



# Standard Part

## Grade 5 Hex Head Bolts – Inch – Non-Preferred

<b>STPB120</b>
<b>87366874</b>
Rev AY
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### 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-61—Fluorocarbon Coating
- Case MS-91—Zinc Phosphate Coating
- SAE J429—Mechanical and Material Requirements for Externally Threaded Fasteners

#### 2.2 REPLACED STANDARDS

- Case B-001—Hex Head Bolts (General Specifications)
- Case B-002—Hex Head Bolts Grade 5 UNC ZND – Preferred
- Case B-006—Hex Head Bolts Grade 5 UNC – Non-Preferred
- NH FNHA-1-B-010.00—Screw, Cap, Hex Head, G5, ZnCr, Inch
- NH FNHA-1-B-020.00—Screw, Cap, Hex Head, G5, Plain, Inch

### 3. PREFERRED PARTS POLICY

All standard parts measured in inches are considered non-preferred. See STPB510 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 5 steel per SAE J429.

### 6. FINISH

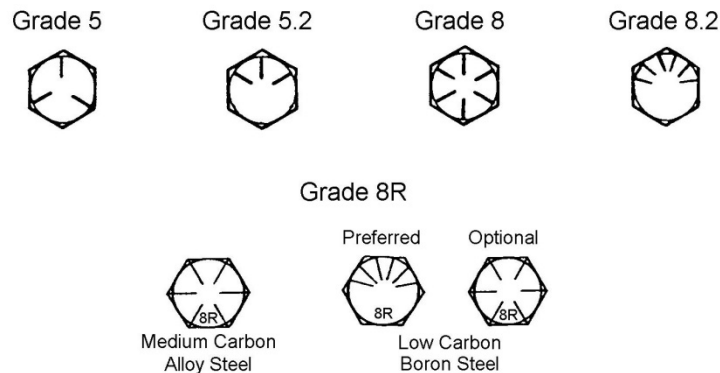
Bolts shall be furnished plain (PLN), plated, or coated as designated by part number in accordance with CNH or Case Material Specifications.

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### 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.

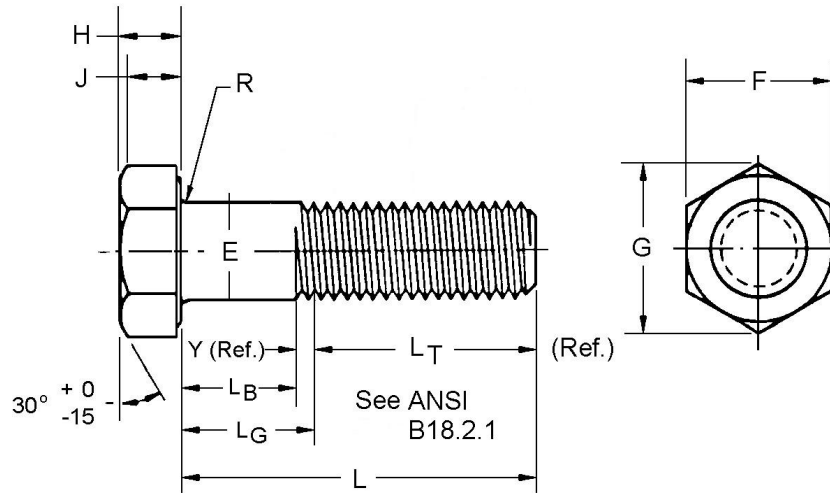
7.3 Markings for bolt sizes larger than 5/8 inch shall project not less than the equivalent in inches of .0075 times the basic bolt diameter above the surface or more than .030 inch over the specified maximum head height.

### 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.

Bolts of nominal length which have a calculated  $L_B(\text{min})$  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.



