

WHEN YOU NEED
FASTENERS.



Hwashin - Hitech

South Korea

DISCOVER THE NEW WORLD IN EXTREME CONDITIONS.

Hwashin-Hitech offers a wide variety of products and materials for specialized bolts and nuts to ensure ultimate safety and worry free risk of damage. We have served a large field of industries including gas/steam turbines, submarines, locomotives, dampers and offshore plants. Our engineers ensure perfect bolting, even at the worst possible place. With worldwide demand for our stable fasteners, we now produce up to about 5,000 kinds of fasteners each year.

 **Hwashin - Hitech**

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HISTORY

New Challenge

Feb. 2016

Established R&D Center

Oct. 2015

Obtained ISO 9001:2008 Certificate

Jan. 2015

Established HWASHIN-HITECH
(Related Company)

Foundation & Expansion

Mar. 2016

Obtained NORSOK M-650 [Norwegian Piping]
(Norsk Søkkel Konkurransen posisjon)

Jul. 2013

Achievement of KEPIC-MN,SN.
(Korea Electric Power Industry Code)

Sep. 2012

Awarded 5 Million Export Tower [KITA]
(Korea International Trade Association)

Jun. 2011

Obtained ISO 14001:2004 Certificate (A.B.S)
(Environment Management System)
Obtained OHSAS 18001:2007 Certificate (A.B.S)
(Health and Safety Management System)

Jul. 2009

Established R&D Center

Apr. 1998

Obtained ISO 9001:2008 Certificate

Aug. 1996

Qualified as Vender of Material Manufacture
of Bolt / Nut from KEPCO (Quality Class : Q)
(Korea Electric Power Corporation)

Nov. 1993

Incorporation of going business

Oct. 1965

Established HWASHIN BOLT

PARTNERSHIP CLIENTS



CEO Introduction

After Taehyung Jung inherited the family business, which is three generations old, he did it with a passionate devotion to provide the finest fasteners possible.

He emphasize a competitive price as much as a safety, taking a broad study and discussion with staff to puzzle out how to improve manufacturing process.

He has a talent for choosing the right people to work for his company and treat his employees with fairness.

At Busan, the hometown of Hwashin-Hitech, cutting-edge facilities and well-trained engineers come together to create the best fasteners in the world.



CEO TaeHyung Jung

GAS & STEAM TURBINE PRODUCT



THRU STUD / COVERED NUT
INCONEL 718, A453-660A-B
A193-B16, A437-B4B, SCM435, AISI 4140
DUREHETE 1055



HEXAGON HEAD BOLT & NUT
INCONEL 718, A453-660A,
A193-B16, A437-B4B,
A193-B7, A325, A449



TAP STUD / SLOTTED NUT
SCM435, INCONEL 718, A453-660A-B,
A193-B16, A437-B4B, AISI4140,
DUREHETE 1055

COUPLING SET
SNCM 439

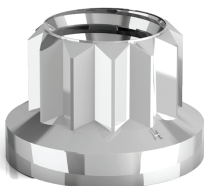


DOWEL PIN / ECCENTRIC PIN
INCONEL 718, A453-660A
A193-B16, A437-B4B

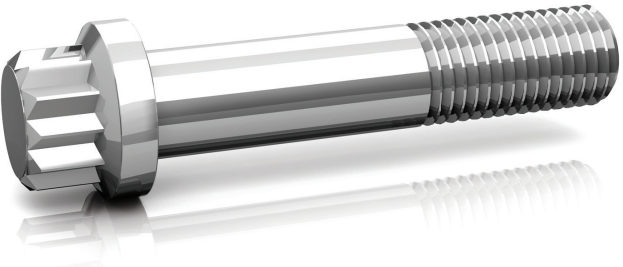
BODY BOUND STUD / ROUND NUT
INCONEL 718, A453-660A,
A193-B16, A437-B4B,
AISI 4140



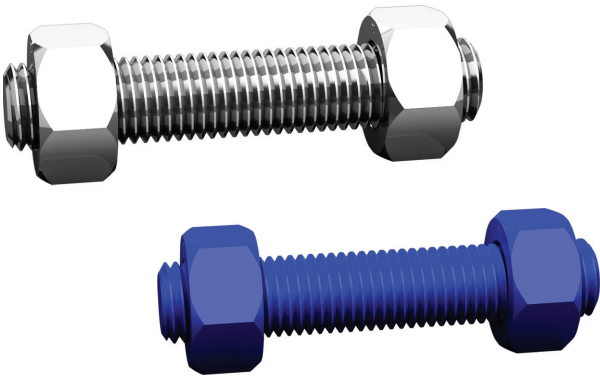
STUD BOLT
INCONEL 718, INCONEL X-750, A453-660A,
A193-B16, A437-B4B,
A193-B7, A193-B8M



12PT BOLT & NUT
INCONEL 718, A453-660A-B,
A193-B16, A437-B4B,
A193-B7, A193-B8M

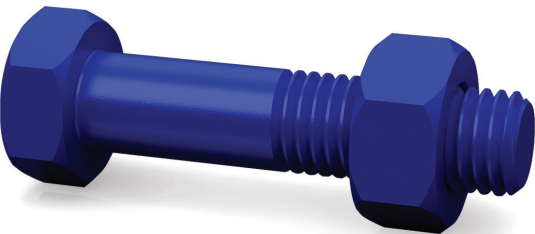
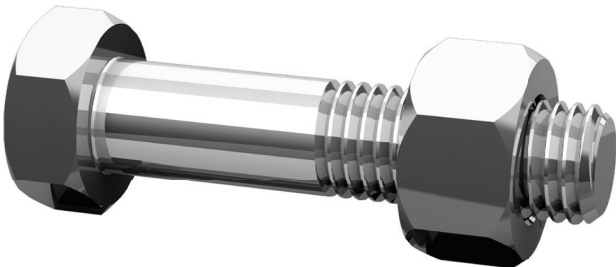


OFFSHORE & SHIPBUILDING PRODUCT

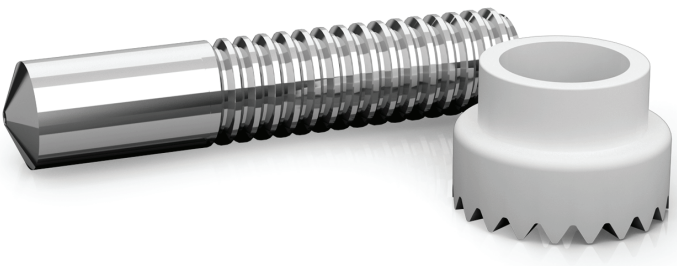


STUD BOLT & NUT
A193-B7 / B7M , A320-L7 / L7M,
A453-660, A193-B8 / B8M / B8M CL2,
INCONEL 718, INCONEL 625,
UNS S32750 / S32760,
MONEL K-400 / K-500

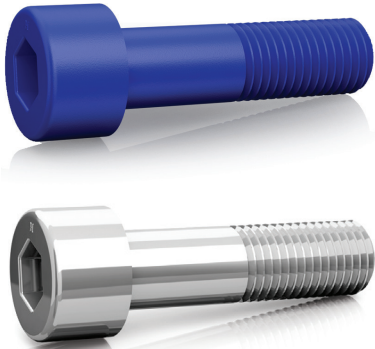
HEXAGON BOLT & NUT
A193-B7 / B8M, 10.9, A325, A453-660,
INCONEL 718, INCONEL 625,
UNS S32750 / S32760,
MONEL K-400 / K-500



