FIRE DAMPERS

CHAPTER-14

FIRE DAMPERS

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FIRE DAMPERS

Introduction

The folding blade fire damper manufactured by TECNALCO and designed to stop the spread of fire through ducts, walls, ceilings, doors, partition walls or floors. The product incorporates numerous features as required and specified by Contractors, local fire authorities in addition to Consultants.

There are three casing variants—all fully welded, Square / Rectangular, Circular and Flat oval with infinite sizing capability with in min / max dimensions. All are suitable for either low, medium or high velocity / pressure applications.

Features:

Low, medium and high velocity models.
2 and 4 hour fire rated assemblies- Intertek standard.
1 ½ and 3 hours fire rated assemblies-UL standard.

Galvanized blades and casings.
Fully welded construction.
Infinite sizing capability.
Factory fitted HEVAC/ HVAC installation frame (if required)
Comprehensive control options.

Specifications and Testing:

Fire tested in accordance with UL 555 (1999) Std.
.
Tested for a duration of two hours, ITS Report no: WHI-495-1582.

Air performance and leakage testing were conducted in accordance with AMCA standard 500-89 (Rev 1994) entitled “Test methods for louvres, dampers and shutters” ITS Report no:J20024293-001A refers.

Conformance to DW 142.

Blades

The roll-formed interlocked steel curtain section is available in either galvanized steel, formed with in the full length of the blade are dual swages which provides additional strength and rigidity.
FIRE DAMPERS

PRODUCT MODEL DESCRIPTION

TYPE TFL
- Low / Medium velocity
- Blades partly in air stream.
- Square / Rectangular spigot connection.
- Vertical or horizontal mounting.

Dimensional data:

TYPE TFH
- High velocity
- Blades outside air stream.
- Square / Rectangular spigot connection.
- Vertical or horizontal mounting.

Dimensional data:

VOLUME DAMPERS

PRODUCT MODEL DESCRIPTION

TYPE TFC
- High velocity.
- Blades outside air stream.
- Circular spigot connection.
- Vertical or horizontal mounting.

Dimensional data:

TYPE TFO
- High velocity.
- Blades outside air stream.
- Flat oval spigot connection.
- Vertical or horizontal mounting.

Dimensional data:
**PRODUCT MODEL DESCRIPTION**

**TYPE TFI**
- Low velocity.
- Blades partly in air stream.
- Square / Rectangular spigot connection.
- Vertical or horizontal mounting.

**Dimensional data:**

![Diagram of TFI model](image1)

**TYPE TFM**
- Medium velocity.
- Blades outside air stream.
- Square / Rectangular spigot connection.
- Vertical or horizontal mounting.

**Dimensional data:**

![Diagram of TFM model](image2)
FOLDING BLADE FIRE DAMPER

1. Galvanised steel frame.
2. Top blade riveted to frame.
4. Easily replaceable fusible link.
5. Interlocking galvanised blades as std and Stainless steel blades are available on request.

FIRE DAMPERS

Mounting Frame

HEVAC / HVAC Installation frame.
Available for TFL, TFH, TFC, TFO Models only.
The installation frame is assembled with its respective fire shutter damper and delivered to site as one unit.
This unit should be installed centrally within the thickness of the surrounding wall or floor such that the centre line of the frame is a minimum distance of 50mm from the nearest face of the wall or floor.
After completing the duct work installation to the damper the wall opening should be backfilled over the damper subframe building ties, which should be grouted into the surrounding wall or floor using cement mortar till all joints.

Dimensional data:
For TFL model $Z=(H-5)+110$
For TFH, TFC, TFO Models $Z$ is as below mentioned
If the Duct height is from 100 to 250 then $Z=(H-5)+110$
If the Duct height is from 251 to 750 then $Z=(H-5)+155$
If the Duct height is from 751 to 1000 then $Z=(H-5)+175$

Multisection dampers
Where fire dampers are required to be installed in apertures with dimensions greater than the maximum single unit size, multisection dampers can be supplied. Multisection dampers are available for all the models.
ENGINEERING AND PERFORMANCE DATA

The tests were conducted by InterTek Testing Services on the selected sizes of the fire dampers. The test results include Static pressure drop, Duct velocity, Airvolume and free area.

Test method: The fire dampers were tested for Air Performance and Leakage testing, were conducted in accordance with AMCA Standard 500-89 (Rev 1994) entitled “Test Methods for Louvres, Dampers and Shutters”. Air volume was measured employing metering stations containing appropriately sized sharp edged orifices. Static pressure was measured employing a Dwyer Pitot Tube model # 160-18.

Static Pressure: Pressure inside the duct which is necessary to overcome the friction resistance.

