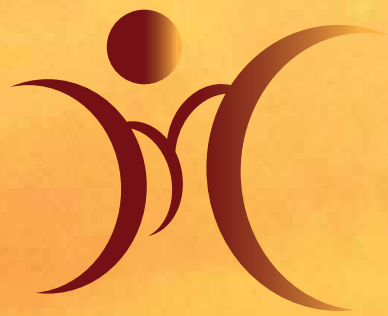




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Building & Construction Material Trading LLC

BOLTS & NUTS

of modern developments



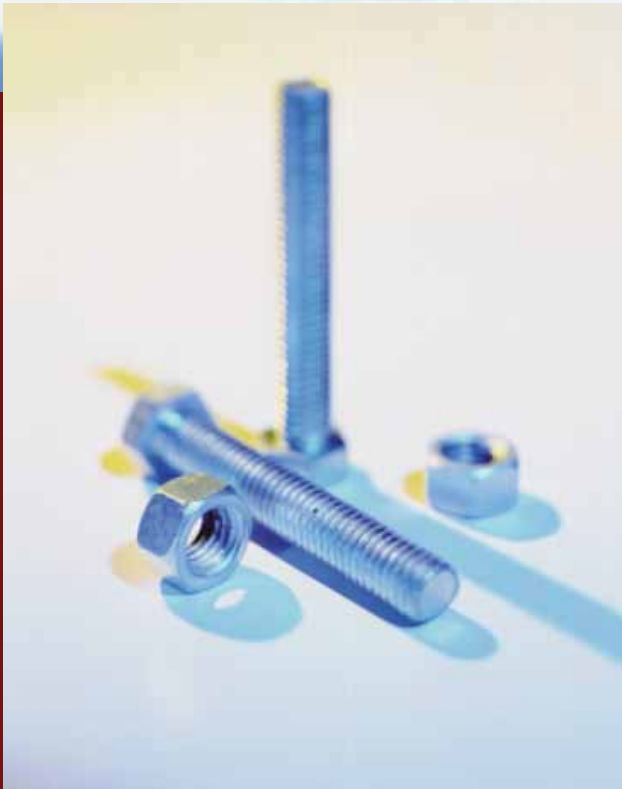
AN ISO CERT CO.

Commitment to Quality Products and Services.



1. Prompt and efficient services
2. Products available off the shelf
3. Stringent quality checks
4. Products well packaged
5. Timely delivery

Our Core Strengths

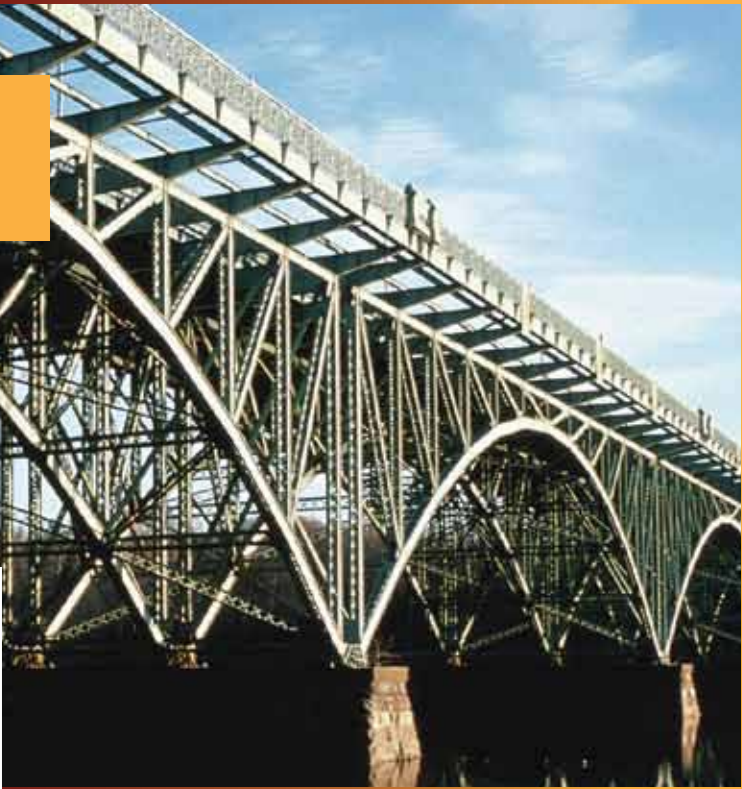


Quality and customer service are our core strengths. Our efficient response means that clients receive feedback on enquiries for most products within a day period. This translates into quicker turn around times and overall efficiency in the supply cycle.

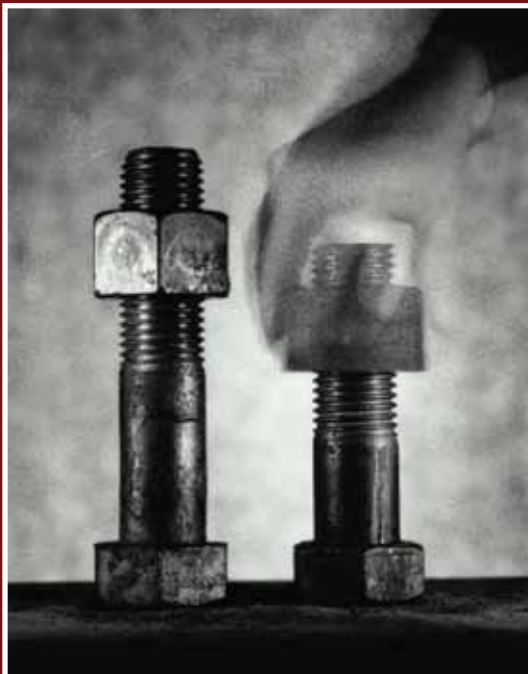
Our modern ware housing facility spread over 15000 thousand square feet, over 12000 different fasteners products. All of this managed by an automated Inventory management system. This enables us to offer efficient service to our clients, with most products available off the shelf.

All our products are delivered with the necessary certification in terms of Material Test certificates. Our products are therefore in compliance with international quality standards allowing complete traceability assurance.

Exacting Standards



Our sound organizational strengths and strategic ties with quality manufacturers, have positioned ourselves well to meet the growing demands of the regions industrial sector.



