

# INSTALLATION, OPERATION & MAINTENANCE

M  
A  
N  
U  
A  
L

## Flowline™

### Architectural Linear Diffusers



FLH Series: Horizontal High Throw  
FLV Series: Vertical Jet Throw  
[www.nailor.com](http://www.nailor.com)

 **Nailor**<sup>®</sup>  
Industries Inc.

## Installation Practices During Hard Ceiling Construction

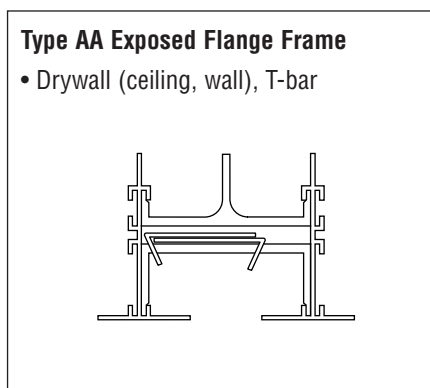
Following are the recommended instructions for Flowline™ Diffuser installation. It is the responsibility of the installing contractor to install in accordance with local codes and regulations.

### Summary of Steps to Install Flowline™ in Hard Ceiling Applications

- Step 1. Determine Diffuser Frame/Border Style
- Step 2. Construct Ceiling Framework
- Step 3. Install Ceiling/Wall Clips on Diffuser
- Step 4. Fasten Diffuser to Ceiling Framework
- Step 5. Insert Drywall According to Frame/Border Style
- Step 6. Attach Plenum to Diffuser (if required)
- Step 7. Installation without plenum
- Step 8. Surface Finishing Procedure (where applicable)

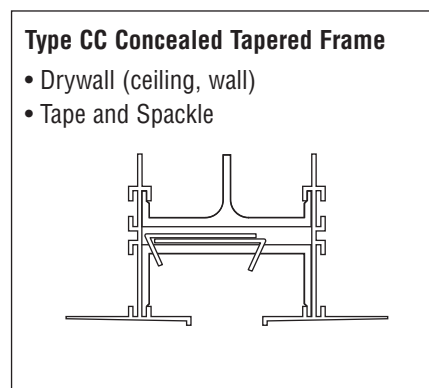
### 1. Identify the Flowline Diffuser Frame Style for your installation.

There are six frame/border styles described below and most can combine with each other to accommodate any application.



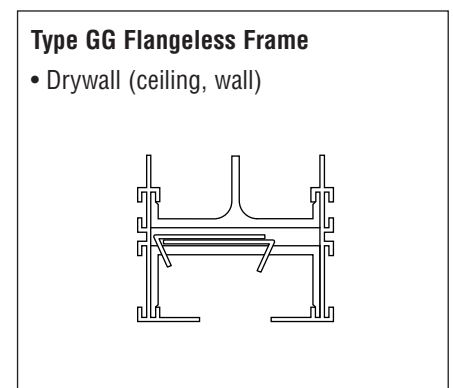
**Figure 1. Frame style A.**

Frame border style A - used for hard ceiling applications and T-bar systems. Available with concealed mounting brackets (Type AAC)



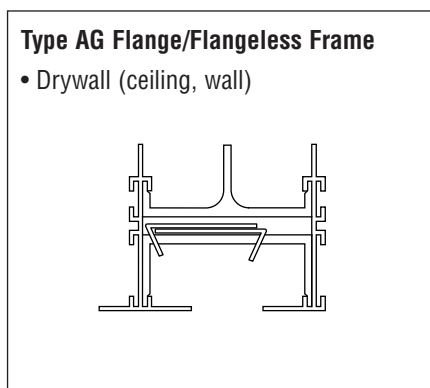
**Figure 2. Frame style C.**

Frame border style C - used for hard ceiling applications when the flanges are to be concealed. Available with concealed mounting brackets (Type CCC)



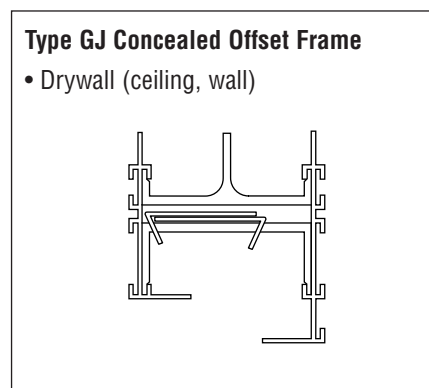
**Figure 3. Frame style G.**

Frame border style G - used for flush mounting in hard ceiling and regressed T-Bar suspension ceiling applications.



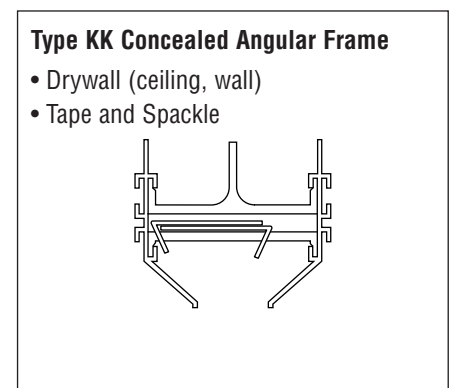
**Figure 4. Frame Style AG.**

Frame border styles A and G - combine to fit hard ceiling and T-Bar applications where a perimeter application is desired.



**Figure 5. Frame Style GJ.**

Frame border styles G and J - combine to fit hard ceiling applications in perimeter applications or where the ceiling meets a wall or ceiling height varies.



