

## CET Field Inspection and Repair Procedure

<b>DOCUMENT INFORMATION</b>	<b>Title:</b>	<b>Field Inspection Procedure for Used/Phosphate Coated/Post-Make-and-Break CET Connections</b>
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### 1. Scope:

The following procedure details the equipment, inspection methods, and acceptance criteria for field inspection and repair of used, post-make-and-break, phoscoated, and cold-rolled CET connections. This is both a visual and dimensional inspection.

### 2. Equipment:

The equipment listed below, with a valid annual calibration (if so indicated) against NIST traceable standards, is required to perform the dimensional checks:

- a) 12" Steel Rule graduated in 1/64" increments
- b) Outside Dial Caliper for OD Measurements (calibration required)
  - i.) Model: Mitutoyo 505-677 or equivalent
- c) Telescoping Gage for ID Measurements
  - i.) Model: Fowler F52-470-006 or equivalent
- d) Long Stroke Depth Micrometer (calibration required)
  - i.) Model: Starrett 445 or equivalent
- e) Length Standards for Depth Micrometer (calibration required)
  - i.) Model: Mitutoyo 167-144 or equivalent
  - ii.) Model: Mitutoyo 167-145 or equivalent
- f) Profile Gage (calibration required)
  - i.) Model: Gagemaker TP-23-50-JSS or equivalent
- g) Field Inspection Dimension Drawings
  - i.) CET Box Field Inspection Drawing
  - ii.) CET Pin Field Inspection Drawing

NOTE: All measuring equipment shall be at same temperature as inspection piece, +/- 10°F.

### 3. Receiving Pre Inspection

All drill pipe received for field inspection shall be examined on the carrier for general condition such as damage, straightness, markings. Note if and how many thread protectors are missing. If there is any indication of damage, photograph the pipe on the carrier before unloading and contact the Command Energy Field Services representative before continuing.

After unloading, remove thread protectors and note general condition of all box and pin ends, particularly the absence of dope or any obvious damage. If significant do a full count, photograph typical problems and contact Command Energy Field Services representative before continuing.

Record results, sign and date report and attach or reference photographs

## **4. Preparation:**

All thread and make-up shoulder surfaces shall be cleaned sufficiently so that no residue of any kind can be wiped from the thread or shoulder surfaces with a clean rag. Connections should be 100% dope free and cleaned with a solvent to remove dope if necessary.

## **5. Visual inspection:**

### **5.1 Primary Shoulder (Seal):**

The seal surface should be free of galls, nicks, washes, fins, or other conditions that would affect its joint stability or pressure holding capacity.

Damage that does not exceed 1/32" in depth and crosses less than 50% of the radial width of the seal is acceptable. If the damage exceeds these limits, re-facing shall be used to repair the seal surface.

The re-facing repair should only remove enough material to repair the damage. A maximum of 1/32" of material may be removed during each re-facing operation and a maximum of 1/16" may be removed from the connection before re-threading is required. Refer to the Field Inspection Drawing for benchmark measurements and tolerances.

Both the Primary Seal and the Secondary Shoulder must be re-faced at the same time to ensure that proper connection length is maintained. Connection Lengths shall be as per the Field Inspection Drawing.

### **5.2 Secondary Shoulder (Mechanical Stop):**

The Secondary Shoulder is not a sealing surface. Damage to this surface is not critical unless the damage interferes with the make-up, the ability to pass a drift through the ID, or torque capacity of the connection.

Dents, scratches, and cuts do not affect this surface unless these exceed 1" in width and cause the connection to be rejected due to shortening of the shoulder to shoulder length. Filing may be used to repair material protrusions, which extend from the face. Connection length readings shall not be taken in damaged areas.

### **5.3 Thread Damage:**

Thread flank surfaces should be free of damage that exceeds 1/16" in depth or 1/8" in diameter. Thread roots should be free of damage that extends below the radius. Thread crest should be free of damage that would interfere with make-up. Material that protrudes beyond the thread profile should be removed using a round cornered triangle hand file or soft buffing wheel.

