

Fire Damper Installation on Drywall Supported from Building Structure

Installation Instructions

Doc No. : IM-082020/0001/1 (2nd issue)
Prepared by : S.Y. Ong, Steven Ong & Y.L. Wong
First Issued : 3 Mar 2020
Current Issue Date : 25 Aug 2020

The Secure Way of Installing Fire Damper on Drywall

1. Pre-installation Preparation

- a) Provide fire dampers opening details and location on the masonry wall to builder. Ensure that sufficient expansion gap is included in the opening size. Opening size including allowance for thermal expansion is calculated according to the latest Singapore Standard SS333, Annex G.
- b) Calculation of Wall Opening:
 - i) For Galvanized steel
Opening width = Damper width x 1.01 + 10 mm
Opening height = Damper height x 1.01 + 10 mm
 - ii) For Stainless steel damper
Opening width = Damper width x 1.015 + 10 mm
Opening height = Damper height x 1.015 + 10 mm

For convenience, we have provided a recommended opening sizes as shown in Table 1 to Table 4 in Appendix B.

Also, excel template for calculation of the opening size is provided on our website.

- c) Check and confirm that fire damper opening position and dimensions (width, height and depth) provided on the drywall is correct before proceeding to install the fire damper. In the event that the opening provided is inaccurate, request the builder to make good.
- d) Check that the cut edges of the opening are made good
- e) Electrical trunking, piping or any other M & E services should not run in the way of the hanger rod position.
- f) Figure 1 describes the damper parts that will be mentioned throughout this installation manual.

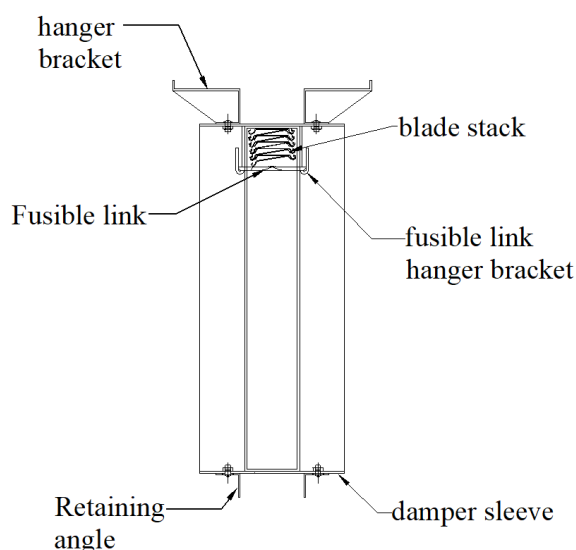


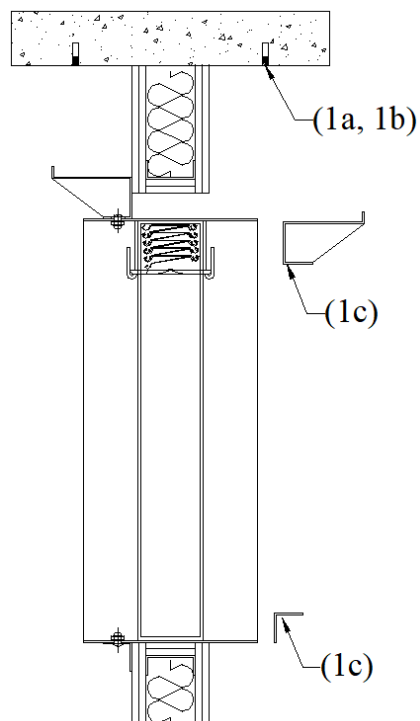
Figure 1: Damper parts

2. Installation Procedures

Step 1

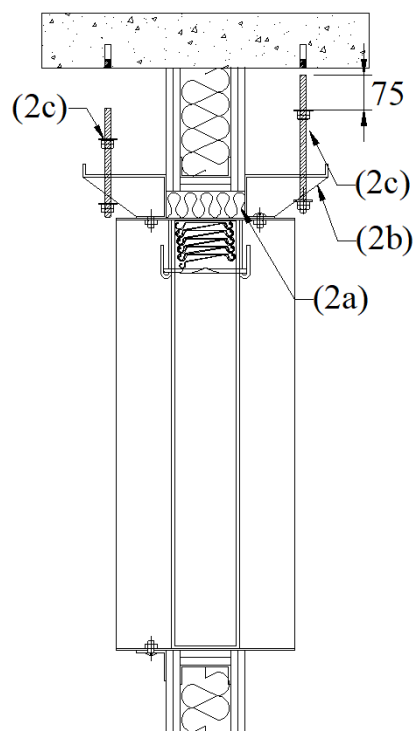
- 1a) Mark the anchor bolt position on the soffit above according to the hanger bracket on the damper.
- 1b) Drill and insert steel anchor bolt on the marked positions. HILTI M10 x 40 flush/drop-in anchor HKD model is recommended (refer to Appendix A.1 and Appendix A.2 – setting details for M10 x 40 anchor).
- 1c) Remove the retaining angles on one side of fire damper, then position fire damper within the drywall opening sitting on it.

Note 1. The fire damper is designed for bi-directional airflow and the fusible is accessible from either side, so the damper may be installed regardless of airflow direction and access panel may be installed on either side of the damper.



Step 2

- 2a) Insert 25mm compressible and fire-resistant insulation in the expansion gap above the damper.
- 2b) Fix back the top retaining angles that was removed in (1c).
- 2c) Slide the hanger rod through hanger bracket and tighten 2 nuts and 1 washer down the top of the rod to about 75mm.

