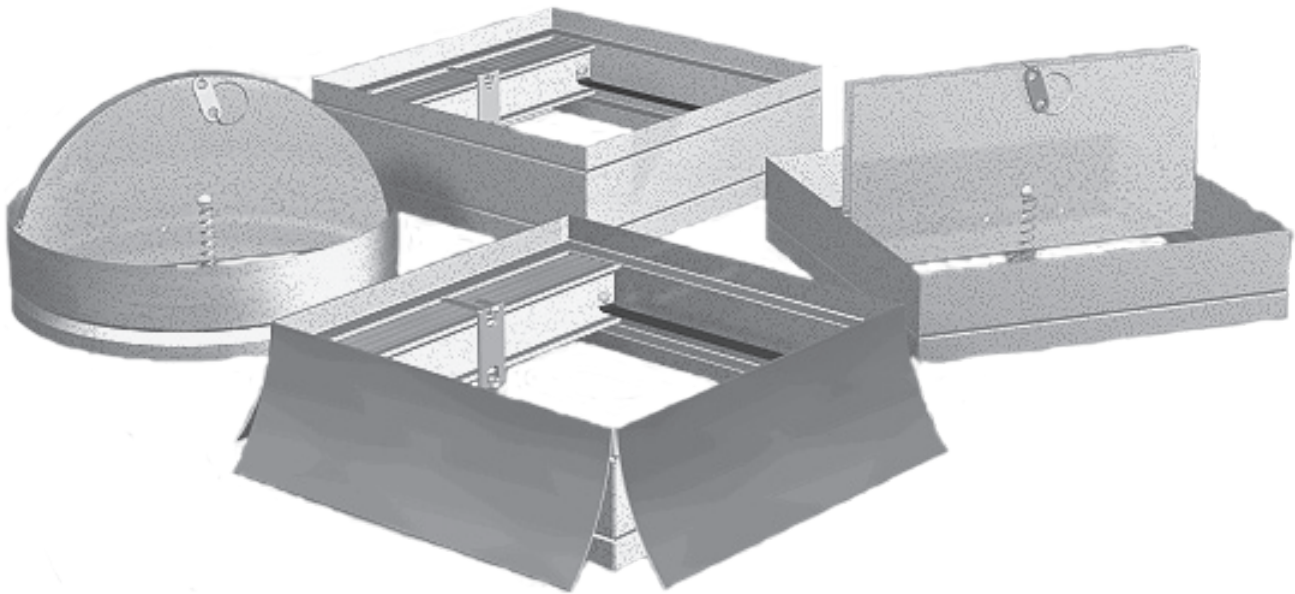




# INSTALLATION INSTRUCTION BOOKLET FOR CEILING RADIATION DAMPERS



## Instructions included in this booklet:

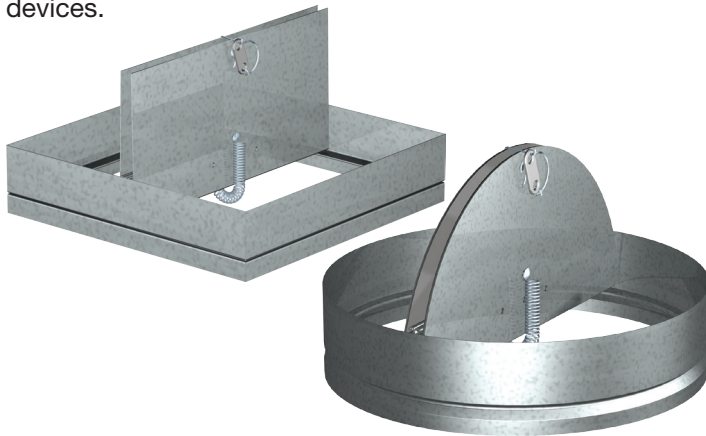
IOM #	Description	Page(s)
453343	CRD series	2-9
460637	CRD Wood Truss with Gypboard Ceiling - Warnock Hersey	10-13
472365	CRD-1WJ	14-18
474094	CRD-1WT	19-22
475063	CRD-501	23-30

**KIT # 826252**  
**Ceiling Radiation**  
**Dampers**

## Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

These installation instructions apply to a 3 hour rated ceiling radiation dampers (aka ceiling dampers) mounted in a ceiling with supports from 1) a ceiling grid system, 2) ductwork above, or 3) structure above. Each type of damper support system is described with damper being mounted in conjunction with various air devices.



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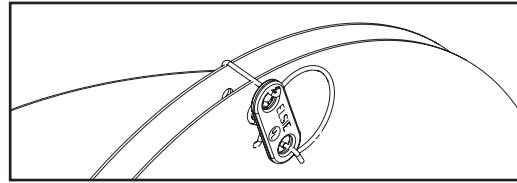
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### General Information

- Application:** Model CRD-1, CRD-1LP, CRD-2, CRD-3, CRD-60, and CRD-60B are UL labeled ceiling radiation dampers. When installed as shown, they provide appropriate protection for air inlet or outlet penetrations in the ceiling membrane of floor/ceiling and roof/ceiling assemblies with fire resistance ratings of up to 3 hours. Use of these UL and Warnock Hersey labeled ceiling damper eliminates the need to use “hinged door” type dampers or other alternate protection methods for specific floor/ceiling and roof/ceiling designs shown in the UL FIRE RESISTANCE DIRECTORY (FRD).
- System Components:** All system components (ducts, duct drops, hanger wires, sleeves, and diffuser pan) must be constructed of steel. The diffuser core may be non-ferrous. Grilles may be non-metallic. Flexible duct (if used) must be Class 1 or Class 0) type, bearing the UL listing mark. Maximum length of flex duct shall not exceed 14 feet. The installations and air devices shown in these instructions must also incorporate any specific requirements in the FRD. Note that both “Design Information - General” and individual ceiling/floor or ceiling/roof design listings apply.
- Ceiling Penetrations:** Ceiling penetration should be located within ceiling tiles or panels without necessitating cuts in the ceiling suspension main runners or cross tees. If required, a maximum of one runner or cross tee may be cut to enable proper damper location and installation. Each cut end shall be supported by a minimum 12 SWG vertical hanger wire. A 1/2 in. clearance must be maintained between the air inlet/outlet and the cut end of the runner or cross tee.
- Connections:** Connections must be made using #8 sheet metal screws, 3/16 in. tubular steel rivets, tack, or spot welds. Use a minimum of one connection per side for rectangular or square dampers and three equally spaced connections for round dampers. Space fasteners a maximum of 6 in. apart. Any W or H dimension larger than 12 in. requires a minimum of two connections per side. All screws or rivet attachments shall be placed a minimum of 3/16 in. from the edge of the damper frame, duct drop, diffuser, or grille frame. When making connections, the ceiling radiation damper may slide over the neck or inside the neck of the diffuser, grille, or inlet/outlet device. Important: Connections to the damper frame must not interfere with the damper blade operation.

## General Information....

- Thermal Blanket:** In those installation where the opening in the ceiling membrane is larger than the ceiling damper (more than 1 in. any dimension), a thermal insulating blanket ( Model TB or QB) must be installed by laying over the exposed surface of the air inlet or outlet device. The thermal blanket rests upon and protects exposed portions of the air device and may fit inside adjacent Tee Bars (if any).
- Fusible Link:** All CRD models are shipped from the factory with the blades closed. The fusible link must be installed at time of installation such that the blades are held open as shown.



## Dampers Supported by a Ceiling Grid System

Exposed Tee Bar ceiling grid systems often use “ Lay In” style air inlets and outlets. With attention to the following requirements, the ceiling grid system provides all required support for installation of “Lay In” style ceiling dampers and air inlets and/or outlets.

Ceiling openings up to a 24 in. x 24 in. (576 in.<sup>2</sup>) maximum are allowable. Maximum size limits of each individual ceiling damper model must be observed.

The four corners of the grid module containing the air device ( or the midpoint of the adjacent cross-tees) shall be directly supported from the structural members of

the floor or roof by 12 SWG minimum vertical hanger wires. When the duct extends over the intersections of the grid members, 16 ga. x 1½ in. steel channels with ⅝ in. minimum flanges shall be used to ensure that the grid is supported from structural members by 12 SWG minimum hanger wires. All UL Classified ceiling assemblies require lay-in ceiling panels be cut to fill the remainder of the hole openings larger that 24 in. x 24 in. and shall provide a minimum of ⅝ in. bearing on the ceiling grid members.

## Lay-In Diffuser Applications

### Lay-In Diffuser

- Lay-in diffuser installs directly into exposed Tee bar grid system.
- Ceiling damper attaches to the diffuser neck (see General Information, Connections).
- Thermal blanket required (see General Information, Thermal Blanket).
- If flexible duct is used, it shall be fastened to the diffuser neck with a steel clamp or #16 SWG minimum wire. (See General Information, System Components)

### Note:

- The flexible air duct shall not rest on the back surface of the ceiling grid or panels (provide a minimum of 4 in. clearance).
- The flexible air duct shall not interfere with the closing of the ceiling damper.

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in **Figure 1** (Model CRD-2 illustrated).

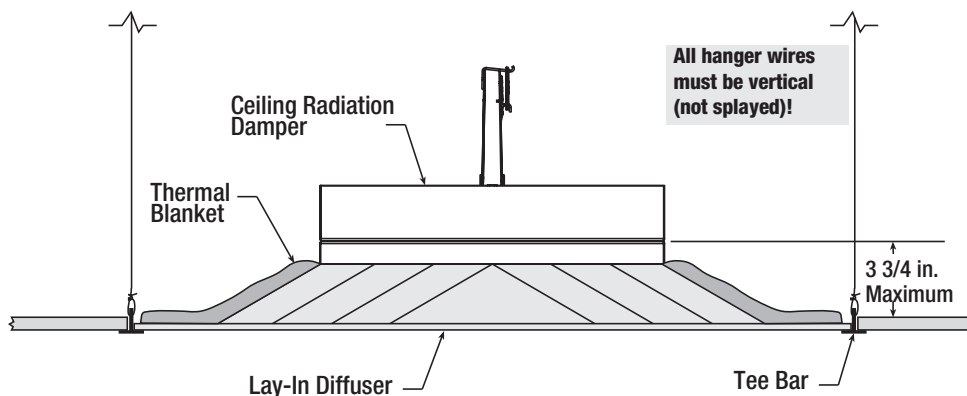


Figure 1

### Lay-In Diffuser with Steel Duct Drop

- Lay-In diffuser with steel duct drop installs directly into exposed Tee bar grid system
- Thermal blanket required (see General Information, Thermal Blanket).
- Connection of ceiling radiation damper, diffuser neck, and steel duct drop (see General Information, Connections) may be satisfied in two ways:
  - 1) Ceiling radiation damper and diffuser neck may be connected directly to the duct drop (see **Detail A**,

### Figure 2).

- 2) Ceiling radiation damper may be connected directly to the diffuser neck and then the duct drop connected to the damper (see **Detail B**, **Figure 2**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in **Figure 2** (Model CRD-1 and CRD-1LP as illustrated).

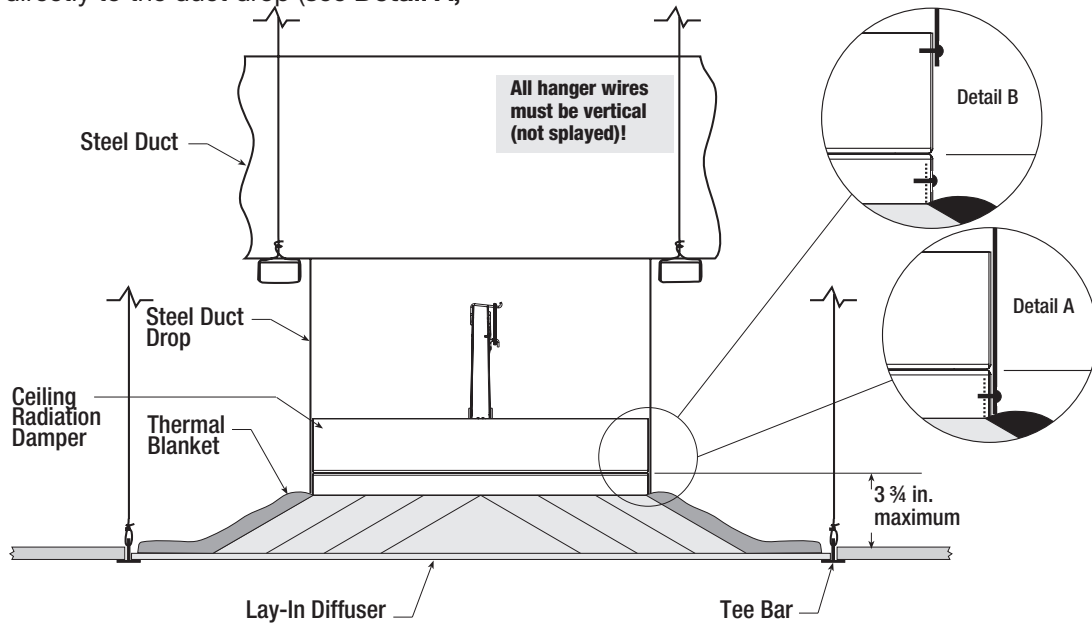


Figure 2

## Unducted Ceiling Plenum Return Air Applications

### Models: CRD-1, CRD-1LP, CRD-3, & CRD-60

- Ceiling radiation damper is the same size as the ceiling opening and installs directly into the exposed Tee bar grid system opening.
- Damper is supported directly by the grid system and may lay on the top of the perforated metal (or similar) grille core material.
- Models CRD-1, CRD-1LP, CRD-3, and CRD-60 may be installed as shown in **Figure 3** (Model CRD-3 illustrated).

### For Model CRD-60X

- Ceiling radiation damper is the same size as the ceiling opening and installs directly into the exposed Tee bar grid system opening.
- Damper is supported directly by the grid system and may lay on the top of the perforated metal (or similar) grille core material.
- Skirt material must overhang the Tee bars around perimeter of the damper.

Models CRD-60X may be installed as shown in **Figure 4**.

