Grade 8 Hex Head Bolts – Inch Fine Thread – Non-Preferred

1. GENERAL

This standard conforms essentially to Finished Hex Head Bolts (Hex Cap Screws) described in ANSI B18.2.1. All dimensions in this standard are in inches. For dimensions not shown in this specification, refer to ANSI B18.2.1.

2. RELATED DOCUMENTS

2.1 REFERENCE STANDARDS

ANSI B18.2.1—Square and Hex Bolts and Screws Inch Series
MAT0310—Zinc Plating
STPA020—Fastener Finishes and Material Specifications
Case MS-91—Zinc Phosphate Coating
SAE J429—Mechanical and Material Requirements for Externally Threaded Fasteners
SAE J123—Surface Discontinuties on Bolts, Screws and Studs in Fatigue Applications

2.2 REPLACED STANDARDS

Case B-001—Hex Head Bolts (General Specifications)
Case B-012—Hex Head Bolts Grade 8 UNF – Non-Preferred
NH FNHA-1-B-050.00—Screw, Cap, Hex Head, G8, ZnCr, UNF, Inch

3. PREFERRED PARTS POLICY

All standard parts measured in inches are considered non-preferred. See STPB730 for preferred parts (metric).

4. CROSS REFERENCE

For cross reference listing of company part numbers, go to CNH Catalogue.

5. MATERIAL

Bolts shall conform to the chemical composition, mechanical properties, and heat treatment requirements for Grade 8 steel per SAE J429.

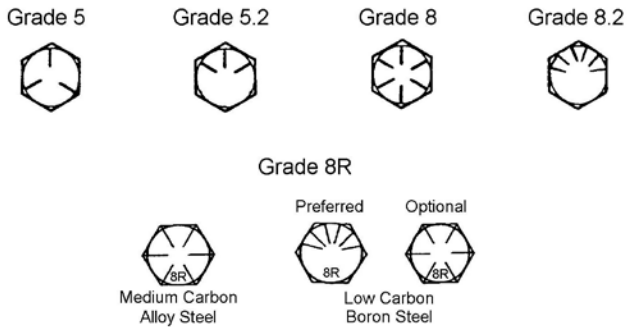
6. FINISH

Bolts shall be furnished plain (PLN), plated, or coated as designated by part number in accordance with CNH or Case Material Specifications.

7. HEAD MARKING

7.1 Bolts shall have legible, raised radial head markings to indicate bolt grade and a manufacturer's identification symbol recognizable in the trade to indicate source. Figure 1 illustrates the standard grade marking symbols for steel bolts and screws.

FIGURE 1: Standard Grade Markings



7.2 Marking symbols on the heads for bolt sizes 5/8 inch and smaller shall project not less than .005 inch above surface nor more than .015 inch over the specified maximum head height.

7.3 Markings for bolt sizes larger than 5/8 inch shall project not less than the equivalent in inches of .0075 times the basic bolt diameter above the surface or more than .030 inch over the specified maximum head height.

8. THREAD LENGTH (SEE FIGURE 2)

8.1 The basic thread length (L_T) for a bolt with shank is equal to twice the nominal body diameter (E) plus 0.25 inch for nominal bolt lengths up to and including 6 inches, and twice the basic thread diameter plus 0.50 inch for nominal lengths over 6 inches. See Table 1.

8.2 Body length, L_B, is the distance from the underhead bearing surface to the last scratch of thread or to the top of the extrusion angle.

8.3 Bolts of nominal length which have a calculated L_B(min) length equal to or shorter than 2.5 times the coarse thread (UNC) pitch shall be threaded for full length. See Table 3. The length of the underhead fillet of these “thread to head” bolts shall not be less than L_B as defined in note 7 to Table 4 of ANSI B18.2.1.