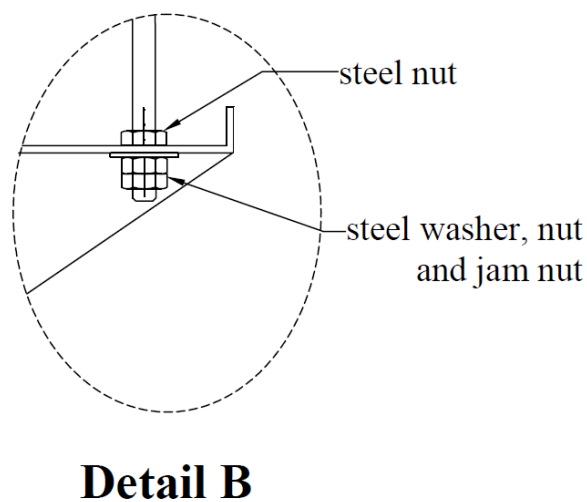
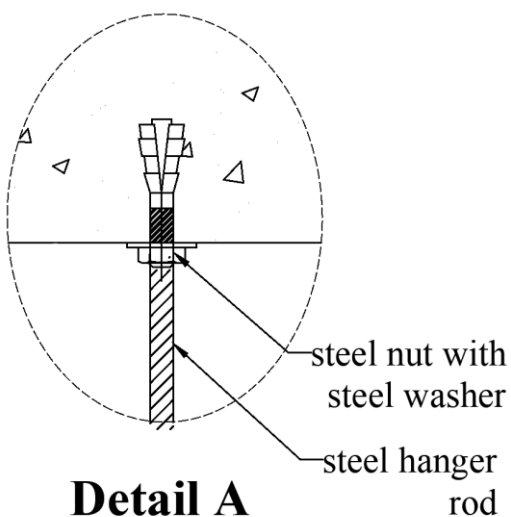
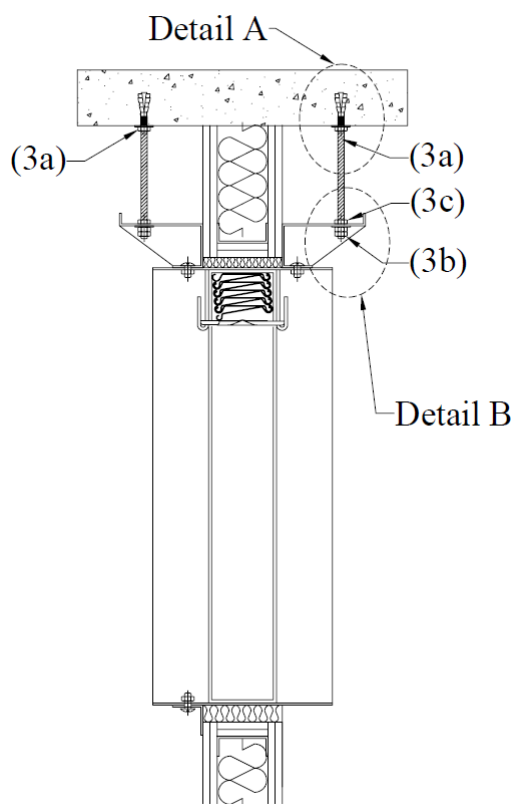


Step 3

- 3a) Turn each rod fully into the anchor bolt and tighten with the first nut (please refer to Appendix A.2 for HILTI's recommended torque setting) until the rod is secured (Detail A) according to anchor installation instruction.
- 3b) Suspend the damper with steel nuts and washers from bottom end of each rod and tighten against the hanger bracket until it fully compresses the insulation. Check that damper is level and tighten the lock nut provided.
- 3c) Tighten the nut above against hanger bracket as shown in Detail B.

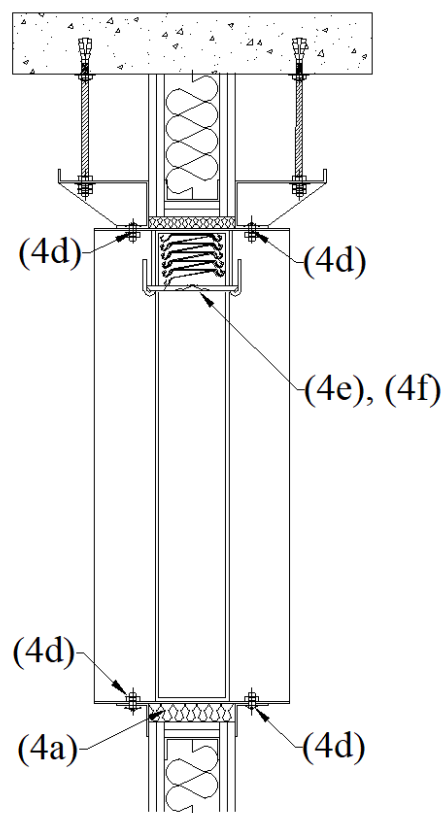
Note 2. For single module damper width up to 600mm, 2 hanger rods are required. (refer to Illustration 1, pg. 6)

Note 3. For single module damper width >600mm, 4 hanger rods are required. (refer to Illustration 2, pg.6)



Step 4

- 4a) Check that expansion gaps on both sides of damper are equal. Then fill the expansion gaps on both sides and beneath the damper with compressible and fire-resistant insulation.
 - 4b) For multiple modules, fasten adjacent modules together using the M6 bolts and nuts provided. (refer to illustration 3-7, pg. 7-9)
 - 4c) After all modules are properly secured, adjusted and levelled, check that:
 - i. 12 mm expansion gap is allowed on top,
 - ii. damper is centered horizontally and expansion gaps are filled with compressible and fire-resistance insulation on other three sides of the damper.
 - 4d) Fasten back all retaining angles with M6 bolts and nuts.
 - 4e) Remove the fusible link and release the damper blade and ensure that it falls freely and close fully (Illustration 8, pg.9).
- Note 4: For each module, remove the fusible link on one side from the hanger bracket by straightening the fusible link hanger bracket while supporting the blade stack with other hand. Let the fusible link fall out of the way and release the blades. For large damper you may need an assistance to support the blades. Ensure that the blade falls freely to the close position as shown in Illustration 8 (pg. 9).
- 4f) Reset the blade and the fusible link.



