JOHN W. BAUMGARTEN ARCHITECT, P.C.
NY, NJ, PA, FL

Fire Rated Ceilings – What You Need to Know

The Pros and Cons of Fire Rated Ceilings


With HMD Healthcare Design

In recent years, JWB has been involved in helping many of our skilled nursing home clients replace non-compliant suspended ceilings in their senior care facilities. In most cases, Owners and operators were taken completely by surprise when they were told by governing agencies that a fire code deficiency existed in their circa 1970s buildings.

Before "finishing this story" we should discuss the history of fire rated ceilings and outline why and when their use is appropriate. To really understand this, you need to first have a basic understanding of how building codes address fire protective construction.

A building's fire protective infrastructure is composed of a series of interconnected assemblies which work together to protect the building's structure and ultimately its occupants. Building codes group these assemblies (walls, beams, columns, floor/ceiling systems) into "construction types" based upon their degree of combustibility and duration of protection (in hours). The first major distinction is whether an assembly (walls, floor/ceiling systems, columns, beams) is combustible or not (will it burn or be otherwise damaged in a fire). For example, the New York State Building Code classifies non-combustible assemblies as Type I & II and combustible assemblies as Type II, IV and V. Each numerical category has subcategories "A & B" which define relative hourly fire ratings for various assemblies. For Example:

Building Element	Type IA	Type IIA	
Primary Structural Frame	3 Hours Minimum	1 Hour	Minimum
Interior Bearing Walls	3 Hours Minimum	1 Hour	Minimum
Exterior Bearing Walls	3 Hours Minimum	1 Hour	Minimum
Floor Construction	2 Hours Minimum	1 Hour	Minimum
Room Construction	1½ Hours Minimum	1 Hour	Minimum

By assigning a minimum hourly rating, the code is establishing a timeframe for occupants to safely evacuate the building and for fire fighters to control or extinguish a fire.

Think of the building code as a spreadsheet. If you change any parameter in a spreadsheet formula, "the answer changes". The Life Safety parameters set by building codes include;

1. What is the building used for? (It's Occupancy)
2. What is it made of? (Wood, Concrete, Steel)
3. How big is its floor plan area? (Building Area/Footprint)
4. How high is it? (# Stories and #Feet)
5. Is it sprinklered or not?


With AE Design

JOHN W. BAUMGARTEN ARCHITECT, P.C.
NY, NJ, PA, FL


With AE Design

As a general rule, "the safer a building is, the less restrictive the code provisions which govern it". For example, a large, tall hospital where recovering patients cannot self-evacuate during an emergency will be subject to significantly more code restrictions than a 2-story office building where the persons that work there are thoroughly familiar with the building and its exits and can easily travel down 2 flights of stairs to escape during an emergency.

Armed with this basic understanding of how codes assess risk, we can now discuss how fire-rated ceilings fit into the discussion.

When any building is built, there are a series of basic decisions made by the Owner and Architect based on the use permitted by local zoning along with fire protection requirements dictated by the building code for the intended occupancy (Apartment Building? Office? Nursing Home?). One such decision is selecting various fire rated assemblies to meet the minimum hourly fire ratings of the required construction type.

In the case of a nursing home, governing codes will dictate a fully sprinklered building of Type I or II Construction (most often Type IB or IIA) which require 2-hour and 1-hour floor construction respectively. However, within construction Types IB or IIA there are a few options on how to achieve the required 1 or 2-hour fire ratings. These include;

1. A poured-in-place concrete building (no steel beams to fire protect, but relatively expensive).
2. A steel-framed building with spray-on fireproofing protecting the steel columns, beams and joists.
3. A steel-framed building with a fire rated ceiling protecting the steel beams and joists.

Many original owners/developers of ground-up nursing homes built in the 1970s chose option #3 (fire rated ceilings to fire protect structural steel beams and joists). At that time, fire rated ceilings were an efficient and cost-effective way to protect a building's structure and steel framing was also an economical structural choice. Over their 40-plus year life span, the ownership of many 1970s era senior care facilities may have changed several times. Multiple refurbishments of interior finishes may have also occurred. In many cases, these renovations included the inadvertent replacement of original fire rated ceiling systems, with non-fire rated ceiling systems, leaving the building's steel structure unprotected.