**HEXAGON BOLT & NUT
PTFE COATING**
A193-B7 / B8M, 10.9, A307, A453-660,
UNS S32750 / S32760,
MONEL K-400 / K-500



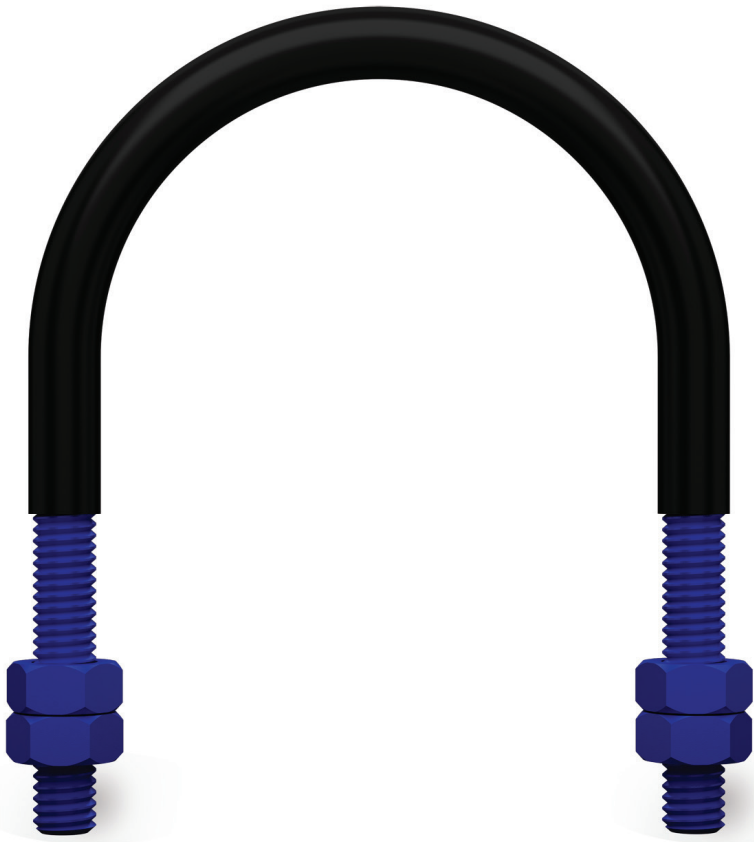
WELD STUD (DUO TYPE) & FERRULE
A108, A193-B8, SUS304L,
A276-316Ti, A276-316L / CERAMIC



HEXAGON SOCKET HEAD BOLT
A193-B7 / B16 / B8M, A437-B4B,
A453-660, INCONEL 718, INCONEL 625,
UNS S32750 / S32760, MONEL K-400 / K-500



WASHER
F436, F844, SUS304, SUS316, A453-660,
UNS S32750 / S32760



U-BOLT
A193-B7 / B8 / B8M,
A325, A320-L7, SS400,
UNS S32750 / S32760

SPECIFICATION OF PRODUCTS

DESCRIPTION	MATERIAL	DIMENSION	RANGE
HEX BOLT	A193, A320, A437, A449, A453, J429	ASME B18.2.1/ANSI B18.2.3.5M	1/4"~4"/M5~M100
HEAVY HEX BOLT	A193,A320,A437,A449,A453	ASME B18.2.1/ANSI B18.2.3.6M	3/8"~3"/M12~M36
HEX CAP SCREW	A193,A320,A437,A449,A453	ASME B18.2.1/ANSI B18.2.3.1M	1/4"~3"/M5~M100
HEAVY HEX CAP SCREW	A193,A320,A437,A449,A453,J429	ASME B18.2.1/ANSI B18.2.3.3M	3/8"~6"/M12~M36
SQUARE HEAD BOLT	A193,A307,S45C,S20C,SS400	ASME B18.2.1	1/4"~1-1/2"
HEX & HEX JAM NUT	A194,A453,A563	ASME B18.2.2/ANSI B18.2.4.1M	1/4"~4"/M1.6~M36
HEX SLOTTED NUT	A194,A563	ASME B18.2.2/ANSI B18.2.4.3M	1/4"~1-1/2"/M5~M36
HEX THICK NUT	A194,A563	ASME B18.2.2	1/4"~1-1/2"
HEAVY HEX & HEAVY HEX JAM NUT	A194,A453,A563	ASME B18.2.2/ANSI B18.2.4.6M	1/4"~4"/M12~M100
HEX COUPLING NUT	A194,A563	ASME B18.2.2	No.6~6"
HEX FLANGE SCREW	AISI4140	ASME B18.2.1/IFI536	1/4"~3/4"/M5~M16
ROUND HEAD BOLT	A193,A307	ASME B18.5	No.10~1"
TRACK BOLT	A193,A307	ANSI B18.10	1/4"~3"
STUD BOLT	A193,A307,A540,A564	ASME B18.31.2,B16.5,IFI136/IFI528	1/4"~4"/M5~M100
12POINT FLANGE SCREW	A193,A437,A453,A1014,AISI4140	IFI-115	1/4"~1-1/2"
HEX SOCKET HEAD CAP SCREW	A574,AISI4135,AISI4140	ASME B18.3/ANSI B18.3.1M	No.0~4"/M1.6~M48
HEX SOCKET SET SCREW	F912	ASME B18.3/ANSI B18.3.6M	No.0~2"/M1.6~M24
HEX SOCKET C.S HEAD CAP SCREW	F835,AISI4140	ANSI B18.3.4M	M3~M20
HEAVY HEX STRUCTURAL BOLT	A325,A354,A490	ASME B18.2.6/ANSI B18.2.3.7M	1/2"~1-1/2"/M16~M36
U-BOLT	A193,A325,SS400	JIS F3022	3/8"([10A]~32"([800A])
ANCHOR BOLT	A36,A307,A540,SF440,S45C, S20C,SS400	JIS B1178	1/2"([M12]~5"([M125])
T-HEAD BOLT	A36,SF440,S45C,S20C,SS400	DIN7992	1/2"~4"
EYE BOLT	A489,S45C,S20C,SS400	ANSI B18.15	1/4"~2-1/2"
FLAT HEAD SCREW	A193,A307	ASME B18.6.3/JIS B1176	No.0~3/4"
WASHER PLAIN	A240,F436,F844	ASME B18.21.1/ANSI B18.22M	No.0~3"/M1.6~M36
HARDENED WASHER	F436M	IFI542	M12~M100
WASHER SPRING	A510,A580,SWRH	ASME B18.21.1/IFI532/JIS B1251	No.2~3"/M2.2~M30
WASHER SQUIRE	F436,S45C,SS400	IFI534	1/2"~1-1/2"/M12~M36
PLUG	A105,A182,A350	ANSI B16.11	1/8"~4"
LOCKING NUT	A194,A563,A453,AISI4140	IFI100/107/ISO2320	No.4~1-1/2"/M8~M39

HOT-DIP GALVANIZED COATING	MATERIAL
ASTM A123	IRON AND STEEL PRODUCT
ASTM A153	IRON AND STEEL HARDWARE
ISO 10684	FASTENER
ELECTRO-DEPOSITED COATING	
ASTM B633	ZINC
ASTM B766	CADMIUM
ISO 2081	ZINC
ASTM B841	ZN+NI
NON-ELECTRONICALLY ZINC FLAKE COATION	
ISO 10683	ZINC
ZINC PHOSPHATE COATIN	
ASTM F1137	ZN/MN
ISO 11408	ZN/MN
PTFE(FLUOROPOLYMER COATING)	
XYLAN 1070	BLUE, GREEN, ORANGE, YELLOW, BLACK, GREY
XYLAN 1052	BLUE, GREEN, ORANGE, YELLOW, BLACK, WHITE
XYLAN 1014	BLUE, GREEN, ORANGE, YELLOW, BLACK, RED
XYLAN 1424	BLUE, GREEN, ORANGE, YELLOW, BLACK
XYLAN STD	BLUE, GREEN, ORANGE, YELLOW, BLACK
XYLAR 2 / XYLAN 1424	BLUE, GREEN, ORANGE, YELLOW, BLACK
SERMAGARD 1105 / 1280	SILVER

STAINLESS STEE

Martensitic	403, 410, 410S, 410JI, 416, 420JI, 420J2, 420F, 431, 440A, 440B, 440C
Ferritic	405, 429, 430, 430F, 434
Austenitic	201, 202, 301, 302, 303, 303Se, 304, 304L, 304N1, 304N2, 305, 305J1, 309S 310S, 316, 316N, 316L, 316JI, 316JIL, 317, 317L, 321, 347, 384, XM7, XM15JI, 329JI

NICKEL ALLOYS

ALLOY	UNS	ASTM	WERKSTOFF	DIN	CHEMICAL COMPOSITION, %
ALLOY B2 -HASTELLOY C276	N10276	B574/B622	2.4819	NiMo16Cr15W	Ni57,Cr16,Mo16,Fe5,W4
ALLOY A286 -INCOLOY A286	S66286	A453	1.4890	-	Ni25.5,Cr15,Mo1.25,Ti2.2
ALLOY 400 -MONEL 400	N04400	B164	2.4360	NiCu30Fe	Ni66,Cu31,Fe1.5,Mn1
ALLOY K500 -MONEL K500	N05500	B865	2.4375	NiCu30Al	Ni65,Cu30,Al2.7,Fe1.5,Mn1,Ti0.6
ALLOY 600 -INCONEL 600	N06600	B166/B564	2.4816	NiCr15Fe	Ni75,Cr15.5,Fe8
ALLOY 625 -INCONEL 625	N06625	B446/B564	2.4856	NiCr22Mo9Nb	Ni62,Cr22,Mo9,Nb3.5,Fe2.5
ALLOY 80A -NIMONIC 80A	N07080	B637	2.4952	NiCr20TiAl	Ni76,Cr30,Ti2.3,Al1.4
ALLOY 718 -INCONEL 718	N07718	A1014/B637	2.4668	NiCr19NbMo	Ni54,Fe17,Cr19,Nb5,Mo3,Ti1,Al0.5
ALLOY X750 -INCONEL 750	N07750	B637	2.4669	NiCr15Fe7TiAl	Ni72,Cr15.5,Fe7,Ti25,Nb1
ALLOY 800 -INCOLOY 800	N08800	B407/B408/B564	1.4876	X10NiCrAlTi32.20	Fe46,Ni32,Cr21,Al+Ti0.7
ALLOY 800H -INCOLOY 800H	N08810	B407/B408/B564	1.4958	X10NiCrAlTi32.20	Ni32.5,Cr21,Cu0.5,Ti0.38,Al0.38
ALLOY 825 -INCOLOY 825	N08825	B423/B425/B564	2.4858	NiCr21Mo	Ni42,Fe28,Cr21.5,Mo3,Cu2,Ti0.9
ALLOY 904L	N08904	A182/B649	1.4539	X1NiCrMoCuN25.20.5	Fe47,Ni25,Cr20,Mo4.8,Cu1.5

