

TESTING AND INSPECTION REQUIREMENTS (FROM DSA IR 19-1):
 Post-installed anchors shall be tested in accordance with the provisions of Section 1923A.3.5, by an LEA accepted testing facility, unless approval of an alternative individual is obtained in advance from the DSA Field Engineer for the project.

If any anchor fails testing, test all anchors of the same type, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency. If the anchors are used for the support and bracing of non-structural components (pipe, duct or conduit), the twenty (20) shall be only those anchors installed by the same trade. Refer to Note 8 on the Test Values Table (attached) for acceptance/failure criteria.

Regardless of which test method is chosen by the consultant, test values and all appropriate criteria shall be shown on the contract documents.

1. Expansion-type Anchors

1.1. Setting verification:

1.1.1. Torque-controlled anchors: Following attainment of 10% of the required torque, torque-controlled anchors shall not require more than six (6) additional complete turns of the nut during installation to achieve the manufacturer's specified installation torque. The extent of bolt projection after installation shall be measured to confirm that this requirement has been met.

1.1.2. Displacement-controlled anchors: The position of the plug in the anchor shell shall be checked with the manufacturer-supplied installation tool or other appropriate device. The position of the plug shall conform to the manufacturer's specifications.

1.2. Testing:

1.2.1. An acceptable testing procedure is attached to this IR. The test load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring loaded devices, or a calibrated torque wrench. Displacement-controlled anchors such as drop-ins shall not be tested using a torque wrench.

1.2.2. Required test loads may be determined by either of the following methods:

1.2.2.1. Twice the allowable tension load as determined in Section 2, or;

1.2.2.2. Tension or torque test values from the table and procedures attached to this IR.

1.2.3. Anchors tested with a hydraulic jack should exhibit no discernible movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.

1.2.4. Anchors tested with a calibrated torque wrench must attain the specified torque within 1/2 turn of the nut.

1.2.5. **Exceptions:** Undercut anchors that are so designed to allow visual confirmation of full set, need not be tension or torque tested. If the manufacturer's installation torque is less than the specified test torque, use the manufacturer's specified installation torque for testing the anchor.

2. Epoxy-type (adhesive) Anchors

2.1. Epoxy-type (adhesive) anchors shall be tension tested per Section 1923A.3.5. The tension test load shall equal twice the allowable load for the specific location of the anchor to be tested (i.e., accounting for edge distance) or 80% of the yield strength of the bolt (0.8AbFy), whichever is less. The test procedures for expansion-type anchors in the attached table shall also be used for epoxy-type (adhesive) anchors. Torque testing of epoxy-type (adhesive) anchors is not permitted.

2.2. Where epoxy-type (adhesive) anchors are used as shear dowels across cold joints in slabs on grade and the slab is not part of the structural system, testing of those dowels is not required.

2.3. Anchors shall exhibit no discernible movement during the tension test.

3. Screw-type Anchors: Screw-type anchors shall be torque tested in accordance with the following testing procedure.

3.1. Anchor diameter refers to the thread size for the WEDGE & SHELL categories, and to the anchor outside diameter for the SLEEVE category.

3.2. Apply proof test loads to WEDGE & SLEEVE anchors without removing the nut if possible. If not, remove nut and install a threaded coupler to the same tightness as the original nut using a torque wrench to apply the test load.

3.3. For SLEEVE/SHELL internally threaded categories, verify that the anchor is not prevented from withdrawing by a baseplate or other fixtures. If restraint is found, loosen and shim or remove fixture(s) prior to testing.

3.4. Reaction loads from test fixtures may be applied close to the anchor being tested, provided the anchor is not restrained from withdrawing by the fixture(s).

3.5. SHELL type anchors should be tested as follows:

3.5.1. Visually inspect 25% for full expansion as evidenced by the location of the expansion plug in the anchor body. Plug location of a fully expanded anchor should be as recommended by the manufacturer, or, in the absence of such recommendation, as determined on the job site following the manufacturer's installation instructions. At least 5% of the anchors shall be proof loaded as indicated in the table above, but not less than three anchors per day for each different person or crew installing anchors, or;

3.5.2. Test installed anchors per Section 1923A.3.5

3.6. Test equipment (including torque wrenches) is to be calibrated by an approved testing laboratory in accordance with standard recognized procedures.

3.7. Alternate torque test procedures and test values for SHELL type anchors may be submitted to the enforcement agency for review and approval on a case-by-case basis when test procedures are submitted and approved by the enforcement agency.

