



Product Guide

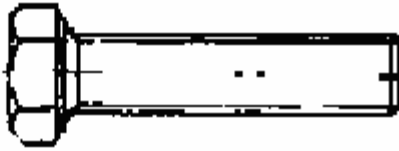
- 1. Hexagon Head Bolt (Din 931/933)**
- 2. High Strength Bolts**
 - 2.1 High Strength Structure Bolts ASTM A325
 - 2.2 High Strength F-10T and S-10T Bolts
- 3. Socket Screws**
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 - 3.2 Hexagon Socket Allen Countersunk Screws (Din 7991)
 - 3.3 Hexagon Socket Allen Button Screws (Din 7380)
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 - 8.6 Expansion Bolts/ Sleeve Anchors
 - 8.7 Grease Nipple Fittings
 - 8.8 Retaining Rings
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Hexagon Head Bolts (Din 931/933)



Available Grades	:	Mild Steel 4.8/ Grade 8.8/ Grade 10.9/ Stainless Steel 304/Stainless Steel 316/ Brass
Finishing/ Coating	:	Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated/ Brass
Threading	:	Half Thread (din931) / Full Thread (din933)Coarse Thread, UNC/ Fine Thread, UNF
Sizes Available	:	Diameter - M3-M64 (metric) 3/16 – 2” (inches) Length - 10mm – 500mm (metric) ¼ - 16” (inches)
++ Brass sizes limited to Diameter M12, Length 100mm		



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High Strength Structural Bolts ASTM A325



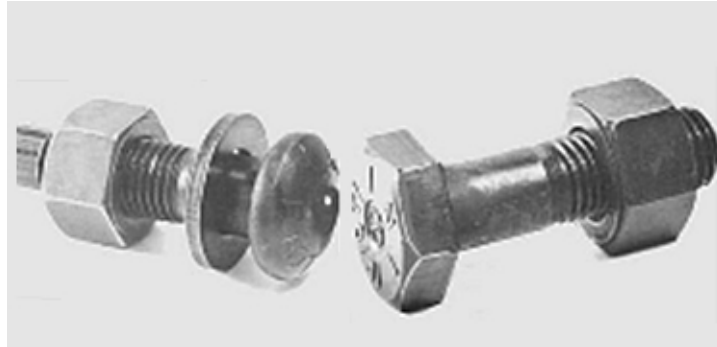
Sizes Available	:	Diameter : $\frac{1}{2}$ - $1 \frac{1}{4}$ " Length : 1" - 9"
++ Flat Harden Washer & Load Indicating Washers Options ++ Sizes in accordance to ATSM standards		



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High Strength F-10T & S-10T Bolts



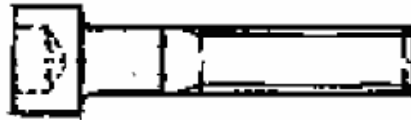
Sizes Available	:	Diameter : M12 – M36 Length : 30mm – 300mm
++Flat Harden Washer Option ++Metric sizes in accordance to JIS Standards		



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Hexagon Socket Allen Key Cap Screws (Din 912)



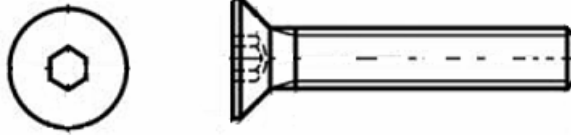
Available Grades	:	ISO Grade 12.9 / Stainless Steel 304 / Stainless Steel 316
Finishing/ Coating	:	Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated
Threading	:	Half Thread / Full Thread Coarse Thread, UNC/ Fine Thread, UNF
Sizes Available	:	Diameter - M3- M45 (metric) 3/16 – 1 1/2" (inches) Length - 10mm – 400mm (metric) 1/4 - 10" (inches)
++Hot Dip Galvanised only available from Diameter 10mm onwards		



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Hexagon Socket Allen Key Countersunk Screw (Din 7991)



Available Grades	:	JIS Grade 10.9/ ISO Grade 12.9/ Stainless Steel 304/ Stainless Steel 316
Finishing/ Coating	:	Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated
Threading	:	Half Thread / Full Thread Coarse Thread, UNC
Sizes Available	:	Diameter - M3- M24 (metric) 3/16 – 1" (inches) Length - 10mm – 200mm (metric) 1/4 - 5" (inches)
++Hot Dip Galvanised only available from Diameter 10mm onwards		



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Hexagon Socket Allen Key ButtonScrews (Din 7380)



Available Grades	:	ISO Grade 12.9 / Stainless Steel 304
Finishing/ Coating	:	Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated
Threading	:	Half Thread / Full Thread Coarse Thread, UNC
Sizes Available	:	Diameter - M3- M16 (metric) 3/16 –5/8 " (inches) Length - 10mm – 100mm (metric) 1/4 - 4" (inches)
++Hot Dip Galvanised only available from Diameter 10mm onwards		



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Hexagon Socket Allen Set Screws (Din 916)



