



## Fastening of Gypsum Boards to Steel Roof Deck

Gypsum boards are commonly used on steel roof decks for these main reasons:

1. To provide a smooth surface for a protected membrane roof system.
2. As a levelling layer for the air/vapour barriers in a conventional roof system.
3. To act as a thermal barrier under combustible plastic insulations in roof systems.

The three most common methods of attaching the gypsum boards to the deck are:

1. Adhesives
2. Drywall screws
3. Screws and plates to Factory Mutual (FM) standards

Of the three, only the screw and plate method is currently sanctioned by Factory Mutual. The other two, however, are commonly and successfully used in various areas of the country on projects that do not require FM approval.

### Description and Uplift Resistance of the Various Fastening Methods

1. **Adhesive** - This method requires the installation of continuous 13 mm (0.5 in) beads of solvent based adhesive spaced 150 mm (6 in) on centre to adhere the gypsum board to the steel deck. Beads should widen to 50 mm (2 in) after application of the board. This method is similar to the application of proprietary vapour retardants and the same precautions would apply. This method should not be used where uplift forces would exceed 1.4 kPa (30 psf).
2. **Drywall screws** - Tests performed by the National Research Council (NRC) for Canada Mortgage and Housing Corporation (CMHC Report CR 5505.1) on the use of gypsum board as an air barrier has shown that of 1.8 kPa (38 psf) is required to push 13 mm (0.5 in) gypsum board through the head of drywall screws spaced 300 mm (12 in) apart. Incorporating a reasonable safety factor and adding the weight of the roofing system suggests that a 400 mm (16 in) spacing (28 screws per 1.2 x 2.4 m, or 4 x 8 ft, board) provides an uplift resistance of between 1.1 and 1.4 kPa (22 and 28 psf) depending on the roof system used.
3. **Screws and plates** - To FM requirements. Currently FM uses two patterns: 8 screws and plates (per 1.2 x 2.4 m, or 4 x 8 ft, board) for a wind uplift pressure up to 1.4 kPa (30 psf)(Class I-60) or 11 screws and plates for a wind uplift pressure between 1.4 and 2.2 kPa (30 and 45 psf) (Class I-90). Both have a safety factor of 2 at the maximum value.

It is important to note that the designer of the roof system has the ultimate responsibility for the method used to ensure adequate attachment of the gypsum board. Also, where the insulation or roof membrane will be mechanically fastened through the gypsum board to the roof deck, the attachment of the gypsum board could obviously be limited to what would be required to hold it in place until the insulation or roof membrane was installed. Provincial roofing associations should be consulted when selecting an attachment method, particularly when a warranty program is being implemented.

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