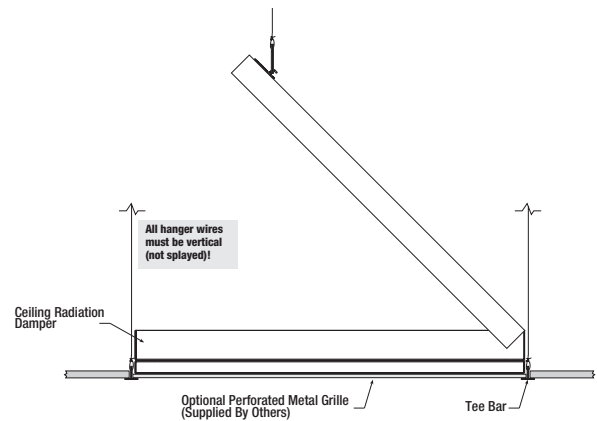


Figure 3

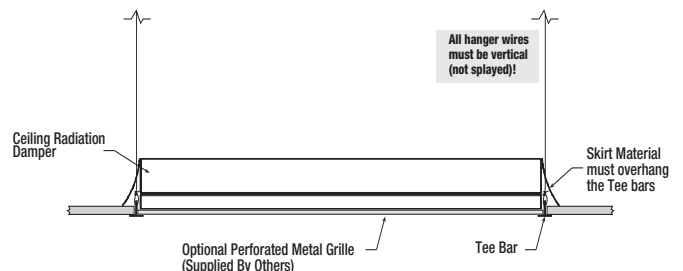


Figure 4

## Dampers Supported from Ductwork Above

### Note About Support

When main ducts are supported by 16 ga. x 1½ in. steel channels (with 9/16 in. minimum flanges) located 1 inch to 3 inches from and on both sides of a steel duct drop and these channels are suspended by #12 SWG wire from structure above, the steel duct drop provides all required support for ceiling damper and air inlet or outlet devices. Air device flange must overlap the ceiling membrane by a minimum of one inch.

Follow guidelines under General Information (Ceiling Penetrations and Connections) when preparing opening in the ceiling membrane and making connections.

### Surface Mounted Air Inlet or Outlet Devices

- A maximum size of permitted opening equals maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane (See General Information, Ceiling Penetrations) may be up to one inch larger than the nominal size of the ceiling radiation damper (i.e. 12 in. x 12 in. nominal ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. x 13 in.).
- Connection of ceiling radiation damper, air device neck, and steel duct drop (see General Information, Connections) may be satisfied in two ways:
  1. Ceiling radiation damper and air device neck may be connected directly to the duct drop (see **Detail A, Figure 5**).
  2. Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Detail B, Figure 5**).

**Non-Ferrous Air Devices** - Air devices that have non-ferrous frames.

Ceiling membrane opening that utilize non-ferrous devices require one of the following:

1. The steel duct drop should extend to the bottom surface of the ceiling membrane and the opening in the ceiling membrane (see General Information, Ceiling Penetrations) should be equal to the outside of the duct drop (see **Detail C, Figure 5**).
2. A steel angle should be attached to the bottom of the ceiling radiation damper and span the gap from the ceiling radiation damper to the bottom of the ceiling membrane. The steel angle should overlap the ceiling membrane (see **Detail D, Figure 5**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in **Figure 5** (Model CRD-1 & CRD-1LP illustrated).

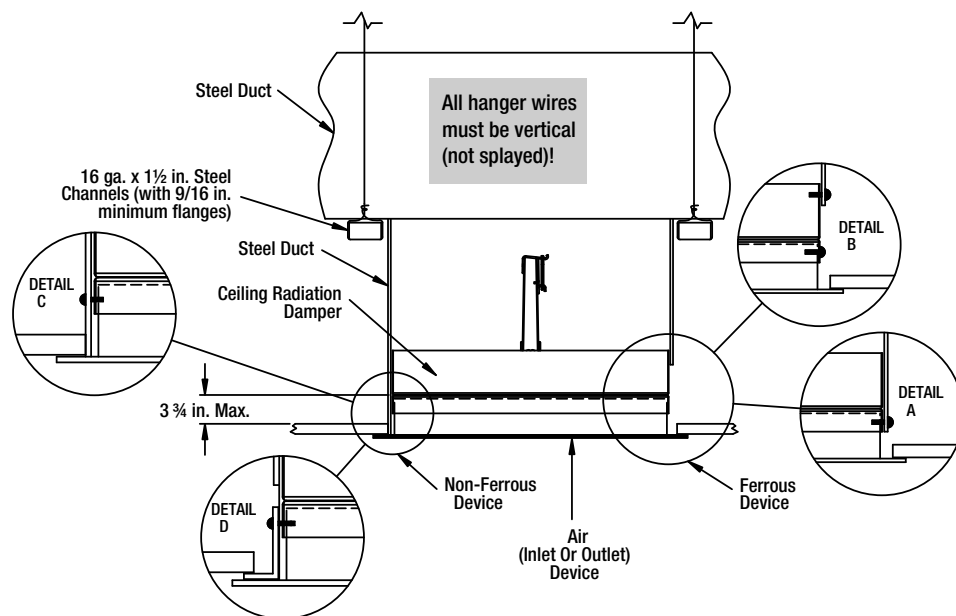


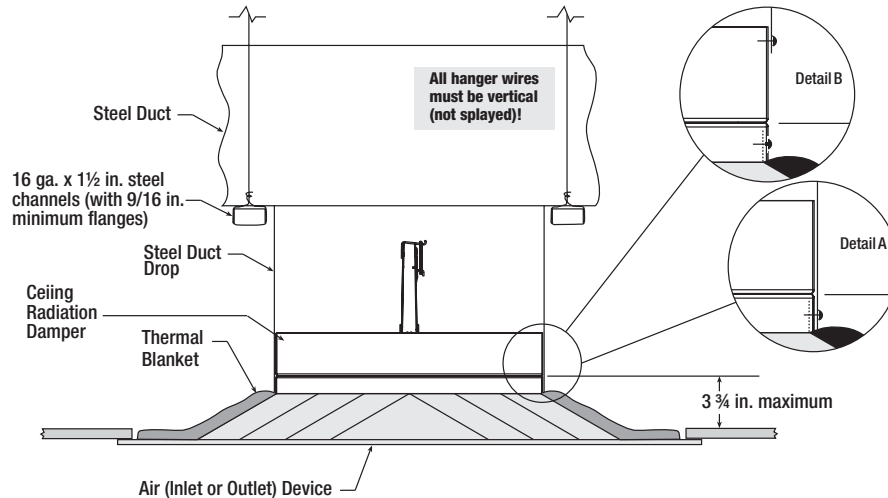
Figure 5

### Recess Mounted Air Inlet or Outlet Devices

- Opening in ceiling membrane (see General Information, Ceiling Penetrations) is more than one inch larger than nominal size of ceiling damper (i.e. if the radiation is 12 in. x 12 in. nominal, the ceiling membrane opening is larger than 13 in. x 13 in.).
- Thermal blanket is required (see General Information, Thermal Blanket).

- Connection of ceiling radiation damper, air device neck, and steel duct drop (see General Information, Connections) may be satisfied in two ways:
  1. Ceiling radiation damper and air device neck may be connected directly to the duct drop (see **Detail A, Figure 6**).
  2. Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Detail B, Figure 6**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in **Figure 6** (Model CRD-1 and CRD-1LP illustrated).



**Figure 6**

## Dampers Supported Directly From Structure

### A Note About Support

Ceiling radiation dampers and air inlet or outlet devices may also be supported directly from the structure above using one or more of the methods described in **Figures 7, 8, 9, or 10**. When channels are to be used as support, they must be 16 ga. x 1 1/2 in. steel channels with 9/16 in. minimum flanges (2 required per damper on opposite sides). Air device flange must overlap the ceiling membrane by a minimum of one inch.

Follow guidelines in General Information (Ceiling Penetrations and Connections) when preparing opening in the ceiling membrane and making connections.

## Ducted Surface Mounted Air Inlet or Outlet Devices

- Maximum size of permitted opening equals maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane (see General Information, Ceiling Penetrations) may be up to one inch larger than the nominal size of the ceiling radiation damper (i.e. 12 in. x 12 in. nominal ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. x 13 in.).
- Steel channel is connected directly to ceiling radiation damper (see General Information, Connections).
- Connection of ceiling radiation, air device neck, and steel duct drop (see General Information, Connections) may be satisfied in two ways:
  1. Ceiling radiation damper and air device neck may be connected directly to the duct drop (see **Detail A, Figure 7**).
  2. Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Detail B, Figure 7**).

**Non-Ferrous Air Devices** - Air devices that have non-ferrous frames.

Ceiling membrane openings that utilize non-ferrous devices require one of the following:

1. The steel duct drop should extend to the bottom surface of the ceiling membrane and the opening in the ceiling membrane (see General information, Ceiling Penetrations) should be equal to the outside of the duct drop (see **Detail C, Figure 7**). Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in **Figure 7** (Model CRD-1 & CRD-1LP illustrated).
2. A steel angle should be attached to the bottom of the ceiling radiation damper and span the gap from the ceiling radiation damper to the bottom of the ceiling membrane (see **Detail D, Figure 7**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in **Figure 7** (Model CRD-1 & CRD-1LP illustrated).

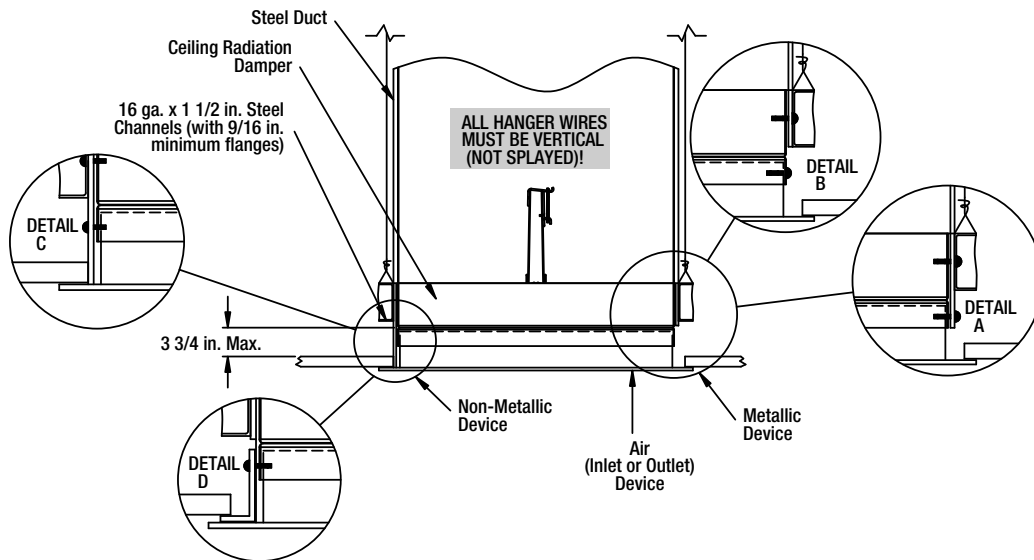


Figure 7

## Ducted Recess Mounted Air Inlet or Outlet Devices

- Opening in ceiling membrane is more than one inch larger than nominal size of ceiling damper (i.e. if the ceiling damper radiation damper is 12 in. x 12 in. nominal the ceiling membrane opening is larger than 13 in. x 13 in.).
- Maximum size of opening is 24 in. x 24 in. (576 sq. in.).
- Thermal blanket is required. (see General Information, Thermal Blankets).
- Connection of ceiling radiation damper, air device neck, and steel duct drop (see General Information, Connections) may be satisfied in two ways:

1. Ceiling radiation damper and air device neck may be connected directly to the duct drop (see **Detail A, Figure 8**).
2. Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Detail B, Figure 8**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in Figure 8 (Model CRD-1 & CRD-1LP illustrated).

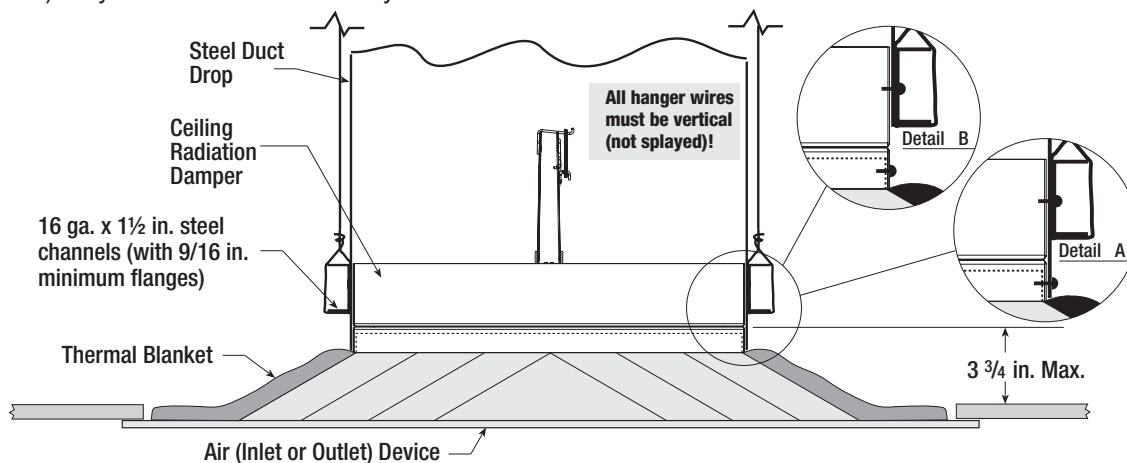


Figure 8

## Unducted Surface Mounted Air Inlet or Outlet Devices

- Maximum size of permitted opening and equals maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane may be up to one inch larger than the nominal size of the ceiling radiation damper (i.e. 12 in. x 12 in. nominal ceiling radiation damper could have a maximum ceiling membrane of 13 in. x 13 in.).

- Connection of ceiling radiation damper and air device neck (see General Information, Connections) may be satisfied in three ways:
  1. Ceiling radiation damper may be connected directly to the air device neck and supported by steel channel (see **Detail A, Figure 9**).
  2. Ceiling radiation damper may be connected directly to the air device neck and supported by hanger straps (see **Detail B, Figure 9**).

- Ceiling radiation damper may be connected directly to the air device neck and supported by direct suspension with wires looped through the holes in the damper frame before tying (see **Detail C, Figure 9**).

**Non-Ferrous Air Devices** - Air devices that have non-ferrous frames.

Ceiling membrane openings that utilize non-ferrous devices require one of the following:

- A steel extension should extend from the ceiling radiation damper to the bottom surface of the ceiling membrane (see General Information,

Ceiling Penetrations) should be equal to the outside of the steel extension (see **Detail D, Figure 9**).

- A steel angle should be attached to the bottom of the ceiling radiation damper and span the gap from the ceiling radiation damper to the bottom of the ceiling membrane. The steel angle should overlap the ceiling membrane (see **Detail E, Figure 9**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in Figure 9 (Model CRD-1 & CRD-1LP illustrated).