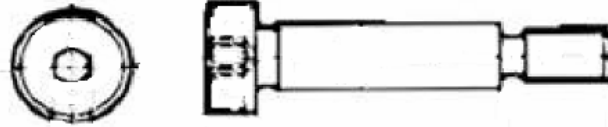
Available Grades	:	ISO Grade 12.9 / Stainless Steel 304
Finishing/ Coating	:	Black/ White Zinc Galvanised/ Cadmium Plated/ Hot Dip Galvanised/ Flouro Carbon Coated
Threading	:	Full Thread Coarse Thread, UNC
Sizes Available	:	Diameter - M3- M24 (metric) 3/16 – 1" (inches) Length - 10mm – 150mm (metric) 1/4 - 6" (inches)
++Hot Dip Galvanised only available from Diameter 10mm onwards		



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Hexagon Socket Shoulder Screws



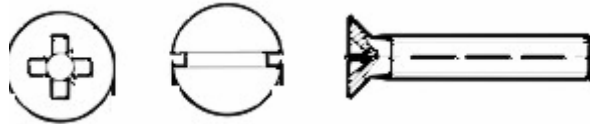
Available Grades	:	ISO Grade 12.9
Finishing/ Coating	:	Black
Threading	:	Coarse Thread
Sizes Available	:	Diameter - M6- M20 (metric) Length - 10mm – 100mm (metric)



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Countersunk Flat Head Machine Screws (Din 963 / 965)



Available Grades	:	Brass / Mild Steel 4.8 / Stainless Steel 304 / Stainless Steel 316
Finishing/ Coating	:	Bronze / White Zinc Galvanised/ Cadmium Plated / Stainless Steel
Threading	:	Half Thread / Full Thread
Sizes Available	:	Diameter - M3- M12 (metric) (+) 3/16 – 3/8 (inches) (-) Length - 10mm – 100mm (metric) 1/4 - 4" (inches)



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Pan Head Machine Screws (Din 85 / 7985)



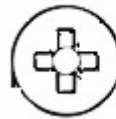
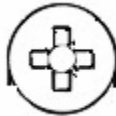
Available Grades	:	Brass / Mild Steel 4.8 / Stainless Steel 304 / Stainless Steel 316
Finishing/ Coating	:	Bronze / White Zinc Galvanised/ Cadmium Plated / Stainless Steel
Threading	:	Half Thread / Full Thread Coarse Thread, UNC
Sizes Available	:	Diameter - M3- M12 (metric) (+) 3/16 – 3/8 (inches) (-) Length - 10mm – 100mm (metric) 1/4 - 4" (inches)



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Self Tapping Screws (Din 7981/ 7982)



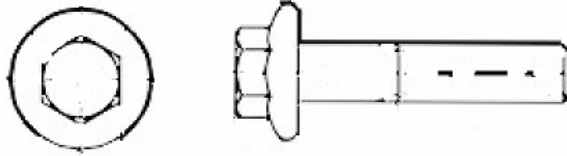
Available Grades	:	Nickel / Stainless Steel
Finishing/ Coating	:	Nickel Polished / Stainless Steel
Sizes Available	:	Diameter - #4 - #14 Length - 1/2" - 3"



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Hexagon Flange Bolts



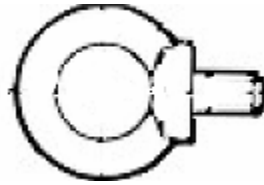
Available Grades	:	Mild Steel
Finishing/ Coating	:	Yellow Zinc Galvanised
Threading	:	Coarse Thread
Sizes Available	:	Diameter - M43- 6 (metric) Length - 10mm – 50mm (metric)



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Eye Bolts



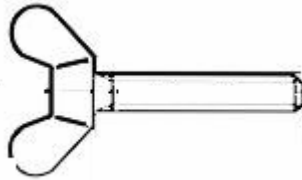
Available Grades	:	Steel
Finishing/ Coating	:	Yellow Zinc Galvanised
Threading	:	Coarse Thread
Sizes Available	:	Diameter - M6- M64 (metric)



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Wing Bolts



Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	Nickel Plated
Threading	:	Coarse Thread
Sizes Available	:	Diameter - M4- M6 (metric) Length - 10mm – 50mm (metric)



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Square Neck Carriage Bolts



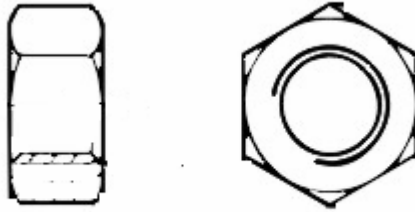
Available Grades	:	Mild Steel
Finishing/ Coating	:	Black / White Zinc Galvanised
Threading	:	Coarse, UNC
Sizes Available	:	Diameter - $\frac{1}{4}$ - $\frac{3}{4}$ Length - 1" - 5"



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Hexagon Nuts (Din 934)



