

This section is an overview of good design, application, installation and safety concerns that should be addressed when USG's products and systems are used. This section outlines some major issues, but is not intended to be a comprehensive review. No attempt is made at completeness.

We recommend that architects and contractors seek the assistance of safety professionals, especially at the professional construction site, because there are many factors to consider that are not included here. For more detailed information and references, please refer to Chapter 13 — Safety Considerations, Material Handling of the USG *Gypsum Construction Handbook*.

System Performance

United States Gypsum Company conducts tests on products and systems to meet performance requirements of established test procedures specified by various agencies. Upon written request we will provide test certification for published fire, sound, structural and other pertinent data covering systems designed and constructed according to our published specifications. **Substitutions of any of the components are not recommended and are not endorsed by the United States Gypsum Company.**

Fire Resistance

Use fire test data to compare and select materials and constructions. In addition, these data are essential for securing acceptance by the building code or agency having jurisdiction. The USG *Fire-Resistant Assemblies* (SA100) shows tested fire resistance for various systems.

What is fire resistance?

Fire resistance refers to the ability of an assembly to serve as a barrier to fire and to confine its spread to the area of origin. Spread of fire from one area to another occurs due to the following conditions:

- the barrier collapses
- openings in the barrier allow passage of flame or hot gases
- sufficient heat is conducted through an assembly to exceed specified temperature limitations

These characteristics form the basis for judging when an assembly no longer serves as a barrier in a test.

What is a fire resistance rating?

A *fire resistance rating* denotes the length of time a given assembly can withstand fire and give protection from it under precisely controlled laboratory conditions. All tests are conducted in accordance with the Standard ASTM E119: Fire Tests of Building Construction and Materials. The standard is also known as ANSI/UL 263 and NFPA 251. Fire resistance ratings are expressed in hours and apply to walls, floor- and roof-ceiling assemblies, beams, and columns.

Can I substitute or add materials in a design?

For assemblies tested at Underwriters Laboratories Inc. (UL), ratings are specific to the designs tested. This is of particular importance when faced with alternate product or construction suggestions. For example, insulation may not be added to floor- or roof-ceiling assemblies, unless described in the UL design. Addition of insulation in the concealed space between the ceiling membrane and the floor or roof structure may reduce the hourly rating of an assembly by causing premature disruption of the ceiling membrane and/or higher temperatures on structural components under fire exposure conditions.

Increasing the size and gauge of the stud does not impact the fire resistance rating of the assembly.

For more detailed information, refer to the the Underwriters Laboratory Fire Resistance Directory, Volume One.

Structural Criteria

Design of any structure must take into account the kinds of conditions that will exist and the resulting stresses and movements. Load-bearing walls include the exterior walls of a building and some interior walls too. These structures must be designed to carry the weight of the structure, its components, and other loads that occur once the building is occupied.

The amount of axial load that structural members can bear will vary with the amount of lateral load (pressure from wind or other horizontal stresses) that the final assembly may incur.

Manufacturers of structural components, particularly steel framing (studs, runners, joists) provide tables that identify the maximum allowable loads for various components under specific conditions. These tables typically start at 5 psf lateral loads and increase in 5 or 10 psf increments to about 40 psf. Interior partitions are typically designed for 5 psf lateral loads.

Interior non-bearing partitions are not designed to carry axial loads. Limiting heights are based on stress or deflection limits for given lateral loads. Height limitations depend on the gauge of the steel used, dimensions of the stud, stud spacing, and the allowable deflection limit.

**Control Joints –
Building Movement**

USG is unable to determine the specific location of control joints. Locating control joints is the responsibility of the design professional/architect. Integrate these suggestions with project conditions when determining specific locations for control joints.

What are control joints and how are they used?

Control joint is a general term for methods used to minimize (not eliminate) the potential for cracking in partitions and ceilings. Specifically, a control joint minimizes cracking in the face of a partition or ceiling. At the perimeter of a partition or ceiling it is actually called a perimeter relief joint or slip joint.

A control joint is effective in minimizing cracking caused by tensile or compressive movement in a membrane resulting from thermal, hygrometric and structural effects.

Where should I consider a control joint?

Isolate surfaces with control joints or other means where:

- construction changes within the plane of the wall, such as T and L intersections
- partition run exceeds 30'
- expansion or control joints occur through the building itself

Ceiling-height door frames may be used as control joints. Less-than-ceiling-height door frames should have control joints extending to ceiling from both corners on both sides of the partition. Treat window openings in the same manner as doors.

Zinc control joints, when properly insulated and backed by gypsum panels, have been fire-endurance tested and are certified for use in one- and two-hour fire-rated walls.

