ISSUE
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LARSON'S
CURTAIN WALL
NEWSLETTER

momentum

This Issue

MOMENTUM

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Larson Engineering, Inc. is a leader in structural, civil, mechanical and process engineering services.

Momentum is produced by Larson Engineering to provide information to our clients & the curtain wall industry at large.

Sunshade Loading

Tim Schulz, LEED AP

Sunshades and canopies often see very high loading and may result in major revisions during the design process. Larson Engineering's forensic investigation services are often requested for canopy and sunshade failures. Wind, snow, and seismic loads all affect the design of these structures. This article is intended to provide a basic understanding of the applied loads.

WIND LOAD

Typical wall wind pressures are used on assemblies that are attached or located close to a building. Wind loads are assumed to act perpendicular to the projection of the sunshade or canopy. Freestanding canopies use a different wind load determination than typical enclosed buildings that can be found in ASCE 7.

SNOW AND ICING LOAD

It is our design philosophy that snow will bridge the gap between blades and will result in load applied over the entire projection of the sunshade or canopy. Wind or sliding snow from the roof will cause increased loading due to forming drifts. These drifts can nearly double the base snow load. In northern climates snow loads are often the controlling case and Larson Engineering has found this to be one of the leading causes of failure.

Icing loading rarely controls design, but in a few geographic locations several inches of ice can form on the blades. In these cases, the design must resist the additional weight of the ice and a reduced wind speed. These regions and wind speeds can be found in ASCE 7.

SEISMIC

Unlike wind or snow, seismic loads act in every geometric direction. Seismic loading creates unique failure modes. For high seismic regions, knife plate brackets are often not capable of supporting the lateral loading parallel to building. Lighter sunshades and stiffener brackets are often necessary to provide a structurally adequate assembly.

Loading values and combinations are determined from the International Building Code and ASCE 7. Each structure is unique and may require different loading and design assumptions. Larson Engineering would be happy to assist in any design.

Dissimilar Metals –
Understanding Galvanic Corrosion

Melissa Gradecki, PE, LEED AP

Understanding material compatibility is key to a quality, sustainable structural design. Dissimilar metals are used together frequently, so it is important to know when this practice is acceptable and when it may put metals at risk for galvanic corrosion.

Three conditions are necessary in order for a material to be at risk for galvanic corrosion:

1. Metal to metal contact
2. Presence of a conductive liquid (electrolyte)
3. Sufficiently different electrochemical potentials

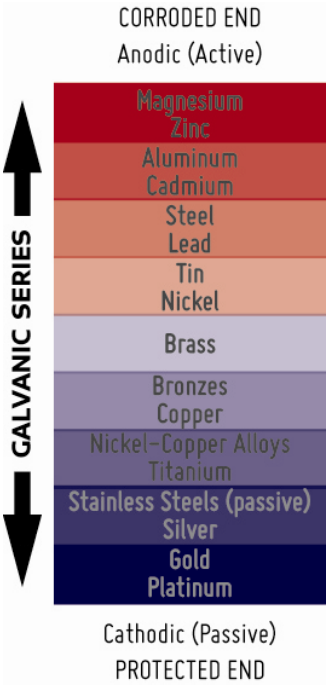
If all conditions exist, ions will move on the electrically conductive path from the more anodic metal to the more cathodic metal. The anodic metal in essence becomes the sacrificial metal and corrodes to protect the cathodic metal. If any one of the three conditions is not present, galvanic corrosion will not take place.

The first step in preventing galvanic corrosion is to know which metals are compatible and which ones may be at risk for galvanic corrosion. If the metals are compatible (have similar potentials) then galvanic corrosion will not occur and no further prevention design is necessary. If the metals do have sufficiently different potentials then galvanic corrosions must be considered and methods to prevent it must be applied.

A conductive liquid must be present to transfer the ions and cause corrosion; dry conditions are not susceptible. Depending on location, the metals may be more or less susceptible to galvanic corrosion. Rainwater is a common electrolyte; water from condensation may also pose a problem. Salt and industrial pollution can significantly increase the conductivity of the water, so locations near oceans and industrial parks may be at a greater risk. Sealants may be used to prevent water penetration to the area of contact.

Lastly, the two metals must be in direct contact for a conductive path to be established. Plastic strips, washers, or sleeves can be used to separate the two metals and therefore prevent galvanic corrosion. Galvanic compatibility can also be managed by finishes and plating. Painting the entire cathodic material can be effective, but paint is not an entirely reliable separator. The rate of galvanic corrosion is governed by the size of the potential difference. The farther away the metals are from each other in the galvanic series (see chart below), the higher the potential difference, and the greater galvanic corrosion risk.

Avoid using a large surface area cathodic metal with a small surface area anodic metal. The cathodic metal will create a large current and transfer through the electrolyte to a small surface area causing significant corrosion in a localized element. For example, using galvanized fasteners on stainless steel is not recommended, but stainless steel fasteners on a galvanized member do not pose a large risk.



Office Spotlight

Larson Engineering | Norcross, GA

Opened in 1996, the Norcross office provides service to industrial clients, mainly in the mechanical and electrical disciplines. They also provide energy and alternative systems engineering services including thermal analysis and have in-house certified NFRC simulators.

Recently one of their projects, The Gateway Village - a three building mixed use project, made the news in Tennessee. The Norcross office provided the MEP design, Energy Modeling, and LEED credit counseling. You can watch a clip of the news coverage here.

Bleacher Inspections

In addition to curtain wall services, Larson Engineering also performs other types of services like bleacher inspections.

Not only is it important to maintain bleachers because of mandated codes, but also:

- Bleachers hold lives.
- Bleachers are often an integral part of functions, which generate revenue.
- Bleachers are less expensive to maintain than to replace.
- Bleachers, well maintained, reduce liability exposure.

Larson's structural and civil engineers can provide services on telescopic and grandstand bleachers.

Larson will:

- Review and identify problems, suggesting repairs if necessary
- Ensure code compliance
- Act as third party independent inspectors, you'll never get a sales pitch

YOUR INPUT

We'd love to hear what you have to say! Email us at momentum@larsonengr.com.

Want more? Check out www.larsonengr.com for past issues of our newsletter and more information on Larson Engineering.