

Know H.O.W. (Head-of-Wall) - Vol. 1 - IG's of Life Safety

Installed Gaps (I.G.'s) of Life Safety - Framing, Drywall, and Maximum Allowed Gaps

Determining proper code certified life safety joint protection requires knowledge of engineered or specified structural (Vertical) deflection with verification of installed gaps for Framing (FIG), Drywall (DIG), and Maximum Joint Certification (MIG).

Deflection in design terms is "degree to which a part of a structural element is displaced under a load (because it deforms)". In dynamic Head of Wall **HOW** conditions this means a horizontal floor/roof frame, beam, or truss bends downward as forces are applied. These forces can be Dead (structure), Live (load/unload people, machines, furniture, etc...), or Gravity Loads (concrete creep over time) which the Engineer of Record uses to determine "total structural deflection". A simple check to ensure or determine possible deflection:

$$\text{Span} \times 12\text{in} \div \text{Load Limit} = \text{Deflection}$$

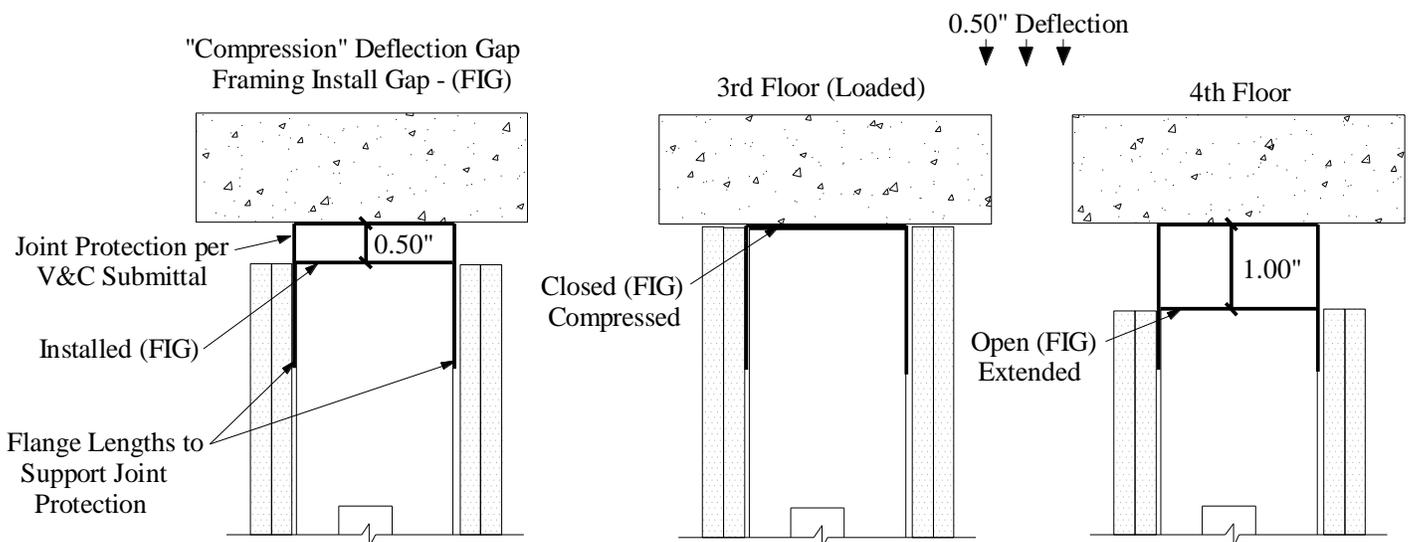
Example: 20ft x 12in \div L/240 = 1.00" (one way compression)

Required Framing (Stud) Deflection Gap (FIG) = 1.00"

Required Multi-Story (Up/Down) Total Joint Protection = 2.00"

To avoid failure of wall framing/assemblies and joint protection, structural deflection distance should be clearly specified and detailed with "installed gap between stud and overhead" or Framing Install Gap (**FIG**). Plan set details should note a "slip or slide" connection allowing independent movement at **HOW**.