DUPLEX ALLOYS

ALLOY	UNS	ASTM	WERKSTOFF	DIN	CHEMICAL COMPOSITION, %
ALLOY 2205 -DUPLEX 2205	S31803/ S32205	A182/A276/A479	1.4462	X2CrNiMoN22.5.3	Cr22,Ni5.5,Mo3,Mn2
ALLOY 2507-25Cr	S32750	A182/A276/A479	1.4410	X2CrNiMoN25.7.4	Cr25,Ni7,Mo4,Mn1.2,Cu0.5
ALLOY 2507-25Cr	S32760	A182/A276/A479	1.4501	X2CrNiMoCu- WN25.7.4	Cr25,Ni7,Mo3.5,Mn1,Cu0.75,W0.75

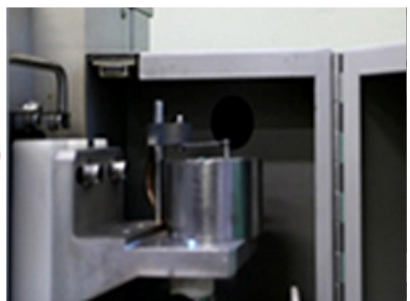
6%-MOLY

ALLOY	UNS	ASTM	WERKSTOFF	DIN	CHEMICAL COMPOSITION, %
6-MOLY	N08925	B649	1.4529	X1NiCrMoCuN25.20.6	Ni25,Cr20,Mo6.5,Mn1
6-MOLY	N08926	B649	1.4529	X1NiCrMoCuN25.20.6	Ni25,Cr20,Mo6.5Mn2
6-MOLY	N08367	A182/A276/A479/B688	1.4529	X1NiCrMoCuN25.20.6	Ni24.5,Cr21,Mo6.5,Mn2
254SMO	S31254	A182/A276/A479	1.4547	-	Cr20,Ni18,Mo6.25,Mn1

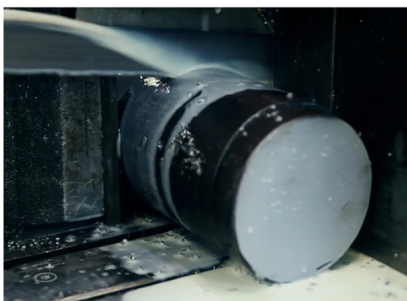
MANUFACTURING PROCESS



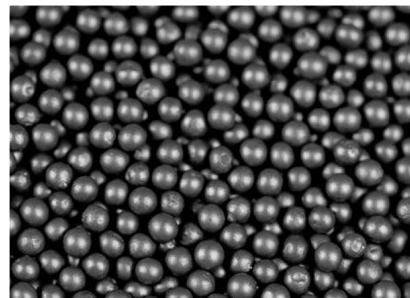
Raw Material
Material Vertification
Mill Cert Review & Tag Check



Chemical Analysis
Composition Comparison
Spectrometer / PMI



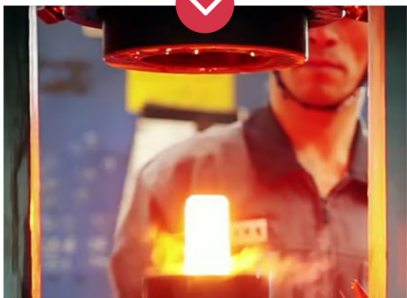
Cutting
Dia & Length Check



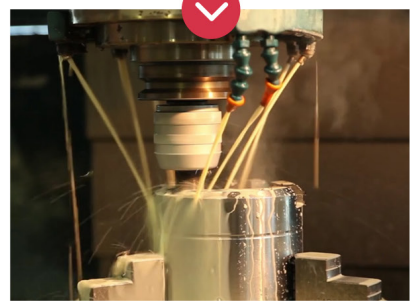
Shot Blast
Scale Remove



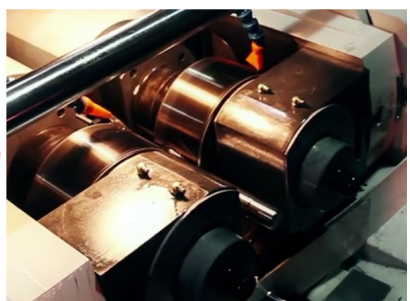
Heat Treatment
Temp & Hardness
Mechanical Test