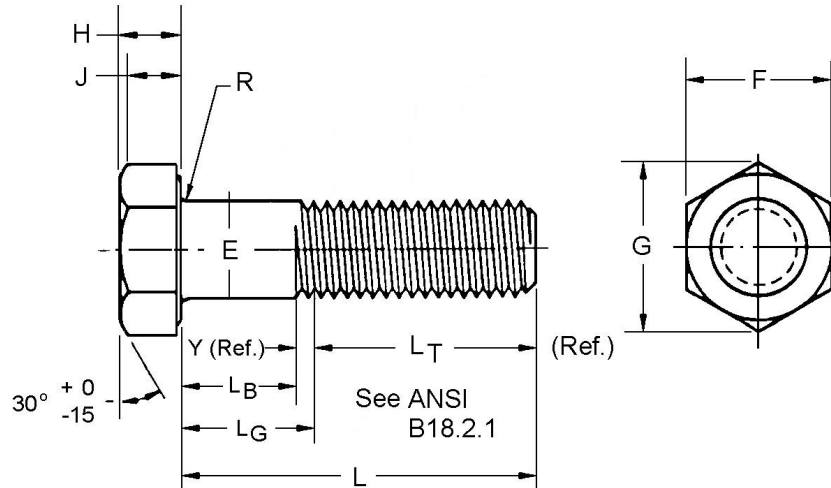
**FIGURE 2: Hex Head Bolt**

**TABLE 1: Basic Dimensions in Inches**

E			L <sub>T</sub> *		Y**
Body Diameter			Basic Thread Length for Given Bolt Lengths		Transition Thread Length Maximum
Nominal	Maximum	Minimum	L ≤ 6"	L > 6"	
1/4	.25	.245	.75	1	.25
5/16	.312	.306	.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<sub>T</sub> 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<sub>G</sub>(max) = L - L<sub>T</sub>

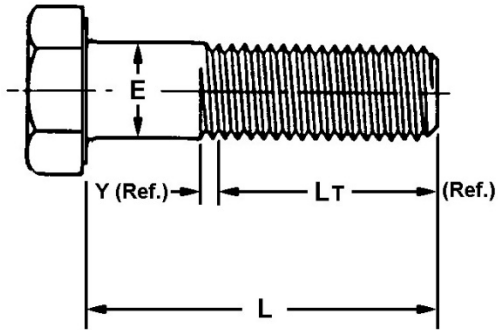
\*\* Y is a reference dimension equal to five coarse (UNC) pitches. It includes the length of incomplete threads, the extrusion angle on rolled threads, and tolerance on grip length.



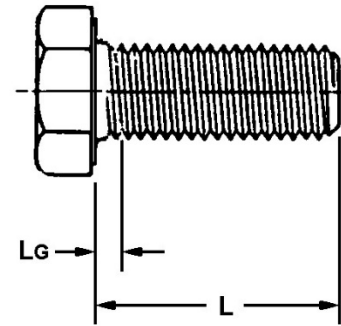
**FIGURE 3: Hex Head Bolt**

**TABLE 2: Additional Dimensions in Inches**

E	F		G		H			J	R	
	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 ≤	$L_G(\text{Max})^*$	For L >	For L ≤	$L_G(\text{Max})^{**}$
		All Thread Series			UNC Series Only
1/4	.5	.075	.5	1.125	0.125
5/16	.625	.083	.625	1.375	0.139
3/8	.75	.094	.75	1.5	0.156
7/16	7/8	.107	.875	1.75	0.179
1/2	1	.115	1	1.875	0.192
9/16	1.125	.125	1.125	2	0.208
5/8	1.25	.136	1.25	2.25	0.227
3/4	1.5	.15	1.5	2.25	0.25
7/8	--	--	--	2.875	0.278
1	--	--	--	3.25	0.312
1-1/8	--	--	--	3.625	0.357
1-1/4	--	--	--	3.875	0.357
1-3/8	--	--	--	4.25	0.417
1-1/2	--	--	--	4.5	0.417

\* 1.5 times the coarse thread (UNC) pitch

\*\* 2.5 times the thread pitch



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**TABLE 4: Inch Hex Head Bolts, Grade 5, ZND**

