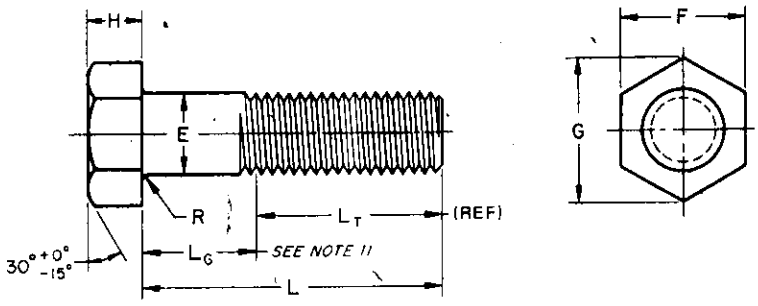
HEX BOLTS

1970 Draft Revision of ANSI B18.2.1 1965



Nominal Size or Basic Bolt Dia		E	F			G		H			R		L_T (Ref)	
		Body Dia	Width Across Flats			Width Across Corners		Height			Radius of Fillet		Thread Length	
													For Bolt Lengths ≤ 6 in.	For Bolt Lengths > 6 in.
		Max	Basic	Max	Min	Max	Min	Basic	Max	Min	Max	Min	Basic	Basic
1/4	0.2500	0.260	7/16	0.438	0.425	0.505	0.484	11/64	0.188	0.150	0.03	0.01	0.750	1.000
5/16	0.3125	0.324	1/2	0.500	0.484	0.577	0.552	7/32	0.235	0.195	0.03	0.01	0.875	1.125
3/8	0.3750	0.388	9/16	0.562	0.544	0.650	0.620	1/4	0.268	0.226	0.03	0.01	1.000	1.250
7/16	0.4375	0.452	5/8	0.625	0.603	0.722	0.687	19/64	0.316	0.272	0.03	0.01	1.125	1.375
1/2	0.5000	0.515	3/4	0.750	0.725	0.866	0.826	11/32	0.364	0.302	0.03	0.01	1.250	1.500
5/8	0.6250	0.642	15/16	0.938	0.906	1.083	1.033	27/64	0.444	0.378	0.06	0.02	1.500	1.750
3/4	0.7500	0.768	1-1/8	1.125	1.088	1.299	1.240	1/2	0.524	0.455	0.06	0.02	1.750	2.000
7/8	0.8750	0.895	1-5/16	1.312	1.269	1.516	1.447	37/64	0.604	0.531	0.06	0.02	2.000	2.250
1	1.0000	1.022	1-1/2	1.500	1.450	1.732	1.653	43/64	0.700	0.591	0.09	0.03	2.250	2.500
1-1/8	1.1250	1.149	1-11/16	1.688	1.631	1.949	1.859	3/4	0.780	0.658	0.09	0.03	2.500	2.750
1-1/4	1.2500	1.277	1-7/8	1.875	1.812	2.165	2.066	27/32	0.876	0.749	0.09	0.03	2.750	3.000
1-3/8	1.3750	1.404	2-1/16	2.062	1.994	2.382	2.273	29/32	0.940	0.810	0.09	0.03	3.000	3.250
1-1/2	1.5000	1.531	2-1/4	2.250	2.175	2.598	2.480	1	1.036	0.902	0.09	0.03	3.250	3.500
1-3/4	1.7500	1.785	2-5/8	2.625	2.538	3.031	2.893	1-5/32	1.196	1.054	0.12	0.04	3.750	4.000
2	2.0000	2.039	3	3.000	2.900	3.464	3.306	1-11/32	1.388	1.175	0.12	0.04	4.250	4.500
2-1/4	2.2500	2.305	3-3/8	3.375	3.262	3.897	3.719	1-1/2	1.548	1.327	0.19	0.06	4.750	5.000
2-1/2	2.5000	2.559	3-3/4	3.750	3.625	4.330	4.133	1-21/32	1.708	1.479	0.19	0.06	5.250	5.500
2-3/4	2.7500	2.827	4-1/8	4.125	3.988	4.763	4.546	1-13/16	1.869	1.632	0.19	0.06	5.750	6.000
3	3.0000	3.081	4-1/2	4.500	4.350	5.196	4.959	2	2.060	1.815	0.19	0.06	6.250	6.500
3-1/4	3.2500	3.335	4-7/8	4.875	4.712	5.629	5.372	2-3/16	2.251	1.936	0.19	0.06	6.750	7.000
3-1/2	3.5000	3.589	5-1/4	5.250	5.075	6.062	5.786	2-5/16	2.380	2.057	0.19	0.06	7.250	7.500
3-3/4	3.7500	3.858	5-5/8	5.625	5.437	6.495	6.198	2-1/2	2.572	2.241	0.19	0.06	7.750	8.000
4	4.0000	4.111	6	6.000	5.800	6.928	6.612	2-11/16	2.764	2.424	0.19	0.06	8.250	8.500
See Notes 17		7		4									11	

