

BUILDING CODES, INDUSTRY STANDARDS, AND EVALUATION REPORTS

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Given the differing roles and complementary functions of building codes, industry standards, and product evaluation reports, it is important that construction professionals understand the appropriate applications for each.

BUILDING CODES

For most local and state jurisdictions across the United States, the controlling building codes are modeled upon the International Building Code (IBC) and/or the International Residential Code (IRC), collectively the “I-Codes,” published by the International Code Council (ICC).

The nationwide model I-Codes and their predecessor regional codes – the Uniform Building Code (UBC), the BOCA National Building Code (BOCA), and the Standard Building Code (SBC) – establish minimum requirements for safeguarding life and limb and the public health and welfare by regulating and controlling the design, construction, quality of materials, use, occupancy, and locations of all buildings and structures.

To this end, many pages of the model I-Codes are focused upon highly prescriptive instructions regarding the critical issues of fire resistance, structural strength and stability, and safe means of egress for occupants. Examples of prescriptive code requirements are the specific requirements for maximum fastener spacing and size for

installation of gypsum sheathing prescribed at Table 2306.4.5 of the 2006 edition of the IBC.

The model I-Codes also contain “performance” language that simply establishes the general intent of the specific code section. For example:

- “The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly.” – *Section 1403.2 of 2006 IBC*
- “Roof coverings shall be designed, installed, and maintained in accordance with this code and the approved manufacturer’s instructions such that the roof covering shall serve to protect the building or structure.” – *Section 1503.1 of 2006 IBC*

Note the phrase “approved manufacturer’s instructions” in Section 1503.1. When the I-Codes do not prescribe installation instructions for a proprietary product or system, then it is the general intent of the code authorities that the manufacturer’s installation instructions should be followed. However, in those cases where the manufacturer’s installation instructions may be missing, incomplete, generic, or vague, the contractor still remains burdened by the code authorities with a duty to ensure the product or system is installed in a manner that protects the building occupants’ health, safety, and general welfare.

INDUSTRY STANDARDS

More and more, the modern building codes also rely upon widely acknowledged industry standards to control installation of building materials and systems.

The trend in code writing is to reference national consensus standards rather than incorporate the standards into the code by transcription. This is the approach taken by the IBC. It is imperative, therefore, that code users obtain the necessary standards in order to have access to the full range of code requirements and any applicable conditions of approval.¹

This increasing reliance by the I-Code authorities upon installation standards published by industry associations will be a familiar concept to many previous users of the regional BOCA and SBC model codes, but it has come as a surprise to some construction professionals in the western United States who were experienced only with the many past editions of the model UBC, in which virtually no industry-published installation standards were referenced.

When compliance with such installation standards is prescribed within the I-Codes, then the standard simply becomes an extension of the building code, as noted in Section 102.4 of the 2006 IBC: “The codes and standards referenced in this code shall

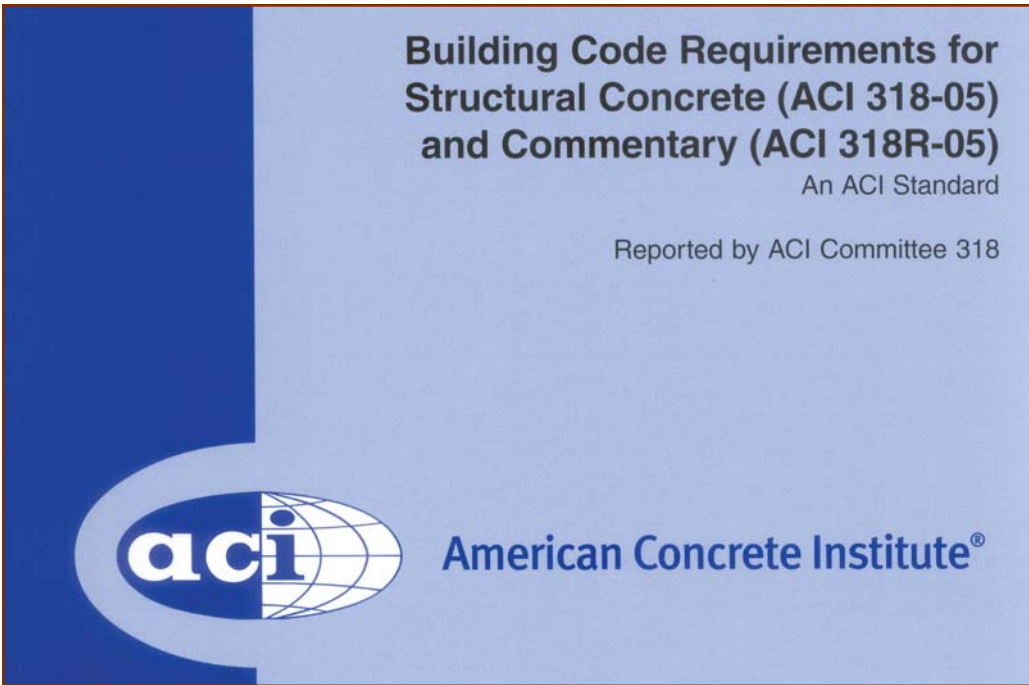


Figure 1 – All architects, engineers, building officials, and others who are responsible for the design, construction, or approval of structural concrete should own a copy of this ACI publication.

