Steel Design Guide

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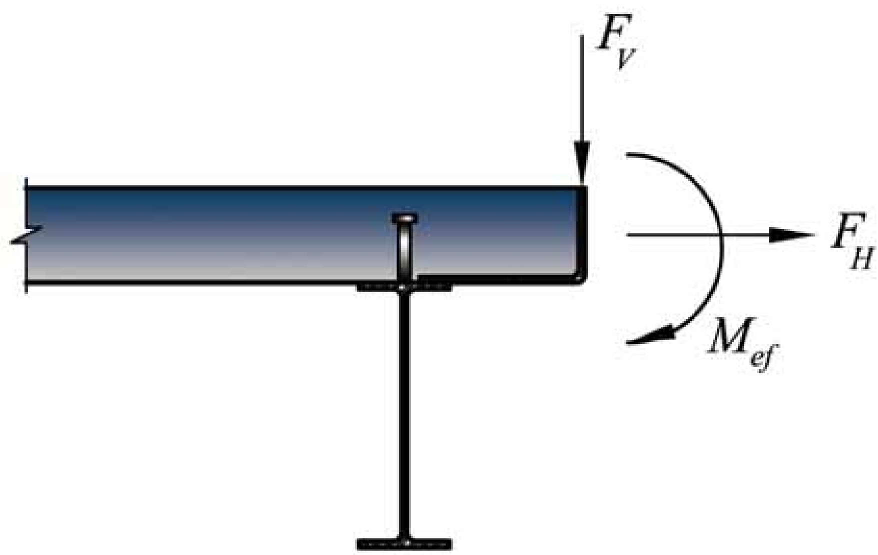
Façade Attachments

to Steel-Framed Buildings



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Façade Attachments
to Steel-Framed Buildings

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AMERICAN INSTITUTE OF STEEL CONSTRUCTION

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Chapter 1
Introduction

Perhaps the most complicated details in a building occur where the façade and structural frame meet. The details of this interface have a significant impact on the cost of the project and performance of the façade. Performance issues that affect the façade attachment details include proper support of the façade elements, structural anchorage to the frame, relative movements, fire safing, waterproofing, thermal and moisture migration, air infiltration, and sound transmission. The design team must coordinate responsibilities among the architect, building frame engineer, façade engineer, general contractor, steel fabricator, steel erector, and façade subcontractor(s). This AISC Design Guide on façade attachments provides explanations of façade system fundamentals, highlights building performance issues that influence attachment design, and includes practical attachment design examples.

1.1 OBJECTIVE AND SCOPE

The objective of this Design Guide is to assist the practicing engineer in achieving economical slab edge details for steel frames that are structurally sound, durable, and accommodating of the performance requirements of the particular façade system. The focus is on façades—the non-load-bearing building enclosures attached to, and supported by, the building structure. This Design Guide presents concepts and fundamentals pertinent to façades in general, as well as specific information about supporting and anchoring some of the more common façade systems. Although primarily intended to assist the structural engineer responsible for design of the steel frame, this Design Guide is also a reference for the architect and the engineer responsible for the design of the façade elements.

When referring to the structural engineer responsible for the design of the steel frame, this Guide uses the term *structural engineer of record* (SER) as it is used in the AISC *Code of Standard Practice for Steel Buildings and Bridges* (AISC, 2005). When referring to the engineer responsible for the structural design of the façade elements and/or their attachments, this Design Guide uses the term *specialty structural engineer* (SSE) in a manner consistent with that used by the Council of American Structural Engineers (CASE).

General concepts and principals of this Design Guide include façade performance fundamentals, attachment design criteria, roles and responsibilities, and fabrication and erection tolerances. Specific steel framing issues include slab-edge details and spandrel-beam design issues.

Specific façade systems include masonry cavity wall systems with concrete-block or steel-stud back-up, precast-concrete wall panels, aluminum curtain walls with glass and/or metal panels, glass-fiber-reinforced concrete (GFRC) and other lightweight panels, and exterior-insulation-and-finish-system (EIFS) panels.

No one text can present all of the creative and effective strategies and details that designers can and will develop, and this Design Guide does not represent an attempt to do this—nor is it an attempt to present preferred details. Preference depends on the specific conditions for a given project, regional norms, and individual designers, fabricators, and erectors. Rather, the concepts and performance characteristics that will lead to successful support of façades are described. By way of illustrative sample details and example problems, readers will see how to implement these concepts and achieve proper performance. This, along with a basic understanding of fundamental principles, will help the practicing engineer to develop and apply sound strategies for support and attachment of a façade on a particular project, addressing any number of project-specific conditions.

This Design Guide focuses on attachment strategies and their effect on the design, fabrication, and erection of steel frames. Although the general background is presented on various façade systems and principles for their proper support, this Design Guide does not focus on the design of the façade components, their intra-connections, or anchors integral to the façade structure, such as embedded inserts into concrete panels or flex anchors of GFRC panels.

1.2 FUNDAMENTALS OF FAÇADE PERFORMANCE

1.2.1 The Façade and the Building Envelope

The building envelope encloses the building, controlling the transmission of air, water, heat, sound, and light, both into and out of the building. The exterior walls, roofs, windows, doors, foundation walls, and foundation slabs, and the interfaces of these parts, comprise the building envelope. The exterior wall is but one of the envelope components and the façade is just one component of the exterior wall. However, when this Design Guide refers to façades and façade attachments, it is meant to encompass all those components of the exterior wall supported by and anchored to the building, either directly or indirectly through other wall components.