Pressure Drop and Velocity

<table>
<thead>
<tr>
<th>In H2O</th>
<th>Kpa</th>
<th>Fpm</th>
<th>m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.016</td>
<td>0.004</td>
<td>1000</td>
<td>5.08</td>
</tr>
<tr>
<td>0.025</td>
<td>0.006</td>
<td>1250</td>
<td>6.35</td>
</tr>
<tr>
<td>0.036</td>
<td>0.009</td>
<td>1500</td>
<td>7.62</td>
</tr>
<tr>
<td>0.064</td>
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<td>10.16</td>
</tr>
<tr>
<td>0.100</td>
<td>0.025</td>
<td>2500</td>
<td>12.70</td>
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</tbody>
</table>

Air leakage Test:

Air leakage test on fire damper size 12”x12” with full closed position.

Pressure Drop and Air volume

<table>
<thead>
<tr>
<th>In H2O</th>
<th>Kpa</th>
<th>Cfm</th>
<th>L/s</th>
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</thead>
<tbody>
<tr>
<td>0.50</td>
<td>0.13</td>
<td>53</td>
<td>25</td>
</tr>
<tr>
<td>1.00</td>
<td>0.25</td>
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<td>34</td>
</tr>
<tr>
<td>2.00</td>
<td>0.50</td>
<td>104</td>
<td>49</td>
</tr>
<tr>
<td>3.00</td>
<td>0.75</td>
<td>129</td>
<td>61</td>
</tr>
<tr>
<td>4.00</td>
<td>1.00</td>
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<tr>
<td>5.00</td>
<td>1.25</td>
<td>167</td>
<td>79</td>
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</table>

NOTE: For other sizes refers test report: J20024293-001A

Air leakage can be observed from the smoke test. Smoke tests conducted by ITS, USA.

Fire Endurance Test

The Antioch, CA fire testing laboratory of ITS conducted a 2 hour fire endurance test and a hose stream test on a vertically mounted fire damper assembly installed in a reinforced concrete wall. The tests were conducted in accordance with the standard for fire dampers, UL555(1999), except one sample was tested and the hose stream duration and pressure were calculated for a 1-1/2 hour fire damper.

The fire endurance test was started after igniting the burners and moving the test assembly into position in front of the furnace opening. Thermocouples were attached to automatic recording equipment.

Temperatures within the furnace were monitored using nine thermocouples. The temperatures were controlled by adjusting fuel to the furnace burners to conform to the time / temperatures.

The 2134mm wide x 2743mm high concrete wall with the fire damper installed was anchored to the test frame. The locking ramps on the fire damper were on the unexposed side. The side of the wall were enclosed to fit the 3658mm wide test frame with 20 gauge, 92mm steel studs and track, and two layers of 16mm type X gypsum board were installed on each side of the studs. To check the damper operation, the fusible links were removed and the blades allowed to drop closed. The blades were reset open and the fusible links installed. A temporary 16mm type X gypsum board cover was installed on the unexposed side of the damper.

Hose Stream Test

Immediately after the fire endurance test, the exposed surface of the fire damper was subjected to the impact, erosion and cooling effects of the hose stream test for 25sec, with a water pressure of 30 psi, in accordance with the UL555 specifications.

The fire damper withstood the hose stream test without developing any openings through assembly. Clearances between parts were within the allowable limits specified in the test standard.

NOTE: For complete details refers test report: WHI-495-1582
ENGINEERING AND PERFORMANCE DATA

Free area table for TFL, TFI Models.

