These instructions apply to 1½ and 3 hour rated fire dampers mounted in: 1) masonry, block, or stud walls (blades must be horizontal) and 2) concrete floors. Specific requirements in these instructions are mandatory. Dampers must be installed in accordance with these instructions to meet the requirements of UL 555.

**Note:** Fire dampers are manufactured and labeled for either vertical or horizontal installation. The dampers must be installed in accordance with labeling.

### 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.

This manual is the property of the owner and is required for future maintenance. Please leave it with the owner when the job is complete.
Pre-Installation Guidelines

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

1) Check the schedules for proper damper locations within the building. Visually inspect the damper for damage and verify that the fusible link is in place and has not activated. Never install a fire damper without the proper UL approved fusible link in place. Visually inspect the link to verify its not damaged. Replace link as necessary.

2) Lift or handle damper using sleeve or frame. Do not lift damper using blades.

3) Dampers have a label indicating the required mounting orientation. When the mounting orientation is horizontal, the ‘K side’ must be up. Care must be taken to ensure that the indicated orientation is adhered to.

4) Damper must be installed into duct or opening square and free of twist or other misalignment.

5) Damper must be kept clean and protected from dirt, dust and other foreign materials prior to and after installation. Examples of such foreign materials include but are not limited to:
   a) Mortar dust
   b) Drywall dust
   c) Firesafing materials
   d) Wall texture
   e) Paint overspray

6) Damper should be sufficiently covered as to prevent overspray if wall texturing or spray painting will be performed within 5 feet of the damper.

7) Caulking is not necessary, nor is it allowed, between the damper sleeve and the wall or floor opening (annular space). However, caulking may be applied to the retaining angles.

8) ACCESS: Suitable access (such that the fusible link may be removed and the damper’s blade stack may be reset, etc.) must be provided for damper inspection and servicing. Where it is not possible to achieve sufficient size access, it will be necessary to install a removable section of duct. (Refer to NFPA 90A).

9) The Code Authority Having Jurisdiction (AHJ) must evaluate and provide approval of final installation where variations to these instructions are necessary.
Preparation of Openings

- Frame wall openings as shown below (see Figure 1, 2, & 2A).
- Gypsum wall board must be fastened 12 in. (305mm) on center (O.C.) to all stud and runner flanges surrounding opening.
- Prepare opening between studs and sleeve assembly as shown below (see Figure 3 & 4).
- All construction and fasteners must meet the requirements of the appropriate wall design (See UL Fire Resistance Directory) and/or local codes.
Clearances Required Between Damper Sleeves & Wall/Floor Openings

Two-Sided Angle Installation
Two-sided angle installations require clearances for thermal expansion between the damper sleeve and the wall/floor opening. The minimum required clearances are:

- For galvanized steel dampers and sleeves: ¼ in. per foot (3mm per .3 m) of damper width and ½ in. per foot (3mm per .3 m) height with a minimum clearance of ¼ in. (6mm). The total gap may be up to 6 in. (152mm), 3 in. (76mm) per side, as long as the retaining angles overlap the wall/floor by a minimum of 1 in. (25mm).

- For stainless steel dampers and stainless steel or galvanized sleeves: 3⁄16 in. per foot (5mm per .3 m) of damper width and height with a minimum clearance of ¼ in. (6mm), maximum of 2 in. (51mm).

Example:

A 12 in. x 12 in. (305mm x 305mm) will require a minimum clearance of ¼ in. (6mm) width and ¼ in. (6mm) on height

A 48 in. x 12 in. (1219mm x 305mm) damper will required a minimum clearance of ½ in. (13mm) on width and ¼ in. (13mm) on height.

These are total clearances (ignoring fastener heads) and do not need to be equally spaced around the damper.

Although the minimum requirements are listed above, for ease of installation the following are the recommended clearances for galvanized dampers:

- Width/Height of 48 in. (1219 mm) or less - ½ in. (13mm) clearance
- Width/Height between 48.01 in. (1220 mm) and 96 in. (2438 mm): 1 in. (25mm) clearance
- Width/Height greater than 96 in. (2438 mm): 1½ in. (38 mm) clearance

Single Side Angle Installation
On vertical mount single side angle installations there are no minimum clearance requirements between the wall opening and the damper sleeve. However, to facilitate installation, clearances between the wall opening and the damper sleeve are recommended.

