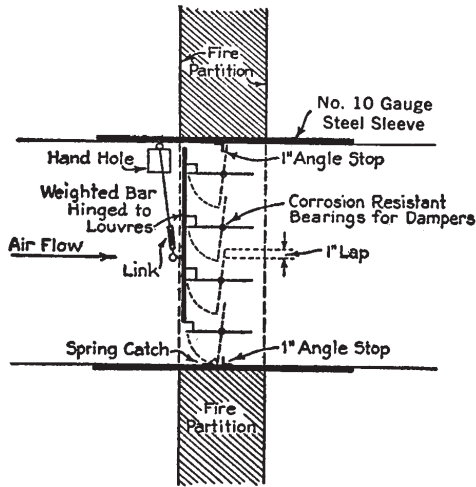


Dynamic Rated Fire Dampers



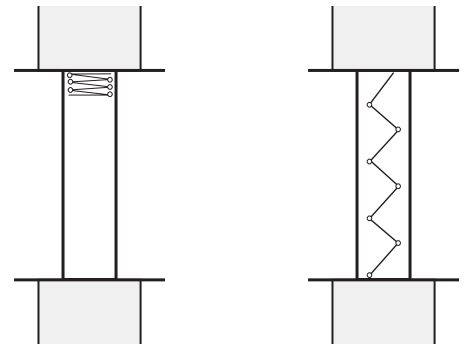
Typical fire damper of the early 1960's
(from 1960 edition of NFBU 90A)

Originally fire dampers were sheet metal shop fabricated devices built to specifications shown in The National Board of Fire Underwriters, (NFBU) Standard 90A. This Standard became National Fire Protection Association (NFPA) 90A in 1965. Until 1966, fire dampers could be built to certain minimum specifications as outlined in 90A or could be laboratory tested and listed. After 1966, only laboratory tested and listed fire dampers were permitted. Underwriters Laboratories first published UL Standard 555 for fire dampers in 1968. UL 555 was revised in 1973, 1979 and 1990. This UL Standard has governed fire damper construction and ratings since 1968. From about 1966 onward the great majority of fire dampers were manufactured rather than shop fabricated because the curtain fire damper easily qualified to UL 555 and could be manufactured to any size quickly and at a much lower cost than any shop fabricated damper.

In the 1960's and 1970's, most building, heating, ventilating and air conditioning (HVAC) systems were designed to shut down at the earliest notification of a fire emergency. Because of the assumed HVAC system shut down, fire damper operation did not consider airflow forces that might impede closure and UL 555 did not include testing for damper closure with air flowing.

While some HVAC and fire safety spokesman felt this to be a serious shortcoming of UL-555, it was not addressed in the 1973 or the 1979 revisions. Increased use of Smoke Control Technology in the 1980's resulted in numerous HVAC systems that were designed to continue operation during fire emergencies and emphasized the need for fire dampers that were rated to close against HVAC system airflows and pressures. The 1990 revision of UL 555 (fourth edition) addressed this need and identified **Static Rated** and **Dynamic Rated** fire dampers.

The dynamic fire dampers ratings provided in UL555 fourth edition became effective April 1, 1992 and since that date all UL labeled fire dampers are required to have labels identifying them as **static rated** (only for use in systems with fan shut down during fire emergencies) or as **dynamic rated**. Fire dampers qualified to UL 555's earlier requirements (prior to 4/1/92) are still available but must now be identified as static rated fire dampers. While some jobs can be properly protected by static fire dampers, dynamic fire dampers are proper on all jobs, even those where HVAC system fans continue running during fire emergencies.



Typical Curtain Fire Damper
w/Blades Folded
(Damper Open)

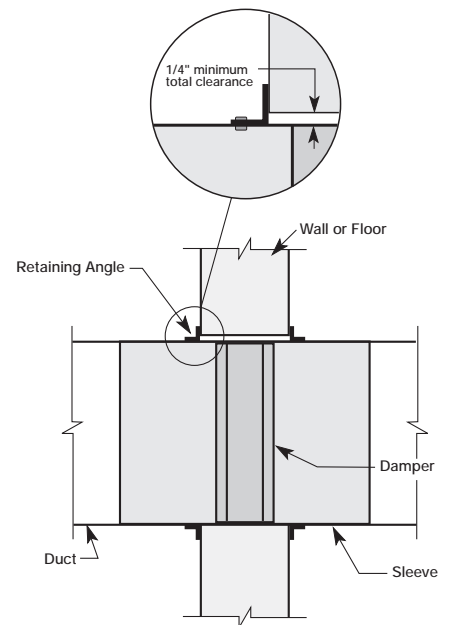
Typical Curtain Fire Dampers
w/Blades Unfolded
(Damper Closed)