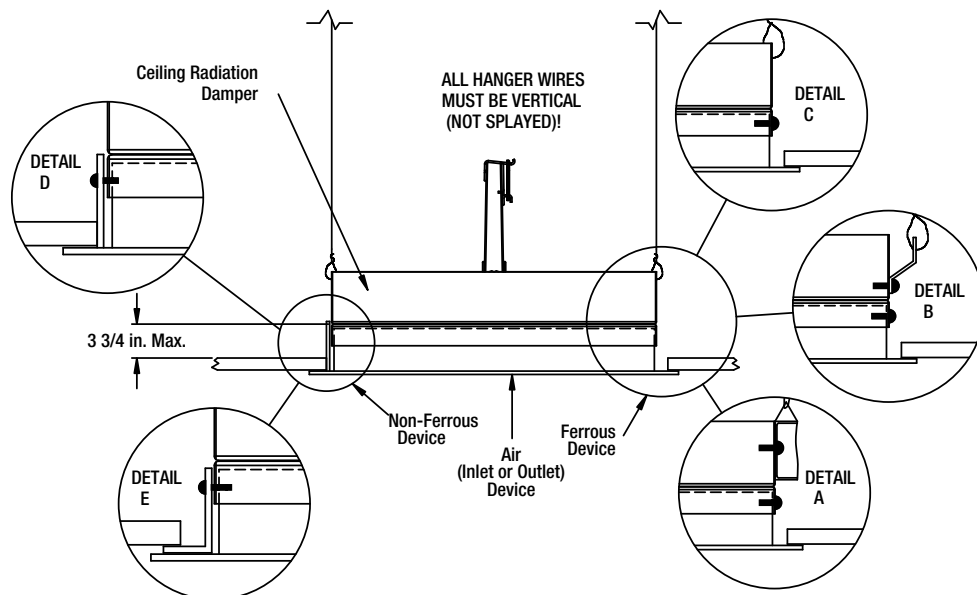


Figure 9

## Unducted Recess Mounted Air Inlet or Outlet Devices

- Opening in ceiling membrane is more than one inch larger than nominal size of ceiling damper (i.e. if the ceiling radiation damper is 12 in. x 12 in. nominal, the ceiling membrane opening is larger than 13 in. x 13 in.).
- Maximum size of opening is 24 in. x 24 in. (576 sq. in.)
- Thermal blanket is required. (see General Information, Thermal Blankets)
- Connection of ceiling radiation damper and air device neck may be satisfied in three ways:
  - Ceiling Radiation damper may be connected directly to the air device neck and supported by steel channel (see **Detail A, Figure 10**).

- Ceiling radiation damper may be connected directly to the air device neck and supported by hanger straps (see **Detail B, Figure 10**).
- Ceiling radiation damper may be connected directly to the air device neck and supported by direct suspension with wires looped through holes in the damper frame before tying (see **Detail C, Figure 10**).

Models CRD-1, CRD-1LP, CRD-2, and CRD-60 may be installed as shown in Figure 10 (model CRD-1 & CRD-1LP illustrated).



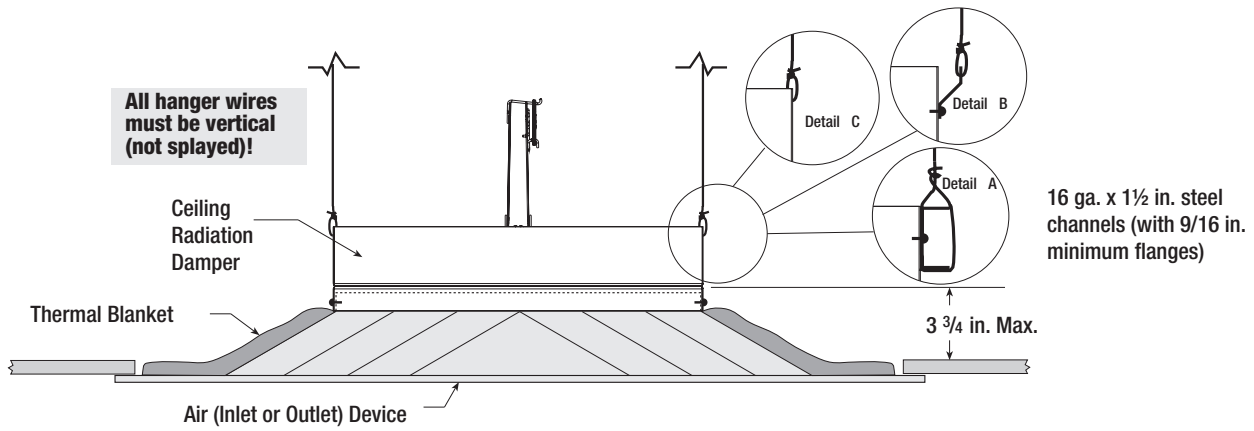


Figure 10

## Our Commitment

*As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.*

Specific Greenheck product warranties are located on [greenheck.com](http://greenheck.com) within the product area tabs and in the Library under Warranties.



## Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

These instructions describe the installation of a CRD-1WJ in designs: L501, L502, L503, L506, L507, L508, L512, L513, L514, L515, L516, L517, L519, L533, L537, and L545 as detailed in the UL Fire Resistance Directory.

Number	Description
1	Flooring Systems
2	Wood Joists
3	Cross Bridging
4	CRD-1WJ Assembly (damper, steel box, & insula- tion)
5	Mounting angle
6	Gypsum board (see UL Fire Resistance Directory for type)
7	Finishing System (not shown)
8	Grille

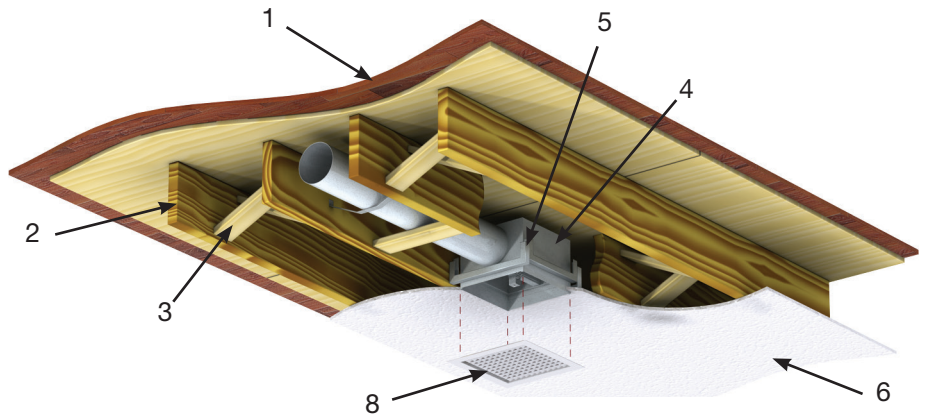


Figure 1

### Receiving and Handling

Upon receiving dampers, check for both obvious and hidden damage. If damage is found, record all necessary information on the bill of lading and file a claim with the final carrier. Check to be sure that all parts of the shipment, including accessories, are accounted for.

Dampers must be kept dry and clean. Indoor storage and protection from dirt, dust and the weather is highly recommended. Do not store at temperatures in excess of 100°F (38°C).

### Safety Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.

### General Information

**“UL CLASSIFIED (see complete marking on product)”**

**“UL CLASSIFIED to Canadian safety standards (see complete marking on product)”**

Standard 555C (Listing #R13446)

This manual is the property of the owner and is required for future maintenance. Please leave it with the owner when the jobs is complete.

## Pre-Installation Guidelines

The following items will aid in completing the damper installation in a timely and effective manner.

- 1) Check the drawings for proper damper locations within the building. Visually inspect the damper for damage. CRD-1WJ are shipped from the factory with blades in the closed position. The fusible link must be installed at the time of installation such that the blades are held open as shown in **Figure 2**.
- 2) Lift or handle damper using sleeve or frame. Do not lift damper using blades.
- 3) Fasteners (screws, bolts, rivets, etc.) used for installation must not interfere with blade operation.
- 4) Flexible duct must be Class 1 or 0 type, bearing the UL listed mark. Steel duct must be a minimum 28 ga. (0.5mm) and maximum 20 ga. (1mm).
- 5) Ceiling damper must be be installed as described in these installations.
- 6) Ceiling penetration shall be located between floor/ceiling joists.

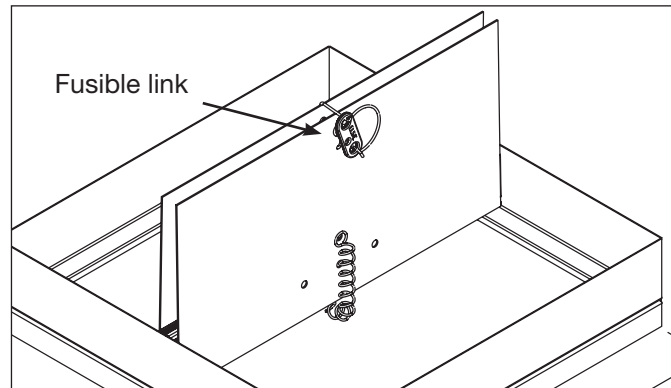


Figure 2

## Installation

The damper assembly is to be attached to the joists using 2 - 1 in. x 1/2 in. x 20 ga. (25mm x 13mm x 1mm) mounting angles. See **Figure 3**.

- 1) Attach the mounting angles to the damper box on the sides of the box without the supplied flanges. Attach the mounting angles 5/8 in. (16mm) above using minimum #8 sheet metal screws or 3/16 in. (5mm) angle and a maximum of 2 in. (51mm) from the corner of the box.
- 2) Insert the damper assembly, with attached mounting angles, between ceiling joists and attach to joists using minimum 2 - #8 x 3/4 in. (19mm) nails per side - see **Figure 4 & 5**.

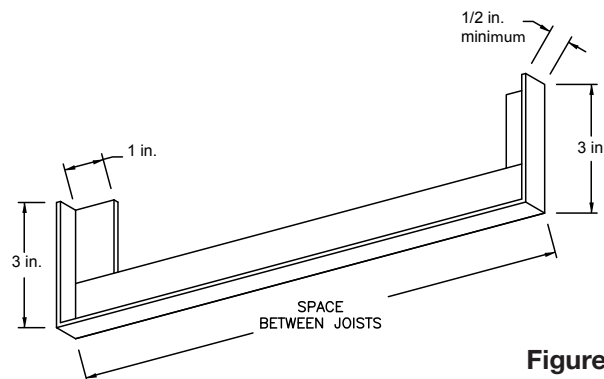


Figure 3

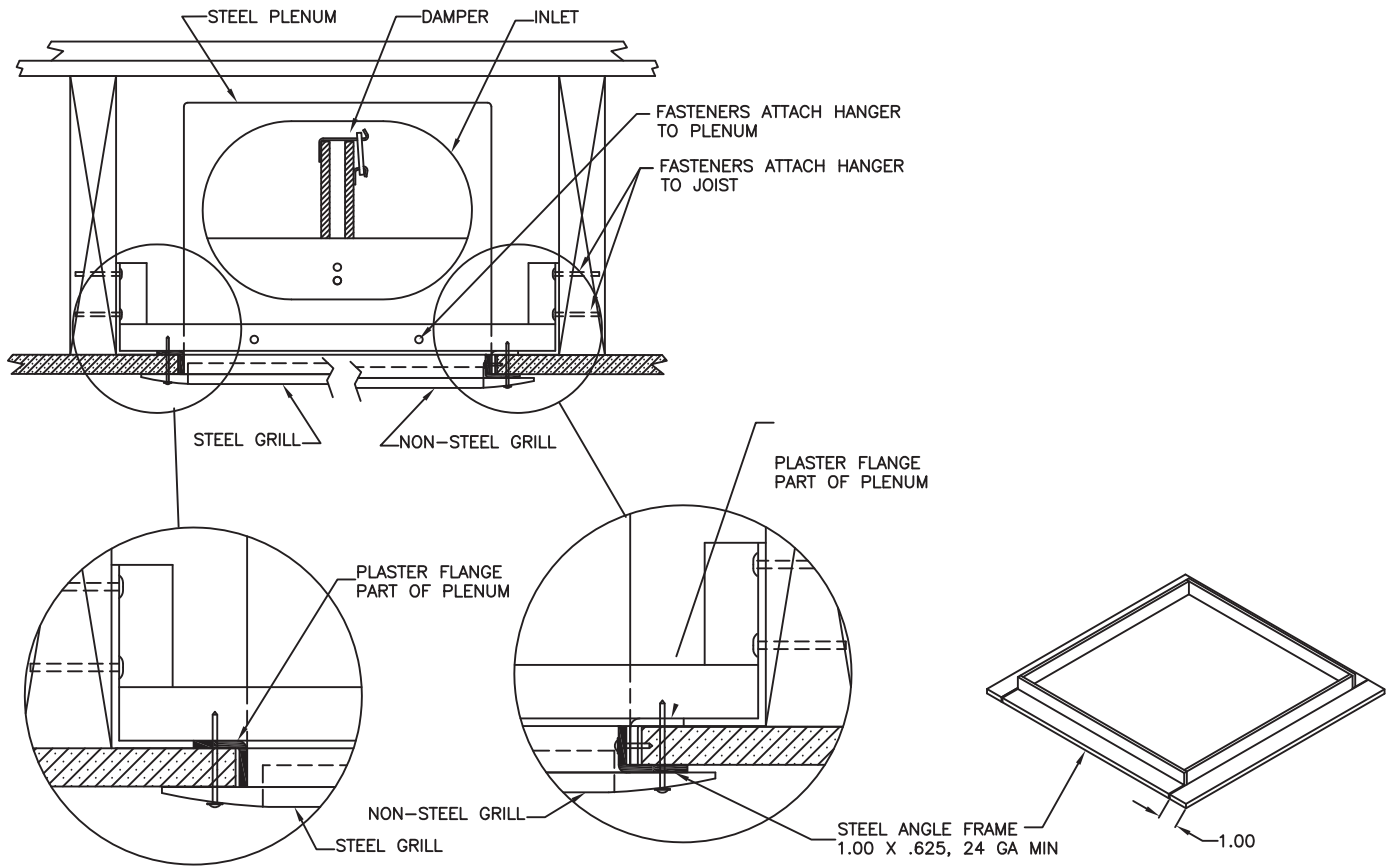


Figure 4

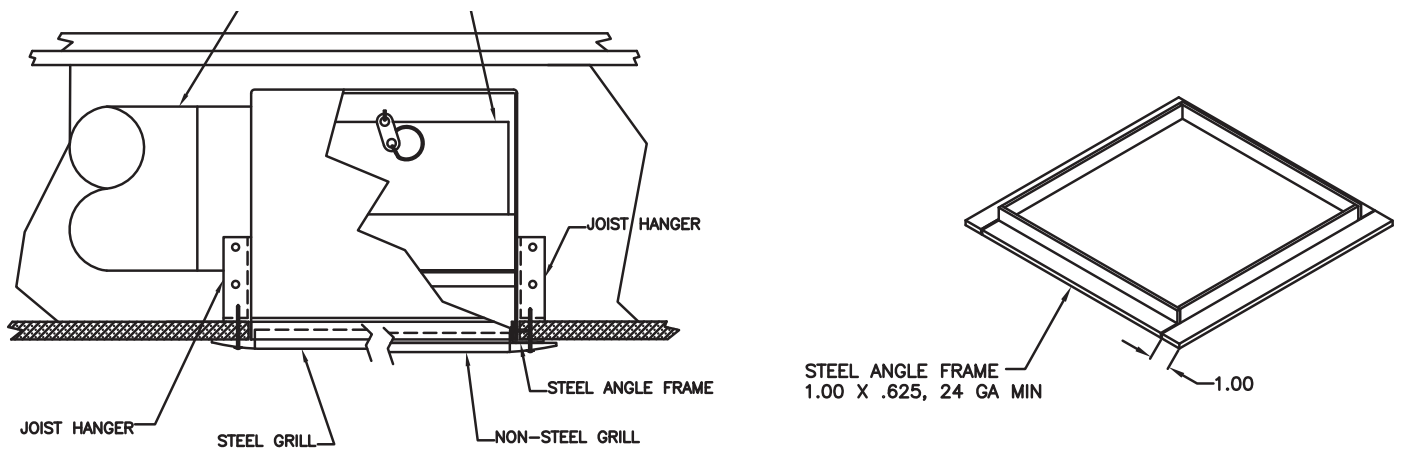


Figure 5

## Damper Maintenance

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Dampers do not typically require maintenance as long as they are kept dry and clean. If cleaning is necessary, use mild detergents or solvents. If lubrication is desired for components, such as axle bearings, do not use oil-based lubricants or any other lubricants that attract contaminants such as dust.

