$	$30{,}0^{+4}$	3240	5190	5840	6920	9710	11770
M 18x1,5	$11{,}0^{+1{,}5}$	$18{,}0^{+2}$	$20{,}0^{+2{,}5}$	$24{,}0^{+3}$	$34{,}0^{+4}$	$40{,}0^{+5}$	3890	6240	7020	8380	11800	13960
M 20x1,5	$16{,}0^{+2}$	$26{,}0^{+3}$	$29{,}0^{+3{,}5}$	$34{,}0^{+4}$	$49{,}0^{+5}$	$59{,}0^{+6}$	5070	8170	9180	10680	15200	18250

Values given in this table shall apply to bolts/screws or nuts having the above mentioned properties. Tightening torque values including tolerances will only be given on layout or assembly drawings if

a) operations require a value deviating from standards,
b) or property class of bolt/screw and nut is not known.

Important! All deviations from this table are pointed out in the "Specifications".

Conversions: 1 mkp x 7.233 = tightening torque in ft. lbs.
1 kp x 2.2046 = preload force in lbs.

Summary of tightening torques f
R 45–R 65 LS in Nm (lb. ft)

	Nm	lb.ft
Engine		
Cylinder head nuts (in three stages: 15/25/35 Nm)	35 + 4	26 + 3
Big end bolts	50 ± 2	37 ± 1.4
Clutch housing (flywheel)	100 + 5	74 + 3.7
Nut for valve adjusting screw	20 ± 2	14.7 ± 1.5
Threaded stub pipe for carburettor connection	50	37
Oil drain plug	30 + 5	22 + 3.7
Engine electrical system		
Armature retaining bolt	25 ± 2	18.4 ± 1.5
Spark plugs	20 + 5	14.7 + 3.7
Starter retaining bolts	47.5	35
Exhaust system		
Star nuts for exhaust pipes	200 + 20	147 + 15
Clutch		
Clutch housing cover	20 + 2	14.7 + 1.5
Gearbox		
Attachment to engine	33	24.3
Bearing mount	19	14
Output flange at gearbox output shaft	221.5	163
Gearbox cover to gearbox housing	8	5.9
Nut for kick starter lever (taper screw)	22.5	16.6
Oil filler plug	31	22.9
Oil drain plug	26	19.2
Drive shaft		
Twelve-sided bolt	40	29.5
Front forks		
Fork bridge clamp bolts	40 + 5	29.5 + 3.7
Retaining bolt for damper at slider tube	35 ± 5	25.8 ± 3.7
Screw end plug	80 + 10	59 + 7.5
Oil filler plugs	9	6.6
Oil drain plugs	8	5.9
Steering		
Cap screw	80 + 10	59 + 7.5
Threaded ring	Free from play	

Summary of tightening torques for R 45–R 65 LS in Nm (lb. ft)

(continued)

Rear axle drive with swinging arm	**Nm**	**lb. ft**
Nut on input pinion	165	122
Ring nut in axle housing	118	87
Nuts for axle housing cover	17.7	13
Oil level check plug on axle housing	10	7.4
Oil drain plug on axle housing	25.5	18.8
Swinging arm pivot pin	10 + 2	7.4 + 1.5
Locknut for swinging arm pivot pin	100 + 20	74 + 15
Swinging arm oil filler plug	Screwed in but not fully tightened	
Swinging arm oil drain plug	15.7	11.6
Shock absorber rod at spring strut lug	38 ± 2	28 ± 1.5
Retaining bolts (twelve-sided) for axle housing at swinging arm	47	35
Retaining bolts for spring struts	35 + 5	26 + 3.7
Brakes		
Brake pipe to master cylinder	8 + 2	5.9 + 1.5
Brake pipe to brake caliper	8 + 2	5.9 + 1.5
Brake pipe to brake hose	12 + 3	8.8 + 2.2
Wheels and tires		
Wheel bearing friction moment at specified axle nut tightening torque (front wheel)	0.15 ... 0.30	0.11 ... 0.22
Nuts for quick-release axle	48	35
Axle clamping bolts	17	12.5