Available Grades	:	Mild Steel / High Tensile 8.8 / High Tensile 10.9 / Stainless Steel 304 / Stainless Steel 316/ Brass
Finishing/ Coating	:	Black / White Zinc Galvanised / Cadmium Plated / Hot Dip Galvanised/ Bronze
Threading	:	Coarse Thread, UNC/ Fine Thread, UNF
Sizes Available	:	M64 – M100 (metric) 3/16 – 2 ½ (imperial)

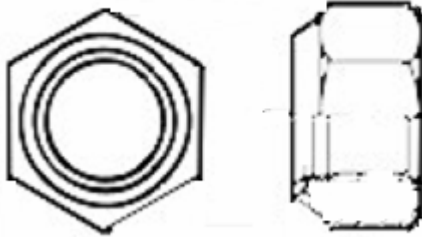
+ + B r a s s s i z e s l i m i t e d t o d i a m e t e r M 2 4



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Nylon Lock Nuts (Din 985)



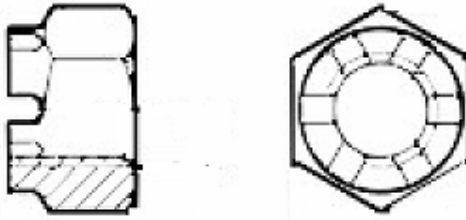
Available Grades	:	Mild Steel / Stainless Steel 304 / Stainless Steel 316
Finishing/ Coating	:	White Zinc Galvanised / Stainless Steel
Threading	:	Coarse Thread, UNC/ Fine Thread, UNF
Sizes Available	:	M64 – M48 (metric) 3/16 – 2 (imperial)



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Castle Nut (Din 935)



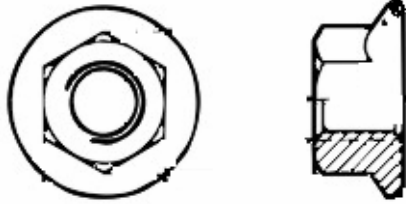
Available Grades	:	Mild Steel
Finishing/ Coating	:	Black
Threading	:	Coarse Thread
Sizes Available	:	M3 – M48 (metric)



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Flange Nut (Din 6923)



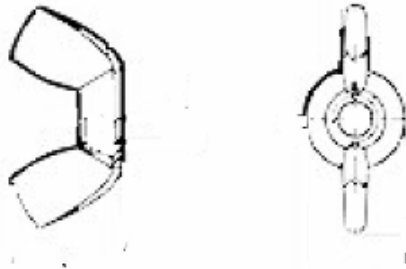
Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	Yellow Zinc Galvanised
Threading	:	Coarse Thread
Sizes Available	:	M6 – M20 (metric)



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Wing Nut (Din 315)



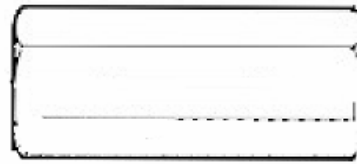
Available Grades	:	Nickel / Stainless Steel / Brass
Threading	:	Coarse Thread
Sizes Available	:	M4 – M12 (metric)



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Coupling Long Nut (Din 6334)



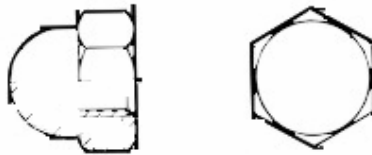
Available Grades	:	Mild Steel
Finishing/ Coating	:	White Zinc Galvanised
Threading	:	Coarse Thread, UNC
Sizes Available	:	M6 – M24 (metric) ¼ - 1" (imperial)



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Dome Cap Nut



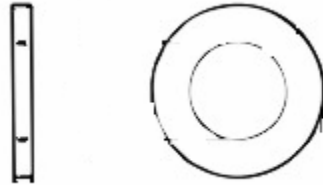
Available Grades	:	Nickel / Stainless Steel
Threading	:	Coarse Thread, UNC
Sizes Available	:	M6 – M24 (metric) 1/4 - 1" (imperial)



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Flat Round Washers



Available Grades	:	Mild Steel / Nickel / High Tensile / Stainless Steel 304 / Stainless Steel 316 / Nylon/ Brass
Finishing/ Coating	:	Bronze / Black / White Zinc Galvanised / Cadmium Plated/ Hot Dip Galvanised/ NiCr
Threading	:	Coarse Thread, UNC
Sizes Available	:	M2 – M64 (metric) 3/16 – 2 1/2" (imperial)
+ + B r a s s S i z e s l i m i t e d t o d i a m e t e r M 2 4 o r 1 ”		



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Spring Lock Washers



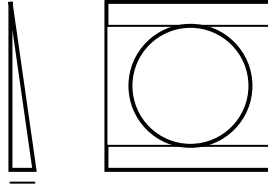
Available Grades	:	High Tensile / Stainless Steel 304 / Stainless Steel 316/ Brass
Finishing/ Coating	:	Black / White Zinc Galvanised / Cadmium Plated / Hot Dip Galvanised
Sizes Available	:	M2 – M64 (metric) 3/16 – 2 1/2" (imperial)
+ + B r a s s S i z e s l i m i t e d t o d i a m e t e r M 2 4 o r 1 ”		



