Static Bonding for TOC Equipment

Tank Farm Maintenance Procedure

USQ # N/A-4

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides static bonding instructions for work on TOC equipment that requires static bonding.

1.2 Scope

This procedure applies only to devices, objects, or equipment that do not have the potential to become energized from an electrical source.

2.0 INFORMATION

NONE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Equipment Safety

CAUTION - Failure to have sufficient slack for arrangement of wire and cable outside of traffic areas when connecting static bonding may cause inadvertent damage or disconnection of bonding after installation.

3.2 Radiation and Contamination Control

Work in radiological areas will be performed using a radiological work permit following review by Radiological Control per ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.
### 3.3 Limits

3.3.1 This procedure applies to waste tank systems subject to TSR and Administrative Controls for flammable gas or where Engineering has determined static bonding is required.

3.3.2 Additional static bonding is not required for objects or equipment that are electrically grounded and bonded per NFPA-70 (NEC).

3.3.3 Wire or cable used for static bonding shall be flexible and of adequate size to ensure sufficient mechanical strength for its application as determined by the qualified electrical worker or electrical engineer.

3.3.4 Wire or cable used for static bonding may be insulated or un-insulated. If insulated wire or cable is used, its continuity shall be verified by a qualified electrical worker and recorded in the work record of the document that requires static bonding.

3.3.5 Connectors used for static bonding must be appropriate for the application and provide a secure connection as determined by the qualified electrical worker or electrical engineer.

3.3.6 Connectors typically used for static bonding are pressure-type ground clamps, brazing, welding, battery-type clamps, magnetic clamps, or other special clamps that provide metal-to-metal contact. Drill and tap bonding methods may also be used.

3.3.7 Special care should be taken when using magnetic clamps to attach bonding jumpers. Due to surface geometries and coatings, magnetic clamps may not make good contact with the bonded objects or may slip or be pulled off bonded objects during work activities.

3.3.8 Verification of static bonding requires an inspection by the qualified electrical worker to ensure bonding is in good condition and connections are secure (after initial installation) prior to use.
4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies will be needed to perform this procedure:

NOTE - Wire size for static bonding is dictated by mechanical strength rather than current-carrying capacity (NFPA-77, 3-3.1.3). Conductor length should allow sufficient slack for ease in handling and help prevent inadvertent damage or disconnection of bonding after installation.

- Bonding wire or jumper, with connectors when required
- Cleaning materials, nonflammable solvent
- Calibrated Multimeter or ohmmeter.
5.0 PROCEDURE

NOTE - Sections 5.1 and 5.2 may be worked individually, independently, or concurrently as the field conditions dictate.

- Connecting bonding wires or cables to survey benchmarks is not allowed.
- Any bonding wire or attachment point configuration that would interfere with riser elevation surveys is not allowed.

5.1 Connect Static Bonding to Grounded Equipment

CAUTION

Failure to have sufficient slack for arrangement of wire and cable outside of traffic areas when connecting static bonding may cause inadvertent damage or disconnection of bonding after installation.

5.1.1 ENSURE when arranging wiring and/or cabling used for static bonding that adequate slack is provided to allow running outside of traffic areas.

NOTE - For multiple connections, a common connection point or bus bar may be used and separate components may be bonded concurrently.

5.1.2 IF multiple static bonding connections are required, USE of any one or more of the following types of connections is allowed and separate components may be bonded concurrently;
- A common connection point
- A bus bar.

5.1.3 LOCATE metal area on stationary portion of grounded equipment or bus bar.

5.1.4 CLEAN metal area to ensure metal-to-metal contact.

5.1.5 CONNECT one end of bonding wire to metal area of ground.

5.1.6 CONNECT free end of bonding wire to ungrounded object.

NOTE - Measurement of resistance and documentation of bonding (Step 5.1.7) may be performed after all bonding has been completed.

5.1.7 MEASURE resistance from metal area(s) to be bonded to grounding device to verify resistance is less than 1-megohm AND

RECORD on work document that object or equipment is properly bonded.
5.1 Connect Static Bonding to Grounded Equipment (Cont.)

5.1.8 MEASURE resistance between metal areas to be bonded to verify resistance is less than 1-megohm AND
RECORD on work document that object or equipment is properly bonded.

5.1.9 REPEAT Steps 5.1.1 through 5.1.8 for each object or equipment to be bonded.

5.1.10 RECORD M&TE and Calibration Due Date of instrument(s) used on the work record of the work document that requires static bonding.

