California Council of Testing and Inspection Agencies

THE TEST REPORT

A Newsletter of the California Council of Testing and Inspection Agencies

Spring 2010

This Issue

We're on the Web! http:// www.cctia.org

2010 PRESIDENT INSTALLED!

By Elizabeth Levi, BSK Associates

James "Chip" Moore, PE

Welcome to our new President, James "Chip" Moore! Chip hails from ENGEO Incorporated, and is both a P.E. and Principal with his firm. He has hit the ground running this year and was already working with DSA the day prior to being installed as President on some emerging issues. This year he will be focusing on increasing membership, building the education forum, and code development issues. In fact, our Education committee has already lined up three seminars in April and May 2010. These seminars afford the special inspector Continuing Education Units (CEU's) for their ICC requirements for recertification. Stay tuned for more news from this exciting President in future issues of this Newsletter!

Update: Codes & Standards

By Anthony Felder, Concrete Reinforcing Steel Institute

ASTM - The recently released edition of ASTM A615/A615M-09a (which includes Grade 80) contains a significant typographical error. The minimum tensile strength of Grade 80 is listed as 150,000 psi. This value should have been 105,000 psi. A corrected version will be issued by ASTM soon.

ASTM A615/A615M now has four grades: 40, 60, 75 and 80. ASTM A706/A706M has two grades: 60 and 80. Also, the four wire/welded wire reinforcement specifications A82 (plain wire), A185 (plain WWR), A496 (deformed wire) and A497 (deformed WWR) have been combined into one standard: A1064/A1064M. The four wire/WWR specifications will continue for awhile. Copies of the new specifications A615, A706 and A1064 will be available from ASTM shortly.

If you would like additional information on the above, please contact Anthony Felder at afelder@crsi.org.

Lifetime Achievement Award for Michelle "Miki" Craig

By Elizabeth Levi, BSK Associates

Michelle "Miki" Craig was honored at our Annual Business Meeting this year giving her a Lifetime Award of exceptional achievement. As a fellow Board Member, I was honored to be asked to bring to life Miki's life personally and professionally during our installation dinner. As many of you know, Miki has been involved in CCTIA since its birth and was instrumental in bringing to life this organization and the vision it stands for. Over the years, Miki has offered her time to us by chairing many Committees, taking the lead as President (for more years than most!), and being the overall champion for the group whenever the need arises. She even designed our website and continues to be the webmaster. You may remember, Miki's involvement with the original SIC Committee lead us to have one of the strongest relationships with the Bay Area Building Officials that we have had in years. Recently, Miki accepted the role of Executive Secretary for us, knowing that not many relish stepping into the Secretary's position. Please join me in congratulating Miki on continuing to set the bar high for us in this industry and for her unwavering involvement in our association.

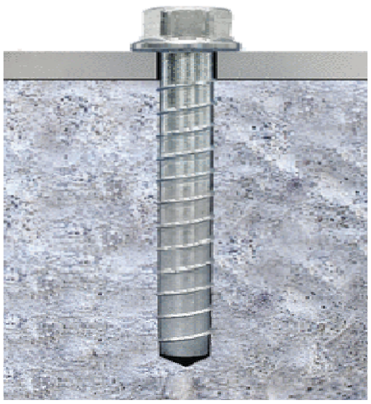
FAQ 10.061

TESTING & INSPECTION REQUIREMENTS FOR POST INSTALLED ANCHORS

We are installing hold-downs and rebar dowels on a commercial project. What are the requirements for special inspection and testing on these items?

Submitted by a General Contractor

Special inspection and testing of post-installed



anchors, which includes epoxy and mechanical anchors, is covered by 1704.13 (Special Cases) of the California Building Code. The section is not specific as to the requirements of inspection and testing but rather just requires it when "materials and systems required to be installed in accordance with manufacturer's instructions that prescribe requirements not contained in this code or in standards reference by this code." The specific requirements should be outlined in the Statement of Special Inspection prepared by the registered design professional. These requirements should also be outlined in the project plans and specifications.

Most manufacturers of mechanical anchors and epoxy products require special inspection (also commonly referred to as "observation") to verify the product is being installed as recommended. This inspection would include verifying material type, hole depths and cleanliness, and proper installation. In addition, depending on the service load application and values, testing may be required to verify in-situ load capabilities. The frequency of testing could range from 5% to 100% at values of up to 2 times the allowable tension values. Essential facilities (School and Hospitals) and specific cities could have additional requirements.