Fasteners and bolting are crucial component in any construction project. While their cost maybe negligible to the overall projects costs, substandard bolting can have severe consequences in terms of project schedules and costs. Our emphasis therefore is always on quality, backed up by reliable inventory and efficient supply chain.

We maintain a large inventory of fastening solutions for various sectors including Structural Steel Construction, Pro-Engineered Steel Buildings (PEB), Tower Cranes, Construction and Oil & Gas & Petrochemical industries.

With our strong presence in Dubai, UAE the regions trading hub and other GCC countries one of the regions fastest growing economies, we are ideally placed to cover the wider GCC region. Our inherent strength in terms of quality policy, organization and inventory gives us considerable leverage to be a leading player in the distribution and supply of quality fastening solutions.

Our Key Suppliers



In our endeavor to provide quality products, we have forged strategic partnerships with manufacturers worldwide, particularly in Europe, U.S, Canada & Far East.

Using modern technology and stringent quality control regimen, our supplier has established themselves in providing innovative fastening solutions to suit various requirements.

Turnasure® LLC is the manufacturer of the world's most comprehensive range of Direct Tension Indicator (DTI) washers, Turnasure LLC predecessor was the inventor of the original Load- indicating washer, the simplest solution for properly tensioning bolts.

Now Turnasure® introduces the revolutionary TurnAnut™ DTI fastener. This ingenious new tensioning device links a Turnasure® DTI to an ASTM A563M/A563 DH nut in the USA. For use in the EU, TurnAnut™ DTIs will be based on the EN 14399-3 HR nut. The benefits for users are immense. Now the nut, hardened washer and Direct Tension Indicator, previously being three pieces become one piece.

DTI have been used on projects His Highness Sheikh Khalifa bin Zayed al Nahyan palace P-1&II, Sharjah Expo Center, EEMC and many more.

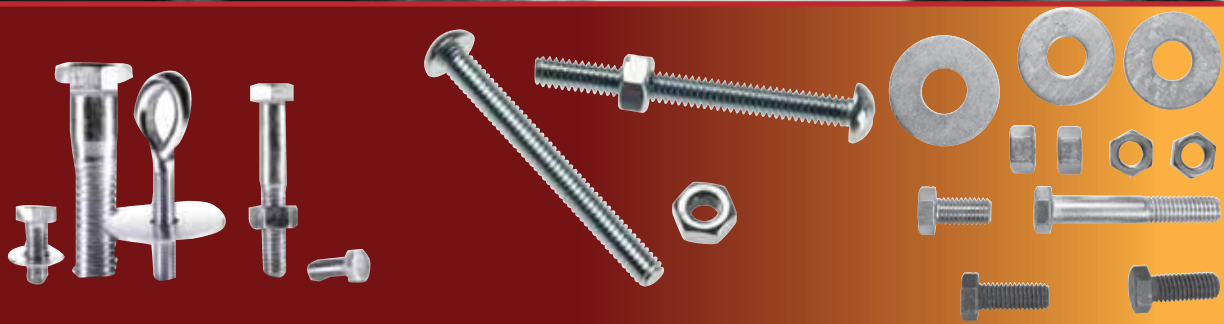
Midland Fasteners Ltd, based in London, United Kingdom are Stockiest and Exporters of a wide variety of quality construction, Oil&Gas, Petrochemical and Structural industrial fasteners.

Acknowledged as an assured brand name for quality and consistency, Midland are among a select group of Exporter to offer CE marked products complying with stringent European standards. Their Quality certifications.

Using modern technology and stringent quality control regimen, Midland have established themselves in providing innovative fastening solutions to suit various requirements.

Midland believe motto "Customer Focus & Quality Commitment". to do business with Midland, you are assured that what we promise is what we deliver.

Our Product Range



A brief though not comprehensive sampling of our product range and some industry verticals their commonly applied to.

Fasteners in high tensile steel 8.8/10.9/12.9 grades, Threaded Bars, Stud Bolts, Shear Studs, Straight Anchor Bolts, L-shaped Anchor Bolts, Wedge Anchor, Contact Washers.

Products available in a wide variety of head types such as Hex head, Socket head, Allen CSK etc. Various thread types such as UNC, UNF, and BSW etc. Various sacrificial coatings such as Electro

High Strength Friction Grip (HSFG) bolting: ASTM A325 & ASTM A490 widely used in Steel Construction and Pre-Engineered steel building (PEB) industry. Assemblies with compatible ASTM A563 Nuts & Hardened

Stainless Steel Fasteners:

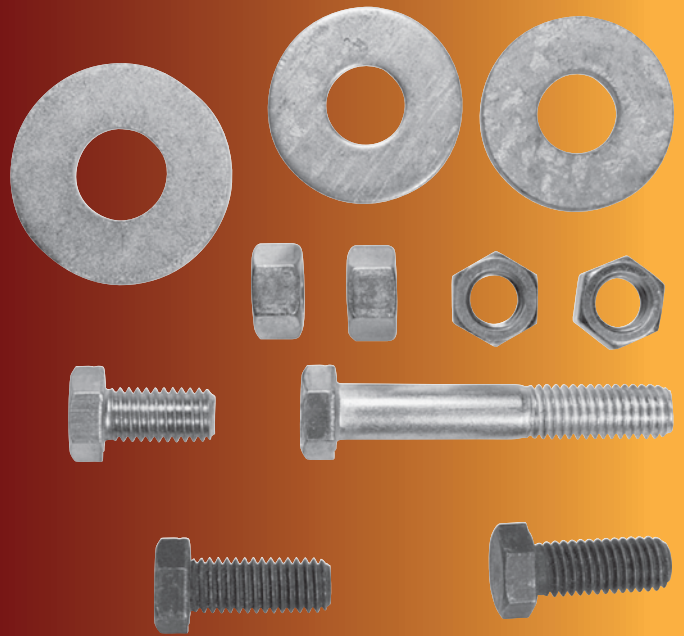
Products available in Gr 304 (A2-70) & Gr 316 (A470/80) with a wide variety of head types. Stainless Steel Self Drilling Screws for the PEB

Products available adhering to the following International Standards

• American ASTM Standard • British BS Standard • German DIN Standard

Besides the above products we stock a wide variety of specialized fasteners and can also supply customized solutions to meet specific requirements.