On horizontal mount single side angle installations a minimum clearance is required between the outside of the damper sleeve and the floor opening of ¼ in. per foot (3mm per .3m) of damper width and ½ in. per foot (3mm per .3m) height with a minimum clearance of ¼ in. (6mm).

Installing Multiple Section Assemblies
A damper assembly is not restricted to a maximum number of sections, but must not exceed the section sizes and overall sizes shown (see chart below).

The damper sections must be attached together with #10 (¾ in. max. [19mm]) sheet metal screws, ¼ in. (6mm) diameter nuts and bolts, tack or spot welds, or ¾ in. (48mm) diameter steel pop rivets. Attachments must be spaced a maximum of 6 in. (152mm) O.C. and a maximum of 2 in. (51mm) from corners. Attachments must be made on front face and back face (air entering and air exiting side) of damper sections.
Maximum Assembly Tables

When multiple sections are shipped unassembled, installer shall fasten dampers together. The table shows maximum sizes for multiple section dampers. Dampers that are two or more sections tall must be factory assembled. **Note:** All dimensions are shown in inches (W x H). * Sizes listed refer to the damper size, not transition size.

<table>
<thead>
<tr>
<th>Damper Model</th>
<th>Mounting</th>
<th>Maximum Single Section Damper Sizes*</th>
<th>Maximum Multi-Section Damper Sizes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD-100, FD-300, FD-310, SSFD-350</td>
<td>Vertical</td>
<td>48 x 48 (1219mm x 1219mm)</td>
<td>-</td>
</tr>
<tr>
<td>FD-150</td>
<td>Vertical or Horizontal</td>
<td>48 x 48 (1219mm x 1219mm)</td>
<td>96 x 48 (2438mm x 1219mm) or 120 x 40 (3048mm x 1016mm)</td>
</tr>
<tr>
<td>FD-110</td>
<td>Vertical or Horizontal</td>
<td>48 x 48 (1219mm x 1219mm)</td>
<td>96 x 48 (2438mm x 1219mm)</td>
</tr>
<tr>
<td>SSFD-150</td>
<td>Vertical</td>
<td>48 x 48 (1219mm x 1219mm)</td>
<td>96 x 48 (2438mm x 1219mm) or 120 x 40 (3048mm x 1016mm)</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>36 x 36 (914mm x 914mm)</td>
<td>-</td>
</tr>
<tr>
<td>FD-350</td>
<td>Vertical</td>
<td>48 x 48 (1219mm x 1219mm)</td>
<td>80 x 40 (2032mm x 1016mm)</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>40 x 40 (1016mm x 1016mm)</td>
<td>-</td>
</tr>
<tr>
<td>KFD-150</td>
<td>Vertical or Horizontal</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>96 x 48 (2438mm x 1219mm) or 120 x 40 (3048mm x 1016mm)</td>
</tr>
<tr>
<td>KFD-110</td>
<td>Vertical or Horizontal</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>96 x 48 (2438mm x 1219mm)</td>
</tr>
<tr>
<td>SSKFD-150</td>
<td>Vertical</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>96 x 48 (2438mm x 1219mm) or 120 x 40 (3048mm x 1016mm)</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>-</td>
</tr>
<tr>
<td>KFD-350</td>
<td>Vertical</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>80 x 40 (2032mm x 1016mm)</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>-</td>
</tr>
<tr>
<td>SSKFD-350</td>
<td>Vertical</td>
<td>36 x 16 (914mm x 406mm)</td>
<td>-</td>
</tr>
<tr>
<td>DFD-150, DFD-110</td>
<td>Vertical</td>
<td>36 x 36 (914mm x 914mm)</td>
<td>72 x 48 (1828mm x 1219mm) or 60 x 60 (1524mm x 1524mm) or 120 x 30 (3048mm x 762mm)</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>24 x 18 (610mm x 457mm)</td>
<td>48 x 36 (1217mm x 914mm)</td>
</tr>
<tr>
<td>DFD-350</td>
<td>Vertical</td>
<td>36 x 36 (914mm x 914mm)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>24 x 18 (610mm x 457mm)</td>
<td>48 x 36 (1217mm x 914mm)</td>
</tr>
<tr>
<td>DFD-310</td>
<td>Vertical</td>
<td>36 x 36 (914mm x 914mm)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>30 x 30 (762mm x 762mm)</td>
<td>-</td>
</tr>
<tr>
<td>SSDFD-110, SSDFD-150, SSDFD-350</td>
<td>Vertical</td>
<td>30 x 30 (762mm x 762mm)</td>
<td>-</td>
</tr>
<tr>
<td>FD-150X</td>
<td>Vertical or Horizontal</td>
<td>48 x 48 (1219mm x 1219mm)</td>
<td>-</td>
</tr>
<tr>
<td>DFD-150X</td>
<td>Vertical</td>
<td>36 x 36 (914mm x 914mm)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Horizontal</td>
<td>30 x 30 (762mm x 762mm)</td>
<td>-</td>
</tr>
</tbody>
</table>