See Notes on Page A—7.

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HEAVY HEX BOLTS

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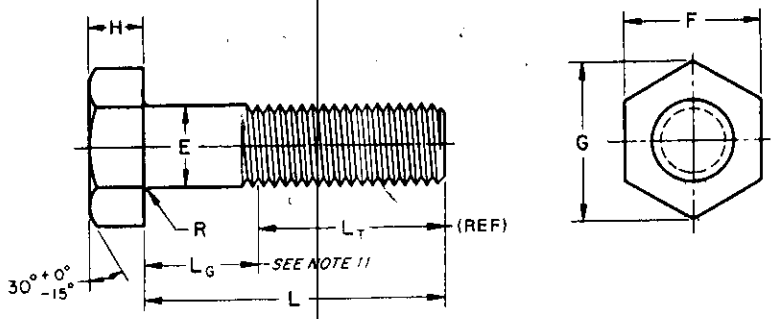


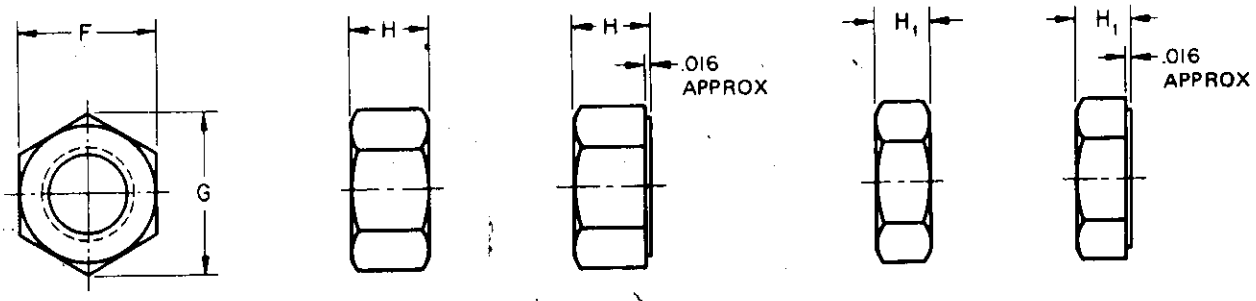
Nominal Size or Basic Bolt Dia		E	F			G		H			R		L_T	
		Body Dia	Width Across Flats			Width Across Corners		Height			Radius of Fillet		Thread Length	
													For Bolt — Lengths ≤ 6 in.	For Bolt Lengths > 6 in.
		Max	Basic	Max	Min	Max	Min	Basic	Max	Min	Max	Min	Basic	Basic
1/2	0.5000	0.515	7/8	0.875	0.850	1.010	0.969	11/32	0.364	0.302	0.03	0.01	1.250	1.500
5/8	0.6250	0.642	1-1/16	1.062	1.031	1.227	1.175	27/64	0.444	0.378	0.06	0.02	1.500	1.750
3/4	0.7500	0.768	1-1/4	1.250	1.212	1.443	1.383	1/2	0.524	0.455	0.06	0.02	1.750	2.000
7/8	0.8750	0.895	1-7/16	1.438	1.394	1.660	1.589	37/64	0.604	0.531	0.06	0.02	2.000	2.250
1	1.0000	1.022	1-5/8	1.625	1.575	1.876	1.796	43/64	0.700	0.591	0.09	0.03	2.250	2.500
1-1/8	1.1250	1.149	1-13/16	1.812	1.756	2.093	2.002	3/4	0.780	0.658	0.09	0.03	2.500	2.750
1-1/4	1.2500	1.277	2	2.000	1.938	2.309	2.209	27/32	0.876	0.749	0.09	0.03	2.750	3.000
1-3/8	1.3750	1.404	2-3/16	2.188	2.119	2.526	2.416	29/32	0.940	0.810	0.09	0.03	3.000	3.250
1-1/2	1.5000	1.531	2-3/8	2.375	2.300	2.742	2.622	1	1.036	0.902	0.09	0.03	3.250	3.500
1-3/4	1.7500	1.785	2-3/4	2.750	2.662	3.175	3.035	1-5/32	1.196	1.054	0.12	0.04	3.750	4.000
2	2.0000	2.039	3-1/8	3.125	3.025	3.608	3.449	1-11/32	1.388	1.175	0.12	0.04	4.250	4.500
2-1/4	2.2500	2.305	3-1/2	3.500	3.388	4.041	3.862	1-1/2	1.548	1.327	0.19	0.06	4.750	5.000
2-1/2	2.5000	2.559	3-7/8	3.875	3.750	4.474	4.275	1-21/32	1.708	1.479	0.19	0.06	5.250	5.500
2-3/4	2.7500	2.827	4-1/4	4.250	4.112	4.907	4.688	1-13/16	1.869	1.632	0.19	0.06	5.750	6.000
3	3.0000	3.081	4-5/8	4.625	4.475	5.340	5.102	2	2.060	1.815	0.19	0.06	6.250	6.500
See Notes 17		7	4										11	

