



# Standard Parts

Number:	BM-001
Date Issued:	A-JUL 2010

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## HEX HEAD BOLTS METRIC SERIES

### GENERAL SPECIFICATIONS

**GENERAL:** This specification contains the essentials of the following standards:

- International Organization for Standardization: ISO 4014 (coarse thread)
- International Organization for Standardization: ISO 8765 (fine thread)

**PREFERRED PARTS POLICY:** Preferred parts are so designated to reduce variety of parts and assure maximum availability, interchangeability and cost savings.

- Material and Finish: Class 8.8 Zinc with chromate
- Class 10.9 Phosphate coated
- Thread: Metric Standard (coarse) series

Nominal Size & Length Incrementation:

Lengths mm	Nominal Diameters									
	M6	M8	M10	M12	M16	M20	M24	M30	M36	
30	X									
35	X	X								
40	X	X	X							
45	X	X	X	X						
50	X	X	X	X						
60	X	X	X	X	X					
70	X	X	X	X	X	X				
80	X	X	X	X	X	X	X			
90	X	X	X	X	X	X	X			
100		X	X	X	X	X	X	X		
110		X	X	X	X	X	X	X	X	
120			X	X	X	X	X	X	X	
130			X	X	X	X	X	X	X	
140			X	X	X	X	X	X	X	
150			X	X	X	X	X	X	X	
160				X	X	X	X	X	X	
180				X	X	X	X	X	X	

FOR SHORTER LENGTHS  
SEE PAGE  
BM-021 THRU BM-027  
"THREAD TO HEAD"

20 mm increments over 180 mm - All preferred lengths beyond those shown in above chart will be carried in the non preferred section because of limited usage.

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## HEX HEAD BOLTS METRIC SERIES

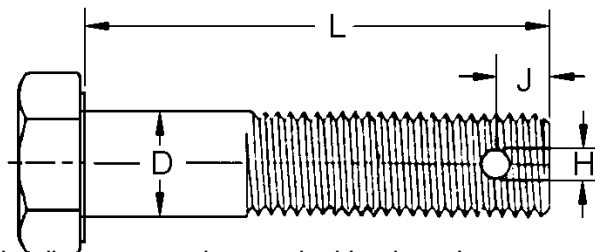
**LENGTH TOLERANCE:** The length of the bolt shall be measured parallel to the axis of the bolt from the underhead bearing surface to the extreme end of the shank. The following table lists the length tolerances.

NOMINAL LENGTH		LENGTH TOLERANCES (+/-) MM NOMINAL DIAMETER													
OVER	TO	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M30	M36
-	10	0.29	0.29	0.29	0.29	0.29									
10	18	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35						
18	30	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42		
30	40	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.25	1.25
40	50	1.25	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.25	1.25
50	60	1.5	1.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.5	1.5
60	80	1.5	1.5	1.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.5	1.5
80	100	1.75	1.75	1.75	1.75	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.75	1.75
100	120		1.75	1.75	1.75	1.75	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.75	1.75
120	140			2	2	2	2	0.8	0.8	0.8	0.8	0.8	0.8	2	2
140	150			2	2	2	2	2	0.8	0.8	0.8	0.8	0.8	2	2
150	180			2	2	2	2	2	2	2	2	2	2	2	2
180	250				2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
250	315				2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
315	400					2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
400	500								3.15	3.15	3.15	3.15	3.15	3.15	3.15

Sizes above and to the left of the dashed line are product grade A per ISO 4014. All other sizes are product grade B.

### REQUIREMENTS FOR DRILLED HOLES IN BODY: (Non preferred) ISO 7378, DIN 962

Dimensions in millimetres		
D	J*	H
M6	3.3	1.6
M8	3.9	2
M10	4.9	2.5
M12	5.9	3.2
M16	7	4
M18	7.7	4
M20	7.7	4
M22	8.7	4
M24	10	5



\* Drilled holes are to be located from under the head a distance equal to nominal L minus J.

