

Iowa Department of Transportation

ROTATIONAL-CAPACITY TEST

Long Bolt Procedure 1-5-95

(For bolts too short to be tested in a Skidmore.)

County _____ Project # _____

Test Number _____

Date _____

Inspector _____

Design # _____

Fastener Type BLACK GALVANIZED
 Field Relubrication for this test Yes _____ No _____

Calculations	
Bolt diameter*D* = _____ inches	
4D = _____ in.	8D = _____ in.
Bolt Length = _____ inches	

R – C PROCEDURE (IM 452.06B)	
Measured Torque at Snug Tight = _____ ft-lbs	Range given in TABLE 1
Measured Torque after Initial Rotation = _____ ft-lbs	Rotation given in TABLE 2
Is Torque < TABLE 3? _____	Yes, Continue test No, R – C Lot Fails
Complete R-C Test Rotation	Total rotation required by § - C test given in TABLE 4.
Condition of Fastener:	Nut OK? _____ Bolt OK? _____ Pass? _____

Production Lot # _____ Notes _____
 Bolts _____
 Nuts _____
 Washers _____
 R – C Lot # _____

R – C Procedure from IM 453.06 B Appendix A	
1. Place fastener into an appropriate size hole in any available splice. Use washer/shims under "turned" element. Need a minimum 3 to 5 exposed threads behind the nut. (NOTE: May use a maximum of 3 washers &/or shim plates.)	
2. Initially tension fastener to values listed in TABLE 1.	
3. Match mark bolt tip, nut corner, washer/shims, and the base steel. (Mark shall be a straight line.)	
4. Tighten fastener to rotation specified in TABLE 2. NOTE: Same rotation required for Turn-of-Nut.	
5. Record torque when rotation in Step 4 is achieved. (Torque is read with nut in motion.)	
6. Torque shall not exceed values in TABLE 3. If Step 5's torque is LESS THAN "Maximum" allowable, fastener lot passes first phase of R – C testing. If torque is GREATER, fastener lot fails. Entire lot may be relubricated and retested or else lot is replaced and tested.	
7. Complete nut rotation to total rotation required by TABLE 4. NOTE: Rotation is measured from initial reference marked in Step 3 and is 2 times the rotation required for Turn-of-Nut.	
8. Loosen nut, remove bolt, and inspect bolt and nut for visible signs of damage. Damage could be thread stripping, nut does not run freely to location of test shims, nut is cracked, bolt is cracked in the threads, etc. If there is evidence of damage, the bolt lot is rejected. Entire lot may be relubricated and retested or else replaced and tested.	
9. Conduct test on two randomly selected fasteners for each lot to be incorporated into the structure. Both tested fasteners must pass the R – C test to accept that lot.	

Misc. Information

TABLE 1

Bolt Dia.	Initial Tension Range (ft-lbs)
3/4"	50 to 100
7/8"	80 to 160
1"	120 to 240
1-1/8"	150 to 300

TABLE 2

Bolt Length	Initial R – C (Turns)
L ≤ 4D	1/3
4D < L ≤ 8D	1/2
8D < L ≤ 12D	2/3

TABLE 3

Bolt Dia.	Max Torque (ft-lbs)
5/8"	290
3/4"	500
7/8"	820
1"	1230
1-1/8"	1500

TABLE 4

Bolt Length	Total R – C Turns
L ≤ 4D	2/3
4D < L ≤ 8D	1
8D < L ≤ 12D	1 1/3

Bolt Diameters

Fraction	Decimal
5/8"	0.625"
3/4"	0.750"
7/8"	0.875"
1-1/8"	1.125"

ASTM GRADES FOR

Blk & Galv	Bolt A 325
Black	Nut A 194
Galvanized	Nut A 563
Blk & Galv	Washer F 436