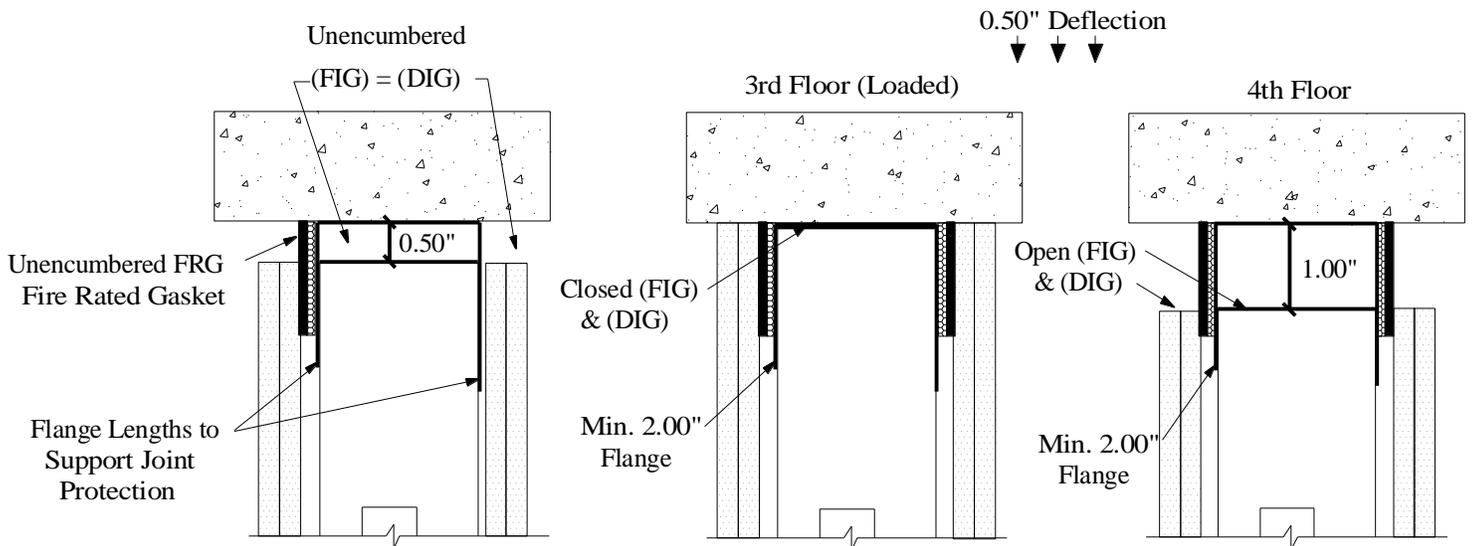
FIG - Framing installed Gap required between overhead structure and top end of wall framing (studs) to allow for one-way Compression or Downward Deflection of the structure above per Engineer of Record design. The (**FIG**) is to prevent vertical load upon wall framing causing it buckle, twist, or bow, and keep the entire assembly from cracking, crushing, and dislodging while maintaining Life Safety rated Fire, Smoke, and or Sound resistance.



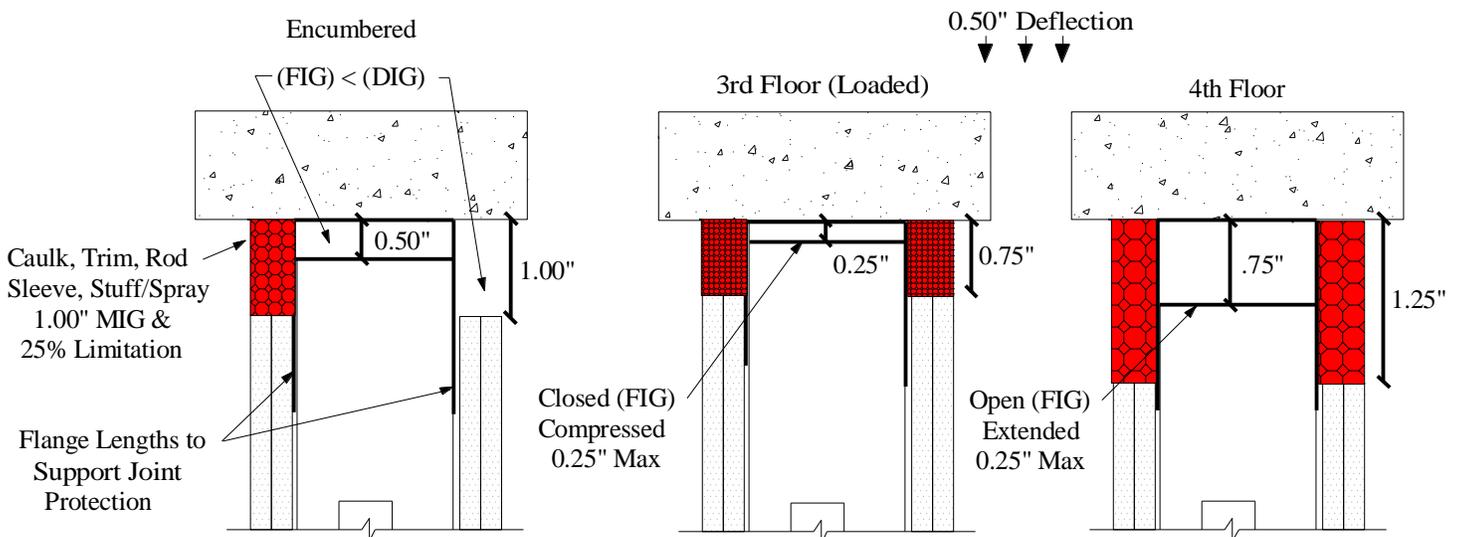
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DIG – *Drywall Installed Gap* required between overhead structure and top of gypsum wall sheathing to accommodate **Both** Downward Compression and Assembly Upper Extension based on joint protection. Certified current UL 2079 compliant joint systems are rated either 100% Unencumbered or Encumbered and limited to lowest % rating. **Unencumbered** 100% Movement solutions (**DIG**) can equal (**FIG**).