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Taper Washers



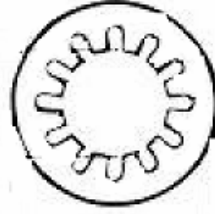
Available Grades	:	High Tensile / Stainless Steel 304
Finishing/ Coating	:	Black / White Zinc Galvanised
Sizes Available	:	M8 – M30 (metric) 5/16 – 1 1/4" (imperial)



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External Tooth-Lock Washer (Din 6796A) Internal Tooth-Lock Washer (Din 6797J)



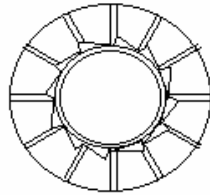
Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	Black/ White Zinc Galvanised / Stainless Steel
Sizes Available	:	M6 – M24 (metric) 1/4 - 1" (imperial)



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Disc Washer (Din 17 222)



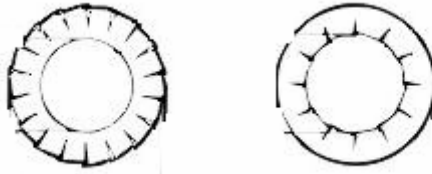
Available Grades	:	Spring Steel
Finishing/ Coating	:	Black/ White Zinc Galvanised
Sizes Available	:	M6 – M24 (metric)



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Internal Overlap Washer (Din 6798J) External Overlap Washers (Din 6798A)



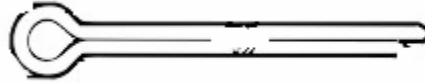
Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	Black/ White Zinc Galvanised / Stainless Steel
Sizes Available	:	M6 – M24 (metric) ¼ - 1" (imperial)



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Cotter Pins (Din 94)



Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	White Zinc Galvanised / Stainless Steel
Sizes Available	:	Diameter : M1.5 – M16 (metric) 1/16 – 3/4 (imperial) Length : 12mm – 300mm (metric) 1/2" – 12" (imperial)



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Spring Lock Pins (Din 1481)



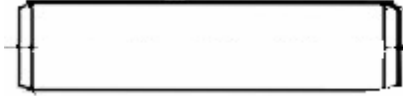
Available Grades	:	Carbon Spring Steel / Stainless Steel
Finishing/ Coating	:	Black / Stainless Steel
Sizes Available	:	Diameter : M1.5 – M16 (metric) Length : 12mm – 100mm (metric)



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Dowel Pins



Available Grades	:	Hardened Carbon Steel
Finishing/ Coating	:	White Zinc Galvanised / Stainless Steel
Sizes Available	:	Diameter : M2 – M12 Length : 6mm – 100mm



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Socket Pipe Plus



Available Grades	:	ISO Grade 12.9
Finishing/ Coating	:	Black
Threading	:	NPT /BSP
Sizes Available	:	1/16 – 1”



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Drop In Anchors



Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	White Zinc Galvanised / Cadmium Plated / Stainless Steel
Threading	:	Coarse, UNC
Sizes Available	:	Diameter : M6 – M12 (metric) 1/4 - 1/2 (imperial)



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Expansion Bolts / Set Anchors / Sleeve Anchors



Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	White Zinc Galvanised / Cadmium Plated / Stainless Steel
Threading	:	Coarse, UNC
Sizes Available	:	Diameter : M6 – M16 (metric) $\frac{1}{4}$ - $\frac{3}{4}$ (imperial) Length : 30mm – 150mm $\frac{1}{4}$ - 6" (imperial)



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Grease Fittings



Available Grades	:	Mild Steel / Stainless Steel
Finishing/ Coating	:	Nickel Plated / Stainless Steel
Threading	:	NPT / BSP / UNF
Sizes Available	:	Diameter : M6 – M10 (metric) 1/8 – 1/2(imperial)



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Retaining Rings (Din 471 / 472)



Available Grades	:	Hardened Steel / Stainless Steel
Sizes Available	:	A -Type (Din 471) 3mm-300mm B -Type (Din 472) 3mm-300mm



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Fully Threaded Stud Rods



Available Grades	:	Mild Steel/ High Tensile / Stainless Steel 304 / Stainless Steel 316 / Brass
Finishing/ Coating	:	Black / White Zinc Galvanised / Stainless / Brass
Threading	:	Coarse, UNC
Sizes Available	:	M4 & M5 (1 meter each length) M6 – M48 (2meter each length) ¼ - 2 " (6 feet each length)