(continued)

See Notes on Page A—9.

HEAVY HEX NUTS AND HEAVY HEX JAM NUTS

1970 Draft Revision of ANSI B18.2.2 1965



Nominal Size or Basic Major Dia of Thread		F Width Across Flats			G Width Across Corners		H Thickness Heavy Hex Nuts			H_1 Thickness Heavy Hex Jam Nuts			Runout of Bearing Surface — FIR	
													Heavy Hex Nuts with Specified Proof Loads Less than 150,000 psi and all Heavy Hex Jam Nuts	Heavy Hex Nuts with Specified Proof Loads Equal to 150,000 psi and Greater
		Basic	Max	Min	Max	Min	Basic	Max	Min	Basic	Max	Min	Max	Max
1/4	0.2500	1/2	0.500	0.488	0.577	0.556	15/64	0.250	0.218	11/64	0.188	0.156	0.017	0.011
5/16	0.3125	9/16	0.562	0.546	0.650	0.622	19/64	0.314	0.280	13/64	0.220	0.186	0.020	0.012
3/8	0.3750	11/16	0.688	0.669	0.794	0.763	23/64	0.377	0.341	15/64	0.252	0.216	0.021	0.014
7/16	0.4375	3/4	0.750	0.728	0.866	0.830	27/64	0.441	0.403	17/64	0.285	0.247	0.022	0.015
1/2	0.5000	7/8	0.875	0.850	1.010	0.969	31/64	0.504	0.464	19/64	0.317	0.277	0.023	0.016
9/16	0.5625	15/16	0.938	0.909	1.083	1.037	35/64	0.568	0.526	21/64	0.349	0.307	0.024	0.017
5/8	0.6250	1-1/16	1.062	1.031	1.227	1.175	39/64	0.631	0.587	23/64	0.381	0.337	0.025	0.018
3/4	0.7500	1-1/4	1.250	1.212	1.443	1.382	47/64	0.758	0.710	27/64	0.446	0.398	0.027	0.020
7/8	0.8750	1-7/16	1.438	1.394	1.660	1.589	55/64	0.885	0.833	31/64	0.510	0.458	0.029	0.022
1	1.0000	1-5/8	1.625	1.575	1.876	1.796	63/64	1.012	0.956	35/64	0.575	0.519	0.031	0.024
1-1/8	1.1250	1-13/16	1.812	1.756	2.093	2.002	1-7/64	1.139	1.079	39/64	0.639	0.579	0.033	0.027
1-1/4	1.2500	2	2.000	1.938	2.309	2.209	1-7/32	1.251	1.187	23/32	0.751	0.687	0.035	0.030
1-3/8	1.3750	2-3/16	2.188	2.119	2.526	2.416	1-11/32	1.378	1.310	25/32	0.815	0.747	0.038	0.033
1-1/2	1.5000	2-3/8	2.375	2.300	2.742	2.622	1-15/32	1.505	1.433	27/32	0.880	0.808	0.041	0.036
1-5/8	1.6250	2-9/16	2.562	2.481	2.959	2.828	1-19/32	1.632	1.556	29/32	0.944	0.868	0.044	0.038
1-3/4	1.7500	2-3/4	2.750	2.662	3.175	3.035	1-23/32	1.759	1.679	31/32	1.009	0.929	0.048	0.041
1-7/8	1.8750	2-15/16	2.938	2.844	3.392	3.242	1-27/32	1.886	1.802	1-1/32	1.073	0.989	0.051	0.044
2	2.0000	3-1/8	3.125	3.025	3.608	3.449	1-31/32	2.013	1.925	1-3/32	1.138	1.050	0.055	0.047
