





Quality Flange Bolting Products from 12PBC

(12PBC) specialises in supplying only Flanged Hex Bolting and 12 point fasteners which are sourced only from premium supplier's in Taiwan and the USA.

Our Flanged products are equal to if not better than Standard OEM Fasteners, we have supplied specialised fasteners into Australia since 1998 and offer a wide range of metric and imperial flanged hex and socket products to market.

www.fbabolt.com.au

PRODUCT INDEX



Page 2-4 Why are Flange Bolts better than Standard Hex Products

Page 5 Hex Flange Bolts UNC / UNF Grade 8 (IFI 111. Grade 8)



Page 6 Hex Flange Bolt Metric Grade 10.9 (DIN 6921)



Page 7 Advantage of 12 Point Fasteners over In - Hex Socket Product



Page 8 The 12PBC Difference

Page 9 12 Point Flange Screw UNC / UNF Alloy Steel (IFI 115)



Page 10 12 Point Flange Screw Metric Class 12.9 (B18.2.2.5M Class 12.9)



Page 11 Socket Flange Serrated Metric Cl.100 (12PBC - Spec)



Page 12 Toplock® Flanged Lock Nuts UNC / UNF Grade G (IFI 100/107 1987)



Page 13 Toplock Flanged Lock Nuts Metric Class 10 (Din 6927)



Page 14 Class 10 Flanged Nyloc Nuts



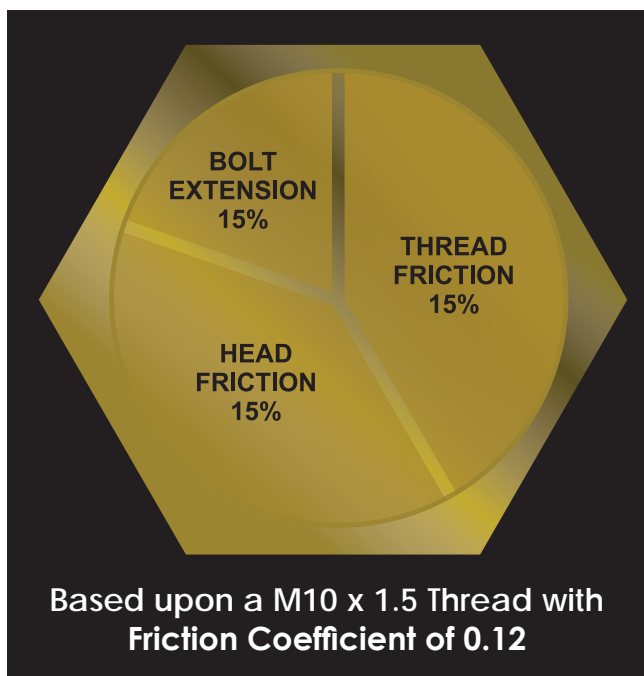
Page 15 Metric Tap and Clearance Drill Sizes

Page 16 Inch Tap and Clearance Drill Sizes

Why are Flange Bolts better than Standard Hex Products



Washers have traditionally been used to protect the joint surface from damage during the tightening process and to distribute the load under the bolt head and nut. The stress under the face of a standard hexagon headed nut can result in indentation into standard strength steel surfaces. In recent years washers have started to be replaced by flanged headed fasteners for several reasons that will be discussed in this article. Prior to going into the details, let's look at some background.



Using torque to indirectly control a bolt's tension is by far the most popular controlled tightening method. This is due to its simplicity and its widespread understanding by the majority of engineers.

The nominal torque necessary to tighten the bolt to a given tension can be determined either from tables, or, by calculation using a relationship between torque and the resulting bolt tension, or by testing. Friction that acts in the threads of the bolt and under the bolt head dissipates the majority of the tightening torque. For a free spinning nut, only about 15% of the torque is actually used to extend the bolt. The majority of the torque is used to overcome friction under the nut face and in the threads.

The way in which this can affect replacement fasteners is that the original equipment manufacturers (OEMs) specify the tightening torque based upon tests or calculations on the fasteners that are installed on the equipment.

Many OEMs specify flanged headed fasteners for a number of reasons. Using a replacement fastener not of the same type, strength and finish as that originally specified will lead to potentially serious problems since the torque-tension characteristics will be affected. That is, the preload generated by the tightening torque may be insufficient to prevent the joint or the bolt failing.

Flanged headed nuts and bolts have been developed to eliminate the deficiencies that have been found with the use of washers.

Standard washers are typically softer than the nuts and bolts that they are used with and can often plastically deform under the high compressive stress that they must sustain. For higher strength fasteners, this can lead to the washer dishing and indenting resulting in the clamp force being reduced significantly. An example of such a washer is shown in figure 3. Flange headed nuts and bolts do not suffer from this effect since the washer face is as strong as the bolt/nut itself.

Indented washer from excessive loading



To overcome the indentation problem, special hardened washers can be used however such washers are not available usually off the shelf. Research conducted in the 1980's in the U.K. showed that because of the clearance hole in the washer, an eccentric loading can occur that can lead to very high localised stresses. A reasonably large clearance hole in the washer is needed to ensure that the radius that is present under the bolt head does not contact the hole edge. Such clearance on the nut can lead to the washer being tightened eccentrically to the bolt axis. This leads to a high localised load concentration increasing the risk of indentation and joint damage. This effect is illustrated in figure 4.

One further effect that was noted in the UK research was movement of the bearing face during tightening. Normally when the nut is tightened, the nut moves on a stationary washer. However it has been found that sometimes as the nut is being tightened; the washer begins to rotate on the joint surface. That is, the nut and the washer rotate as one. The effect of this is shown in figure 5. The relationship between the applied torque and bolt tension can change. For a given applied torque this can result in a significant loss of bolt tension. Unless careful observation is made during tightening, you will not be able to tell whether this effect has happened or not.

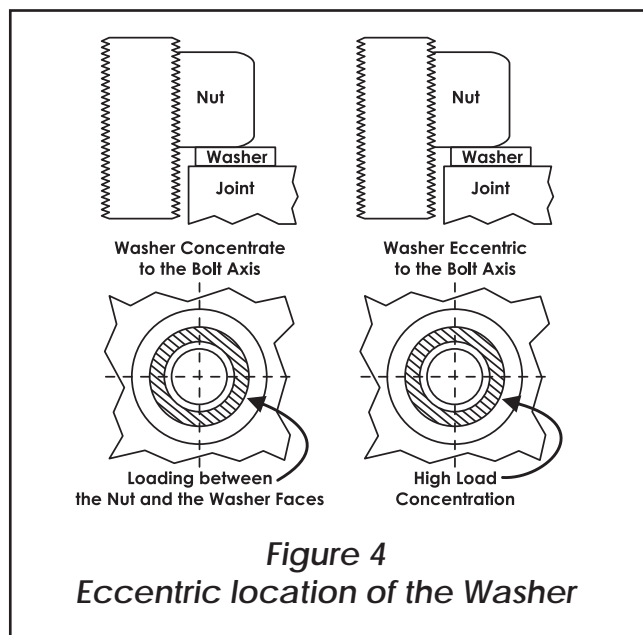


Figure 4
Eccentric location of the Washer

One final consequence of using washers an effect referred to as embedding. Surfaces that may feel flat are anything but flat when viewed under a microscope. A photo of the surface of a zinc plated washer is shown in figure 6 on page 4

As you may be able to predict, when this surface is placed into contact with another, only the tops of the surfaces touch.