Length L <sup>†</sup>	Nominal Bolt Diameter						
	1/4-20	5/16-18	3/8-16	*7/16-14	1/2-13	*9/16-12	5/8-11
0.5	88542	88574	88814	9790252			
0.625*	80280641	9627874	80088703				
0.75	9707580	87872	88434	280244	9627879	86622999	
0.875*	86533411	280345	81821889	50087	86507009		
1	88146	9635884	88206	9706729	87909	281078	280580
1.125*	280727	180080	180123	331050			
1.25	87716	87657	88011	9627887	87670	81821254	280319
1.375*			280206	88714	86525021	81821258	
1.5	280112	88275	88044	9637916	87689	80088702	88062
1.625*		84177569			280524		
1.75	280164	9707515	9706689	84192879	9707516	9849940	9627896
1.875*		180086			81821288		
2	87404	9636711	88436	280117	9706716		86505999
2.25	87405	86505972	88546	86505984	87975		88556
2.5	87845	88346	87936	88604	87972	6034	87630
2.75	280566	87626	88444	88870	87974		88693
3	2485	88731	280161	2652	87339	81838640	87338 87023126**
3.25	80280390	280275	9637240	87870	88043		9827853
3.5	280492	86507008	88959	9627866	9637417	88956	280119
3.75	280600	280444	84192885	84192886	86505992		16445
4	280657	189298	80012047	280130	86505993	47763341	86977740
4.25*	280595	86523038	280796		189316		86597433
4.5	280367	9849585	86505980	80280289	87996		280183
4.5							84375321**
4.75*			86507010		280376		84212769

Length L <sup>†</sup>	Nominal Bolt Diameter						
	3/4-10	*7/8-9	1-8	*1-1/8-7	1-1/4-7	1-1/2-6	
1	50086						
1.125*							
1.25	88691						
1.375*							
1.5	88692	87490809	87315228				
1.625*							
1.75	88725						
1.875*							
2	88557	87315212	9823443				
2.25	87403	20348	87493270				
2.5	9706701	87490810	16505				
2.75	280173	9823688					
3	87337	9845479	84128		87493271		
3.25	88747	19688	280113				
3.5	86977759	271821	88962		87493272		
3.75	50159	280864					
4	280210	84168354	280285		281064		
4.25*							
4.5	88007	50182	280443	86619809	4303		
4.5***	87490789						
4.75*	281011	9847539					

- \* Do not use these sizes in new designs
- \*\* Left-hand thread    \*\*\*has drilled hole
- † 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



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**TABLE 4: Inch Hex Head Bolts, Grade 5, ZND (Continued)**

Length L †	Nominal Bolt Diameter						
	1/4-20	5/16-18	3/8-16	*7/16-14	1/2-13	*9/16-12	5/8-11
5	280415	88575	280177	50569	87997		88729
5.25*			280219	280291	280290		87490801
5.5	86571158	88812	20304	280352	88576		280232
5.75*	87564733	280187	280537		215723		
6	215303	280929	280258		86000020		84009
6.25							87490798
6.375*							
6.5	87752080	85807859	80280391		9627857		86507000
6.75*							86631269
7	22343		280284		86505996		280293
7.5			280505		86505997		280361
8	84577050		86505981		280831		280743
8.5			87493273		280214		86507001
8.75*							280228
9			87493274		86563660		86622984
9.5*			86624953		86622970		86509114
9.75*							280506
10			280750		84183814		280601
10.5*			84415416		68538		
11							22043
11.5*							

Length L †	Nominal Bolt Diameter						
	3/4-10	*7/8-9	1-8	*1-1/8-7	1-1/4-7	1-1/2-6	
5	88421	86599585	88381	86631897			
5.25*	280455	87019287					
5.5	86507002	280125	280346				
5.75*		47686201					
6	280120	50187	50204		7110		
6.375*							
6.5	280223	87477172	18681				
6.75*							
7	280316	87490802	9602223		87635854		
7.5	281036	87490803	280256	86619810	87552232		
8	88945	87490804	18682				
8.5	86502676	87490805	84015				
8.75*							
9	280441	87490806	6436		86507006	87029730	
9.5*	83980547	87490807	280574		87301556		
9.75*							
10	9842687	3548	86622974		87302794		
10.5*	280211	87490808	9842686				
11	280330	47461554					
11.5*	280434						

- \* Do not use these sizes in new designs
- \*\* Left-hand thread
- † 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