Technical Data

High Tensile Hexagon Head Bolts and Screws

	BS 3692 Grade 8-8					BS 1768 Grade S					BS 1083 Grade R				
Minimum Tensile Strength	785 N/mm ² (80 kg f/mm ²)					50 ton f/in ²					45 ton f/in ²				
Minimum Stress at Permanent Set Limit R _{0.2}	628 N/mm ² (64kg f/mm ²)					38 ton f/in ²									
Minimum Yield Stress	—					—					34 ton f/in ²				
Minimum Effective Thread Length	Up to 125 mm long – 2 x dia. + 6 mm Over 125 mm – 200 mm long – 2 x dia. + 12 mm Over 200 mm long – 2 x dia. + 25 mm					Up to 6" long – 2 x dia. + ¼" Over 6" long – 2 x dia. + ½"					All Lengths 2 x dia.				
(1) Based on 85% of Proof Load or theoretical Proof Load. (2) The Torque figures quoted are experimental approximations and are for guidance only. They apply to fasteners in the lightly oiled and self-colour (unplated) condition. ALWAYS REMEMBER THAT THE BEST METHOD OF MAINTAINING BOLT TENSION IS BY CORRECT TIGHTENING	Dia.	Pitch (coarse) mm	Tensile Stress Area (mm ²)	Bolt Preload ⁽¹⁾ (kN)	Approx. Torque ⁽²⁾ (Nm)	Dia.	Pitch (T.P.I.)	Tensile Stress Area (in ²)	Bolt Preload ⁽¹⁾ (ton)	Approx. Torque ⁽²⁾ (lb f ft)	Dia.	Pitch (T.P.I.)	Tensile Stress Area (in ²)	Bolt Preload ⁽¹⁾ (ton)	Approx. Torque ⁽²⁾ (lb f ft)
	M5	0.8	14.2	6.9	6.9	¼"	UNF 28	.0368	1.19	11	¼"	BSF 26	.0356	0.98	9
							UNC 20	.0324	1.05	10		BSW 20	.0320	0.88	8
	M6	1.0	20.1	9.8	11.7	5/16"	UNF 24	.0587	1.89	22	5/16"	BSF 22	.0567	1.56	18
							UNC 18	.0532	1.72	20		BSW 18	.0527	1.45	17
	M8	1.25	36.6	17.8	28	¾"	UNF 24	.0886	2.86	40	¾"	BSF 20	.0839	2.30	32
							UNC 16	.0786	2.54	36		BSW 16	.0779	2.14	30
	M10	1.5	58.0	28.1	56	7/16"	UNF 20	.1198	3.87	65	7/16"	BSF 18	.1158	3.18	50
							UNC 14	.1078	3.48	55		BSW 14	.1069	2.93	48
	M12	1.75	84.3	40.9	98	½"	UNF 20	.1612	5.21	95	½"	BSF 16	.152	4.17	80
							UNC 13	.1438	4.65	90		BSW 12	.1385	3.80	70
	M16	2.0	157	76.2	244	5/8"	UNF 18	.258	8.33	195	5/8"	BSF 14	.243	6.67	155
							UNC 11	.229	7.40	175		BSW 11	.227	6.23	145
	M20	2.5	245	119.0	476	¾"	UNF 16	.375	12.11	340	¾"	BSF 12	.352	9.66	270
							UNC 10	.338	10.91	310		BSW 10	.336	9.22	260
M24	3.0	353	170.8	822	7/8"	UNF 14	.513	16.57	540	7/8"	BSF 11	.487	13.37	435	
						UNC 9	.467	15.08	490		BSW 9	.463	12.71	415	
M30	3.5	561	272.0	1630	1"	UNF 12	.667	21.54	800	1"	BSF 10	.642	17.63	660	
						UNC 8	.612	19.77	740		BSW 8	.608	16.89	620	



Thread Size Comparison

Size	METRIC PRODUCTS				UNIFIED INCH PRODUCTS				B.S. INCH PRODUCTS					
	Major Dia.		Thread Pitch mm	T.P.I.	Size	T.P.I.		Major Dia. Inch	Size	T.P.I.		Major Dia. Inch	T.P.I. BA	Major Dia. Inch
	mm	Inch				UNC	UNF			BSW	BSF			
M1.6	1.60	.063	.35	73	# 0	—	80	.060						
M2.0	2.00	.079	.4	64	# 1	—	72	.073	.073					
M2.5	2.50	.098	.45	56	# 2	56	64	.086	8BA				59.1	.087
					# 3	48	56	.099						
M3	3.00	.118	.5	51	# 4	40	48	.112	6BA				47.9	.110
					# 5	40	44	.125	1/8	40		.125		
					# 6	32	40	.138	5BA				43.1	.126
M4	4.00	.157	.7	36	# 8	32	36	.164	3BA				34.8	.161
M5	5.00	.197	.8	32	# 10	24	32	.190	3/16	24	32	.187		
									2BA				31.3	.185
									1BA				28.2	.209
M6	6.00	.236	1.0	25	1/4	20	28	.250	1/4	20	26	.250		
									OBA				25.4	.236
M8	8.00	.315	1.25	20	5/16	18	24	.313	5/16	18	22	.313		
M10	10.00	.394	1.5	17	3/8	16	24	.375	3/8	16	20	.375		
					7/16	14	20	.438	7/16	14	18	.438		
M12	12.00	.472	1.75	14.5	1/2	13	20	.500	1/2	12	16	.500		
M14	14.00	.551	2.0	12.5										
M16	16.00	.630	2.0	12.5	5/8	11	18	.625	5/8	11	14	.625		
M20	20.00	.787	2.5	10	3/4	10	16	.750	3/4	10	12	.750		
					7/8	9	14	.875	7/8	9	11	.875		
M24	24.00	.945	3.0	8.5	1	8	12	1.000	1	8	10	1.000		
					1.1/8	7	12	1.125	1.1/8	7	9	1.125		
M30	30.00	1.181	3.5	7.3	1.1/4	7	12	1.250	1.1/4	7	9	1.250		
M36	36.00	1.417	4.0	6.4	1.1/2	6	12	1.500	1.1/2	6	8	1.500		
M42	42.00	1.654	4.5	5.6										



