



# A Close-Up Look at Ceiling Radiation Dampers

Michael Bulzomi, product manager, commercial dampers, Greenheck



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- Credit cannot be issued to anyone who does not complete the evaluation.
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AND a completed evaluation are  
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# Michael J. Bulzomi

Product Manager – Commercial Dampers,  
AMCA Member Company

- Over 16 years experience in the HVAC industry
- Has held positions in sales, marketing and application engineering across the U.S. for HVAC product manufacturers and Sales Reps
- Holds an MBA, and a Bachelors in Earth Science and Atmospheric Science
- Active member of ASHRAE, NFPA, and AMCA, serving on multiple committees



# Purpose and Learning Objectives

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The purpose of this presentation is to be able to...

- Identify the different types of Ceiling Radiation Dampers
- Understand the difference between a Ceiling Radiation Damper and other life safety dampers
- Find and identify critical information regarding Ceiling Radiation Dampers in construction documents.
- Understand the UL Product IQ listing requirements for combustible and non-combustible assemblies.

# Agenda

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What is a Ceiling  
Radiation  
Damper?

Different Types of  
Ceiling Radiation  
Dampers

Differences from  
other Life Safety  
Dampers

UL Floor/Ceiling &  
Roof/Ceiling  
Design Review

How to Identify  
Ceiling Radiation  
Dampers

How to Select the  
Appropriate  
Ceiling Radiation  
Damper





What...  
is a Ceiling  
Radiation Damper?

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# What is a Ceiling Radiation Damper?

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## Definition of a Ceiling Damper per NFPA Standard 90A

*“A device installed to limit radiant heat transfer through an air outlet or air inlet opening in the ceiling of a floor- or roof-ceiling assembly having not less than a 1 hour fire resistance rating.”*

# A rose by any other name...

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**CRD**

**Radiation  
Damper**

**Ceiling  
Damper**

**Ceiling Fire  
Damper**

**Wood Truss  
Damper**

**Fire Rated  
Wood Truss  
Damper**

**Wood Joist  
Damper**

**Fire Stop  
Flaps**





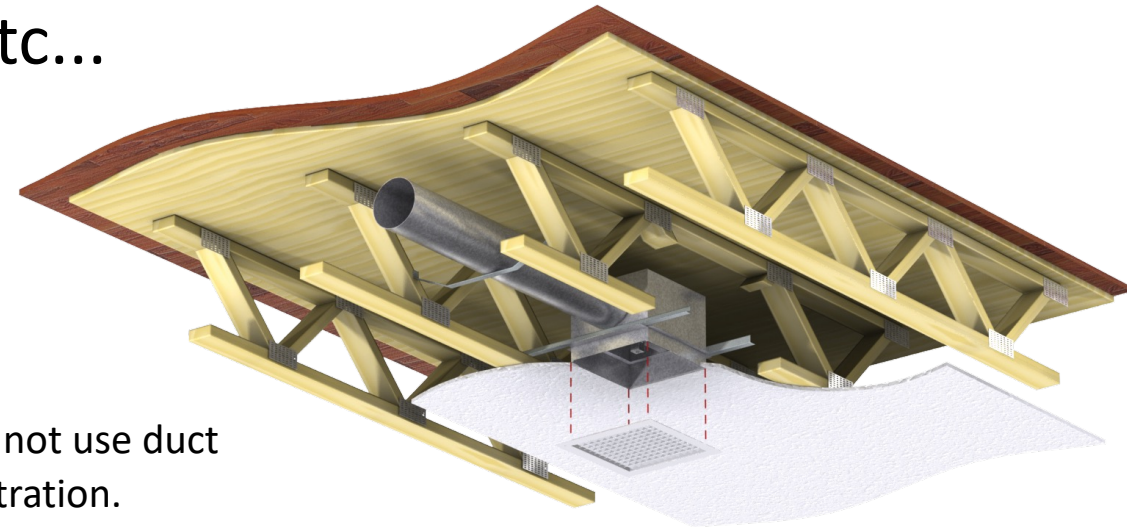
Where...  
are CRDs installed?

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# Ceiling Radiation Dampers are found:

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- In ceilings, behind diffusers, grilles, and exhaust fans
- Supply and return air ceiling membrane penetrations for above ceiling (or in attic) Furnaces/ERV/Fan Coils/Heat Pumps, etc.
- Supply and return air ceiling membrane penetrations for in closet Furnace/ERV/Fan Coil/Heat Pumps, etc...



**NOTE: Single floor penetrations only** Cannot use duct to create a “shaft” or multi-floor ducted penetration.

# How...

does a Ceiling Radiation Damper  
protect an assembly?

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# Limits radiant heat transfer above ceiling

Ceiling Dampers are designed to limit the transfer of radiant heat to protect structural integrity of floor/ceiling or roof/ceiling assembly above it.

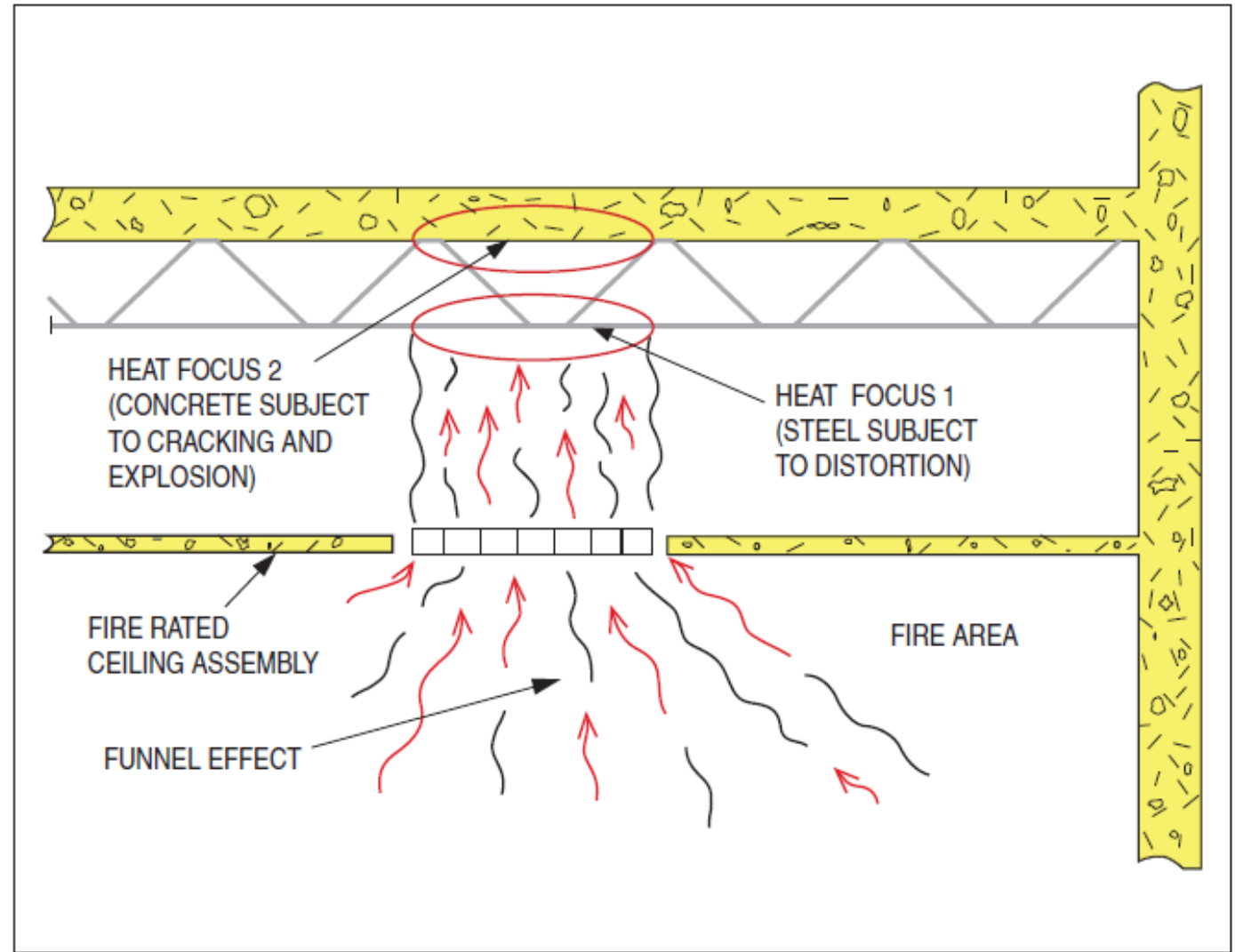


FIGURE 1



When...  
are CRDs required?

