

# BREAKING & YIELD LOADS OF BOLTS & SET SCREWS

## Conversion Factors

Convert	Into	Multiply by factor
Tonf	lbf	2240
lbf	Tonf	0.000446
tonnef	kN	10
kN	tonnef	0.1
lbf	kN	0.00445
kN	lbf	224.8

## Torque Conversion

lbft	Nm	1.36
Nm	lbft	0.74

## Stress Conversion

MPa	psi	145
psi	MPa	0.06896

## Length Conversion

mm	in	0.0394
in	mm	25.4

## Abbreviations

lbf	=	pounds - force
lbft	=	pounds - feet
psi	=	pounds per square inch
in	=	inches
kN	=	kiloNewton
Nm	=	Newton - Metre
MPa	=	Megapascals
mm	=	millimetres

## Breaking & Yield Loads of BSW Bolts

BSW bolts

Based on:



Tensile Strength	=	28 tonf/in <sup>2</sup> min
Yield Stress	=	16 tonf/in <sup>2</sup> min

Size	Stress Area of Thread	Yield Load of Bolt (Min)			Breaking Load of Bolt (Min)		
		Sq. In.	Tonf	lbf	kN	Tonf	lbf
(3/16 BSW)	0.0171	0.27	600	2.73	0.48	1070	477
1/4 BSW	0.0321	0.51	1140	5.12	0.90	2010	8.97
5/16 BSW	0.0527	0.84	1880	8.40	1.47	3290	14.6
3/8 BSW	0.0779	1.25	2800	12.4	2.18	4880	21.7
7/16 BSW	0.1069	1.71	3830	17.0	2.99	6700	29.8
1/2 BSW	0.1385	2.22	4970	22.1	3.88	8690	38.7
5/8 BSW	0.227	3.63	8130	36.2	6.35	14220	63.3
3/4 BSW	0.336	5.38	12050	53.6	9.41	21080	93.8
7/8 BSW	0.464	7.42	16620	73.9	13.00	29120	129
1 BSW	0.608	9.73	21800	96.9	17.05	38190	170
1.1/8 BSW	0.766	12.26	27460	122.1	21.42	47980	213
1.1/4 BSW	0.980	15.68	35120	156.2	27.44	61480	273
1.1/2 BSW	1.410	22.56	50530	224.8	39.48	88370	393
(1.3/4 BSW)	1.907	30.51	68340	304.0	53.39	119590	532
(2 BSW)	2.508	40.13	89890	399.8	70.21	157270	700

[ ] Sizes not covered in standard. Data above is given for information only.

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## Unified High Tensile Hexagon Head Bolts & Set Screws

Grade 5



AS / NZS 2465 / SAE J429

Based on:

Tensile Strength	=	120000 lbf/in <sup>2</sup> min. [827 MPa]	Sizes 1/4 - 1incl
	=	105000 lbf/in <sup>2</sup> min. [724 MPa]	Sizes 1.1/8 - 1.1/2 incl
Yield Stress	=	92000 lbf/in <sup>2</sup> min. [634 MPa]	Sizes 1/4 - 1 incl
	=	81000 lbf/in <sup>2</sup> min. [558 MPa]	Sizes 1.1/8 - 1.1/2 incl
Proof Load Stress	=	85000 lbf/in <sup>2</sup> [586 MPa]	Sizes 1/4 - 1 incl
	=	74000 lbf/in <sup>2</sup> [510 MPa]	Sizes 1.1/8 - 1.1/2 incl

Size		Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
			lbf	kN	lbf	kN
1/4	UNC	0.0364	3100	13.8	4350	19.3
5/16	UNC	0.0580	4900	218	6950	30.9
3/8	UNC	0.0878	7450	33.1	10500	46.7
7/16	UNC	0.1187	10100	449	14200	63.2
1/2	UNC	0.1599	13600	60.5	19200	85.4
5/8	UNC	0.256	21800	97.0	30700	137
3/4	UNC	0.373	31700	141	44800	199
7/8	UNC	0.509	43300	193	61100	272
1	UNS	0.679	57715	254	81480	358
1.1/8	UNC	0.856	63300	282	89900	400
1.1/4	UNC	1.073	79400	353	112700	501
1.1/2	UNC	1.581	117000	520	166000	738

## UNC High Tensile Hexagon Head Bolts & Set Screws

Grade 5



AS / NZS 2465 / SAE J429

Based on:

Tensile Strength	=	120000 lbf/in <sup>2</sup> min. [827 MPa]	Sizes 1/4 - 1incl
	=	105000 lbf/in <sup>2</sup> min. [724 MPa]	Sizes 1.1/8 - 1.1/2 incl
Yield Stress	=	92000 lbf/in <sup>2</sup> min. [634 MPa]	Sizes 1/4 - 1 incl
	=	81000 lbf/in <sup>2</sup> min. [558 MPa]	Sizes 1.1/8 - 1.1/2 incl
Proof Load Stress	=	85000 lbf/in <sup>2</sup> [586 MPa]	Sizes 1/4 - 1 incl
	=	74000 lbf/in <sup>2</sup> [510 MPa]	Sizes 1.1/8 - 1.1/2 incl

Size		Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
			lbf	kN	lbf	kN
1/4	UNC	0.0318	2700	12	3800	16.9
5/16	UNC	0.0524	4450	19.8	6300	28
3/8	UNC	0.0775	6600	29.4	9300	41.4
7/16	UNC	0.1063	9050	40.3	12800	56.9
1/2	UNC	0.1419	12100	53.8	17000	75.6
5/8	UNC	0.226	19200	85.4	27100	121
3/4	UNC	0.334	28400	126	40100	178
7/8	UNC	0.462	39300	175	55400	246
1	UNC	0.606	51500	229	72700	323
1.1/8	UNC	0.763	56500	251	80100	356
1.1/4	UNC	0.969	71700	319	101700	452
1.1/2	UNC	1.405	104000	463	147500	656

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## UNC High Tensile Hexagon Head Bolts & Set Screws

Grade 8

**Based on:**

<b>Tensile Strength</b>	=	150000 lbf/in <sup>2</sup> min.	[1034 MPa] Sizes 1/4" - 1.1/2" incl
<b>Yield Stress</b>	=	130000 lbf/in <sup>2</sup> min.	[896 MPa]
<b>Proof Load Stress</b>	=	120000 lbf/in <sup>2</sup>	[827 MPa]

 AS / NZS 2465 / SAE J429

Size		Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
			lbf	kN	lbf	kN
1/4	UNF	0.0364	4350	19.3	5450	24.2
5/16	UNF	0.0580	6950	30.9	8700	38.7
3/8	UNF	0.0878	10500	46.7	13200	58.7
7/16	UNF	0.1187	14200	63.2	17800	79.2
1/2	UNF	0.1599	19200	85.4	24000	107
5/8	UNF	0.256	30700	137	38400	171
3/4	UNF	0.373	44800	199	56000	249
7/8	UNF	0.509	61100	272	76400	340
1	UNF	0.663	79600	354	99400	442
1	UNS	0.679	81480	359	101850	448
1.1/8	UNF	0.856	102700	457	128400	571
1.1/4	UNF	1.073	128800	573	161000	716
1.1/2	UNF	1.581	189700	844	237200	1055
1/4	UNC	0.0318	3800	16.9	4750	19.3
5/16	UNC	0.0524	6300	28.0	7850	30.9
3/8	UNC	0.0775	9300	41.4	11600	46.7
7/16	UNC	0.1063	12800	56.9	15900	63.2
1/2	UNC	0.1419	17000	75.6	21300	85.4
5/8	UNC	0.226	27100	121	33900	137
3/4	UNC	0.334	40100	178	50100	199
7/8	UNC	0.462	55400	246	69300	272
1	UNC	0.606	72700	323	90900	354
1.1/8	UNC	0.763	91600	407	114400	457
1.1/4	UNC	0.969	116300	517	145400	573
1.1/2	UNC	1.405	168600	750	210800	844

## TECHNICAL EXPERTISE

Our team are solution focused individuals, with in-depth product knowledge and sourcing experience.

We're driven to fully understand our customers' needs

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## Metric Hexagon Commercial Bolts & Set Screws

Property Class 4.6



AS 1111.1/2 / AS 4291.1

Based on:

Tensile Strength	=	400 MPa min	(58015 lbf/in <sup>2</sup> )
Yield Stress	=	240 MPa min	(34810 lbf/in <sup>2</sup> )
Proof Load Stress	=	225 MPa	(32635 lbf/in <sup>2</sup> )

Size	Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
	mm <sup>2</sup>	kN	lbf	kN	lbf
M5	14.2	3.20	719	5.68	1275
M6	20.1	4.52	1015	8.04	1805
M8	36.6	8.24	1850	14.6	3280
M10	58.0	13.0	2920	23.2	5215
M12	84.3	19.0	4270	33.7	7575
M14	115	25.9	5820	46.0	10300
M16	157	35.3	7940	62.8	14120
M18	192	43.2	9710	76.8	17250
M20	245	55.1	12390	98.0	22030
M22	303	68.2	15450	121	27200
M24	353	79.4	17850	141	31700
M27	459	103	23200	184	41400
M30	561	126	28330	224	50360
M33	694	156	35100	278	62500
M36	817	184	41370	327	73510
M39	976	220	49500	390	87700
M42	1120	252	56650	448	100710
M48	1470	331	74410	588	132190
M56	2030	458	102960	812	182550
M64	2680	605	136000	1072	241000