STANDARD PRODUCTION RANGE



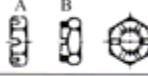






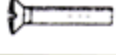
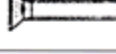
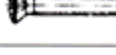


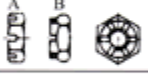


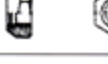

DIN	Illustration	Designation	DIN	Illustration	Designation
1		Taper pins	188		Tee-head bolts with double nip
7		Dowel pins	258		Taper pins with external thread
84		Slotted cheese head machine screws	261		Tee-head bolts
85		Slotted pan head machine screws	302		Countersunk head rivets, nominal dia, 10-36 mm
93		Tab washers with long tab	315		Wing nuts American standard
94		Cotter pins	315		Wing nuts German standard
95		Slotted raised countersunk head woodscrews	316		Wing screws American standard
96		Slotted round head woodscrews	316		Wing screws German standard
97		Slotted countersunk head woodscrews	404		Slotted drilled fillister head screws
124		Round head rivets	417		Slotted grub screws with full dog point
125		Flat washers Form A without chamfer Form B with chamfer	427		Slotted headless screws with chamfered end
126		Flat washers without chamfer	431		Pipe threaded nuts Form A
127		Spring lock washers Form A with bent ends (only to order) Form B with flat ends (ex stock)	432		External tab washers
128		Spring lock washers Form A curved Form B crinkle	433		Flat washers with reduced o. D.
137		Spring washers Form A curved Form B crinkle	434		Square taper washers: 8%
186		Tee-head bolts with square neck	435		Square taper washers: 14%




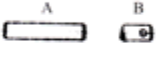
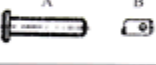
















DIN	Illustration	Designation
436		Square washers
438		Slotted grub screws with cup point
439		Hexagon lock nuts ~ 0,5 d Form A unchamfered
439		Hexagon lock nuts ~ 0,5 d Form B chamfered
440		Round washers for wood constructions Form R = round (ex stock) Form V = square (only to order)
444		Eye bolts
462		Internal tab washers
463		Tab washers with long and short tab
464		Knurled thumb screws
466		Knurled nuts with full collar
467		Flat knurled nuts
471		External retaining rings
472		Internal retaining rings
478		Square head bolts with collar
479		Square head bolts with half dog point
480		Square head bolts with collar and half dog point with rounded end
525		Weld studs
529		Masonry bolts Form A
529		Masonry bolts Form C

DIN	Illustration	Designation
529		Masonry bolts Form D
546		Slotted round nuts
547		Round nuts with drilled holes in one face
548		Round nuts with set pin hole inside
551		Slotted grub screws with flat point
553		Slotted grub screws with cone point
555		Hexagon nuts ~ 0.8 d (only in DIN 934 ex stock)
557		Square nuts
558		Hexagon head screws (only in DIN 933 ex stock)
561		Hexagon set screws with full dog point Form A with undercut
561		Hexagon set screws with full dog point Form B with runout
562		Square thin nuts
564		Hexagon set screws with half dog point and cone end Form A with undercut
564		Hexagon set screws with half dog point and cone end Form B with runout
571		Hexagon coach screws
580		Eye bolts
582		Eye nuts
603		Hexagon bolts (only in DIN 931 ex stock)
603		Carriage bolts



DIN	Illustration	Designation
935		Hexagon slotted and castle nuts Form A up to M 10 Form B from M 12
936		Hexagon lock nuts (only in DIN 439 ex stock)
937		Hexagon thin slotted and castle nuts Form A up to and incl. 10 mm nominal thread dia. Form B from 12 mm nom. thread dia.
938		Engineering studs metal end ~ 1 d
939		Engineering studs metal end ~ 1,25 d
940		Engineering studs metal end ~ 2,5 d
960		Hexagon head bolts metric fine thread
961		Hexagon head set screws metric fine thread
963		Slotted countersunk head machine screws
964		Slotted raised countersunk (oval) machine screws
965		Cross recessed countersunk head machine screws
966		Cross recessed raised countersunk (oval) head machine screws
975		Studding (also 3 m length ex stock)
976		Stud bolts Form A without chamfer Form B with chamfer
979		Slotted thin and castle nuts Form A up to M 10 Form B from M 12
980		All metal self-locking nuts
982		Nylon inserted self-locking nuts (Form P)
985		Nylon inserted self-locking nuts (Form T)
986		Self-locking domed cap nuts with nylon insert