be considered part of the requirements of this code to the prescribed extent of each such reference.”

An excellent example of this practice is found at Section 1901.2 of the 2006 IBC: “Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318.” ACI 318, Building Code Requirements for Structural Concrete, is an industry standard published by the American Concrete Institute (ACI).

The authors recommend that all architects, engineers, building officials, and others who are responsible for the design, construction, or approval of structural concrete should own a copy of the associated ACI publication, Building Code Requirements for Structural Concrete and Commentary (see Figure 1).

Similarly, Chapter 21 (Masonry) of the 2006 IBC mandates that virtually all masonry construction, including glass-unit masonry and masonry veneer, must comply with applicable requirements of ACI 530/ASCE 5/TMS 402, Building Code Requirements for Masonry Structures, jointly published by ACI, the Structural Engineering Institute of the American Society of Civil Engineers (ASCE), and The Masonry Society (TMS).

Again, all architects, engineers, building officials, and others who are responsible for the design, installation, or approval of masonry construction should own a copy of

the associated manual, Commentary on Building Code Requirements for Masonry Structures, (see Figure 2) published by ACI,

ever, it is important to note that there are many other meritorious industry standards that are not referenced within the model I-

ASCE, and TMS.

The 2006 IBC (and its recent successor edition, the 2009 IBC) mandate compliance with a wide variety of other well-known industry standards, particularly key standards published by ASTM International. For example, many of the stucco sections of IBC Chapter 25 reference compliance with ASTM C926-98a, Specification for Application of Portland Cement-Based Plaster. The ICC confirms, “ASTM employs a consensus process that ensures technically competent standards that have the highest credibility when used as the basis for regulatory policy.”²²

Industry standards that are referenced specifically within the IBC are listed in Chapter 35. The authors advise consultants to carefully peruse these listings to identify all standards that contain specific installation instructions. How-

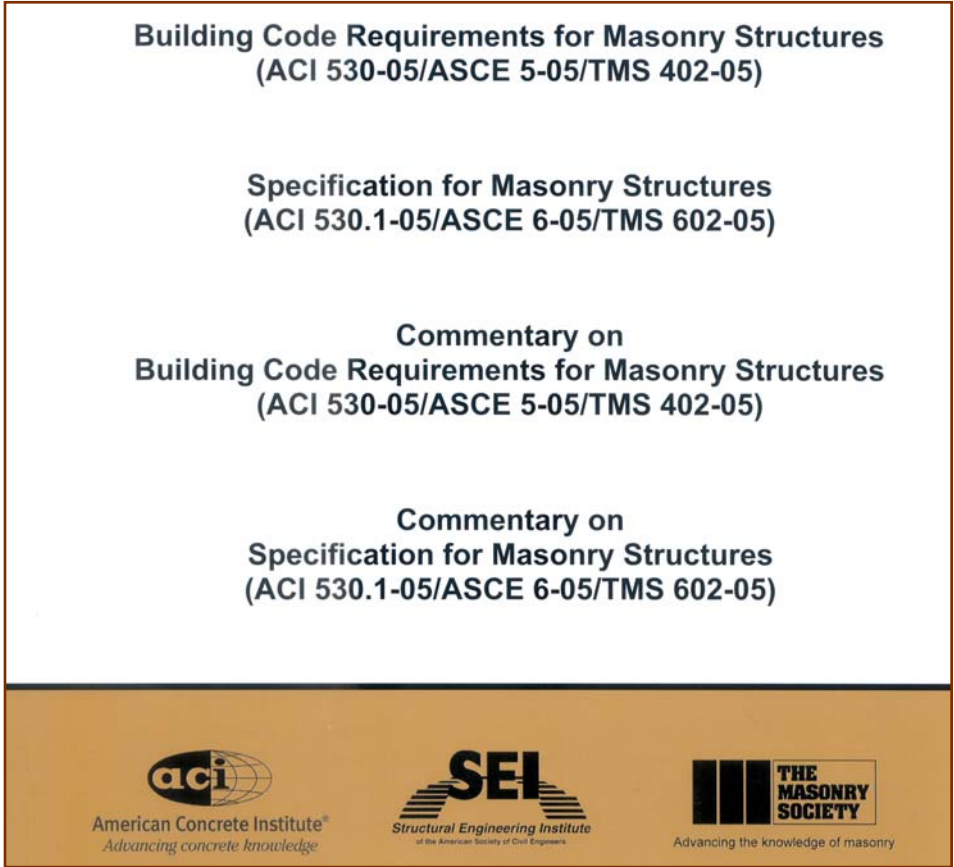


Figure 2 – This publication is a “must have” for all architects, engineers, building officials, and others who are responsible for the design, construction, or approval of masonry construction.