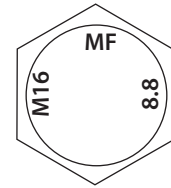
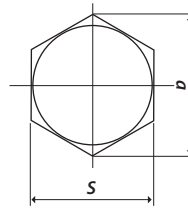
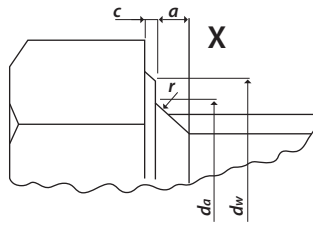
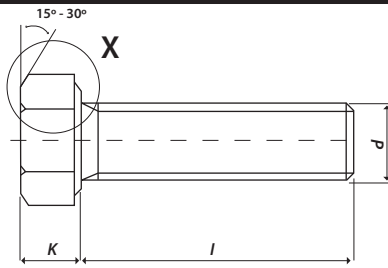
Technical Information





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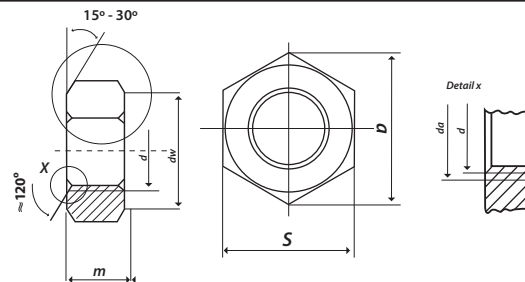
Fully threaded Bolts / Setscrews
The actual arrangement of the marking may vary from that shown

Dimensions of Fully Threaded Bolts DIN 933 Gr. 8.8/10.9

Thread size d		M12	M16	M20	M24	M30	M36
p pitch of thread		1.75	2	2.5	3	3.5	4
a	max.	5.25	6	7.5	9	10.5	12
c	max.	0.6	0.8	0.8	0.8	0.8	0.8
	min:	0.15	0.2	0.2	0.2	0.2	0.2
da	max.	13.7	17.7	22.4	26.4	33.4	39.4
dw	min.	17.4	22.5	27.7	33.2	42.7	51.1
e	min.	21.1	26.75	32.95	39.55	50.85	60.79
k	nom.	7.5	10	12.5	15	18.7	22.5
	max.	7.68	10.18	12.85	15.35	19.12	22.92
	min.	7.32	9.82	12.15	14.65	18.28	22.08
r	min.	0.6	0.6	0.8	0.8	1	1
s nom.	max.	19	24	30	36	46	55
	min.	18.67	23.67	29.16	35	45	53.8

Dimensions apply prior to coating.

The table shows popular diameters, other diameters can be supplied provided the quantity is sufficient to warrant manufacture.



Dimensions of Nuts DIN 934 CL 8 & CL10

Thread size d		M12	M16	M20	M24	M30	M36
p pitch of thread		1.75	2	2.5	3	3.5	4
da	max.	13	17.3	21.6	25.9	32.4	38.9
	min:	12	16	20	24	30	36
dw	min.	17.2	22.2	28.2	33.2	42.7	51.1
e	min.	21.1	26.75	32.95	39.55	50.85	60.79
m	max. = nom.	10	13	16	19	24	29
	min.	9.64	12.3	14.9	17.7	22.7	27.4
s	max. = nom.	19	24	30	36	46	55
	min.	18.67	23.67	29.16	35	45	53.8

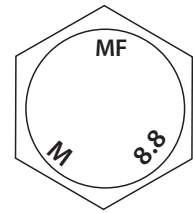
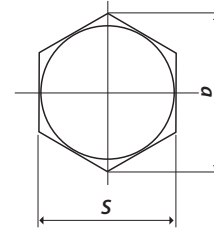
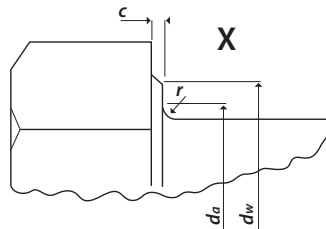
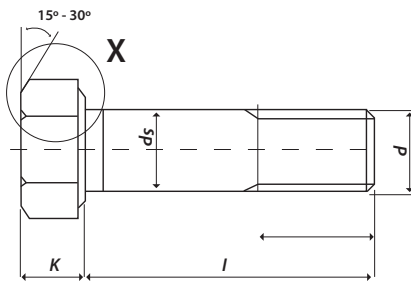
Dimensions apply prior to coating.

The table shows popular diameters, other diameters can be supplied provided the quantity is sufficient to warrant manufacture.



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Standard Threaded Bolts
The actual arrangement of the marking may vary from that shown

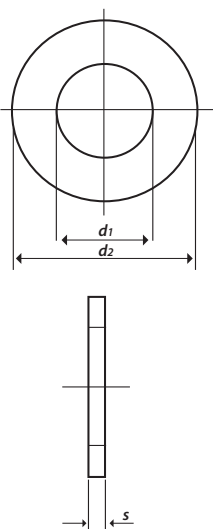
Dimensions of Standard Thread Bolts DIN 931 Gr. 8.8/10.9

Thread size d		M12	M16	M20	M24	M30	M36
p pitch of thread		1.75	2	2.5	3	3.5	4
b	1)	30	38	46	54	66	78
	2)	36	44	52	60	72	84
	3)	49	57	65	73	85	97
c	max.	0.6	0.8	0.8	0.8	0.8	0.8
	min.	0.15	0.2	0.2	0.2	0.2	0.2
da	max:	13.7	17.7	22.4	26.4	33.4	39.4
ds	max.	12	16	20	24	30	36
	min.	11.73	15.73	19.48	23.48	29.48	35.38
dw	min.	17.4	22.5	27.7	33.2	42.7	51.1
e	min.	21.1	26.75	32.95	39.55	50.85	60.79
k	nom.	7.5	10.	12.5	15	18.7	22.5
	max.	7.68	10.18	12.85	15.35	19.12	22.92
	min.	7.32	9.82	12.15	14.65	18.28	22.08
r	min.	0.6	0.6	0.8	0.8	1	1
s nom.	max.	19	24	30	36	46	55
	min.	18.67	23.67	29.16	35	45	53.8

- 1) for $\leq 125\text{mm}$
2) for $\geq 125\text{mm} < 200\text{mm}$
3) for $\geq 200\text{mm}$

Dimensions apply prior to coating.

