

Visual 'After the Fact' Welding Inspections

Welding inspectors need to be aware of the liability issues they may face when asked to perform inspections late in the building process

A lack of special welding inspections offers the potential for quality problems, life safety issues, and liabilities. The intent of this article is to provide a reference tool for Certified Welding Inspectors, owners, engineers, architects, building officials, building department staff inspectors, and other design professionals.

The Inspection Issue

What constitutes an approved fabricator? There seems to be some confusion about this issue. It is commonly assumed that as long as a welding fabrication shop is AISC certified or is licensed by an agency such as the Los Angeles Department of Building and Safety, it is exempt from shop welding inspections. This simply is not the case.

Actually, it is the building official for the jurisdiction in which the project is permitted who has the authority to approve the fabricator. For consideration of approval, the fabricator must submit his or her quality information to the building official as required by Section 1701.7

of the *California Building Code (CBC)* or Section 1704.2.2 of the *International Building Code (IBC)*. This process must be completed prior to any welding being performed. It is from this information that the building official makes the decision whether or not to approve a fabricator and waive the requirement of shop welding inspections for that specific project. Generally, most building departments throughout California do not approve fabricators. Therefore, the owner or owner's representative must provide shop welding inspections. These inspections must be performed by qualified inspectors who have demonstrated competence, to the satisfaction of the building official, for inspection of the particular type of construction or operation requiring special inspection.

During the permit approval process, the owner or his agent is required to employ the special inspector under Chapter 17, Section 1701, of the *CBC* or Section 1704 of the *IBC*. The registered design professional is responsible for preparing a statement of special

inspections and submitting it to the building department. The purpose of this document is to inform the building department that a special inspection agency or special inspectors have been retained to perform all required special inspections for the project. This letter is usually required to be submitted before the building permit is issued, and includes the scope of the inspection, a list of inspectors and their certifications, and, when requested, the inspectors' résumés. In some instances, the individual inspectors must successfully complete an interview with the building department in order to obtain approval to perform special inspections in their jurisdiction.

Where the Problem Begins

When shop or field welding for a permitted project is performed without the required inspection, we face the issue of visual "after the fact" welding inspections. When this situation occurs, the special inspection agency usually receives a frantic call requesting the services of a welding inspector. Sometimes this involves situations



Fig. 1 — Sample of a visually acceptable single-pass fillet weld with poor fitup and lack of effective weld to one member. (See Fig. 2.)



Fig. 2 — Sample cross section of a single-pass fillet weld with poor fitup. Notice the lack of effective weld to the vertical member.



Fig. 3 — Sample single-V-groove weld plate showing acceptable weld profile, yet the weld has been slugged. (See Fig. 4.)



Fig. 4 — Sample of cross section of single-V-groove weld plate with rebar slugged weld.



Fig. 5 — Sample of visually acceptable multipass fillet weld with poor fitup and a slugged and bridged root opening that has been welded over as an example. (See Fig. 6.)



Fig. 6 — Sample of the backside view of a visually acceptable multipass fillet weld with poor fitup and a slugged and bridged root opening.

where weeks of welding have been performed, or even entire projects have been completed, where no call has been made for welding inspections. The contractor or responsible party assumes the problem will be easily resolved by simply having a welding inspector come out and do a quick visual inspection of all the completed welds and provide a report that will satisfy the building department.

This is where the problems begin. Yes, a welding inspector can, in most cases, conduct an “after the fact” limited visual inspection of completed welds. The inspector can provide a limited report to protect himself or herself and the inspector’s employer from liabilities for not performing the inspections in conformance with the codes. The inspector may even be able to make the statement or statements that the welds meet the minimum visual requirements of the AWS D1.1, D1.3, or D1.4 welding codes and appear to conform to the proper size, length, and locations as shown on the project plans. However, without committing the crime of perjury, the inspector cannot provide a report to the building official stating that the welds were performed and inspected in accordance with the *California Building Code*, the *International Building Code*, and the approved project plans or construction documents as applicable.