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# International Building Code (IBC): Chapter 7

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## 717.3.1 Damper testing.

*Dampers shall be listed and labeled in accordance with the standards in this section.*

1. *Fire dampers shall comply with the requirements of UL 555.*
2. *Smoke dampers shall comply with the requirements of UL 555S.*
3. *Combination fire/smoke dampers shall comply with the requirements of both UL 555 and UL 555S.*
4. *Ceiling radiation dampers shall comply with the requirements of UL 555C or shall be tested as part of a fire-resistance-rated floor/ceiling or roof/ceiling assembly in accordance with ASTM E119 or UL 263.*
5. *Corridor dampers shall comply with requirements of both UL 555 and UL 555S. Corridor dampers shall demonstrate acceptable closure performance when subjected to 150 feet per minute (0.76 mps) velocity across the face of the damper during the UL 555 fire exposure test.*

## 717.5 Where required.

*Fire dampers, smoke dampers, combination fire/smoke dampers, ceiling radiation dampers and corridor dampers shall be provided at the locations prescribed in Sections 717.5.1 through 717.5.7 and 717.6. Where an assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and a smoke damper shall be provided.*

# International Building Code (IBC): Chapter 7

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## 717.5.4.1 Corridors.

Duct and air transfer openings that penetrate *corridors* shall be protected with *dampers* as follows:

1. A *corridor damper* shall be provided where *corridor* ceilings, constructed as required for the *corridor* walls as permitted in Section 708.4, Exception 3, are penetrated.
2. A *ceiling radiation damper* shall be provided where the ceiling membrane of a fire-resistance-rated floor-ceiling or roof-ceiling assembly, constructed as permitted in Section 708.4, Exception 2, is penetrated.
3. A *listed smoke damper* designed to resist the passage of smoke shall be provided at each point a duct or air transfer opening penetrates a *corridor* enclosure required to have smoke and draft control doors in accordance with Section 716.2.2.1.

### Exceptions:

1. *Smoke dampers* are not required where the building is equipped throughout with an approved smoke control system in accordance with Section 909, and *smoke dampers* are not necessary for the operation and control of the system.
2. *Smoke dampers* are not required in *corridor* penetrations where the duct is constructed of steel not less than 0.019 inch (0.48 mm) in thickness and there are no openings serving the *corridor*.

# International Building Code (IBC): Chapter 7

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## 717.6.1 Through penetrations.

In occupancies other than Groups I-2 and I-3, a duct constructed of approved materials in accordance with the *International Mechanical Code* that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two stories is permitted without *shaft enclosure* protection, provided that a *listed fire damper* is installed at the floor line or the duct is protected in accordance with Section 714.5. For air transfer openings, see Section 712.1.9.

**Exception:** A duct is permitted to penetrate three floors or less without a *fire damper* at each floor, provided that such duct meets all of the following requirements:

1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel having a minimum wall thickness of 0.0187 inches (0.4712 mm) (No. 26 gage).
2. The duct shall open into only one *dwelling unit* or *sleeping unit* and the duct system shall be continuous from the unit to the exterior of the building.
3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m<sup>2</sup>) in any 100 square feet (9.3 m<sup>2</sup>) of floor area.
4. The *annular space* around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 or UL 263 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the *fire-resistance rating* of the construction penetrated.
5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a *listed ceiling radiation damper* installed in accordance with Section 717.6.2.1.

# International Building Code (IBC): Chapter 7

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## 717.6.2 Membrane penetrations.

Ducts and air transfer openings constructed of *approved* materials in accordance with the *International Mechanical Code* that penetrate the ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with one of the following:

1. A *shaft enclosure* in accordance with Section 713.
2. A *listed ceiling radiation damper* installed at the ceiling line where a duct penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.

### Exceptions:

1. A fire-resistance-rated assembly tested in accordance with ASTM E119 or UL 263 showing that *ceiling radiation dampers* are not required in order to maintain the *fire-resistance rating* of the assembly.
  2. Where exhaust duct or outdoor air duct penetrations protected in accordance with Section 714.5.2 are located within the cavity of a wall and do not pass through another dwelling unit or tenant space.
  3. Where duct and air transfer openings are protected with a duct outlet penetration system tested as part of a fire-resistance-rated assembly in accordance with ASTM E119 or UL 263.
3. A *listed ceiling radiation damper* installed at the ceiling line where a diffuser with no duct attached penetrates the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly.

### Exceptions:

1. A fire-resistance-rated assembly tested in accordance with ASTM E119 or UL 263 showing that *ceiling radiation dampers* are not required in order to maintain the *fire-resistance rating* of the assembly.
2. Where duct and air transfer openings are protected with a duct outlet penetration system tested as part of a fire-resistance-rated assembly in accordance with ASTM E119 or UL 263.



# International Building Code (IBC): Chapter 7

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## 717.6.2.1 Ceiling radiation dampers testing and installation.

*Ceiling radiation dampers* shall be tested in accordance with Section 717.3.1. *Ceiling radiation dampers* shall be installed in accordance with the details specified in the fire-resistance-rated assembly and the manufacturer's instructions and the listing.

Premium Code Insights :  Key Changes

### 717.6.2.1.1 Dynamic systems.

Only *ceiling radiation dampers* labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.

Premium Code Insights :  Code Change Details  Hearing Videos

### 717.6.2.1.2 Static systems.

Static *ceiling radiation dampers* shall be provided with systems that are not designed to operate during a fire.

#### Exceptions:

1. Where a static *ceiling radiation damper* is installed at the opening of a duct, a *smoke detector* shall be installed inside the duct or outside the duct with sampling tubes protruding into the duct. The detector or tubes in the duct shall be within 5 feet (1524 mm) of the *damper*. Air outlets and inlets shall not be located between the detector or tubes and the damper. The detector shall be *listed* for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, *dampers* shall be closed upon fan shutdown where local *smoke detectors* require a minimum velocity to operate.
2. Where a static *ceiling radiation damper* is installed in a ceiling, the *ceiling radiation damper* shall be permitted to be controlled by a smoke detection system installed in the same room or area as the *ceiling radiation damper*.
3. A static *ceiling radiation damper* shall be permitted to be installed in a room where an occupant sensor is provided within the room that will shut down the system.

