An Alternative Design for Brick Veneer Steel Stud Walls

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Abstract:

Conventional brick veneer wall systems used in commercial construction are backed by either steel stud or concrete block walls. Steel stud systems are used most often, particularly in medium and high rise buildings because of their weight and cost savings. However, over the past decade there have been many problems identified with this type of system. These problems include increasing depth and metal gauge now that the L/600 deflection limit is more widely accepted, problems with water tightness and structural safety created by cracked veneer, difficulties in maintaining a clear drainage cavity, intact flashing and a functioning weep system, and the corrosion weakening of the tie/stud connection.

An alternative to backing the brick veneer with steel studs or block is to back the veneer with vertical structural steel elements spaced at larger intervals and design the brick to span horizontally between these supports. These angles would then be designed to span between floor levels. Some of the advantages associated with this alternative include the ability to use the higher horizontal brick flexural strength and possibly incorporate horizontal joint reinforcement in the brick veneer to increase support spacing and address large openings. This alternative backing system also allows the use of a thin steel stud furring wall system that is applied after the veneer is built. This allows cleaning of the cavity and inspection of the flashings, likely resulting in a more water tight system. This construction configuration will also reduce or eliminate the thermal bridging effect of the steel studs.

A preliminary investigation was conducted to evaluate the structural feasibility and the economics of a proposed alternative support system for two different brick veneer steel stud exterior wall system configurations. This investigation also included an evaluation of the wall system thermal performance, particularly with respect to thermal bridging.

The results of the study indicates that although the alternative designs appeared to be slightly greater in cost than a conventional system (approximately 8%), the expected performance improvement of the alternative system and the potential cost savings available with further design refinements, suggests further study is warranted.

DOI: 10.70803/001c.140688

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