

**CONSTRUCTION INSPECTOR'S CHECKLIST  
FOR  
STRUCTURAL STEEL BOLTING**

The installation of fasteners in bridge connections is a critical element in the proper behavior of the structure. All connections are to be installed, tightened and inspected in accordance with the latest issue of the Specifications for Structural Joints using A325 or A490 Bolts for slip critical connections as issued by the Research Council on Structural Connections of the Engineering Foundation. The pertinent parts of this specification are discussed in detail in Section 500 of the Construction Manual. While its use is not required, this checklist is provided to give the inspector a quick overview of the requirements. Before beginning any fastener installation the inspector should read and be familiar with all of the requirements for the type of fastener used. If your answer to any of the following questions is no, STOP and review the required information before continuing.

**1. PRE-INSTALLATION INSPECTION**

Have you read Section 505 of the Standard Specifications, the Supplemental Specifications, the Special Provisions and Section 500 of the Construction Manual? \_\_\_\_\_

Are all fasteners being stored in their original containers so that they are protected from dirt and moisture or intermixing of lots? Lids should be on and the containers not stored under plastic. \_\_\_\_\_

Do all delivered fastener assemblies have approved manufacturer's markings? Markings should be on the containers, not just the lids. (505.04)(f)(3)(f)(1) \_\_\_\_\_

**CONTAINER INFORMATION REQUIREMENTS:**

- A. Manufacturer identification
- B. Contents
- C. Component lot numbers (verify with MCTR)
- D. R-C lot number

Have you received the required certifications from the mill, the manufacturer and/or distributor? (505.04)(f)(3)(f)(2) \_\_\_\_\_

**MILL TEST REPORT (MTR) 505.04(f)(3)(e)(1)**

- A. From steel producer on their form
- B. One report for each component
- C. Report must contain following:
  - 1. Heat number
  - 2. Chemical analysis
  - 3. Location where melted and manufactured
  - 4. Location where tests conducted
  - 5. Date of tests

MANUFACTURER CERTIFIED TEST REPORT (MCTR) 505.04(f)(3)(e)(2)

- A. From each component manufacturer to document any tests they performed
- B. Report must contain the following:

- 1. Mill heat numbers (verify with MTR)
- 2. Manufacturer lot number (verify with container)
- 3. Test results

BOLT	A.	Proof load test minimum values:	1/2 in. bolt	12,050 lbs.
			5/8 in. bolt	19,200 lbs.
			3/4 in. bolt	28,400 lbs.
			7/8 in. bolt	39,250 lbs.
			1 in. bolt	51,500 lbs.
	B.	Wedge tensile test (10° with no head failures 1/4 in. to 1 in.) (6° with no head failures over 1 in.)		
		minimum values:	1/2 in. bolt	17,050 lbs.
			5/8 in. bolt	27,100 lbs.
			3/4 in. bolt	40,100 lbs.
			7/8 in. bolt	55,450 lbs.
		1 in. bolt	72,700 lbs.	
C.	Hardness test	≤ to 1 in. bolt	min. 24RC	max. 34RC
		> 1 in. bolt	min. 19RC	max. 31RC
D.	Galvanization thickness		min. 2 ml.	max. 6 ml.
E.	R-C test			
		1. Component lot number		
		2. R-C lot number		
		3. Location and date of tests		
NUT	A.	Proof load test minimum values:	1/2 in. nut	20,450 lbs.
			5/8 in. nut	32,550 lbs.
			3/4 in. nut	48,100 lbs.
			7/8 in. nut	66,550 lbs.
			1 in. nut	87,250 lbs.
B.	Hardness test	C and C3 nuts	B78 to C38	
		DH and 2H nuts	C24 to C38	
C.	Galvanization thickness		min. 2 ml.	max. 6 ml.
WASHER	A.	Hardness test	black and mech. galv. hot dip galv.	C38 to C45 C26 to C45
	B.	Galvanization test		min. 2 ml.      max. 6 ml.

- 4. Certification statement

DISTRIBUTOR CERTIFIED TEST REPORT (DCTR) 505.04(f)(3)(e)(3)

- A. Prepared by distributor
- B. Documents R-C tests they performed and lot numbers assigned
- C. Must contain the following:
  - 1. Manufacturer lot numbers (verify with MCTR)
  - 2. R-C test results
  - 3. Location and date of tests
  - 4. R-C lot numbers
  - 5. Certification statement

NOTE: Galvanized fastener assemblies must have all physical tests performed after galvanization. Therefore the test results could be on either the MCTR or the DCTR depending on who had the components coated.