The table shows popular diameters, other diameters can be supplied provided the quantity is sufficient to warrant manufacture.



Dimensions of Washers

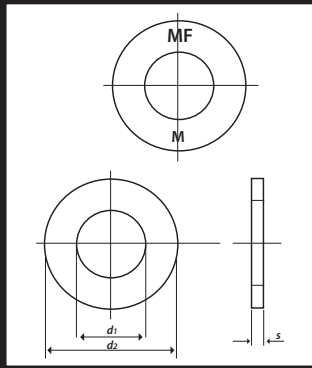
Nominal size of bolt or screw	BS 4320 Form 'E'											
	Inside Diameter d		Outside Diameter d_2		Thickness s		Inside Diameter d		Outside Diameter d_2		Thickness s	
	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
M12	14.5	14	24	23.2	2.8	2.2	13.43	13	24	23.48	2.7	2.3
M16	18.5	18	30	29.2	3.6	2.4	17.43	17	30	29.48	3.3	2.7
M20	22.6	22	37	35.8	3.6	2.4	21.52	21	37	36.38	3.3	2.7
M24	26.6	26	44	42.8	4.6	3.4	25.52	25	44	43.38	4.3	3.7
M30	33.8	33	56	54.5	4.6	3.4	31.62	31	56	55.26	4.3	3.7
M36	39.8	39	66	64.5	6.0	4.0	37.62	37	66	65.26	5.6	4.4

Dimensions apply prior to coating.

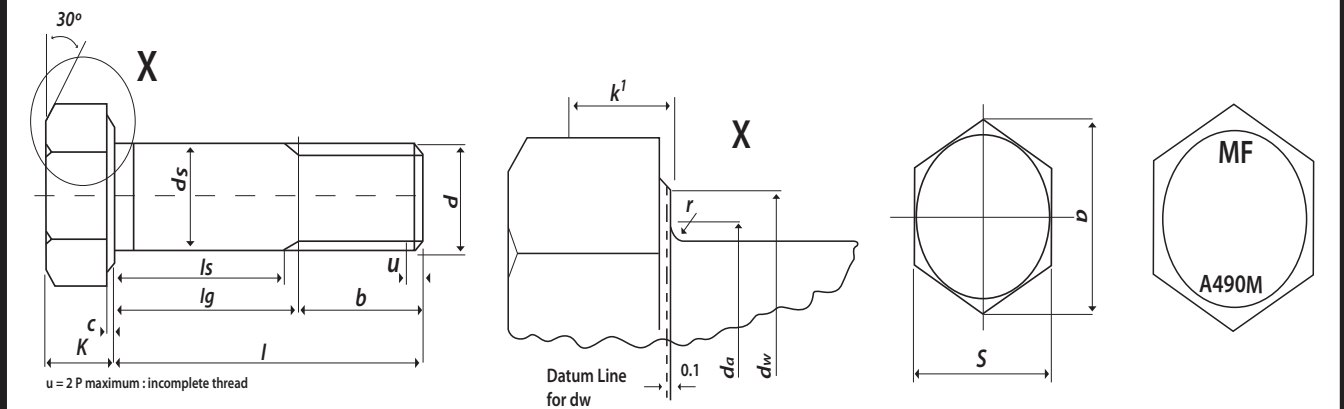
Either BS 4320 Form 'E' washers or DIN 125 washers may be supplied depending on availability.



F436 Washer Dimensions



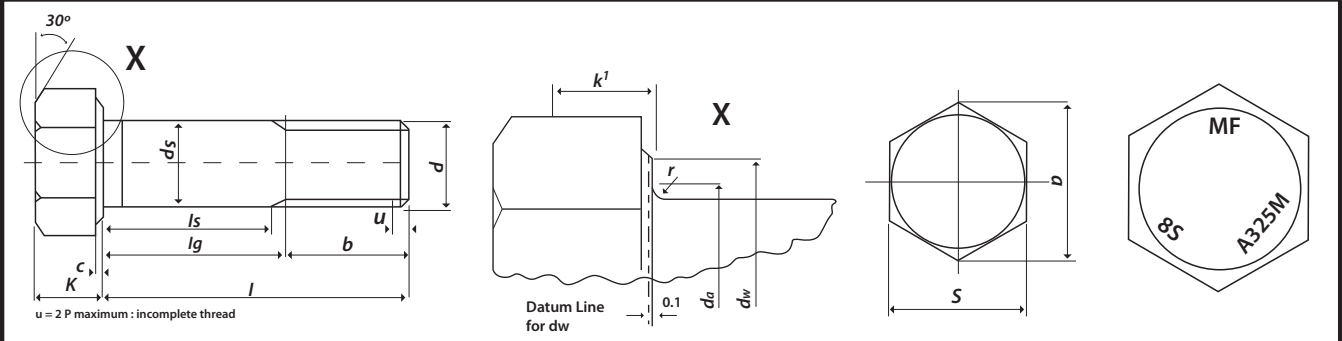
Nominal washer size		M16	M20	M22	M24	M27	M30	M36
d_1	max.	18.4	22.5	24.5	26.5	30.5	33.6	39.6
	min.	18.0	22.0	24.0	26.0	30.0	33.0	39.0
d_2	max.	34.0	42.0	44.0	50.0	56.0	60.0	72.0
	min.	32.4	40.4	42.4	48.4	54.1	58.1	70.1
s	max.	4.6	4.6	4.6	4.6	4.6	4.6	4.6
	min.	3.1	3.1	3.4	3.4	3.4	3.4	3.4



A490 Bolt Dimensions

Thread size d		M16	M20	M22	M24	M27	M30	M36
p pitch of thread		2	2.5	2.5	3	3	3.5	4
b	Bolt ≤ 100	31	36	38	41	44	49	56
	Bolt ≤ 100	38	43	45	48	51	56	63
ds	min.	15.30	19.16	21.16	23.16	26.16	29.16	35.00
	max.	16.70	20.84	22.84	24.84	27.84	30.84	37.00
s	min.	26.16	33.00	35.00	40.00	45.00	49.00	58.80
	max.	27.00	34.00	36.00	41.00	46.00	50.00	60.00
e	min.	29.56	37.29	39.55	45.20	50.85	55.37	66.44
	max.	31.18	39.26	41.57	47.34	53.12	57.74	69.28
k	min.	9.25	11.60	13.10	14.10	16.10	17.65	21.45
	max.	10.75	13.40	14.90	15.90	17.90	19.75	23.55
k^1	min.	6.5	8.1	9.2	9.9	11.3	12.4	15.0
dw^1	min.	24.9	31.4	33.3	38.0	42.8	46.5	55.9
c	min.	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	max.	0.8	0.8	0.8	0.8	0.8	0.8	0.8
da	max.	18.2	22.4	24.4	26.4	30.4	33.4	39.4
r	min.	0.6	0.8	0.8	1.0	1.2	1.2	1.5