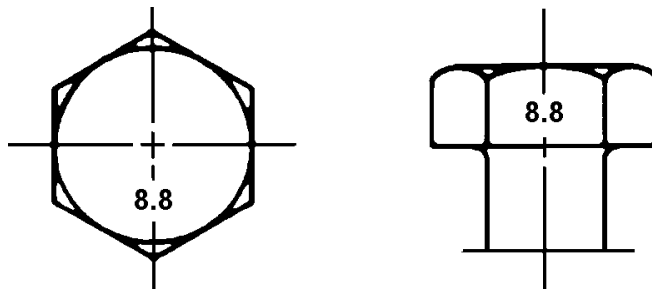
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## HEX HEAD BOLTS METRIC SERIES

**THREADS:** Thread form, diameters and associated pitches are in accordance with ISO recommendations. Threads shall be made to the tolerances of the medium class of fit (6g-external threads) for plain or unplated bolts as shown in ISO 965/2, General Purpose Metric Screw Threads. The threads after plating must not exceed the basic size which is the maximum material condition (minimum size) of the internal thread.

**HEADS:** Previous across the flats dimensions for M10, M12 and M14 sizes were one (1) mm larger than current and M22 was two (2) mm smaller. Head heights for M7, M8 and M14 were .2 mm smaller than current; M10 was .6 mm smaller; M12, M18, M20 and M36 was .5 mm smaller; M30 was .3 mm smaller. Bolts with old across flats and head height dimensions can be furnished only with an explicit engineering deviation. It is important that all bolts of a given diameter on a product be to the same head size. Therefore, bolts to the old and current standard should not be mixed.

**BOLT IDENTIFICATION:** For Hex Bolts & Screws with nominal diameters of 5mm and greater the property class symbol must be marked per ISO 898/1.



**MATERIAL:** Classes 8.8 and 10.9 per ISO 898/1. (Class 9.8 may be furnished for class 8.8 at supplier's discretion in sizes M6 through M16. Supplier must obtain permission for substitution prior to shipping parts. Substitution is not acceptable for prototype and test and development machines.)

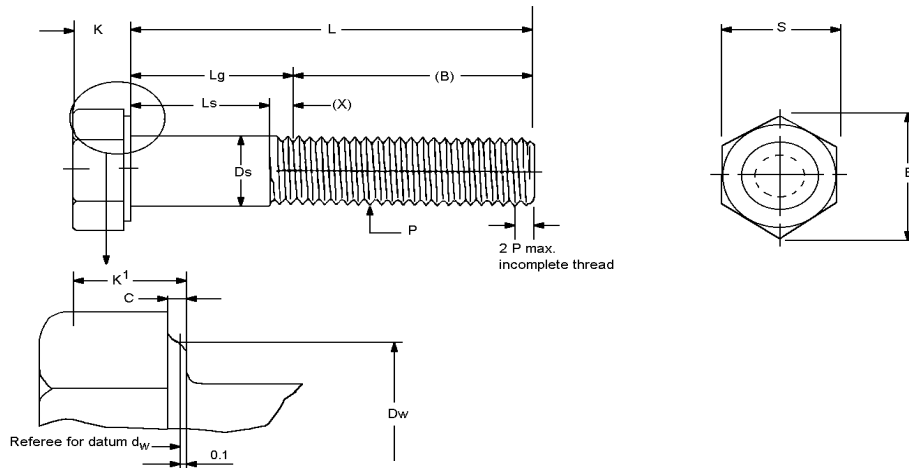
**FINISHES:** Bolts shall be furnished plain (PLN), plated or coated in accordance with the Case IH Engineering Materials Specification and class listed below.

Phosphate Coated	(PHC) - MS 91
Zinc Dichromate	(ZND) - MS 201
Black Zinc	(BZN) - MS 203
Black Teflon	(PTF) - MS 61
Zinc-Cobalt	(ZCA) - MS 202
Black Zinc Cobalt	(ZCB) - MS 202
Dorrltech	(DOR) -A-011 Standard Parts Book
Electro Polyseal	(POL) - A-011 Standard Parts Book

**WORKMANSHIP:** Bolts and screws shall be free from burrs, seams, laps, loose scale, irregular surfaces and any defects affecting their serviceability. Surface discontinuities to meet limits per ISO 6157/3.