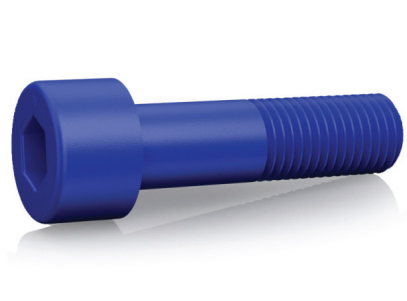
Hot Forging
Dimension & Visual Check



Machining
Dimension & Tolerance



Rolling
Ring Gauge Check



Coating
Color & Thickness
Corrosion Test



Shipping
Prevent Damage

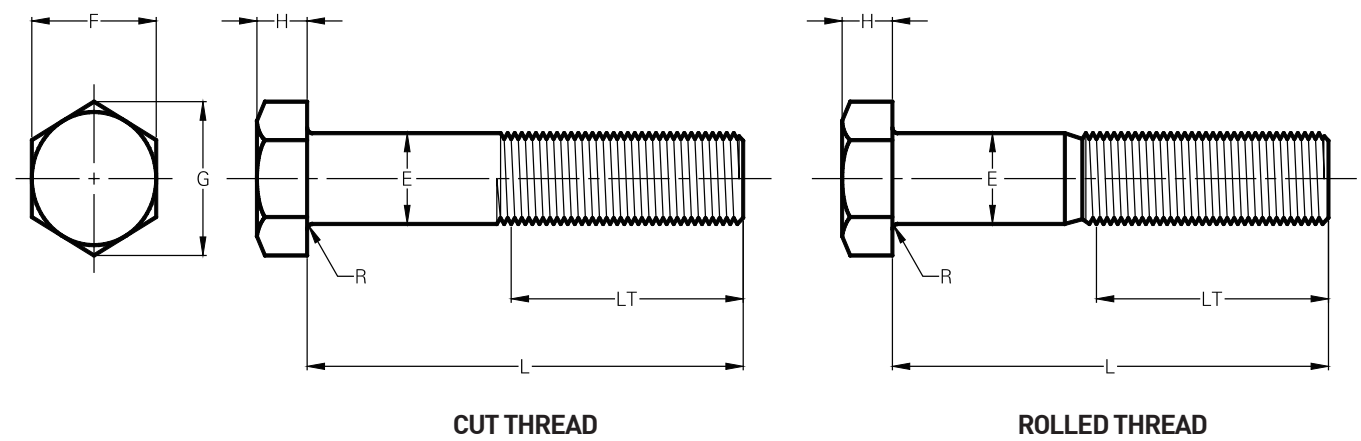


Packing
Preservation & Quantity Check



Inspection
Final Dimension Check
Certificate Issue

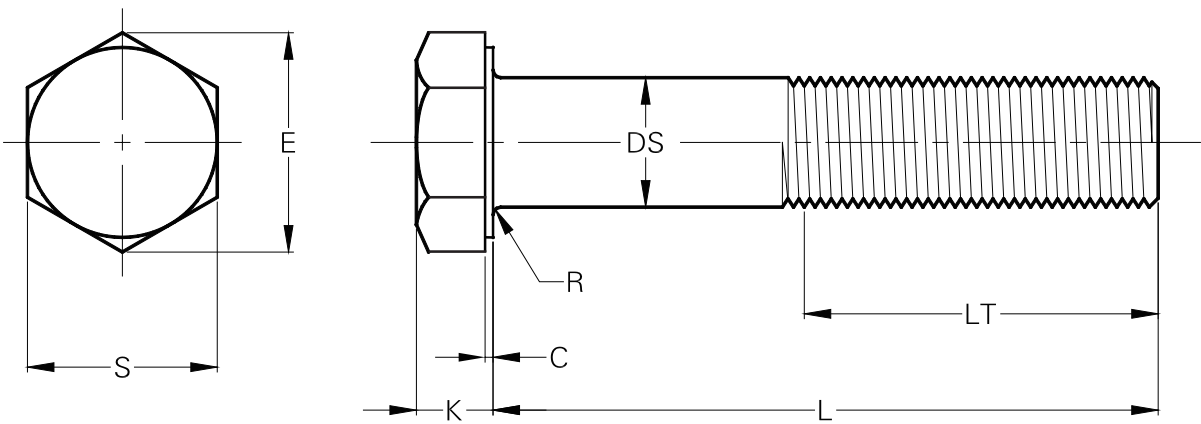
HEXAGON HEAD BOLT INCH THREAD



ANSI B18.2.1

Nominal Size	E		F		G		H		R		LT	
	Body Dia		Across Flats		Across Corners		Height		Radius of Fillet		Thread Length for Bolt Lengths	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	6" and Shorter	Over 6"
1/4	6.60	6.02	11.12	10.80	12.82	12.30	4.77	3.81			19.05	25.40
5/16	8.23	7.57	12.70	12.30	14.65	14.03	5.96	4.96			22.23	28.58
3/8	9.85	9.15	14.27	13.82	16.51	15.75	6.80	5.75	0.76	0.26	25.40	31.75
7/16	11.48	10.70	15.87	15.32	18.33	17.45	8.02	6.91			28.58	34.93
1/2	13.08	12.25	19.05	18.42	21.99	20.99	9.24	7.68			31.75	38.10
5/8	16.30	15.37	23.82	23.02	27.50	26.24	11.27	9.61			38.10	44.45
3/4	19.50	18.52	28.57	27.64	32.99	31.50	13.30	11.56	1.52	0.51	44.45	50.80
7/8	22.73	21.65	33.32	32.24	38.50	36.76	15.34	13.49			50.80	57.15
1	25.95	24.79	38.10	36.83	43.99	41.99	17.78	15.02			57.15	63.50
1 1/8	29.18	27.89	42.87	41.43	49.50	47.22	19.81	16.72			63.50	69.85
1 1/4	32.43	31.07	47.62	46.03	57.99	52.48	22.25	19.03	2.28	0.77	69.85	76.20
1 3/8	35.66	34.17	52.37	50.65	60.50	57.74	23.87	20.58			76.20	82.55
1 1/2	38.88	37.34	57.15	55.25	65.98	63.00	26.31	22.92			82.55	88.90
1 5/8	42.11	40.42	61.92	59.85	71.50	66.45	28.34	24.85			88.90	95.25
1 3/4	45.33	43.59	66.67	64.47	76.98	73.49	30.37	26.78			95.25	101.60
1 7/8	48.56	46.72	71.42	69.07	82.49	78.72	32.41	28.71	304	1.02	101.60	107.95
2	51.79	49.89	76.20	73.66	87.98	83.98	35.25	29.85			107.95	114.30
2 1/4	58.54	56.24	85.72	82.86	98.98	94.47	39.31	33.71			120.65	127.00
2 1/2	64.99	62.51	95.25	92.08	109.98	104.98	43.38	37.57			133.35	139.70
2 3/4	71.80	68.86	104.77	101.30	120.98	115.47	47.47	41.46			146.05	152.40
3	78.25	75.21	114.30	110.49	131.97	125.96	52.32	46.11	4.82	1.53	158.75	165.10
3 1/4	84.70	81.54	123.82	119.69	142.97	136.45	57.17	49.18			171.45	177.80
3 1/2	91.16	87.91	133.35	128.91	153.97	146.97	60.45	52.25			184.15	190.50
3 3/4	97.99	94.64	142.87	138.10	164.97	157.43	65.32	56.93			196.85	203.20
4	104.41	100.97	152.40	147.32	175.97	167.95	70.20	61.57			209.55	215.90

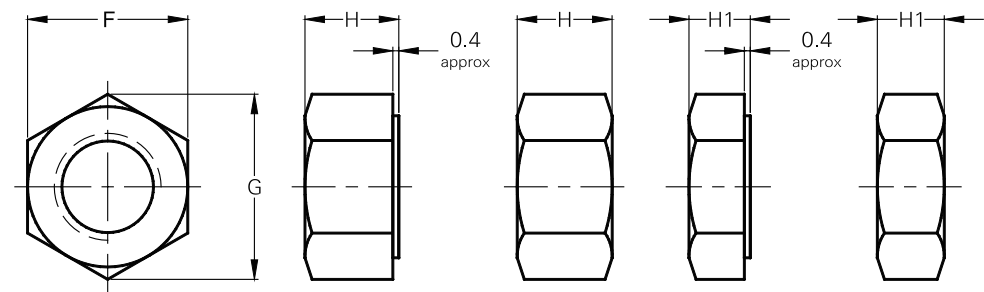
HEXAGON HEAD BOLT METRIC THREAD



ISO 4014

Nominal Size	C		DS		E	K		R	S		LT		
	Max	Min	Max	Min	Min	Max	Min	Min	Max	Min	≤125	125<L ≤125	>200
M6	0.50	0.15	6.00	5.82	11.05	4.15	3.85	0.25	10.00	9.78	18	24	37
M8	0.60	0.15	8.00	7.78	14.38	5.45	5.15	0.40	13.00	12.73	22	28	41
M10	0.60	0.15	10.00	9.78	17.77	6.58	6.22		16.00	15.73	26	32	45
M12	0.60	0.15	12.00	11.73	20.03	7.68	7.32		18.00	17.73	30	36	49
M14	0.60	0.15	14.00	13.73	23.36	8.98	8.62	0.60	21.00	20.67	34	40	53
M16	0.80	0.20	16.00	15.73	26.75	10.18	9.82		24.00	23.67	38	44	57
M18	0.80	0.20	18.00	17.73	30.14	11.715	11.285		27.00	26.67	42	48	61
M20	0.80	0.20	20.00	19.67	33.53	12.715	12.285	0.80	30.00	29.67	46	52	65
M22	0.80	0.20	22.00	21.67	37.72	14.215	13.785		34.00	33.38	50	56	69
M24	0.80	0.20	24.00	23.67	39.98	15.215	14.785		36.00	35.38	54	60	73
M27	0.80	0.20	27.00	26.48	45.20	17.35	16.65	1.00	41.00	40.00	60	66	79
M30	0.80	0.20	30.00	29.48	50.85	19.12	18.28		46.00	45.00	66	72	85
M33	0.80	0.20	33.00	32.38	55.37	21.42	20.58		50.00	49.00	-	78	91
M36	0.80	0.20	36.00	35.38	60.79	22.92	22.08	1.20	55.00	53.80	-	84	97
M39	1.00	0.30	39.00	38.38	66.44	25.42	24.58		60.00	58.80	-	90	103
M42	1.00	0.30	42.00	41.38	71.30	26.42	25.58		65.00	63.10	-	96	109
M45	1.00	0.30	45.00	44.38	76.95	28.42	27.58	1.60	70.00	68.10	-	102	115
M48	1.00	0.30	48.00	47.38	82.60	30.42	29.58		75.00	73.10	-	108	121
M52	1.00	0.30	52.00	51.26	88.25	33.50	32.50		80.00	78.10	-	116	129
M56	1.00	0.30	56.00	55.26	93.56	35.50	34.50	2.00	85.00	82.80	-	-	137
M60	1.00	0.30	60.00	59.26	99.21	38.50	37.50		90.00	87.80	-	-	145
M64	1.00	0.30	64.00	63.26	104.86	40.50	39.50		95.00	92.80	-	-	153