Dampers and their actuator(s) must be maintained, cycled, and tested a minimum in accordance with:

- The latest editions of NFPA 80, 90A, 92A, 92B, 101, 105, UL864, AMCA 503-03, and local codes.

## Our Commitment

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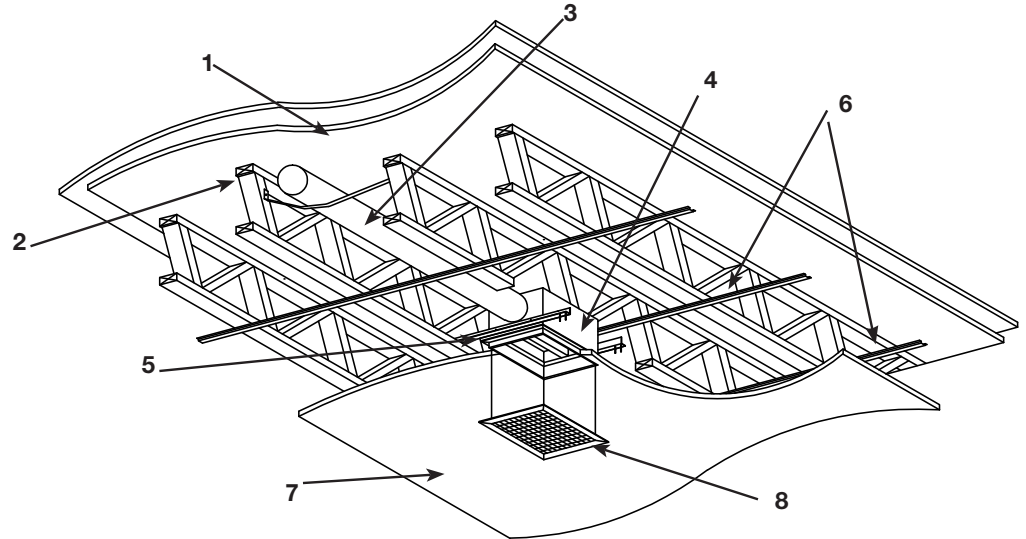


## Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

These instructions describe the installation of a CRD-1WT in designs: M508 and P554 as detailed in the UL Fire Resistance Directory.

Number	Description
1	Flooring Systems
2	Wood Truss
3	Air Ducts
4	CRD-1WT assembly
5	Mounting Angle
6	Resilient Channel
7	Gypsum Board
8	Grille (not supplied)
9	Finishing System (not shown)



### Receiving and Handling

Upon receiving dampers, check for both obvious and hidden damage. If damage is found, record all necessary information on the bill of lading and file a claim with the final carrier. Check to be sure that all parts of the shipment, including accessories, are accounted for.

Dampers must be kept dry and clean. Indoor storage and protection from dirt, dust and the weather is highly recommended. Do not store at temperatures in excess of 100°F (38°C).

### Safety Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.

### General Information

“UL CLASSIFIED (see complete marking on product)”

“UL CLASSIFIED to Canadian safety standards (see complete marking on product)”

Standard 555C (Listing #R13446)

This manual is the property of the owner and is required for future maintenance. Please leave it with the owner when the jobs is complete.

## Pre-Installation Guidelines

- 1) CRD's are shipped from the factory with the blades in the closed position. The fusible link must be installed at the time of installation such that the blades are held open as shown in **Figure 2**.
- 2) Fasteners (screws, bolts, rivets, etc.) used for installation must not interfere with blade operation.
- 3) Flexible duct must be class I or 0 type, bearing the UL listed mark. Steel duct must be a minimum 28 ga. (.5mm) and maximum of 20 ga. (1mm).
- 4) Ceiling damper must be installed as described in these installations.
- 5) Ceiling penetrations shall be located between floor/ceiling trusses.
- 6) Dampers supplied without a factory supplied plenum box require a steel or ductboard plenum to be field installed (see pages
- 7) Dampers shipped with factory attached plenums MUST be installed prior to sheetrock ceiling installation.

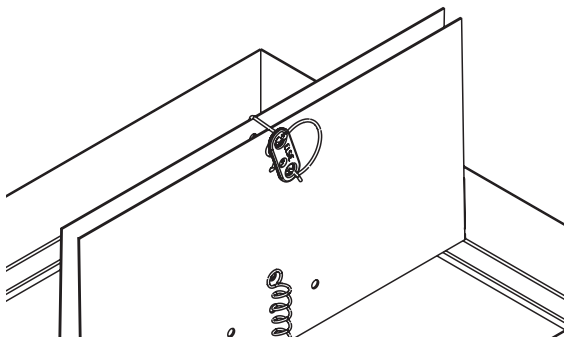


Figure 2

## Installation

- 1) The damper assembly is to be attached to the trusses using 2 - 1 in. x 1 in. x 16 ga. or 2 - 1 1/4 in. x 1 in. x 20 ga. (25mm x 25mm x 1.5mm or 32mm x 25mm x 1mm) mounting angles. See **Figure 3** for alternate mounting angle detail. Attach each mounting angle to the damper with a minimum of 2 - #8 screws or 5/32 in. (8mm) diameter steel rivets.

**Note:** Make sure the fasteners do not interfere with the damper operation.

- 2) Install the damper assembly, with attached mounting angles, between the trusses as shown in **Figures 4-7** and attach mounting angles to the trusses using 4 - 1 1/4 in. (32mm) long steel screws per mounting angle.
- 3) For grille mount installations, the grille/diffuser frame shall be steel. The grille/diffuser shall be attached with a minimum of 4 - 1 in. (25mm) long #6 screws run through the gypsum wall board into the plaster flange (**Figures 4 and 5**).
- 4) For duct mount installations, 1 in. x 1 in. x 24 ga. (25mm x 25mm x 0.7mm) retaining angles shall be installed on all four sides and shall be attached with a minimum of 4 - 1 in. long #6 screws run through the gypsum wall board into the plaster flange (**Figures 6 and 7**).

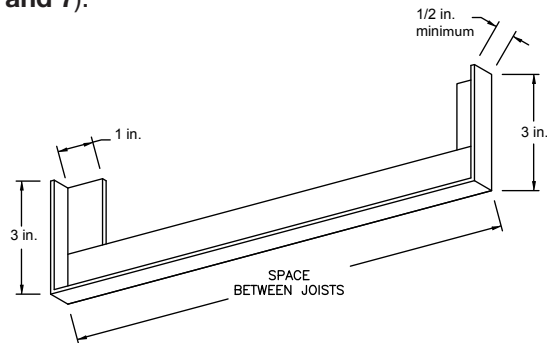
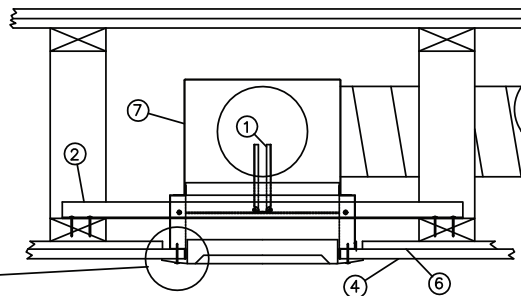
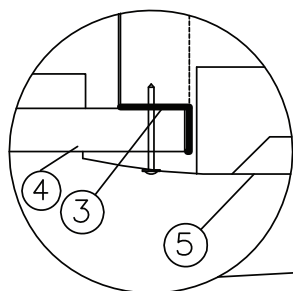


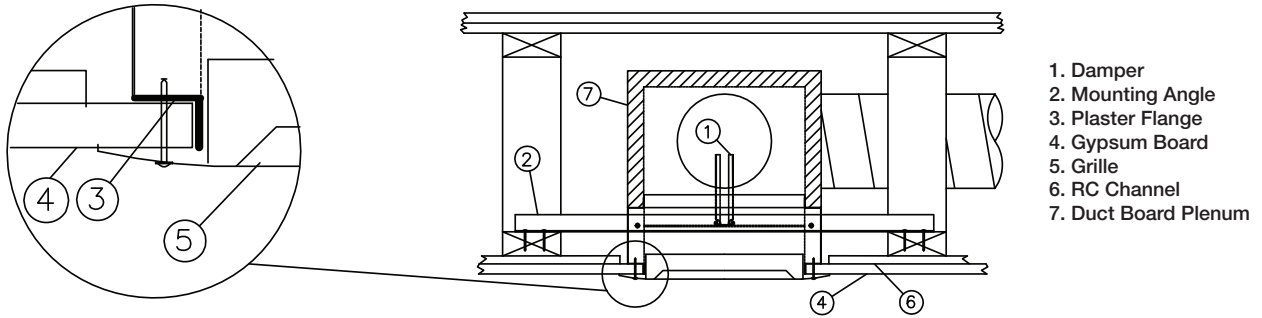
Figure 3 - Alternate Mounting Angle (provided by others)

**Note:** For grille mount installations, the damper blades shall be maximum 3 1/4 in. (83mm) above the top of the ceiling plane. For duct mount installations, the damper blades shall be maximum 1/8 in. (6mm) above the top of the ceiling plane.

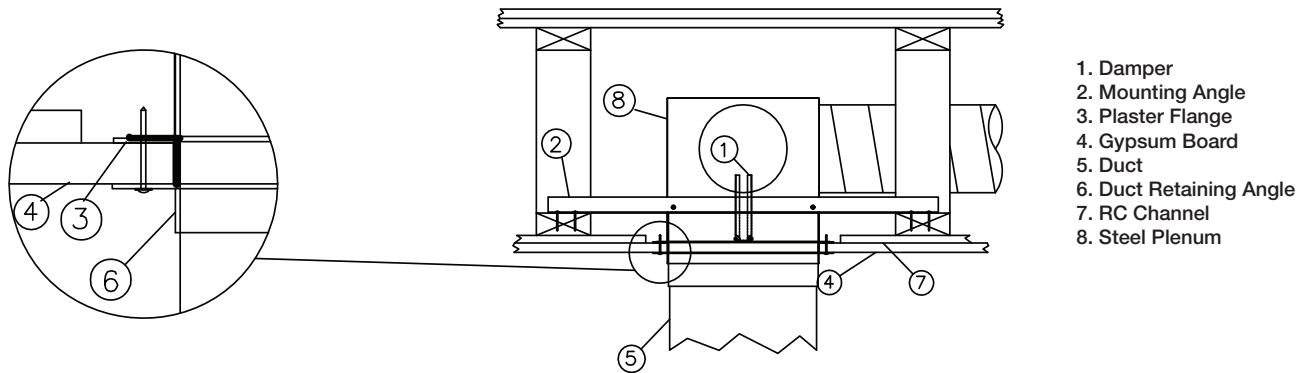


1. Damper
2. Mounting Angle
3. Plaster Flange
4. Gypsum Board
5. Grille
6. RC Channel
7. Steel Plenum

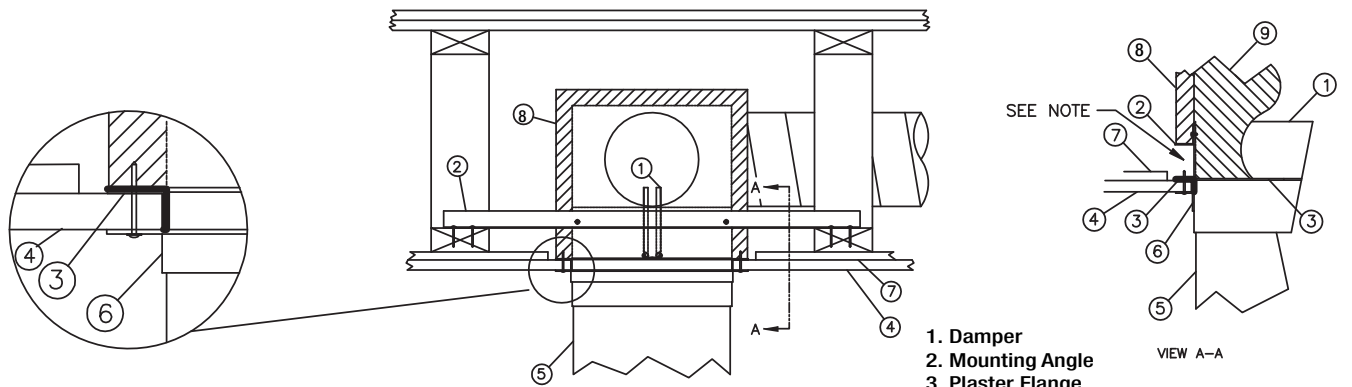
Figure 4: Grille Mount with Steel Plenum



**Figure 5: Grille Mount with Duct Board Plenum**



**Figure 6: Duct Mount with Steel Plenum**



1. Damper
  2. Mounting Angle
  3. Plaster Flange
  4. Gypsum Board
  5. Duct
  6. Duct Retaining Angle
  7. RC Channel
  8. Duct Board Plenum
  9. Steel Plenum
- SEE NOTE
- VIEW A-A
- Note: Trim duct board to install mounting angle. It is not necessary to re-install trimmed piece to maintain UL certification.