## Metric Hexagon High Tensile Bolts & Set Screws

Property Class 8.8



AS 1110.1/2 / AS 4291.1

Based on:

Tensile Strength	=	800 MPa min	(116030 lbf/in <sup>2</sup> )	Sizes M5 - M16 incl
	=	830 MPa min	(120380 lbf/in <sup>2</sup> )	Sizes M18 - M39 incl
Yield Stress	=	640 MPa min	(92825 lbf/in <sup>2</sup> )	Sizes M5 - M16 incl
	=	660 MPa min	(95725 lbf/in <sup>2</sup> )	Sizes M18 - M39 incl
Proof Load Stress	=	580 MPa	(84120 lbf/in <sup>2</sup> )	Sizes M5 - M16 incl
	=	600 MPa	(87025 lbf/in <sup>2</sup> )	Sizes M18 - M39 incl

Size	Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
	mm <sup>2</sup>	kN	lbf	kN	lbf
M5	14.2	8.23	1850	11.35	2550
M6	20.1	11.6	2610	16.1	3620
M8	36.6	21.2	4770	29.2	6560
M10	58.0	33.7	7580	46.4	10430
M12	84.3	48.9	10990	67.4	15150
M14	115	66.7	14995	92	20680
M16	57	91.0	20460	125	28100
M18	192	115	25850	159	35745
M20	245	147	33050	203	45640
M22	303	182	40915	252	56650
M24	353	212	47660	293	65870
M27	459	275	61820	381	85650
M30	561	337	75760	466	104760
M33	694	416	93520	576	129490
M36	817	490	110160	678	152420
M39	976	586	131740	810	182100

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## Metric Hexagon High Tensile Bolts & Set Screws

Property Class 10.9

Based on:

Tensile Strength	=	1040 MPa min	[150340 lbf/in <sup>2</sup> ]	Sizes M5 - M39 incl
Yield Stress	=	940 MPa min	[136340 lbf/in <sup>2</sup> ]	Sizes M5 - M39 incl
Proof Load Stress	=	830 MPa	[120330 lbf/in <sup>2</sup> ]	Sizes M5 - M39 incl

 AS 1110.1/2 / AS 4291.1

Size	Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
	mm <sup>2</sup>	kN	lbf	kN	lbf
M5	14.2	118	2655	14.8	3325
M6	20.1	16.7	3755	20.9	4700
M8	36.6	30.4	6835	38.1	8565
M10	58.0	48.1	10810	60.3	13555
M12	84.3	70	15750	87.7	19720
M14	115	95.5	21470	120	26970
M16	157	130	29225	163	36650
M18	192	159	35750	200	44960
M20	245	203	45650	255	57330
M22	303	252	56650	315	70820
M24	353	293	65870	367	82510
M27	459	381	85650	477	107230
M30	561	466	104760	583	131060
M33	694	570	128140	722	162310
M36	817	678	152420	850	191090
M39	976	810	182100	1020	229310

## Metric Hexagon High Tensile Bolts & Set Screws

Property Class 8.8

Based on:

Tensile Strength	=	800 MPa min	[116030 lbf/in <sup>2</sup> ]	Sizes M8 - M16 incl.
	=	830 MPa min	[120380 lbf/in <sup>2</sup> ]	Sizes M18 - M39 incl
Yield Stress	=	640 MPa min	[92825 lbf/in <sup>2</sup> ]	Sizes M8 - M16 incl
	=	660 MPa min	[95725 lbf/in <sup>2</sup> ]	Sizes M18 - M39 incl
Proof Load Stress	=	580 MPa	[84120 lbf/in <sup>2</sup> ]	Sizes M5 - M16 incl
	=	600 MPa	[87025 lbf/in <sup>2</sup> ]	Sizes M18 - M39 incl

Bolts (Fine Pitch)

Set Screws

 DIN960

 DIN961

Size	Thread Pitch	Stress Area of Thread	Proof Load of Bolt		Breaking Load of Bolt (Min)	
	mm <sup>2</sup>	mm <sup>2</sup>	kN	lbf	kN	lbf
M8	1.0p	39.2	22.7	5102	31.3	7036
M10	1.25p	61.0	39.0	8767	48.8	10970
M12	1.25p	92.0	59.0	13263	73.6	16545
M14	1.5p	125.0	72.5	16298	100.0	22480
M16	1.5p	167.0	96.9	21783	134.0	30123
M18	1.5p	216.0	130.0	29224	179.0	40239
M20	1.5p	272.0	163.0	36642	226.0	50804
M22	1.5p	333.0	200.0	44960	276.0	62044
M24	2.0p	384.0	230.0	51704	319.0	71711

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