METAL BUILDING MANUFACTURERS ASSOCIATION®

Technical Bulletin **Spring 2012**

METAL BUILDING SYSTEMS

IBC Special Inspection Requirements - Approved Fabricators are Exempted!

by

W. Lee Shoemaker, P.E., Ph.D.

Director of Research and Engineering

Introduction

Special inspection is defined in the International Building Code (IBC) as "inspection of construction requiring the expertise of an approved special inspector in order to ensure the compliance with this code and the approved construction documents." The focus of this Technical Bulletin will be on compliance with the IBC code requirements. Special inspection requirements in the IBC have been evolving rapidly over the past few editions, so it is important to utilize the appropriate edition that is specified for any given project. However, this Technical Bulletin will focus on the requirements in the 2012 IBC.

As summarized in the Preface of the 2012 IBC, the "proper assembly of structural components, proper quality of materials used, and proper application of materials are essential to ensuring that a building, once constructed, complies with the minimum structural and fire-resistance requirements of the code and the approved design. To determine this compliance often requires continuous or frequent inspection and testing. Chapter 17 establishes these special inspections and testing standards as well as reporting of the work to the building official." The special inspection requirements of Chapter 17 are invoked by IBC Section 110.3.9.

Special Inspection of Fabricated Steel

Except as noted below regarding approved fabricators, IBC Section 1704.1 requires the owner or the registered design professional in responsible charge to employ an approved agency to perform inspections during construction for the types of work listed in Section 1705, which includes Section 1705.2 - Steel Construction, and Section 1705.11.1 - Special Inspections for Seismic Resistance of Structural Steel.

With respect to the work performed by a steel fabricator, such as a metal building manufacturer, special inspections are not required if the fabricator is registered and approved to perform such work without special inspection as defined by Section 1704.2.5.2. More on this is explained in the next section of this Technical Bulletin.

IBC Section 1704.2.5 requires special inspection of structural load-bearing members and assemblies that are fabricated on the premises of a non-approved fabricator's shop. For a non-approved steel fabricator, the special inspection requirements of Section 1705.2 for structural steel are to be in accordance with the quality assurance requirements of AISC 360, Chapter N.

Additional special inspection requirements of Section 1705.11.1, for structural steel fabricated on the premises of a non-approved fabricator's shop, apply to the seismic force resisting systems in structures assigned to seismic design category (SDC) C, D, E, or F and are to be in accordance with the quality assurance requirements of AISC 341. An exception noted in Section 1705.11.1 applies to steel structures in SDC C that are not specifically detailed for seismic resistance and are designed with a response modification factor, R, of 3 or less. This is a common design option for SDC C, and if elected, there would not be any special inspection requirements invoked for both approved and non-approved fabricators. It is important to note that the 2009 IBC did not exempt an approved fabricator from these special seismic inspections. For projects governed by earlier versions, the issue should be discussed with the building official.

Approved Fabricator

As previously noted, special inspections normally called for by Section 1705 are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection (See IBC Section 1704.2.5.2). The exemption further explains that this approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency.

The steel fabrication industry has embraced the benefit of a strong quality control program with periodic auditing through programs such as AISC's Certification Program for

Structural Steel Fabricators. Additionally, most metal building manufacturers have endorsed a quality control program with the International Accreditation Services (IAS) customized to the unique products and fabrication methods of this industry. This accreditation program (IAS AC472) is a credible means for building officials to grant approved fabricator status to metal building manufacturers. As noted in the IBC Chapter 2 definition of approved fabricator, it is the building official who approves the qualified fabricator pursuant to Chapter 17.

Section 1704.2.5.2 of the 2012 IBC requires that "at completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction drawings."

Structural Observations

Additional inspection requirements for seismic and wind resistance in higher risk categories are indentified in the IBC as "structural observations." This is defined in Chapter 2 of the IBC as "the visual observation of the structural system by a registered design professional for general conformance to the approved construction documents." IBC Sections 1704.5.1 and 1704.5.2 define the structures that would require structural observations for seismic resistance and wind resistance, respectively. When structural observations are triggered by one of these provisions, Section 1704.5 requires the owner to hire a registered design professional to submit to the building official a written statement identifying the frequency and extent of structural observations. It is possible that steel fabrication could be included in these observations and the metal building manufacturer would need to be made aware, by the registered design professional, of any requirements to accommodate the structural observer. However, it is the observer who submits a report to the building official indicating that the site visits were made and identifying any unresolved deficiencies known to the structural observer.