Step 5	
<p>5a) Connect the duct using S-clips all round as shown in Detail C.</p> <p>5b) Apply duct sealant to the S-clips as required.</p> <p>5c) Seal the joints with duct tape to prevent air leakage.</p> <p>Note 5. For ease of duct connection and future maintenance, the connected duct shall be short of about 600mm. Access panel may be installed on this duct.</p> <p>Note 6. Duct shall be connected such that the connecting duct is able to break free from the fire damper if the duct collapse during fire. Alternative clips may be used as shown in Appendix C.</p>	

After installation, check the followings to ensure proper installation:

- i. All retaining angles must be firmly butted against the wall and overlap the wall by a minimum 25 mm.
- ii. The damper is square, and all bolts and nuts are tightened to a maximum torque of 12 Nm.
- iii. Both sides of the damper have an equal thermal expansion gap, and a sufficient gap must be provided on the bottom (damper mounted on the drywall expand downwards and sideways).
- iv. Never insert a hard object in the expansion gap.
- v. Fusible link is hooked up properly. If the fusible link is lost, replace it with a new fusible link. Never substitute with wire.

Remember, lives depend on the proper functioning of fire damper.

3. Modular Arrangement

Illustration 1: Single Module up to 600mm width

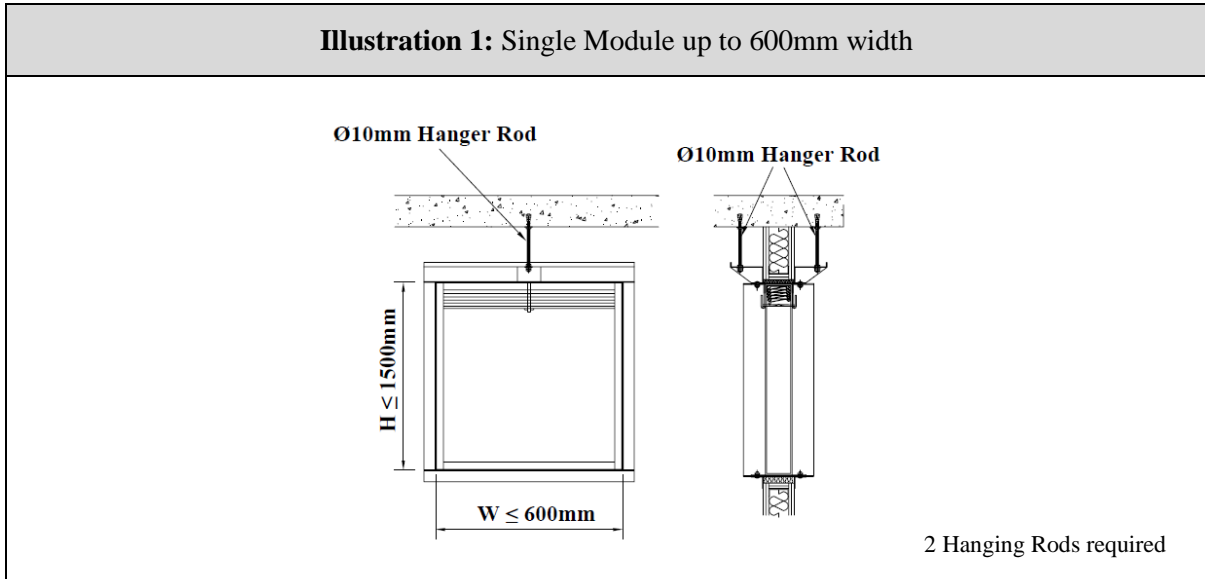
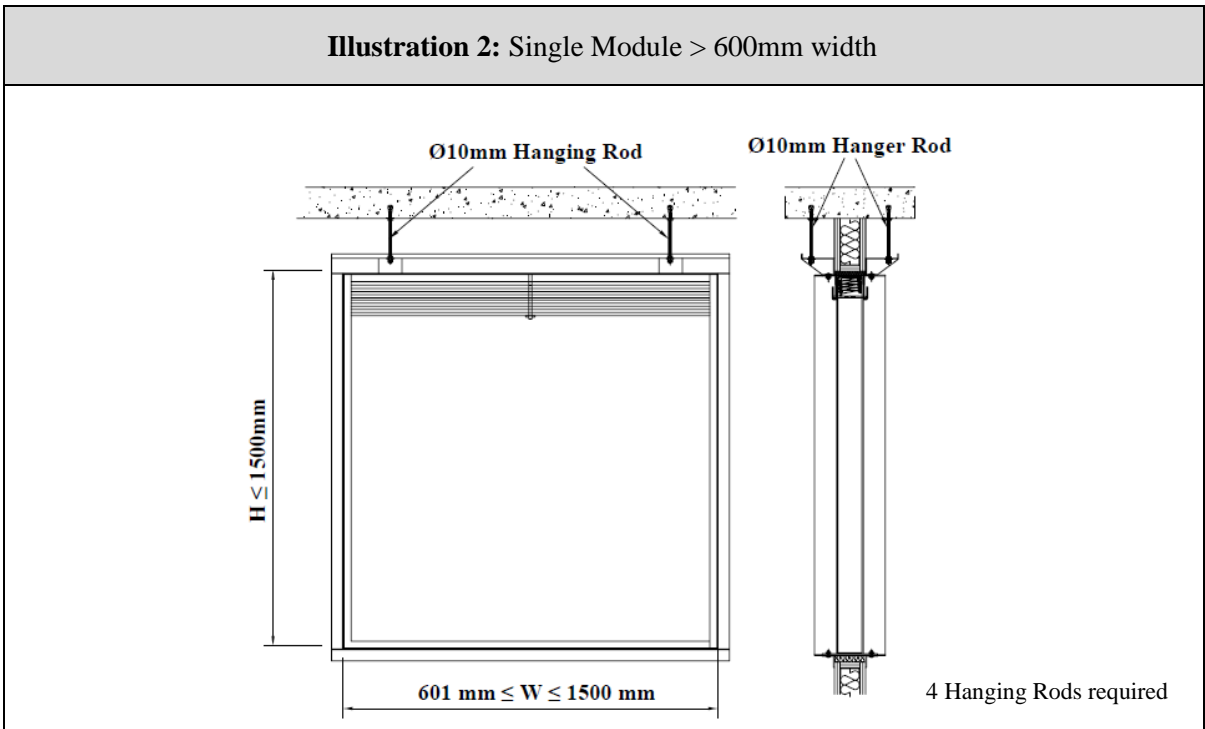