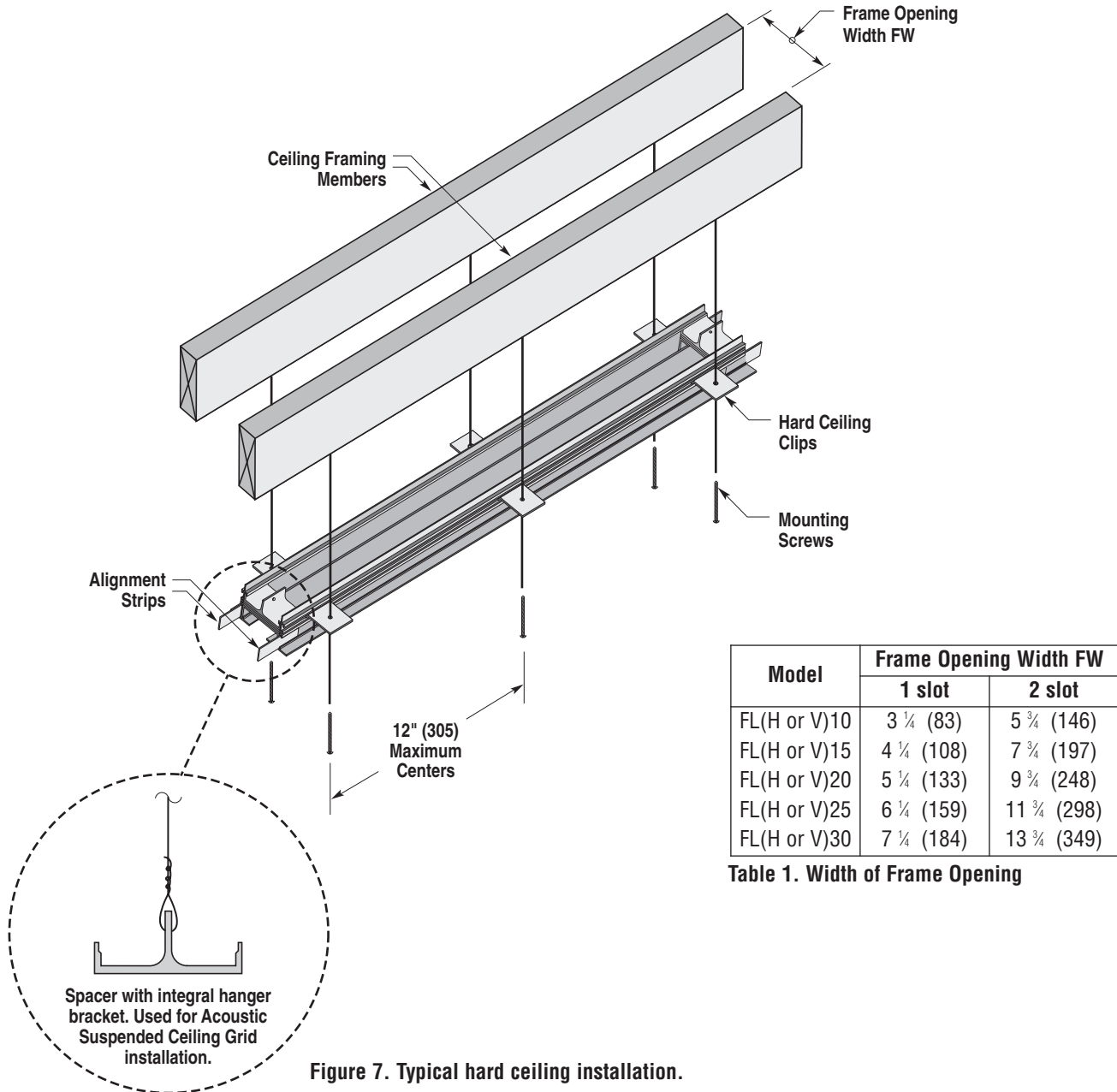
**Figure 6. Frame Style K.**

Frame border style K - the slot is the only visible part of the diffuser in hard ceiling application and drywall is cut at 45 degree angle to be flush with frame.

## 2. Construct Ceiling Framework.

Figure 7 below depicts the recommended installation process to integrate the Flowline™ system into the hard ceiling application which is best achieved if done concurrently with hard ceiling installation.

- Before installing drywall, frame the ceiling in such a way that the selected diffuser frame style fits with enough room to attach an associated plenum onto its top.
- A continuous length of framework is recommended in order to fasten the hard ceiling clips at required spacings.
- The table included in Figure 7 shows the required frame opening width (FW) based on diffuser model and number of slots.
- Make sure framework material is suitable for bearing load applied by diffuser once fastened.
- If there is going to be inadequate spacing to install a plenum onto the diffuser after the diffuser is installed into the hard ceiling, support the plenum above the ceiling framework using integral hanger brackets with wires prior to diffuser installation.



### 3. Install Ceiling/Wall Clips on Diffuser.

- A. For Exposed Flange Frame/Border Style A and Flangeless Flush Frame/Border Styles G and J (See Figure 8).
  - a. Size diffuser if necessary to fit opening (see field cutting procedure on page 11).
  - b. Spacers are factory installed with integral hanger brackets at maximum 24" (610) centers.
  - c. Insert appropriate hard ceiling (HC) clips into the diffuser's lower outside rail niches at maximum 12" (305) centers.
  - d. Insert blank-offs as required
  - e. Install end caps where required.
  - f. Suspend diffuser section at approximate final position and height by attaching to the plenum, if pre-installed, and/or using hanger wire attached to spacers with integral hanger brackets. This is to be repeated for each individual section.
  - g. Use alignment strips to join additional diffuser sections together inline and check ends for flushness.  
**Note:** Leave a 1/8" (3) gap to allow for thermal expansion between sections longer than 12 feet (3658).
  - h. Go to Step 4 on page 5.

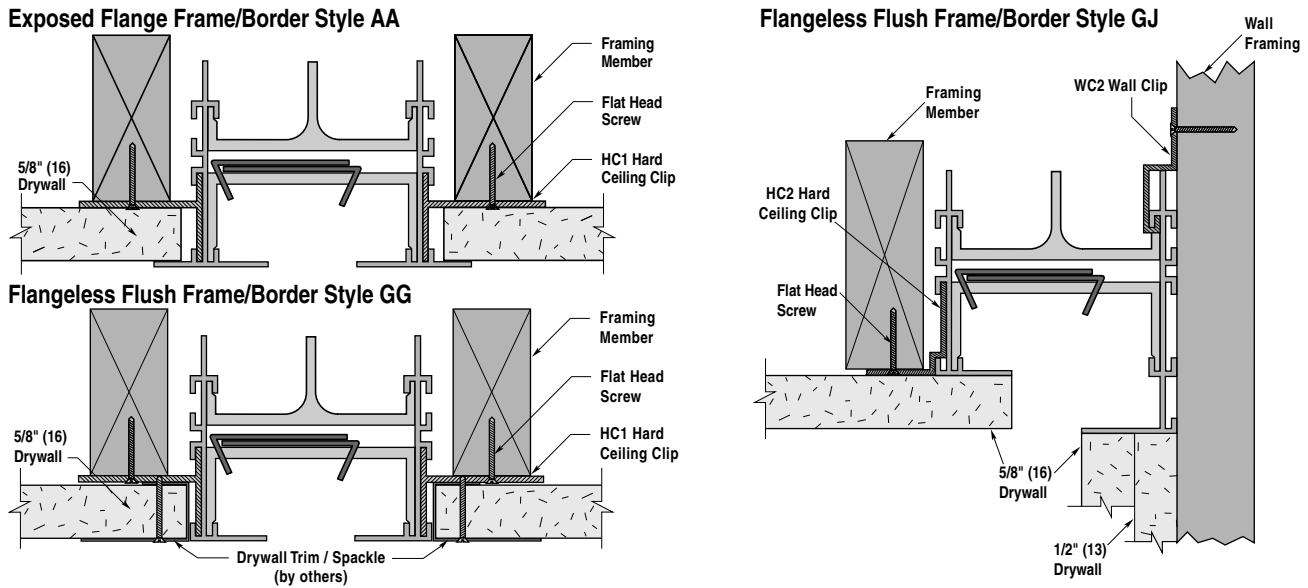


Figure 8. Depictions of frames A, G and J hard ceiling installations.

- B. For Concealed Tapered Frame/Border Styles C and K (see Figure 9).
  - a. Size diffuser as needed to fit opening (see field cutting procedure on page 11).
  - b. Spacers are factory installed with integral hanger brackets at maximum 24" (610) centers.
  - c. Insert appropriate hard ceiling (HC) clips into the diffuser's lower outside rail niches at maximum 12" (305) centers.
  - d. Insert blank-offs as required.
  - e. Install end caps where required.
  - f. Suspend diffuser section at approximate final position and height by attaching to the plenum, if pre-installed, and/or using hanger wire attached to spacers with integral hanger brackets. This is to be repeated for each individual section.
  - g. Use alignment strips to join additional diffuser sections together inline and check ends for flushness.  
**Note:** Leave a 1/8" (3) gap to allow for thermal expansion between sections longer than 12 feet (3658).
  - h. Go to Step 4A on page 5.