**Sleeve Requirements**

All fire dampers must be installed in a steel sleeve of the required gauge and length. Note that DFD-150X and FD-150X series dampers are provided with an integral sleeve. See **Table on page 9** for required minimum sleeve gauges. Maximum sleeve thickness is 10 gauge (3.5mm). Sleeve inside dimensions must equal damper outside dimensions.

Sleeves shall extend a maximum of 6 in. (152mm) beyond the wall or floor opening on each side. When a factory mounted access door is incorporated as a part of the sleeve, the sleeve may extend a maximum of 16 in. (406mm) beyond the wall or floor opening on the access door side.
Sleeve Requirements cont....

Fire dampers must be attached to sleeves as shown in Figure 6. All four sides of the damper frame must be attached to the sleeve with one row of attachments on each side of the blade channel. Attachments must be spaced a maximum of 6 in. (152mm) O.C. and a maximum of 2 in. (51mm) from corners. A minimum of 4 attachments (2 on each side of the blade channel) per side (16 per damper) are required. One of the methods of attachment shown below must be used:

- tack or spot welds
- #10 sheet metal screws
- ¼ in. (6mm) bolts and nuts
- ¾ in. (4.7mm) steel pop rivets

Securing the Damper/Sleeve Assembly to Wall/Floor Openings

The fire damper must be installed such that the centerline of the blades are mounted in the plane of the wall or floor. All fire dampers may utilize the two-sided angle installation method described below. 1½ hour rated fire dampers may use the single sided angle installation method up to the following maximum sizes:

- Vertical mount: 80 in. W x 50 in. H (2032mm W x 1270mm H), 50 in. W x 80 in. H (1270mm W x 2032mm H), or 40 in. W x 100 in. H (1016mm W x 2540mm).

- Horizontal mount: 144 in. W x 96 in. H (3658mm W x 2438mm H)

**Retaining Angle Gauge:** Retaining angles for 1½ hour rated dampers with a width and height 48 in. (1219mm) or less must be a minimum of 20 ga. (1mm). Retaining angles for all 3 hour rated dampers and all dampers with a width or height greater than 48 in. (1219mm) must be a minimum of 16 ga. (1.5mm).

**Retaining Angle Size:** The leg of the retaining angle on the damper sleeve shall be a minimum of 1¼ in. (32mm). The leg of the retaining angle on the wall/floor shall be long enough to cover the annular space and overlap the wall/floor by a minimum of 1 in. (25mm).

**Retaining Angle Attachment to Sleeve:** Retaining angles must be attached to the damper using one or more of the following methods of attachment (refer to label on outside of sleeve for ‘No Screw’ area):

- Tack or spot welds
- #10 (¾ in. [19mm] max.) sheet metal screws
- ¼ in. (6mm) bolts and nuts
- ¾ in. (5mm) steel pop rivets

A minimum of two connections per side, top, and bottom, spaced 12 in. (305mm) O.C. maximum are required for openings of 48 in. W x 36 in. H (1219mm x 914mm) and less. Dampers greater than 48 in. wide (1219mm) or 36 in. high (914mm) require the connections to be no more than 6 in. (152mm) O.C.