Illustration 2: Single Module > 600mm width



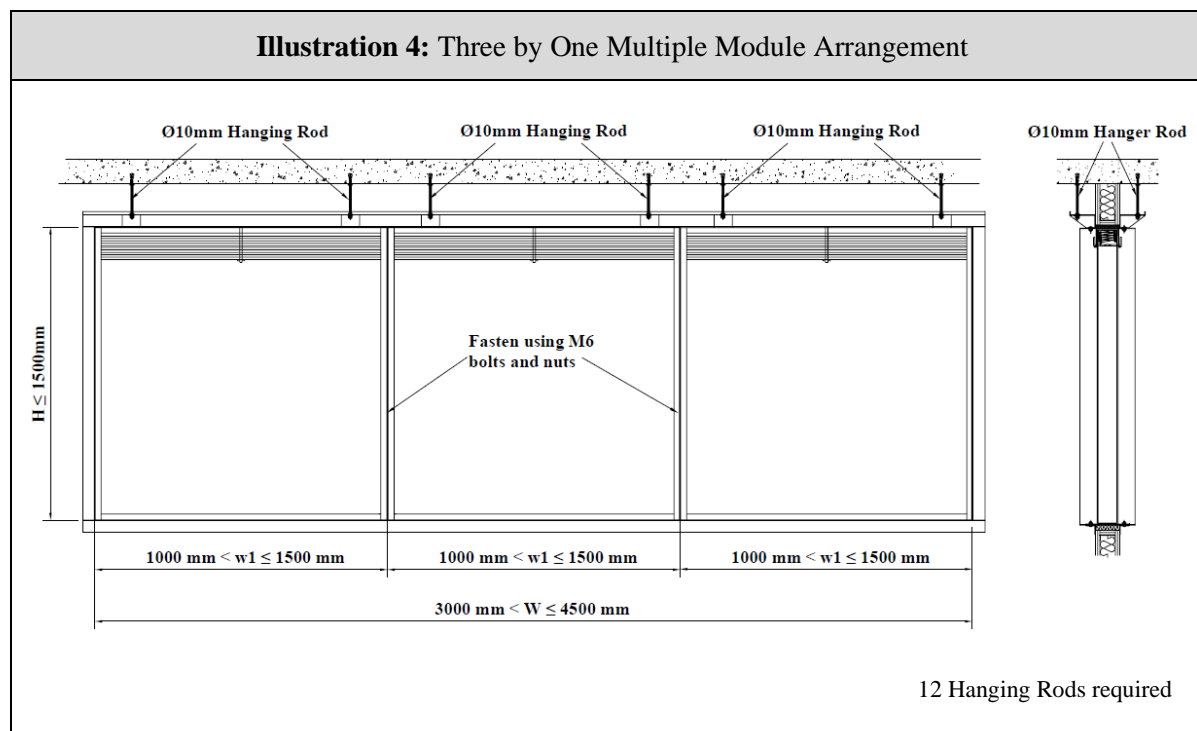