**Figure 7: Duct Mount with Duct Board Plenum**



## Field Installation of Steel Plenums

- 1) The steel plenum box shall be a minimum of 28 ga. (0.47mm) of galvanized steel.
- 2) The inside width x length dimensions of the steel plenum shall be sized no greater than  $\frac{1}{8}$  in. (3mm) larger than the damper frame. The maximum plenum height shall be 14 in. (356mm) as illustrated below. The plenum should be sized to provide a snug fit over the damper frame.
- 3) The plenum duct collars shall be a minimum of 30 ga. (0.4mm) galvanized steel. The total area of the plenum box duct collars shall not exceed 78.5 sq. in. (1994 sq. mm) with a maximum of two duct collars per plenum. Duct collars shall be securely fastened to the plenum surface. Any segment of the duct collar that protrudes inside the plenum wall must not interfere with the damper blade operation.
- 4) The steel plenum box is to be attached to the damper using a #8 screws,  $\frac{1}{8}$  in. (3mm) rivets, spot welds, or tack welds. Minimum of two per side (**Figure 8**).
- 5) The attachment of the screws or rivets must not interfere with the damper operation.

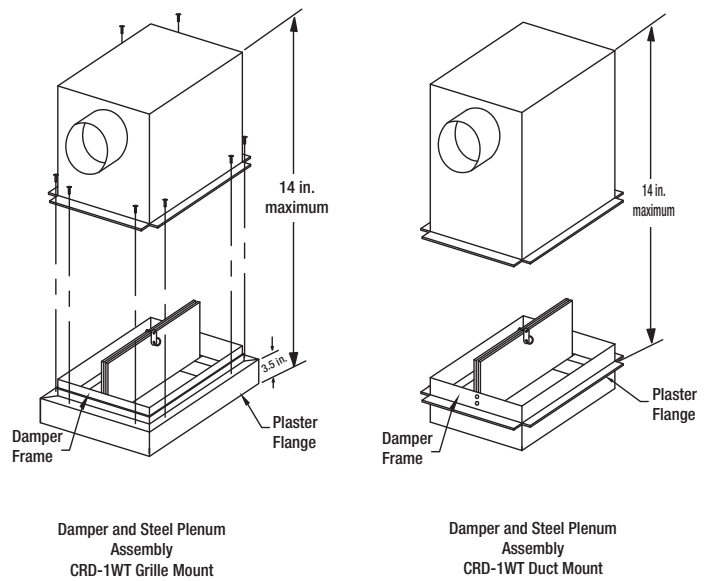


Figure 8

## Fabrication of Fiberglass Ductboard Plenum for CRD-1WT

- 1) Fiberglass ductboard shall be a minimum of 1 inch (25mm) thick UL 181 listed and have a minimum R-value 4.3.
- 2) The inside width x length dimensions on the duct board plenum shall be sized no greater than  $\frac{1}{8}$  in. (3mm) larger than the damper frame. The maximum plenum height shall be 15 in. (381mm) as illustrated below. The plenum should be sized to provide a snug fit over the damper frame.
- 3) Edge and corner preparation shall be accordance with details shown (**Figures 9 and 10**). Plenum top shall be fabricated and attached using similar method, S-AF and SF-AF (**Figures 9 and 10**).
- 4) Corner sealing tape shall be UL 181 listed and minimum of 2 inches (51mm) wide.
- 5) The plenum duct collars shall be a minimum of 30 ga. (0.4mm) galvanized steel. The total area of the plenum box duct collars shall not exceed 78.5 sq. in. (1994 sq. mm) with a maximum of two duct collars per plenum. Duct collars shall be securely fastened to the plenum duct board. Any segment of the duct collar that protrudes inside the plenum must not interfere with the damper blade operation.
- 6) Plenum shall be attached to ceiling damper subframe using UL 181 listed tape (**Figure 11**).
- 7) Refer to **Figure 4-7** for ceiling damper installation. The CRD-1WT ceiling is classified for use in specific wood truss ceiling assemblies. See UL Fire Resistance Directory for floor/ceiling design number M508 and roof/ceiling design number P554.

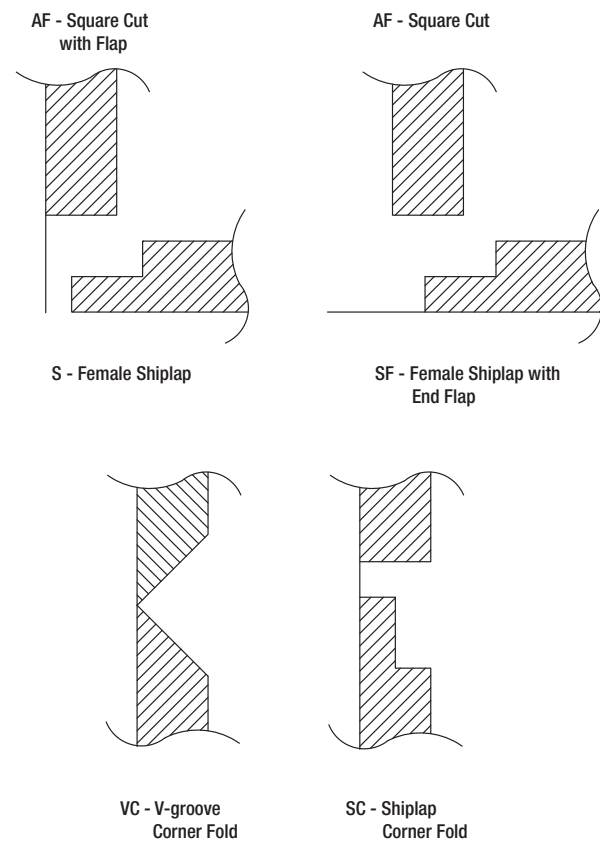


Figure 9- Cutting Duct board

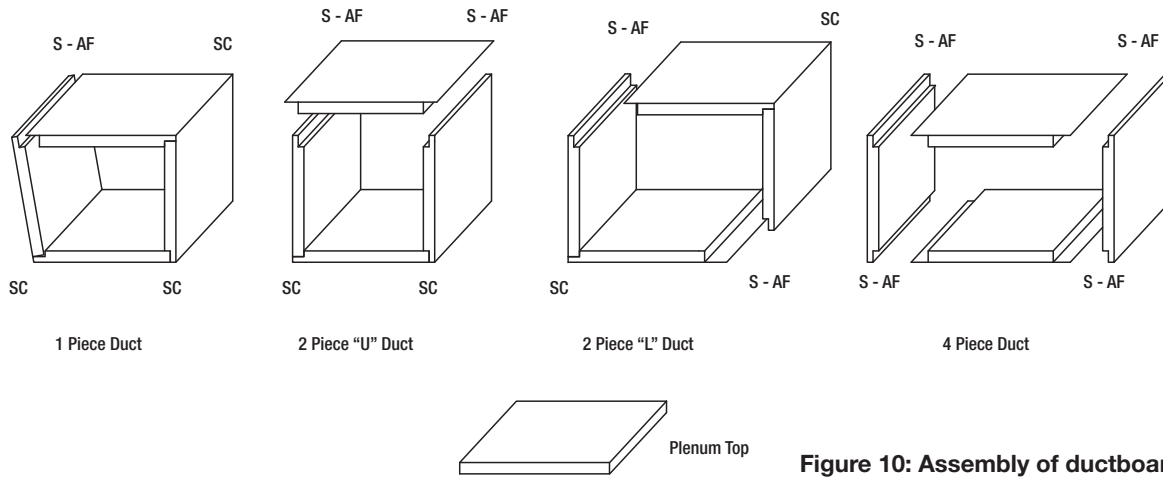


Figure 10: Assembly of ductboard plenum

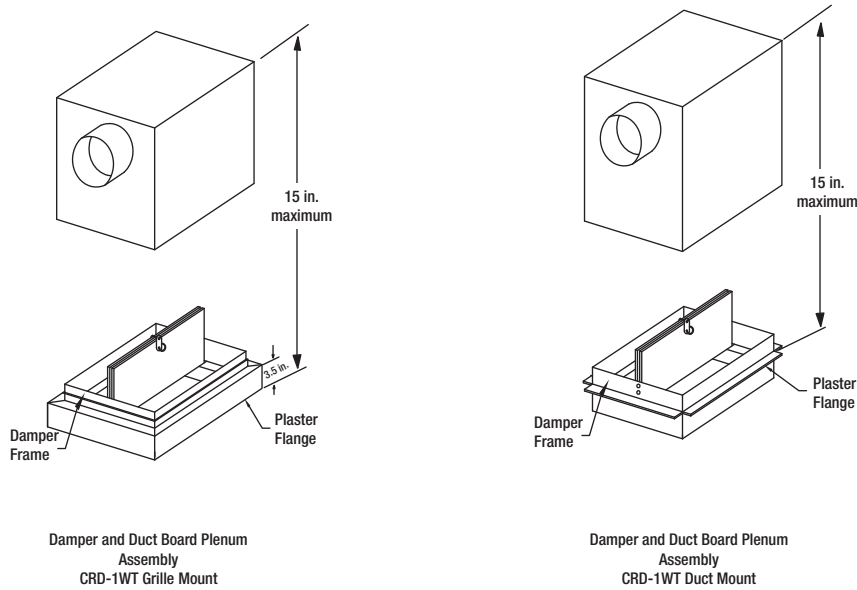


Figure 11

## Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on [greenheck.com](http://greenheck.com) within the product area tabs and in the Library under Warranties.



## Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!



Warnock Hersey Listed (Report #J98 18453, #J99 13961)

### Dampers Installed in Gypboard Ceiling

#### Wood Truss with Gypboard Ceiling

- Maximum size of permitted opening equals maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane may be up to one inch larger than the nominal size of the ceiling radiation damper (i.e. a 12 in. x 12 in. (nominal) ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. x 13 in.).
- Connection of ceiling radiation damper:
  1. Measure the actual spacing between the wood framing members and cut the vertical leg of the mounting angle to length plus six inches. Two mounting angles are required. Fold up three inches at 90° at both ends of the mounting angle and attach it to the wood frame with minimum of two each #6 penny nails or #8 screws.
  2. The damper is attached to the mounting angle by sheet metal screws (minimum of two screws per angle for rectangular dampers and minimum of one screw per angle for round dampers).
  3. On the sides opposite the retaining angles, a three inch long (minimum) mounting angle is required. Make attachments as shown in Figure 1; make two attachments minimum per mounting angle for rectangular dampers and one attachment minimum per mounting angle for round dampers. Bottom leg of mounting angle rests on the ceiling material.
  4. See **Figure 1** for further details.
- **Figure 2 and Figure 3** show top views of a rectangular and round damper installation, respectively.
- **Figure 4** shows the installation of a damper, with top and bottom extensions which extends three inches above and below the rated ceiling.
- Fiberglass or metal duct may be attached to either the top or bottom of the damper or both.
- If flexible duct is used, it shall be fastened to the diffuser neck with a steel clamp or #16 SWG minimum wire or cable ties.

Models CRD-1, CRD-1LP, and CRD-2 may be installed as shown in Figure 1 and Figure 4.