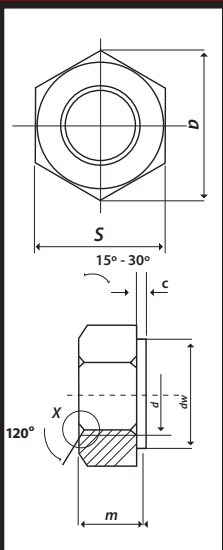
¹ The maximum value of dw shall not exceed the actual width across flats.



A325 Bolt Dimensions

Thread size d		M16	M20	M22	M24	M27	M30	M36
p pitch of thread		2	2.5	2.5	3	3	3.5	4
b	Bolt ≤ 100	31	36	38	41	44	49	56
	Bolt ≤ 100	38	43	45	48	51	56	63
ds	min.	15.30	19.16	21.16	23.16	26.16	29.16	35.00
	max.	16.70	20.84	22.84	24.84	27.84	30.84	37.00
s	min.	26.16	33.00	35.00	40.00	45.00	49.00	58.80
	max.	27.00	34.00	36.00	41.00	46.00	50.00	60.00
e	min.	29.56	37.29	39.55	45.20	50.85	55.37	66.44
	max.	31.18	39.26	41.57	47.34	53.12	57.74	69.28
k	min.	9.25	11.60	13.10	14.10	16.10	17.65	21.45
	max.	10.75	13.40	14.90	15.90	17.90	19.75	23.55
k¹	min.	6.5	8.1	9.2	9.9	11.3	12.4	15.0
dw¹	min.	24.9	31.4	33.3	38.0	42.8	46.5	55.9
c	min.	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	max.	0.8	0.8	0.8	0.8	0.8	0.8	0.8
da	max.	18.2	22.4	24.4	26.4	30.4	33.4	39.4
r	min.	0.6	0.8	0.8	1.0	1.2	1.2	1.5

¹ The maximum value of **dw** shall not exceed the actual width across flats.



A563 Nut Dimensions CL 8S / 10S

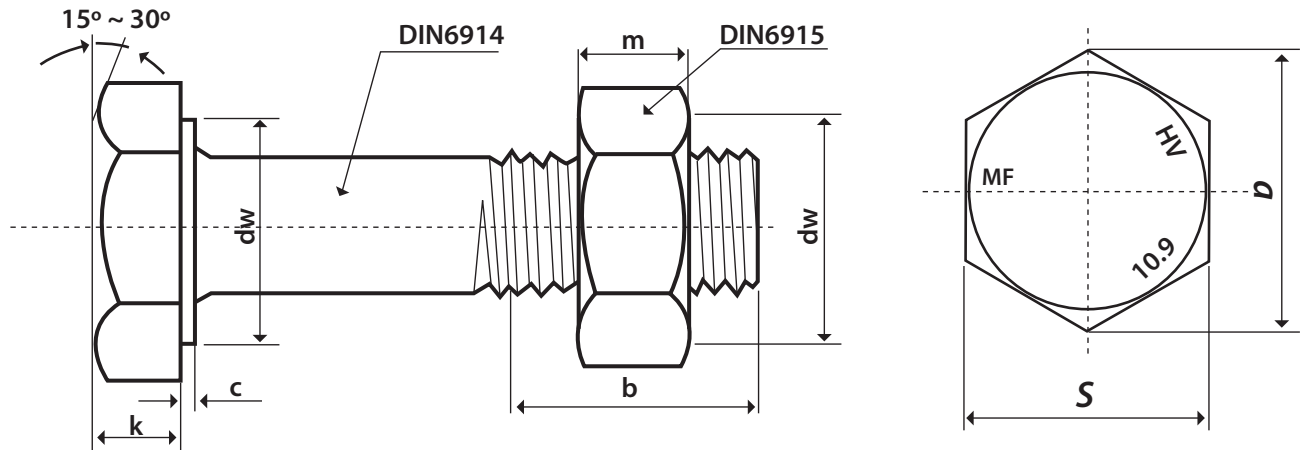
Nominal size and thread pitch <i>d</i>	<i>s</i>		<i>e</i>		<i>m</i>		<i>dw</i> ¹	<i>c</i>		Total runout of bearing surface
	Width across s flats		Width across s corners		Thickness		Bearing face diameter	Washer face thickness		
	max.	min.	max.	min.	max.	min.	max.	max.	min.	max.
M16 x 2	27.00	26.16	36.18	29.56	17.1	16.4	26.9	0.8	0.4	0.47
M20 x 2.5	34.00	33.00	39.26	37.29	20.7	19.4	31.4	0.8	0.4	0.58
M22 x 2.5	36.00	35.00	41.57	39.55	23.6	22.3	33.3	0.8	0.4	0.63
M24 x 3	41.00	40.00	47.34	45.20	24.2	22.9	38.0	0.8	0.4	0.72
M27 x 3	46.00	45.00	53.12	50.85	27.6	26.3	42.8	0.8	0.4	0.80
M30 x 3.5	50.00	49.00	57.74	55.37	30.7	29.1	46.6	0.8	0.4	0.87
M36 x 4	60.00	58.80	69.28	66.44	36.6	35.0	55.9	0.8	0.4	1.05

¹ The maximum value of **dw** shall not exceed the actual width across flats.



