



Metal Roof Installation Manual

Chapter 18: Codes/Standards & Specifications

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BUILD LEGACIES
 METAL

Chapter 18: Codes/Standards and Specifications

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18. INTRODUCTION

Along with the large variety of panel profiles, seam types, and roof design configurations, there are other factors which will change how a metal roof system *must* be installed. Applicable codes, standards, and specifications developed and approved by interest groups, regulators, and legislators must be followed by the installer.

Failure to follow these accepted procedures and methods can result in lawsuits, inspection failures, and added project costs. Most codes, standards, and specifications are designed to ensure quality and safety in the construction, and specific requirements in energy efficiency.

Important Note

Different codes, standards and specifications may apply to similar jobs, even within the same geographic vicinity or similar structure type. For example,

- Occupancy considerations: facilities such as hospitals and fire houses typically require higher standards than other buildings, such as agricultural buildings.
- Roof pitch and geometry: these design issues directly affect wind impact on a roof.
- Other factors: local topography, wall openings, and parapets are also taken into account since they, too, affect wind load on a roofing system.

Always check and clarify before starting any installation.

18.1 Overview

Historically, geographically-based roofing codes have been developed in response to specific local, regional, or national concerns. The net result has been a complex mix of regulations that make it difficult to keep up-to-date on all the requirements that could possibly impact new construction and renovation projects.

It is virtually impossible to develop one single set of criteria or standards to govern the manufacture, selection, installation, and maintenance of a metal roof system. Installers, however, must still comply with the code that relate to their work. Overlap in requirements can be confusing without a basic understanding of their development and enforceability.

Local government jurisdictions regulate the construction industry by means of building codes that are developed through an arduous process. This process is illustrated in Figure 18-1, and explained as follows:

18.1.1 Specifications

First, specifications are developed to clearly describe technical requirements for materials, procedures, and services. Specifications may state the requirements for a desired product and the process used to produce it.

18.1.2 Standards

Standards are guidelines, or principles, that are agreed upon by a broad spectrum of the industry, typically working through a trade association. The association may be at a state, national, or international level.

18.1.3 Codes

When standards or requirements are published, they may become codes. By publishing these standards, they become available not only to members of the

developing organizations, but to any interested party.

18.1.4 Becoming Law

Once a code is adopted by a jurisdiction, it becomes law. The construction industry is governed by a collection of regulations and requirements. By becoming law, these rules and regulations are designed to provide uniformity on *minimum* design and construction practices, thereby avoiding inconsistencies arising from differing approaches of architects, builders, and installers. When jurisdictions adopt these national, state, or local codes, they are no longer recommendations, but the law, and they *must* be followed.

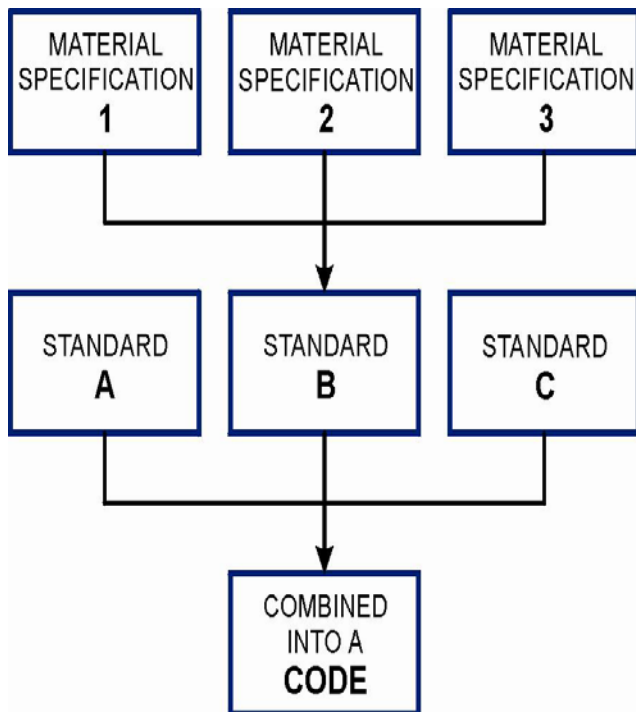


Figure 18-1
How Specifications, Standards, and Codes Are Related

18.2 Building Codes

Building codes normally set roof requirements affecting the strength and safety of the roof system. These requirements translate into installation

requirements such as type, quantity, and spacing of fasteners, underlayment and related fastening requirements, and gutter and drainage details. A metal roof presents a unique situation.