Embedding is a result of local plastic deformations that occur under the nut face, in the joint faces and in the threads as a result of plastic flattening of the surface roughness. To some extent, this always will occur when two surfaces are placed in contact and loaded. It is known that the majority of embedding losses arise when the working load is first applied to a joint changing the contact pressures. The amount of loss, essentially the joint becoming ever so slightly thinner under the bolt head and nut face, is typically in the region of between 0.002 to 0.006 mm for each metal to metal steel surfaces. It can be significantly more on surfaces that are painted.

The effect of using washers instead of flanged nuts and bolts is to increase the number of interfaces within the joint. Since each face will sustain an embedding loss, the net effect of using washers is to increase the loss of bolt tension due to this effect. On joints that use bolts that have a relatively short grip length, typical of chassis joints, the additional embedding effect can be particularly pronounced.

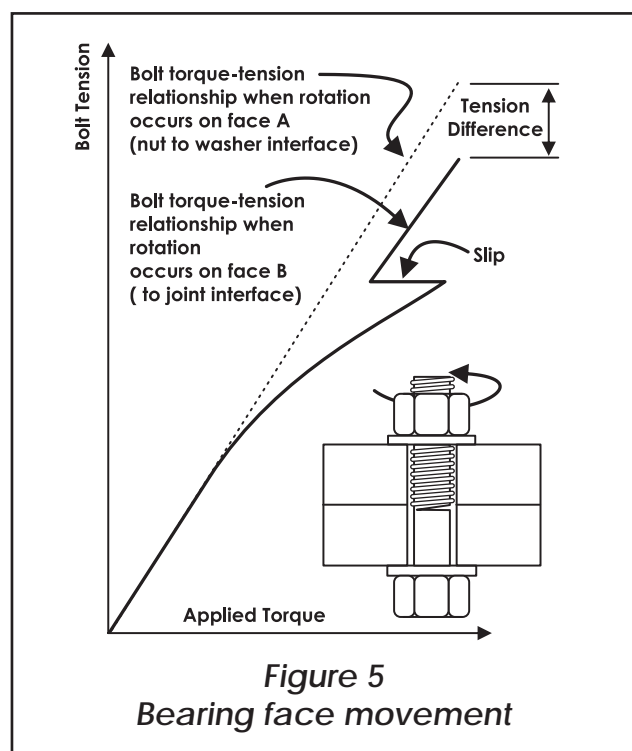


Figure 5
Bearing face movement

Why are Flange Bolts better than Standard Hex Products (continued)

It is not unusual for short grip length joints, with several interfaces, to experience a bolt tension reduction of up to 50%. A joint that may perform satisfactorily when flanged nuts and bolts are used may suffer problems when washers are inserted into the joint. Such a change can invalidate all the calculations and testing pertaining to the joint completed by the manufacturer.

Using a plain hexagon headed nut and bolt without washers will increase the surface pressure under the bolt head and nut face well beyond that which a standard structural steel surface can

adequately support. The consequence of this is that the amount of embedding loss is significantly increased resulting in a higher than anticipated bolt tension loss. Essentially the risk is that for short grip length joints, the bolts can come loose without nut rotation occurring. The adverse effect that this can have on the joint's structural integrity is obvious.

As has been explained, there are several reasons as to why flanged nuts and bolts are preferred over standard hexagon fasteners used with washers. The sensible approach is to replace like fasteners with like fasteners; unless you are feeling lucky.

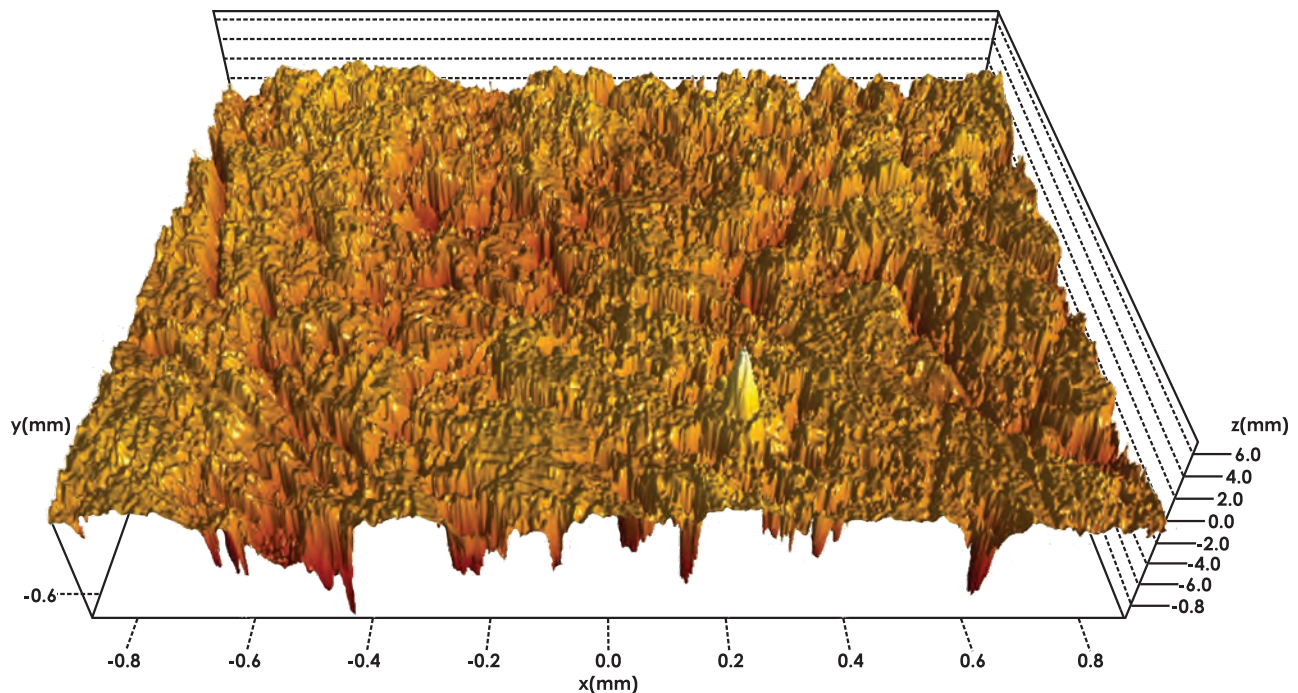


Figure 6 - Magnified surface of a zinc plated washer

*The above information has been compiled by Bill Eccles from Bolt Science UK for and on behalf of 12PBC Australia. More Bolting information can be accessed from the Bolt Science Website at www.boltscience.com Or alternatively Contact 12PBC on the following numbers:
Phone - +612 8788 8000
Fax - +612 9725 1622
Email - info@fbabolt.com.au*