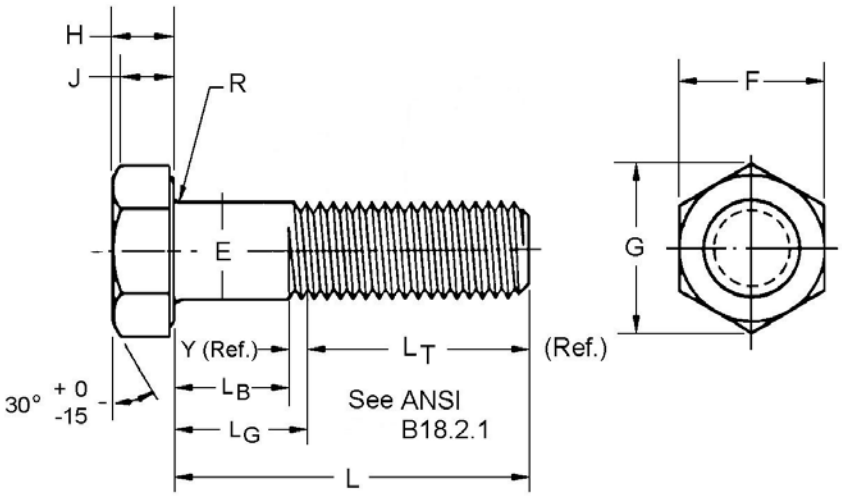


FIGURE 2: Hex Head Bolt

TABLE 1: Basic Dimensions in Inches

E			L_T*		Y**
Body Diameter			Basic Thread Length for Given Bolt Lengths		Transition Thread Length
Nominal	Maximum	Minimum	L ≤ 6"	L > 6"	Maximum
1/4	.25	.245	.75	1	.25
5/16	.312	.307	.875	1.125	.278
3/8	.375	.369	1	1.25	.312
7/16	.438	.43	1.125	1.375	.357
1/2	.5	.493	1.25	1.5	.385
9/16	.562	.554	1.375	1.625	.417
5/8	.625	.617	1.5	1.75	.455
3/4	.75	.741	1.75	2	.5
7/8	.875	.866	2	2.25	.556
1	1	.99	2.25	2.5	.625
1-1/8	1.125	1.114	2.5	2.75	.714
1-1/4	1.25	1.239	2.75	3	.714
1-3/8	1.375	1.363	3	3.25	.833
1-1/2	1.5	1.488	3.25	3.5	.833

* L_T is a reference dimension equal to the distance from the extreme end of the bolt to the last complete (full form) thread. For any bolt not threaded full length, L_G(max) = L - L_T
** Y is a reference dimension equal to five coarse (UNC) pitches. It includes the length of incomplete threads, the extrusion angle on rolled threads, and tolerance on grip length.

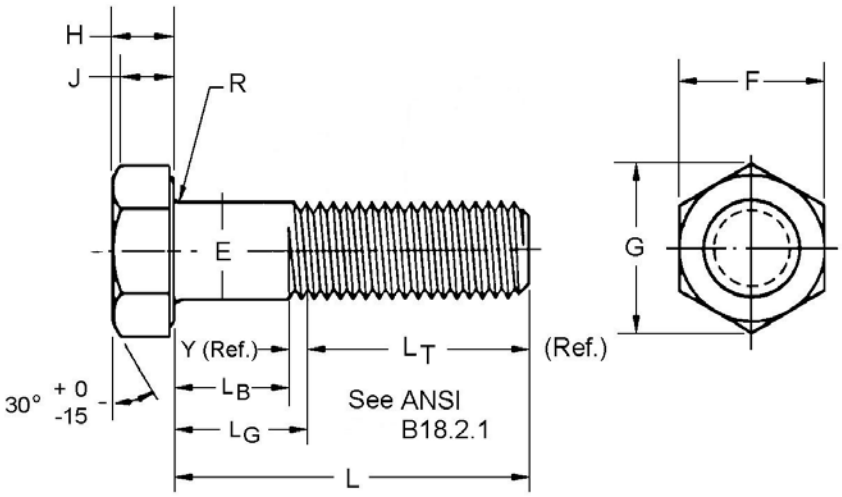


FIGURE 3: Hex Head Bolt

TABLE 2: Additional Dimensions in Inches

E	F		G		H			J	R	
Nominal Diameter	Width Across Flats		Width Across Corners		Head Height			Wrenching Height	Radius	
	Basic	Min	Max	Min	Max	Basic	Min	Min	Max	Min
1/4	.438	.428	.505	.488	.163	.156	.15	.106	.025	.015
5/16	.5	.489	.577	.557	.211	.203	.195	.14	.025	.015
3/8	.563	.551	.65	.628	.243	.234	.226	.16	.025	.015
7/16	.625	.612	.722	.698	.291	.281	.272	.195	.025	.015
1/2	.75	.736	.866	.84	.323	.313	.302	.215	.025	.015
9/16	.813	.798	.938	.91	.371	.359	.348	.25	.045	.02
5/8	.938	.922	1.083	1.051	.403	.391	.378	.269	.045	.02
3/4	1.125	1.1	1.299	1.254	.483	.469	.455	.324	.045	.02
7/8	1.313	1.285	1.516	1.465	.563	.547	.531	.378	.065	.04
1	1.5	1.469	1.732	1.675	.627	.609	.591	.416	.095	.06
1-1/8	1.688	1.631	1.949	1.859	.718	.688	.658	.461	.095	.06
1-1/4	1.875	1.812	2.165	2.066	.813	.781	.749	.53	.095	.06
1-3/8	2.062	1.994	2.382	2.273	.878	.844	.81	.569	.095	.06
1-1/2	2.25	2.175	2.598	2.48	.974	.938	.902	.64	.095	.06