# For Use in Lieu of Hinged Door Type Dampers

Tested for use in UL fire  
resistive designs that  
indicate the use of a  
**hinged door type  
damper**



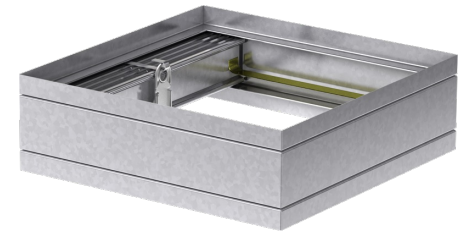
Tested & classified to  
**UL 555C**



**Butterfly Type**  
**Sq/Rect, Round**



**Low Profile Type**



**Curtain Type**

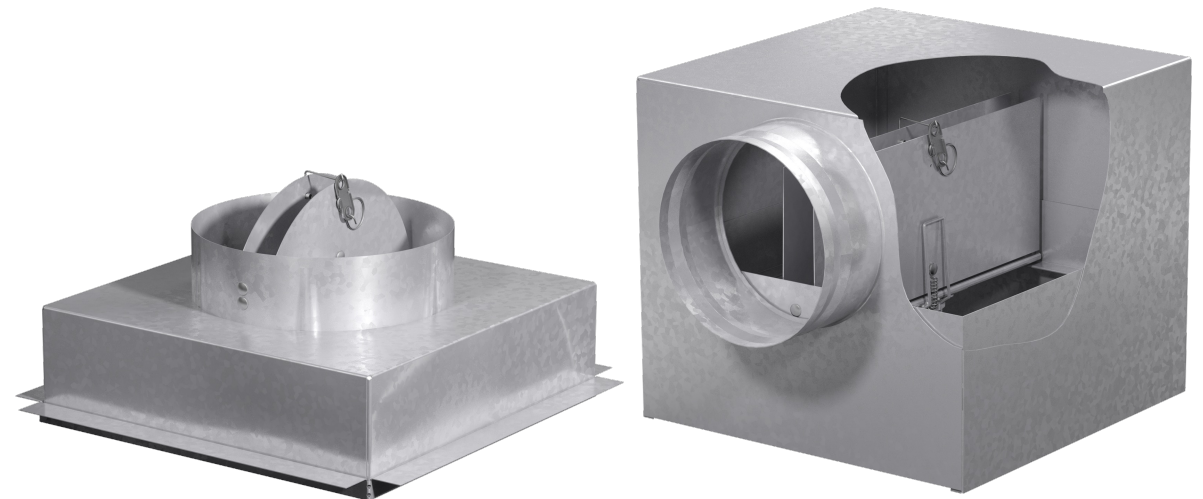
# For use in specific floor/ceiling or roof/ceiling designs

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Tested for use only in  
one or more specific  
UL fire-resistive  
floor/ceiling or  
roof/ceiling designs

Commonly used in  
multi-family dwellings,  
nursing homes, smaller  
hotels and motels, etc.

Tested and classified to  
**UL 263**



## For use in specific UL floor/ceiling or roof/ceiling designs

- These designs can be “**proprietary**,” meaning the listing is owned by a damper manufacturer and only their products have been tested and approved for use under that design number.
- Or they can be “**open**,” typically owned by a gypsum board manufacturer where multiple manufacturers of dampers have been tested and are approved for use under that design number.



What...  
is the difference?

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# Between a Fire Damper & Ceiling Radiation Damper?

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- Limits Flame (UL555)



FIRE DAMPER

- Limits Heat (UL555C)



CEILING RADIATION DAMPER



# Between a CRD and Wood Truss CRD?

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- For installation in ceiling penetration with an air outlet and thermal blanket (fire rated t-bar or gypsum board) (**UL555C**).
- Part of a specific assembly usually in conjunction w/a factory or field supplied boot (by others) (**UL555C, UL263**).



CEILING  
RADIATION DAMPER



WOOD TRUSS  
CEILING RADIATION DAMPER

# Differences continued...



The application of ceiling radiation dampers versus horizontal fire dampers, smoke dampers, combination fire-smoke dampers and corridor dampers are distinctly different.



Dampers may be constructed differently

- Different frame and/or blade gauges
- May or may not require blade insulation



Different installation methods/requirements



Ceiling Dampers for Wood Truss are assemblies and usually require a Factory supplied or Field Supplied boot (by others) constructed per manufacturers IOM.



And most importantly...the different UL classifications have different UL labels – they are tested and approved for different applications!

What...  
do the UL designs look like?

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# Design that allows a UL 555C Rated Ceiling Damper

## Design No. G526

July 28, 2017

Restrained Assembly Rating — 2 Hr.

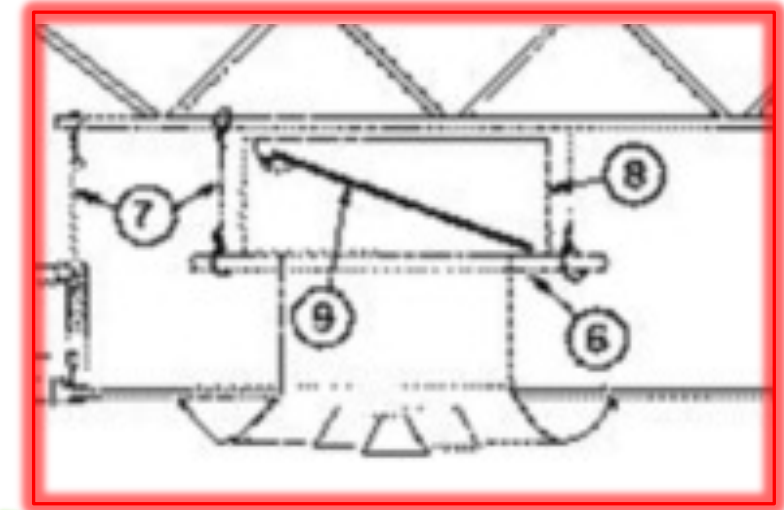
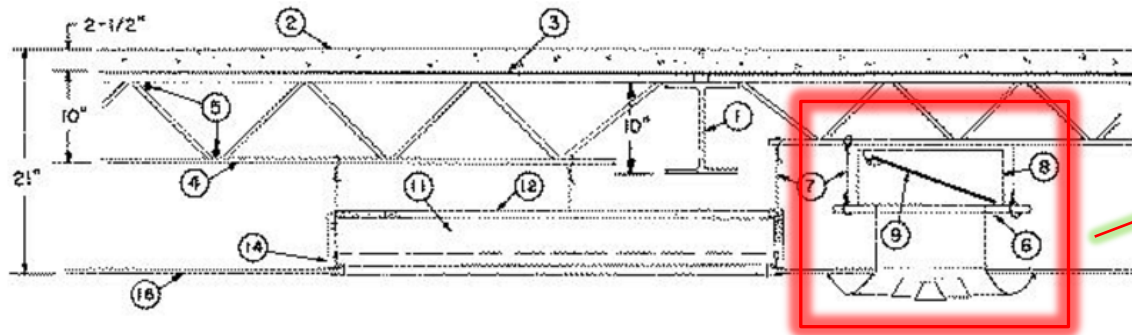
Unrestrained Assembly Ratings — 1-1/2 and 2 Hr.

(See Item 14B)

Unrestrained Beam Rating — 2 Hr.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide [BXUV](#) or [BXUV7](#)

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



# Design that allows a UL 555C Rated Ceiling Damper

7. **Hanger Wire** — No. 12 SWG galv steel wire tied to cold-rolled channels or bar joists. Located a max of 48 in. O.C. with a hanger wire located at the corner of each light fixture. A wire is to be located at the center of each cross tee at light fixtures. Also used to hold duct support as needed.
8. **Air Duct** — No. 20 gauge galv steel. Total area of duct opening not to exceed 56.5 sq in. per each 100 sq ft of ceiling area. Area of individual duct opening not to exceed 113 sq in. Max dimension of opening 12 in. Duct supported by cold-rolled channels spaced not more than 60 in. O.C. suspended from joists in trapeze fashion.
9. **Damper** — No. 14 MSG galv steel. Protected on both surfaces with 1/16 in. thick ceramic fiber paper and held open with a 160 F fusible link (Bearing the UL Listing Mark). Damper to overlap duct outlet min 1 in.