Hex Flange Bolts UNC / UNF Grade 8

(IFI 111. Grade 8)

IFI 111, Grade 8

Materials: Alloy Steel AISI 4135

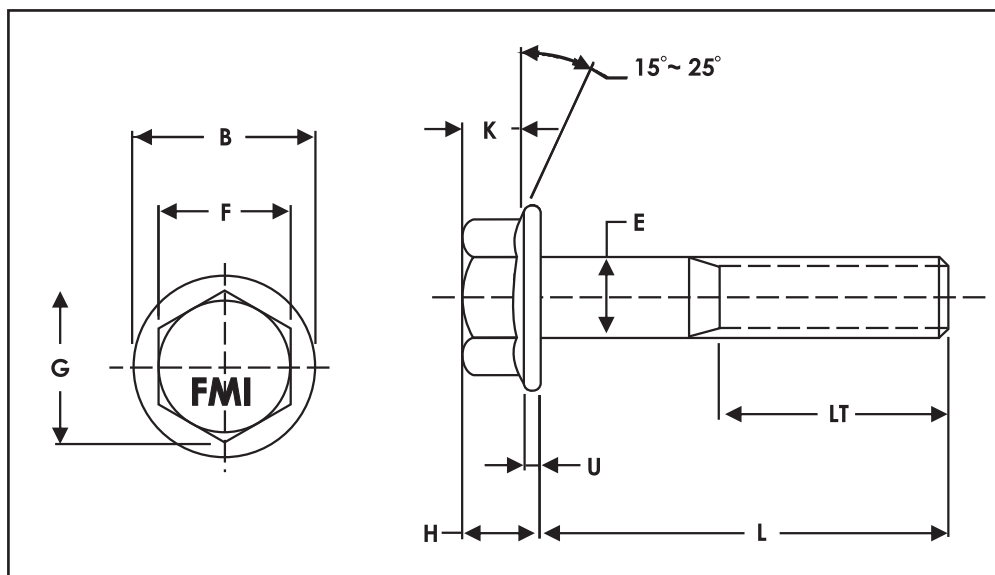
Tensile Strength: Min 150,000 psi

Core Hardness: HRC 33~39

Surface Hardness: HR30N MAX 58.6

Screw Threads: ANSI B1.1 UNC, UNF

Class of Thread: #8 through 3/4, 2A, 3A



Dimensional Data

Unit: Inch

Normal Size of Screw	E		F		G		B	U	H	K	LT
	Body Diam		Width Across Flats		Width Across Corners		Flange Diam	Flange Thickness	Head Height	Hex Height	Thread Length
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Basic
#8	0.1638	0.1587	0.2500	0.241	0.297	0.271	0.37	0.02	0.18	0.11	-
#10	0.1902	0.1843	0.3125	0.305	0.367	0.340	0.45	0.03	0.21	0.13	-
1/4	0.2500	0.2450	0.3750	0.367	0.433	0.409	0.56	0.04	0.28	0.17	0.750
5/16	0.3125	0.3065	0.5000	0.489	0.577	0.548	0.68	0.05	0.32	0.21	0.875
3/8	0.3750	0.3690	0.5625	0.551	0.650	0.618	0.81	0.06	0.39	0.25	1.000
7/16	0.4375	0.4305	0.6250	0.621	0.722	0.685	0.93	0.07	0.46	0.30	1.125
1/2	0.5000	0.4930	0.7500	0.736	0.866	0.825	1.07	0.08	0.51	0.34	1.250
5/8	0.6250	0.6170	0.9375	0.922	1.083	1.034	1.33	0.10	0.62	0.42	1.500
3/4	0.7500	0.7410	1.1250	1.100	1.299	1.254	1.59	0.11	0.73	0.51	1.750

Hex Flange Bolt Metric Grade

10.9 (DIN 6921)

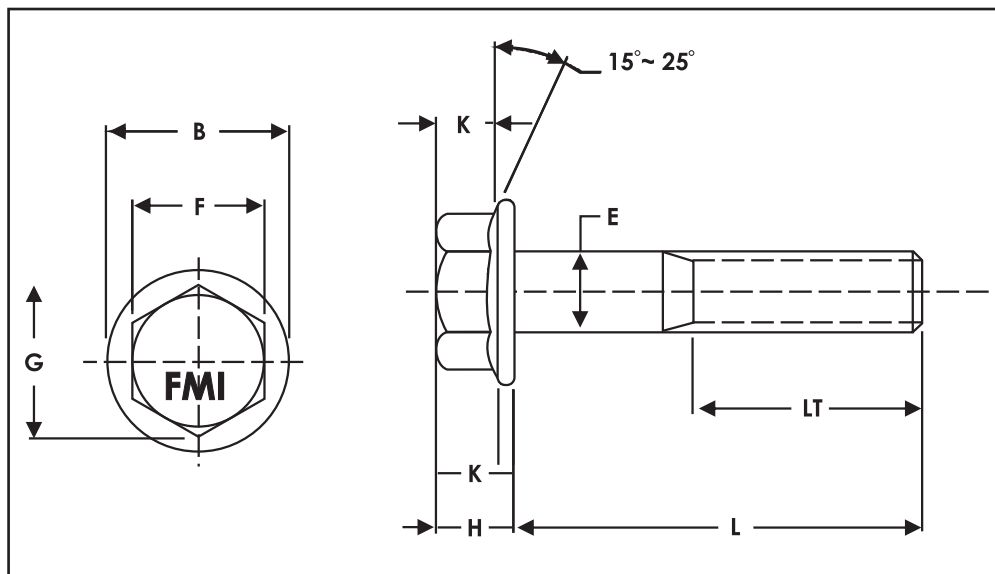
DIN 6921 CLASS 10.9

Materials: Alloy Steel AISI 4135

Tensile Strength: Min 1040 Mpa

Core Hardness: HRC 32~39

Class of Thread: M5 through M16, 6g



Dimensional Data

Unit: mm

Normal Size of Screw	F		G	B	E		H	K	LT
	Width Across Flats		Width Across Corners	Flange Diameter	Body Diameter		Head Height	Hex Height	Thread Length
	Max	Min	Max	Min	Max	Min	Max	Min	Max
M5	8.00	7.78	8.71	11.80	5.00	4.82	5.40	2.80	16.00
M6	10.00	9.78	10.95	14.20	6.00	5.82	6.60	3.40	18.00
M8	13.00	12.73	14.26	18.00	8.00	7.78	8.10	4.20	22.00
M10	15.00	14.73	16.50	22.30	10.00	9.78	9.20	5.70	26.00
M12	16.00	15.73	17.62	26.60	12.00	11.73	11.50	6.10	30.00
M14	18.00	17.73	19.86	30.50	14.00	13.73	12.80	7.10	34.00
M16	21.00	20.67	23.15	35.00	16.00	15.73	14.40	8.70	38.00