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## Grade 5 Hex Head Bolts – Inch – Non-Preferred

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**TABLE 4: Inch Hex Head Bolts, Grade 5, ZND (Continued)**

Length L †	Nominal Bolt Diameter						
	1/4-20	5/16-18	3/8-16	*7/16-14	1/2-13	*9/16-12	5/8-11
12			84416975		84256785		87490799
13					9843228		86602734
13.5							87490800
14							87303012
15							86602735
17.5*							
18.5*							
18.75*							
20							

Length L †	Nominal Bolt Diameter						
	3/4-10	*7/8-9	1-8	*1-1/8-7	1-1/4-7	1-1/2-6	
12	84470495		86507007		87302984		
13	280448		280576				
14	3325		50453		86507005		
15	280751		280577				
17.5*	281073						
18.5*					86507004		
18.75*	9509						
20					86500913		

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## Grade 5 Hex Head Bolts – Inch – Non-Preferred

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**TABLE 5: Inch Hex Head Bolts, Grade 5, PLN**

Length L †	Nominal Bolt Diameter						
	*3/16-24	1/4-20	5/16-18	3/8-16	*7/16-14	1/2-13	*9/16-12
0.375*		179789					
0.5		86508941	87966	179833			
0.625*		179793		179835			
0.75		86507069	87000	87982		87999	
0.875*			179817	179838	86508959		
1	417751	86505867	88040	87541		87057	
1.125*			179819				
1.25		87523	87620	86508951	88260	87503	
1.375*		179800				179884	
1.5		87954	88121	86508952	87709	87327	
1.625*						179886	
1.75			86508945	9790354	179864	87466	
2		179805	87505	88337	87855	22363	179910
2.25				88412	179867	88516	
2.375*							
2.5			179828	86508954	179868	22364	
2.75		87056	179829	86508955	179869	179892	
3		88645	179830	88393	88884	88519	
3.25			426444		179871	88211	
3.5			186270	186283	86508961	87314813	
3.75			88638		179873	179896	

Length L †	Nominal Bolt Diameter					
	5/8-11	3/4-10	7/8-9	1-8	1-1/4-7	
0.375*						
0.5						
0.625*						
0.75						
0.875*						
1	87328					
1.125*						
1.25	87389	87314832				
1.375*						
1.5	87091					
1.625*						
1.75	9790321					
2	87608	87490792	87490793			
2.25						
2.375*				86624949		
2.5	87856			87490795		
2.75		84156991				
3		87699				
3.25	86508963	88800				
3.5	87574					
3.75						

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## Grade 5 Hex Head Bolts – Inch – Non-Preferred

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**TABLE 5: Inch Hex Head Bolts, Grade 5, PLN (Continued)**

Length L †	Nominal Bolt Diameter						
	*3/16-24	1/4-20	5/16-18	3/8-16	*7/16-14	1/2-13	*9/16-12
4			186272	186285	179874	86508962	
4.25*			186273				
4.5			187953	86508956	87490796	22905	
4.75*						187201	
5						280682	
5.5			186275	187491		88521	
6						8655851	
6.5						191268	
7						87490797	
7.5				88605			
8			9849638				
8.5							
9							
10							
10.5*							
14							
15							

Length L †	Nominal Bolt Diameter						
	5/8-11	3/4-10	7/8-9	1-8	1-1/4-7		
4	86508964	280495					
4.25*							
4.5	87500						
4.75*							
5	87708	86613129		9849650			
5.5	80088523			87315232			
6							
6.5							
7	87490790						
7.5							
8							
8.5							
9	22420						
9.5	87490791						
10							
10.5*	86516952						
12			84577048				
12.5				87490794			
14		5052					
15	87534989						

\* Do not use these sizes in new designs

\*\* Left-hand thread

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**TABLE 6: Inch Hex Head Bolts, Grade 5, DOR**