Metal roof systems depend on attachment to the building structures with clips which are spaced throughout the field of the roof. This type of installation is strikingly distinct from alternative roofing systems (like asphalt or built-up roofs) that are uniformly attached across the entire field of their surface with continuous adhesives, fasteners, or weight (ballast). In addition, standing seam metal roof systems have vertical seam components that protrude from the field of the roof. This creates an uneven surface and a non-uniform stiffening of the panel against the forces of wind.

If a roof installation is located in a designated historic district, or on an historic structure, additional requirements may apply which will likely affect the style and type of roof structure and even allowable materials.

18.2.1 National

In the past, there were three building codes. Unfortunately, they were regional models, and written by three separate organizations of building officials. Each state, county, and municipal jurisdiction typically adopted one of these regional codes. They were known as the Uniform Building Code (UBC) published by ICBO¹, the BOCA² National Building Code, and the SBCCI³ Standard Building Code.

In 1994, the three model code organizations (ICBO, BOCA, and SBCCI) were consolidated

¹ ICBO – International Council of Building Officials
² Building Officials and Code Administrators International
³ Southern Building Code Congress International

into one organization – the International Code Council (ICC).

The code developed by the ICC to address commercial construction is the International Building Code (IBC). In 2000, the first comprehensive and coordinated set of the IBC was published. An updated edition of the code is published every three years. This code and its revisions do not become law until adopted by the local jurisdiction.

18.2.2 Local

Local building codes which may apply to a metal roof installation are too numerous to list, vary greatly, and change frequently.

It is best to check with the administration offices of the local jurisdiction. Many have knowledgeable code officials and inspectors who are quite capable of answering related questions.

18.3 Energy Codes

About one-third of all energy in the United States is consumed in buildings. While building codes deal with the structural aspects of the installation, energy codes deal with the energy-conserving aspects of the roof system. Such requirements may affect fastening and sealing, coatings, touch-up, insulation, and related installation factors. Energy efficiency, as it relates to a metal roof installation, is examined in more detail in Section 10.3, *Energy Efficiency*.

18.3.1 National

Nationally, this high level of energy usage led to the development of various energy standards and codes with support from the U.S. Department of Energy (DOE). Many states, such as California and Oregon, publish their own energy codes. Other states rely heavily on the Model Energy Codes or the International Energy Conservation Code.

18.3.2 Local

Local energy codes may apply to a metal roof installation. Local energy codes are not as common as building codes, but are already in place in many larger cities and some states, like California. Be aware that many municipalities merely adopt the codes already established at the state or national level.

Again, it is best to check with the administration offices of the local jurisdiction. Many have code officials, and inspectors who are energy conscious and capable of answering related questions.

18.4 Home Rule Doctrine

Because of the large number of specifications, codes, and standards that affect the construction and metal roof industry, conflicts between their requirements will inevitably arise. *When* such a conflict occurs, the installer may need to apply the concept of "Home Rule Doctrine," which means, "The most stringent requirement applies." Our governmental structure allows the lowest governing body to have final control, as long as their requirement is equal to or more stringent than, the state or federal requirement.

Home Rule Doctrine Example

Here is an example of "Home Rule Doctrine" as it might apply to a roof's ability to withstand wind uplift. For the installer, meeting wind uplift requirements normally translates into requiring installation of a certain number of fasteners per roof panel with a specified distance between the fasteners. The current IBC may allow a minimum of 9 fasteners per panel. A state code may require 12 fasteners per panel. The county code may also equate to 12, but the local code may be higher, specifying an uplift resistance which equates to 15 fasteners in each panel. In this case, the 15 fasteners per panel would be enforced because it is the most stringent. Keep in mind

that any Property Owners' Association's CC&Rs (Covenants, Conditions and Restrictions) could require a wind uplift resistance which would require even more fasteners per panel.

18.5 Guarantees and Warranties

While these are not laws, both guarantees and warranties are legally binding documents. Even though, for our purposes, they are very similar, there are legal differences, but both are assurances that certain characteristics or conditions will be maintained for a designated period of time. In addition to an expected condition, like not leaking, other roof characteristics are often guaranteed. Color retention, energy efficiency, and longevity of a roof are often stated to maintain a level of performance for many years. A well-known selling point for a metal roof system is its longevity.