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DIN 6914 Bolt (HR/HV) Dimensions

Grade	Thread size	Material	Tensile Strength σ_b min (Mpa)	Hardness (HRC)	Elongation δ %	Reduction of cross-sectional area ψ %
10.9	M12 ~ M36	40Cr	1040	32 ~ 39	9	48

Thread size <i>d</i>		M12		M16		M20		M22		M24		M27		M30		M30	
c	min.	0.4		0.4		0.4		0.4		0.4		0.4		0.4		0.4	
	max.	0.6		0.6		0.6		0.6		0.6		0.6		0.6		0.6	
dw	min.	20		26		30		34		39		43.5		47.5		57	
e	min.	23.91		29.56		35.03		39.55		45.2		50.85		55.37		66.44	
k		8		10		13		14		15		17		19		23	
s	max.	22		27		32		36		41		46		50		60	
	min.	21.16		26.16		31		35		40		45		49		58.8	
b (reference)	L Nominal	L≤70	L≥75	L≥70	L≥75	L≤85	L≥90	L≤85	L≥90	L≤85	L≥90	L≤95	L≥100	L≤95	L≥100	L≤100	L≥105
	Nominal	21	23	26	28	31	33	32	34	34	37	37	39	40	42	48	50

DIN 6915 Nut Dimensions

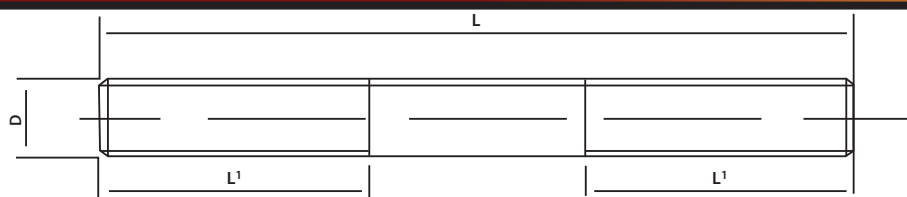
Grade	Thread size	Guarantee stress SP Mpa	Hardness max (HRC)
10	45#	1000	36

Thread Size		M12	M16	M20	M22	M24	M27	M30	M36
dw	min.	20	25	30	34	39	43.5	47.5	57
e	min.	23.9	29.56	35.03	39.55	45.2	50.85	55.37	66.44
m		10	13	16	18	19	22	24	29
s	max.	22	27	32	36	41	46	50	60
	min.	21.16	26.16	31	35	40	45	49	58.8



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Holding Down Bolt Dimensions

ASTM F1554 Straight Body Holding Down Bolt Body Dimensional Specification [Full Body Size]

Body Diameter [D]	M20		M24		M27		M30		M33		M36		M39	
	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾
	20.00	19.45	24.00	23.40	27.00	26.85	30.00	29.32	36.00	32.30	36.00	35.30	39.00	38.23

¹⁾ Minimum body dimension are calculated base on F1554 Table 5

All dimension in mm

Straight Body Holding Down Bolt Thread Length Dimensional Specification

Body Diameter [D]	M20			M24	M27			M30			M33	
Vert. Length [L]	1,000	1,200	1,600	1,600	1,000	1,200	1,600	1,400	1,600	1,600	1,200	1,200
Threaded Length [T1]	250	300	300	300	250	300	300	300	300	300	300	300

All dimension in mm

Threaded Length Dimensional Specification - Continued

Body Diameter [D]	M36				M39
Vert. Length [L]	1,000	1,200	1,600	1,800	1,200
Threaded Length [T1]	250	300	300	300	250

All dimension in mm

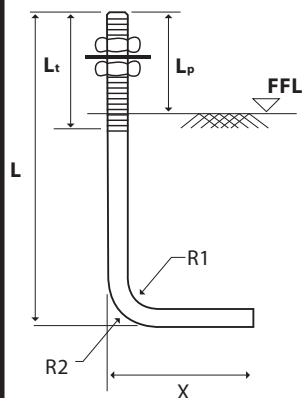
Anchor Bolt Dimensions

ASTM A36 / F1554 Anchor Bolt Dimensional Specification (Full Body Size)

Body Diameter [D]	16		20		20		24		30		36	
	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾	Max.	Min. ¹⁾
	16.00	15.50	20.00	19.45	20.00	19.45	24.00	23.40	30.00	29.32	36.00	35.30
Vert. Length [L]	475		450		600		625		850		1,150	
Hor. Length [X]	120		175		175		205		250		295	
Projection above FFL [L _p]	75		100		100		100		125		150	
Threaded Length [L _t]	200		200		200		200		200		250	
Radius [R1]	40		50		50		60		75		90	
Radius [R2]	56		70		70		84		105		126	
Unbended Length	595		625		775		830		1100		1,445	

¹⁾ Minimum body dimension are calculated base on ASTM A36 / F1554 Table 5 cut threads

All dimension in mm





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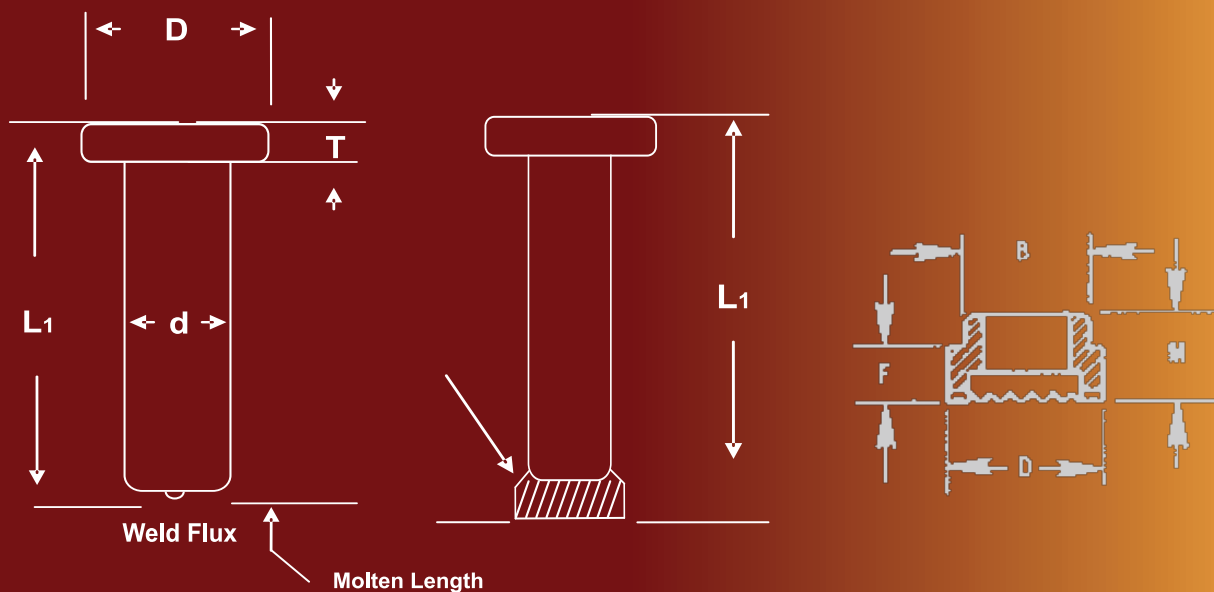
SHEAR CONNECTOR EN ISO 14555 and DINEN ISO 13918