Do all containers have an ILL OK stamp on them or have you received a letter from the Bureau of Materials and Physical Research approving the fasteners? If not, have you sent the required samples to Materials for testing? No installation should begin until you have received the results. \_\_\_\_\_

Do all delivered fasteners have lubrication? Black fasteners should be oily to the touch; galvanized nuts should have a visible tinted lubricant on them. (505.04)(f)(4)(g)(2a & b), 1006.08 \_\_\_\_\_

Has the contractor supplied a tension calibrating device? The device must have been calibrated within the last year and the calibration results must be included. The device must be capable of testing the following minimum bolt lengths (505.04)(f)(2):  
5/8" and 3/4" : 2"  
7/8" : 2.25"  
1" : 2.5" \_\_\_\_\_

Have you performed rotational capacity tests on two assemblies from each rotational capacity lot and recorded the results? (505.04)(f)(3)(g)(1) \_\_\_\_\_

**INSPECTION DURING INSTALLATION**

Has the contractor demonstrated that the procedure to be used by the bolting crew will provide the required tension in a tension calibrating device? Does each bolting crew member fully understand the tightening procedure to be used? (505.04)(f)(2) \_\_\_\_\_

Are only enough fasteners that can be used during a work shift being removed from storage and are all unused fasteners being returned to storage in their original containers at the end of each work shift? \_\_\_\_\_

Are all of the holes in the splices and field connections being filled with bolts before any bolt tightening is begun? On continuous span beams no bolt tightening shall begin until the entire length is in place. (505.04)(f)(2) \_\_\_\_\_

Are all fasteners in a connection being brought to snug tight before final tightening is begun? Snug tight should bring all the plies of a connection into

contact with each other. Start at the most rigid part (near the center) of the connection and work toward the free edges. (505.04)(f)(2) \_\_\_\_\_

Are all fasteners being brought to the required minimum tension in accordance with the Specifications? Start at the most rigid part (near the center) of a connection and work toward the free edges. (505.04)(f)(2) \_\_\_\_\_

If at any time during installation you suspect the level of lubrication of the fastener has changed, are you conducting additional rotational capacity testing? \_\_\_\_\_

Are you monitoring the installation to assure that the installation method is being properly applied? \_\_\_\_\_

Are you inspecting each completed connection as required by the specification for the type of fastener used? \_\_\_\_\_

Galvanized and A490 bolts can not be reused. A325 black bolts may be reused if allowed by your supervisor. Additional tightening is not considered reuse. \_\_\_\_\_

**TURN-OF-THE-NUT METHOD**

After snug tightening has each bolt or socket been marked so that the required turn can be verified? (505.04)(f)(2)(d) \_\_\_\_\_

Is the unturned element being prevented from turning? \_\_\_\_\_

If impact wrenches are being used, are they of sufficient capacity so that the required turn is being performed in approximately 10 seconds? \_\_\_\_\_

Is tightening progressing from the most rigid part (near the center) to the free edges? \_\_\_\_\_

Are all bolts being tightened using the required turn of the nut? \_\_\_\_\_

Are you visually checking the match marks to ensure that each fastener has been turned the amount necessary to achieve the required minimum tension? (505.04)(f)(2)(d)(2) \_\_\_\_\_

**TWIST-OFF BOLTS**

Following the snug tightening operation, are all fasteners being tightened until the control or indicator element is twisted off? (505.04)(f)(2)(b) \_\_\_\_\_

Is tightening progressing from the most rigid part (near the center) to the free edges? (505.04)(f)(2) \_\_\_\_\_

Are you monitoring the tightening operation to ensure that the proper procedure is routinely being followed? \_\_\_\_\_

Are you visually checking that each control or indicator element has sheared? \_\_\_\_\_

Are you tapping each fastener with a hammer to ensure there are no loose fasteners? \_\_\_\_\_

Is the Contractor cleaning and painting the exposed end? Cleaning may be accomplished with a wire brush or power tool. Painting shall consist of one coat (5.0 mils minimum thickness) of an approved high-build aluminum epoxy mastic. (505.04)(f)(2) \_\_\_\_\_

**LOCK PIN AND COLLAR**

Following the snug tightening operation, are all fasteners being tightened until the control or indicator element is broken off? (505.04)(f)(2)(c) \_\_\_\_\_

Is tightening progressing from the most rigid part (near the center) to the free edges? (505.04)(f)(2) \_\_\_\_\_

Are you monitoring the tightening operation to ensure that the proper procedure is routinely being followed? \_\_\_\_\_

Are you visually checking that each control or indicator element has broken? Are you randomly measuring the collar dimensions to ensure they are within the allowable tolerances shown in the manufacturer's table? (505.04)(f)(2)(c) \_\_\_\_\_

Is the Contractor cleaning and painting the exposed end? Cleaning may be accomplished with a wire brush or power tool. Painting shall consist of one coat (5.0 mils minimum thickness) of an approved high-build aluminum epoxy mastic. (505.04)(f)(2) \_\_\_\_\_

**DIRECT TENSION INDICATORS**

Following the snug tightening operation, are you checking that the number of spaces in which a 0.005 inch gage is refused does not exceed the allowable value? (505.04)(f)(2)(a)(2) \_\_\_\_\_

Is tightening progressing from the most rigid part (near the center) to the free edges? (505.04)(f)(2) \_\_\_\_\_

Are you monitoring the tightening operation to ensure that the proper procedure is routinely being followed? \_\_\_\_\_

Are you visually checking that all gaps are not completely closed? (505.04)(f)(2)(a)(2) \_\_\_\_\_

Are you checking that the number of spaces in which a 0.005 inch gage is refused is equal to or greater than the allowable value? (505.04)(f)(2)(a)(2) \_\_\_\_\_