

METALLURGICAL REQUIREMENTS FOR STEEL NUTS

GM284M GM286M GM301M GM305M GM456M

1 SCOPE. These specifications cover the metallurgical requirements for five grades of steel nuts each identified by a separate material number. They also include recommended test procedures.

1.1 These specifications do not apply to parts welded in place or otherwise subjected to any heat which alters the microstructure.

2 REQUIREMENTS.

2.1 GENERAL. Nuts shall withstand the proof stress called for in the detailed specifications below without thread stripping or excessive plastic deformation when subjected to the proof stress test.

2.1.1 Case hardening of nuts shall not be permissible.

2.1.2 When heat treated nuts are electroplated or phosphate coated, appropriate processes should be employed to avoid hydrogen embrittlement. If necessary, the product shall be suitably treated as soon as practicable after plating or coating to remove detrimental hydrogen embrittlement.

2.2 GM284M. This specification covers steel machine screw nuts and unfinished varieties of steel nuts intended primarily for assembly with bolts conforming to GM250M, GM255M, or GM260M. Any type of steel, standard with manufacturer, may be used provided the nuts will meet the proof stress requirement given in Table 1. Nuts shall not exceed a hardness of HRC30.

TABLE 1 - PROOF STRESS REQUIREMENTS

GM Material Number	GM 284M	GM286M						GM 301M	GM 305M	GM 456M
Thread Series	All	Coarse Thread			Fine Thread			All	All	All
Nominal Size, Inches	All	1/4 to 3/4 Incl	7/8 and 1	1-1/8 to 1-1/2 Incl	1/4 to 3/4 Incl	7/8 and 1	1-1/8 to 1-1/2 Incl	All	All	All
Type of Nut	Minimum Proof Stress, psi in thousands									
Hex Nuts	-	120.0	115.0	105.0	109.0	104.0	94.0	150.0	172.0	55.0
Jam	-	71.5	68.5	62.5	65.0	62.0	57.0	90.0	103.0	33.0
Slotted	-	96.0	91.0	84.0	87.0	83.5	76.5	120.0	138.0	44.0
Thick	-	144.0	138.0	126.0	144.0	138.0	126.0	180.0	207.0	66.0
Thick Slotted	-	116.0	111.0	102.0	116.0	111.0	102.0	144.0	165.0	53.0
Heavy Hex Nuts	-	120.0	115.0	105.0	120.0	115.0	105.0	150.0	172.0	55.0
Jam	-	71.5	68.5	62.5	71.5	68.5	62.5	90.0	103.0	33.0
Slotted	-	96.0	91.0	84.0	96.0	91.0	84.0	120.0	138.0	44.0
Hex Lock Nuts Washer Insert		See Table 3								
All-metal Directional Torque-Tension Hex Lock Nuts	-	120.0	115.0	-	120.0	115.0	-	150.0	-	-
Crown Nuts										
High	-	141.0	135.0	123.0	128.0	122.5	112.0	-	-	-
Low	-	132.0	126.0	115.0	120.0	115.0	105.0	-	-	-
Machine Screw Nuts	69.0	-	-	-	-	-	-	-	-	-
Unfinished Nuts	69.0	-	-	-	-	-	-	-	-	-

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2.3 GM286M. This specification covers steel nuts intended primarily for assembly with bolts conforming to GM280M, or bolts of lesser strength. Proof stress requirements for the various nut designs are given in Table 1. Nuts shall not exceed a hardness of HRC30.

2.3.1 These nuts should have a minimum hardness of HRB85; however, nuts having a lower hardness are acceptable providing the proof stress requirements are met. All-metal Directional Prevailing Torque-Tension Hex Locknuts shall not exceed a hardness of HRC28.

2.3.2 Quenched and tempered nuts shall be tempered at a minimum temperature of 455 C. Quenchant whose principal constituent is water shall not be used unless specifically approved by the purchaser.

2.3.3 These nuts also shall conform with GM6103M which specifies allowable limits for the various types of surface discontinuities that may occur during the manufacture and processing of such products. All nuts larger than one inch shall not exceed the surface discontinuity limits specified for one inch nuts.

2.3.4 Some steels which have been satisfactorily used to produce these nuts are: SAE 1108, 1109, 1110, 1113, 1115 and 12L14.

2.4 GM301M. This specification covers steel nuts intended primarily for assembly with bolts conforming to GM290M and GM300M. Proof stress requirements for these nuts are given in Table 1. Hardness shall conform to the following:

Sizes smaller than 1 inch HRC 24 to 32

Sizes 1 inch and larger HRC 26 to 34

2.4.1 Quenched and tempered nuts shall be tempered at a minimum temperature of 455 C. Quenchant whose principal constituent is water shall not be used unless specifically approved by the purchaser.

2.4.2 These nuts shall also conform with GM6103M which specifies allowable limits for the various types of surface discontinuities that may occur during the manufacture and processing of such products. All nuts larger than one inch shall not exceed the surface discontinuity limits specified for one inch nuts.

TABLE 2 - TENSILE STRESS AREAS OF THREADED SECTIONS

Nominal Size	Threads per Inch	Tensile Stress Area	Nominal Size	Threads per Inch	Tensile Stress Area	Nominal Size	Threads per Inch	Tensile Stress Area
		Square Inches			Square Inches			Square Inches
0	80	.00180	12	28	.0258	7/8	9	.462
1	64	.00263	1/4	20	.0318	7/8	14	.509
1	72	.00278	1/4	28	.0364	1	8	.606
2	56	.00370	5/16	18	.0524	1	12	.663
2	64	.00394	5/16	24	.0580	1	14	.680
3	48	.00487	3/8	16	.0775	1-1/8	7	.763
3	56	.00523	3/8	24	.0878	1-1/8	12	.856
4	40	.00604	7/16	14	.1063	1-1/4	7	.969
4	48	.00661	7/16	20	.1187	1-1/4	12	1.073
5	40	.00796	1/2	13	.1419	1-3/8	6	1.155
5	44	.00830	1/2	20	.1599	1-3/8	12	1.315
6	32	.00909	9/16	12	.182	1-1/2	6	1.405
6	40	.01015	9/16	18	.203	1-1/2	12	1.581
8	32	.0140	5/8	11	.226	1-3/4	5	1.90
8	36	.01474	5/8	18	.256	1-3/4	12	2.19
10	24	.0175	3/4	10	.334	2	4-1/2	2.50
10	32	.0200	3/4	16	.373	2	12	2.89
12	24	.0242						