For your project you will likely need to have all hold-down and anchor installation observed by a special inspector. This will also apply for epoxy dowels, which are considered a type of anchor. In addition, most mechanical anchors require a specific torque value to verify engagement. This should be performed by the installer but is often verified by the testing lab. Any other testing should be specified by the design professional based on the manufacturer's recommendation, the project specific load conditions and the governing codes.

The following is a sample of typical information contained in an expansion anchor evaluation report.

4.3 Installation:

Installation parameters are provided in Table 1 and Figure 2. Anchor locations must comply with this report. Anchors must be installed in accordance with the manufacturer's installation instructions and this report. Embedment, spacing, edge distance, and concrete thickness are provided in Tables 3 through 5 of this report. Holes must be drilled using carbide-tipped masonry drill bits complying with ANSI B212.15-1994. The nominal drill bit diameter must be equal to that of the anchor. The anchor must be hammered into the predrilled hole until at least four threads are below the fixture surface. The nut must be tightened against the washer until the torque value, T_{inst}, specified in Table 1 is achieved. For installation in the soffit of concrete on metal deck assemblies, the hole diameter in the deck must not exceed the diameter of the hole in the concrete by more than $^1/_8$ inch (3.2 mm).

4.4 Special Inspection:

Special inspection is required in accordance with Section 1704.13 of the IBC. The special inspector must be on the jobsite continuously during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete member thickness, anchor embedment, and tightening torque. Additional requirements set forth in Section 1705 and 1706 of the IBC must be observed where applicable.

William Wahbeh is the responsible engineer at Signet Testing Laboratories, Inc. and a registered engineer in California. He can be reached at William_Wahbeh@URSCorp.com

This is the author's opinion, not necessarily that of CCTIA. To read more or respond, go to www.CCTIA.org

MECHANICAL TESTING

A new ASTM standard will serve as a guide for manufacturers and laboratories that make and test steel products according to standards using the SI system of units.

A1058, TEST METHODS FOR MECHANICAL TESTING OF STEEL PRODUCTS – METRIC, arose from a need for a stand-alone metric steel-testing standard.

The new standard follows a different format from that of testing standard A370, TEST METHODS AND DEFINITIONS FOR MECHANICAL TESTING OF STEEL PRODUCTS. A1058 does not include the product annexes found in A370. A1058 provides detailed directions for mechanical testing and includes coverage of international standards. The new standard references and cross references international standards from Europe Committee for Standardization, the International Organization for Standardization and the Japanese Standards Association.

Article condensed from ASTM STANDARDIZATION NEWS May/June 2009

Got a question?
Send it to Q&A,CCTIA, 2811 Teagarden St. San Leandro, Ca.94577 or email terry@testing-engineers.com

Sampling and Testing High Strength Bolts

By Jeffry Cannon, Kleinfelder Inc.

Sampling and testing high-strength bolts is one of the most confusing things our industry has to deal with. Everyone either has no idea how to do this, or have differing opinions! How many specimens do you sample from a project? How many tests do you perform? What tests do you perform? These are all questions that people frequently ask and need help understanding. Project specifications may help decipher the issues, but frequently they only state that samples should be sampled and testing in accordance with some other standard, typically an ASTM International (ASTM) and/or American Society of Mechanical Engineers (ASME) standard. ASTM and ASME standards can also be confusing in that there are multiple specification standards that apply, and there are multiple test procedures and methods that can apply.

The following discussions have been prepared to help our industry decipher how to sample and test high-strength bolts.

Terminology

"High-strength bolt" is a term that is commonly used for threaded fastener systems comprised of one bolt, one nut, and one or two washers. The bolts are typically either ASTM A 325 quenched and tempered (heat treated) steel bolts, or ASTM A 490 quenched and tempered steel alloy bolts. When specifications and codes state to sample and test high-strength bolts, all three components of the fastener system should be sampled and tested, not just the bolts.

A 325 and A 490 Bolts

Use ASTM F 1470, Table 1 and Table 3 to determine how many specimens to sample and what tests to perform. Table 1 identifies the Sample Level for each type of test. For hardness, the sample level is B. For proof load and tensile strength the sample level is C. (Since most testing we do is limited to these tests, this article will not go into detail on the other tests.) Once you have identified the sample level, go to Table 3 to identify how many specimens to test. The quantity of tests is dependent on lot size (see discussion on Lots, below). As an example for a lot of 100 bolts, 6 bolts would be tested for hardness and 2 tested for proof load and tensile strength.