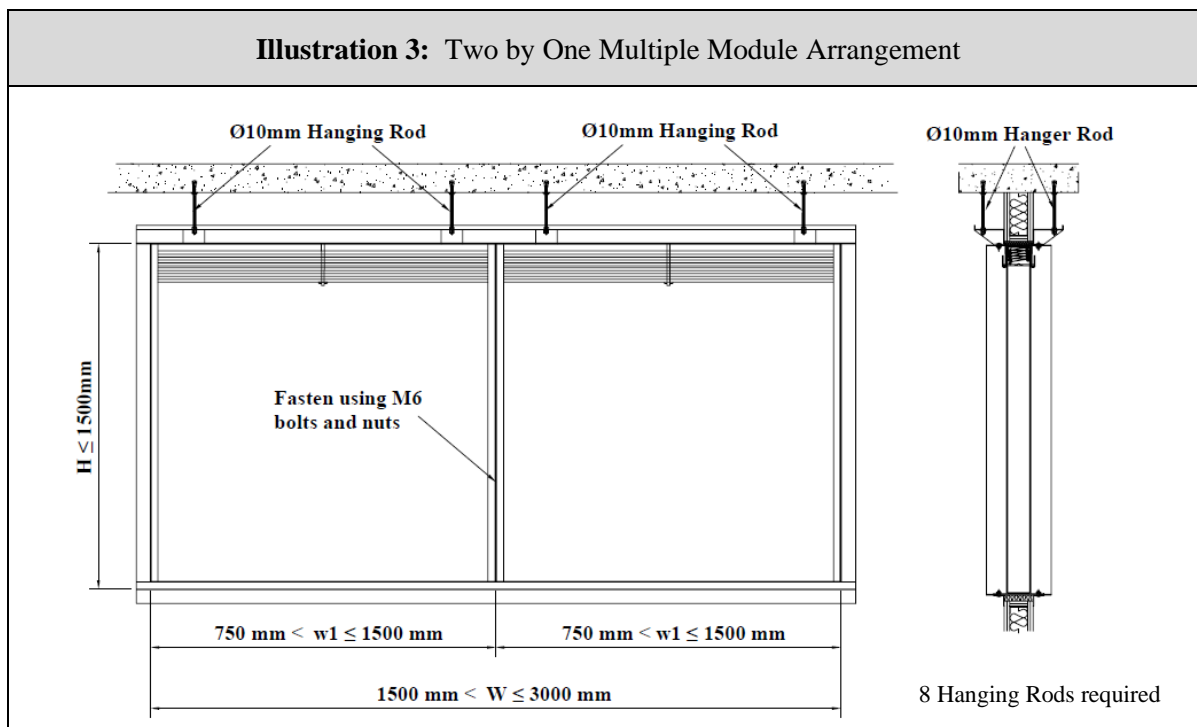
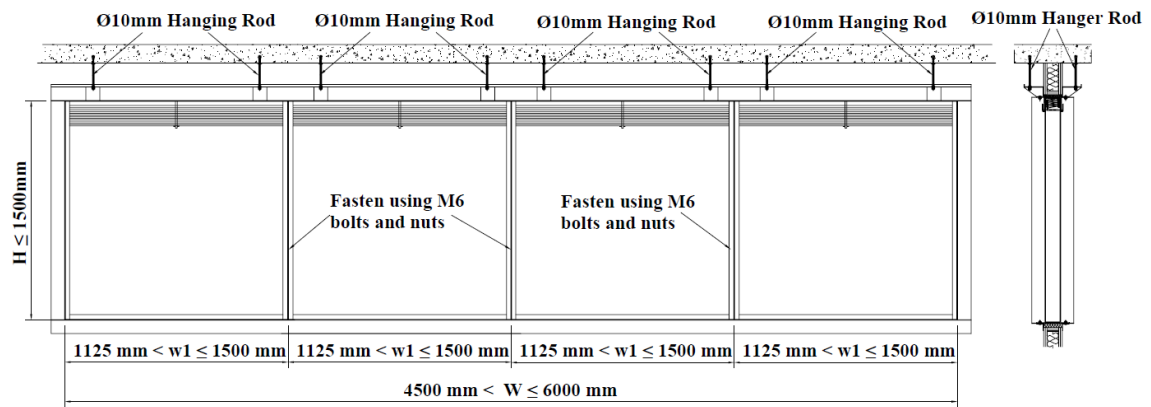
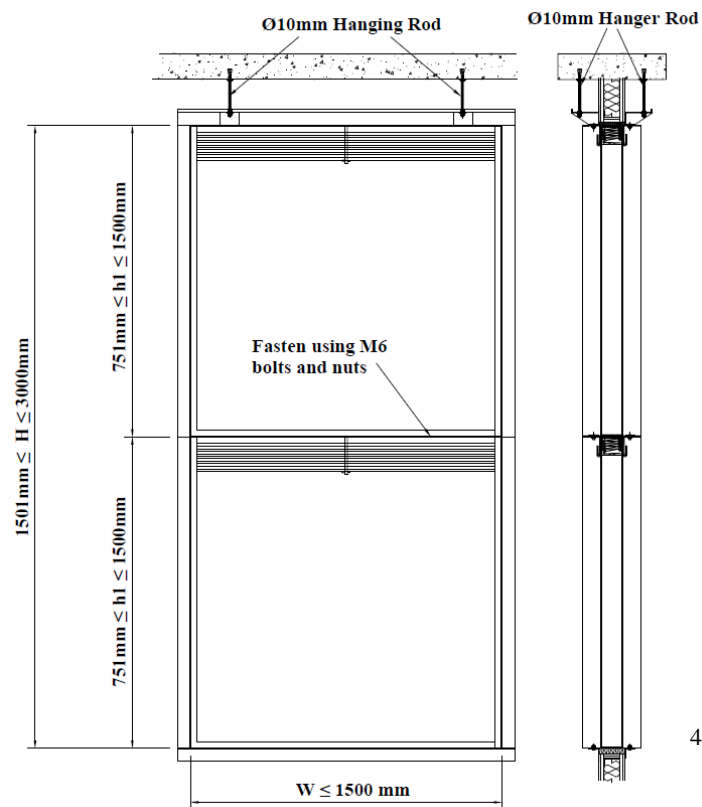