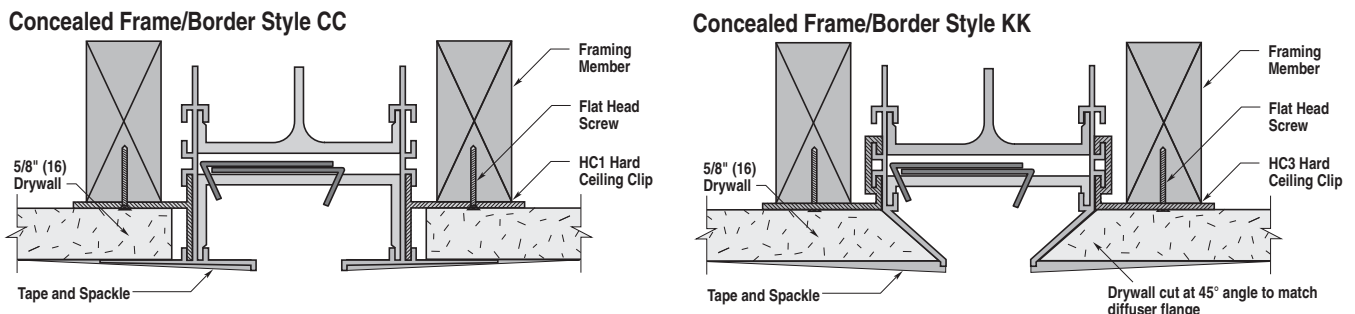


Figure 9. Depictions of frame C and K hard ceiling installations.

#### 4. Fasten Diffuser to Ceiling Framework.

- A. For All Frame/Border Styles except J
  - a. Fasten diffuser sections to framework by drilling 1/2" – 3/4" (13 – 19) flat head screws through **HC** Hard Ceiling Clips into framework at maximum 12" (305) centers (See Figure 8).
  - b. Go to Step 5.
- B. For Frame/Border Style J
  - a. Fasten diffuser sections to wall framing by drilling 1/2" – 3/4" (13 – 19) flat head screws through **WC** Wall Clips into framework at maximum 12" (305) centers.
  - b. Go to Step 5.

#### 5. Insert Drywall According to Frame/Border Style.

**Note:** If diffuser inlet is inaccessible after drywall installation, perform step 6 first, then step 5.

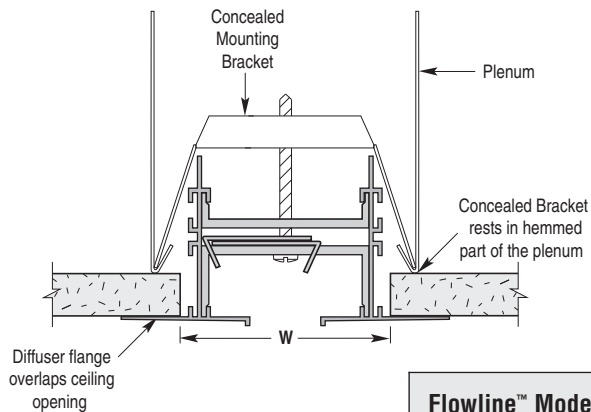
- A. For Frame/Border Style A (See Figure 8)
  - a. Insert correctly sized drywall sheets between Flowline™ flanged border and framework, assuring a snug fit.
- B. For Frame/Border style G and J (See Figure 8)
  - a. Assure drywall is flush with Flowline™ border.
- C. For Frame/Border Style C (See Figure 9)
  - a. Insert correctly sized drywall sheets between Flowline™ border and framework, assuring a snug fit.
  - b. Secure with min. 1 1/4" (32) drywall screws through the drywall and into the ceiling framework just outside tapered border flange at maximum 12" (305) centers.
- D. For Frame/Border Style K (See Figure 9)
  - a. Cut end of drywall at 45 degree angle to fit flush with diffuser border.
  - b. Secure with min. 1 1/4" (32) drywall screws through the drywall and into the ceiling framework outside beveled border at maximum 12" (305) centers.

#### 6. Attach Plenum to Diffuser.

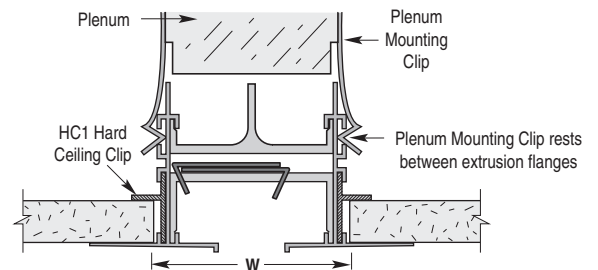
**Note:** Install non-Nailor® engineered plenums using current industry standards.

- A. Nailor® engineered plenums (See Figure 10). Two types:
  - a. Straight leg version with spring clips for direct attachment to diffuser neck. This style is for hard ceiling installations using diffuser ceiling clips prior to drywall installation.
  - b. Hemmed leg version for diffusers with concealed mounting brackets for diffuser installation after drywall installation.

##### Hemmed Leg Plenum



##### Straight Leg Plenum



Flowline™ Model	Ceiling Opening Width W	
	1 Slot	2 Slot
FL(H or V)10	3	5 1/2"
FL(H or V)15	4	7 1/2"
FL(H or V)20	5	9 1/2"
FL(H or V)25	6	11 1/2"
FL(H or V)30	7	13 1/2"

**Table 2. Width of Ceiling Opening**

**Figure 10. Installations with Nailor® Engineered Plenums**

- B. Attach hanger wire to plenum seismic tabs and secure to building structure per local code near location of final diffuser installation.
- a. Straight leg plenum:
    - i. Lift plenum into place and attach to the diffuser using spring clips provided.
    - ii. Attach ductwork to plenum inlet collar in accordance with recommended practices.  
(**Note:** If plenum inlet is readily accessible after diffuser installation, this step can be performed later.)
  - b. Hemmed leg plenum:
    - i. Lift and push diffuser section into place until mounting brackets spring into hemmed edge and secure with concealed mounting brackets provided using a flat head screw driver, ensuring diffuser is in correct location.
    - ii. Attach ductwork to plenum inlet collar in accordance with recommended practices.  
(**Note:** If plenum inlet is readily accessible after diffuser installation, this step can be performed later.)
    - iii. Secure diffuser border to drywall with min. 1 1/4" (32) drywall screws on 12" (305) max. centers. (Frame/border style CCC only).
    - iv. Check and re-tighten diffuser to concealed mounting brackets if necessary.

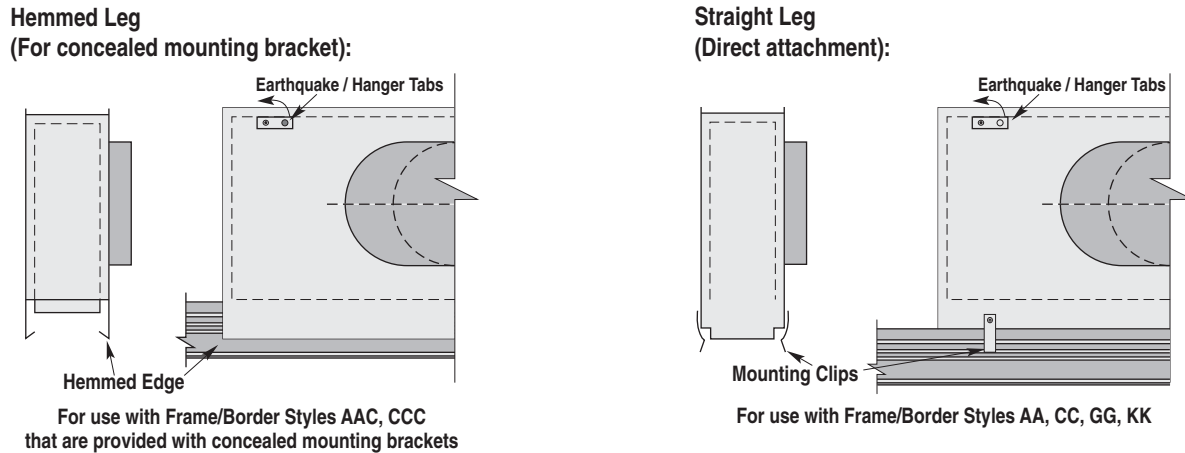


Figure 11. Nailor plenum designs.