<table>
<thead>
<tr>
<th>Duct width in mm</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
<th>750</th>
<th>900</th>
<th>1050</th>
<th>1200</th>
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<tbody>
<tr>
<td>100</td>
<td>0.010</td>
<td>0.015</td>
<td>0.025</td>
<td>0.035</td>
<td>0.04</td>
<td>0.05</td>
<td>0.06</td>
<td>0.08</td>
<td>0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>200</td>
<td>0.015</td>
<td>0.035</td>
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<td>0.07</td>
<td>0.10</td>
<td>0.13</td>
<td>0.16</td>
<td>0.18</td>
<td>0.22</td>
<td></td>
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<tr>
<td>300</td>
<td>0.025</td>
<td>0.05</td>
<td>0.08</td>
<td>0.10</td>
<td>0.13</td>
<td>0.16</td>
<td>0.20</td>
<td>0.24</td>
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</tr>
<tr>
<td>400</td>
<td>0.035</td>
<td>0.07</td>
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<td>0.13</td>
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<td>0.26</td>
<td>0.32</td>
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<tr>
<td>500</td>
<td>0.04</td>
<td>0.09</td>
<td>0.13</td>
<td>0.17</td>
<td>0.22</td>
<td>0.26</td>
<td>0.33</td>
<td>0.40</td>
<td>0.47</td>
<td>0.54</td>
</tr>
<tr>
<td>600</td>
<td>0.05</td>
<td>0.10</td>
<td>0.16</td>
<td>0.21</td>
<td>0.26</td>
<td>0.32</td>
<td>0.40</td>
<td>0.48</td>
<td>0.57</td>
<td>0.65</td>
</tr>
<tr>
<td>750</td>
<td>0.06</td>
<td>0.13</td>
<td>0.20</td>
<td>0.26</td>
<td>0.33</td>
<td>0.40</td>
<td>0.50</td>
<td>0.60</td>
<td>0.72</td>
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<td>0.24</td>
<td>0.32</td>
<td>0.40</td>
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<td>0.60</td>
<td>0.73</td>
<td>0.87</td>
<td>0.98</td>
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<td>1050</td>
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<td>0.18</td>
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<td>0.36</td>
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<td>0.57</td>
<td>0.72</td>
<td>0.87</td>
<td>1.00</td>
<td>1.14</td>
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<tr>
<td>1200</td>
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<td>0.22</td>
<td>0.32</td>
<td>0.43</td>
<td>0.54</td>
<td>0.65</td>
<td>0.76</td>
<td>0.98</td>
<td>1.14</td>
<td>1.31</td>
</tr>
</tbody>
</table>

Blades are out of air stream

Air performance characteristics of TFL and TFI models.
****INSTALLATION DETAILS****

The damper should be installed centrally within the surrounding wall or floor thickness with a minimum distance of 50 mm from the nearest face of the wall or floor. The damper should be installed in a rectangular galvanized steel sleeve with a minimum thickness of 1.2mm. This sleeve should be attached to the damper by means of 6mm dia bolts at max of 225mm centres.

The sleeve should be of a suitable length to extend through the wall or floor opening to enable the fitting of the cover angles and ductwork. The cover angles should be attached to the sleeve by 6mm dia bolts at a maximum of 225 mm centres and should form a complete frame around the sleeve and cover over the expansion gap required between sleeve and wall or floor opening.

This gap should be in the order of 1% of linear measurement (width or height) and should be fitted with soft packing (mineral wool). The cover angle should be of such a size as to always form a cover over the wall or floor opening of 25mm minimum and should be manufactured from a minimum size of 38x38x6mm steel angle.

**Method**

Type TFI: Attach damper inside sleeve and boltup, then fix one complete side of the cover angle framing. The damper can now be slid into the wall or floor opening and positioned centrally within this opening using soft packing in the expansion gap. The other side of the cover angle can now be fitted and then the ductwork can be connected to the sleeve.

Type TFM: All as TFI but the ductwork will be fitted to the sleeve on three sides and to the damper at the channel section keeping the blades out of air stream.

Type TFL, TFH, TFO: All as TFI but duct work will be fitted to the damper spigot and not to the sleeve.

****PRODUCT SPECIFICATIONS****

**Casing**

Standard case is constructed with 1.2 mm (18swg) thickness of galvanized steel, 160mm deep and formed to provide two 25.4mm continuous internal flanges and spaced 80mm apart. Casing is fully welded. welded areas to be applied with Zinc paint.

**Blades**

The Blades are manufactured from 0.8mm galvanized steel and formed to provide a continuous internal locking hinge extending the full length with dual swages providing more strength and rigidity. The blade pack is attached to the case by the first blade riveted to the inside face of one side of the frame. Stainless steel blades are also available on request.

**Locking ramp**

On closing, the leading blade locks inside the internal flanges of the bottom frame section into two locking ramps are manufactured from 1.2mm G.I steel and fitted in such a postion as to ensure correct operation of the damper and to effect the minimum obstruction to the free area of the damper.

**Fusible link**

The damper blades are held in the folded position by means of fusible link, set to operate at 74°C (165°F) unless otherwise specified. The link is positioned at the centre of the blade length in an exposed position.

**Spring**

All dampers whether supplied for vertical or horizontal operation are fitted with two constant for coiled band stainless steel springs 19mm wide of suitable length which are riveted to the leading blade. The coiled end is retained by the locking ramp in such way that the spring cannot become dislodged. These springs are to ensure complete closure of the blades with the damper in either orientation.

**Ordering data:**

1. TECNALCO Model 4. Blade material
2. Size: W x H 5. Installation frame
3. Quantity 6. Remarks

<table>
<thead>
<tr>
<th>Example</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFH</td>
<td>500X400</td>
<td>50</td>
<td>G.I. Finish</td>
<td></td>
<td></td>
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</tbody>
</table>