3.8. The following criteria apply for the acceptance of installed anchors:

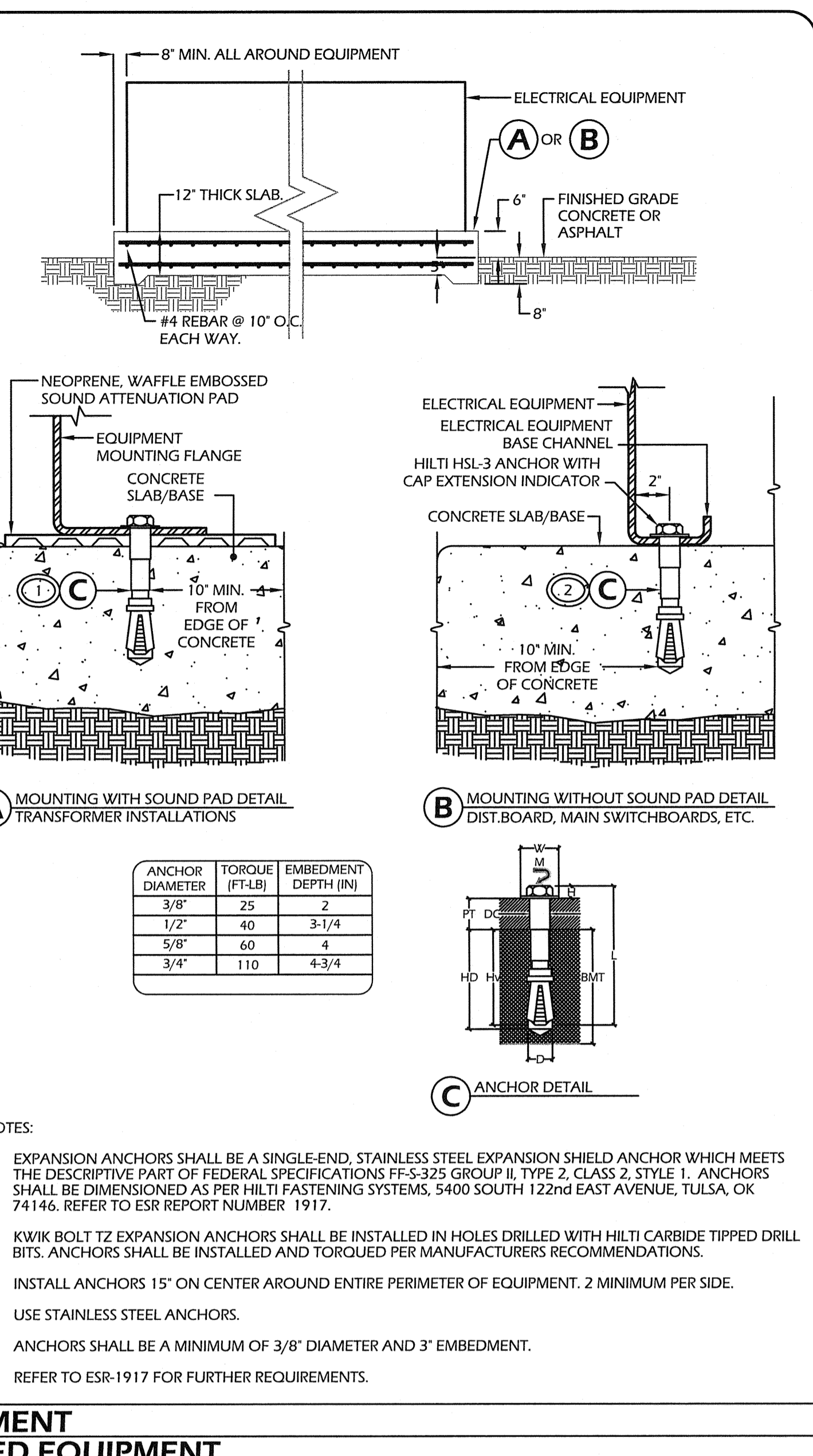
3.8.1. **HYDRAULIC RAM METHOD:** The anchor should have no observable movement at the applicable test load. For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose.

3.8.2. **TORQUE WRENCH METHOD:** The applicable test torque must be reached within the following limits:

3.8.2.1. Wedge or Sleeve type: One-half (1/2) turn of the nut.

3.8.2.2. One-quarter (1/4) turn of the nut for the 3/8 in. sleeve anchor only.

3.9. If the manufacturer's recommended installation torque is less than the test torque noted in the table, the manufacturer's recommended installation torque should be used in lieu of the tabulated values.



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TYPICAL DETAILS

**PIONEER DRIVE ELEMENTARY SCHOOL
 5 PERMANENT MODULAR CLASSROOMS
 BAKERSFIELD CITY SCHOOL DISTRICT
 4404 PIONEER DRIVE, BAKERSFIELD, CA 93306**

Issue Date: _____
 Date: _____
 Designer: _____
 DFR: _____
 PC: _____

DSA Identification Stamp:
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