# Design that allows a UL 263 Ceiling Damper assembly for use in Wood Truss Ceiling

Design No. **M508**

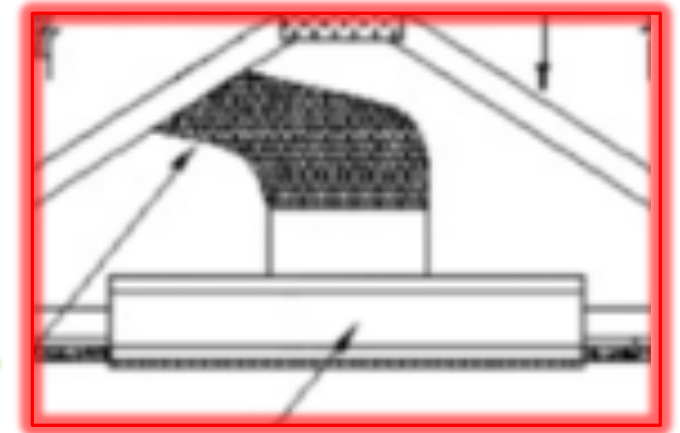
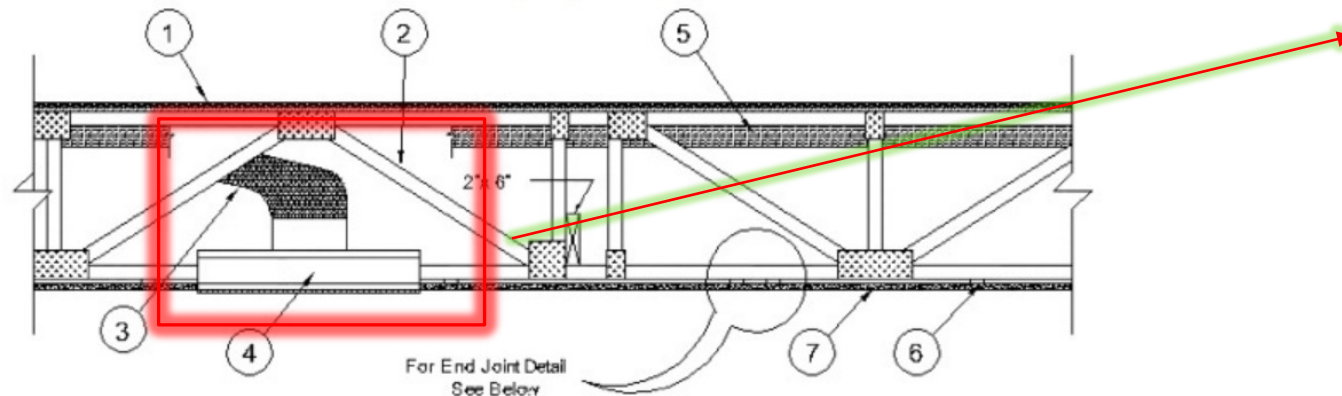
May 03, 2023

Unrestrained Assembly Rating — 1 Hr.

Finish Rating — 23 Min (See Items 5 or 5A)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide [BXUV](#) or [BXUV7](#)

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.





# Design that allows a UL 263 Ceiling Damper assembly for use in Wood Truss Ceiling

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4. **Ceiling Damper\*** — Optional- Max nom 21 in. long by 18 in. wide, fabricated from galvanized steel. Plenum box max size nom 21 in. long by 18 in. wide by 14 in. high (inner dimension) fabricated from either galvanized steel or min 1 in. thick Listed Duct Board bearing the UL Listing Marking having a min R-Value of 4.3. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 180 sq in. per 100 sq ft of ceiling area.

**GREENHECK FAN CORP** — Model CRD-1WT

4A. **Alternate Ceiling Damper\*** — Optional - Max nom 12 in. long by 12 in. wide with an 8 in. diameter damper, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 72 sq in. per 100 sq ft of ceiling area

**GREENHECK FAN CORP** — Model CRD-2WT

4B. **Alternate Ceiling Damper\*** — Optional - Max nom 11-1/8 in. long by 13-5/8 in. wide, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 76 sq in. per 100 sq ft of ceiling area.

**GREENHECK FAN CORP** — Model CRD-310WT

4C. **Alternate Ceiling Damper\*** — Optional - Max nom 12-3/8 in. long by 14-1/2 in. wide, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 90 sq in. per 100 sq ft of ceiling area.

**GREENHECK FAN CORP** — Model CRD-320WT

4D. **Alternate Ceiling Damper\*** — Optional - Max nom 10-3/8 in. long by 10-3/8 in. wide, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 54 sq in. per 100 sq ft of ceiling area.

**GREENHECK FAN CORP** — Model CRD-300WT

# UL 555C vs. UL 263

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There are several notable differences but always remember:

- **UL 555C** Ceiling Dampers are intended for use in **sheet metal air duct outlets** which penetrate the ceilings of hourly-rated fire resistive assemblies (**in lieu of hinged plate dampers**).
- **UL 263** Ceiling Radiation Dampers are part of an assembly intended for installation in **specific** fire resistive assemblies (**i.e. wood truss ceilings**).

What...  
do I look for on  
Mechanical Plans?

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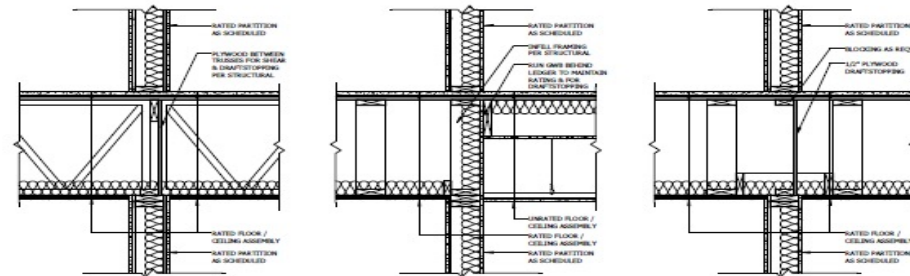
## Check the Architectural A set...

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Look for the following:

- Life Safety Plans
- Partition Plans
- Assembly Details
- Floor Elevations
- Building Section Details

# Check the Architectural A set...



**A WALL / CEILING INTERSECTION AT SHEAR WALLS**  
**B WALL / CEILING INTERSECTION AT CORRIDOR WALLS**  
**C WALL / CEILING INTERSECTION PARALLEL TO TRUSSES**  
**1 DRAFT STOPPING DETAILS**  
 1" = 1'-0"