Unfortunately, these promises are based on certain factors, many which take place during the installation and are the responsibility of the installer. The use and spacing of designated fasteners, sealant, environmental conditions, and failure to maintain tolerances during installations may all void any warranty or guarantee issued by a manufacturer.

A preferred method and "Best Practice" is to take digital photographs or video of critical components, installation factors, or portions of an installation which will not be visible after the installation is complete. This action documents, for all parties involved, certain details, conditions, and factors of the installation in the event there are questions, concerns, or even litigation.

18.5.1 Weathertight Warranty Text

Obviously a roof must be weathertight and not leak, but how is this determined and how does this affect the installer?

Many factors like weathertightness, water resistance, and leaking are performance expectations, but are not directly covered in any code. They are, however, usually covered in an installation, or manufacturers, warranty or guarantee. The expected level of performance is usually determined as follows:

- All exterior gutters and downspouts shall be designed for rainfall intensity based upon a 5-year recurrence interval for a 5-minute duration.
- All interior gutters, valleys, and downspouts shall be designed for rainfall intensity based upon a 25-year recurrence interval based on a 5-minute duration.

No matter what a manufacturer says in a warranty or guarantee, the following clause, or something similar, is often included;

"XYZ⁴ Company, Inc. assumes no responsibility for any problems which might arise as a result of improper installation or any personal injury or property damage that might occur with the products use."

In order to meet and exceed the expected, and guaranteed, levels of performance, an installer, must be sure to use the correct materials and follow the established procedures. Unfortunately, most leak issues are caused by improper installation and not the failure of a manufactured panel, fastener, or sealant.

⁴ Not a real Company

Installer Note

Installers should be aware that they have much more to do with a roof system being weathertight than any other party involved with the project. As a result, installers are usually the first party contacted when leaks occur. A typical contract will normally require some minimum time that an installer will be responsible for the weathertightness of an installation. Even if a manufacturer gives a weathertightness warranty, be aware that most of these warranties require the installer to be responsible for an initial period of weathertightness. If there is a manufacturer’s weathertightness warranty required on the project, the installer should check with the manufacturer *before* installation begins to insure that all requirements necessary to insure the warranty are understood. The installer must then make sure and verify that all requirements have been completed before the installation is considered completed.

Installer Warranty Precautions

There are several precautions an installer should follow to minimize liability, confusion, and misunderstanding concerning contracts and manufacturer warranties.

- Always follow any manufacturer or job specific engineering details during the installation. These are designed to provide maximum weathertightness, performance and protection. If there are questions or concerns, they should be resolved and documented before proceeding.
- Be aware of and involved in any additional roof work which is to be completed or added by other trades, or workers; especially if roof penetrations are involved. This should include documentation of any communication with the others involved with the additional work, follow-up checks, photographs, and verifications.
- Any additional documentation relating to the above two issues should be filed and available for an appropriate period of time. Keep in mind that many warranties may be significant in length.

18.5.2 When Conflicts Arise

There will be cases when conflicts arise between the installer and the approving authority. An installer may be told to install a product in a certain manner, which is in direct conflict with the manufacturer's instructions, job calculations, and/or the principles outlined in this manual. When this situation occurs, immediately contact the responsible party about the situation. The responsible party shall handle and resolve any disputes, and get a written waiver of responsibility if the work is to proceed as instructed by the approving authority.

Full documentation of the situation, including the conflicting instructions, specific details, photographs, and the actions taken by the installer must be done in writing as a matter of permanent record. Installers and their management are encouraged to maintain these records for a period of not less than 10 years.

Summary

When the installer fails to use the proper materials and methods, whether or not it is intentional, they are in danger of breaking the law and possibly voiding the roof warranty. These are costly mistakes, and often wind up in litigation, which may go on

for years. In addition, it may be years after the initial roof installation before certain infractions are discovered and litigation begins.

Such installation mistakes may be avoided by following two basic guidelines. First, prior to beginning the job, find out and understand the codes, standards, and specifications which are applicable to the work being performed.

Secondly, during the installation, if conflicts, confusion, or uncertainty arise, immediately contact the responsible party about the situation. When resolved, be sure to document the details of the resolution of the matter.

Notes:

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