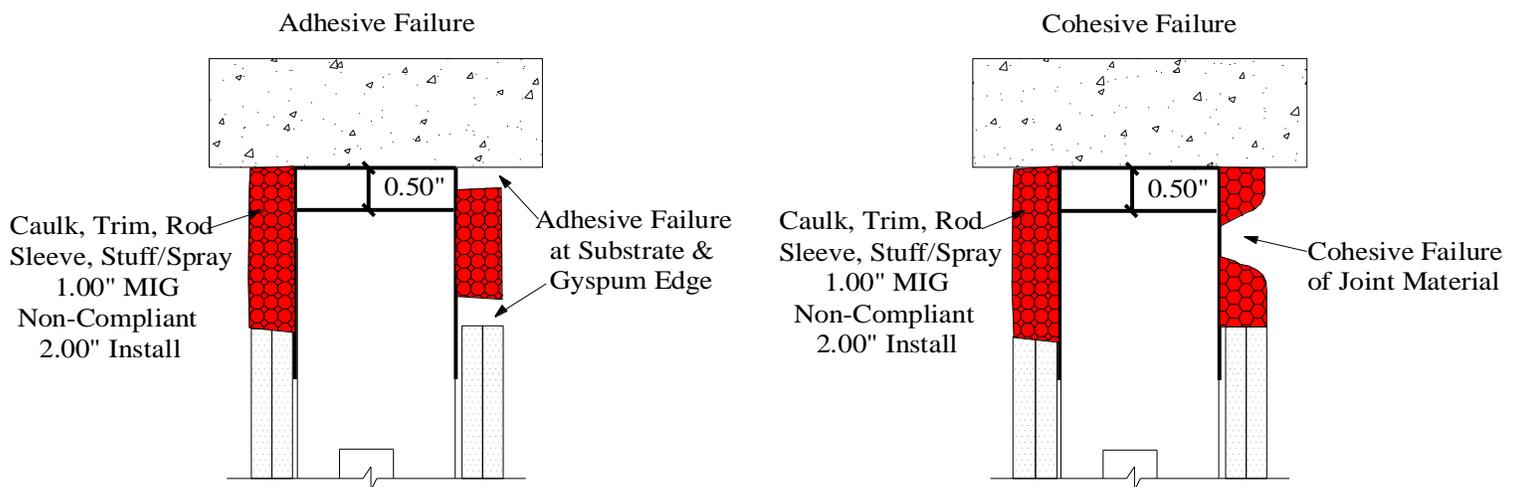
Encumbered solutions require a wider drywall gap (**DIG**) than the (**FIG**) based on certified Maximum Installed Gap Limits (**MIG**) in relation to % of movement capability before material/system failure.



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MIG – Maximum Installed Gap is the *Certified Limitation* of (**DIG**) in accordance with use of a corresponding joint system. Installing a (**DIG**) wider than certified to increase movement or achieve joint protection of specified/required deflection is **not code compliant** and will result in assembly failure:

Wet applied mastic sealants, foam rods, and overlapped sleeves are limited in “stretchability” and upon curing/shrinkage and or deflection, will experience cohesive, adhesive, or stress (dislodge or “wear and tear”) failure. Manufacturer provided sealant shrinkage, foam compression, overlapping or butting of material ratings should be considered prior to any degradation caused by deflection of joint.



Based on individual certifications, systems become “**non-compliant**” if installed beyond their (**MIG**).

- Choosing a product with 1.00” (**MIG**) and 25% Movement for a 1.00” total deflection (up/down)
- Increasing (**DIG**) to 2.00”, adding additional same limited material to achieve 1.00” deflection
- Responsibility/liability for such “non-compliant” Life Safety falls upon Designer, Installer, and AHJ

Consideration of “non-rated” and uncertified **Smoke and Sound** sealant/systems typically listed around 18% or less movement capability. These products/systems would require an even larger “theoretical” (**DIG**) to accommodate deflection and provide joint protection. In comparison, tape on gaskets like Safti-Seal FRG or SSG third party certified “unencumbered” or 100% Movement systems are systems where (**DIG**) can be the same as the (**FIG**).

Understanding “**smoke protection saves lives and fire protection saves property**” and that both types of joint protection “fire-rated” or “non-fire rated” experience the same deflection, all HOW joints should be “protected” with products or systems that provide consistent deflection capabilities. Whether Encumbered or Unencumbered, the decision of which joint protection to use (driven by structural deflection) should take in consideration the information and limitations provided in third party certifications. Once a system or product is chosen, it must be detailed, built, and inspected properly to stop the spread of smoke and fire saving lives for the life of the wall assembly.