The angles must be attached to all 4 sides of the sleeve. Ensure that fasteners do not interfere with the operation of the damper. The angles need not be attached to each other at the corners.
• Retaining Angle Attachment to Wall/Floor:

**Two-Sided Angle Method:** For two-sided angle installations the retaining angles shall not be attached to the wall/floor (see Figure 7).

**Single Sided Angle Method:** For single side installations the retaining angles must be attached to the wall/floor (see Figures 8-11). For metal stud partitions only, the single side mounting angle may be directly attached to the metal stud prior to the installation of the drywall.

- Retaining angles must be attached to the partition using one of the methods shown below:
  - Drywall screws of a length such that the screw engages the steel stud/track by ½ in. (13mm) (steel framing).
  - Drywall screws of a length such that the screw engages the wood stud by 1¾ in. (44mm) (wood framing).
  - Steel anchors or self tapping concrete screws penetrating masonry or block 1⅛ in. (31mm).

- A minimum of two connections per side are required. Additional connections made at a maximum of 12 in. (305mm) O.C. for openings of 48 in. W x 36 in. H (1219mm x 914mm) and less. Dampers greater than 48 in. wide (1219mm) or 36 in. high (914mm) require the connections to be no more than 6 in. (152mm) O.C.
Securing the Damper/Sleeve Assembly to Wall/Floor Openings cont........

Grille Installations (Dampers up to 36 in. x 36 in. [914mm x 914mm])
Retaining angles used in conjunction with grille installations must be a minimum of 5⁄8 in. x 1 in. (15mm x 25mm) 16 gauge (1.5mm) steel. Space screws a maximum of 6 in. (152mm) O.C. and a maximum of 2 in. (51mm) from the corners (minimum of 2 screws per side). See Figure 12 and Figure 13.

Note: Screws used to attach grille are allowed to penetrate reversed angle leg.

Figure 12: Wood Stud - Grille
Figure 13: Metal Stud - Grille

Figure 14: Damper/Sleeves with Transition
Duct to Sleeve Connection

Sleeve Gauge and Connection Type Requirements

The size of the damper/duct determines the required sleeve gauge and the required duct to sleeve connection (see table to the right). The sleeve thickness must also not be less than the gauge of the connecting duct. Any duct connection other than the breakaway connections described below are considered rigid.

<table>
<thead>
<tr>
<th>Sleeve Gauge</th>
<th>Duct Dimension</th>
<th>Type of Duct to Sleeve Connection Permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 ga. (0.075 in.) - 10 ga. (0.138 in.) [2mm - 3.5mm]</td>
<td>All duct sizes</td>
<td>Rigid or Breakaway</td>
</tr>
<tr>
<td>16 ga. (0.060 in.) [1.5mm]</td>
<td>36 in. (914mm) max. width 24 in. (610mm) max. height 24 in. (610mm) diameter</td>
<td>Rigid or Breakaway</td>
</tr>
<tr>
<td>16 ga. (0.060 in.) [1.5mm]</td>
<td>All duct sizes</td>
<td></td>
</tr>
<tr>
<td>18 ga. (0.048 in.) [1.2mm]</td>
<td>85 in. (2159mm) wide and over</td>
<td></td>
</tr>
<tr>
<td>20 ga. (0.036 in.) [0.9mm]</td>
<td>55 in. - 84 in. wide (1397mm - 2134mm)</td>
<td></td>
</tr>
<tr>
<td>22 ga. (0.030 in.) [0.76mm]</td>
<td>31 in. - 54 in. wide (787mm - 1372mm)</td>
<td></td>
</tr>
<tr>
<td>24 ga. (0.024) [0.6mm]</td>
<td>13 in. - 30 in. wide (330mm - 762mm)</td>
<td></td>
</tr>
<tr>
<td>26 ga. (0.018 in.) [0.46mm]</td>
<td>12 in. wide and under (305mm)</td>
<td></td>
</tr>
</tbody>
</table>

Approved Breakaway Connections

All breakaway connections described below may utilize the following duct sealants: PA2084T duct sealant adhesive manufactured by Precision, DP1010 water base duct sealant manufactured by Design Polymetrics, Grey Pookie, Ductmate PROseal®, or CL Ward S Seal in accordance with SMACNA recommendations.