DIN	Illustration	Designation
1151		Countersunk head nails
1440		Flat washers for clevis pins, medium
1441		Flat washers for clevis pins, coarse
1443		Clevis pins without head Form A without split pin holes Form B with split pin holes (replacement for DIN 1443)
1444		Clevis pins with head Form A without split pin holes Form B with split pin holes (replacement for DIN 1434, 1435, 1436)
1445		Clevis pins with head and threaded portion (replacement for DIN 1438)
1469		Grooved pins with half length groove and circlip groove end
1470		Full length parallel grooved pins with pilot end
1471		Full length taper grooved pins
1472		Pins with half length taper groove
1473		Full length parallel grooved pins
1474		Pins with half length reverse groove
1475		Pins with center groove
1476		Round head grooved pins
1477		Countersunk head grooved pins
1480		Turnbuckles
1481		Spring pins, heavy duty
1587		Hexagon domed nuts, full pattern
1804		Slotted round nuts for hook spanner



DIN	Illustration	Designation
1816		Round nuts with set pin holes
2093		Disc springs
2509		Double end studs
2510		Double end studs with reduced shank
2510		Extensions sleeves for double end studs
2510		Hexagon nuts for double end studs
2510		Hexagon cap nuts for double end studs
6303		Knurled nuts
6330		Heavy series hexagon nuts with spherical face
6331		Hexagon nuts with collar
6332		Grub screws with trust point
6896		Conical spring washers
6797		External tooth lock washers Form A
6797		Internal tooth lock washers Form J
6797		External tooth lock washers Form V (A 4 only to enquiry)
6798		Serrated lock washers Form A
6798		Serrated lock washers Form J
6798		90° Countersunk serrated lock washers Form V
6799		Retaining rings for shafts

DIN	Illustration	Designation
6885		Parallel keys square-ended round-ended
6900		Screw and washer assemblies
6900		Screw and washer assemblies
6901		Tapping screw and washer assemblies
6901		Tapping screw and washer assemblies
6902 6908		Washers for screw and washer assemblies
6912		Hexagon socket head cap screws, shallow head, with pilot recess for wrench key
7341		Rivet pins Form A
7341		Rivet pins Form B
7343		Spiral pins
7349		Washers for bolts with heavy type spring pin
7513		Hexagon head thread cutting screws Form A
7513		Slotted cheese head thread cutting screws Form B
7513		Slotted countersunk head thread cutting screws Form F
7513		Slotted raised countersunk head thread cutting screws Form G
7516		Pan head thread cutting screws Form A cross recessed
7516		Countersunk head thread cutting screws Form D cross recessed
7516		Raised countersunk head thread cutting screws Form E cross recessed
7604		Hexagon head pipe plugs up to M16 From M18



TIGHTENING AXIAL STRENGTH AND TORQUE VALUE FIOT (JIS B 1186)

The design strength of a high strength friction grip bolted joint is calculated from the design tensile strength of the bolt. Because of tightening variations, the standard tensile strength is taken as 10% more than the standard tensile strength.

Torque Coefficient of Set

Division	Class of set according to torque coefficient	
	A	B
Mean of torque coefficient values of one manufacturing lot (2)	0.110 to 0.130	0.130 to 0.190
Standard Deviation of torque coefficient values of one manufacturing lot (2)	0.010 max.	0.013 max.

	Bolt tension (t)	Standard Torque Coefficient	Standard Torque (kg f/m)
M12	6.3	B (0.165)	12
M16	11.7	B (0.165)	30
M20	18.2	B (0.165)	58
M22	22.6	A (0.130) B (0.165)	A (65) B (80)
M24	26.2	A (0.130) B (0.165)	A (82) B (100)
M27	34.1	A	110
M30	41.7	A	150

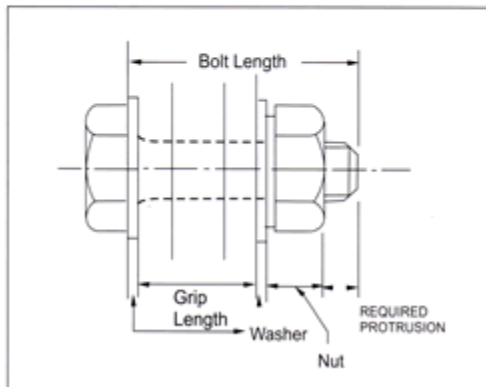
The torque coefficient shall be obtained from the following formula:

where

$$K = \frac{T}{d \times N} \times 1000$$

- K: torque coefficient
 T: torque (moment to fasten nut) (kgf-m) (N-m)
 d: basic thread outside diameter of bolt (mm)
 N: axial force of bolt (1) (kgf) (N)

- Notes: (1) The axial force mentioned above means a tensile force to act in axial direction of the bolt caused by a torque to fasten the bolt.
 (2) The one manufacturing lot mentioned above means the lot of set which the bolt, nut and washers of each identical lot constitute.