A 563 Nuts

ASTM A 563, Section 9 contains a table of test quantities, which is based on lot size. As an example, if you have a lot of 100 nuts, you test 1 specimen. Mechanical properties are limited to hardness and proof load (Section 6), so those are the only tests to perform. If a failure is identified, A 653 says to retest double the quantity of tests for that lot, and all retests must pass.

F 436 Washers

ASTM F 436, Section 9 contains a table of test quantities, which is based on lot size. As an example, if you have a lot of 100 washers, you test 1 specimen. Mechanical properties are limited to hardness and carburization (Section 6). Most labs test for hardness only; not for depth of carburization. F 436 has no stipulations for what to do if a failure is identified, but one suggestion is to follow the process of retesting double the quantity, as addressed in A 563. This should then be discussed in the report of lab results, and the project structural engineer or your client asked to accept or reject the lot.

Lot Size

A "lot" is similar to a heat number for reinforcing steel. When a bolt, nut, or washer is manufactured, the manufacturer must identify each batch in a unique way (most use numbers or letter-number combinations) so that future identification is possible. The products in a single lot must be of the same nominal size and length, produced from a single mill heat of material, and made at one time by the same process and manner. Bolts, nuts, and washers are commonly packaged into boxes, buckets, bags, and barrels, and each container should be marked to enable continuous identification throughout all subsequent operations and re-packaging. At a minimum, containers are supposed to be marked with ASTM designation and type, size, name and brand (or trademark) of the manufacturer, number of pieces, lot number, purchase order, and country of origin.

Realistically for most projects that our firms are involved with, a lot is usually defined as the quantity of the products on hand at the project site. The individual components have often been removed from their original containers, and frequently they have been preassembled into sets (1 bolt, 1 nut, 1-2 washers). When this happens you should ask for copies of the mill certificates that should have accompanied the materials, then sample according to the quantity of each size on the project site.

ASTM F 606

This standard is frequently used incorrectly in specifications by stating something similar to, "Sample and test A 325 bolts in accordance with ASTM F 606". F 606 is a laboratory test procedure only and does not contain any information on sampling or quantities of tests.

California DSA Projects

The California Division of State Architect (DSA) has recognized that high-strength bolt sampling and testing is often an issue on the projects they have jurisdiction over. They have said they are preparing a directive on bolt testing, but this has not been completed yet. For DSA projects, most testing firms typically sample one set of three specimens of each type and size, irregardless of the lot size. This usually under-samples bolts for hardness testing, but over-samples and over-tests everything else.

Things Frequently Done Incorrectly

1. Hardness tests are performed on specimens without the proper surface preparation. Galvanization, paint, mill scale, lubricating grease, etc. must be ground off (or cleaned off) to white metal before the test is performed. The ground surface must also be relatively smooth, so fine-grit sandpaper and grinding wheels should be used, not coarse-grained. This is equally important for the area to be indented by the hardness tester <u>and</u> the surface that will be resting on the test machines anvil.

2. Insufficient numbers of hardness tests are performed on each sample. A minimum of three tests (indentions) for each sample shall be averaged for routine testing, and a minimum of four tests (indentions) shall be averaged for arbitration testing. This applies to bolts, nuts, and washers.

3. Hardness tests on bolts are performed at non-standard locations. Standard test locations are: top of the head, wrench flats, unthreaded portion of the shank, and end of the bolt. Arbitration tests must be performed at the mid-radius of a transverse section cut through the threads, taken one diameter from the end of the bolt.

4. Only one or two sizes of bolts are tested. This is especially common on smaller projects that do not have a significant quantity of bolts being used. Frequently only the prevalent size(s) of bolts will be sampled and tested. All sizes of bolts, diameter <u>and</u> length, should be tested.

5. More than the required quantity of nuts and washers are tested (which is good, but something the client is not required to pay for to meet specifications). Frequently, nuts and washers from the same lot are used with varying lengths of bolts, and three complete sets from every bolt length are sampled and tested. For instance: 1-inch diameter bolts are found on-site in 2- and 3-inch lengths, and both lengths will use nuts and washers from the same lots. Both lengths of bolts should be tested, but only one set of nuts and washers need to be tested.