AISC 360 Chapter N

Special inspections are prescribed in Chapter 17 of the IBC, which invokes the quality assurance requirements of AISC 360 and AISC 341 for structural and seismic resistance, respectively. An approved fabricator is exempt from the special inspection requirements per Section 1704.2.5.2, as previously discussed. However, it would be prudent to examine what the special inspection requirements would be if the contract documents specifically called for the structural steel to meet the quality assurance requirements of AISC 360/341, thereby imposing more exacting obligations than required by the IBC.

AISC 360, Section N7, has a similar inspection exemption for a steel fabricator approved to perform work without third-party quality as-

surance. The commentary for this section goes on to state that this approval shall be based on review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. The AISC Certification Program for Structural Steel Fabricators is cited as an example. The IAS AC472 accreditation program for metal building manufacturers exceeds the recommended criteria for an approved special inspection agency. IAS AC472 requires two audits per year instead of the annual audit required by the AISC program. Further, IAS AC472 requires that a certified welding inspector be employed by the metal building manufacturer.

AISC 360 Section N7 states that the nondestructive testing (NDT) requirements of AISC 360 are not included in the quality assurance exemption granted an approved fabricator. It further states that the approved fabricator may perform any required nondestructive tests when approved by the authority having jurisdiction.

AISC 341 is invoked by AISC 360 Section A1.1 for the seismic force resisting system, which would cover the pertinent nondestructive tests of welds in the moment resisting frames of metal buildings. AISC 341, Section J6.2b, requires ultrasonic testing (UT) on 100% of complete joint penetration (CJP) groove welds in material 5/16" and thicker. This is clearly more stringent than the requirements of AISC 360, Section N5.5b. For example, in AISC 360, only 10% of the same CJP groove welds in Risk Category II structures require NDT. In AISC 341, Section J6.2b, UT of a CJP groove weld is only required for demand critical welds in ordinary moment frames.

The only demand critical welds in ordinary moment frames are the CJP groove welds of beam flanges to columns, as identified in AISC 341, Section E1.6a. The demand placed on the flange to end-plate weld of a web-tapered member has been shown to be low in recent full-scale shake table tests at UCSD that went beyond the maximum considered earthquake. This is mostly due to the fact that for frames with web-tapered members, the flexural strength of the beam (rafter) will typically be reached first at some distance away from the connection, as noted in the AISC 341 Commentary, Section E1.6b(b). Therefore, for ordinary moment frames used in metal building systems, there would be no demand critical CJP groove welds requiring NDT.

Summary

Chapter 17 of the 2012 IBC defines special inspections and structural observations that may be required for steel fabrication. Special inspections are not required for typical steel fabrication performed in the shop of an approved fabricator; however, structural observations may be triggered for high wind and seismic applications in Sections 1704.5.1 and 1704.5.2 that could include observations of steel fabrication if specifically included in the written plan of the registered design professional.

Section 2204.1 of the 2012 IBC specifically states that the "special inspection of welding shall be provided where required by Section 1705." Therefore the approved fabricator exemption would also apply to any nondestructive testing of welds. But if the quality assurance requirements of AISC 360 and/or AISC 341 are specified in the contract documents, nondestructive testing of some complete joint penetration groove welds may be required. However, based on the AISC 341 requirements, only CJP groove welds that are demand critical welds in an ordinary moment frame in material greater than 5/16" would be subject to ultrasonic testing. Since only beam flange to column welds are identified in AISC 341 as demand critical, typical flange to end-plate welds in a frame utilizing bolted moment end connections would not be subject to this requirement. In an intermediate or special moment frame, all CJP groove welds in material greater than 5/16" would be required to be ultrasonically tested, in accordance with AISC 341.

This Technical bulletin is designed to be general advice. Be certain to check the specific requirements of applicable Codes and contract documents to verify your responsibilities, if any for special inspections.

For Further Information:

Metal Building Manufacturers Association, Inc.

1300 Sumner Avenue

Cleveland, Ohio 44115-2851

216-241-7333

Email: mbma@mbma.com

Website: www.mbma.com