FIRE DAMPER RATINGS

The fire damper is installed in the HVAC penetration and fastened securely to the wall or floor. The damper installation becomes an integral part of the wall or floor and ductwork may or may not be connected to the fire damper. The fire damper is usually controlled by a fusible link, which melts at a specified temperature (usually 165°F). The melting action frees the damper to close under spring or gravity power. The fire damper closes off the HVAC opening and prevents flame from spreading through the opening into the adjacent space.

Fire dampers are rated at either 1 1/2 hours or 3 hours and are applied to protect walls, floors and partitions with fire resistance ratings of up 4 hours.

| Wall/Partition Rating | Fire Damper Rating |
|-----------------------|--------------------|
| Less than 3 hours | 1 1/2 hours |
| 3 hours or more | 3 hours |

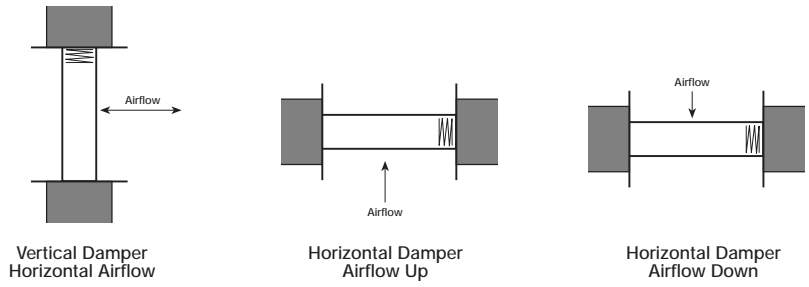


Fire Damper Installation

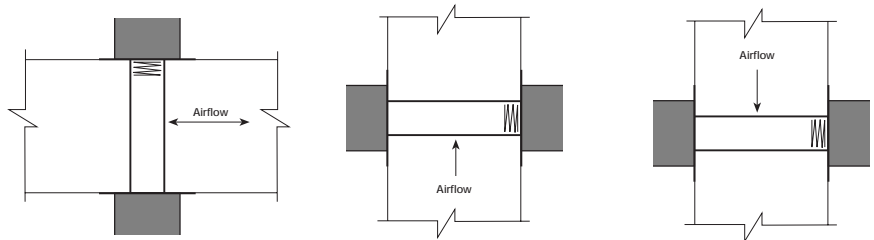
In addition to the 1 1/2 or 3 hour fire resistant ratings, each dynamic rated fire damper carries an airflow rating (maximum airflow with damper in its open position) and a pressure rating (maximum pressure that will occur across the closed damper). All Greenheck dynamic fire dampers are rated to close against 8 in. w.g. pressure. The dampers' ability to close against dynamic airflow conditions will vary depending on its installed configuration. UL 555 (fourth edition) identifies six fire damper installation configurations (see illustration) and requires a separate airflow and pressure rating for each of them.

Greenheck's dynamic rated fire dampers are identified as "DFD" models and are available with all typical fire damper options and accessories. Greenheck's comprehensive Dynamic Fire Damper literature simplifies selection by illustrating each of the six installation configurations along with an adjacent Airflow Velocity Table showing airflow ratings in feet per minute for each available damper size.

Unducted Installations



Ducted Installations



Fire Damper Selection Procedure

To select a Greenheck DFD fire damper (or verify that it is appropriate for the application being considered)

- 1: Check the maximum pressure that can occur with the damper fully closed. All model DFD dampers are rated to close against 8 in. w.g.
- 2: Select the installation and Airflow Velocity Table that most closely approximates the installation configuration being considered.
- 3: Using the dampers ordering dimensions (W x H) determine the maximum velocity rating in fpm from the Airflow Velocity Table.