2-1/4	2.2500	3-1/2	3.500	3.388	4.041	3.862	2-13/64	2.251	2.155	1-13/64	1.251	1.155	0.061	0.052
2-1/2	2.5000	3-7/8	3.875	3.750	4.474	4.275	2-29/64	2.505	2.401	1-29/64	1.505	1.401	0.068	0.058
2-3/4	2.7500	4-1/4	4.250	4.112	4.907	4.688	2-45/64	2.759	2.647	1-37/64	1.634	1.522	0.074	0.064
3	3.0000	4-5/8	4.625	4.475	5.340	5.102	2-61/64	3.013	2.893	1-45/64	1.763	1.643	0.081	0.070
3-1/4	3.2500	5	5.000	4.838	5.774	5.515	3-3/16	3.252	3.124	1-13/16	1.876	1.748	0.087	0.075
3-1/2	3.5000	5-3/8	5.375	5.200	6.207	5.928	3-7/16	3.506	3.370	1-15/16	2.006	1.870	0.094	0.081
3-3/4	3.7500	5-3/4	5.750	5.562	6.640	6.341	3-11/16	3.760	3.616	2-1/16	2.134	1.990	0.100	0.087
4	4.0000	6-1/8	6.125	5.925	7.073	6.755	3-15/16	4.014	3.862	2-3/16	2.264	2.112	0.107	0.093
See Notes 9			3		4								2	

NOTES: 1. Unification. Bold type indicates products unified dimensionally with British and Canadian standards. Unification of fine thread products is limited to sizes 1 in. and under.

2. Tops and Bearing Surfaces of Nuts. Nuts in sizes 7/16 in. nominal size and smaller shall be double chamfered. Larger size nuts shall be double chamfered or have washer faced bearing surface and chamfered top.

   The diameter of chamfer circle on double chamfered nuts and diameter of washer face shall be within the limits of the maximum width across flats and 95 per cent of the minimum width across flats.

   The tops of washer faced nuts shall be flat and the diameter of chamfer circle shall be equal to the maximum width across flats within a tolerance of minus 15 per cent. The length of chamfer at hex corners shall be from 5 to 15 per cent of the basic thread diameter. The surface of chamfer may be slightly convex or rounded.

   Bearing surfaces shall be flat and perpendicular to the axis of the threaded hole within the FIR limits specified for the respective nut type and strength level.

3. Width Across Flats. Maximum width across flats shall not be exceeded. (See exception in General Data.) No transverse section through the nut between 25 and 75 per cent of the actual nut thickness as measured from the bearing surface shall be less than the minimum width across flats.