There is no "easy fix" for this problem. Attempting to spray-fireproof steel in an occupied health facility could pose significant health risks to building occupants. Applying spray fireproofing is a high-humidity process that could negatively impact air quality and produces unpleasant odors as a by-product. The only real choice is to take down the existing non-fire-rated ceiling systems and replace them with fire-rated ceiling systems. The key word here is system. You are not simply replacing ceiling tiles, you are replacing;

1. Ceiling tiles with fire rated ceiling tiles
2. Ceiling grid with fire rated ceiling suspension grid


With The Designers Group

T: 516.939.2333 F: 516.939.0033 E: info@jwbarch.com PO Box 725, Merrick, NY 11566 www.jwbarch.com

JOHN W. BAUMGARTEN ARCHITECT, P.C.
NY, NJ, PA, FL


With The Designers Group

The fire rated ceiling components cannot be replaced à la cart. They must be part of a specifically configured floor/ceiling assembly tested (burned in a fire tunnel) by a certified testing agency such as Underwriters Laboratory (UL). There are a good number of UL tested assemblies which can be utilized such as UL Design G211 which, when tested, achieved both a 1-hour and 2-hour fire rating.

Think of a fire rated floor ceiling assembly as a "sandwich". The concrete floor slab and the suspended ceiling are the slices of bread that protect the "meat" of the building, its structural steel superstructure. Also, part of this "sandwich" are other building elements such as HVAC ductwork and light fixtures.

The effectiveness of a fire rated floor ceiling assembly centers on limiting the amount of openings in the ceiling tiles, and fire protecting those openings that cannot be avoided such as air grilles and recessed light fixtures.

The UL G211 assembly requires that all HVAC air grilles be protected by spring loaded, heat activated fire dampers. These devices are also referred to as fusible link fire dampers where a spring with a soft metal "bridge" holds a metal gate or door in the open position at the point where the air duct connects to the air grille above the ceiling. When subjected to high "fire temperatures" (165+ degrees), the metal bridge melts and the spring "slams the door" preventing a fire from spreading through the air duct network.

UL G211 also requires that the "above-ceiling side" of light fixtures be protected with "fire canopies" that can be fabricated from fire rated ceiling tiles or incombustible insulation blankets.

When it comes to the wholesale replacement of ceiling systems in an occupied senior care facility the "how" is just as important as the "what". Such a project must be executed in a series of phases with emphasis on protecting the health, safety and welfare of residents, staff and visitors. To meet this primary objective, the project must be divided into many "small" phases, and it may be necessary to execute a good portion of the project at off-hours utilizing more costly night-differential labor rates.

Health facility operators must submit detailed phasing/interim life-safety plans to the governing health agencies who must approve them before construction may commence and will monitor compliance for the duration of the project (along with local building authorities).

Given the many complexities and constraints it is not unusual to see a major ceiling replacement project in a 200+ bed long-term care facility have a project duration exceeding 2 years.


With HMD Healthcare Design

For all of the above reasons, we tend to specify spray-on fireproofing for new construction and for alterations of non-residential buildings where construction floors can be vacated. With the steel protected, ceilings need not be fire rated and the expense of ceiling fire dampers and light fixture protection along with the on-going maintenance headache can be avoided.

JOHN W. BAUMGARTEN ARCHITECT, P.C.
NY, NJ, PA, FL

When considering significant alterations of occupied building, we recommend that you consult with an experienced architect who can make you aware of how the various construction assemblies in your building contribute to its code compliance. This will allow you to alter your building while maintaining its code compliance.







With AE Design



Interior Design by Crème
Photography: ©Ines Leong / L-INES Photo

T: 516.939.2333 F: 516.939.0033 E: info@jwbarch.com PO Box 725, Merrick, NY 11566 www.jwbarch.com