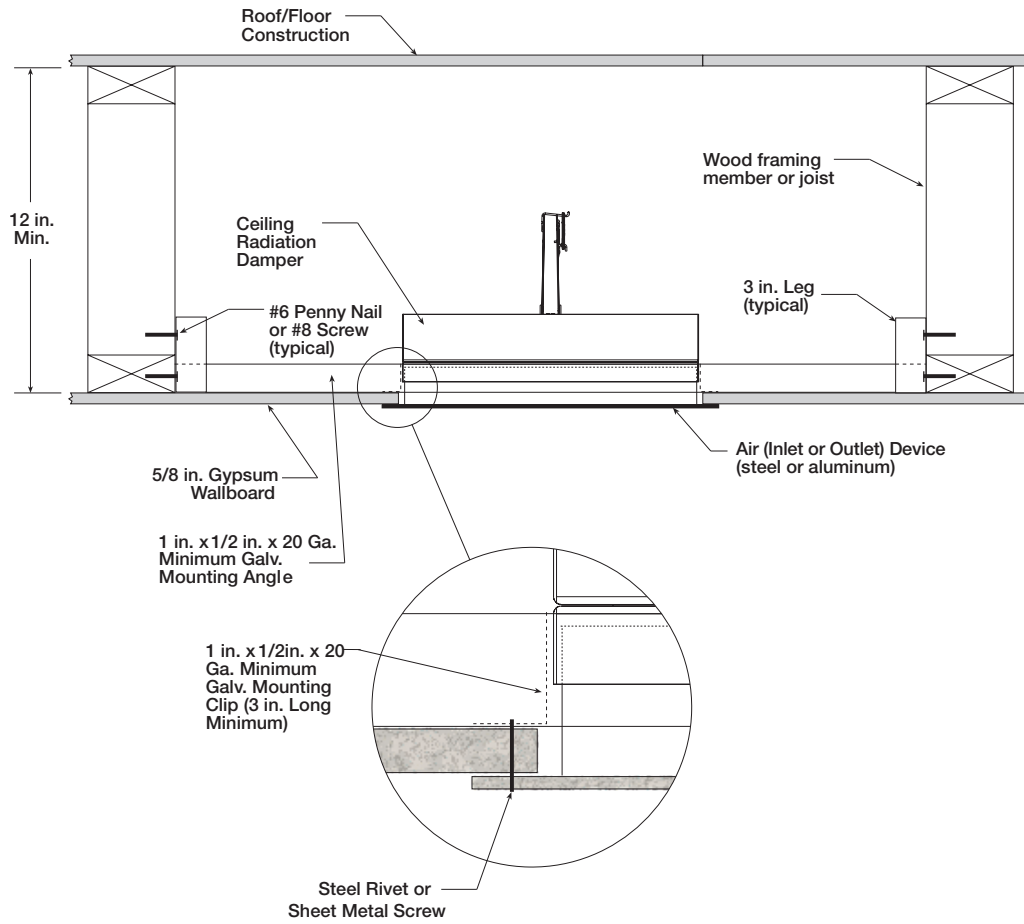


Figure 1

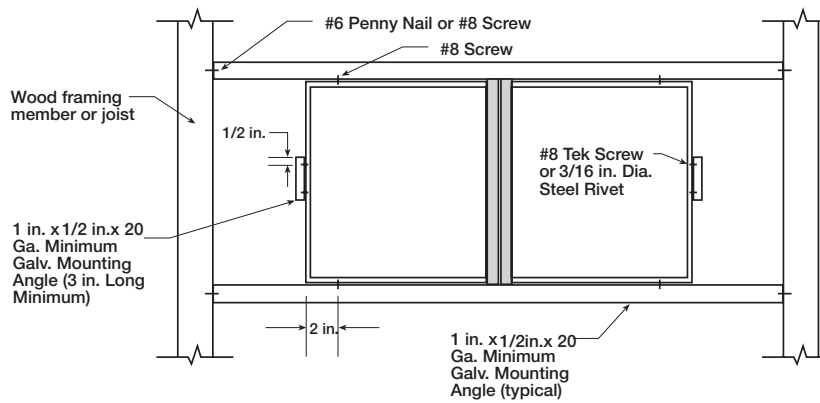


Figure 2

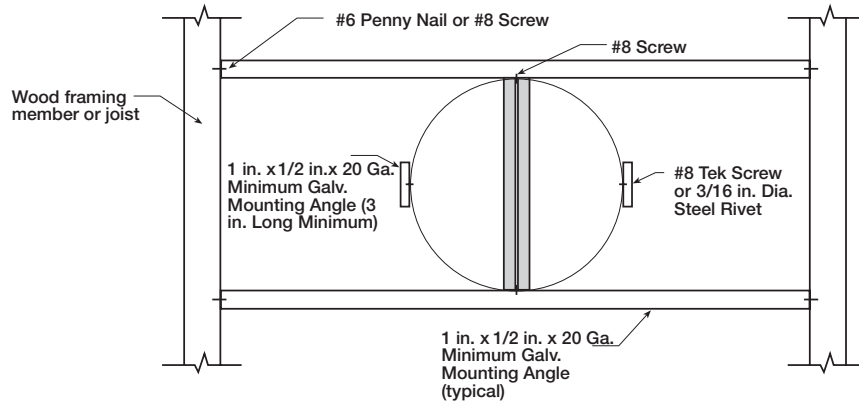


Figure 3

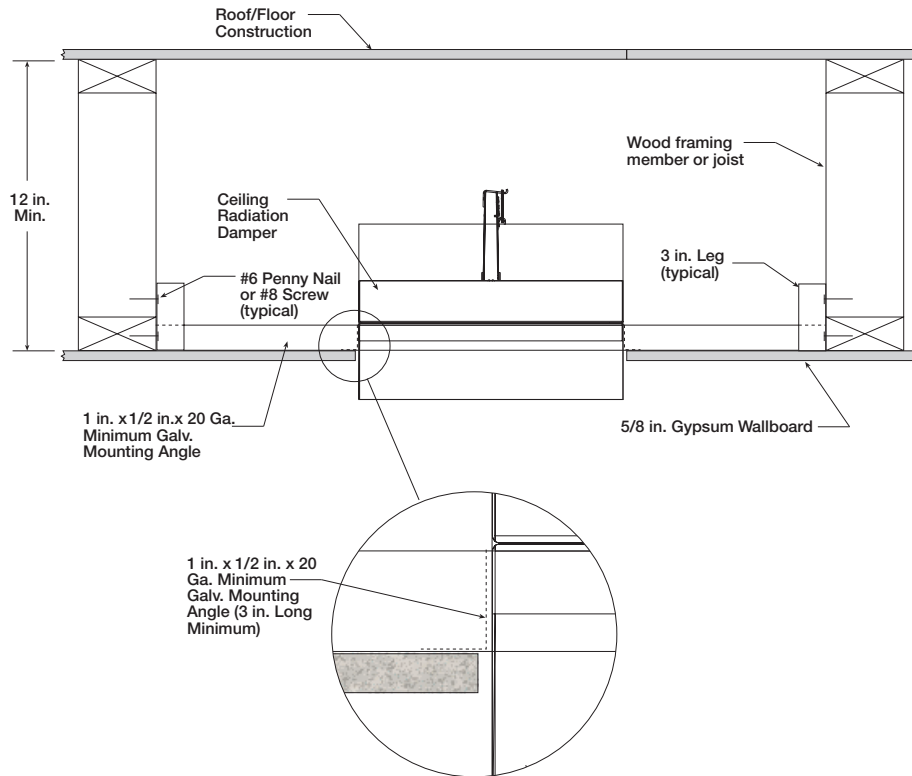


Figure 4

## Notes


## Our Commitment

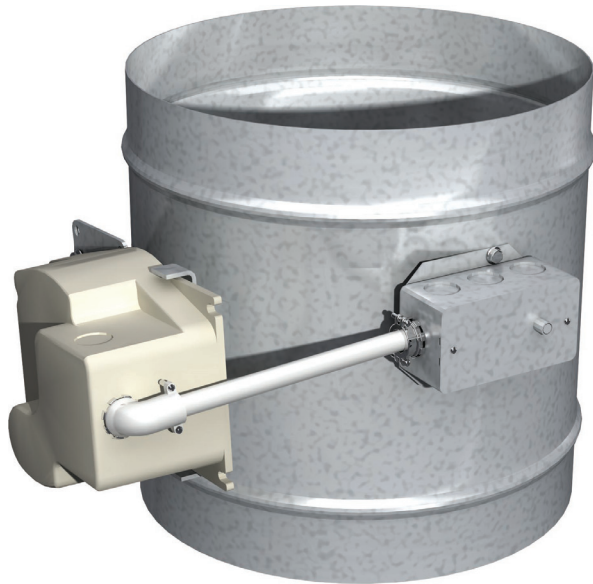
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### Receiving and Handling

Upon receiving dampers, check for both obvious and hidden damage. If damage is found, record all necessary information on the bill of lading and file a claim with the final carrier. Check to be sure that all parts of the shipment, including accessories, are accounted for.

Dampers must be kept dry and clean. Indoor storage and protection from dirt, dust and the weather is highly recommended. Do not store at temperatures in excess of 100°F (38°C).

### Safety Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.

**“UL CLASSIFIED (see complete marking on product)”**

**“UL CLASSIFIED to Canadian safety standards (see complete marking on product)”**

Standard 555C (Listing #R13446)

Standard 555S (Listing # R13317)

This manual is the property of the owner and is required for future maintenance. Please leave it with the owner when the jobs is complete.

## Electrical Guidelines

### Electrical Guidelines

All wiring shall be done in accordance with the National Electrical Code ANSI/NFPA-70 latest edition, any local codes that may apply, and wiring diagrams developed in compliance with the job or project design and specifications.

### Important!

Electrical input may be needed for this equipment. This work should be performed by a qualified electrician. Verify power before wiring actuator. Greenheck is not responsible for any damage to, or failure of the unit caused by incorrect field wiring. To avoid causing death or serious bodily harm to building occupants, follow all instructions carefully. Dampers must close completely to preserve the integrity of the fire smoke separation.

## General Information

- 1) **Application:** Model CRD-501 is a UL labeled ceiling radiation damper. When installed as shown, they provide appropriate protection for air inlet or outlet penetrations in the ceiling membrane of floor/ceiling and roof/ceiling assemblies with fire resistance ratings of up to 3 hours. Use of these UL and Warnock Hersey labeled ceiling damper eliminates the need to use “hinged door” type dampers or other alternate protection methods for specific floor/ceiling and roof/ceiling designs shown in the UL FIRE RESISTANCE DIRECTORY (FRD).
- 2) **System Components:** All system components (ducts, duct drops, hanger wires, sleeves, and diffuser pan) must be constructed of steel. The diffuser core may be non-ferrous. Grilles may be non-metallic. Flexible duct (if used) must be Class 1 or Class 0 type, bearing the UL listing mark. Maximum length of flex duct shall not exceed 14 feet (4.27m). The installations and air devices shown in these instructions must also incorporate any specific requirements in the FRD. Note that both “Design Information - General” and individual ceiling/floor or ceiling/roof design listings apply.
- 3) **Ceiling Penetrations:** Ceiling penetration should be located within ceiling tiles or panels without necessitating cuts in the ceiling suspension main runners or cross tees. If required, a maximum of one runner or cross tee may be cut to enable proper damper location and installation. Each cut end shall be supported by a minimum 12 SWG vertical hanger wire. A ½ in. (13mm) clearance must be maintained between the air inlet/outlet and the cut end of the runner or cross tee.

- 4) **Connections:** Connections must be made using #8 sheet metal screws, ⅜ in. (4.7mm) tubular steel rivets, tack, or spot welds. Use a minimum three equally spaced connections. Space fasteners a maximum of 6 in. (152mm) apart. All screws or rivet attachments shall be placed a minimum of ⅜ in. (4.7mm) from the edge of the damper frame, duct drop, diffuser, or grille frame. When making connections, the ceiling radiation damper may slide over the neck or inside the neck of the diffuser, grille, or inlet/outlet device. **Important:** Connections to the damper frame must not interfere with the damper blade operation.
- 5) **Thermal Blanket:** In those installation where the opening in the ceiling membrane is larger than the ceiling damper (more than 1 in. (25mm) in any dimension), a Thermal Insulating Blanket (Model TB or QB) must be installed by laying over the exposed surface of the air inlet or outlet device. The Thermal Blanket rests upon and protects exposed portions of the air device and may fit inside adjacent Tee Bars (if any),
- 6) **Thermostat:** The CRD-501 is shipped from the factory with the blades closed. The CRD-501 is equipped with RRL2 (Resettable Link).

## Dampers Supported by a Ceiling Grid System

Exposed Tee Bar ceiling grid systems often use “Lay In” style air inlets and outlets. With attention to the following requirements, the ceiling grid system provides all required support for installation of “Lay In” style ceiling dampers and air inlets and/or outlets.

Ceiling openings up to a 24 in. x 24 in. (576 in.<sup>2</sup>) [610mm x 610mm (.371m<sup>2</sup>)] maximum are allowable. Maximum size limits of each individual ceiling damper model must be observed.

The four corners of the grid module containing the air device (or the midpoint of the adjacent cross-tees) shall be directly supported from the structural members of the floor or roof by 12 SWG minimum vertical hanger wires. When the duct extends over the intersections of the grid members, 16 ga. x 1 1/2 in. (1.5mm x 38mm) steel channels with ⅜ in. (14mm) minimum flanges shall be used to ensure that the grid is supported from structural members by 12 SWG minimum hanger wires. All UL Classified ceiling assemblies require lay-in ceiling panels be cut to fill the remainder of hole openings larger than 24 in. x 24 in. (610mm x 610mm) and shall provide a minimum of ⅜ in. (9.5mm) bearing on the ceiling grid members.

## Lay-In Diffuser Applications

### Lay-in Diffuser

- Lay-in diffuser install directly into exposed Tee bar grid system.
- Ceiling damper attaches to diffuser neck (see General Information, Connections).



- Thermal blanket required (see General Information, Thermal Blanket)
- If flexible duct is used (see General Information, System Components), it shall be fastened to the diffuser neck with a steel clamp or #16 SWG minimum wire.

**Note:**

- 1) The flexible air duct shall not rest on the back surface of the ceiling grid or panels (provide a minimum of 4 in. [102mm] clearance).
- 2) The flexible air duct shall not interfere with the closing of the ceiling damper.

Model CRD-501 may be installed as shown in **Figure 1**.

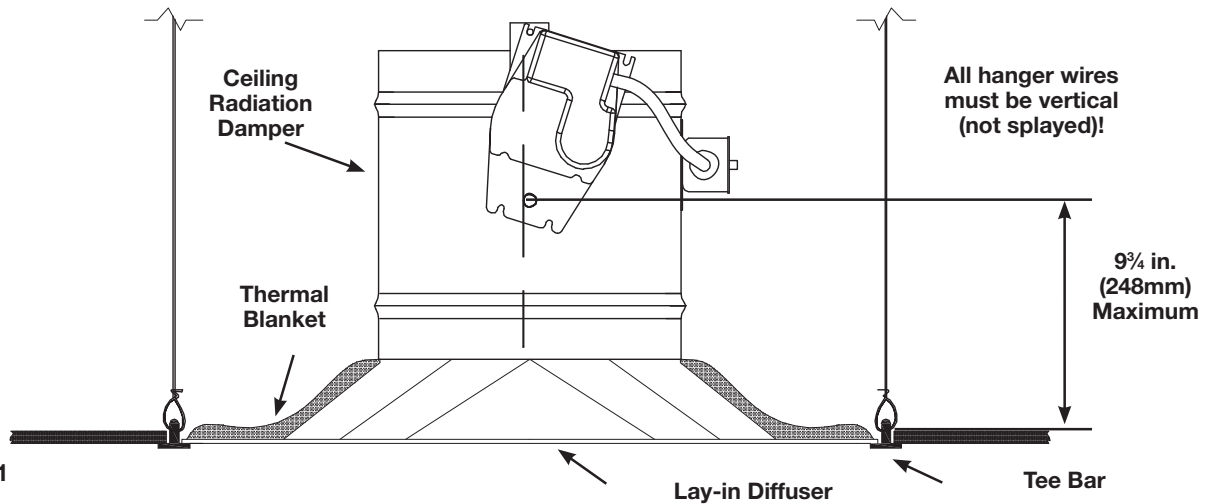


Figure 1

**Lay-In Diffuser with Steel Duct Drop**

- Lay-in diffuser with steel duct drop installs directly into exposed Tee bar grid system.
- Thermal blanket required (See General Information, Thermal Blanket)
- Connection of ceiling radiation damper, diffuser neck, and steel duct drop (See General Information, Connections) may be satisfied as follows:

Ceiling radiation damper may be connected directly to the diffuser neck and then the duct drop connected to the damper (see **Figure 2, Detail B**).

Model CRD-501 may be installed as shown in **Figure 2**.