FLOOR / CEILING ASSEMBLIES	ROOF ASSEMBLIES
<p><b>1 FLOOR TYPICAL FLOOR ASSEMBLY - SLAB</b></p> <ul style="list-style-type: none"> <li>FINISHED FLOOR AS SCHEDULED</li> <li>1/4" GYPSUM-CONCRETE TOPPING</li> <li>FLOOR MAT</li> <li>1/4" AIR FLOOR SHEATHING</li> <li>WOOD FLOOR TRUSSES PER STRUCTURAL</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> </ul> <p><b>2 FLOOR TYPICAL FLOOR ASSEMBLY - FRAMING</b></p> <ul style="list-style-type: none"> <li>FINISHED FLOOR AS SCHEDULED</li> <li>1/4" GYPSUM-CONCRETE TOPPING</li> <li>FLOOR MAT</li> <li>1/4" AIR FLOOR SHEATHING</li> <li>WOOD FLOOR TRUSSES PER STRUCTURAL</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> </ul> <p><b>3 FLOOR CORRIDOR FLOOR ASSEMBLY - SLAB</b></p> <ul style="list-style-type: none"> <li>FINISHED FLOOR AS SCHEDULED</li> <li>1/4" GYPSUM-CONCRETE TOPPING</li> <li>FLOOR MAT</li> <li>1/4" AIR FLOOR SHEATHING</li> <li>WOOD FLOOR JOISTS PER STRUCTURAL</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> </ul> <p><b>4 FLOOR CORRIDOR FLOOR ASSEMBLY - FRAMING</b></p> <ul style="list-style-type: none"> <li>FINISHED FLOOR AS SCHEDULED</li> <li>1/4" GYPSUM-CONCRETE TOPPING</li> <li>FLOOR MAT</li> <li>1/4" AIR FLOOR SHEATHING</li> <li>WOOD FLOOR JOISTS PER STRUCTURAL</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> </ul>	<p><b>1 ROOF TYPICAL ROOF ASSEMBLY - SLAB</b></p> <ul style="list-style-type: none"> <li>FINISHED ROOF AS SCHEDULED</li> <li>1/4" GYPSUM-CONCRETE TOPPING</li> <li>FLOOR MAT</li> <li>1/4" AIR FLOOR SHEATHING</li> <li>WOOD FLOOR TRUSSES PER STRUCTURAL</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> </ul> <p><b>2 ROOF TYPICAL ROOF ASSEMBLY - FRAMING</b></p> <ul style="list-style-type: none"> <li>FINISHED ROOF AS SCHEDULED</li> <li>1/4" GYPSUM-CONCRETE TOPPING</li> <li>FLOOR MAT</li> <li>1/4" AIR FLOOR SHEATHING</li> <li>WOOD FLOOR TRUSSES PER STRUCTURAL</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> <li>1 LAYER 5/8" TYPE 1" GYPSUM WALL BOARD</li> </ul>
	<p><b>COLUMN ASSEMBLIES</b></p> <p><b>1 COLUMN TYPICAL COLUMN ASSEMBLY - SLAB</b></p> <ul style="list-style-type: none"> <li>STEEL COLUMN PER STRUCTURAL</li> <li>1/4" THICK FLOORING, PER</li> </ul>
	<p><b>BEAM ASSEMBLIES</b></p> <p><b>1 BEAM TYPICAL BEAM ASSEMBLY - SLAB</b></p> <ul style="list-style-type: none"> <li>STEEL BEAM PER STRUCTURAL</li> <li>1/4" THICK FLOORING, PER</li> </ul>

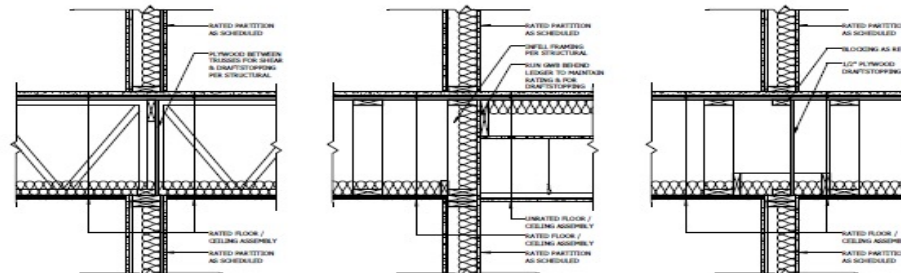
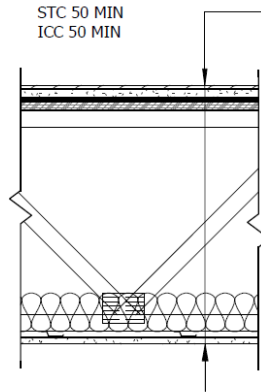
## Check the Architectural A set...

## FLOOR / CEILING ASSEMBLIES

1 HOUR TYPICAL FLOOR ASSEMBLY - **UL L521**

STC 50 MIN  
ICC 50 MIN

- FINISHED FLOOR AS SCHEDULED
- 3/4" GYPSUM-CONCRETE TOPPING
- FLOOR MAT
- 3/4" SUB FLOOR SHEATHING
- WOOD FLOOR TRUSSES PER STRUCTURAL
- 3 1/2" SAFB INSULATION OVER RESILIENT CHANNELS
- RC-1 RESILIENT CHANNEL AT UNDERSIDE OF TRUSSES @ 12" O.C.
- 5/8" TYPE "C" GYPSUM WALL BOARD

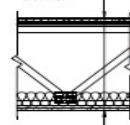


1. DRAFT STOPPING DETAILS  
 12" x 14"

## FLOOR / CEILING ASSEMBLIES

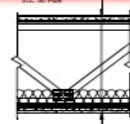
1 HOUR TYPICAL FLOOR ASSEMBLY - SEE 1.5.21

- FINISHED FLOOR AS SCHEDULED
- 3/4" GYPSUM-CONCRETE TOPPING
- FLOOR MAT
- 3/4" SUB FLOOR SHEATHING
- WOOD FLOOR TRUSSES PER STRUCTURAL
- 2 1/2" SAFE INSULATION OVER RESILIENT CHANNELS
- R1-C RESILIENT CHANNEL AT UNDERSIDES TRUSSES @ 12" O.C.
- 5/8" TYPE 'C' GYPSUM WALL BOARD



## 200400 FLOOR ASSEMBLY IN FIRE AREA &amp; OCCUPANCY SEPARATIONS - 16, 1577

- FINISHED FLOOR AS SCHEDULED
- 3/4" GYPSUM-CONCRETE TOPPING
- FLOOR MAT
- 3/4" SUB FLOOR SHEATHING
- WOOD FLOOR TRUSSEES PER STRUCTURAL
- 2 1/2" SAFE INSULATION
- 1 LAYER 5/8" TYPE "C" GYPSUM WALL BOARDS
- 4x4 RESILIENT CHANNEL AT UNDERSCORE TRUSSEES @ 12" O.C.
- 2 LAYERS 5/8" TYPE "C" GYPSUM WALL BOARDS



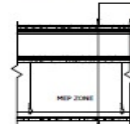
1 HOUR CORROSION FLOOR ASSEMBLY - 18.5 SQ.

- FINISHED FLOOR AS SCHEDULED
- 3/4" GYPSUM-CONCRETE TOPPING
- FLOOR MAT
- 3/4" SUB FLOOR SHEATHING
- WOOD FLOOR JOISTS PER STRUCTURAL
- 5/8" TYPE "C" GYPSUM WALL BOARD
- 5/8" GYPSUM WALL BOARD HUNG FROM GRID SYSTEM



2 HOUR CORRIDOR FLOOR ASSEMBLY - 18 LBS

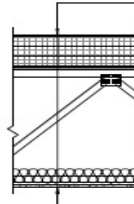
- FINISHED FLOOR AS SCHEDULED
- 3/4" GYPSUM-CONCRETE TOPPING
- FLOOR MAT
- 3/4" SUB FLOOR SHEATHING
- WOOD FLOOR JOISTS PER STRUCTURAL
- 1 LAYER 5/8" TYPE "C" GYPSUM WALL BO
- R-1 RESISTANT CHANNEL AT UNDOORSE
- TRUSSES @ 12" O.C.
- 1 LAYER 5/8" TYPE "C" GYPSUM WALL BO
- 5/8" GYPSUM WALL BOARD (SEE SPEC)



## ROOF ASSEMBLIES

1 HOUR TYPICAL ROOF ASSEMBLY - 10L PERL

- TYPICAL ROOF ASSEMBLY**
- EPDM ROOFING MEMBRANE
  - POLYSTYRENE INSULATION (4-6 IN)
  - VAPOR BARRIER
  - ROOF SHEATHING - PER SPECS
  - WOOD ROOF TRUSSES PER STRUCTURAL
  - 3" R-50 SAFE INSULATION OVER RESILIENT CHANNELS
  - RC-1 RESILIENT CHANNEL, AT UNDERSIDE OF TRUSSES @ 52" O.C.



