

Installation of Fire Damper on Drywall

Methods of Installation

Doc No.: AC-032020/0001/00

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Issued Date: 03 Mar 2020

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Introduction

The use of drywall for building construction has become a very common practice due to high productivity that can be derived from drywall construction. It significantly increases the speed and lowers the cost of construction. Training worker on drywall construction is easy and, therefore, there is readily supply of worker for this part of the building work. In addition, drywall board is inexpensive and the drywall can be easily designed and constructed to provide the required fire rating (typically 1- or 2 hours fire resistance) and high noise transmission loss. Local regulation requires fire damper to be tested with drywall for fire resistance on a furnace. There are basically three test criteria in relation to this test, namely a) integrity of fire damper, b) integrity of drywall and c) insulation of drywall. Currently, fire dampers tested on drywall are single module in construction. For large damper of two or multiple module construction, assessment by recognized laboratory are carried out to predict the damper performance and approval from local authority is granted on this basis.

Type of fire damper installation method on drywall

There are basically two methods of installation of fire damper on drywall:

a) Fire damper supported on drywall

With this method of installation, drywall must be reinforced with additional and thicker studs or tracks or both to strengthen the drywall and opening to carry the weight of damper. Current practice is the drywall installer will erect the drywall first follow later by the damper installer who will cut the required opening on the drywall and install the damper. Proper coordination between the two installers must be done to ensure that drywall installer knows exactly how to strengthen the drywall. This is a particularly important step when damper is supported on drywall. It is crucial for building professional to ensure that this step be carried out by the qualified installer. Without proper construction, the drywall may crack causing it to fail prematurely under fire conditions. For large damper, it is very important that each module is sufficiently supported on the drywall. Test of fire damper on drywall takes into consideration the performance of both the fire damper and the fire-rated drywall. Both must meet the required fire rating. For a standard furnace of 3m by 3m in size, the largest fire damper that can be mounted on the drywall for fire resistant testing is limited to 1.5m X 1.5m in size so as to be able to assess the performance of the drywall board and the stud and tracks that form the frame. Hence, it becomes very difficult for anyone to assess large damper fire performance due to lack of relevant test data. The serious setback with this method is that the stud and track required cannot be verified after installation is completed.

b) Fire damper supported from building structure from above

The second installation method uses steel rods to suspend the fire damper from concrete structure above so that its weight is not resting on the drywall as shown in Figure 1. Because the fire damper is not rested on the drywall, each damper module may be suspended individually from the concrete structure above and adjacent modules bolted together, the fire performance of the fire rated drywall will not be affected by the weight of the damper. Logically, builder should erect fire-rated drywall of the required fire rating with opening provided to suit the damper size. ACMV subcontractor should provide fire damper opening size, location and position of drywall to builder. The opening size should be determined to include sufficient gap for thermal expansion all-round the damper and should be provided by the manufacturer. The installation of the fire damper should strictly follow the detail instructions provided by the manufacturer. The damper installer only needs to install the damper according to the manufacturer instruction. There is no need to reinforce the drywall as it is supported on the building structure from above. With this method of installation, the damper support can be visually verified from the ground.



Figure 1

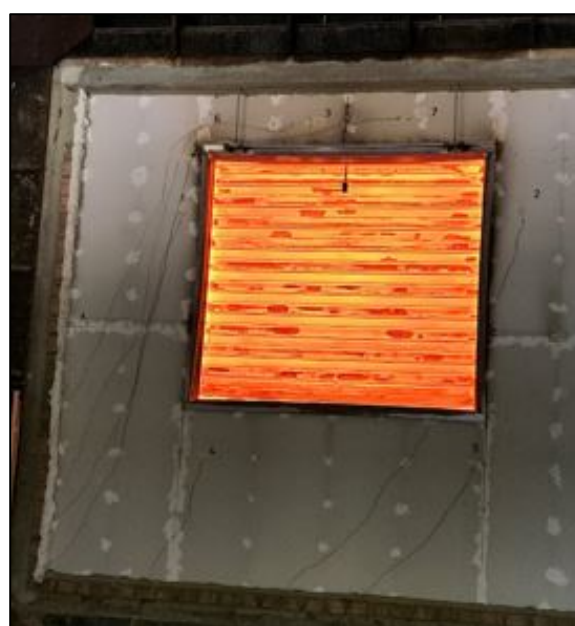


Figure 2

Figure 1 shows a fire damper mounted on drywall and supported from a concrete lintel above in a 3m x 3m furnace for fire resistant testing to Singapore Standard SS 333:2012.

Figure 2 shows drywall board exhibiting minor cracks on the unexposed side at 3.5 hours into the fire test.

The fire damper and drywall system successfully completed the test with the following results:

- i. fire damper/drywall system met integrity of 4 hours and 20 minutes,
- ii. drywall met insulation of 3 hours and 28 minutes.



Figure 3



Figure 4

Figures 3 and 4 show the condition of the damper and drywall on the exposed side after the calcium silicate board was removed upon completion of fire-resistant testing. Layers of damper metal parts flaked off during testing, but it maintained its fire resistance throughout the fire test. Some parts of the drywall board have cracked exposing the insulation. Severe distortion of studs and tracks occurred during the fire test and the 3m x 3m drywall deflected towards the furnace by 42 mm. However, the dry wall was able to maintain its integrity.

Conclusion

By comparison, installation by suspension from the building structure is a much more reliable method as shown in the table below.

Attributes	Supported on dry wall	Supported on building structure
Field Coordination	<p>More co-ordination</p> <p>a) Cut, strengthen, insulate Fire damper opening. b) Add studs and tracks in wall to support Fire damper c) Complete the drywall. d) Install Fire Damper in opening</p>	<p>Less co-ordination</p> <p>a) Cut, strengthen, insulate Fire damper opening. b) Install Fire Damper in opening</p>
Reliability	<p>Not safe as weight of damper may cause crack and premature failure of drywall, additional risk due to different types of drywall, uncertainty for large damper</p>	<p>Both fire damper/drywall are safe as damper weight is not rested on the drywall, each module individually suspended as proven in fire test, so safe for large damper.</p>
Inspection after installation	<p>Unable</p>	<p>Able</p>
Ease of installation	<p>Installation is difficult as work involve opening and additional support resulting in high cost.</p>	<p>Installation is easy as work involves only the opening</p>

Don't take risk with lives and your asset, insist on the right way to install the fire damper. Building professional, builder and owner are urged to ensure work are planned and coordinated prior to installation of fire damper on drywall.