Selection Example 1: Determine maximum airflow through the following damper:

DFD-150 Type: A Size: 30"x12" Mount: Vertical Ducted

Note: Installation illustrations and airflow velocity tables have been reproduced from Greenheck DFD-150 Type A submittal.

**Vertical Damper Installation
Horizontal Airflow**

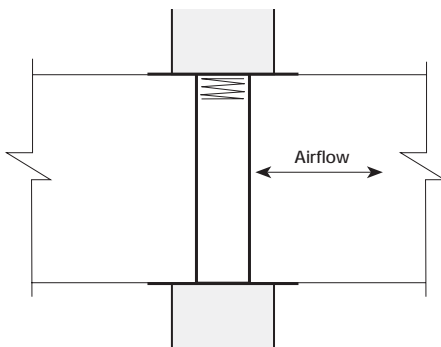


Table D

| Damper Height (H) inches | Damper Width (W) inches | | | | | | | |
|--------------------------|-------------------------|--------------------|--------------------|--------------------|-------------------|--------------------|-------------------|-----|
| | 12 | 24 | 36 | 48 | 72 | 108 | 120 | |
| 12 | 5037 1 section | | | 2002 2 sections | | | | |
| 24 | 4004 1 section | | | | | 1174 3 sections | 880 4 sections | |
| 36 | | 3523 1 section | | 1761 2 sections | | | | 36 |
| 48 | | 2002 2 sections | 1761 2 sections | 1001 4 sections | 880 4 sections | 587 6 sections | 440 8 sections | 40 |
| | | 24 | 36 | 48 | 72 | 96 | 108 | 120 |

- Maximum velocity of airflow through a 30"x12" from Table D is 3523 fpm. 30" x 12" is 2.5 sq. ft., so maximum airflow is 3523 fpm x 2.5 sq. ft. = 8807 cfm.
- Maximum pressure across closed damper is 8 in. w.g. for all damper sizes.

Selection Example 2:

Determine maximum airflow through the following damper:

DFD-150 Type: A Size: 72"x24"
Mount: Horizontal Unducted Airflow: Vertical Downward

Note: Installation illustrations and airflow velocity tables have been reproduced from Greenheck DFD-150 Type A submittal.

Horizontal Damper Installation Airflow Down

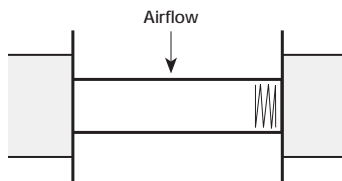


Table B

| Damper Height (H) inches | Damper Width (W) inches | | | | | | | |
|--------------------------|-------------------------|-------------------|-------------------|--------------------|--------------------|-------------------|-------------------|-------------------|
| | 12 | 24 | 36 | 48 | 72 | 96 | 108 | 120 |
| 12 | 6929 1 section | | | | | | | |
| 24 | | 3654 1 section | | | 1827 2 sections | | | |
| 36 | | | 1493 1 section | | 746 2 sections | | | |
| 48 | | | | 1827 2 sections | 746 2 sections | 913 4 sections | 373 4 sections | 248 6 sections |
| | | | | | | | 186 8 sections | |
| | | | | | | | | 36 |
| | | | | | | | | 40 |

- Damper is an assembly of two 36" x 24" sections. Maximum velocity of airflow through a 72" x 24" from Table B is 746 fpm. 72" x 24" is 12 sq. ft., so maximum airflow is 746 fpm x 12 sq. ft. = 8952 cfm.
- Dampers larger than maximum single section size are supplied in 2 or more sections of equal size. In the event of fire it must be assumed that each damper section will close at a slightly different time and that the last damper section remaining open will be handling the entire airflow volume. Airflow ratings for dampers larger than single section are based on this assumption. Tables also show the number of sections in a multi-section damper assembly.
- Maximum pressure across closed damper is 8 in. w.g. for all damper sizes.

How Important are these new UL555 Dynamic Ratings?

Code change recommendations have already been submitted to:

BOCA National Building Codes
ICBO Uniform Building Codes
SBCCI Standard Building Codes

It is only a matter of time until building codes require Dynamic Rated fire dampers.

By installing Dynamic Rated fire dampers, contractors avoid the NFPA 90A recommended requirement to cycle test all fire dampers with the HVAC System operating and consequently SMACNA strongly supports the installation of Dynamic Rated fire dampers.