Codes and thus have no direct legal bearing on construction. Consider, for example, ASTM E2266, Standard Guide for Design and Construction of Low-Rise Frame Building Wall Systems to Resist Water Intrusion; and ASTM E241, Standard Guide for Limiting Water-Induced Damage to Buildings. Both of these standards are worthy of close review by contractors, architects, and other construction professionals, yet neither is referenced within the model I-Codes. In fact, in Section 1.4, the authors of ASTM E241 state, "This guide is not intend-

long-term structural integrity and weather-resistant service.

Instead, this supplemental guidance often is provided by stucco industry standards recognized within the regional market. For example, the comprehensive and extensively detailed *Stucco Resource Guide* published by the Seattle-based Northwest Wall and Ceiling Bureau remains the undisputed bible for plasterers in the Pacific Northwest.

This leads to an important question: what is an industry standard? The ICC

Further, self-serving publications by a specific interest group within an industry also do not constitute industry standards. Similarly, a single author's initial writing about a subject is not an industry standard; instead, initial writing(s) about a particular subject or issue can lead to an exchange of views within the wider industry that may result in formalization of a new consensus standard.

Consider, for example, the widely known New York City publication, *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*. The initial publication of this document may be considered the date that it became a new standard for New York City building professionals; however, it was only after subsequent wide review and broad-consensus acceptance nationwide that it could be considered a recognized industry standard throughout the U.S.'s mold-assessment and -abatement industry.

CODES – Establish minimum requirements for safeguarding life and limb and public health and welfare by controlling the design, construction, quality of materials, use, occupancy, and locations of buildings.

STANDARDS – An industry standard is a published document or detail that helps define the minimum levels of design, materials, and workmanship that currently are recognized via consensus by regional or national industry associations.

EVALUATION REPORTS – Manufacturer-specific product evaluation reports augment the building code and allow local building officials to approve the use of "alternate" materials, designs, and methods of construction not addressed in the building codes.

EVALUATION REPORTS

Similar to industry standards, manufacturer-specific product evaluation reports issued by the independent International Code Council Evaluation Service (ICC-ES) and its predecessors have evolved to augment the building code. The I-Codes and their predecessor model codes have provisions that allow local building officials to approve the use of "alternate" materials, designs, and methods for construction that are not addressed within the building codes but have been demonstrated through approved independent testing to provide a level of performance that meets or exceeds minimum code requirements.

For example, "alternate" cladding systems are independently tested weather-protective systems that have not yet been incorporated into the model building codes although they still may be accepted by a local building official. For many years, vinyl siding was not specifically recognized within the model codes; instead, it was installed in conformance with product-specific evaluation reports issued by the regional evaluation service predecessors of ICC-ES. Eventually, a wide acceptance that this vinyl siding product could provide good weatherproofing and fire-resistant performance when properly installed on Type V buildings led to its inclusion in current model codes. For example, Section 1405.13 of the 2006 IBC allows vinyl siding complying with the specifications of ASTM D3679⁴ to be installed in conformance with the vinyl siding installation requirements of

ed for direct use in codes and specifications. It does not attempt to prescribe acceptable limits of damage."

This leads us to a critical point: While compliance with certain industry standards is mandated by the code authorities, prudent building professionals also will carefully consider, evaluate, and implement other nationally or locally recognized industry standards not specifically referenced within the I-Codes, particularly when weatherproofing the building envelope.

These industry standards serve both to supplement the typically minimalist instructions of the model building codes and to provide specific regional or national guidance for how best to implement the intent of the codes. As an example, while ASTM C926 and Chapter 25 of the 2006 IBC prescribe specific instructions for proper application of stucco, IBC Section 1403.2 mandates that exterior walls must be weather-resistant, and Section 1405.3 requires the use of flashings to achieve this goal, these directives by themselves do not fully inform the stucco contractor how best to install a traditional hard-coat stucco cladding system in a manner that ensures

reports, "A standard is a document that has been developed through an established consensus process."³

The key word in this statement is "consensus." An industry standard is a published document or detail that helps define the levels of design, materials, and workmanship that currently are recognized via consensus by regional or national industry associations that represent a broad spectrum of the key players within the specific industry. These consensus standards represent the minimum efforts necessary to achieve a level of quality construction that, with reasonable and timely maintenance, will provide satisfactory performance throughout the intended service life of the system.

