

# Designing Steel Stiffeners for Aluminum Façade Profiles: Getting the Details Right



# Introduction

In modern façade engineering, the push for high-performance, visually elegant designs often leads to the use of aluminum curtain walls and large-span glazing systems. These systems are prized for their lightness, aesthetic flexibility, and corrosion resistance. However, in areas subject to high structural loads—such as at mullions, transoms, or large unsupported spans—aluminum alone may not provide the required strength or stiffness.

To address this, steel stiffeners are commonly inserted within aluminum profiles. While this hybrid solution is conceptually straightforward, its correct implementation involves a range of technical considerations that must be carefully addressed to avoid structural inefficiencies or long-term failures.

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# 1

## **MATERIAL COMPATIBILITY**

### Managing Thermal Movement

Steel and aluminum expand and contract at different rates due to their distinct thermal expansion coefficients. Without allowances for this movement, temperature fluctuations can lead to internal stresses, audible clicking or popping noises, and eventual material fatigue or deformation.

#### **DESIGN TIP**

Incorporate slip joints or isolating elements—such as EPDM spacers, plastic sleeves, or rubber shims—to allow for independent thermal movement between the steel insert and aluminum profile. This simple measure helps avoid stress concentrations and preserves system integrity over time.

# 2

## **TOLERANCES AND FIT**

### Precision is Key

The interface between the steel insert and the aluminum extrusion must be engineered with precise tolerances. A too-tight fit can deform the softer aluminum during assembly, while a loose fit undermines the intended structural support.

#### **DESIGN TIP**

Coordinate fabrication tolerances across both materials. Additionally, account for the thickness of any coatings—such as galvanisation, fire-rated intumescent paint, or powder coating—that may be applied to the steel, as these can add measurable buildup that affects fit.

# 3

## LOAD TRANSFER AND ANCHORAGE

### Align with Structural Strategy

For the stiffener to serve its purpose, it must be integrated into the overall structural load path. This includes supporting wind loads, dead loads, and any dynamic actions from glass panels or movement joints.

#### DESIGN TIP

Ensure the stiffener is properly anchored at critical support points, and avoid introducing point loads that the aluminum cannot adequately distribute. Structural silicone, specialised clamps, or custom brackets may be necessary to ensure even and reliable load transfer.

# 4

## CORROSION AND ISOLATION

### Prevent Galvanic Reactions

When dissimilar metals like steel and aluminum come into direct contact in the presence of moisture, galvanic corrosion can occur, especially in marine or humid climates.

#### DESIGN TIP

Use non-conductive coatings or physical isolation pads to separate the two metals. Furthermore, ensure that the profile design promotes effective drainage and ventilation to minimise moisture retention inside the assembly.

## Final Thought

### Engineering, Not Just Insertion

Steel stiffeners are not mere reinforcements—they are critical engineered components. Their effectiveness hinges on thoughtful integration into the broader façade system, from design to installation. When well-executed, they enable slender, efficient, and visually stunning façades that meet both aesthetic and structural demands. When overlooked or poorly designed, they can become hidden liabilities that compromise the performance and durability of the entire system.

# How AESG can help

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We have one of the largest dedicated specialist consultancy teams working on projects within the building, urban planning, infrastructure and strategic advisory sectors. With decades of cumulative experience, our team offers specialist expertise in sustainable design, building services, MEPF, fire and life safety, façade engineering, commissioning, digital delivery, waste management, environmental consultancy, strategy and advisory, security consultancy, cost management and acoustics. Our prestigious portfolio demonstrates our extensive capabilities and our ability to consistently deliver best in class solutions to some of the industry's most complex technical challenges.

# How AESG can help



## Gennaro De Marco

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Gennaro is a Senior Associate Façade Consultant with over 20 years of experience in curtain wall, stick system, doors & windows, structural point fix glass system.

Prior to joining AESG in 2021, Gennaro has worked as a Project Design Manager for one of the worldwide leading contractors in the engineering, project management, manufacturing and installation of architectural envelopes and high-end interior fit-out.

With half of his career spent in the UAE, he followed several iconic projects located in different countries like UAE, Saudi Arabia, Azerbaijan and Malaysia. In his role he was fully involved in managing the relations with clients, architects, and main contractors from the technical and economical point of view.

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