Stud Diameter	d	13		16		19	
		Max	Min	Max	Min	Max	Min
Stud length (Before)		12.95	12.70	15.95	15.70	19.00	18.62
Stud Length (after)	[L1]	L1±1.6					
	[L]	3~5mm Shorter Than L1					
Head Diameter	[D]	25.4 ± 0.4		31.7 ± 0.4		31.7 ± 0.4	
Head Height	[T]	8 ^{+1.0} ₀		8 ^{+1.0} ₀		9.5 ^{+1.0} ₀	
Ferrule Inner Diameter	[FA]	Vertical	1400	1700	2050		
		Weld-Thru	-	1700	2050		
Ferrule Outer Diameter	[FD]	Vertical	2100	3000	3200		
		Weld-Thru	-	3000	3200		
Ferrule Height	[FH]	Vertical	1000	1450	1650		
		Weld-Thru	-	1800	1650		

Stud Diameter	d	22		25	
		Max	Min	Max	Min
Stud length (Before)		22.10	21.72	25.40	25.02
Stud Length (after)	[L1]	L1±1.6			
	[L]	3~5mm Shorter Than L1			
Head Diameter	[D]	39.9 ± 0.4		41.3 ± 0.4	
Head Height	[T]	9.5 ^{+1.0} ₀		8 ^{+1.0} ₀	
Ferrule Inner Diameter	[FA]	Vertical	2350	2650	
		Weld-Thru	2350	-	
Ferrule Outer Diameter	[FD]	Vertical	3600	1800	
		Weld-Thru	4000	-	
Ferrule Height	[FH]	Vertical	1800	2100	
		Weld-Thru	2100	-	

Tensile Strength	Yield Strength	Elongation	Reduction Area
Mpa	Mpa	%	%
450	350	15	50

Midland Shear Connector also complies with mechanical requirements as per BS5950, Part3, Section3.1:1990 EN ISO 14555 and DIN EN ISO 13918 are available upon request.





Torque Method (Tightening Method)

If lubrication has been applied to the bolt and/or the nut (other than the normal protective oil film), multiply the recommended torque by the appropriate factor shown in the Lubrication Factor table. n.b. Antiseize lubricants can reduce torque required by approximately 20%.

Example: if bolt and nut are both phosphated, required torque = torque recommended x 0.75.

Lubrication factor

		Surface condition of bolt			
		Self	Electroplated		
			Zinc	Cadmium	Phosphate
Surface condition of nut	Self	1,00	1,00	0,80	0,90
	Zinc	1,15	1,20	1,35	1,15
	Cadmium	0,85	0,90	1,20	1,00
	Phosphate and oil	0,70	0,65	0,70	0,75
	Zinc and Wax	0,60	0,55	0,65	0,55

Conversion Factors

Torque $\text{lbf.ft} \times 1.36 = \text{N}\cdot\text{m}$ $\text{N}\cdot\text{m} \times 0.737 = \text{lbf.ft}$	Flow $\text{l/s} \times 2.119 = \text{cu.ft/min}$ $\text{cu.ft/min} \times 0.472 = \text{l/s}$
Force $\text{lbf} \times 4.45 = \text{N}$ $\text{N} \times 0.225 = \text{lbf}$	Power $\text{hp} \times 0.746 = \text{kW}$
Pressure $\text{lbf/in}^2 \times 0.069 = \text{bar}$ $\text{bar} \times 14.504 = \text{lbf/in}^2$	$\text{kW} = \frac{\text{N}\cdot\text{m} \times \text{rev/min}}{95555}$

Formulae for Calculating the Effect of Torque Wrench Extensions

Accepted formula relating to torque and tension;

$$M2 = M1 \times \frac{L2}{L1}$$

Based on many tests are:

Here L1 is the normal length and L2 is the extended length, M1 is the set torque and M2 the actual torque applied to the nut.

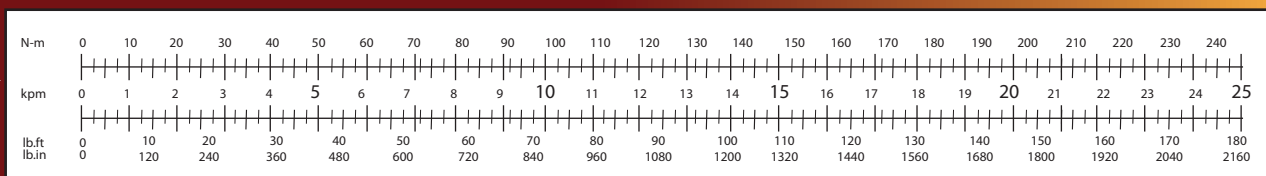
eg. L1=500 L2=650 so

$$M2 = 100 \times \frac{650}{500} = \mathbf{130 \text{ N}\cdot\text{m}}$$

Imperial	Metric
M = torque lbf.ft	M = torque N·m
P = bolt tension lbf	P = bolt tension Newtons
D = bolt dia.ins	D = bolt dia. mm
$M = \frac{P \times D}{60}$	$M = \frac{P \times D}{5000}$



Conversion Scale





Torque Method (Tightening Method)

If lubrication has been applied to the bolt and/or the nut (other than the normal protective oil film), multiply the recommended torque by the appropriate factor shown in the Lubrication Factor table. n.b. Antiseize lubricants can reduce torque required by approximately 20%.