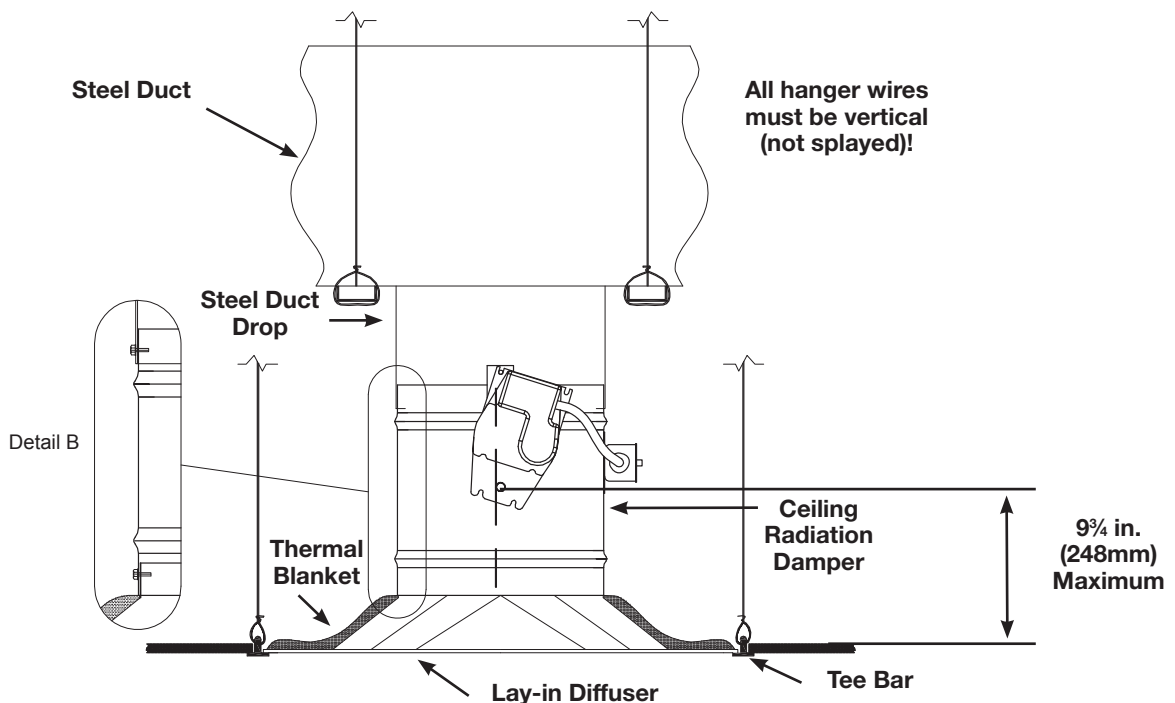


Figure 2

# Dampers Supported From Ductwork Above

## A Note About Support

When main ducts are supported by 16 ga. x 1 1/2 in. (1.5mm x 38mm) steel channels (with 1/16 in. [14mm] minimum flanges) located 1 in. to 3 in. (25 mm to 76mm) from and on both sides of a steel duct drop and these channels are suspended by #12 SWG wire from structure above, the steel duct drop provides all required support for ceiling damper and air inlet or outlet devices. Air device flange must overlap the ceiling membrane by a minimum of 1 inch (25mm).

Follow guidelines in General Information, Ceiling Penetrations and Connections when preparing opening in the ceiling membrane and making connections.

## Surface Mounted Air Inlet or Outlet Devices

- Maximum size of permitted opening equals maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane (See General Information, Ceiling Penetrations) may be up to one inch larger than the size of the ceiling radiation damper (i.e. a 12 inch diameter [305mm] ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. diameter [330mm]).

- Connection of ceiling radiation damper, air device neck, and steel duct drop (see General Information, Connections) may be satisfied as follows:

Ceiling radiation damper may be connected to the air device neck and then the duct drop connected to the damper (see **Figure 3, Detail B**).

### Non-Ferrous Air Devices

Air devices that have non-ferrous frames.

Ceiling membrane openings that utilize non-ferrous devices require one of the following:

- 1) A steel duct drop from the damper extension should extend to the bottom surface of the ceiling membrane and the opening in the ceiling membrane (see General Information, Ceiling Penetrations) should equal to the outside of the duct drop (see **Figure 3, Detail C**).
2. A steel angle should be attached to the bottom of the ceiling radiation damper and span the gap from the ceiling radiation damper to the bottom of the ceiling membrane. The steel angle should overlap the ceiling membrane (See **Figure 3, Detail D**).

Model CRD-501 may be installed as shown in **Figure 3**.

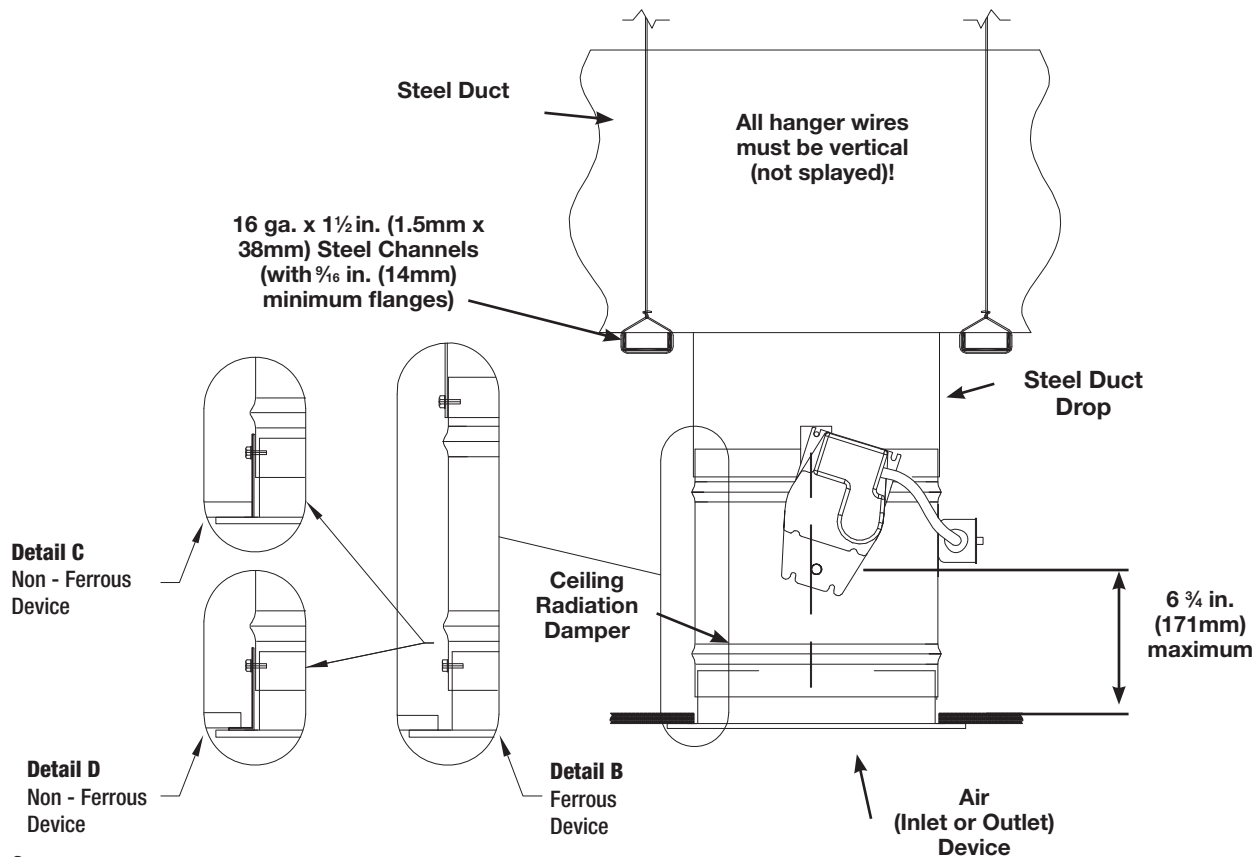


Figure 3

## Recess Mounted Air Inlet or Outlet Devices

- Opening in ceiling membrane (see General Information, Ceiling Penetrations) is more than one inch larger than nominal size of ceiling damper (i.e. a 12 inch diameter [305mm] ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. diameter [330mm]).
- Thermal blanket is required (see General Information, Thermal Blanket)

- Connection of ceiling radiation damper, air device neck, and steel duct drop (see General Information, Connections) may be satisfied as follows:

Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Figure 4, Detail B**).

Model CRD-501 may be installed as shown in **Figure 4**.

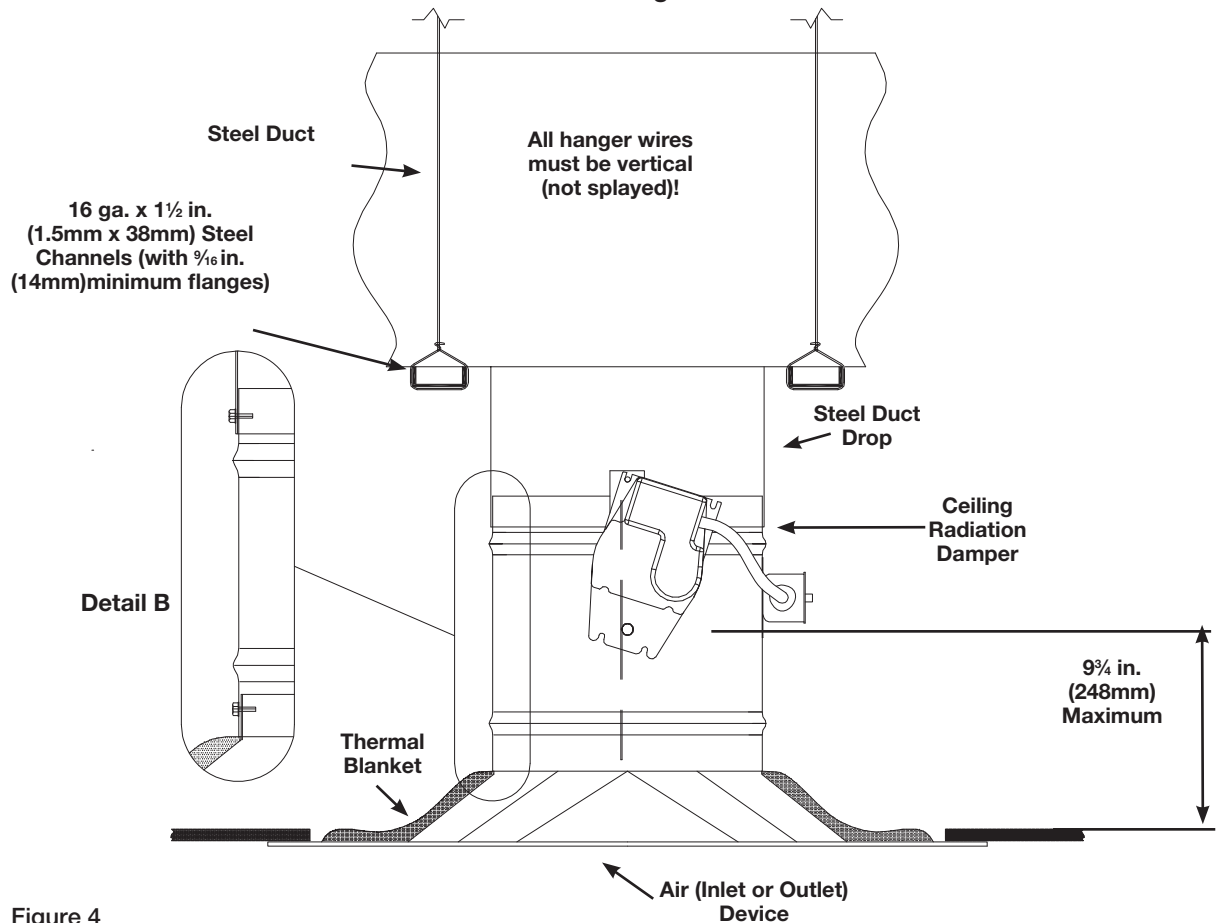


Figure 4

## Dampers Supported Directly from Structure

### A Note About Support

Ceiling radiation dampers and air inlet or outlet devices may also be supported directly from the structure above using one or more of the methods described in **Figures 5, 6, 7, or 8**. When channels are to be used as support, they must be 16 ga. x 1 1/2 in. (1.5mm x 38mm) steel channels with 1/16 in. (14mm) minimum flanges (2 required per damper on opposite sides). Air device flange must overlap the ceiling membrane by a minimum of one inch (25mm).

Follow guidelines in General Information, Ceiling Penetrations and Connections when preparing opening in the ceiling membrane and making connections.

### Ducted Surface Mounted Air Inlet or Outlet Devices

- Maximum size of permitted opening equals the maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane (see General Information, Ceiling Penetrations) may be up to one inch larger than the nominal size of the ceiling radiation damper (i.e. a 12 inch diameter [305mm] ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. diameter [330mm]).
- Steel channel is connected directly to ceiling radiation damper (see General Information, Connections).
- Connection of ceiling radiation damper, air device neck, and steel duct drop (see General Information, Connections) may be satisfied as follows:

Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Figure 5, Detail B**).

### Non-Ferrous Air Devices

Air devices that have non-ferrous frames.

Ceiling membrane openings that utilize non-ferrous devices require one of the following:

- 1) A steel duct drop extension should extend from the damper to the bottom surface of the ceiling membrane and the opening in the ceiling membrane

(see General Information, Ceiling Penetration) should be equal to the outside of the duct drop (see **Figure 5, Detail C**). Models CRD-501 may be installed as shown in **Figure 5**.

2. A steel angle should be attached to the bottom of the ceiling radiation damper and span the gap from the ceiling radiation damper to the bottom of the ceiling membrane. The steel angle should overlap the ceiling membrane (see **Figure 5, Detail D**).

Model CRD-501 may be installed as shown in **Figure 5**.

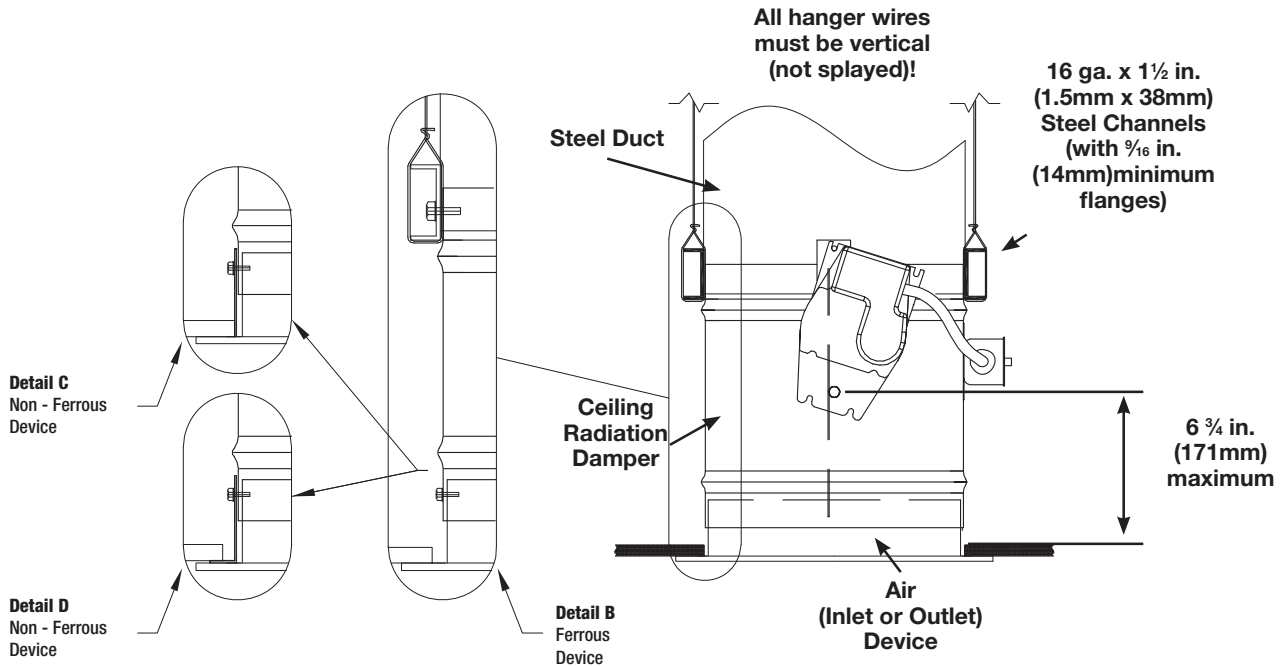


Figure 5

### Ducted Recess Mounted Air Inlet or Outlet Devices

- Opening in ceiling membrane is more than one inch (25mm) larger than nominal size of ceiling damper (i.e. a 12 inch diameter [305mm] ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. diameter [330mm]).
- Maximum size of opening is 24 in. (610mm) diameter (576 sq. in.)
- Thermal blanket is required (see General Information, Thermal Blanket)

- Connection of ceiling radiation damper, air device neck, and steel duct crop (see General Information, Connections) may be satisfied as follows:

Ceiling radiation damper may be connected directly to the air device neck and then the duct drop connected to the damper (see **Figure 6, Detail B**).