4. Corner Fill. A rounding or lack of fill at junction of hex corners with chamfer shall be permissible provided the width across corners is within specified limits at and beyond a distance equal to 17.5 per cent of the basic thread diameter from the chamfered faces.

5. Concentricity of Tapped Hole. Axis of tapped hole shall be concentric with axis of nut body within a tolerance equal to 3 per cent (6 per cent FIR) of the maximum width across flats.

6. Countersink. Tapped hole shall be countersunk on the bearing face or faces. The maximum countersink diameter shall be the thread basic (nominal) major diameter plus 0.030 in. for 3/8 in. nominal size nuts and smaller, and 1.08 times the basic major diameter for nuts larger than 3/8 in. No part of the threaded portion shall project beyond the bearing surface.

7. Threads. Threads shall be Unified coarse, fine or 8 thread series (UNC, UNF or 8 UN series), Class 2B. Unless otherwise specified, coarse thread series shall be furnished.

8. Material. Unless otherwise specified, chemical and mechanical properties of steel nuts shall conform with ASTM A563, Grade A or SAE J995, Grade 2. Other materials shall be as agreed upon by manufacturer and purchaser.

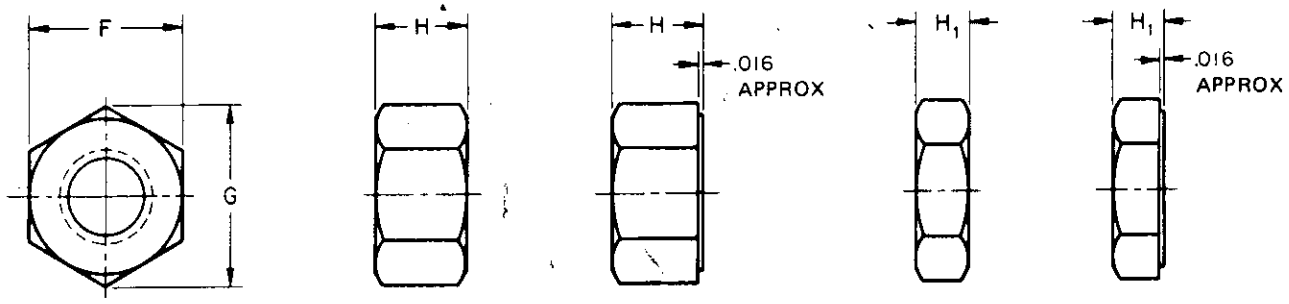
9. Nominal Size. Where specifying nominal size in decimals, zeroes preceding the decimal and in the fourth decimal place shall be omitted.

