

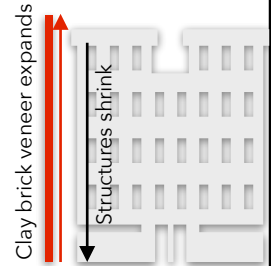


Masonry Veneers, Horizontal Movement Joints, and Shelf Angles

What are the options for supporting masonry veneers?

To estimate differential deflections, compare:

- Brick veneer movement:
 - + Δ brick moisture growth
 - + / - Δ brick temperature
 - Δ compression from self-weight
- Structure movement:
 - Δ gravity (more stud construction)
 - + / - Δ potential lateral
- Veneer vs Structure $\rightarrow \Delta$ differential movement
 - Veneer Anchors need to accommodate this movement



Per Section 12.2 in the TMS 402-16 code, there are several options to consider for supporting masonry veneers for vertical (gravity) and for lateral (wind/seismic) loads. Based on TMS 402, prescriptive requirements or alternative analysis can be used.

Shelf angles are only recommended with wood or metal stud backup systems within prescriptive requirements. See below for options when there is a flexible backup system (i.e. stud walls).

Shelf angles are not required with a rigid structural backup. FORSE and IMI still recommend analysis of veneer movement for walls above 50ft even with a rigid back-up system like structural masonry or concrete walls.

Options for Veneer Support with Flexible Back-up Systems

1 - TMS 402, Section 12.2.2.6.1 - use shelf angles to create a horizontal joint at 30ft and each floor above 30ft, or 38ft at a gable end.

2 - TMS 402, Section 12.2.1, alternative analysis can be used and shelf angles/horizontal joints could be eliminated. This requires an analysis of the differential movement between the veneer and the backup, and generally flexible veneer connectors would have to be used for the upper portion of the wall. See diagram example above.

3 - TMS 402, section 12.2.1, alternative analysis can be used, and shelf angles can be reduced to every other or every third floor. In this case, standard veneer connectors could be used, but a heavier connection for the veneer shelf angle to the backup system would be necessary.

4 - Another option would be to use a structural masonry veneer (4"-12" hollow clay masonry, or 6" or greater concrete masonry), and no shelf angles would be needed, and the structural brick veneer would only need horizontal supports as necessary by design.

There are other options as well for masonry veneer support/design, but this is a good short list for a tall veneer wall, or a building with multiple floors.