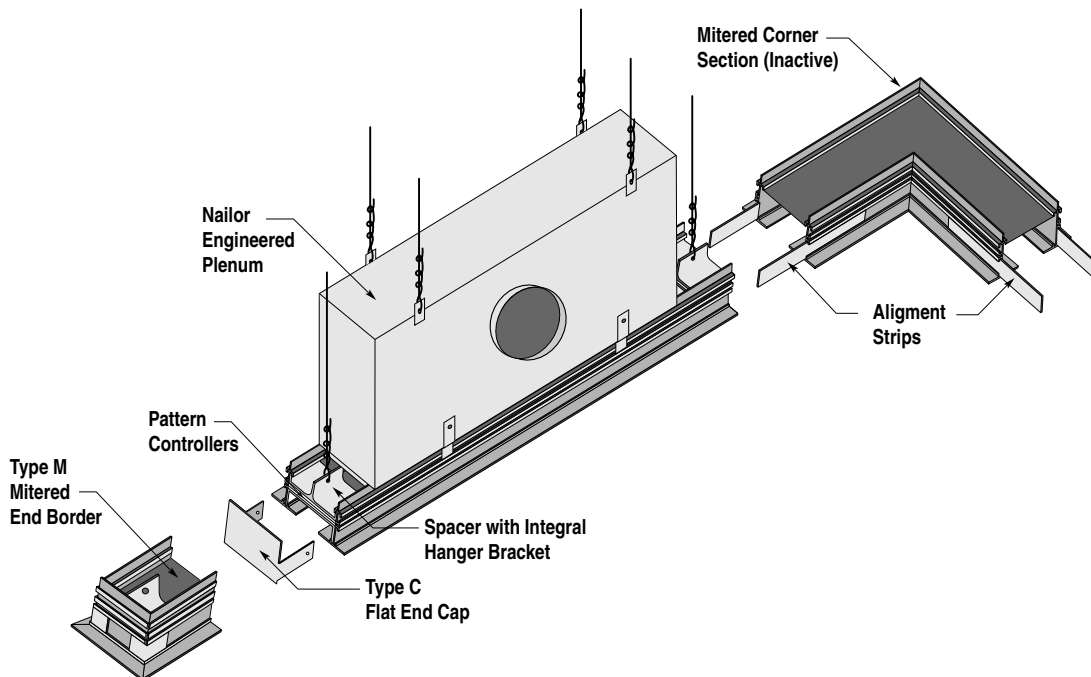


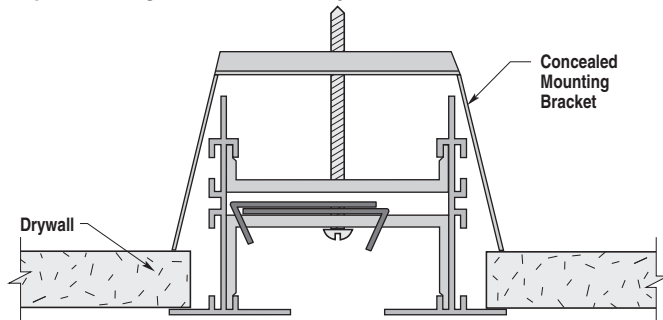
Figure 12. Typical diffuser assembly with mitered fitting installation.

## 7. Installation of Flowline™ without a Plenum or HC Hard Ceiling Clips (See Figure 13)

On continuous diffuser run installations where the diffuser section does not match up with a plenum, the drywall can be used to support the diffuser.

- Lift and push diffuser section with concealed mounting brackets attached through drywall opening. Ensure bracket legs straddle drywall opening.
- Fasten the diffuser to the concealed mounting bracket with a flathead screw driver until the diffuser border is flush with the drywall.
- Secure diffuser border to drywall with min. 1 1/4" (32) drywall screws on 12" (305) max. centers (Frame/Border style CCC only).
- Check and re-tighten diffuser to concealed mounting brackets if necessary.

Exposed Flange Frame/Border Style AAC



Concealed Frame/Border Style CCC

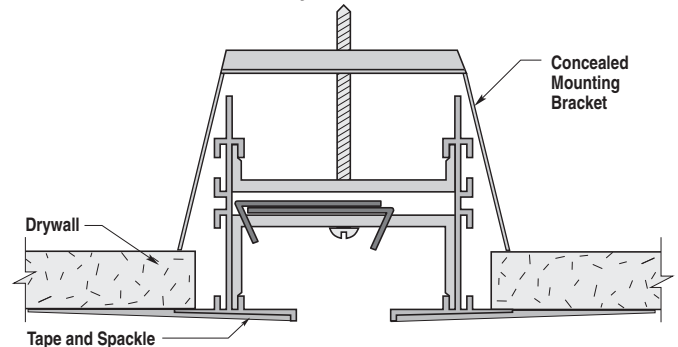


Figure 13. Typical concealed flange frame installation without plenum.

## 8. Surface Finishing Procedure (Frame/Border Styles C and K)

(If Applicable) (See Figure 14)

- Clean and degrease tapered border with cleaner/degreaser (e.g. Pure Strength by Rust-Oleum). Continue to step B.
- Apply a bonding agent (e.g. Plaster Weld by Larsen Products Corp.) to tapered border and allow to dry minimum 1 hour or to manufacturer's instructions.
- Apply a first coat of joint compound (e.g. Durabond by US Gypsum) onto diffuser flange and extend 3" (76) from edge of flange onto drywall. **Tip:** For frame border style K, the majority of the flange is covered by the drywall, so extend compound 4" (102) from edge of exposed flange.
- Embed 4" (102) wide mesh tape into joint compound and add another layer of joint compound atop the mesh tape and smooth. Let dry completely before moving to the next step. **Tip:** Be sure to eliminate all air bubbles from mesh tape and overlap onto drywall to assure best results, but do not extend tape into slot opening of the diffuser.
- Apply minimum two coats of standard finish compound (spackle), letting each dry completely and smooth each coat with fine grit sand paper until flush with drywall. **Tip:** Use wetted sponge for very rough areas of spackle and finish with fine grit sand paper.
- Apply primer to flush finishing compound and paint as scheduled.
- DO NOT** run HVAC system before allotting enough time for compounds to cure. Doing so could cause compound to be more prone to cracking.

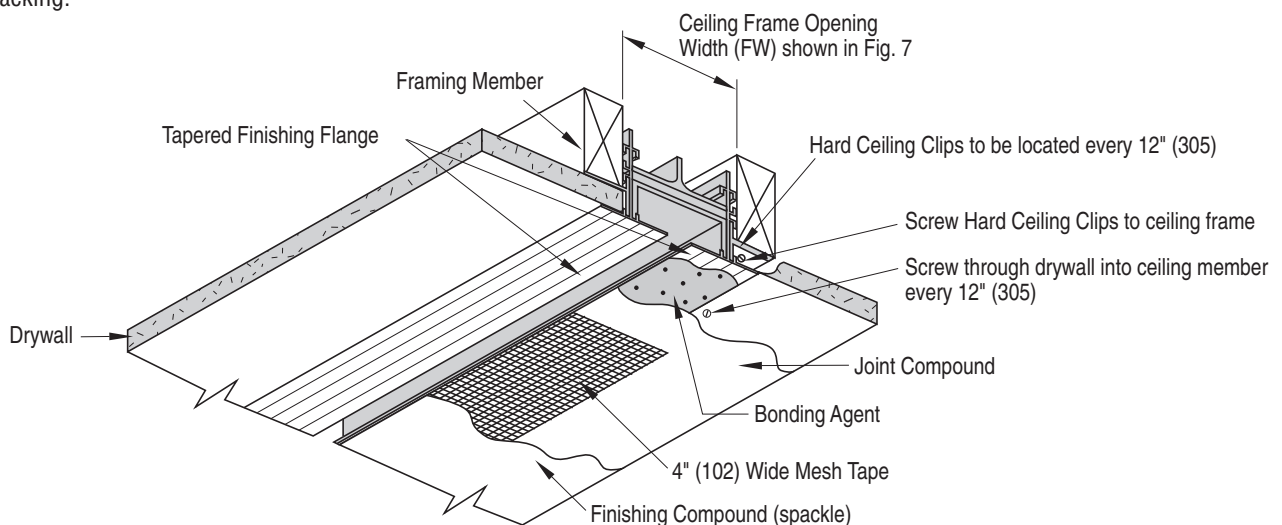


Figure 14. Summary of Frame/Border Style CC Installation.