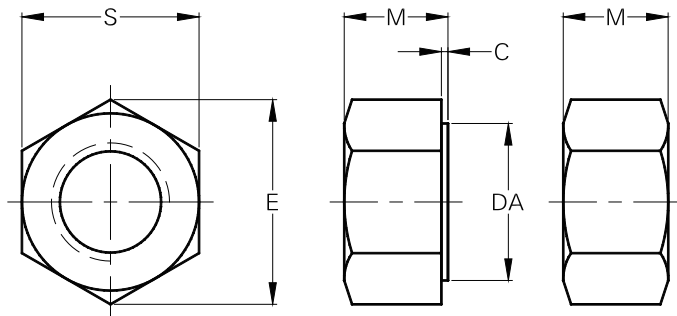
HEXAGON NUT INCH THREAD



ANSI B 18.2.2

Nominal Size	F		G		H		H1	
	Width Across Flats		Width Across Corners		Thickness Hex Nut		Thickness Jam Nut	
	Max	Min	Max	Min	Max	Min	Max	Min
1/4"	11.12	10.88	12.82	12.40	5.74	5.39	4.14	3.81
5/16"	12.70	12.43	14.65	14.15	6.93	6.56	4.95	4.58
3/8"	14.30	14.00	16.51	15.96	8.55	8.13	5.76	5.34
7/16"	17.47	17.15	20.16	19.51	9.77	9.28	6.60	6.10
1/2"	19.05	18.70	21.99	21.34	11.37	10.85	8.20	7.68
9/16"	22.22	21.87	25.65	24.95	12.59	12.02	8.22	7.65
5/8"	23.82	23.42	27.50	26.70	14.19	13.59	9.82	9.23
3/4"	28.57	27.64	32.99	31.50	16.89	15.68	11.32	10.11
7/8"	33.32	32.24	38.50	36.76	19.71	18.39	12.95	11.64
1.0"	38.10	36.83	43.99	41.99	22.52	21.11	14.60	13.19
1 1/8"	42.87	41.43	49.50	47.22	25.37	23.86	16.23	14.71
1 1/4"	47.62	46.03	54.99	52.48	27.78	26.17	19.07	17.45
1 3/8"	52.37	50.65	60.50	57.74	30.63	28.91	20.70	18.98
1 1/2"	57.15	55.25	65.98	63.00	33.45	31.63	22.35	20.53
1 5/8"	61.72	59.69	71.24	68.05	35.96	34.65	23.97	22.05
1 3/8"	66.67	64.47	76.98	73.49	39.11	37.09	25.62	23.60
1 7/8"	71.45	69.14	82.47	78.82	41.93	39.81	27.25	25.13
2.0"	76.20	73.66	87.98	83.98	44.78	42.55	28.90	26.67
2 1/4"	85.72	82.89	98.98	94.47	50.44	48.01	32.18	29.34
2 1/2"	95.25	92.08	109.98	104.98	56.10	53.47	36.24	35.59
2 3/4"	104.77	101.30	120.98	115.47	61.74	58.91	39.52	38.66
3.0"	114.30	110.49	131.97	125.96	67.41	64.37	42.79	41.74
3 1/4"	123.82	119.72	142.97	136.48	73.07	69.83	46.07	44.40
3 1/2"	133.35	128.91	153.97	146.97	78.74	75.29	49.35	47.50
3 3/4"	142.87	138.13	164.97	157.46	84.37	80.73	52.62	50.55
4.0"	152.40	147.32	175.97	167.95	90.04	86.19	55.90	53.65

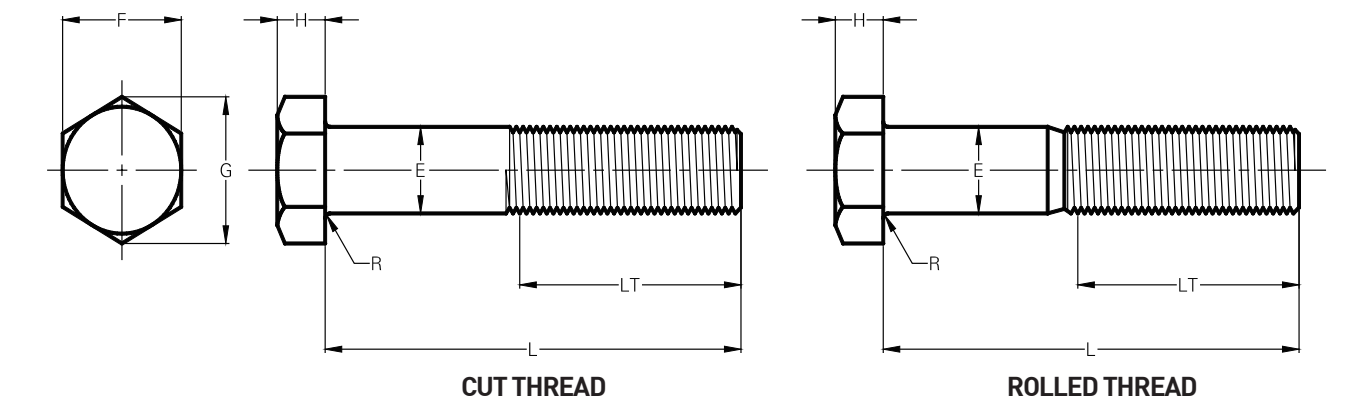
HEXAGON NUT METRIC THREAD



ISO 4032

Nominal Size	C		DA		E	M		S	
	Max	Min	Max	Min	Min	Max	Min	Max	Min
M6	0.50	0.15	6.75	6.00	11.05	5.20	4.90	10.00	9.78
M8	0.60	0.15	8.75	8.00	14.38	6.80	6.44	13.00	12.73
M10	0.60	0.15	10.80	10.00	17.77	8.40	8.04	16.00	15.73
M12	0.60	0.15	13.00	12.00	20.03	10.80	10.37	18.00	17.73
M14	0.60	0.15	15.10	14.00	23.36	12.80	12.10	21.00	20.67
M16	0.80	0.20	17.30	16.00	26.75	14.80	14.10	24.00	23.67
M18	0.80	0.20	19.50	18.00	29.56	15.80	15.10	27.00	26.16
M20	0.80	0.20	21.60	20.00	32.95	18.00	16.90	30.00	29.16
M22	0.80	0.20	23.70	22.00	37.29	19.40	18.10	34.00	33.00
M24	0.80	0.20	25.90	24.00	39.55	21.50	20.20	36.00	35.00
M27	0.80	0.20	29.10	27.00	45.20	23.80	22.50	41.00	40.00
M30	0.80	0.20	32.40	30.00	50.85	25.60	24.30	46.00	45.00
M33	0.80	0.20	35.60	33.00	55.37	28.70	27.40	50.00	49.00
M36	0.80	0.20	38.90	36.00	60.79	31.00	29.40	55.00	53.80
M39	1.00	0.30	42.10	39.00	66.44	33.40	31.80	60.00	58.80
M42	1.00	0.30	45.40	42.00	71.30	34.00	32.40	65.00	63.10
M45	1.00	0.30	48.60	45.00	76.95	36.00	34.40	70.00	68.10
M48	1.00	0.30	51.80	48.00	82.60	38.00	36.40	75.00	73.10
M52	1.00	0.30	56.20	52.00	88.25	42.00	40.40	80.00	78.10
M56	1.00	0.30	60.50	56.00	93.56	45.00	43.40	85.00	82.80
M60	1.00	0.30	64.80	60.00	99.21	48.00	46.40	90.00	87.80
M64	1.00	0.30	69.10	64.00	104.86	51.00	49.10	95.00	92.80