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Surface condition of nut	Self	1,00	1,00	0,80	0,90
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	Cadmium	0,85	0,90	1,20	1,00
	Phosphate and oil	0,70	0,65	0,70	0,75
	Zinc and Wax	0,60	0,55	0,65	0,55

Conversion Factors

Torque $\text{lbf.ft} \times 1.36 = \text{N.m}$ $\text{N.m} \times 0.737 = \text{lbf.ft}$	Flow $\text{l/s} \times 2.119 = \text{cu.ft/min}$ $\text{cu.ft/min} \times 0.472 = \text{l/s}$
Force $\text{lbf} \times 4.45 = \text{N}$ $\text{N} \times 0.225 = \text{lbf}$	Power $\text{hp} \times 0.746 = \text{kW}$
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Formulae for Calculating the Effect of Torque Wrench Extensions

Accepted formula relating to torque and tension;

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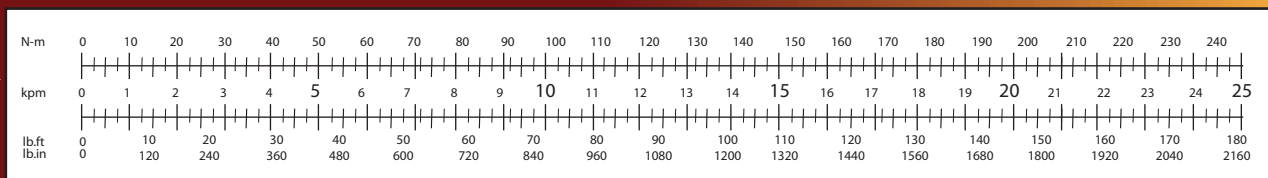
Based on many tests are:

Here L1 is the normal length and L2 is the extended length, M1 is the set torque and M2 the actual torque applied to the nut.

eg. L1=500 L2=650 so

$$M2 = 100 \times \frac{650}{500} = \mathbf{130 \text{ N.m}}$$

Imperial	Metric
M = torque lbf.ft P = bolt tension lbf D = bolt dia.ins	M = torque N.m P = bolt tension Newtons D = bolt dia. mm
$M = \frac{P \times D}{60}$	$M = \frac{P \times D}{5000}$



Conversion Scale

MECHANICAL PROPERTIES

OF STEEL BOLTS, SCREWS & STUDS AS PER ISO898-1 STANDARD

GRADES & DIMENSIONS

Sub- Clause No.	Mechanical Property		Property Class											
			3.6	4.6	4.8	5.6	5.8	6.8	8.8 ¹⁾ d<16mm d> 16mm ²⁾		9.8	10.9	12.9	
5.1 and 5.2	Tensile strength, $R_M^{4),5)}$ N/mm ²	nom.	300	400		500		600	800	800	900	1000	1000	
		Min.	330	400	420	500	520	600	800	830	900	1040	1220	
5.3	Vickers hardness, HV, $F \geq 98\text{ N}$	Min.	95	120	130	155	160	190	250	255	290	320	385	
		Max.	250						320	335	360	380	435	
5.4	Brinell hardness, HB, $F = 30\text{ D}^2$	Min.	90	114	124	147	152	181	238	242	276	304	366	
		Max.	238						304	318	342	361	414	
5.5	Rockwell hardness, HR	Min.	HRB	52	67	71	79	82	89					
			HRC	--	--	--	--	--	--	22	23	28	32	39
		Max.	HRB	99.5										
			HRC	--						32	34	37	39	44
5.6	Surface hardness, HV 0.3		Max.	--						6)				
5.7	Lower yield stress. $ReL^{7)}$ N/mm ²	nom.	180	240	320	300	400	480	--	--	--	--	--	
		Min.	190	240	340	300	420	480	--	--	--	--	--	
5.8	Proof stress, $Rp0.2$ N/mm ²	nom.	--						640	640	720	900	1080	
		Min.	--						640	660	720	940	1100	
5.9	Stress under proofing load, Sp	Sp/ReL or $Sp/Rp0.2$	0.94	0.94	0.91	0.93	0.90	0.92	0.91	0.91	0.90	0.88	0.88	
		N/mm ²	180	225	310	280	380	440	580	600	650	830	970	
5.10	Elongation after fracture, A		Min.	25	22	14	20	10	8	12	12	10	9	8
5.11	Strength under wedge loading ⁵⁾		The Values For Full Size Bolts And Screw (not studs) Shall not be smaller than the minimum values for tensile strength shown in 5.2											
5.12	Impact strength, J		Min.	--			25	--		30	30	25	20	15
5.13	Head soundness		No fracture											
5.14	Maximum height of non-decarburized thread zone, E		mm	--						$\frac{1}{2}H_t$		$\frac{2}{3}H_t$		$\frac{3}{4}H_t$
	Maximum depth of complete decarburization, G			--						0.015				

- For bolts of property class 8.8 in diameters $d < 16\text{mm}$, there is increased risk of nut shipping in the case of inadvertent over tightening inducing a load in excess of proofing load. Reference to ISO 898-2 is recommended.
- For structural bolting the limits is 12 mm
- Applies only to nominal thread diameters $d < 16\text{mm}$
- Minimum tensile properties apply to products of nominal length $l > 2.5\text{ d}$. Minimum hardness applies to products of length $l < 2.5\text{ d}$ and other products which cannot be tensile-tested (e.g. due to head configuration).
- For testing of full- size bolts, screw and studs, the load s given in tables 6 to 9 shall be applied.
- Surface hardness shall not be more then 30Vickers points above the measured core hardness on the products when reading of both surface and core are carried out at HV 0.3 For property class 10.9, any increase in hardness at the surface which indicates that the surface hardness exceeds 390 HV in not acceptable.
- In cases where the lower yield stress ReL cannot be determine, it is permissible to measure the proof stress $Rp0.2$
- The surface condition of bolts, screws and nuts should be in accordance with the requirement of the relevant parts of ISO 6157.



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Building & Construction Material Trading LLC

Size Chart

<u>LENGTH (METRIC)</u>																				
Nom .Dia.	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	110	120	130	140	150
M12	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M14	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M16	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M18	-	-			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M20	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M22	-	-	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M24	-	-	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M27	-	-	-	-	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M30	-	-	-	-	-	-	-	-	√	√	√	√	√	√	√	√	√	√	√	√
M36	-	-	-	-	-	-	-	-	-	-	√	√	√	√	√	√	√	√	√	√
<u>LENGTH (METRIC)</u>																				
Nom. Dia.	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	-	-	-	-	-
M12	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M16	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M20	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M22	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M24	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M27	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M30	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-
M36	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	-	-	-	-



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