Advantage of 12 Point Fasteners over In - Hex Socket Product

- Twelve Point Flange Screws are an alternative head design for hex socket cap screws. The flange diameter and head height are designed to fit applications and counterbored holes designed for standard hex socket cap screws.
- Twelve point flange screws are manufactured with the same thread length as socket head cap screws (2 times the diameter +1/2" minimum guaranteed threads).
- The twelve point head design is tightened with standard twelve point socket wrenches.
- The 12 point design permits greater torque to be applied to the bolt and eliminates the rounding of the hex socket that occurs with standard hex sockets.
- The flange diameter and head thickness of the 12 Point Flange Bolt are equivalent to the head dimensions of a socket head cap screw. This permits the Twelve Point Flange Bolt to be a replacement for any application currently using a socket head cap screw. The twelve point design permits this style bolt to be tightened down with a twelve point socket wrench, which permits higher torque to be applied as compared to a standard internal hex drive socket head cap screw.



- The higher strength and larger bearing area under the head of this design provides additional benefits for assemblies over standard hex head cap screws.
- More aesthetically pleasing than standard cap hex or socket head cap screws.





Flange Bolts Australasia

THE 12PBC DIFFERENCE

FMI is more than 3 letters. It represents the highest in precision, quality and innovation. Using the all-new, FMI Direct Forming with Anti-Rotation Knock-out has resulted in a wide series of flange bolts that raises the standards for fastener design, quality and production. That's why for over a decade, 12PBC has imported FMI fasteners and is the exclusive importer of FMI fasteners to Australia

Products using the "FMI Direct Forming with Anti-Rotation Knock-out", our 12 Point head height is increased by 6% and flange thickness is reduced by 22% compared to other 12 Points. This means a larger surface area for better grip, traction and durability. Because the "FMI Direct Forming with Anti-Rotation Knock-out" does not use trim dyes, our 12 Points will always have a clean, precise and high quality finish and feel.



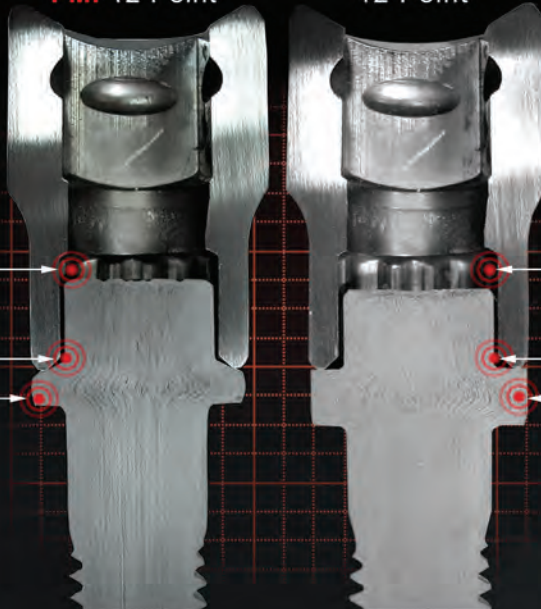
1. A 6% longer head height fills out the length of the socket, allowing for greater traction and grip.

2. The flange has been chamfered to better match the contours of the wrench, giving it a better fit.

3. A 22% thinner flange thickness means greater head height. This adds up to greater grip and traction.

FMI 12 Point

12 Point



1. Traditional 12 Points are made with trim dyes which wear out quickly. As a result, the length of the heads are shortened which reduces traction and grip.

2. Non-chamfered flange means an imperfect fit between wrench and bolt.

3. A thick flange serves no benefit or purpose and reduces the head height.

12 Point Flange Screw UNC / UNF Alloy Steel

(IFI 115)