### **5.4 Thread Profile:**

The thread profile shall be verified along the full length of complete threads in two locations at least 90° apart. The profile gage should mesh evenly in the threads and show normal contact. If there is a significant profile mismatch, compare to thread pin/ box connection length, pin nose diameter and box counterbore diameter to determine if connection has deformed / yielded / stretched, etc. A lead gage may be used to determine evidence of stretch but shall not be used for acceptance. If there is any evidence of deformation, the connection shall be recut.

### **5.5. Coating:**

## **CET Field Inspection and Repair Procedure**

Threads and shoulders that are repaired by filing or re-facing must be phosphate coated or by using copper sulfate.

### **6. Dimensional Inspection:**

#### **6.1. Box Outside Diameter:**

The outside diameter of the box shall be measured at a distance of 5/8" +/-1/4" from the primary make-up shoulder. Measurements shall be taken around the circumference to determine the minimum diameter. This dimension shall be compared to the minimum diameter for the connection being inspected to determine acceptance or rejection.

#### **6.2. Box Counter Bore Diameter:**

The inside diameter of the box counter bore shall be verified in two locations 90 degrees apart. This dimension is used to determine ovality and box swell. Acceptance or rejection based on this criteria is dependent on the inspection level per the customer.

#### **6.3. Box Connection Length:**

The distance between the primary and secondary make-up shoulders shall be verified in two locations 180° apart. Use the depth micrometer to measure the total distance from primary to secondary make-up shoulders, do not use calipers. This distance shall be compared to requirement for the connection being inspected to determine acceptance or rejection.

If the measurement is found to be out of tolerance, two additional measurements shall be taken at 180° adjacent to the original measurements to confirm. If the additional measurements are found to be within tolerance, the connection is OK.

If the connection length exceeds the specified dimension, repair may be made by re-facing the primary make-up shoulder.

If the connection length is less than the specified dimension, re-facing the secondary make-up shoulder may be adequate to repair this condition.

Re-facing limits are the same as for repair of damaged shoulders. (Reference 4.1)

Connection length shall be as per the relevant Field Inspection Drawing.

#### **6.4. Pin Nose Diameter:**

The outside diameter of the pin nose shall be verified. This dimension is not used to determine acceptance or rejection, but to test for pin nose swell and the need to verify connection length.

#### **6.5. Pin Connection Length:**

The distance between the primary and secondary make-up shoulders shall be verified in two locations 180° apart. Use the depth micrometer to measure the total distance from primary to secondary make-up shoulders, do not use calipers. This distance shall be compared to requirement for the connection being inspected to determine acceptance or rejection.

## **CET Field Inspection and Repair Procedure**

If the measurement is found to be out of tolerance, two additional measurements shall be taken at 180° adjacent to the original measurements to confirm. If the additional measurements are found to be within tolerance, the connection is OK.

If the connection length exceeds the specified dimension, repair may be made by re-facing the secondary make-up shoulder (pin nose).

If the connection length is less than the specified dimension, re-facing the primary make-up shoulder may be adequate to repair this condition.

Re-facing limits are the same as for repair of damaged shoulders. (Reference 4.1)

Connection length shall be as per the relevant Field Inspection Drawing.

### **6.6. Tong Length:**

A minimum tong space of 6" is required for both the pin and box. Tong space shall be measured from the seal face to the closest edge of the hardbanding if hardbanding is present. If there is no hardbanding then the tong space is measured from the seal face to the end of the tool joint.

## **7. Re-threading:**

This method shall be used to repair connections that fail to meet the requirements stipulated in this inspection procedure after field repair is completed. This operation shall be performed by a Command licensed repair facility.

## **8. Additional Notes:**

- This procedure for all CET connections.  
The relevant field inspection drawing for the specific connection shall be used.
- There is a requirement for using calibrated equipment.
- In the section "Receiving Pre Inspection" pipe on a carrier shall be visually examined for damage prior to unloading. A record of the inspection is required and a CES rep notified if necessary so that Management is immediately aware of any potential issues. Repeat the procedure after cleaning all threads.
- The thread profile inspection has been linked to dimensional inspections to determine if there is significant deformation due to material problems, over or under torqueing. A lead gage may be used to check for stretch but shall not be used for acceptance.