---

## Installation Practices During Suspension Ceiling Construction

1. Install suspension ceiling T-Bar system prior to installing Flowline™ diffuser assuring proper dimensional layouts for simple diffuser installation.
2. If plenum is required and installation would be difficult after diffuser installation, hang plenum in approximate location using hanger wire on plenum seismic tabs. Otherwise, install plenum with hanger wire after step 6.
3. Diffusers (without concealed mounting brackets) are supplied with integral hanger brackets on 24" (610) centers. Attach hanger wire to secure to the building structure in accordance with local code requirements.
4. Lift each section into position individually and fasten to hanger wire to correct finishing height.  
(**Note:** If multiple sections are required, use alignment strips to join each section for a flush appearance.)
5. Attach ceiling grid sections to the diffuser using TC1 T-Bar Clip which can be field formed to proper angle.
6. Add end caps to diffuser if required.
7. Install plenums where required and secure to the building structure using plenum seismic tabs in accordance with local code requirements.
8. Attach ductwork to plenum inlet collar in accordance with recommended practices.
9. Connect all remaining T-Bar appropriately to diffuser and install acoustic ceiling tiles (trim to size as necessary).

### Typical Installation, Continuous Run Frame/Border Styles AA, GG and AG

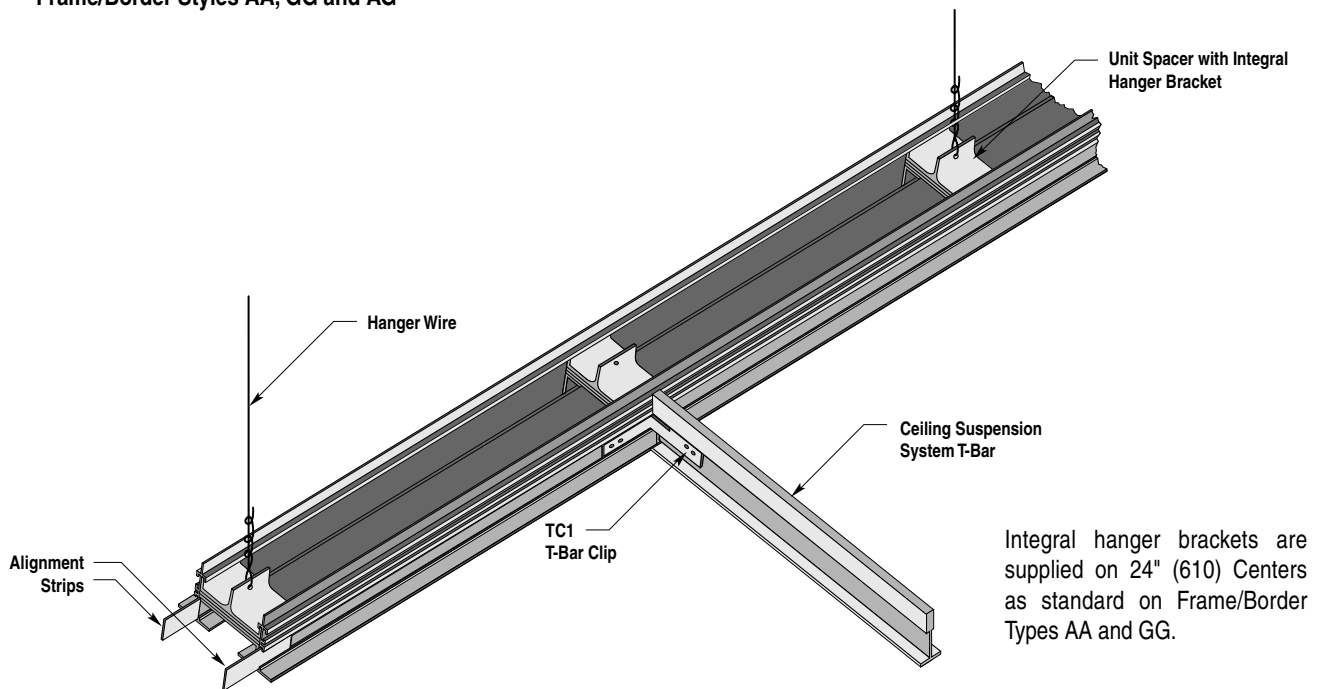
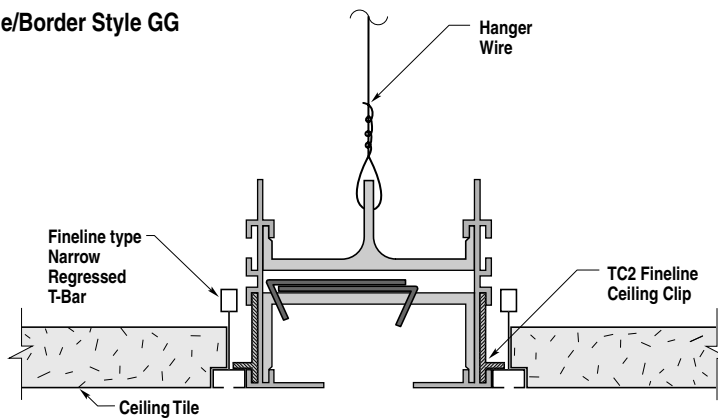


Figure 15. Typical suspension ceiling installation.



## Flangeless Frame/Border Style GG



USG 'Donn Fineline®', Chicago Metallic® 'Ultraline' and Armstrong Silhouette are three common examples of compatibility.

Figure 16. Example of Fineline suspension ceiling installation with type G frame.

## Installation Practices For FT Series Lay-in Diffusers (Modular Linear Diffuser/Plenum Assemblies)

1. Install suspension ceiling T-Bar system prior to installing Flowline™ diffuser assuring proper dimensional layouts for simple diffuser installation.
2. Diffusers are supplied with integral hanger brackets on 24" (610) centers.
3. Lift each modular diffuser/plenum assembly into position individually and rest on top of the T-Bar system.
4. Fasten hanger wire to correct finishing height on plenum seismic tabs and diffuser hanger brackets in accordance with local code requirements.
5. Attach ductwork to plenum inlet collar in accordance with recommended practices.
6. Install acoustic tiles (trim to size as necessary).

