LOCKING FASTENERS

TORQUE-TENSION REQUIREMENTS FOR PREVAILING-TORQUE TYPE STEEL HEX AND HEX FLANGE NUTS

IFI 101 1987

IFI Notes:

1. *IFI-101 is a standard developed through the procedures of the Industrial Fasteners Institute. IFI-101 is under the jurisdiction of IFI Division V and is the direct responsibility of its Engineering Committee.*
2. *IFI-101 defines torque-tension requirements for certain sizes and grades of cadmium plated and lubricated prevailing-torque type steel hex and hex flange nuts as covered in IFI-100/107, page F-6. IFI-101 is considered to be an extension of IFI-100/107.*
3. *IFI-101 was first published in 1967 and since that time has been periodically reviewed and updated. This latest edition was issued in 1987.*
4. *There are no American National Standards for torque-tension requirements of inch series prevailing-torque type nuts, nor are any contemplated.*

INTRODUCTION.

In some engineering applications, it is desirable to use nuts which have a capability of developing a known tensile load in the mating externally threaded component when a specific nut tightening torque is applied.

1.0 Scope.

This standard covers torque-tension requirements for 0.0002/0.0004 in. thickness electrodeposited cadmium plated and lubricated Grades B and C prevailing-torque type steel hex nuts in sizes ¼ to 1 in., incl., and Grades F and G prevailing-torque type steel hex flange nuts in sizes ¼ to ¾ in., incl.

The dimensional, mechanical and other performance requirements for these nuts are given in IFI-100/107, page F-6. IFI-100/107 shall be part of this standard.

The torque-tension requirements covered in this standard apply only to the combination of laboratory conditions described in the test procedure (3.0). If other conditions are met in an actual service application, (such as different plating or coating on the nut or on the externally threaded part, different surface against which the nut is torqued, etc.) torque values must be adjusted in order to develop an equivalent tensile load in the mating externally threaded component.

2.0 Torque-Tension Requirements.

When the nut is tested as specified in 3.0, the nut tightening torque shall not exceed the maximum nor be less than the minimum torque values given in Table 1 for the applicable grade and thread series.

3.0 Torque-Tension Test.

The torque-tension test shall be conducted using a load measuring device (5.3.3 of IFI-100/107). A test bolt (5.3.4 of IFI-100/107) shall be inserted in the load measuring device, a hardened washer (5.3.5 of IFI-100/107) placed on the bolt, and the nut then assembled on the bolt and advanced until it is seated against the hardened washer. The length of the test bolt shall be such that when the nut is seated on the washer, a length equivalent to 6 to 9 thread pitches of the test bolt shall protrude through the top of the nut. The nut shall then be tightened manually with a torque wrench, or with an equivalent torque sensing power device, until a tensile load equal to the clamp load, as specified for the applicable grade and thread series in Table 1, is developed in the bolt. The torque necessary to develop this load shall be recorded and shall meet the requirements specified in 2.0.

Torque measuring devices (torque wrench or power device) shall be as specified in 5.3.2 of IFI-100/107.

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During all tests the hardened washer shall be prevented from turning during nut tightening.

If convenient, the torque-tension test may be conducted in conjunction with the prevailing torque test (5.3 of IFI-100/107).

4.0 Inspection.

4.1 Inspection procedure. Nuts shall be inspected to determine conformance with this standard. Inspection procedures may be specified by the purchaser on the inquiry, purchase order, or the engineering drawing or shall be as agreed upon between the purchaser and supplier prior to the acceptance of the order. In the absence of a defined agreement, the requirements of B18.18.2M shall apply.

Table 1 Torque-Tension Requirements for Prevailing-Torque Type Nuts

Nut Size and Threads Per Inch	Grade B Nuts			Grade C Nuts			Grade F Nuts			Grade G Nuts		
	Clamp Load (1) lb	Nut Tightening Torque (3)		Clamp Load (2) lb	Nut Tightening Torque (3)		Clamp Load (1) lb	Nut Tightening Torque (3)		Clamp Load (2) lb	Nut Tightening Torque (3)	
		Max	Min		Max	Min		Max	Min		Max	Min
Coarse Thread Series												
1/4 — 20	2,000	85	60	2,850	125	85	2,000	95	65	2,850	150	100
5/16 — 18	3,350	150	110	4,700	190	130	3,350	180	120	4,700	240	155
3/8 — 16	4,950	20	14.5	6,950	28	20	4,950	26	16	6,950	32	21
7/16 — 14	6,800	32	23	9,600	43	31	6,800	42	28	9,600	51	34
1/2 — 13	9,050	50	37	12,800	62.5	45	9,050	57	38	12,800	85	55
9/16 — 12	11,600	70	50	16,400	95	70	11,600	85	55	16,400	120	80
5/8 — 11	14,500	95	70	20,300	122.5	90	14,500	112	75	20,300	143	95
3/4 — 10	21,300	165	125	30,100	210	155	21,300	195	135	30,100	240	160
7/8 — 9	29,500	250	185	41,600	312.5	225	—	—	—	—	—	—
1 — 8	38,700	375	275	54,600	462.5	360	—	—	—	—	—	—
Fine Thread Series												
1/4 — 28	2,300	90	65	3,250	125	85	2,300	115	75	3,250	160	105
5/16 — 24	3,700	160	120	5,200	200	140	3,700	200	130	5,200	230	155
3/8 — 24	5,600	22	16	7,900	29	21	5,600	25	17	7,900	33	22
7/16 — 20	7,550	34	24	10,700	43	31	7,550	45	30	10,700	60	40
1/2 — 20	10,200	52.5	37.5	14,400	70	50	10,200	66	44	14,400	89	59
9/16 — 18	13,000	77.5	57.5	18,300	95	70	13,000	94	62	18,300	132	88
5/8 — 18	16,300	97.5	72.5	23,000	125	90	16,300	120	80	23,000	175	115
3/4 — 16	23,800	165	120	33,600	210	155	23,800	192	128	33,600	270	170
7/8 — 14	32,400	270	200	45,800	312.5	225	—	—	—	—	—	—
1 — 14	43,300	400	300	61,100	500	362.5	—	—	—	—	—	—

NOTES:

1. Clamp loads for Grades B and F nuts equal 75% of the proof loads specified for SAE J429 Grade 5 and ASTM A449 bolts.
2. Clamp loads for Grades C and G nuts equal 75% of the proof loads specified for SAE J429 Grade 8 and ASTM A354 Grade BD bolts.
3. Torque values for 1/4 and 5/16 in. sizes are in in.lbs. All other torque values are in ft.lbs.