Proper installation of control joints in partitions and ceilings requires breaking the gypsum panels or lath behind the control joint. In ceiling construction, the framing should also be broken. In partitions, separate studs are used on each side of the joint with the runner track separated at that location.

Sound Control

Use sound test data to compare and select materials and constructions. These data frequently are essential for securing compliance by the agency having jurisdiction. The USG *Fire-Resistant Assemblies* (SA100) provides tested acoustical performance for various systems.

What is sound control?

Sound control refers to the ability to attenuate sound passing through a partition. It is tested per ASTM E90 and rated per ASTM E413.

The *Sound Transmission Class (STC)* is a widely used rating of sound attenuation performance. It is relatively accurate for speech sounds but not for music, mechanical equipment noise or any sound with substantial low-frequency energy.

Sound tests are conducted under ideal laboratory conditions per ASTM procedures. USG products are assembled in a specific manner to meet the requirements of these ASTM procedures. Substitution of materials other than those tested or deviation from the specified construction may adversely affect performance.

Field performance depends on building design and careful attention to detailing and workmanship. Where partitions are used for sound control, seal the partition perimeter with 1/4" min. round bead of SHEETROCK® brand acoustical sealant.

Seal around all cutouts for lights, cabinets, pipes, ducts and electrical boxes. Avoid back-to-back penetrations of the diaphragm, flanking paths and door and borrowed-light openings.

Moisture and Mold

Understanding moisture and mold and their impact on the construction process and building materials is integral to good design and construction practices. USG offers references and additional sources that reinforce good design, construction and maintenance practices. These practices are generally recognized as necessary to minimize moisture-related problems and the growth of mold in a building environment. If you have additional questions please contact those sources or USG.

Mold consists of microorganisms that are present everywhere – indoors and outdoors. Mold can grow in or on virtually every construction material currently made. The best way to address mold is to make sure that building materials do not get wet before and during installation and are not exposed to moisture inside the finished building.

In all situations, immediately identify and address the cause of water damage to prevent re-occurrence of the problem.

For additional information, please use the following resources:

New York City Department of Health: <http://nyc.gov/html/doh/home.html> (Search for mold resources.)

U.S. Environmental Protection Agency: www.epa.gov (Search for mold resources.)

USG: getmoldfacts.com; Moisture, Mold and Construction Practices (WB2317); Moisture Control: System Solutions to Prevent Mold (WB2325)

Air and Water Infiltration

Flashing and sealants as shown in the construction documents and as selected by the architect and/or structural engineer should be provided to resist air and water infiltration. The flashing and sealants selected shall be installed in a workmanlike manner in appropriate locations to maintain continuity of air/water barriers, particularly at windows, doors and other penetrations of exterior wall.

Vapor Retarders

Water vapor control must always be considered in the design of exterior wall systems. Humidity and temperature conditions may require the installation of a vapor retarder to prevent moisture condensation within the wall and the resulting damage. To determine the necessity and location of vapor retarders, a water vapor transmission and dew point analysis of the layered wall assembly should be conducted by a qualified engineer.

Product Handling and Storage

Gypsum Panels – Protect all gypsum products from exposure to excessive or continuous moisture and the elements before, during and after installation. Eliminate sources of moisture immediately.

Metal Framing Protection – Give light gauge metal components such as steel studs and runners, furring channels and resilient channels adequate protection in the warehouse and on the jobsite against rusting caused by moisture. In marine areas such as the Caribbean, Florida and the Gulf Coast where chloride and sea salt are present in combination with excessively high humidity, use of components which offer increased protection against corrosion is recommended.

For additional information, refer to Storage and Handling: Wallboard and Other Products (WB2333).

Painting Systems

Painting products and systems should be used which comply with recommendations and requirements in Appendixes of ASTM C840. For priming and decorating with paint, texture or wall covering, follow manufacturer's directions for materials used.

All surfaces, including applied joint compound, must be thoroughly dry, dust-free, and not glossy. Prime with SHEETROCK® First Coat or with an undiluted, interior latex flat paint with high-solids content. Allow to dry before decorating.

To improve fastener concealment, where gypsum panel walls and ceilings will be subjected to severe artificial or natural side lighting and be decorated with a gloss paint (egg shell, semi-gloss or gloss), the gypsum panel surface should be skim coated with joint compound. This equalizes suction and texture differences between the drywall face paper and the finished joint compound before painting. As an alternative to skim coating, or when a Level 5 finish is required, use SHEETROCK® TUFF-HIDE™ primer-surfacer.

Trademarks

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Notice

We shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than the intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from date it was or reasonably should have been discovered.

Safety First!

Follow good safety and industrial hygiene practices during handling and installation of all products and systems. Take necessary precautions and wear the appropriate personal protective equipment as needed. Read material safety data sheets and related literature on products before specification and/or installation.