## COLUMN ASSEMBLIES

SLIDER COLUMN ASSEMBLY - SL 3320

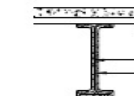
- 
- Diagram showing a cross-section of a steel column with fireproofing applied to its exterior. Labels indicate: STEEL COLUMN PER STRUCTURAL and 1 1/2" THICK FIREPROOFING, MIN.



## BEAM ASSEMBLIES

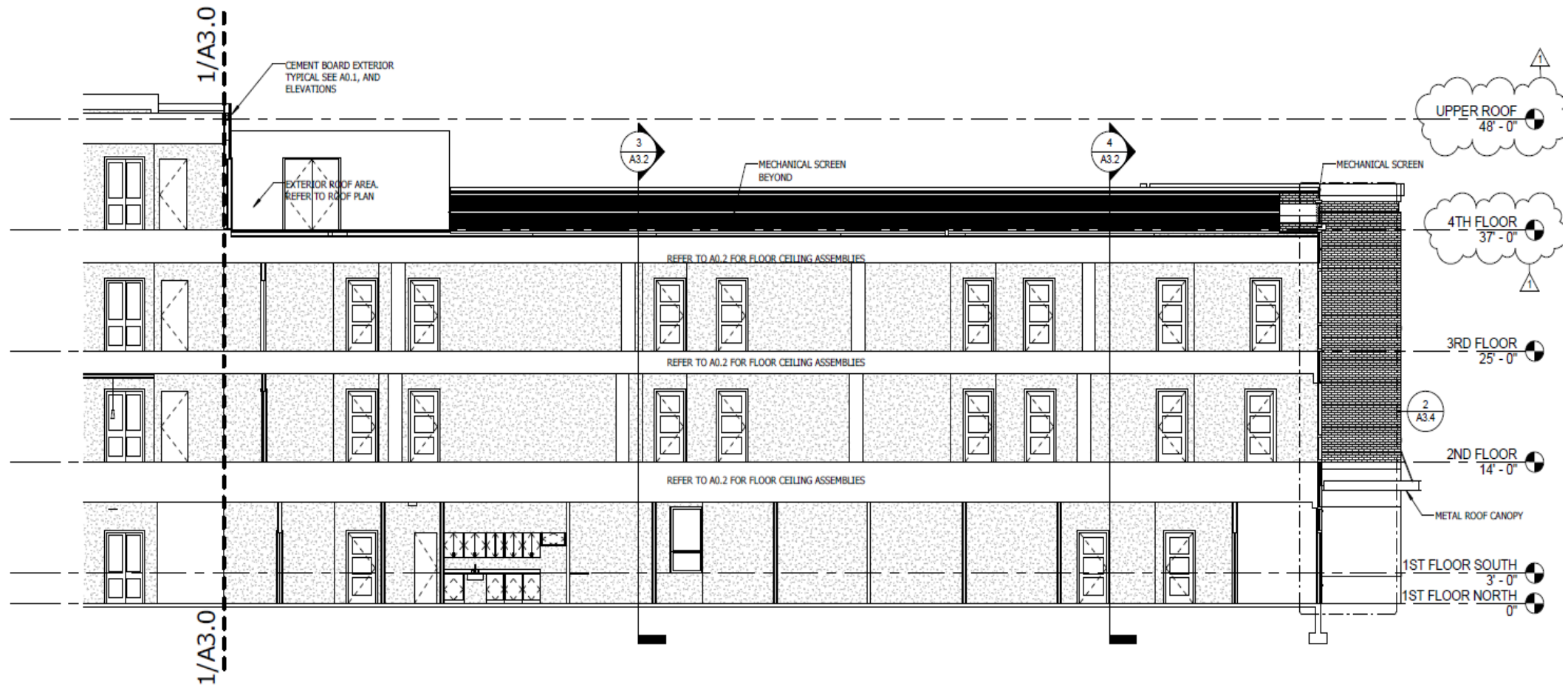
### 3. PACKER HEAD ASSEMBLY - SEE FIGURE 1

- 
- Diagram illustrating the cross-section of a bridge deck structure, showing the following layers from top to bottom:
- CONCRETE SLAB ON STEEL DECK PER STRUCTURAL, FIRE PROOFING NOT SHOWN
  - STEEL BEAMS PER STRUCTURAL
  - 1/2" THICK FIREPROOFING, MIN



