Technical Note No 88

Structural performance of systemised walls – Buckling and torsion

This Technical Note is one of a series describing the design and assessment of curtain wall framing systems and brackets. The series comprises:

TN 84 Structural performance of systemised walls - Introduction
TN 85 Structural performance of systemised walls - Design charts and profile data
TN 86 Structural performance of systemised walls – Connections
TN 87 Structural performance of systemised walls – Closed profiles
TN 88 Structural performance of systemised walls – Buckling and torsion
TN 89 Structural performance of systemised walls – Open profiles
TN 90 Structural performance of systemised walls – Bracket requirements and principles
TN 91 Structural performance of systemised walls – Bracket calculations

This Technical Note describes the torsional and overall buckling behavior of closed profiles.

Introduction

Closed hollow profiles combine lightness of section with very good torsional resistance. For this reason they are good at both resisting buckling and carrying torsional loads.

This Technical Note describes typical causes of torsional loads in framing members and the torsional resistance of transoms and mullions.

Secondly this Technical Note describes the buckling of framing members that may reduce their axial resistance and bending resistance.

Because hollow profiles are so good at resisting torsion it is often possible to simplify the analysis of more complex profiles and still show that they have adequate torsional resistance.

Torsional loads

A torsional load occurs in a framing member if a torque is applied or if a load is applied orthogonal to the axis of the member and not through its shear centre.

Shear centres are described more fully in TN 89. For sections that are bisymmetric or skew symmetric the shear centre lies at the centroid.

Examples of torsional loads in framing members are:-

- The weight of glazing or a panel acting on the glazing shelf of a transom,
- Asymmetric loading from different widths of glazing and at split mullions,
- The wind load on a vertical shading fin connected to a mullion.

Transoms will be subjected to torsional load as the glazing is off-set from the shear centre of the section, Figure 1.

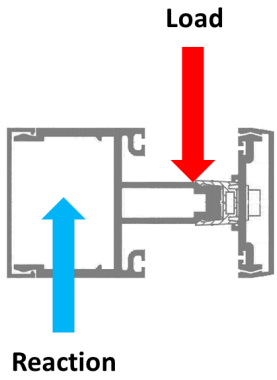

Figure 1 Torsional load on a transom

The small eccentricity associated with most glazing loads means that the torque is small and closed transom profiles are not normally checked for torsion. Note, however, that the ends of the member have to be restrained against rotation.

For larger eccentricities the rotation and torsional resistance should be considered.