Determination of bolt length

Nominal bolt size	Length added to grip. (mm)
M12	25
M16	30
M20	35
M22	40
M24	45
M27	50
M30	55



MECHANICAL PROPERTIES

Mechanical properties of Machined Test Piece, Nut and Washer

Bolt Grade	Yield strength kg f/mm ²	Tensile strength kg f/mm ²	Elongation %	Reduction of area %
	F10T	90 min	100~120	14 min

BOLT

Bolt Grade	Tensile load (min) tonf							Hardness
	M12	M16	M20	M22	M24	M27	M30	
F10T	8.43	15.7	24.5	30.3	35.3	45.9	56.1	HRC 27~38

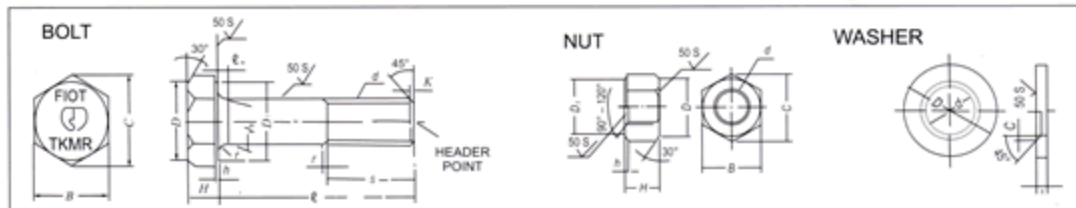
NUT

Nut Grade	Hardness
F10	HRB 95~HRC 35

WASHER

Washer Grade	Hardness
F35	HRC 35~45

DIMENSIONS AND TOLERANCES



(UNIT: mm)

		M 12	M 16	M 20	M 22	M 24	M 27	M 30
BOLT	d ₁	12 ^{+0.7} _{-0.2}	16 ^{+0.7} _{-0.2}	20 ^{+0.8} _{-0.4}	22 ^{+0.8} _{-0.4}	24 ^{+0.8} _{-0.4}	27 ^{+0.8} _{-0.4}	30 ^{+0.8} _{-0.4}
	H	8 ±0.8	10 ±0.8	13 ±0.9	14 ±0.9	15 ±0.9	17 ±0.9	19 ±1.0
	B	22 ⁰ _{-0.8}	27 ⁰ _{-0.8}	32 ⁰ ₋₁	36 ⁰ ₋₁	41 ⁰ ₋₁	46 ⁰ ₋₁	50 ⁰ ₋₁
	C (APPROX)	25.4	31.2	37	41.6	47.3	53.1	57.7
	D (APPROX)	20	25	30	34	39	44	48
	D ₁ (MIN)	20	25	29	33	38	43	47
	r	0.8 ~ 1.6	1.2 ~ 2.0	1.2 ~ 2.0	1.2 ~ 2.0	1.6 ~ 2.4	1.6 ~ 2.4	2.0 ~ 2.8
	K (APPROX)	2	2	2.5	2.5	3	3	3.5
	h (APPROX)	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8
	S	25 ⁺¹ ₀	30 ⁺¹ ₀	35 ⁺¹ ₀	40 ⁺¹ ₀	45 ⁺¹ ₀	50 ⁺¹ ₀	55 ⁺¹ ₀
NUT	H	12 ±0.35	16 ±0.35	20 ±0.4	22 ±0.4	24 ±0.4	27 ±0.4	30 ±0.40
	B	22 ⁰ _{-0.8}	27 ⁰ _{-0.8}	32 ⁰ ₋₁	36 ⁰ ₋₁	41 ⁰ ₋₁	46 ⁰ ₋₁	50 ⁰ ₋₁
	C (APPROX)	25.4	31.2	37	41.6	47.3	53.1	57.7
	D (APPROX)	20	25	30	34	39	44	48
	D ₁ (MIN)	20	25	29	33	38	43	47
	h (APPROX)	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8	0.4 ~ 0.8
WASHER	d	13 ^{+0.7} ₀	17 ^{+0.7} ₀	21 ^{+0.8} ₀	23 ^{+0.8} ₀	25 ^{+0.8} ₀	28 ^{+0.8} ₀	31 ^{+1.0} ₀
	D	26 ⁰ _{-0.8}	30 ⁰ ₋₁	40 ⁰ ₋₁	44 ⁰ ₋₁	48 ⁰ ₋₁	56 ⁰ _{-1.2}	60 ⁰ _{-1.2}
	t	3.2 ±0.4	4.5 ±0.5	4.5 ±0.5	6 ±0.7	6 ±0.7	6 ±0.7	8 ±0.7
	C or r	1.5	1.5	2	2	2.4	2.4	2.8