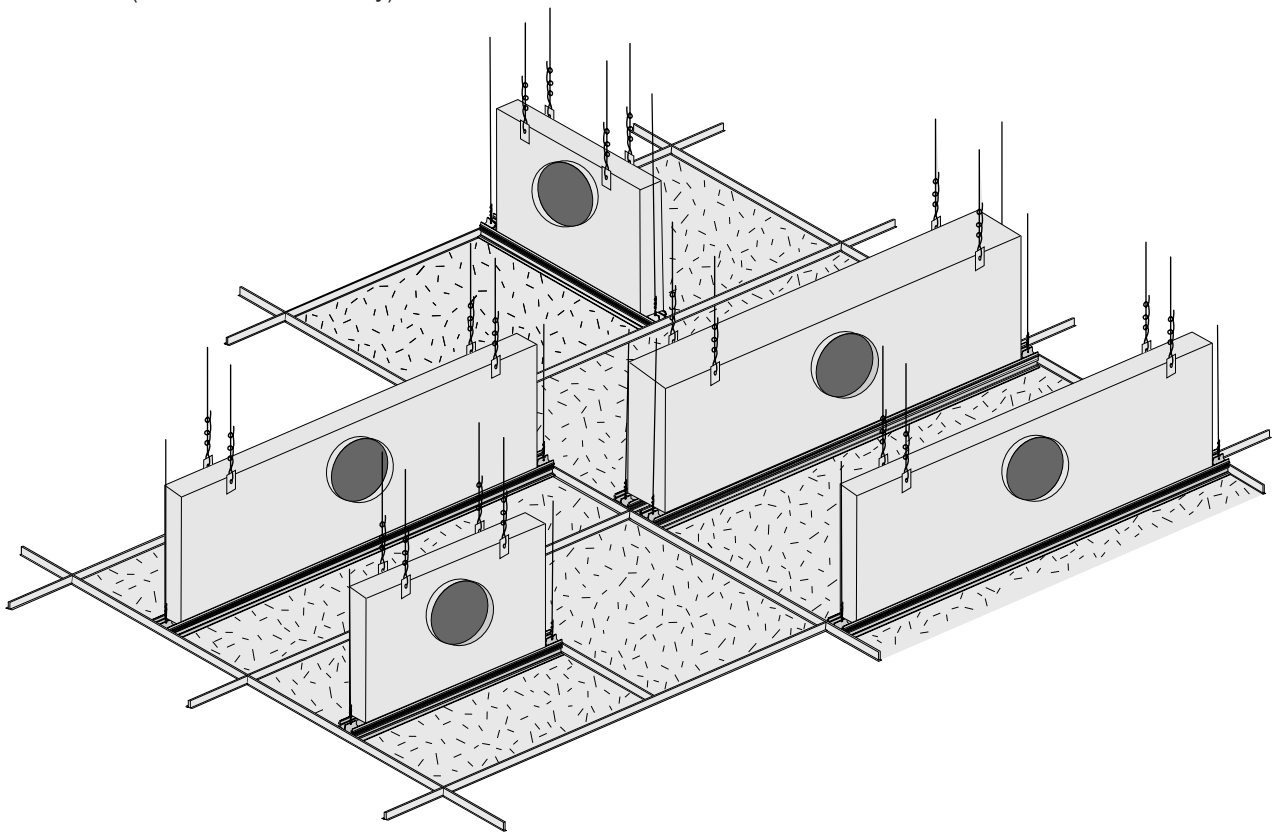


Figure 17. Typical lay-in diffuser configuration.

## Installation Practices For FM Series Modular Square Lay-in Ceiling Diffuser

1. Install suspension ceiling T-Bar system prior to installing Flowline™ diffuser assuring proper dimensional layouts for simple diffuser installation.
2. Unclip back pan from frame and pattern controller assembly.
3. Cut acoustic tile to size, see submittal, and insert into frame and pattern controller assembly.
4. Reattach back pan to frame, assuring that the clips are secure.
5. Where provided for seismic restraint, install WC1 hanger clips into the upper boss of the diffuser extrusion and move to each corner of unit. Diffuser extrusion may require field notching for insertion.
6. A. Suspended Ceilings: Standard units simply lay into the ceiling grid.  
B. Hard Ceilings: Mount the square modular diffuser into the ceiling in the same fashion as the exposed flange frame/border style AA during hard ceiling construction. HC1 or HC5 (optional) Hard Ceiling Clips are required.
7. Attach ductwork to plenum inlet collar in accordance with recommended practices.
8. Attach hanger wire to the hanger clips and secure to the building structure.

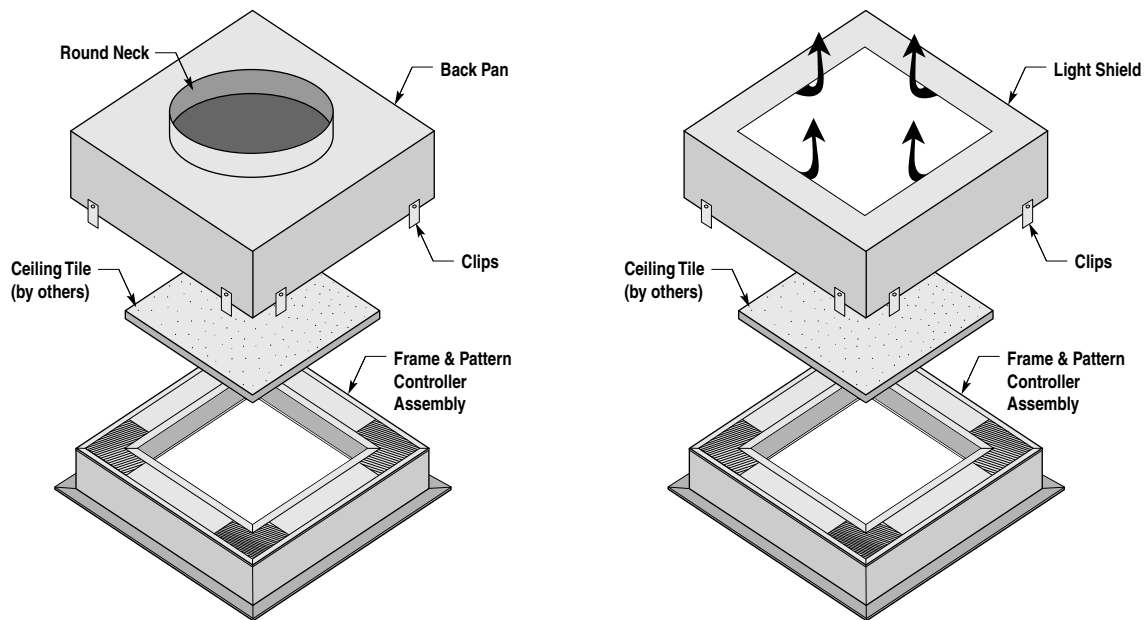


Figure 18. Typical square module diffuser assembly.

## Diffuser Field Cutting Procedure

### 1. Prepare Diffuser for Cutting

- A. Working from a table covered with indoor/outdoor carpet, measure the length of the diffuser to be cut and mark accordingly.
- B. Slide the top spacer sufficiently to allow for removal of the pattern controllers or completely remove top and bottom spacer as shown in Figure 19.
- C. Remove the pattern controllers as shown in Figure 20.
- D. Slide both top and bottom spacers back into the Flowline™ frame as shown in Figure 21, beyond the cut mark to clear the saw blade.

### 2. Cut Diffuser to Length

- A. Secure Flowline™ to table. Cut through both Flowline™ rails with the finished flanges facing up as shown in Figure 22.
- B. A 10" circular saw with fine tooth, high speed carbon steel cutting blade is recommended. Apply lubricant while cutting.
- C. Cut the pattern controllers by the same amount, so they will fit between the spacers.