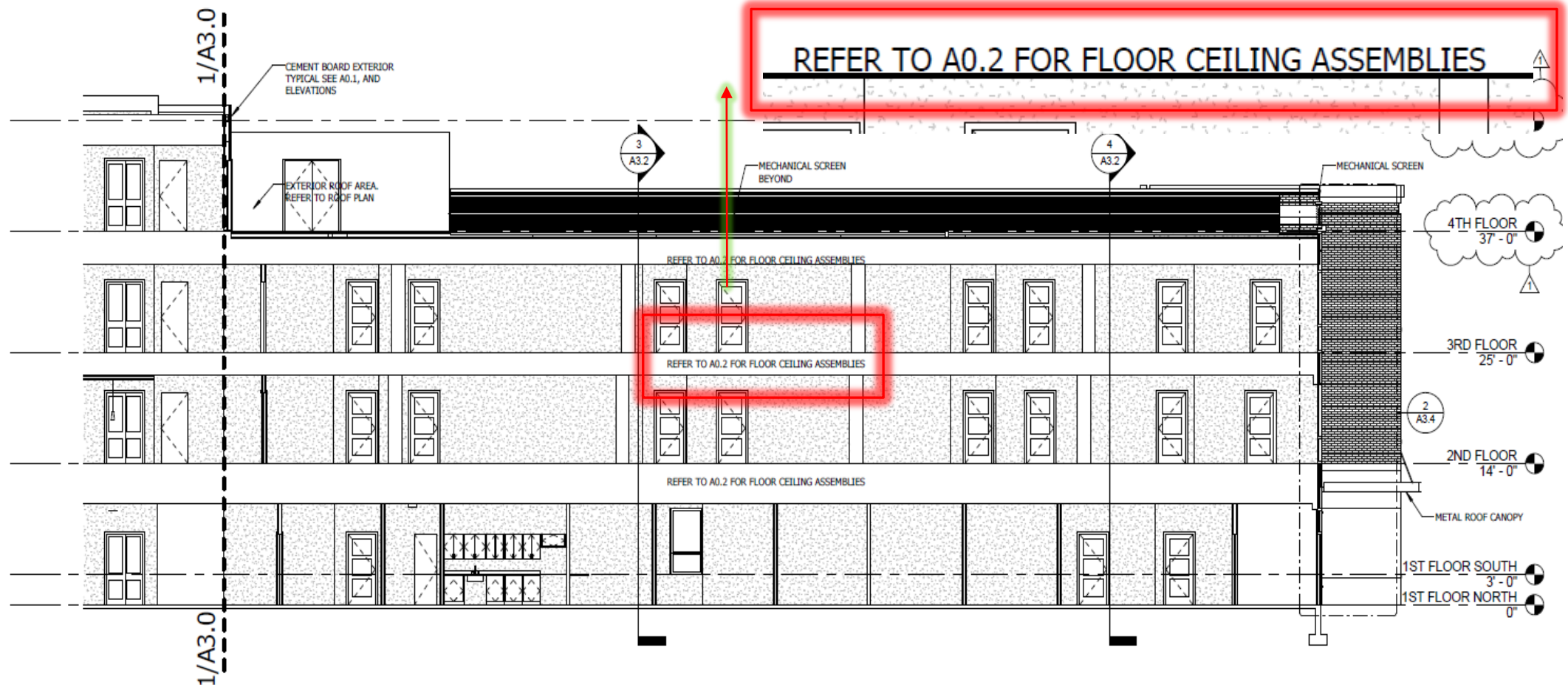


# Check the Architectural A set...





# Check the Architectural A set...





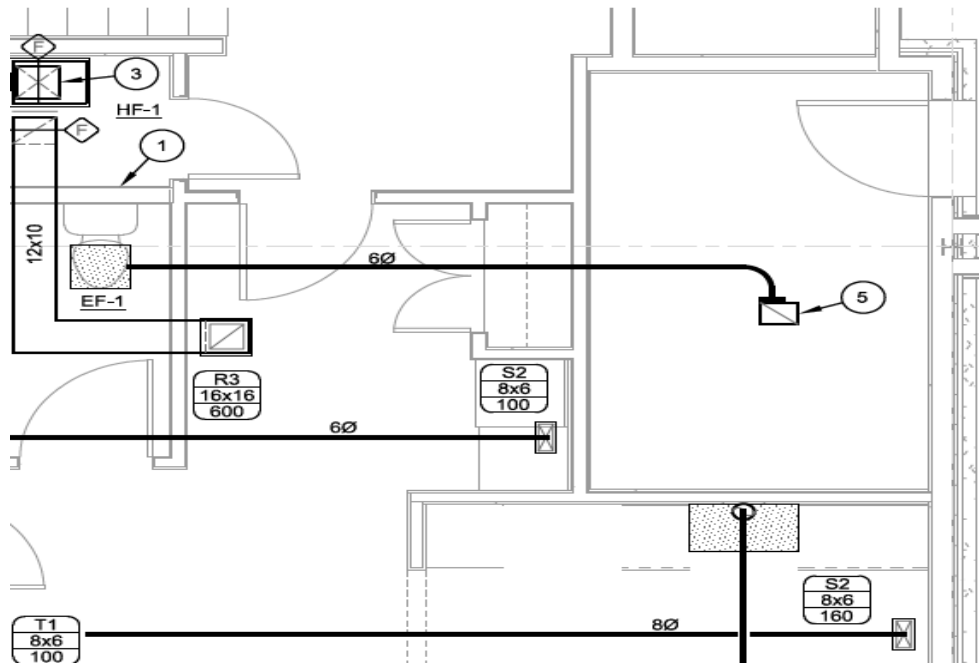
## Check the Mechanical M set...

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Looking for:

