



Iowa Department of Transportation

ROTATIONAL—CAPACITY TEST
Short Bolt Procedure 1-5-95
(For bolts too short to be tested in a Skidmore.)

Test Number _____
Date _____
Inspector _____

County _____ Project # _____ Design # _____

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

Calculations

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

Misc. Information

R – C PROCEDURE (I.M. 453.06 B)

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 R – C test given in TABLE 4.

Condition of Fastener: Nut OK? _____, Bolt OK? _____, PASS? _____

Production Lot# _____ NOTE _____ S: _____
Bolts _____
Nuts _____
Washers _____
R – C Lot # _____

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

R – C Procedure from I.M. 453.06 B, Appendix A

- 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.)
- Initially tension fastener to values listed in TABLE 1.
- Match mark bolt tip, nut corner, washer/shims, and the base steel. (Mark shall be a straight line.)
- Tighten fastener to rotation specified in TABLE 2.
NOTE: Same rotation required for Turn-of-Nut.
- Record torque when rotation in Step 4 is achieved. (Torque is read with nut in motion.)
- 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.
- 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.
- 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.
- 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.