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## HEX HEAD BOLTS METRIC SERIES



Nominal Size			M3*	M4*	M5*	M6	M8	M 10+	M12+
Ds	Body Diameter	max.	3.00	4.00	5.00	6.00	8.00	10.00	12.00
		min.	2.86	3.82	4.82	5.82	7.78	9.78	11.73
S	Head Width (Across Flats)	nom.	5.5	7	8	10	13	16	18
		max.	5.50	7.00	8.00	10.00	13.00	16.00	18.00
		min.	5.32	6.78	7.78	9.78	12.73	15.73	17.73
E	Width Across Corners	min.	6.01	7.66	8.79	11.05	14.38	17.77	20.03
Dw	Bearing Face Diameter	min.	4.6	5.9	6.9	8.9	11.6	14.6	16.6
K	Head Height	max.	2.12	2.92	3.65	4.15	5.50	6.63	7.76
		min.	1.88	2.68	3.35	3.85	5.10	6.17	7.24
K'	Wrenching Height	min.	1.3	1.9	2.28	2.63	3.54	4.28	5.05
C	Thickness of Washer Face	max.	0.4	0.4	0.5	0.5	0.6	0.6	0.6
		min.	0.15	0.15	0.15	0.15	0.15	0.15	0.15
P	Pitch, nom.	Coarse Thread	0.5	0.7	0.8	1	1.25	1.5	1.75
		Fine Thread	-	-	-	-	1	1.25	1.5
		Extra Fine	-	-	-	-	-	1	1.25
X	Transition Thread Length, max. (ref.)	-	-	-	5	6.2	7.5	8.8	
B	Basic Thread Length (ref) Up to & Including 125	12	12	14	16	18	22	26	30
		126 Up to & Including 200				24	28	32	36
		Over 200						45	49

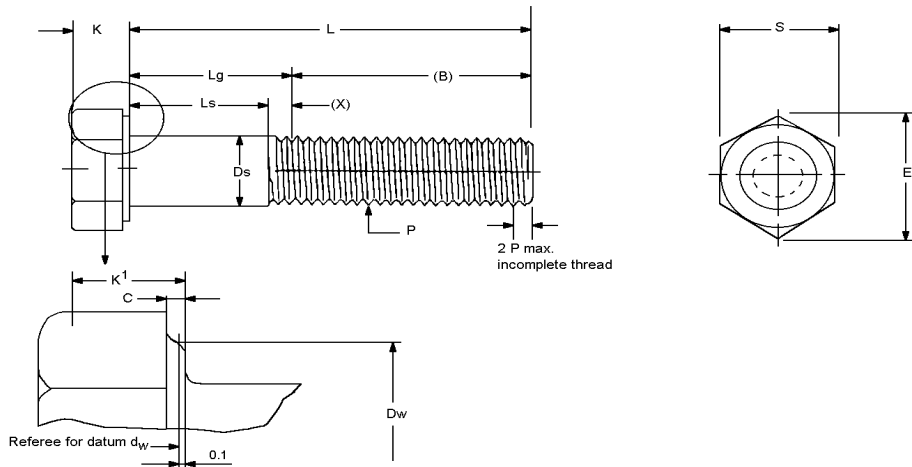
\* Non-Preferred

+ For M10, M12, M14, & M22 sizes, across flats, across corner and head height dimensions reflect the latest ISO/TC2 decisions. See statement under HEADS (page 3).

NOTE: It is common practice in ISO standards to omit thread pitch from the product size designation when screw threads are the metric coarse thread series, e.g., M10 is M10 x 1.5.