- Key Notes
- Schedule Notes
- Product Detail Drawings

# Check the Mechanical M set...

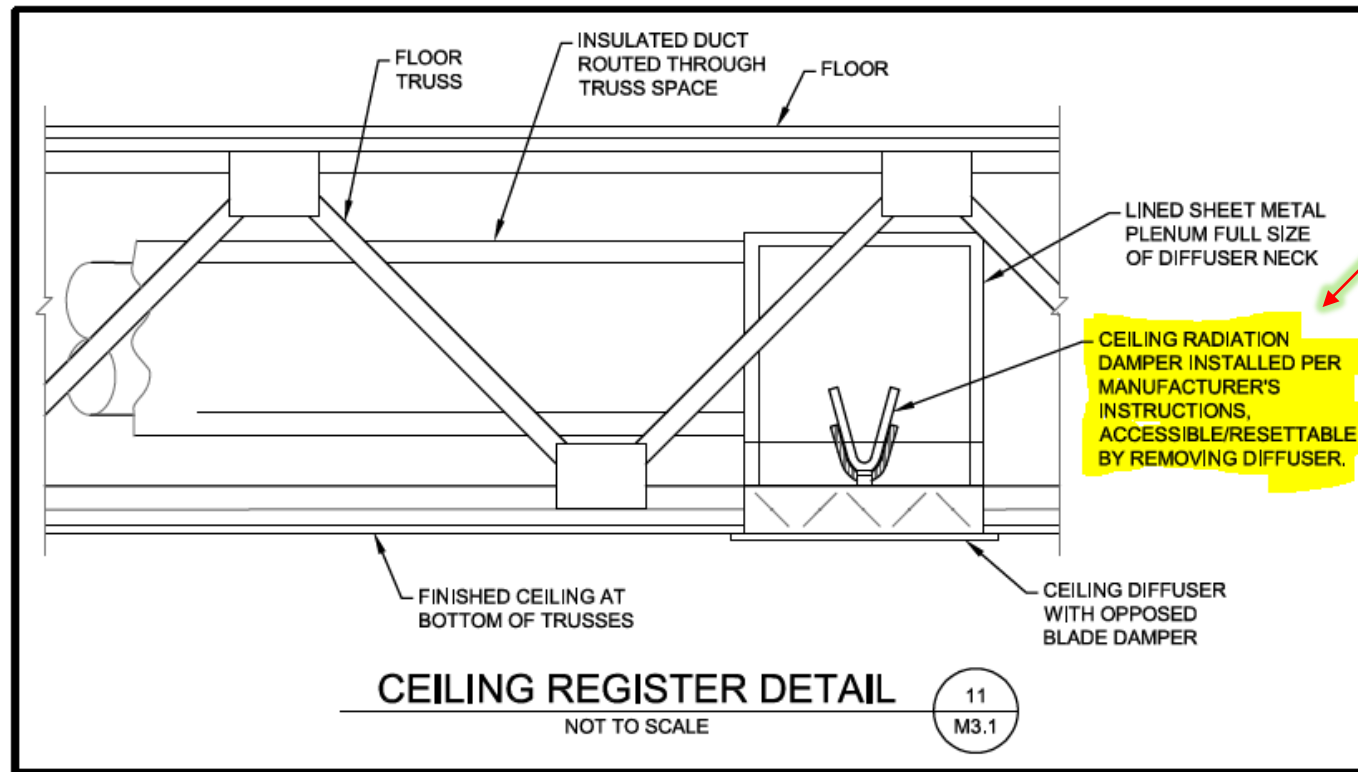


## KEY NOTES

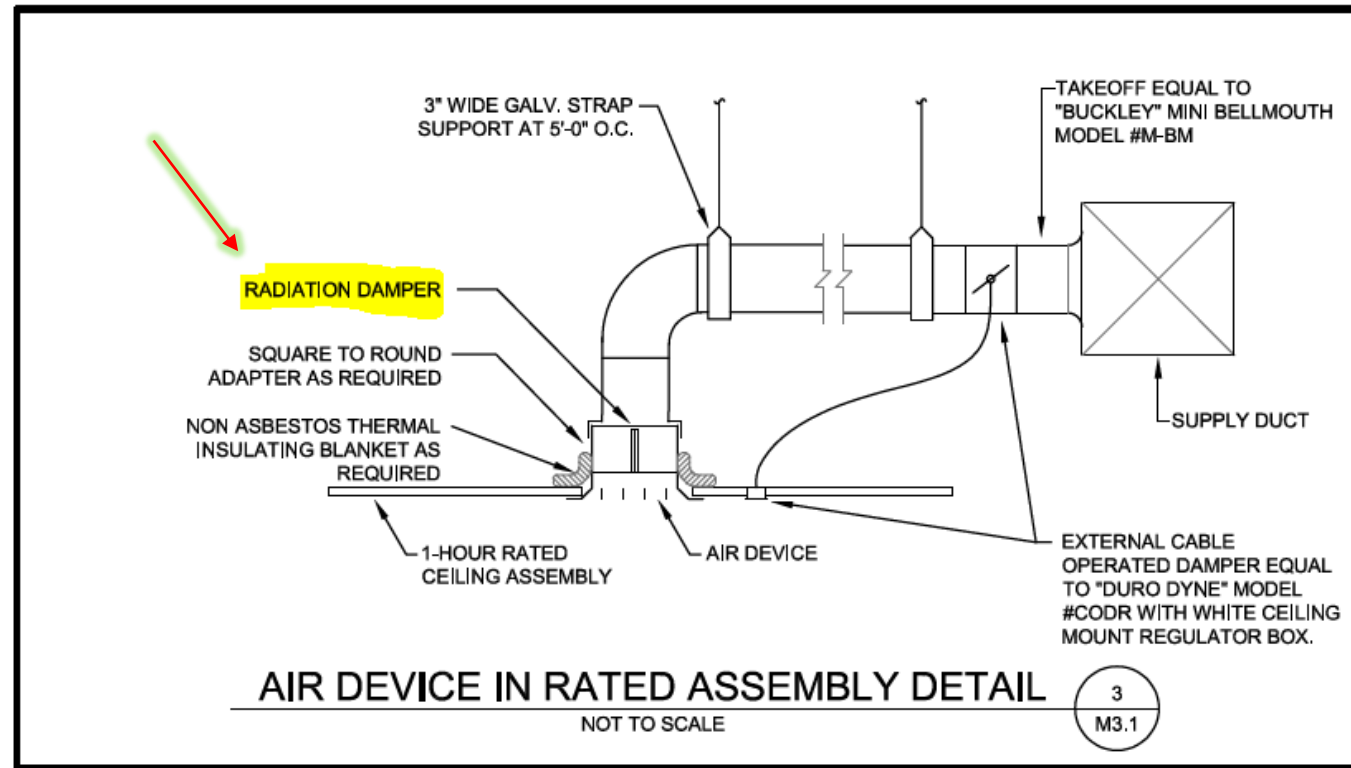
INDICATED BY SYMBOLS ①, ②, ETC.

1. COORDINATE DUCTWORK WITH WATER HEATER AND PIPING IN THIS AREA. SEE ENLARGED MECHANICAL CLOSET PLAN SHEET P2.4.
2. 8x6 EXHAUST AIR DUCT AT 1ST AND 2ND FLOOR, 8x10 AT 3RD AND UP TO UNIT F ON 4TH FLOOR OR TO ROOF TERMINATION.
3. 12x12 SUPPLY AIR DUCT FROM FURNACE UP BETWEEN JOISTS TO ROUND DUCT CONNECTION. COORDINATE WITH STRUCTURE.
4. CENTER 8x6 TRANSFER DUCT ABOVE DOOR WITH TRANSFER GRILLE ON EACH SIDE.
5. 6x8 EXHAUST AIR DUCT AT 1ST AND 2ND FLOOR, 10x8 AT 3RD AND 4TH FLOOR AND UP TO ROOF TERMINATION.
6. PROVIDE A RADIATION DAMPER AT EACH SUPPLY, RETURN, AND TRANSFER GRILLE THAT PENETRATES THE RATED CEILING ASSEMBLY. SEE DETAIL 4/M3.1.
7. 8x6 AT 2ND AND 3RD FLOOR, UP TO UNIT H ON 4TH FLOOR.
8. 10x5 EXHAUST AIR BETWEEN STUDS AT 2ND AND 3RD FLOOR, UP TO ROOF TERMINATION. PROVIDE FIRE DAMPER AT EACH RATED ASSEMBLY WITH ACCESS PANELS.
9. 6x6 TRANSFER DUCT ABOVE CEILING TO TRANSFER GRILLES IN CEILING. PROVIDE RADIATION DAMPERS AT FIRE RATED CEILING.

# Check the Mechanical M set...



# Check the Mechanical M set...



**How...**  
to select the  
appropriate damper?

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## Ceiling-Damper Selection Chart

### **ANSI/UL 263 Fire Test of Floor/Ceiling or Roof/Ceiling Assembly**

UL issues a unique design number and publishes  
it in the UL Fire Resistance Directory

#### **Assembly Tested Without Ceiling Dampers**

No damper design or model  
is listed in the directory

No ceiling dampers may  
be installed in the ceiling  
membrane

#### **Assembly Tested With Generic Hinged-Door-Style Damper**

Directory describes general  
damper construction

Any UL 555C-listed damper  
may be installed

#### **Assembly Tested With Manufacturer-Specific Damper Model(s)\***

Directory describes specific damper  
model(s) and manufacturer(s)

Only the damper models listed in  
the design's description in the  
directory may be installed

# Ceiling Damper Selection

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21st Edition  
GA-600-2015



# **FIRE** **RESISTANCE** **DESIGN MANUAL**

SOUND CONTROL



# **GYPSUM** **SYSTEMS**



GYPSUM ASSOCIATION  
JUNE 2015  
GA-600-2015

## Gypsums Association's Fire Resistance Design Manual

- Design numbers found in the Gypsum Association's manual are commonly specified.
- However – the Gypsum Association is NOT a testing agency. The listings contained in the manual are based on test data from various accredited 3<sup>rd</sup> party labs, all of which test to UL263.
- Some of the listings are proprietary to the manufacturer of the gypsum board, they are not in respect to the damper.
- Ceiling dampers that are approved for use in specific Gypsum Associate designs can be determined by referring to the test reports and/or design numbers of the testing agency.



What...  
is a Dynamic  
Ceiling Radiation Damper?

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# Static vs. Dynamic Systems

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Static systems can be defined as systems that are designed to shut **fans off during a fire emergency.**



Dynamic systems can be defined as systems that are designed to have **fans on during a fire emergency.**

This can be either an engineered smoke control system where a series of fans, dampers, and other devices can be used to control the movement of smoke in a fire emergency,

But can also be a system where unitary heating & cooling devices are not equipped with a means to stop their fans from running in the event of a fire emergency.

# Static vs. Dynamic Ceiling Radiation Dampers

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Until recently, all Ceiling Radiation Dampers commercially available were static rated and used in all applications that required a ceiling radiation damper.



Underwriters Laboratory (UL) has now tested and certified Dynamically rated Ceiling Radiation Dampers.



UL now indicates in the UL Directory (Product IQ) if the floor/ceiling or roof/ceiling design is for use in static systems or for use in dynamic systems.

# Dynamic Ceiling Radiation Dampers

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- Rated for specific airflow and pressures as indicated by the table below.
- Also rated for airflow directionality - either upflow or downflow.

Re: UL 555C, Table 10.1  
Test airflow and pressure conditions

Rated airflow and pressure		Minimum test airflow and pressure	
Airflow, fpm (m/s)	Pressure, inches of water (kPa)	Airflow, fpm (m/s)	Pressure, inches of water (kPa)
500 (2.54)	1 (.25)	600 (3.05)	1.125 (.280)
1000 (5.10)	1 (.25)	1200 (6.10)	1.125 (.280)
1500 (7.62)	1 (.25)	1800 (9.15)	1.125 (.280)
2000 (10.20)	1 (.25)	2400 (12.20)	1.125 (.280)

# Dynamic Ceiling Radiation Dampers

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- It should be noted that the current availability of Floor/Ceiling and Roof/Ceiling designs is limited to 1 design, and it is a “proprietary” listing.
  - Only the specified manufacturer’s damper may be used.
- If the specific assemblies are NOT specified, the available dynamically rated Ceiling Radiation Dampers cannot be substituted in another design unless it has been tested and approved by UL.
- Designers should be aware of limitations prior to specification.



**To receive PDH credit, you must complete  
the post-course evaluation**