### 3. Reassemble Diffuser

- A. Move both spacers to the end of Flowline™.
- B. Slide the top spacer sufficiently to allow for replacement of the pattern controllers.
- C. Reinstall the pattern controllers and slide the top spacer back over the pattern controllers.
- D. Lubricate the portion of the pattern controllers that fits between the top and the bottom spacer if necessary with WD-40 or other.
- E. All Flowline™ components may be reused after cutting, however, additional spacer kits are available.

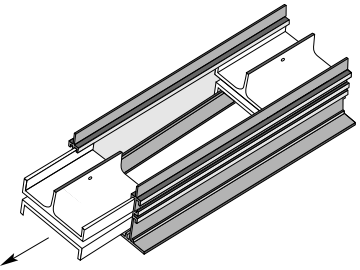


Figure 19. Diffuser Spacer Removal

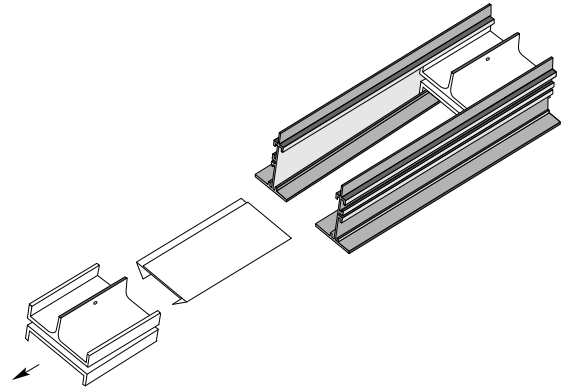


Figure 20. Removal of Pattern Controller

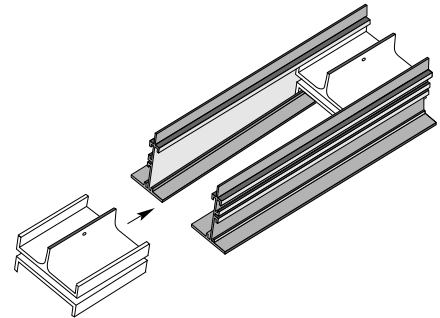


Figure 21. Replacement of Diffuser Spacer

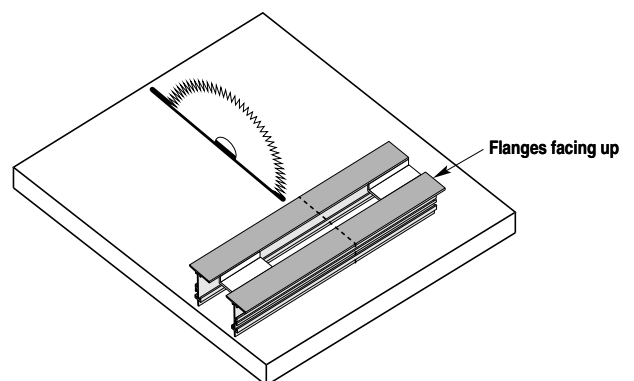


Figure 22. Field Cutting Diffuser

## Patten Controller Adjustable Instructions

### FLH Series Horizontal High Throw Pattern Controllers

Models: FLH10	1" (25) Slot	FLH25	2 1/2" (64) Slot
FLH15	1 1/2" (38) Slot	FLH30	3" (76) Slot
FLH20	2" (51) Slot		

The Flowline™ FLH Series continuous slot diffuser is designed primarily for ceiling applications. The adjustable pattern controllers, which are easily adjusted from the face, allow the discharge air to be directed to the left or right as well as downward. When positioned for horizontal discharge, a tight horizontal air pattern is produced that makes full use of the ceiling (coanda) effect, even at reduced air volumes. High induction characteristics maximize room air movement and mixing, making Flowline™ FLH Series eminently suitable for variable air volume systems.

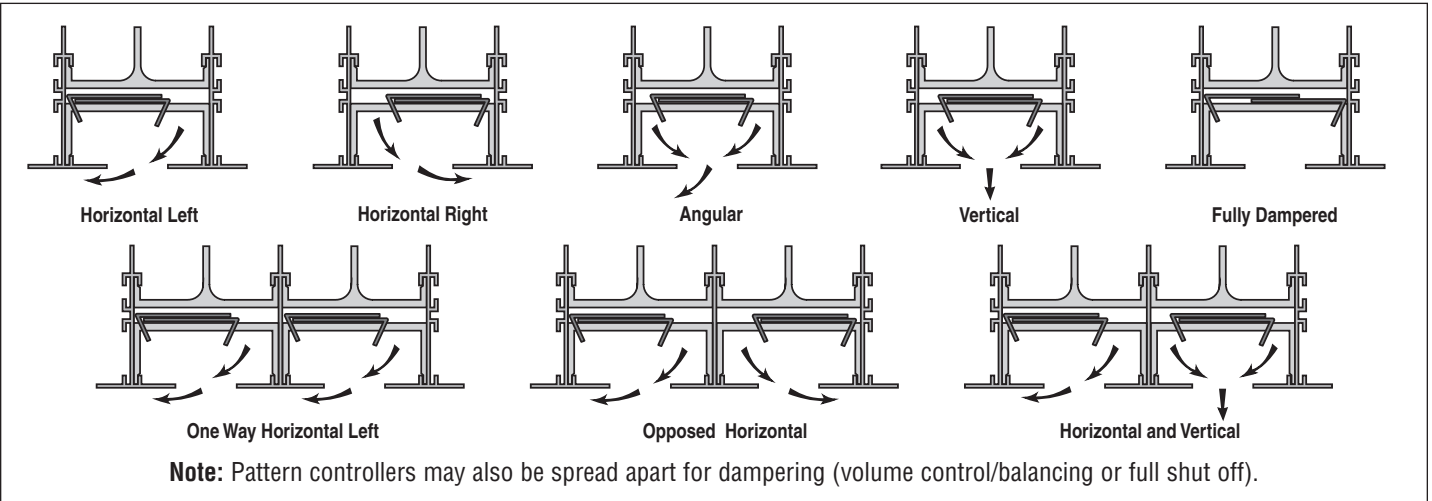


Figure 23. FLH Series Pattern Controller Adjustment.

### FLV Series Vertical Jet Throw Pattern Controllers

Models: FLV10	1" (25) Slot	FLV25	2 1/2" (64) Slot
FLV15	1 1/2" (38) Slot	FLV30	3" (76) Slot
FLV20	2" (51) Slot		

The Flowline™ FLV Series continuous slot diffuser is designed for both ceiling and high sidewall applications and provides total air pattern control flexibility. Similar in appearance to the FLH Series, the FLV Series features adjustable pattern controllers that direct the airstream perpendicular to the face, providing a strong vertical projection when installed in a ceiling and horizontally when installed in a sidewall application. The pattern controllers permit angular discharge, allowing the airstream to be directed left or right in a ceiling application and up or down in a sidewall application. The pattern controllers also provide a variable aperture capability to adjust performance to specific applications.