Dynamic Rated fire dampers cost only slightly more (installed cost should not average more than 10% higher than a Static Rated fire damper). Dynamic Dampers are appropriate in all applications while Static Rated Dampers applications are limited. Dynamic Rated fire dampers are available from most major manufacturers so competition and reasonable costs are assured.

Specifying Engineers should review and revise their fire damper specification and incorporate Dynamic Ratings for all requirements.

DYNAMIC FIRE DAMPER SPECIFICATIONS

Fire dampers meeting the following specifications shall be furnished and installed at the locations shown on the plans and/or as described in applicable schedules. The contractor shall submit manufacturer's data sheets detailing compliance with these specifications.

QUALIFICATIONS

All fire dampers shall meet the requirements of NFPA 90A and further shall be tested, rated, and labeled in accordance with the fourth edition of UL Standard 555. All fire dampers shall be Dynamic Rated for closure against airflow in the following six installation configurations:

- Vertical mount (horizontal airflow) - Ducted and unducted
- Horizontal mount (airflow up) - Ducted and unducted
- Horizontal mount (airflow down) - Ducted and unducted

Each fire damper proposed shall be rated to close against maximum design airflow at its installed location with a 10 percent safety factor and against 8 in. w.g. maximum pressure across the closed damper. If wall, floor, or partition has a fire resistance rating of 3 hours or more, the fire damper shall have a UL 555 fire rating of 3 hours. All other fire dampers shall have UL 555 fire ratings of 1¹/₂ hours.

REQUIRED FEATURES

Each fire damper shall be equipped with a fusible link having a temperature rating approximately 50°F above the maximum temperature normally encountered at its location during system operation or shutdown, but not less than 165°F (specifier could also select 212°F). These fire dampers shall be Greenheck model DFD-150 or DFD-350. Other damper types by the specified manufacturer, such as narrow frame designs, may be submitted for approval if their design facilitates a specific application and they comply with all other specification requirements. In duct systems where airflow velocities exceed 3000 fpm, or which are designed to a SMACNA Pressure Class of 3 in. w.g. or higher, or which require SMACNA Duct Seal Classes A or B; fire dampers shall be of the nominal 100 percent free area type with blade package and all frame components out of the air-stream (except when damper size requires multisection damper assembly). These fire dampers shall include the required oversized enclosures which shall be sealed by the damper manufacturer for high pressure and appropriate rectangular, round, or oval duct collars to facilitate the connection of mating ductwork. The contractor shall be responsible for any additional sealing of duct collars and duct connections required to maintain the specified SMACNA Duct Seal Class requirements. These fire dampers shall be Greenheck model DFD-155 or DFD-355 Types C, CO, CR or R. Dynamic Rated fire dampers from other manufacturers meeting all specified requirements will be considered for approval. Provide complete submittal information (including installation instructions) and the manufacturer's certification of compliance with these specifications for approval prior to bidding.

INSTALLATION

Contractor shall include damper manufacturer's Installation Instructions as part of the fire damper submittal. These instructions shall describe the applicable requirements for damper sleeve thickness, retaining angles, methods of attachment, duct-to-sleeve connections, preparation of wall or floor openings, and all other requirements to provide an installation equivalent to that tested by the damper manufacturer during the UL Standard 555 qualification procedures. Contractor shall detail any proposed installations that deviate from these manufacturer's instructions and explain the needed deviations. All fire damper installations shall comply with the manufacturer's installation instructions or any submitted deviations and must be acceptable to the appropriate authority having jurisdiction. Contractor shall provide suitable access at each fire damper to allow inspection, cycling or testing of the fire damper and replacement of the fusible link. This includes furnishing and installing duct access doors and wall or ceiling access panels as may be required. Contractor installing fire dampers shall be responsible for these access doors and panels unless they are specifically shown to be supplied by other trades.

This specification and a comprehensive specification coordinating all Fire Safety Related Dampers (Fire Dampers, Ceiling Radiation Dampers, Smoke Dampers, and Combination Fire Smoke Dampers) is available in a variety of word processing computer programs. Contact your Greenheck Damper and Louver representative for a printed sample and additional information.