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	M14*+	M16	M18*	M20	M22*+	M24	M27*	M30	M36
Ds	14.00	16.00	18.00	20.00	22.00	24.00	27.00	30.00	36.00
	13.73	15.73	17.70	19.67	21.67	23.67	26.67	29.67	35.61
S	21	24	27	30	34	36	41	46	55
	21.00	24.00	27.00	30.00	34.00	36.00	41.00	46.00	55.00
	20.67	23.67	26.67	29.16	33.00	35.00	40.00	45.00	53.80
E	23.35	26.75	30.14	32.95	37.29	39.55	45.20	50.85	60.79
Dw	19.4	22.4	26.2	27.6	31.70	32.9	40.00	42.5	50.8
K	9.09	10.32	12.22	12.88	14.22	15.44	17.22	19.48	23.38
	8.51	9.68	11.79	12.12	13.79	14.56	16.79	17.92	21.62
K'	5.96	6.8	7.8	8.5	9.6	10.3	11.7	12.8	15.5
C	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	0.15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
P	2	2	2.5	2.5	2.5	3	3	3.5	4
	-	1.5	2	2	2	2	2	2	3
	-	-	1.5	1.5	1.5	1.5	-	-	-
X	10	10	12.5	12.5	12.5	15	15	17.5	20
B	34	38	42	46	50	54	60	66	78
	40	44	48	52	56	60	66	72	84
	53	57	61	65	59	73	79	85	97

\* Non-Preferred

+ For M10, M12, M14, & M22 sizes, across flats, across corner and head height dimensions reflect the latest ISO/TC2 decisions. See statement under HEADS (page 3).



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## HEX HEAD BOLTS METRIC SERIES

Maximum Grip Gaging Lengths (Lg) And Minimum Body Lengths (Ls)

Dimensions in millimetres

Nom Dia & Thd Pitch	M3 x 0.5		M4 x 0.7		M5 x 0.8		M6 x 1		M8 x 1.25		M10 x 1.5		M12 x 1.75	
L Nominal Length	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.
20	8	5.5												
25	13	10.5	11	7.5	9	5								
30	18	15.5	16	12.5	14	10	12	7						
35			21	17.5	19	15	17	12	13	6.8				
40			26	22.5	24	20	22	17	18	11.8	14	6.5		
45					29	25	27	22	23	16.8	19	11.5	15	6.2
50					34	30	32	27	28	21.8	24	16.5	20	11.2
55							37	32	33	26.8	29	21.5	25	16.2
60							42	37	38	31.8	34	26.5	30	21.2
65									43	36.8	39	31.5	35	26.2
70									48	41.8	44	36.5	40	31.2
75									53	46.8	49	41.5	45	36.2
80									55	51.8	54	46.5	50	41.2
85											59	51.5	55	46.2
90											64	56.5	60	51.2
100											74	66.5	70	61.2
110													80	71.2
120													90	81.2
130														

NOTE: Bolts with lengths shorter than shown are threaded full length and are included in section BM-021 thru BM-027 "Thread to Head".

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## HEX HEAD BOLTS METRIC SERIES

Maximum Grip Gaging Lengths (Lg) And Minimum Body Lengths (Ls) (Continued)

Dimensions in millimetres

Nom Dia & Thd Pitch	M14 x 2		M16 x 2		M20 x 2.5		M24 x 3		M30 x 3.5		M36 x 4	
	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.	Lg max.	Ls min.
40 45 50	16	6										
55 60 65	21 26 31	11 16 21	17 22 27	7 12 17			19 6.5					
70 75 80	36 41 46	26 31 36	32 37 42	22 27 32	24 29 34	11.5 16.5 21.5	26 11					
85 90 100	51 56 66	41 46 56	47 52 62	37 42 52	39 44 54	26.5 31.5 41.5	31 36 46	16 21 31	34 16.5			
110 120 130	76 86 90	66 76 80	72 82 86	62 72 76	64 74 78	51.5 61.5 65.5	56 66 70	41 51 55	44 54 58	26.5 36.5 40.5	32 42 46	12 22 26
140 150 160	100	90	96 106 116	86 96 106	88 98 108	75.5 85.5 95.5	80 90 100	65 75 85	68 78 88	50.5 60.5 70.5	56 66 76	36 46 56
170 180 190					118 128 138	105.5 115.5 125.5	110 120 130	95 105 115	98 108 118	80.5 90.5 100.5	86 96 106	66 76 86
200 220 240					148	135.5	140 147 167	125 132 152	128 135 155	110.5 117.5 137.5	116 123 143	96 103 123
260 280 300									175 195 215	157.5 177.5 197.5	163 183 203	143 163 183

NOTE: Bolts with lengths shorter than shown are threaded full length and are included in section BM-021 thru BM-027 "Thread to Head".

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