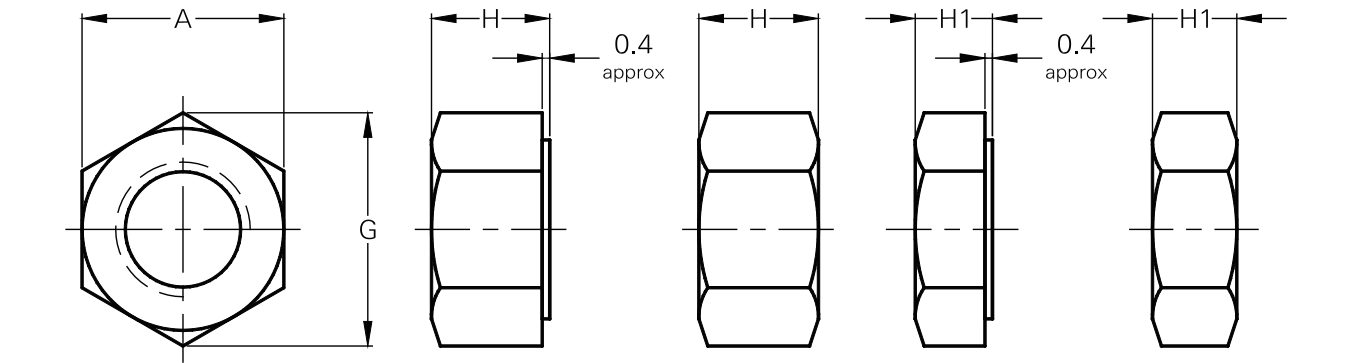
HEAVY HEXAGON BOLT INCH THREAD



ANSI B 18.2.1

Nominal Size	E		F		G		H		R		S	
	Body Dia		Width Across Flats		Width Across Corners		Height		Radius of Fillet		Thread Length for Bolt Lengths	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	6" and shorter Nom	Over 6" Nom
3/8	9.85	9.15	17.47	17.00	20.16	19.39	6.80	5.75	0.76	0.26	25.40	31.75
1/2	13.08	12.25	22.22	21.59	25.65	24.62	9.24	7.68			31.75	38.10
5/8	16.30	15.37	26.97	26.19	31.16	29.85	11.27	9.61			38.10	44.45
3/4	19.50	18.52	31.75	30.79	36.65	35.13	13.30	11.56	1.52	0.51	44.45	50.80
7/8	22.73	21.65	36.52	35.41	42.16	40.37	15.34	13.49			50.80	57.15
1	25.95	24.79	41.27	40.01	47.65	45.62	17.78	15.02			57.15	63.50
1 1/8	29.18	27.89	46.02	44.61	53.16	50.86	19.81	16.72	2.28	0.77	63.50	69.85
1 1/4	32.43	31.07	50.80	49.23	58.64	56.11	22.25	19.03			69.85	76.20
1 3/8	35.66	34.17	55.57	53.83	64.16	61.37	23.87	20.58			76.20	82.55
1 1/2	38.88	37.34	60.32	58.42	69.64	66.60	26.31	22.92	3.04	1.02	82.55	88.90
1 5/8	42.11	40.42	65.07	63.02	75.15	71.86	28.34	24.85			88.9	95.25
1 3/4	45.33	43.59	69.85	67.62	80.64	77.09	30.37	26.78			95.25	101.60
1 7/8	48.56	46.72	74.62	72.24	86.15	82.35	32.41	28.71	4.82	1.53	101.60	107.95
2	51.79	49.89	79.37	76.84	91.64	87.61	35.25	29.85			107.95	114.30
2 1/4	58.54	56.24	88.90	86.06	102.64	98.10	39.31	33.71			120.65	127
2 1/2	64.99	62.51	98.42	95.25	113.63	108.59	43.38	37.57	4.82	1.53	133.35	139.70
2 3/4	71.80	68.86	107.95	104.45	124.63	119.08	47.47	41.46			146.05	152.4
3	78.25	75.21	117.47	113.67	135.63	129.60	52.32	46.11			158.75	165.10

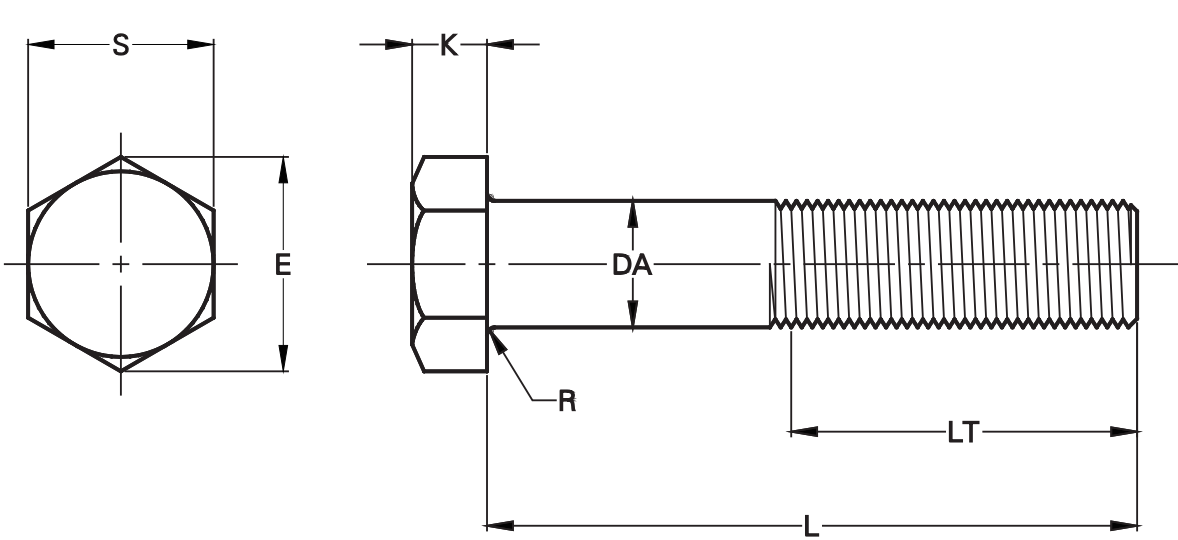
HEAVY HEXAGON NUT INCH THREAD



ANSI B 18.2.2

Nominal Size	A		G		H		H1	
	Width Across Flats		Width Across Corners		Thickness Hex Nut		Thickness Jam Nut	
	Max	Min	Max	Min	Max	Min	Max	Min
1/4"	12.70	12.40	14.65	14.13	6.35	5.54	4.77	3.97
5/16"	14.27	13.87	16.51	15.80	7.97	7.12	5.58	4.73
3/8"	17.47	17	20.16	19.39	9.57	8.67	6.40	5.49
7/16"	19.05	18.50	21.99	21.09	11.20	10.24	7.23	6.28
1/2"	22.22	21.59	25.65	24.62	12.80	11.79	8.05	7.04
9/16"	23.82	23.09	27.50	26.34	14.42	13.36	8.86	7.80
5/8"	26.97	26.19	31.16	29.85	16.02	14.91	9.67	8.56
3/4"	31.75	30.79	36.65	35.11	19.25	18.04	11.32	10.11
7/8"	36.52	35.41	42.16	40.37	22.47	21.16	12.95	11.64
1.0"	41.27	40.01	47.65	45.62	25.70	24.29	14.6	13.19
1 1/8"	46.02	44.61	53.16	50.86	28.93	27.41	16.23	14.71
1 1/4"	50.80	49.23	58.64	56.11	31.77	30.15	19.07	17.45
1 3/8"	55.57	53.83	64.16	61.37	35.00	33.28	20.70	18.98
1 1/2"	60.32	58.42	69.64	66.60	38.22	36.40	22.35	20.53
1 5/8"	65.07	63.02	75.15	71.84	41.45	39.53	23.97	22.05
1 3/4"	69.85	67.62	80.64	77.09	44.67	42.65	25.62	23.60
1 7/8"	74.62	72.24	86.15	82.35	47.90	45.78	27.25	25.13
2.0"	79.37	76.84	91.64	87.61	51.13	48.90	28.90	26.67
2 1/4"	88.9	86.06	102.64	98.10	57.17	54.74	31.77	29.34
2 1/2"	98.42	95.25	113.63	108.60	63.62	60.99	38.22	35.59
2 3/4"	107.95	104.45	124.63	119.08	70.07	67.24	41.50	38.66
3.0"	117.47	113.67	135.63	129.60	76.53	73.49	44.78	41.74
3 1/4"	127	122.89	146.65	140.09	82.60	79.35	47.65	44.40
3 1/2"	136.52	132.08	157.65	150.58	89.05	85.6	50.95	47.50
3 3/4"	146.05	141.28	168.65	161.07	95.50	91.85	54.20	50.55
4"	155.57	150.50	179.65	171.58	101.95	98.10	57.50	53.65

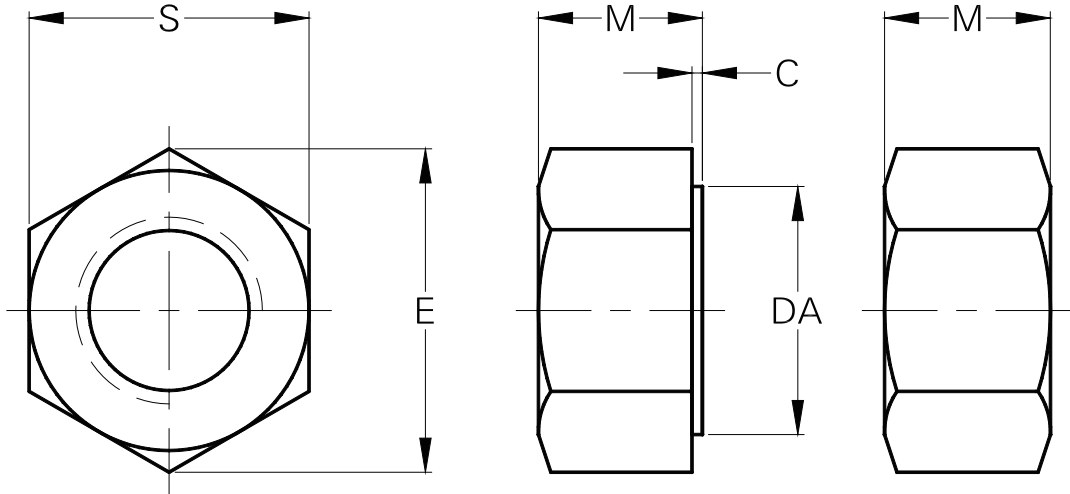
HEAVY HEXAGON BOLT METRIC THREAD



ANSI B 18.2.3.6 M

Nominal Size	DA		S		E		K		R	LT		
	Max	Min	Max	Min	Max	Min	Max	Min	Min	≤125	125<L≤200	>200
M12X1.75P	12.70	11.30	21.00	20.16	24.25	22.78	7.95	7.24		30	36	49
M14X2P	14.70	13.30	24.00	23.16	27.71	26.17	9.25	8.51	0.6	34	40	53
M16X2P	16.70	15.30	27.00	26.16	31.18	29.56	10.75	9.68		38	44	57
M20X2.5P	20.84	19.16	34.00	33.00	39.26	37.29	13.40	12.12	0.8	46	52	65
M24X3P	24.84	23.16	41.00	40.00	47.34	45.20	15.90	14.56		54	60	73
M30X3.5P	30.84	29.16	50.00	49.00	57.74	55.37	19.75	17.92	1.0	66	72	85
M36X4P	37.00	35.00	60.00	58.80	69.28	66.44	23.55	21.72		78	84	97