The following statement is required under *CBC*, Section 1701.3, Duties and Responsibilities of the Special Inspector: “The special inspector shall submit a final signed

report stating whether the work requiring special inspection was, to the best of the inspector’s knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of this code.” The *IBC* requires a similar statement under 1704.1.2, Report Requirements.

When limited “after the fact” welding inspections have been performed, this statement cannot be made because the special inspector was not afforded the opportunity to perform all of the required inspection tasks.

Following is a list of tasks that cannot be verified after the fact. The inability to verify any one of these tasks, let alone all of them, could result in catastrophic failure of a welded structure. They are part of the inspector’s duties and responsibilities and are outlined not only by the building codes, but by the American Welding Society Codes D1.1, *Structural Welding Code — Steel*, D1.3, *Structural Welding Code — Sheet Steel*, and D1.4, *Structural Welding Code — Reinforcing Steel*.

- Positive material identification prior to fabrication (*CBC* and *IBC*)
- Verification of welding procedures and Welding Procedure Specifications (AWS D1.1, D1.3, and D1.4)
- Verification of welder certifications and positions qualified (AWS D1.1, D1.3, and D1.4)
- Verification of welding process, electrode, and electrode storage (AWS D1.1, D1.3, and D1.4)
- Weld joint fitup (AWS D1.1, D1.3, and D1.4)

- Inspection of multipass fillet welds, and partial-joint-penetration and complete-joint-penetration groove welds (AWS D1.1)
- Assembly practice (AWS D1.1, D1.3, and D1.4)
- Observation of the welding (AWS D1.1, D1.3, and D1.4)
- Welder, welding operator, and tack welder performance (AWS D1.1, D1.3, and D1.4).

The integrity and quality of the welds cannot be positively verified without performing all required welding inspection tasks. Even though the overall appearance of the welds may meet all of the visual acceptance criteria, it cannot be assumed that they meet the minimum quality requirements of the code or minimum design requirements specified on the approved project plans. Without being able to verify the actual weld joint fitup prior to welding, there could actually be existing root openings in excess of that allowable by the welding code or even welds that have been “slugged” and welded over. Excessive root openings in fillet welds or slugging a weld to close a gap or fill in a weld joint generally results in an inadequate, ineffective weld size that could affect the design performance of the structure. These types of situations are usually a result of poor workmanship and are commonly found where welding has been performed without inspections. Workmanship like this creates a condition where the visual appearance of the completed weld may appear adequate in size but in actuality results in a severe lack of effective

weld to the connected members — Figs. 1–6.

When welding inspectors are retained and directed to perform a limited “after the fact” visual inspection, and note in their report the limitations related to performing such an inspection, the liability will fall on those who accept the limited reports.

Conclusion

An owner, owner’s representative, contractor, architect, engineer, building department inspector, or building official should be aware of all limitations including potential quality problems, life safety issues, and liabilities that may occur when asking for or accepting “after the fact” welding inspection reports. The building authority and designated inspectors and design professionals should pay close attention to the wording of the written reports. More often than not, the reports will be exclusionary and will not contain the minimum code-required statement. In these situations, ask yourself, “Do I want the liability?” ❗

References

1. *California Building Code*. 2001. Chapter 17.
2. *International Building Code*. 2006. Chapter 17, Structural Tests and Inspections.
3. AWS D1.1/D1.1M:2008, *Structural Welding Code — Steel*. Miami, Fla.: American Welding Society.
4. AWS D1.3/D1.3M:2008, *Structural Welding Code — Sheet Steel*. Miami, Fla.: American Welding Society.
5. AWS D1.4/D1.4M:2005, *Structural Welding Code — Reinforcing Steel*. Miami, Fla.: American Welding Society.

BRAD A. BOSWORTH
(bradb@technicon.net) is manager of Special Inspections, Materials Division, Technicon Engineering Services, Inc., Fresno, Calif. He is also an AWS Certified Welding Inspector.