IFI 115

Materials: Alloy Steel AISI 4135/4140

Wedge Tensile: Min 170,000 psi

Core Hardness: HRC 373~43

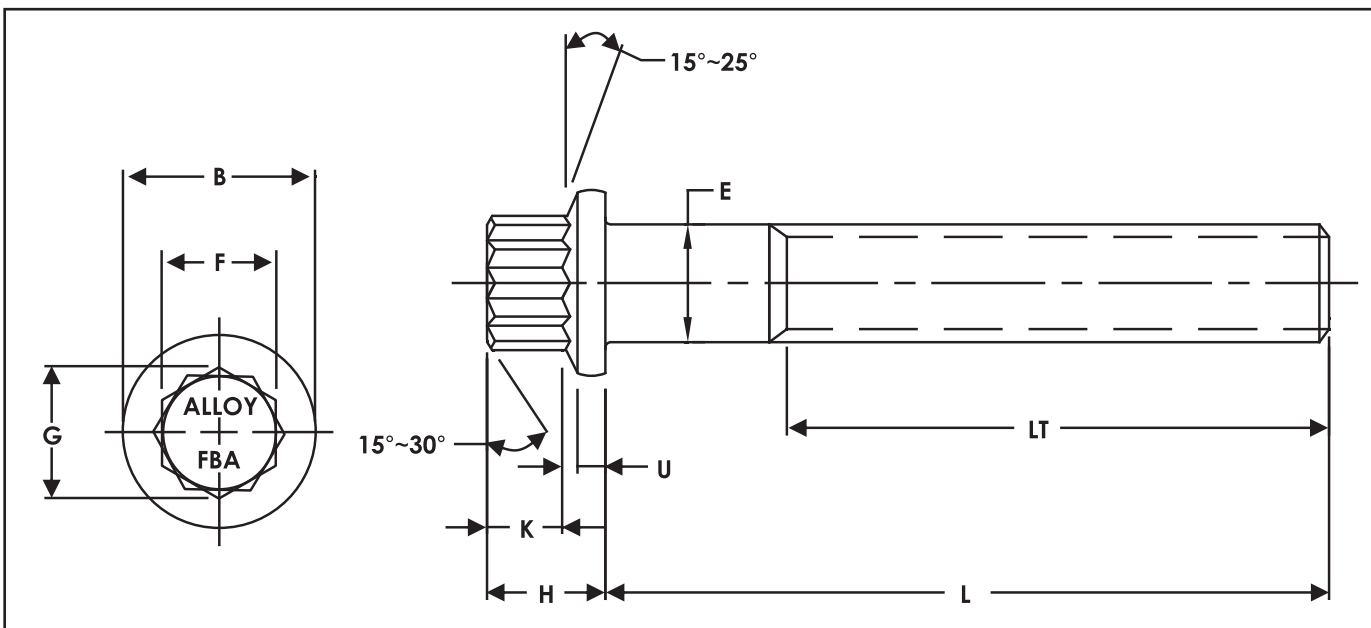
Surface Hardness: HR30N MAX 58.6

Screw Threads: ANSI B1.1 UNC, UNF

Class of Thread: 1/4 through 3/4, 2A, 3A



Dimensional Data



Unit: Inch

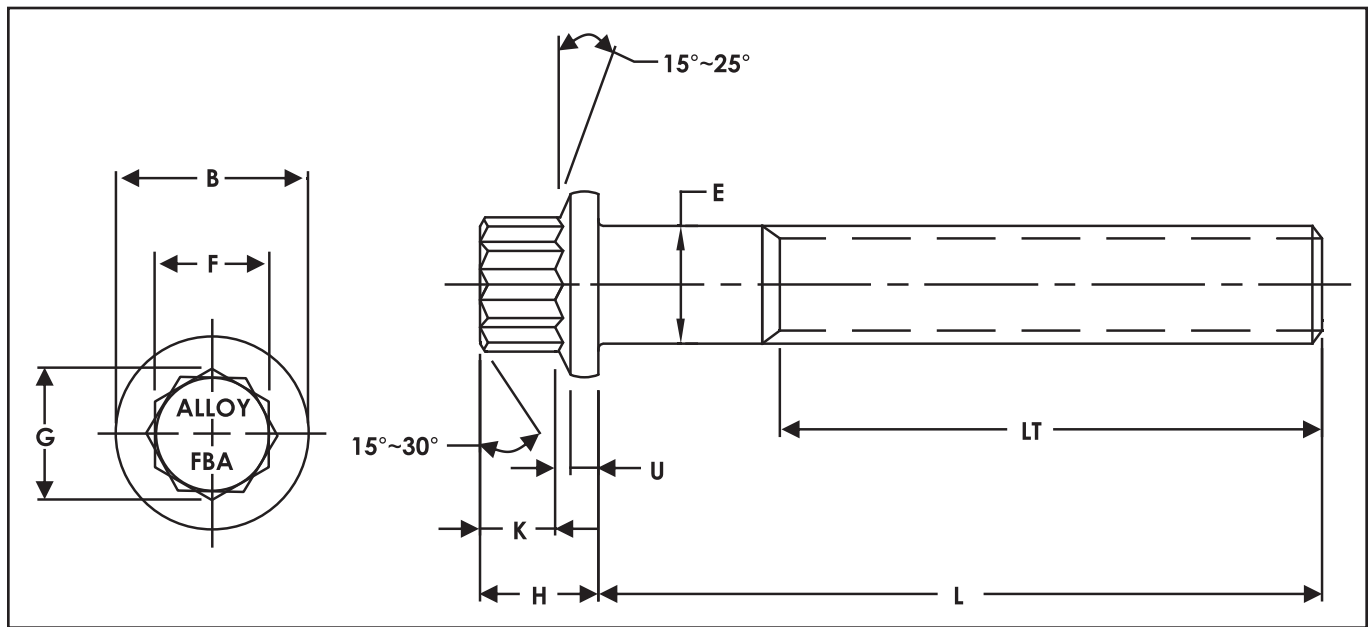
Normal Size of Screw	E		B		F		G	H	K	U	LT
	Body Diam (Max Equal to Norm Size)		Flange Diam		Width Across Flats		Width across Corners	Head Height	Wrench Height	Flange Thickness	Thread Length
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Basic
1/4	0.2500	0.2435	0.375	0.365	0.252	0.244	0.278	0.260	0.158	0.058	1.000
5/16	0.3125	0.3053	0.469	0.457	0.315	0.306	0.348	0.312	0.18	0.074	1.125
3/8	0.3750	0.3678	0.562	0.550	0.377	0.368	0.420	0.375	0.218	0.095	1.250
7/16	0.4375	0.4294	0.656	0.642	0.438	0.429	0.489	0.438	0.26	0.109	1.375
1/2	0.5000	0.4919	0.750	0.735	0.502	0.493	0.562	0.500	0.29	0.129	1.500
5/8	0.6250	0.6163	0.938	0.921	0.627	0.618	0.705	0.625	0.36	0.166	1.750
3/4	0.7500	0.7406	1.125	1.107	0.752	0.743	0.847	0.750	0.44	0.200	2.000

12 Point Flange Screw Metric Class 12.9

(B18.2.2.5M Class 12.9)



Dimensional Data



Unit: Inch

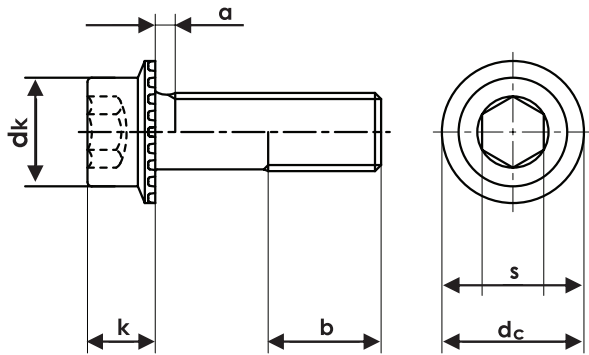
Normal Size of Screw	F		G	B		E		H		U		K	LT
	Width Across Flats		Width Across Corners	Flange Diam		Body Diam		Head Height		Flange Thickness		Wrench Height	Thread Length
	Max	Min	Max	Max	Min	Max	Min	Max	Min	Max	Min	Min	Basic
M6	6.05	5.95	6.70	9.95	9.77	6.00	5.79	6.00	5.82	2.70	2.45	3.12	18.00
M8	8.05	7.95	9.00	12.95	12.72	8.00	7.76	8.00	7.78	3.60	3.35	4.18	22.00
M10	10.05	9.93	11.20	15.95	15.69	10.00	9.73	10.00	9.78	4.50	4.13	5.28	26.00
M12	12.05	11.93	13.50	17.95	17.67	12.00	11.70	12.00	11.73	5.40	5.03	6.33	30.00
M14	14.05	13.92	15.80	20.95	20.67	14.00	13.68	14.00	13.73	6.30	5.93	7.43	34.00
M16	16.05	15.92	18.00	23.92	23.62	16.00	15.68	16.00	15.73	7.20	6.83	8.53	38.00