Transverse Joints

The transverse joints shown below are approved as breakaway connections.

- A maximum of two #10 (19mm) sheet metal screws on each side and on the bottom may be used. The screws should be located in the center of the slip pocket and penetrate both sides of the slip pocket.
- Dampers up to 20 in. (508mm) high may use transverse joints on the top and bottom and Drive Slip joints (see Figure 16) on the sides.

![Figure 15 - Transverse Joints](image)

![Figure 16 - Drive Slip Joint](image)
Duct to Sleeve Connection cont....

Round and Oval Duct Breakaway Connections
Round or flat oval ducts connected to Type R or O damper collars shall be attached with #10 (19mm) sheet metal screws as follows:

- Ducts up to 22 in. (558mm) wide (or dia.) and less shall have three screws.
- Ducts larger than 22 in. (558mm) wide (or dia.) and including 36 in. (914mm) wide (or dia.) shall have five screws.

Factory furnished duct collars, type R and O, are also considered breakaway (see Figure 17).

Manufactured Flanged System Breakaway Connections
Flanged connection systems manufactured by Ductmate, Durodyne, Ward, Nexus, Radiant T-35m, and MEZ are approved as breakaway connections when installed as illustrated (see Figure 18).

Proprietary Flange System Breakaway Connections
(TDC by Lockformer, TDF by Engle)
TDC and TDF systems are approved as breakaway connections when installed as described in the TDC or TDF addendum to the SMACNA Duct Construction Standards. Standard 6 in. (152mm) metal clip may be used with spacing as shown in diagram (see Figure 19 & 20). 3/8 in. (9.5mm) metal bolts and nuts may be used to fasten together corner pieces (see Figure 21).
No Connecting Duct or Transfer Opening

Openings where duct does not attach on either side will not require a breakaway connection. Transfer openings are typical of a non-ducted installation (see Figure 22).

- Sleeve may end flush with the rated wall/floor on both sides
- Refer to Securing the Damper/Sleeve Assembly to Wall/Floor Openings for securing retaining angles to the sleeve.

Figure 22: Transfer opening or no connecting duct

Damper Commissioning and Periodic Testing

The International Fire Code (IFC) requires fire dampers to be maintained in accordance with NFPA standard 80 and smoke dampers to be maintained in accordance with NFPA standard 105. NFPA 80 and 105 define the frequency and method for periodically testing life safety dampers.

NFPA 80 & 105 do not require heat to be applied to a damper’s fusible link or thermostat during periodic testing. Electric or pneumatic actuated dampers are required to be tested by temporarily removing electrical or pneumatic power from the actuator to ensure the damper fully closes and then fully opens once power is restored. Mechanical and gravity operated dampers utilizing a fusible link are required to be tested by removing the fusible link and allowing the damper to fully close and then manually reopening the damper. Re-install the fusible link.

Greenheck’s life safety dampers shall not be tested by applying heat with uncontrollable heat sources (i.e. heat guns, torches, etc.) as this can permanently damage the thermostat or other parts of the damper.

Damper Maintenance

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, jackshaft bearings and jamb seals, do not use oil-based lubricants or any other lubricants that attract contaminants such as dust.

Damper Troubleshooting

The following is a possible cause and correction list for common concerns with the dampers.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damper does not fully open and/or close</td>
<td>Frame is 'racked' causing blades to bind on jamb seals</td>
<td>Adjust frame such that it is square and plumb</td>
</tr>
<tr>
<td></td>
<td>Screws in damper linkage</td>
<td>Damper installed too far into wall. Move out to line as designated on damper label</td>
</tr>
<tr>
<td></td>
<td>Contaminants on damper</td>
<td>Clean with a non-oil based solvent (see Damper Maintenance)</td>
</tr>
<tr>
<td>Link separated</td>
<td>Heat</td>
<td>Replace link</td>
</tr>
</tbody>
</table>
As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.