10. See Introductory Notes and General Data on Page D—3.

11. Weights. Weights given on Page N—99.

HEX NUTS AND HEX JAM NUTS

1970 Draft Revision of ANSI B18.2.2 1965



Nominal Size or Basic Major Dia of Thread		F			G		H			H1			Runout of Bearing Surface—FIR	
		Width Across Flats			Width Across Corners		Thickness Hex Nuts			Thickness Hex Jam Nuts			Hex Nuts with Specified Proof Loads less than 150,000 psi and all Hex Jam Nuts	Hex Nuts with Specified Proof Loads Equal to 150,000 psi and Greater
		Basic	Max	Min	Max	Min	Basic	Max	Min	Basic	Max	Min	Max	Max
1/4	0.2500	7/16	0.438	0.428	0.505	0.488	7/32	0.226	0.212	5/32	0.164	0.150	0.015	0.010
5/16	0.3125	1/2	0.500	0.489	0.577	0.557	17/64	0.273	0.258	3/16	0.195	0.180	0.016	0.011
3/8	0.3750	9/16	0.562	0.551	0.650	0.628	21/64	0.337	0.320	7/32	0.227	0.210	0.017	0.012
7/16	0.4375	11/16	0.688	0.675	0.794	0.768	3/8	0.385	0.365	1/4	0.260	0.240	0.018	0.013
1/2	0.5000	3/4	0.750	0.736	0.866	0.840	7/16	0.448	0.427	5/16	0.323	0.302	0.019	0.014
9/16	0.5625	7/8	0.875	0.861	1.010	0.982	31/64	0.496	0.473	5/16	0.324	0.301	0.020	0.015
5/8	0.6250	15/16	0.938	0.922	1.083	1.051	35/64	0.559	0.535	3/8	0.387	0.363	0.021	0.016
3/4	0.7500	1-1/8	1.125	1.088	1.299	1.240	41/64	0.665	0.617	27/64	0.446	0.398	0.023	0.018
7/8	0.8750	1-5/16	1.312	1.269	1.516	1.447	3/4	0.776	0.724	31/64	0.510	0.458	0.025	0.020
1	1.0000	1-1/2	1.500	1.450	1.732	1.653	55/64	0.887	0.831	35/64	0.575	0.519	0.027	0.022
1-1/8	1.1250	1-11/16	1.688	1.631	1.949	1.859	31/32	0.999	0.939	39/64	0.639	0.579	0.030	0.025
1-1/4	1.2500	1-7/8	1.875	1.812	2.165	2.066	1-1/16	1.094	1.030	23/32	0.751	0.687	0.033	0.028
1-3/8	1.3750	2-1/16	2.062	1.994	2.382	2.273	1-11/64	1.206	1.138	25/32	0.815	0.747	0.036	0.031
1-1/2	1.5000	2-1/4	2.250	2.175	2.598	2.480	1-9/32	1.317	1.245	27/32	0.880	0.808	0.039	0.034
See Notes	9	3			4								2	

NOTES: 1. **Unification. Bold type indicates products unified dimensionally with British and Canadian standards. Unification of fine thread nuts is limited to sizes 1 in. and smaller.**

2. Tops and Bearing Surfaces of Nuts. Nuts in sizes 5/8 in. nominal size and smaller shall be double chamfered. Larger size nuts shall be double chamfered or have washer faced bearing surface and chamfered top.

   The diameter of chamfer circle on double chamfered nuts and diameter of washer face shall be within the limits of the maximum width across flats and 95 per cent of the minimum width across flats.

   The tops of washer faced nuts shall be flat and the diameter of chamfer circle shall be equal to the maximum width across flats within a tolerance of minus 15 per cent. The length of chamfer at hex corners shall be from 5 to 15 per cent of the basic thread diameter. The surface of chamfer may be slightly convex or rounded.

   Bearing surfaces shall be flat and perpendicular to the axis of the threaded hole within the FIR limits specified for the respective nut type and strength level.

3. Width Across Flats. Maximum width across flats shall not be exceeded. (See exception in General Data.) No transverse section through the nut between 25 and 75 per cent of the actual nut thickness as measured from the bearing surface shall be less than the minimum width across flats.

4. Corner Fill. A rounding or lack of fill at junction of hex corners with chamfer shall be permissible provided the width across corners is within specified limits at and beyond a distance equal to 17.5 per cent of the basic thread diameter from the chamfered faces.

5. Concentricity of Tapped Hole. Axis of tapped hole shall be concentric with axis of nut body within a tolerance equal to 3 per cent (6 per cent FIR) of the maximum width across flats.

6. Countersink. Tapped hole shall be countersunk on the bearing face or faces. The maximum countersink diameter shall be the thread basic (nominal) major diameter plus 0.030 in. for 3/8 in. nominal size nuts and smaller, and 1.08 times the basic major diameter for nuts larger than 3/8 in. No part of the threaded portion shall project beyond the bearing surface.

7. Threads. Threads shall be Unified coarse, fine or 8 thread series (UNC, UNF or 8 UN series), Class 2B.

8. Material. Unless otherwise specified, chemical and mechanical properties of steel nuts shall conform with ASTM A563, Grade A or SAE J995, Grade 2. Other materials shall be as agreed upon by manufacturer and purchaser.

9. Nominal Size. Where specifying nominal size in decimals, zeroes preceding the decimal and in the fourth decimal place shall be omitted.

10. See Introductory Notes and General Data on Page D—3.

11. Weights. Weights given on Page N—99.