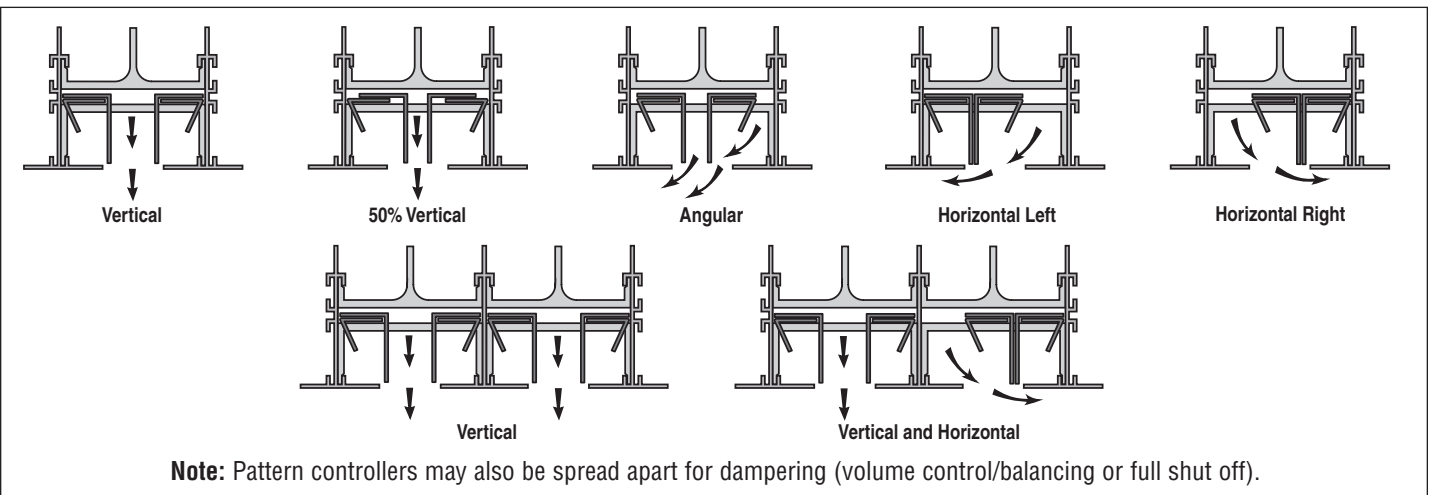
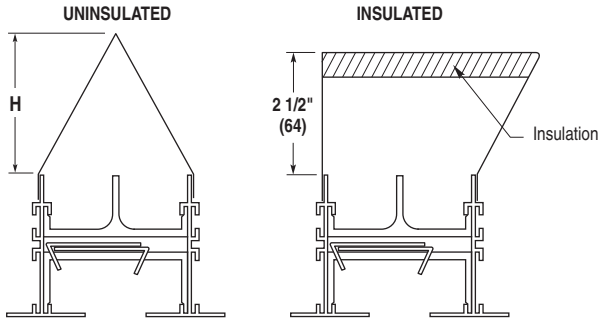


Figure 24. FLV Series Pattern Controller Adjustment.

## Accessories/Parts list

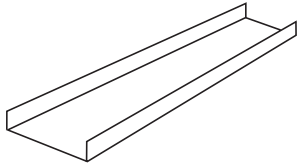
Note: For more detailed information, refer to Nailor website.

### Return Hood/Sight Shield



51% free area perforated corrosion resistant steel, painted flat black. Provided in 48" (1219) lengths. Field cut to length.

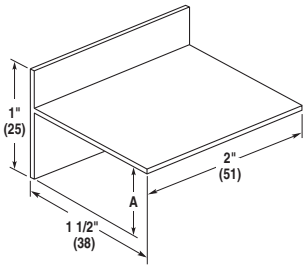
### Blank-Offs



#### FLBO (10-30)

Corrosion resistant steel, painted flat black. Fits in neck of diffuser. Provided in 48" (1219) lengths. Field cut to length.

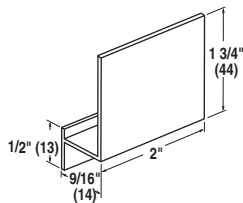
### Mounting Clips



#### HC1, HC5

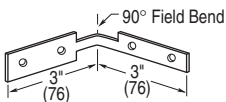
The HC1 and HC5 Hard Ceiling Clip can be used to mount the Flowline™ assembly with frame/border types **AA**, **CC** or **GG**, where 5/8" (16) or 1/2" (13) gypsum wallboard (drywall) is used.

	A Dim.
HC1	5/8" (16)
HC5	1/2" (13)



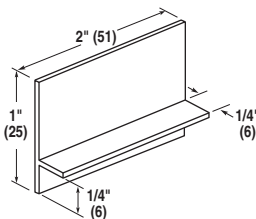
#### WC1

The WC1 Wall Clip is used to mount the Flowline™ assembly with frame/border type **AA** flush to a wall.



#### TC1

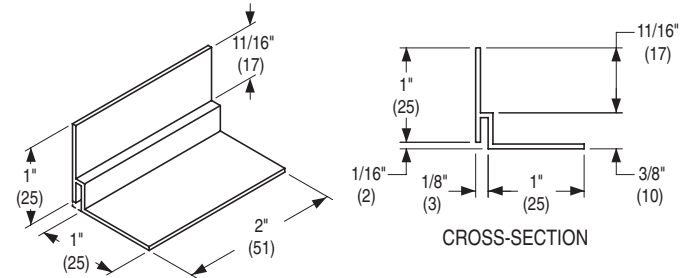
The TC1 T-Bar Clip is used to attach drop tees to the Flowline™ assembly.



#### TC2

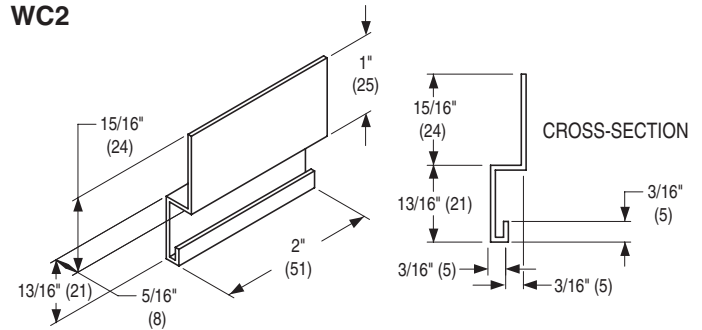
The TC2 Fineline T-Bar Clips are used to support and level the Flowline™ assembly in Bolt-Slot (Fineline type) suspension systems.

### Mounting Clips HC2



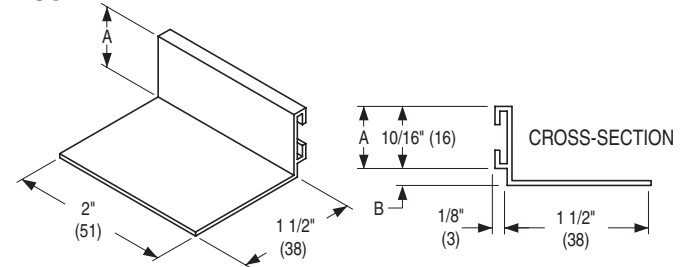
The HC2 Hard Ceiling Clip can be used to mount the Flowline™ assembly with frame/border type **G**, where standard 5/8" (16) gypsum wallboard (drywall) is installed below the frame face.

### WC2



The WC2 Wall Clip can be used to mount the Flowline™ assembly with frame/border types **G** or **J**, flush to a wall.

### HC3



The HC3 Hard Ceiling Clip can be used to mount the Flowline™ assembly with frame/border type **K**, where standard 5/8" (16) gypsum wallboard (drywall) is used.

Flowline	Part No.	A Dim.	B Dim.
FLH10	HC3-10	13/16" (21)	3/16" (5)
FLH20	HC3-15	1 1/16" (27)	7/16" (11)
FLH30	HC3-20	1 5/16" (33)	11/16" (17)

---

**NOTE:**



**Houston, Texas**  
Tel: 281-590-1172  
Fax: 281-590-3086

**Las Vegas, Nevada**  
Tel: 702-648-5400  
Fax: 702-638-0400

**Toronto, Canada**  
Tel: 416-744-3300  
Fax: 416-744-3360

**Calgary, Canada**  
Tel: 403-279-8619  
Fax: 403-279-5035