Industry standards are not simply the unwritten customary practices of some portion of the industry. Just because everyone within a particular trade or profession reportedly does or does not carry out a particular activity, this is not evidence of an industry standard. In short, poor quality construction cannot be defended by arguing that this level of workmanship is customary within a specific market or region.

ASTM D4756.⁵

It should be noted that while Section 1405.13 of the 2006 IBC only cites ASTM D3679, within this particular standard there is a requirement that approved vinyl siding must be installed in compliance with the installation requirements of ASTM D4756. Therefore, even though the vinyl siding installation requirements of ASTM D4756 are not specifically referenced by the IBC code-writing authorities, the installing contractor's compliance with this standard still has been mandated via the other ASTM standard: "The installation also must comply with ASTM D4756, which is referenced within ASTM D3679 and the manufacturer's instructions."⁶

This multilayered approach of mandating compliance with certain industry standards has been described by the ICC as follows: "The ASTM standards referenced in the IBC are very comprehensive in scope, giving detailed descriptions of test methods, material specifications, and installation procedures. Each ASTM standard generally includes a variety of references to other ASTM standards, thereby expanding the scope of that particular method."⁷

Another "alternate" cladding system that has long been installed in conformance with product-specific evaluation reports is EIFS (Exterior Insulation and Finishing Systems). It is worth noting that in 2008, the ICC code-writing committees voted to add EIFS claddings to the 2009 editions of the International Building Code (see Section 1408) and the International Residential Code (see Section R703.9).

As an example of a relatively recent alternate cladding marketed in North America, consider the fiber-reinforced cement exterior-wall panel system that is the subject of ICC-ES evaluation report ESR-1627:

- Section 2.0 of the report informs us that the system is "an alternative exterior-wall covering to those materials described in IBC Section 1405.2, IRC Section R903, and UBC Section 1402";
- Section 3.0 describes the materials and fasteners referenced with the evaluation report;
- Section 4.0 provides design guidance and installation instructions; and
- Section 5.0 identifies key conditions of use, including a requirement that the product is allowed only "where Type V construction is permitted."

Similar evaluation reports for many independently tested "alternate" products and systems can be downloaded without charge at the ICC-ES Web site (www.icc-es.org).

SUMMARY DISCUSSION

In the end, the backbone of the construction process is composed of the chapters and sections of the local or state building code, which commonly is modeled upon a current edition of the International Building Code and/or the International Residential Code. The IBC and IRC code-writing authorities are becoming increas-

ingly reliant upon installation standards published by highly credible industry associations, particularly ACI and ASTM International.

Industry standards that are referenced within the model codes generally have the same force of law as do the published codes. It is important to note that there are many other highly respected industry standards that are not specifically referenced within the model I-Codes but still should be considered, interpreted, and implemented during construction, particularly when weatherproofing the building envelope.




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An industry standard is a consensus-written document that reflects a broad spectrum of interests within a specific industry. In some markets, the challenge for building professionals is to identify and reject those documents that purport to represent local industry standards but instead are self-serving publications by special interest groups seeking to lower their potential legal exposure to poor-quality work.

To promote top-quality installation of materials and systems, building professionals should undertake the following measures:

1. Closely study the building code to identify specific installation guidance, including referenced installation standards by industry associations;
2. Evaluate key industry standards not referenced within the building code;
3. Follow the manufacturer's installation instructions; and
4. Where applicable, comply with all installation instructions published within appropriate product-specific evaluation reports.

The authors still encounter projects enmeshed in construction-defect litigation in which most of the identified deficiencies could have been avoided if these steps had been more closely followed by the designer(s) and contractors. 

REFERENCES

1. 1997 UBC/2006 IBC Nonstructural Comparison & Cross Reference, International Code Council, 1997, p. 202.
2. Ibid.
3. Ibid.
4. ASTM D3679, Standard Specification for Rigid Poly(vinyl Chloride) (PVC) Siding.
5. ASTM D4756, Standard Practice for Installation of Rigid Poly(vinyl Chloride) (PVC) Siding and Soffits.
6. Section 1405.13.1 of 2006 International Building Code – Code and Commentary, Vol. 1, International Code Council (www.iccsafe.org).
7. 1997 UBC/2006 IBC Nonstructural Comparison & Cross Reference, International Code Council, 1997, p. 202.

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