

If f'_m must be verified by the prism test method rather than the unit strength method, an assemblage of the selected units and mortar must be constructed and tested in accordance with ASTM C1314, *Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry*. This test may be used both for preconstruction and construction evaluation of the masonry.

18.2.6 Sample Panels and Mock-Ups

A sample panel is defined as a site-constructed panel of masonry to be used as a basis of judgment for *aesthetic* approval of the appearance of the materials and workmanship. Judging the appearance of masonry can be very subjective, but there are several basic things that should be considered:

- Compliance with allowable unit chippage and warpage
- Compliance with allowable size tolerances
- Unit placement
- Mortar joints and tooling
- Overall workmanship

Typical sample panels range in size from 4 ft × 4 ft to 4 ft × 6 ft or larger. The Masonry Standards Joint Committee (MSJC) *Specification for Masonry Structures* (ACI 530.1/ASCE 6/TMS 602) requires a minimum sample panel size of 4 ft × 4 ft. Larger panels which incorporate technical as well as aesthetic criteria can be more effective in establishing project standards.

A mock-up panel goes a step beyond the sample panel because it includes other elements of the work not related to aesthetics (refer to Chapter 17). Mock-ups may be required instead of or in addition to sample panels. They may serve the dual purpose of setting criteria for both aesthetic and technical consideration, and they may also be built for testing purposes. Mock-ups should include all of the basic components of the masonry system and backing wall, including reinforcement, connectors, shelf angles, flashing, weep holes, and expansion and control joints. If more elaborate mock-ups are required to show specific areas or details of the work such as window detailing, the panels should be delineated on the drawings or described adequately in the specifications to clearly identify the work required. Mock-up panels are often larger than sample panels. The size will vary with complexity, but a basic panel without a window element or other special components should be at least 4 ft × 6 ft.

Sample panels and mock-ups can be built free-standing or as part of the permanent construction. If free-standing, they should be located where they will not interfere with subsequent construction or other job-site activities because they must remain in place until the masonry work has been completed and accepted. Sample panels and mock-ups should be constructed early enough in the construction schedule to allow for rejection and reconstruction without delay to the work.

Since many of the items required in a mock-up will be concealed, and since acceptance is based on procedure as well as appearance, the architect or engineer should try to be present during construction of the panel to observe the work. Documentation of concealed elements and procedural items may best be accomplished by photographing the work in progress. A cursory examination of a completed mock-up panel will tell the observer

nothing about what's inside the wall (or isn't inside the wall). Acceptance on such a basis does not give adequate criteria on which to accept or reject the project masonry.

Specifications typically say too little about sample panels and mock-ups. The construction documents should allow bidders to accurately estimate the cost of constructing the mock-up. Size and number of panels required and all of the components to be included should be specified. Complex mock-ups that include various design elements should be illustrated on the drawings in plan, elevation, and section, and referenced to specific project details. The specifications should designate the accepted mock-up as the project standard. They should also clearly establish the aesthetic and technical criteria on which acceptance or rejection of the panel will be based, as well as the person who will be responsible for evaluation (i.e., architect, engineer, construction manager, independent inspector, owner, etc.). Only specified products and materials or accepted substitutes should be used to construct the mock-up. Units should be of the same production run that will be supplied for the project, and should represent the full range of color variation to be expected in the project. Mortar ingredients, including sand and water, should also be those that will be used for project construction, since they have a significant effect on mortar color. The specification should also stipulate that the panel be built by a mason whose work is typical of that to be expected in the finished wall. A mason contractor would not be wise to assign the best available bricklayer to build the sample, because if the rest of the crew cannot match that workmanship, there may be a basis for rejection of the finished work. Before construction of a sample panel or mock-up begins, all project submittals should be reviewed for conformance to contract document requirements, and any required preconstruction testing should be complete.

18.3 SPECIFYING WITH THE MSJC CODE

The *International Building Code* requirements for masonry construction are based primarily on the Masonry Standards Joint Committee (MSJC) *Building Code Requirements for Masonry Structures* (ACI 530/ASCE 5/TMS 402), which is jointly written by the American Concrete Institute (ACI), the American Society of Civil Engineers (ASCE), and The Masonry Society (TMS). IBC 2000 is based on the 1999 MSJC Code and IBC 2003 is based on the 2002 MSJC Code. Both editions of the MSJC Code incorporate ACI 530.1/ASCE 6/TMS 602, *Specification for Masonry Structures*, as part of the Code.

The MSJC Specifications establish a minimum quality standard for materials and construction, and attempt to ensure a level of testing and inspection commensurate with that required for concrete and steel structures. The document, however, must be coordinated with individual project specifications to avoid overlaps, duplications, conflicts, and omissions.

The MSJC Specifications are intended to be "modified and referenced" in the project specifications. Individual sections, articles, or paragraphs should not be copied into the project specifications, since taking them out of context may change their meaning. A statement such as the following will serve to incorporate the standard into the project spec.

Masonry construction and materials shall conform to requirements of the Masonry Standards Joint Committee *Specification for Masonry Structures* (ACI 530.1/ASCE 6/TMS 602) except as modified by this Section.

The project specifications may stipulate more stringent requirements. They must supplement the MSJC Specifications in order to customize their application to each particular project and design.