Illustration 5: Four by One Multiple Module Arrangement



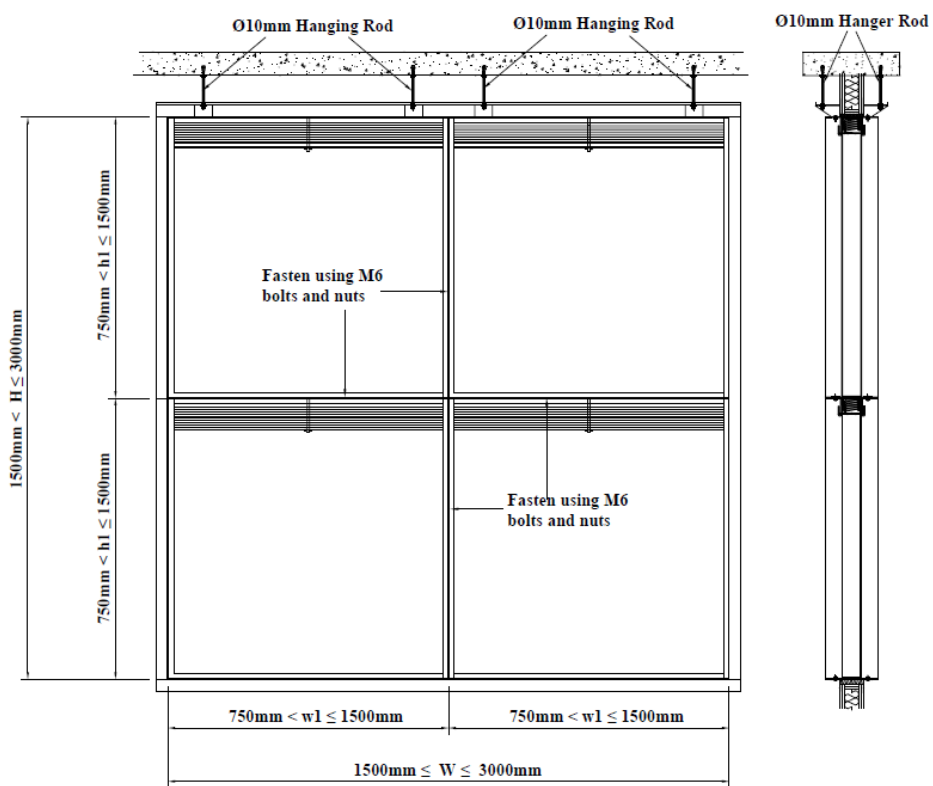
16 Hanging Rods required

Illustration 6: One by Two Multiple Module Arrangement



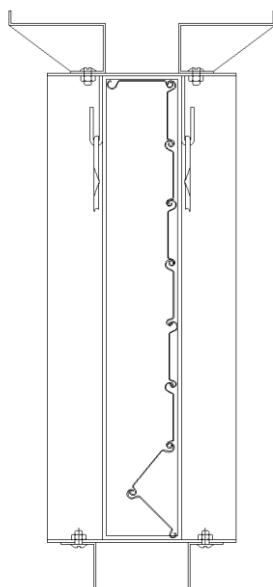
4 Hanging Rods required

Illustration 7: Two by Two Multiple Module Arrangement



8 Hanging Rods required

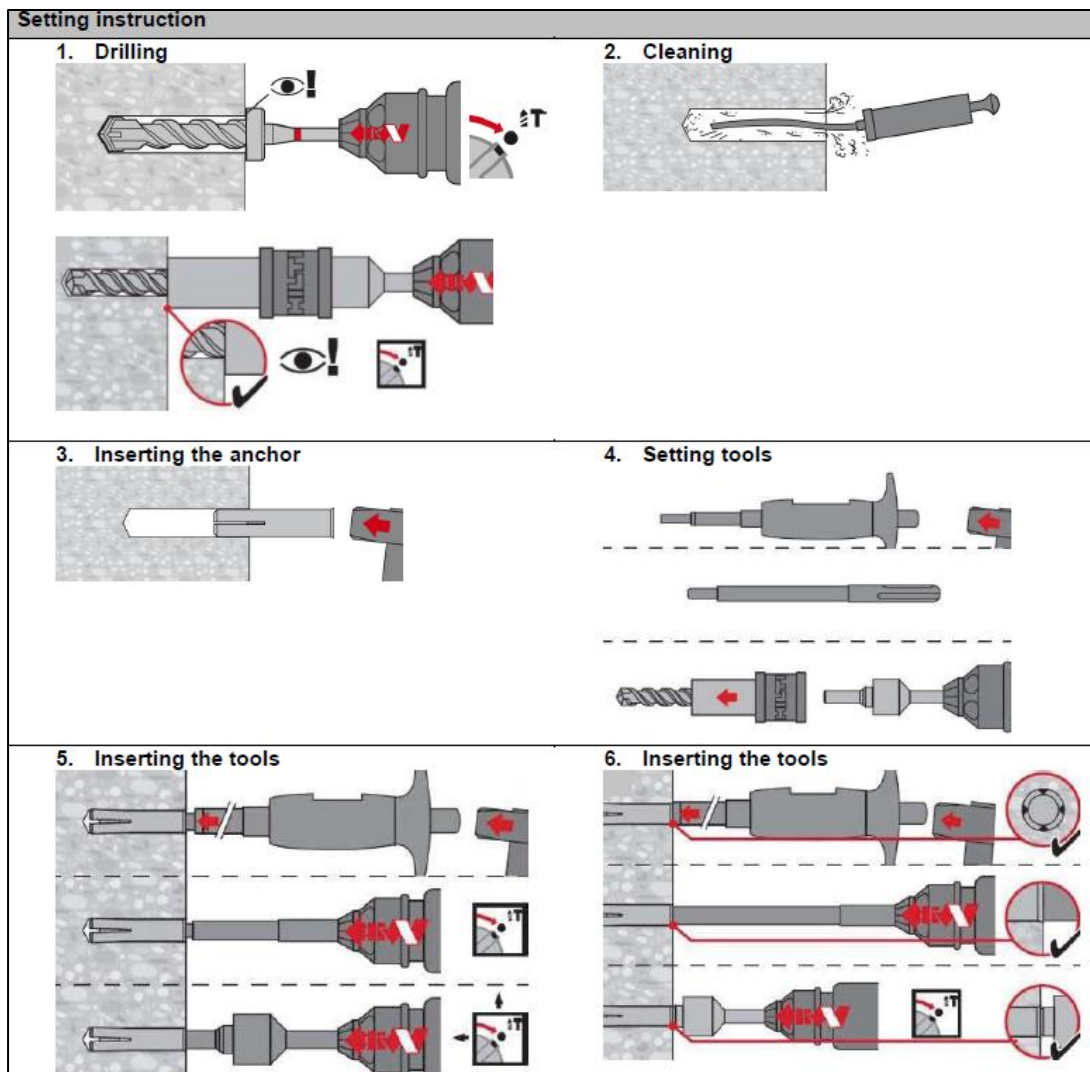
Illustration 8: Damper in fully closed position