Socket Flange Serrated Metric Cl.100

(12PBC - Spec)



Hexagon socket cap screws with flange and ribs



Dimensional Data

Dimensions	M5	M6	M8	M10	M12
a_{max}	2.4	3	3.7	4.5	5.2
b	22	24	28	32	36
d_c	11	13.5	17	19.5	22.5
d_k	9	11	14	17	19
k	5	6	8	10	12
s	4	5	6	8	10
qty. ribs	28	36	48	60	72

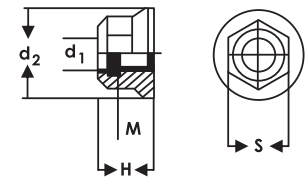


Toplock® Flanged Lock Nuts UNC / UNF Grade G (IFI 100/107 1987)



Dimensional Data Grade G Toplock Nuts

d1	d2 max	s-basic	s-max	h-max	m
1/4	0.560	7/16	0.4380	0.300	0.300
5/16	0.680	1/2	0.5000	0.365	0.365
3/8	0.810	9/16	0.5625	0.425	0.425
7/16	0.930	5/8	0.6250	0.495	0.495
1/2	1.070	3/4	0.7500	0.555	0.555
9/16	1.190	7/8	0.8770	0.625	0.625
5/8	1.330	15/16	0.9375	0.690	0.690
3/4	1.585	1 1/8	1.1250	0.825	0.825



Tech Data UNC Grade G Toplock Nuts

Bolt Diameter	Property Grade	Proof Load (lb)	Clamp Load (lb) Plain Finish	Prevailing Torque First Installation (Max)	Prevailing Torque First Removal (Max)	Prevailing Torque Fifth Removal (Max)	Tightening Torque (Max)
1/4	G	4750	2850	40.00 in lb	6.00 in lb	4.50 in lb	150 in lb
5/16	G	7850	4700	80.00 in lb	10.50 in lb	7.50 in lb	240 in lb
3/8	G	11600	6950	110.00 in lb	16.00 in lb	11.50 in lb	32 ft lb
7/16	G	16000	9600	135.00 in lb	23.00 in lb	16.00 in lb	51 ft lb
1/2	G	21300	12800	17ft lb	30.00 in lb	20.00 in lb	85 ft lb
9/16	G	27300	16400	25 ft lb	40.00 in lb	28.00 in lb	120 ft lb
5/8	G	33900	20300	35 ft lb	52.00 in lb	36.00 in lb	143 ft lb
3/4	G	50100	30100	45 ft lb	78.00 in lb	54.00 in lb	240 ft lb

Tech Data UNF Grade G Toplock Nuts

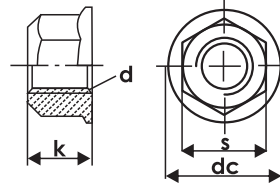
Bolt Diameter	Property Grade	Proof Load (lb)	Clamp Load (lb) Plain Finish	Prevailing Torque First Installation (Max)	Prevailing Torque First Removal (Max)	Prevailing Torque Fifth Removal (Max)	Tightening Torque (Max)
1/4	G	5450	3250	40.00 in lb	6.00 in lb	4.50 in lb	160 in lb
5/16	G	8700	5200	80.00 in lb	10.50 in lb	7.50 in lb	230 in lb
3/8	G	13200	7900	110.00 in lb	16.00 in lb	11.50 in lb	33 ft lb
7/16	G	17800	10700	135.00 in lb	23.00 in lb	16.00 in lb	60 ft lb
1/2	G	24000	14400	17ft lb	30.00 in lb	20.00 in lb	89 ft lb
9/16	G	30500	18300	25 ft lb	40.00 in lb	28.00 in lb	132 ft lb
5/8	G	38400	23000	35 ft lb	52.00 in lb	36.00 in lb	175 ft lb
3/4	G	56000	33600	45 ft lb	78.00 in lb	54.00 in lb	270 ft lb

Toplock® Flanged Lock Nuts Metric Class 10

(Din 6927)



Torque Values and Friction Coefficient - All Metal Self Locking Nuts - Where Torque tightening equipment is used, account should be taken of the additional torque required to overcome the resistance of the prevailing torque locking nut. As a general guide, during initial experiments to determine the specific torque setting required to achieve the desired clamp load, the torque value should be increased by the "first removal minimum" value shown above.



Dimensional Data Class 10 Toplock Metric Nuts unit: mm

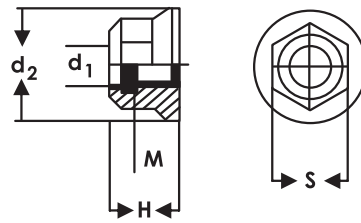
Thread size d	P	dc max	k max	s	
				max	min
M5	0.8	11.8	6.2	8	7.78
M6	1	14.2	7.3	10	9.78
M8	1/1.25	17.9	9.4	13	12.73
M10	1/1.25/1.5	21.8	11.4	15	14.73
M12	1.25/1.5/1.75	26	13.8	18	17.73
M14	1.5/2	29.9	15.9	21	20.67
M16	1.5/2	24.5	18.3	24	23.67
M20	1.5/2.5	42.8	22.4	30	29.16

Tech Data Class 10 Toplock Nuts

Thread	Property Class	Proof Load Kn	Clamp load Kn	Prevailing Torque First Installation (Max)	Prevailing Torque First Removal (Max)
M6 X 1.00	10	20.90	12.50	4.00	0.55
M8 X 1.25	10	38.10	22.80	9.00	1.55
M10 X 1.50	10	60.30	36.10	14.00	2.00
M12 X 1.75	10	88.50	52.50	21.00	3.10
M14 X 2.00	10	121.00	61.60	31.00	4.40
M16 X 2.00	10	165.00	97.50	42.00	6.00

Class 10 Flange Nyloc Nuts

DIN 6926 (ISO 7043)




Dimensional Data Class 10 Flanged Metric Nyloc Nuts

d1	d2 max	s-	h-max	m
M5	11.8	8	7.1	4.7
M6	14.2	10	9.1	5.7
M8	17.9	13	11.1	7.6
M10	21.8	15	13.5	9.6
M12	26	18	16.1	11.6
M14	29.9	21	18.20	13.30
M16	34.5	24	20.3	15.3
M20	42.8	30	24.8	18.9