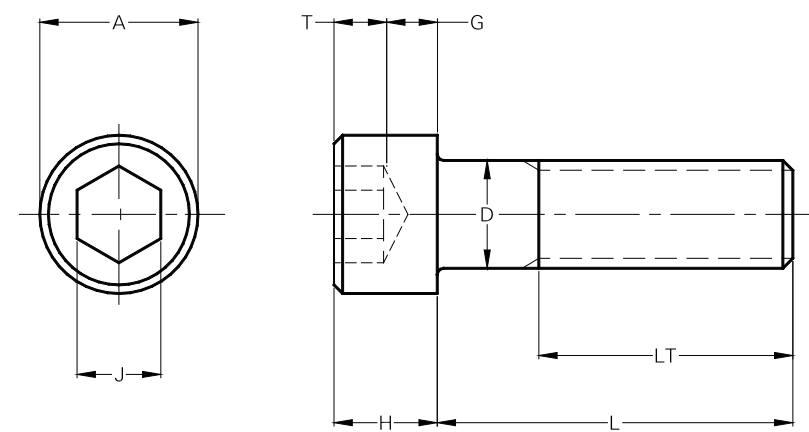
HEAVY HEXAGON NUT METRIC THREAD



ANSI B 18.2.4.6 M

Nominal Size	F		E		H		DA	C	
	Width Across Flats		Width Across Corners		Thickness Hex Nut		Bearing Face Dia	Washer Face Thickness	
	Max	Min	Max	Min	Max	Min	Min	Max	Min
M12X1.75P	21.00	20.16	24.25	22.78	12.3	11.9	19.2	0.8	0.4
M14X2P	24.00	23.16	27.71	26.17	14.3	13.6	22.0	0.8	0.4
M16X2P	27.00	26.16	31.18	29.56	17.1	16.4	24.9	0.8	0.4
M20X2.5P	34.00	33.00	33.26	37.29	20.7	19.4	31.4	0.8	0.4
M22X2.5P	35.00	35.00	41.57	39.55	23.6	22.3	33.3	0.8	0.4
M24X3P	41.00	40.00	47.34	45.20	24.2	22.9	38.0	0.8	0.4
M27X3P	46.00	45.00	53.12	50.85	27.6	26.3	42.8	0.8	0.4
M30X3.5P	50.00	49.00	57.74	55.37	30.7	29.1	46.6	0.8	0.4
M36X4P	60.00	58.80	69.28	66.44	36.6	35.0	55.9	0.8	0.4
M42X4.5P	70.00	67.90	80.83	77.41	42.0	40.4	64.5	1.0	0.5
M48X5P	80.00	77.60	92.38	88.46	48.0	46.4	73.7	1.0	0.5
M56X5.5P	90.00	87.20	103.92	99.41	56.0	54.1	82.8	1.0	0.5
M64X6P	100.00	95.30	116.47	110.35	64.0	62.1	92.0	1.0	0.5
M72X6P	110.00	106.40	127.02	121.30	72.0	70.1	101.1	1.2	0.6
M80X6P	120.00	115.00	138.56	132.24	80.0	78.1	110.2	1.2	0.6
M90X6P	135.00	130.50	135.88	148.77	90.0	87.8	124.0	1.2	0.6
M100X6P	150.00	145.00	173.21	165.30	100.00	97.8	137.80	1.2	0.6

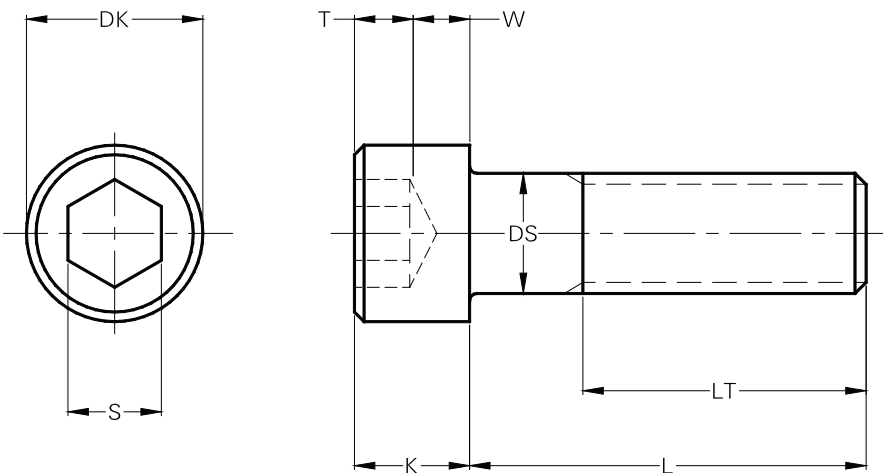
HEXAGON SOCKET HEAD CAP SCREW INCH THREAD



ANSI B 18.3

Nominal Size	D		A		H		J	T	G	LT
	Body Dia		Across Flats		Height		Hexagon Socket Size	Key Engagement	Wall Thickness	Thread Length for Bolt Lengths
	Max	Min	Max	Min	Max	Min	Nom	Min	Min	Min
1/4	6.35	6.19	9.52	9.28	6.35	6.20	4.78	3.05	2.42	25.40
5/16	7.93	7.76	11.91	11.61	7.92	7.78	6.35	3.84	3.03	28.45
3/8	9.52	9.35	14.27	13.97	9.52	9.35	7.92	4.63	3.64	31.75
7/16	11.11	10.91	16.66	16.31	11.12	10.93	9.53	5.41	4.22	35.06
1/2	12.70	12.50	19.05	18.67	12.70	12.50	9.53	6.23	4.83	38.10
5/8	15.87	15.66	23.82	23.40	15.87	15.65	12.70	7.80	6.05	44.45
3/4	19.05	18.82	28.57	28.12	19.05	18.80	15.88	9.40	7.24	50.80
7/8	22.22	21.97	33.32	32.85	22.22	21.95	19.05	10.98	8.46	57.15
1	25.40	25.11	38.10	37.57	25.40	25.10	19.05	12.58	9.66	63.50
1 1/8	28.57	28.16	42.87	42.30	28.57	28.22	22.23	14.15	10.88	71.38
1 1/4	31.75	31.34	47.62	47.05	31.75	31.40	22.23	15.75	12.07	79.25
1 3/8	34.92	34.47	52.37	51.77	34.92	34.55	25.40	17.33	13.29	87.38
1 1/2	38.10	37.64	57.15	56.49	38.10	37.72	25.40	18.93	14.48	95.25
1 3/4	44.45	43.94	66.67	65.97	44.45	44.05	31.75	22.10	16.90	111.26
2	50.80	50.25	76.20	75.44	50.80	50.37	38.10	25.28	19.31	127.00
2 1/4	57.15	56.60	85.72	84.94	57.15	56.70	44.45	28.45	21.72	142.75
2 1/2	63.50	62.90	95.25	94.42	63.50	63.02	44.45	31.63	24.13	158.75
2 3/4	69.85	69.25	104.77	103.89	69.85	69.35	50.80	34.80	26.55	174.76
3	76.20	75.60	114.30	113.39	76.20	75.67	57.15	37.98	28.96	190.50
3 1/4	82.55	81.95	123.82	122.86	82.55	82.00	57.15	41.15	31.37	206.25
3 1/2	88.90	88.30	133.35	132.36	88.90	88.35	69.85	44.33	33.79	222.25
3 3/4	95.25	94.65	142.87	141.84	95.25	94.67	69.85	47.50	36.20	238.26
4	101.60	101.00	152.40	151.34	101.60	101.00	76.20	50.68	38.61	254.00