6. Inadequate identification of different grades of materials. There are many different types and grades of nuts and washers, with varying specifications, and it is important for the lab to know the exact identification of the materials so they can apply the correct specifications to the test results.

7. Not knowing there is a significantly wider hardness range for zinc-coated washers than for uncoated washers. The hardness of uncoated F 436 washers must be 38-45 HRC, while zinc-coated washers must be 26-45 HRC.

8. Not knowing that there is not a minimum hardness limit for long bolts. For 1-inch diameter bolts and smaller: bolts that are at least 2-times longer than their diameter do not have a minimum hardness requirement. For bolts larger than 1-inch diameter: bolts that are at least 3-times longer than their diameter do not have a minimum hardness requirement. As an example, there is no minimum hardness specification for a 3/4-inch diameter bolt that is 2-inches long.

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ES Geotechnologies	Ninyo & Moore	Twining Laboratories, So. CA
ENGEO Incorporated	Nova Engineering	Youngdahl Consulting Group

FAQ10.045

ARE CERAMIC BACK-UPS PREQUALIFIED?

Upon partial completion of a project the project manager rejected one of the WPS's used. The contractor had used an AWS prequalified TC-U4a-GF joint configuration that by code requires metal backing. But, the contractor used ceramic backing. He removed the ceramic backing, back-gouged and welded the root. Is there any way that this might be considered acceptable?

Submitted by S.E. in Oakland, California

Response Submitted by Dave Palfini

Answer: Possibly.

AWS D1.1 - 2.17 Prohibited Joints and Welds
2.17.1 One-Sided Groove Welds.
Groove welds, made from one side only without backing or made with backing, other than steel, that has not been qualified in conformance with Section 4 shall be prohibited…

We aren't talking about "One-Sided Groove Welds", so this restriction does not apply.

In an attempt to mitigate this situation, from an administrative point of view, we designate the prequalified joint configuration to be TCU4b-GF, similar to the TC-U4a-GF joint configuration.

Next, we look at "D1.1 - Fabrication". We cannot prohibit the contractor from using his own "methods and means" to produce welds, as long as they are within the limitations of the code.

The contractor uses the TC-U4b-GF joint configuration, elects to use the widest "As Fit-Up" root opening allowed, uses ceramic backing, and cites the following:

AWS D1.1 - 5.10 Backing
Roots of groove or fillet welds may be backed by copper, flux, glass tape, ceramic, iron powder, or similar materials to prevent melting through.

Since the weld is to be back-gouged and welded, as an inspector, I would have to allow this, verifying that the groove angle was within the tolerances of the 45º bevel preparation and not the 30º that may be used in the case of the TC-U4a-GF joint configuration.

(After back-gouging, the other side of partially welded joints should resemble a prequalified U- or J-joint configuration at the joint root, and, for administrative purposes, would require an additional WPS.)

Published October 2009

Dave Palfini was a principal at Testing Engineers, Inc. and an ASNT Level III and AWS – Senior CWI.

This is the author's opinion, not necessarily that of CCTIA

Special Announcement

Egland Continues With IAS-TAC

Terry Egland, Principal and Registered Engineer for Testing Engineers, Inc. has been named once again to the IAS Technical Advisory Council (TAC) Inspection Agency and IBC Special Inspection Agency Accreditation for 2010. This group was started to help guide IAS on technical issues. The TAC is appointed by the IAS Board of Directors and is comprised of ten members selected from senior management positions within testing and calibration laboratories, inspection agencies and regulatory bodies. The council acts in an advisory capacity on matters regarding accreditation policies and protocol, conformity assessments, test procedures, calibration and other accreditation-related activities. As many of you know, Terry is very involved with this Council as well as ones within ASTM, ACI, and SEAONC CQA. Congratulations Terry on your appointment! CCTIA supports your tireless involvement within the industry to assist in setting the standards higher.

UPCOMING MEETINGS & SEMINARS

CCTIA—General Meeting	CCTIA—General Meeting	ASFE Fall Meeting
Four Points—Sheraton	Sheraton Hotel	The Nines
Sacramento, CA	Pleasanton, CA	Portland, OR
11:30am-3:00pm	3:00pm	
June 24, 2010	**July 22, 2010**	**October 7 & 8, 2010**