Tech Data Class 10 Flanged Metric Nyloc Nuts


Bolt Diameter	Property Class	Proof Load (kN)	Clamp Load (kN) Plain Finish	Prevailing Torque First Installation	Prevailing Torque First Removal	Prevailing Torque Fifth Removal
M6	10	20.90	12.50	4.00	0.55	0.40
M8	10	38.10	22.80	9.00	1.15	0.80
M10	10	60.30	36.10	14.00	2.00	1.40
M12	10	88.50	52.50	21.00	3.10	2.10
M14	10	1231.00	71.60	31.00	4.40	3.00
M16	10	165.00	97.50	42.00	6.00	4.20
M18	10	**	**	**	**	**
M20	10	260.00	152.00	72.00	10.50	7.00
M24	10	374.00	220.00	106.00	15.00	10.50

Metric Tap and Clearance Drill Sizes

		Tap Drill				Clearance Drill			
		75% Thread for Aluminium, Brass & Plastics		50% Thread for Steel, Stainless & Iron		Close Fit		Standard Fit	
Screw Size (mm)	Thread Pitch (mm)	Drill Size (mm)	Closest (inch)	Drill Size (mm)	Closest (inch)	Drill Size (mm)	Closest (inch)	Drill Size (mm)	Closest (inch)
M1.5	0.35	1.15	56	1.25	55	1.60	1/16	1.65	52
M1.6	0.35	1.25	55	1.35	54	1.70	51	1.75	50
M1.8	0.35	1.45	53	1.55	1/16	1.90	49	2.00	5/64
M2	0.45	1.55	1/16	1.70	51	2.10	45	2.20	44
	0.40	1.60	52	1.75	50				
M2.2	0.45	1.75	50	1.90	48	2.30	3/32	2.40	41
M2.5	0.45	2.05	46	2.20	44	2.65	37	2.75	7/64
M3	0.60	2.40	41	2.60	37	3.15	1/8	3.30	30
	0.50	2.50	39	2.70	36				
M3.5	0.60	2.90	32	3.10	31	3.70	27	3.85	24
M4	0.75	3.25	30	3.50	28	4.20	19	4.40	17
	0.70	3.30	30	3.50	28				
M4.5	0.75	3.75	25	4.00	22	4.75	13	5.00	9
M5	1.00	4.00	21	4.40	11/64	5.25	5	5.50	7/32
	0.90	4.10	20	4.40	17				
	0.80	4.20	19	4.50	16				
M5.5	0.90	4.60	14	4.90	10	5.80	1	6.10	B
M6	1.00	5.00	8	5.40	4	6.30	E	6.60	G
	0.75	5.25	4	5.50	7/32				
M7	1.00	6.00	8	6.40	E	7.40	L	7.70	N
	0.75	6.25	D	6.50	F				
M8	1.25	6.80	H	7.20	J	8.40	Q	8.80	S
	1.00	7.00	J	7.40	L				
M9	1.25	7.80	N	8.20	P	9.50	3/8	9.90	25/64
	1.00	8.00	O	8.40	21/64				
M10	1.50	8.30	R	9.00	T	10.50	Z	11.00	7/16
	1.25	8.80	11/32	9.20	23/64				
	1.00	9.00	T	9.40	U				
M11	1.50	9.50	3/8	10.00	X	11.60	29/64	12.10	15/32
M12	1.75	10.30	13/32	10.90	27/64	12.60	1/2	13.20	33/64
	1.50	10.50	2	11.00	7/16				
	1.25	10.80	27/64	11.20	7/16				
M14	2.00	12.10	15/32	12.70	1/2	14.75	37/64	15.50	39/64
	1.50	12.50	1/2	13.00	33/64				
	1.25	12.80	1/2	13.20	33/64				
M15	1.30	13.80	17/32	14.00	35/64	15.75	5/8	16.50	21/32
M16	2.00	14.00	35/64	14.75	37/64	16.75	21/32	17.50	11/16
	1.50	14.50	37/64	15.00	19/32				
M17	1.50	15.50	39/64	16.00	5/8	18.00	45/64	18.50	47/64
M18	1.00	15.50	39/64	16.50	41/64	19.00	3/4	20.00	53/32
	1.50	16.00	5/8	16.75	21/32				
	1.75	16.50	21/32	17.00	43/64				
	2.50	15.00	19/323	15.50	39/64				
M19	1.50	16.50	21/32	17.50	11/16	20.00	25/32	21.00	53/64
M20	1.25	17.50	11/16	18.50	23/32	21.00	53/64	22.00	55/64
	2.00	18.00	45/64	18.50	47/64				
	1.50	18.50	47/64	19.00	3/4				
	2.50	17.00	43/64	17.50	11/16				