Length L †	Nominal Bolt Diameter								
	1/4	5/16	3/8	7/16*	1/2	5/8	3/4	1	1-1/4
0.375	87342880								
0.5	87342604	87342629	87342760						
0.625			87342888						
0.75	87342605	87342632	87342763			87342842			
1	87342606	87342645	87342767		87342791				
1.25	87342607	87342647	87342768	87342890	87342793	87342844			
1.375		87342883							
1.5	87342608	87342734	87342769	87310264	87310191	87605320	87342860		
1.75	87342609	87342735	87342772	87342891	87342794	87342847	87342861		
2	87342610	87342736	87342773		87342799	87342850			
2.25	87342611	87342737	87342774		87342801				
2.5	87342612	87342741	87342778		87342803	87342852			
2.75	87342614	87342743	87342782	87342892	87342807		87342863		
3	87342615	87342744	87342784		87342808	87342856	87310193		
3.25		87342748	87342785		87342811				
3.5	87342625	87342750	87310189	87342904	87342813	87342858	87310194		
3.75					87342820				
4		87342752	87342787		87310267	87310192	87310195	87342864	
4.25			91779545						
4.5	87342626	87342754		87342908	87342821		87310196	87535715	
5		87342756			87342823		87310197		
5.5									
6		87342758	87310190		87342824			87535717	
6.5					87342825				
7			51618419		87342826		47399205		
7.5			87310187					87342866	
8			87312740						
8.5					87342827				
9								47410110	
9.5									
10									
10.5					87342910				
11					87342913				
	<b>1/4</b>	<b>5/16</b>	<b>3/8</b>	<b>7/16*</b>	<b>1/2</b>	<b>5/8</b>	<b>3/4</b>	<b>1</b>	<b>1-1/4</b>
Coarse Thread Pitch	20	18	16	14	13	11	10	8	7

\* Do not use these sizes in new designs

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**TABLE 7: Inch Hex Head Bolts, Grade 5, PHC**

Nominal Diameter (E)	Coarse Thread Pitch	Length (L)	Basic Thread Length (L <sub>T</sub> )	Finish	Part Number
1/4	20	0.5	FULL	PHC	9419000
1/4	20	0.75	FULL	PHC	9419004
1/4	20	1.25	0.75	PHC	9419008
1/4	20	1.5	0.75	PHC	9419010
1/4	20	1.75	0.75	PHC	9419012
1/4	20	3.25	0.75	PHC	9419023
5/16	18	0.75	FULL	PHC	9417950
5/16	18	1	FULL	PHC	9418918
3/8	16	1	FULL	PHC	9418822
3/8	16	4.75	1	PHC	9419187
5/8	11	2.75	1.5	PHC	9419163

**TABLE 8: Inch Hex Head Bolts, Grade 5, Miscellaneous**

Nominal Diameter (E)	Coarse Thread Pitch	Length (L)	Basic Thread Length (L <sub>T</sub> )	Finish	Part Number
1/4	20	1.0	0.75	DAC	@90418979
1/4	20	1.5	0.75	DAC	90349790
1/4	20	1.75	0.75	DAC	90349804
5/16	18	0.75	FULL	DAC	90349807
5/16	18	3	0.875	DAC	90349837
5/16	18	4	0.875	DAC	90349824
5/16	18	5	0.875	DAC	90350429
5/16	18	6	0.875	DAC	90350430
3/8	16	0.5	FULL	DAC	90500189
3/8	16	1.25	FULL	DAC	90349859
3/8	16	1.5	1.0	DAC	90349840
3/8	16	1.5	FULL	ZND	87682406
3/8	16	3.25	1.0	DAC	90395289
7/16	14	2.75	1.125	DAC	90350415
1/2	13	1.25	FULL	DAC	90350420
1/2	13	2.5	1.25	DAC	90350418
1/2	13	9.5	1.5	BZN	1132464
5/8	11	2	FULL	DAC	90350421
3/4	10	3.5	FULL	ZND	87613337
1	8	3.5	2.25	DAC	90474237
1	8	6	2.25	DAC	90395291
1	8	7.5	2.5	DAC	90350423
1	8	8	2.5	DAC	90350425
1	8	9	2.5	DAC	90349780

@ Part may be fully threaded or have basic thread length, at the discretion of the manufacturer. Confirm with the local receiving plant before shipping.