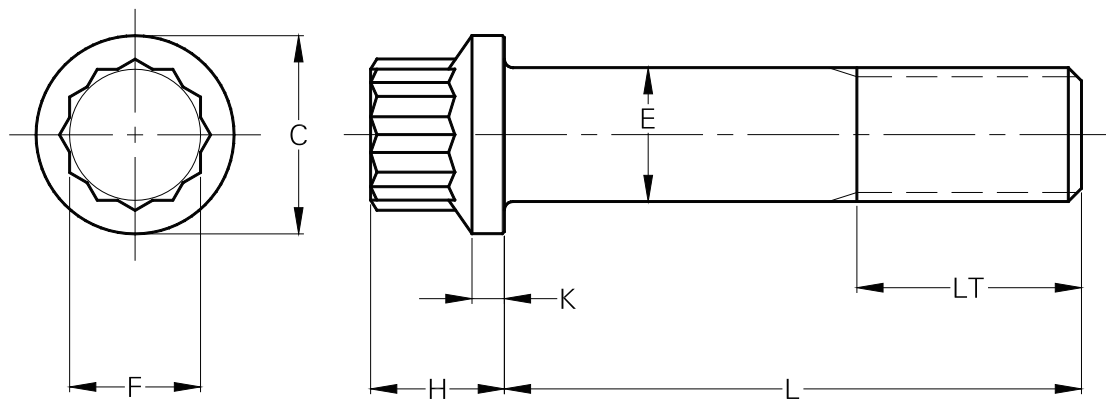
HEXAGON SOCKET HEAD CAP SCREW METRIC THREAD



ISO 4762

Nominal Size	DK		DS		K		S	T	W	LT
	Max	Min	Max	Min	Max	Min	Nom	Min	Min	Ref
M6	10.00	9.78	6.00	5.82	6.00	5.70	5.00	3.00	2.3	24
M8	13.00	12.73	8.00	7.78	8.00	7.64	6.00	4.00	3.3	28
M10	16.00	15.73	10.00	9.78	10.00	9.64	8.00	5.00	4.0	32
M12	18.00	17.73	12.00	11.73	12.00	11.57	10.00	6.00	4.8	36
M14	21.00	20.67	14.00	13.73	14.00	13.57	12.00	7.00	5.8	40
M16	24.00	23.67	16.00	15.73	16.00	15.57	14.00	8.00	6.8	44
M20	30.00	29.67	20.00	19.67	20.00	19.48	17.00	10.00	8.6	52
M24	36.00	35.61	24.00	23.67	24.00	23.48	19.00	12.00	10.4	60
M30	45.00	44.61	30.00	29.67	30.00	29.48	22.00	15.50	13.1	72
M36	54.00	53.54	36.00	35.61	36.00	35.38	27.00	19.00	15.3	84
M42	63.00	62.54	42.00	41.61	42.00	41.38	32.00	24.00	16.3	96
M48	72.00	71.54	48.00	47.61	48.00	47.38	36.00	28.00	17.5	108
M56	84.00	83.46	56.00	55.54	56.00	55.26	41.00	34.00	19.0	124
M64	96.00	95.46	64.00	63.54	64.00	63.26	46.00	38.00	22.0	140

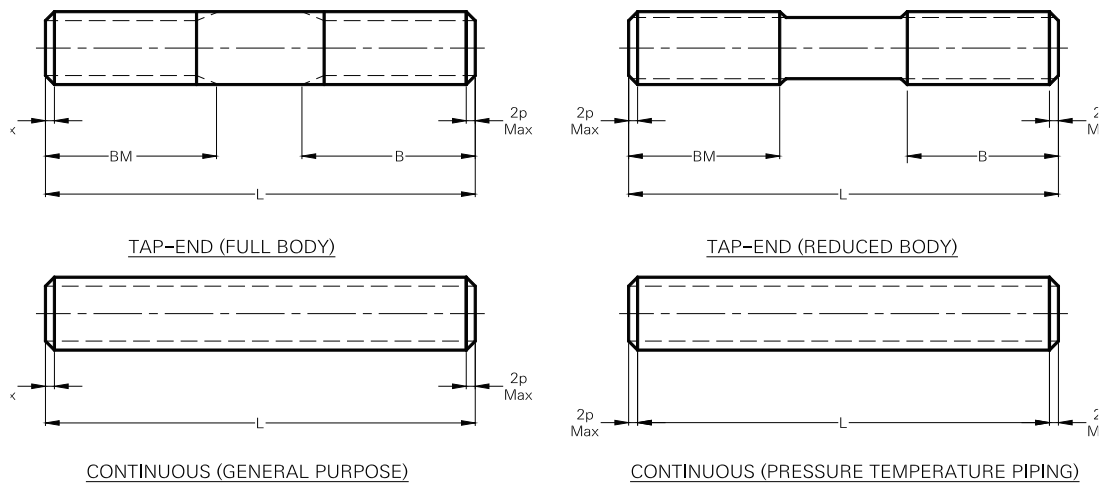
FLANGE 12 POINT SCREW INCH THREAD



IFI 115

Nominal Size	E	C		F		G	H	K	LT
	Body Dia (Max Equal to Nom Size)	Flange Dia		Width Across Flats		Width Across Corners	Head Height	Flange Thickness	Thread Length
	Min	Max	Min	Max	Min	Min	Max	Min	Basic
1/4	6.19	9.52	9.28	6.40	6.20	7.07	6.60	1.48	25.40
5/16	7.76	11.91	11.61	8.00	7.78	8.84	7.92	1.88	28.58
3/8	9.35	14.27	13.97	9.57	9.35	10.67	9.52	2.42	31.75
7/16	10.91	16.66	16.31	11.12	10.90	12.43	11.12	2.77	34.93
1/2	12.50	19.05	18.67	12.75	12.53	14.28	12.70	3.28	38.10
9/16	14.07	21.43	21.04	14.32	14.10	16.08	14.30	3.69	41.28
5/8	15.66	23.82	23.40	15.92	15.70	17.91	15.87	4.22	44.45
3/4	18.82	28.57	28.12	19.10	18.88	21.52	19.05	5.08	50.80
7/8	21.97	33.32	32.85	22.27	22.00	25.07	22.22	5.95	57.15
1	25.11	38.10	37.57	25.47	25.18	28.71	25.40	6.81	63.50
1-1/8	28.16	42.87	42.30	28.65	28.33	32.29	28.57	7.88	69.85
1-1/4	31.34	47.62	47.05	31.82	31.50	35.92	31.75	8.89	76.20
1-3/8	34.47	52.37	51.77	35.00	34.68	39.53	34.92	9.96	82.55
1-1/2	37.64	57.15	56.49	38.17	37.83	43.11	38.10	11.00	88.90

CONTINUOUS AND DOUBLE-END STUD



ANSI B18.31.2

Nominal Size	BM		B		
	Tap End Thread Length		Minimum Nut End Full Thread Length		
	Min	Max	L ≤ 10	10 < L ≤ 10	L > 16
1/4	8.90	10.16	19.05	25.40	38.10
5/16	11.18	12.64	22.23	28.58	41.28
3/8	13.52	15.08	25.40	31.75	44.45
7/16	15.75	17.57	28.58	34.93	47.63
1/2	17.99	20.11	31.75	38.10	50.80
9/16	20.38	22.75	34.93	41.28	53.98
5/8	22.66	24.96	38.10	44.45	57.15
3/4	27.31	29.84	44.45	50.80	63.50
7/8	31.96	34.74	50.80	57.15	69.85
1	36.53	39.67	57.15	63.50	76.20
1 1/8	41.28	44.45	63.50	69.85	82.55
1 1/4	46.05	49.22	69.85	76.20	88.90
1 3/8	50.80	53.97	76.20	82.55	95.25
1 1/2	55.58	58.75	82.55	88.90	101.60
1 5/8	60.33	63.50	88.90	95.25	107.95
1 3/4	65.10	68.27	95.25	101.60	114.30
1 7/8	69.85	73.02	101.60	107.95	120.65
2	74.30	78.10	107.95	114.30	127.00
2 1/4	83.82	87.63	120.65	127.00	139.70
2 1/2	93.35	97.15	133.35	139.70	152.40
2 3/4	102.87	106.68	146.05	152.40	165.10
3	112.40	116.20	-	165.10	177.80
3 1/4	121.29	126.36	-	177.80	190.50
3 1/2	130.81	135.89	-	190.50	203.20
3 3/4	140.34	145.41	-	203.20	215.90
4	149.86	154.94	-	215.90	228.60

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