Models CRD-501 may be installed as shown in **Figure 6**.

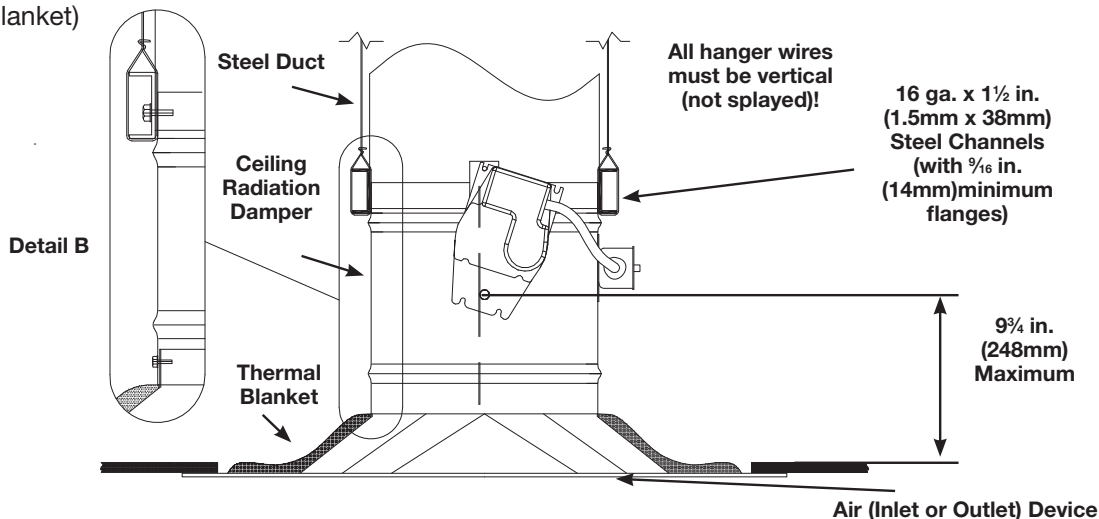


Figure 6

## Unducted Surface Mounted Air Inlet or Outlet Devices

- Maximum size of permitted opening equals maximum size of available listed ceiling radiation dampers.
- Opening in ceiling membrane may be up to one inch larger than the nominal size of the ceiling radiation damper (i.e. a 12 inch diameter [305mm] ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. diameter [330mm]).
- Connection of ceiling radiation damper and air device neck (see General Information, Connections) may be satisfied in three ways:
  1. Ceiling radiation damper may be connected directly to the air device neck and supported by steel channel (see **Figure 7, Detail A**)
  2. Ceiling radiation damper may be connected directly to the air device neck and supported by hanger straps (see **Figure 7, Detail B**).
  3. Ceiling radiation damper may be connected directly to the air device neck and supported by direct suspension with wires looped through holes in the damper frame before tying (see **Figure 7, Detail C**).

## Non-Ferrous Air Devices

Air devices that have non-ferrous frames.

Ceiling membrane openings that utilize non-ferrous devices require one of the following:

1. A steel extension should extend from the ceiling radiation damper to the bottom surface of the ceiling membrane (see General Information, Ceiling Penetrations) should be equal to the outside of the steel extension (see **Figure 7, Detail D**).
2. A steel angle should be attached to the bottom of the ceiling radiation damper and span the gap from the ceiling radiation damper to the bottom of the ceiling membrane. the steel angle should overlap the ceiling membrane (see **Figure 7, Detail E**).

Model CRD-501 may be installed as shown in **Figure 7**.

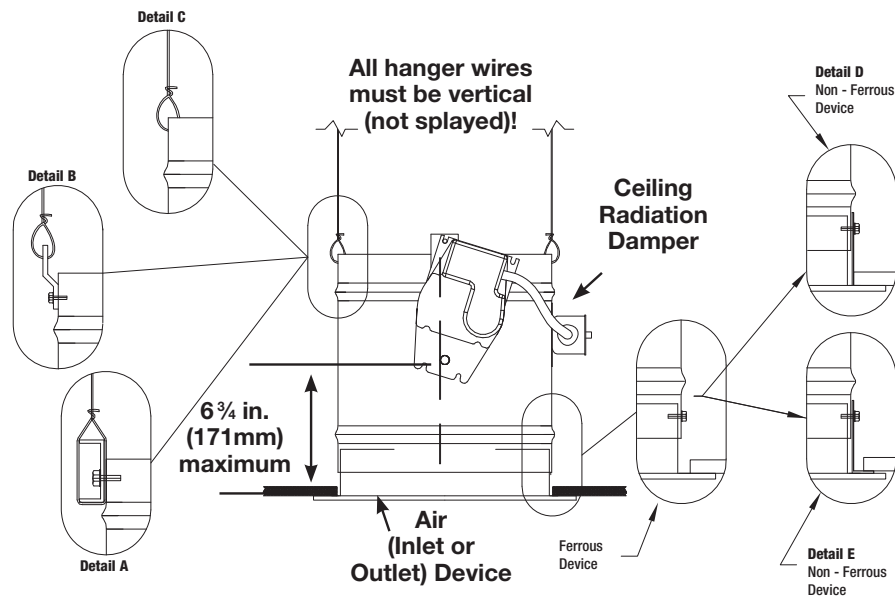


Figure 7

## Unducted Recess Mounted Air Inlet or Outlet Devices

- Opening in ceiling membrane is more than one inch (25mm) larger than nominal size of ceiling damper (i.e. a 12 inch diameter [305mm] ceiling radiation damper could have a maximum ceiling membrane opening of 13 in. diameter [330mm]).
- Maximum size of opening is 24 in. (576 sq. in.) [610mm (.371 sq. m)].
- Thermal blanket is required. (see General Information, Thermal Blanket).
- Connection of ceiling radiation damper and air device neck may be satisfied in three ways:
  1. Ceiling radiation damper may be connected directly

to the air device neck and supported by steel channel (see **Figure 8, Detail A**).

2. Ceiling radiation damper may be connected directly to the air device neck and supported by hanger straps (see **Figure 8, Detail B**).
3. Ceiling radiation damper may be connected directly to the air device neck and supported by direct suspension with wires looped through holes in the damper frame before tying (see **Figure 8, Detail C**).

Models CRD-501 may be installed as shown in **Figure 8**.

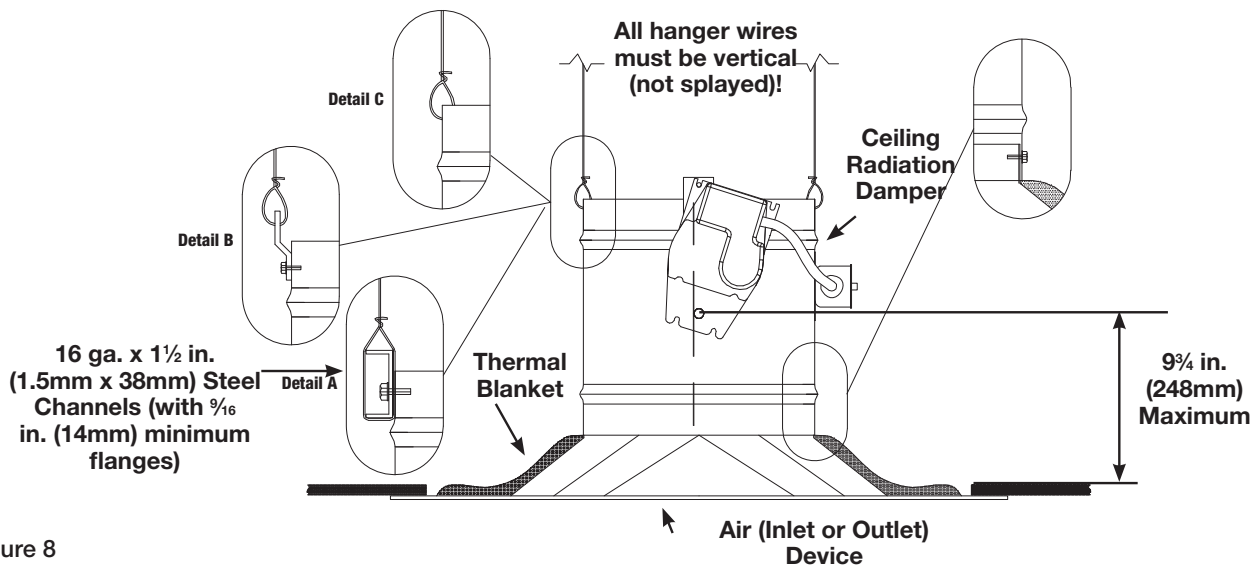


Figure 8

## Connection and Operation of Thermostat (RRL2)

**RRL2** - Dampers will be supplied with a thermostat-type temperature response device, as a standard. The device is a RRL2 (resettable link device), which only incorporates one thermostat and therefore the damper remains closed as soon as its sensor temperature is reached. The RRL2 does not contain blade indication switches. Refer to **Figure 9** for wiring of the RRL2 thermostat.

### Ratings

**Integral Switch Type:** Single pole, double throw

**Electrical Capacity:** 10 Amps, 1/3 hp, 120 or 240 Vac;  
 1/2 Amp, 125 Vdc;  
 1/4 Amp, 250 Vdc;  
 5 Amps, 120 Vac "L" (lamp load);  
 1 Amp, 24 Vac;  
 1.5 Amps, 24 Vdc

**Temperature Limit:** 165°F (standard primary sensor)  
 212°F (optional primary sensor)

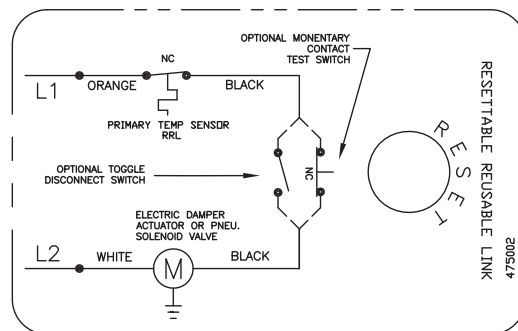


Figure 9

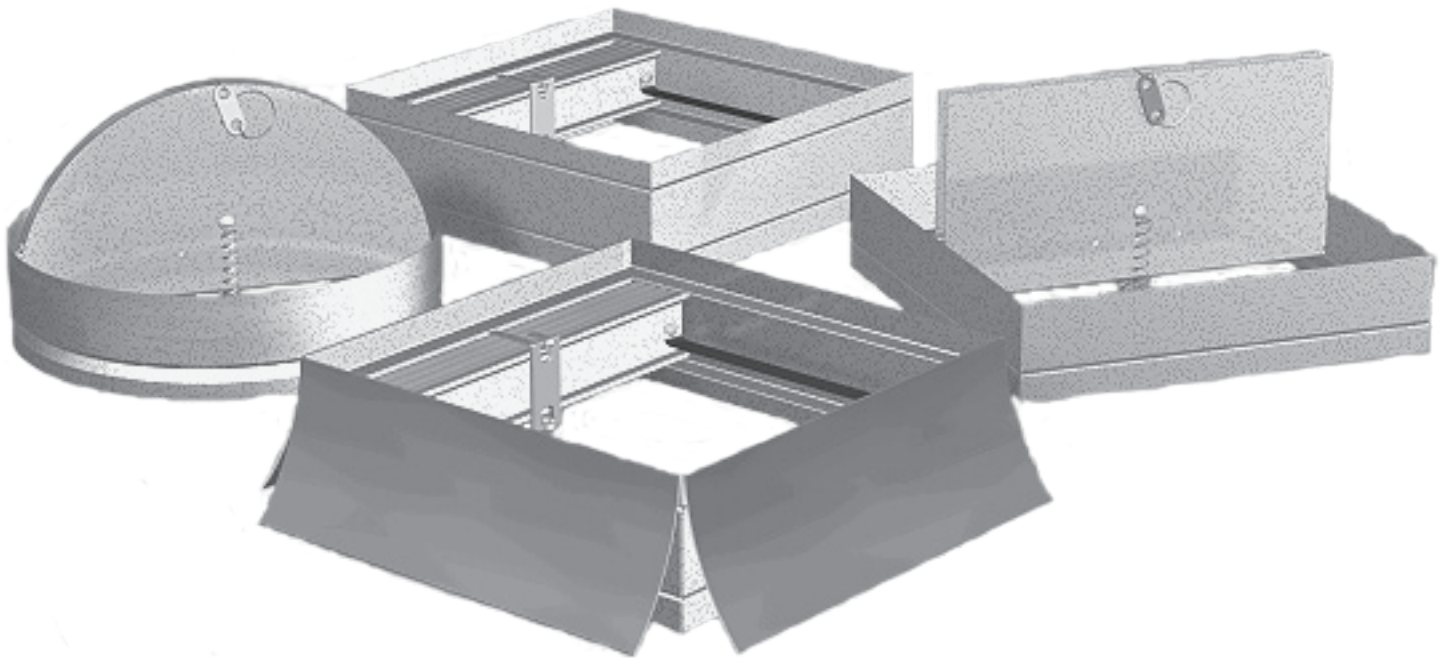
## Our Commitment

*As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.*

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