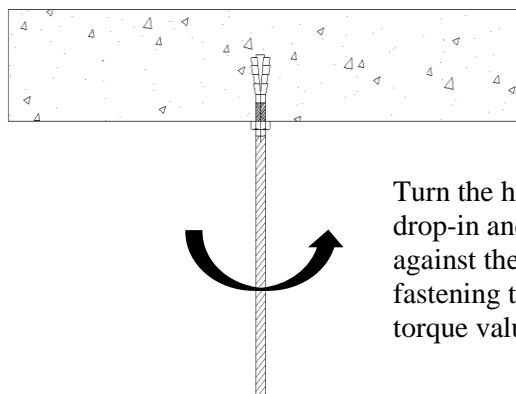
4. Troubleshooting

Problem	Action	Remedy
Blade cannot close freely	a) Check that blade is release squarely b) Check that the damper is square	i. Open fully and release squarely ii. Remove damper and adjust its square and re-install.
Blade cannot close fully	Check that there is no obstruction within the damper frame	Remove obstruction and try closing it again
Damper closed	Check if fusible link is broken	Replace fusible link

Appendix A.1: HILTI HKD flush anchor setting instruction



Extracted from HILTI HKD flush anchor Technical datasheet, update Sep-18



Turn the hanger rod and fasten to the drop-in anchor, then fasten the top nut against the slab. Ensure that the fastening torque does not exceed torque values in Appendix A.2

Appendix A.2: Recommended Setting Details (Based on HILTI's datasheet)

Setting details			Hilti technical data				ETA-02/0032, issued 2015-01-07							
			M6x25	M8x25	M10x25	M12x25	M6x30	M8x30	M8x40	M10x30 ^{a)}	M10x40	M12x50	M16x65	M20x80
Anchor size														
Effective embedment depth	h_{ef}	[mm]	25	25	25	25	30	30	40	30	40	50	65	80
Nominal diameter of drill bit	d_o	[mm]	8	10	12	15	8	10	10	12	12	15	20	25
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45	10,5	12,5	15,5	8,45	10,5	10,5	12,5	12,5	15,5	20,5	25,5
Depth of drill hole	$h_1 \geq$	[mm]	27	27	27	27	32	33	43	33	43	54	70	85
Screwing depth	$l_{s,min}$	[mm]	6	8	10	12	6	8	8	10	10	12	16	20
Thread engagement depth	$l_{s,max}$	[mm]	12	11,5	12	12	12,5	14,5	17,5	12,7	18	23,5	30,5	42
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14	7	9	9	12	12	14	18	22
Max. torque moment	T_{ins}	[Nm]	4	8	15	35	4	8	8	15	15	35	60	100

a) With anchor size M10x30 only threaded rod is to be used.

Extracted from HILTI HKD flush anchor Technical datasheet, update Sep-18

Appendix B: Thermal Expansion Gap

Table 1: Recommended Thermal expansion gap for Galvanized Steel Fire Damper

Damper Dimension W or H (mm)	Recommended gap for Galvanized Steel fire dampers (mm)		
	Side	Top	Bottom
150-850	10	10	10
851-1500	15	10	20
1501-2000	20	15	25
2001-3000	25	15	35

1. Table 1 is applicable to single module, 1 x 2 and 2 x 2 modules galvanized steel damper only. Damper dimension refers to width or height of a damper.
2. The recommendation table above is suitable for hanger rod length is less than 300mm.
3. For hanger rod length longer than 300mm, please allow additional 1% of the hanger rod length to the bottom expansion gap.

Table 2: Recommended Thermal expansion gap for Stainless Steel Fire Damper

Damper Dimension W or H (mm)	Recommended gap for Stainless Steel fire dampers (mm)		
	Side	Top	Bottom
150-600	10	10	10
601-1250	15	10	20
1251-1500	20	10	30
1501-2000	25	15	35
2001-3000	30	15	45

1. Table 2 is applicable to single module, 1 x 2 and 2 x 2 modules stainless steel damper only. Damper dimension refers to width or height of a damper.
2. The recommendation table above is suitable for hanger rod length is less than 300mm.
3. For hanger rod length longer than 300mm, please allow additional 1.5% of the hanger rod length to the bottom expansion gap if the hanger rod is in stainless steel material.