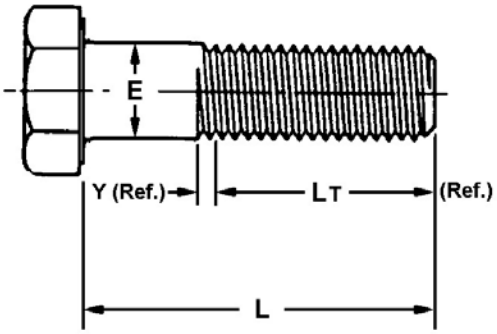


FIGURE 4: Hex Head Bolt With Shank

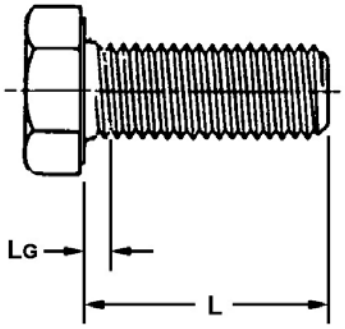


FIGURE 5: Hex Head Bolt Fully Threaded

TABLE 3: Standard Thread to Head Length Limitations

Nominal Diameter	For L ≤	L_G(Max) All Thread Series	For L >	For L ≤	L_G(Max)* UNF Series Only
1/4	.5	.075	.5	1.125	0.089
5/16	.625	.083	.625	1.375	0.104
3/8	.75	.094	.75	1.5	0.104
7/16	7/8	.107	.875	1.75	0.125
1/2	1	.115	1	1.875	0.125
9/16	1.125	.125	1.125	2	0.139
5/8	1.25	.136	1.25	2.25	0.139
3/4	1.5	.15	1.5	2.25	0.156
7/8	--	--	--	2.875	0.179
1	--	--	--	3.25	0.208
1-1/8	--	--	--	3.625	0.208
1-1/4	--	--	--	3.875	0.208
1-3/8	--	--	--	4.25	0.208
1-1/2	--	--	--	4.5	0.208

* 2.5 times the thread pitch

TABLE 4: Inch Hex Head Bolts, Fine Thread Grade 8, ZND

Length	Nominal Bolt Diameter											
L †	1/4	5/16	3/8	7/16*	1/2	9/16*	5/8	3/4	7/8	1	1-1/8*	1-1/4
0.5												
0.625*		86624956	48020077									
0.75		86512037	86514065	87021864								
1			280137	50217	84163833							
1.125*					50034							
1.25		86512038	280619	84548951			86246					
1.5			280655	86512039	86512043		280204					
1.75			88948	280983	84545650			86512046	86512052			
2			88644	86512040	8067	86512044		88344				
2.125*					82001791							
2.25			280419	86512041	86551024			86512047	9845584			
2.5		9790463			280133	86512045	280171	86512048	47685770			
2.75	86837942	86977761	280458	86512042	280561	280475	9790649					
2.875*					280424							
3				86050014	412359		280335	86512049	86018502			86544958
3.25					88852			86512050				
3.5					86565315		280369	280156				7036
3.75		80280928		86520697								
4			86557802		88966		280621	88736				
4.25*								280227				
4.5						9847650	281065	86512051				8467
5								88737				
5.5				86520696			280986					7652
6								84323				6707
6.25*								280302	86508841			
6.5												
7							86528023					6708
7.5												
8												
8.5												
9												
10												
	1/4	5/16	3/8	7/16*	1/2	9/16*	5/8	3/4	7/8	1	1-1/8*	1-1/4
Fine Thread Pitch	28	24	24	20	20	18	18	16	14	14	12	12

* Do not use these sizes in new designs

† Parts above broken heavy line are always fully threaded

Parts below solid heavy line adhere to basic thread length defined in Table 1

Parts in between heavy lines may be fully threaded or have basic thread length, at the discretion of the manufacturer

TABLE 5: Inch Hex Head Bolts, Fine Thread Grade 8, PLN

Nominal Diameter (E)	Fine Thread Pitch	Length (L)	Basic Thread Length (L_T)	Finish	Part Number
7/16	20	2.5	1.125	PLN	186669
1/2	20	1	FULL	PLN	280438
1/2	20	1.5	FULL	PLN	455014
9/16	18	1.25	FULL	PLN	280690
9/16	18	2.75	1.375	PLN	84818310
5/8	18	1.25	FULL	PLN	88572
5/8	18	1.75	1.5	PLN	80088431
5/8	18	1.75	FULL	PLN	223737
3/4	16	2.5	1.75	PLN	87015938
3/4	16	3.25	1.75	PLN	47368449
3/4	16	3.5	1.75	PLN	47368448
1	14	2.5	FULL	PLN	86624948
1	14	5	2.25	PLN	9430395
1-1/8	12	5.5	2.50	PLN	70929092

TABLE 6: Inch Hex Head Bolts, Fine Thread Grade 8, Miscellaneous

Nominal Diameter (E)	Fine Thread Pitch	Length (L)	Basic Thread Length (L_T)	Finish	Part Number
1/4	28	0.75	FULL	DOR	90326335
3/8	24	3	1	PHC	87015532
3/8	24	5.75	1	BLO	47430163
1/2	20	0.75	FULL	DOR	87310332
1/2	20	3	1.25	PHC	87025940
9/16	18	2	1.375	PHC	87306017
5/8	18	1.75	FULL	ZND	84238732
7/8	14	3.5	2	PHC	86620879
1-1/8	12	3	2.500	PHC	87384582