Inch Tap and Clearance Drill Sizes

				Tap Drill				Clearance Drill			
				75% Thread for Aluminium, Brass and Plastics		50% Thread for Steel, Stainless and iron		Close Fit		Free Fit	
Screw Size	Major Diameter	Threads per inch	Minor Diameter	Drill Size	Dec. Eq.	Drill Size	Dec. Eq.	Drill Size	Dec. Eq.	Drill Size	Dec. Eq.
0	.0600	80	.0447	3/64	.0469	55	.0520	52	.0635	50	.0700
		64	.0538	53	.0595	1/16	.0652	48	.0760	46	.0810
1	.0730	72	.0560	53	.0595	52	.0635	48	.0760	46	.0810
		56	.0641	50	.0700	49	.0730	43	.0890	41	.0960
2	.0860	64	.0668	50	.0700	48	.0760	43	.0890	41	.0960
		48	.0734	47	.0785	44	.0860	37	.1040	35	.1100
3	.0990	56	.0771	45	.0820	43	.0890	37	.1040	35	.1100
		40	.0813	43	.0890	41	.0960	32	.1160	30	.1285
4	.1120	48	.0864	42	.0935	40	.0980	32	.1160	30	.1285
		40	.0943	38	.1015	7/64	.1094	30	.1285	29	.1360
5	.125	44	.0971	37	.1040	35	.1100	30	.1285	29	.1360
		32	.0997	36	.1065	32	.1160	27	.1440	25	.1495
6	.138	40	.1073	33	.1130	31	.1200	27	.1440	25	.1495
		32	.1257	29	.1360	27	.1440	18	.1695	16	.1770
8	.1640	36	.1299	29	.1360	26	.1470	18	.1695	16	.1770
		24	.1389	25	.1495	20	.1610	9	.1960	7	.2010
10	.1900	32	.1517	21	.1590	18	.1695	9	.1960	7	.2010
		24	.1649	16	.1770	12	.1890	2	.2210	1	.2280
12	.2160	28	.1722	14	.1820	10	.1935	2	.2210	1	.2280
		32	.1777	13	.1850	9	.1960				
1/4	.2500	20	.1887	7	.2010	7/32	.2188	F	.2570	H	.2660
		28	.2062	3	.2130	1	.2280				
5/16	.3125	32	.2117	7/32	.2188	1	.2280				
		18	.2443	F	.2570	J	.2770	P	.3230	Q	.3320
3/8	.3750	24	.2614	I	.2720	9/32	.2812				
		32	.2742	9/32	.2812	L	.2900				
7/16	.4375	16	.2983	5/16	.3125	Q	.3320	W	.3860	X	.3970
		24	.3239	Q	.3320	S	.3480				
1/2	.5000	32	.3367	11/13	.3438	T	.3580				
		14	.3499	U	.3680	25/64	.3906	29/64	.4531	15/32	.4687
9/16	.5625	24	.3762	25/64	.3906	13/32	.4062				
		28	.3937	Y	.4040	Z	.4130				
5/8	.6250	13	.4056	27/64	.4219	29/64	.4531	33/64	.5156	17/32	.5312
		20	.4387	29/64	.4531	15/32	.4688	33/64	.5156	17/32	.5312
11/16	.6875	28	.4562	15/32	.4688	15/32	.4688				
		12	.4603	31/64	.4844	33/64	.5156	37/64	.5781	19/32	.5938
3/4	.7500	18	.4943	33/64	.5156	17/32	.5312				
		24	.5114	33/64	.5156	17/32	.5312				
13/16	.8125	11	.5135	17/32	.5312	9/16	.5625	41/64	.6406	21/32	.6562
		18	.5568	37/64	.5781	19/32	.5938	41/64	.6406	21/32	.6562
7/8	.8750	24	.5739	37/64	.5781	19/32	.5938				
		10	.6273	21/32	.6562	11/16	.6875	45/64	.7031	25/32	.7812
15/16	.9375	16	.6733	11/16	.6875	45/64	.7031	49/64	.7656	25/32	.7812
		20	.6887	45/64	.7031	23/32	.7188				
1	1.000	20	.7512	49/64	.7656	25/32	.7812	53/64	.8281	27/32	.8438
		9	.7387	49/64	.7656	51/64	.7969				
		14	.7874	13/16	.8125	53/64	.8281	57/64	.8906	29/32	.9062
		20	.8137	53/64	.8281	27/32	.8438				
		20	.8762	57/64	.8906	29/32	.9062	61/64	.9531	31/32	.9688
		8	.8466	7/8	.8750	59/64	.9219	1-1/64	1.0156	1-1/32	1.0313
		12	.8978	15/16	.9375	61/64	.9531				
		14	.9134	61/64	.9531	15/16	.9375				
		20	.9387	61/64	.9531	31/32	.9688				

Terms and Conditions of Trade

WDS and the Customer each agree with the other as follows:

1. DEFINITIONS

WDS means The WDS Group Pty Ltd (ABN 90 003 832 684)

12PBC means 12-Point - Bolts China Inc. a division of the WDS Group Pty Ltd

WDS/12PBC means either of the above entities

Customer means the customer named on the Delivery Docket and Invoice.

Delivery Docket means the document furnished by WDS/12PBC to the Customer.

GST includes a value added tax, consumption tax or goods and services tax.

Invoice means a tax invoice (as defined in the Act) furnished by WDS/ 12PBC to the Customer in respect of the product.

Product means all goods supplied to the Customer by WDS from time to time.

Purchase Order means the request by the Customer for the Product which is accepted by WDS/12PBC.

Sum means the price and other monies payable for the Product together with GST payable on the supply of the Product.

2. GENERAL

- a. WDS/12PBC supplies to the Customer the Product in accordance with these terms and conditions as varied in writing by WDS/12PBC. Any variation in writing by WDS/12PBC shall take precedence to these terms and conditions.

3. TERMS OF SALE

- a. The Product is sold on these Terms and Conditions

4. PRICE

- a. Unless otherwise stated, all Prices quoted by WDS/12PBC are net and exclusive of all GST, transport costs and any other costs payable in respect of the supply of the Product.
- b. Prices for Product quoted on price lists may be varied at any time without notice and Product will be invoiced at the then current price for those Products as at the time of the delivery.

5. PAYMENT

- a. Payment for Product is due within 30 days from statement date.
- b. Accounts exceeding this limit will be suspended until the account is paid in full.
- c. If the Customer breaches these Terms, the Customer must pay any collection, commission, and/or legal fees charge by any third party to recover money due.

6. TITLE TO GOODS

- a. Notwithstanding any other term and condition, the risk of the Product passes to the Customer on delivery but title to the Product does not pass until the Sum is paid in full.
- b. Until such time as the Sum is paid in full, the Customer is only at liberty to sell the Product in the ordinary course of its business as agent for the Company on the condition that it holds on trust and accounts to the Company for the proceeds thereof.
- c. Pending the passing of title to the Product the Company may require the Customer to mark the Product as being the property of the Company.

7. DELIVERY

- a. Freight charges for deliveries to Customer's business address are \$15.00 per delivery.
- b. Where Customer requests delivery to a job site the minimum freight charge is \$50.00 per delivery.
- c. Additional charges will apply for orders exceeding 100kg.

8. INSPECTION BY CUSTOMER

- a. The Customer is obliged to open and check all Products supplied and to report any alleged deficiency within 7 days of delivery.
- b. Any claim by the Customer for non-delivery, short delivery, or delivery of the wrong Product must be notified to WDS 12PBC within 7 days of the delivery.
- c. Any claims made outside of this date may not be accepted for credit, except where the supply of such Product breaches a condition prescribed by Statute or regulation which is unavoidable.

9. PRODUCT RETURNS

- a. The Customer may return Product but WDS/12PBC will not be obliged to accept the returned Product and provide a credit in respect thereof, unless:
 - i. The Customer notifies WDS/12PBC of its intention to return Product and WDS/12PBC approves the return prior to the physical return of the Product;
 - ii. The Customer returns the Product within 7 days of the goods being received;
 - iii. The Product returned is accompanied by a request for credit that quotes 12PBC/ WDS's invoice number, date and reason for return; and
 - iv. The Product and any packaging is returned in the same condition in which they were originally delivered to the Customer.
- b. Product will not be accepted for return for credit where:
 - i. Traceable products are not returned in their original sealed packets;
 - ii. Any Product is cut or otherwise reworked to Customer's specifications;
 - iii. Any Product has been specially manufactured and supplied to Customer's specifications;
 - iv. Any Product is altered or damaged by the Customer;
 - v. Any item outside of the normal product range is specially procured for the Customer; and
 - vi. The Customer has not advised WDS/12PBC of the deficiency as per the conditions of Clause 8.
- c. Product approved by WDS/12PBC for return by the Customer will be subject to a Handling and Restocking fee. Freight for returning these Products will be at the Customers expense and forwarding freight costs may be recharged as applicable.