NOTE - Bonded objects or equipment are considered to remain bonded as long as bonding stays intact. A qualified electrical worker should ensure bonding integrity at regular intervals (weekly, for work evolutions greater than a week), especially whenever a break or other discontinuity is suspected.

5.1.11 IF a break or other discontinuity is suspected, PERFORM the following,

OR

PERFORM the following weekly to ensure bonding integrity when the work evolution spans a week or longer,

5.1.11.1 IF static bonding is broken or disconnected during work activities, RE-INSTALL bonding as follows:

a. REPAIR OR REPLACE static bonding AND
RECORD any repairs or replacements in work document.

5.1.11.2 MEASURE resistance from device to device to verify resistance is less than 1-megohm AND
RECORD on work document that object or equipment is properly bonded.

5.1.11.3 MEASURE resistance between metal areas to be bonded (working surfaces) to verify resistance is less than 1-megohm AND
RECORD on work document that object or equipment is properly bonded.

5.1.11.4 RECORD M&TE and Calibration Due Date of instrument(s) used on the work record of the work document that requires static bonding.
5.2 Connect Static Bonding to Un-Grounded Equipment

CAUTION
Failure to have sufficient slack for arrangement of wire and cable outside of traffic areas when connecting static bonding may cause inadvertent damage or disconnection of bonding after installation.

5.2.1 ENSURE when arranging wiring and/or cabling used for static bonding that adequate slack is provided to allow running outside of traffic areas.

5.2.2 IF multiple static bonding connections are required, USE of any one or more of the following types of connections is allowed and separate components may be bonded concurrently;
  • A common connection point
  • A bus bar
  • Multiple bonding wires.

5.2.3 LOCATE metal areas on equipment to be bonded.

5.2.4 CLEAN metal areas to ensure metal-to-metal contact.

5.2.5 CONNECT bonding wire(s) to metal areas of equipment to be bonded.

NOTE - Step 5.2.6 may be performed after all bonding has been completed.

5.2.6 MEASURE resistance from metal to metal of areas to be bonded (working surfaces) to verify resistance is less than 1-megohm AND RECORD on work document that object or equipment is properly bonded.

5.2.7 RECORD M&TE and Calibration Due Date of instrument(s) used on the work record of the work document that requires static bonding.
5.2 Connect Static Bonding to Un-Grounded Equipment (Cont.)

NOTE - Bonded objects or equipment are considered to remain bonded as long as bonding stays intact. A qualified electrical worker should ensure bonding integrity at regular intervals (weekly, for work evolutions greater than a week), especially whenever a break or other discontinuity is suspected.

5.2.8 IF a break or other discontinuity is suspected, PERFORM the following, OR

PERFORM the following weekly to ensure bonding integrity when the work evolution span a week or longer,

5.2.8.1 IF static bonding is broken or disconnected during work activities, RE-INSTALL bonding as follows:

a. REPAIR OR REPLACE static bonding AND RECORD any repairs or replacements in work document.

5.2.8.2 MEASURE resistance from metal to metal of area(s) to be bonded (working surfaces) to verify resistance is less than 1-megohm AND

RECORD on work document that object or equipment is properly bonded.

5.2.8.3 RECORD M&TE and Calibration Due Date of instrument(s) used on the work record of the work document that requires static bonding.
5.3 Restoration

5.3.1 DISCONNECT static bonding after all work activities are complete.

5.3.2 DISCONNECT bonding wire from bonded objects.

5.3.3 DISCONNECT bonding wire from tank farm equipment.

5.3.4 DOCUMENT that bonding has been removed on work record of work document that required equipment to be bonded.

5.3.5 IF work activities affected Operations equipment, NOTIFY Operations that static bonding removal activities have been completed and systems have been returned to As-Found condition.

5.4 Acceptance Criteria

Satisfactory completion of the steps within this procedure, and bonding resistance between metal areas to be bonded are less than 1 megohms, satisfies Acceptance Criteria for this procedure.

5.5 Review

5.5.1 INFORM FWS that testing is complete.

5.5.2 FWS SHALL REVIEW AND ENSURE the following:

- Acceptance Criteria is met by properly documenting required information on work record of the work document that required equipment to be bonded
- Comments sections are filled out appropriately
- Work requests needed as a result of this procedure are identified and generated
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Work Record.

5.6 Records

The performance of this procedure generates no records. However, PM Data Sheets associated with the procedure, are records and are maintained in the work package as record material.

The record custodian identified in the Company-level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.