Table 3: Recommended Thermal expansion gap for Galvanized Steel Fire Damper
(3x1 and 4x1 arrangement)

Damper width W (mm)	Recommended gap for Galvanized Steel fire dampers (mm)		
	Side	Top	Bottom
3001-3500	25	10	20
3501-4000	30	10	20
4001-5000	35	10	20
5001-6000	40	10	20

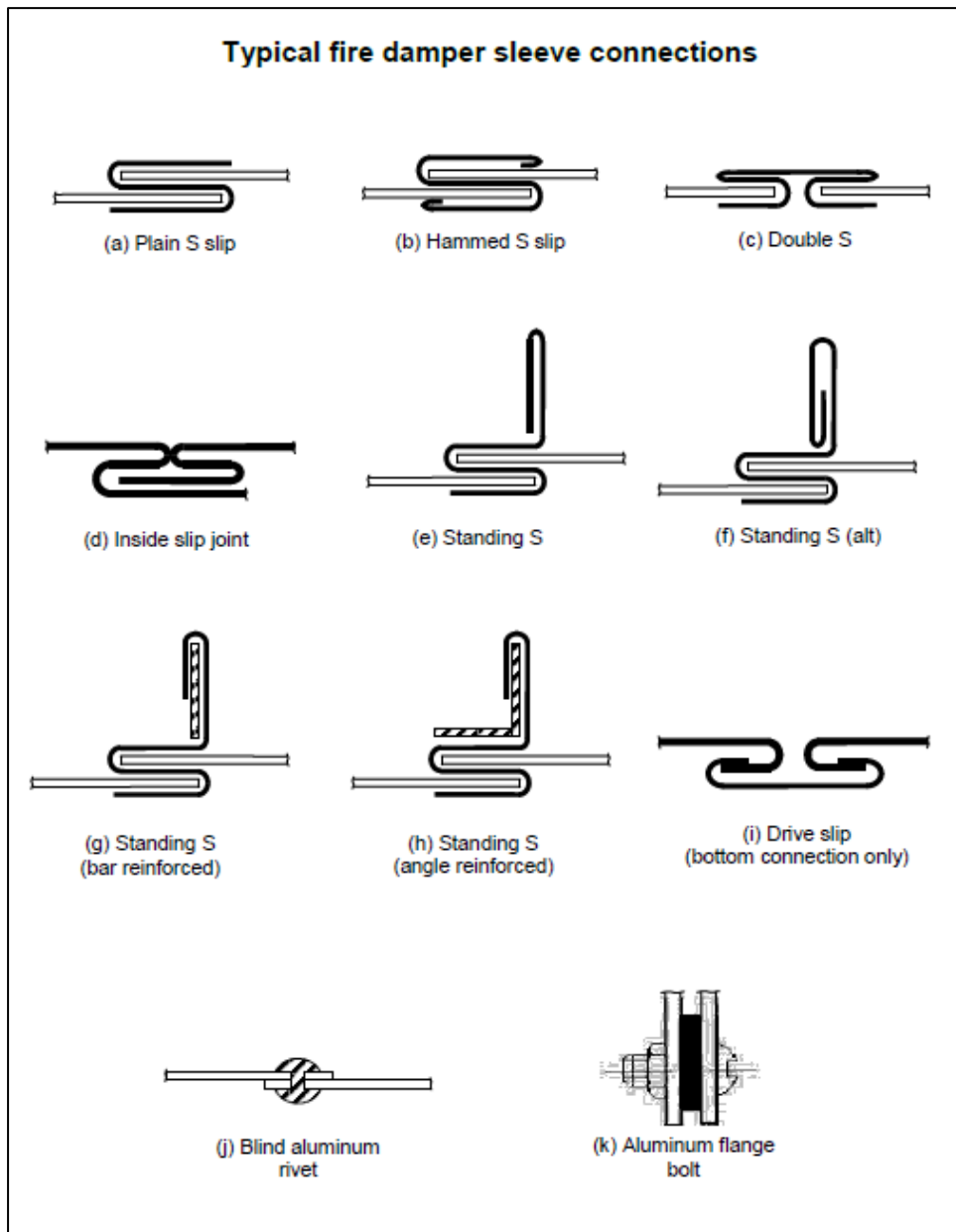
1. Table 3 is applicable for 3x1 and 4x1 modules galvanized steel damper only.
2. The recommendation table above is suitable for hanger rod length is less than 300mm.
3. For hanger rod length longer than 300mm, please allow additional 1% of the hanger rod length to the bottom expansion gap.

Table 4: Recommended Thermal expansion gap for Stainless Steel Fire Damper
(3x1 and 4x1 arrangement)

Damper width W (mm)	Recommended gap for Stainless Steel fire dampers (mm)		
	Side	Top	Bottom
3001-3500	35	10	30
3501-4000	40	10	30
4001-5000	50	10	30
5001-6000	60	10	30

1. Table 4 is applicable for 3x1 and 4x1 modules stainless steel damper only.
2. The recommendation table above is suitable for hanger rod length is less than 300mm.
3. For hanger rod length longer than 300mm, please allow additional 1.5% of the hanger rod length to the bottom expansion gap if the hanger rod is in stainless steel material.

Appendix C: Typical Fire Damper connection



Remark:

1] Extracted from SS333 Singapore Standard for Fire Dampers

2] Connection (d) and connection (i) are not suitable for OLS Fire Damper.