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We welcome your feedback. Please contact Suzanne Phillips (suzanne.phillips@eriemetal.com, phone 716-542-3991) with any comments or questions.

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ERIE METAL SPECIALTIES

Tech Topics

by Suzanne Phillips

Welcome to *EMS Tech Topics*. This monthly e-publication covers technical subjects related to expansion joints. Each edition covers a different topic such as expansion joint use and function, installation, maintenance, warranties, etc. All current and previous editions are available on our website in Adobe Acrobat Reader (.pdf) format.

POTENTIAL EXPANSION JOINT ISSUES

This is the fifth installment of the *Tech Topics* series discussing potential issues with expansion joint systems and actions that can be taken to alleviate these problems. In previous installments, we provided an overview of some typical failure modes for various expansion joint systems, sealants, and caulks. We also looked at some of the underlying causes in the design phase of the project that may contribute to these potential issues. In this installment we will review underlying causes for failures in the installation, inspection, and maintenance phases of the project. We will also take a look at potential product issues that could affect the performance of expansion joint systems.

UNDERLYING CAUSES FOR EXPANSION JOINT FAILURES INSTALLATION PHASE

Certified or Approved Applicator

Proper installation of the expansion joint system is critical to its ability to function properly over its lifespan. One of the most important aspects of installing expansion joint systems is the degree of knowledge that the installing contractor has regarding the entire installation process, from substrate preparation through final cleanup techniques.

Expansion joint systems should only be installed by contractors who have been certified or approved by the manufacturer. Although many expansion joint systems appear to be similar, there are significant differences in the installation techniques between manufacturers. Improper installation can cause premature failure of the joint system.

Some manufacturers offer classes or schools to certify or approve contractors to install their products. These classes typically consist of one or two representatives from the contractor's company attending a classroom-type seminar along with several other contractors. An instructor provides an overview of the installation process and demonstrates the techniques used to install the expansion joints. Hands-on experience generally involves "installing" an expansion joint into a "perfect" expansion joint opening.

There are several potential issues with this type of certification program:

(1) The person(s) attending the seminar may never actually be on-site to install the expansion joint system
(2) Perfect expansion joint openings and blockouts that are used in the classroom do not exist in the real world
(3) There are problems that arise on the job site that cannot be adequately addressed in a classroom setting

To assure that the people installing the expansion joint system are properly trained, contractors should be certified by the manufacturer on-site. This allows the contractor's crews to learn how to address real-world situations such as poor substrate conditions, improper blockouts, expansion joint sizing issues, etc. in the environment that they are accustomed to working in. This type of training also gives the manufacturer the opportunity to properly assess the degree of understanding that the installers have attained throughout the training. Although this requires more effort for the manufacturer, the long-term benefits in terms of performance of the expansion joint systems far outweigh the costs.

Misunderstanding of Relationship Between Joint Opening Size and Temperature

It is critical that the contractor understand the relationship between the size of the expansion joint opening and the substrate temperature because this will affect the size of the material installed in the expansion joint opening.

As the temperature of the substrate increases, the material expands. This causes the size of the joint opening to decrease. A decrease in temperature causes the substrate material to contract which results in a larger joint opening.

Every expansion joint manufacturer provides a movement chart for their products. The mid-range joint opening is typically specified for substrate temperatures of approximately 70°F (that is the temperature of the concrete or other building material, not the air temperature).

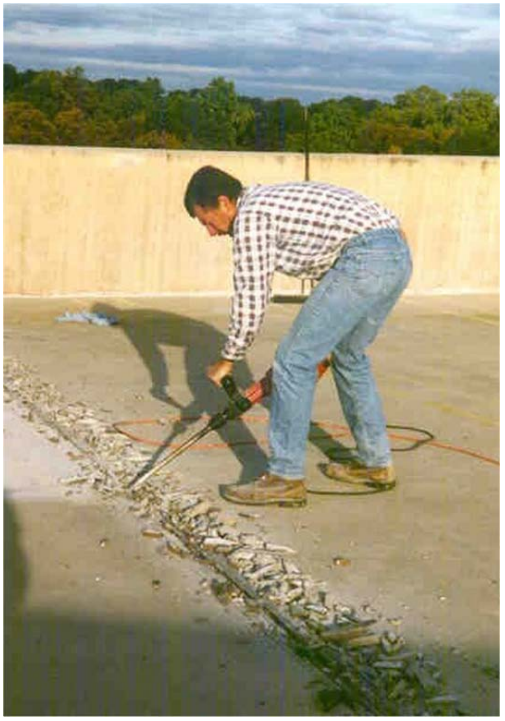
In the real world, expansion joint systems are installed in a wide range of substrate temperatures (from approximately 40°F to 120°F). These temperature variations will affect the size of the joint opening and the size of the material that should be installed. It is important for the contractor to understand these effects and to work with the manufacturer and/or architect/engineer to assure the proper size material is installed.

Installation Performed Outside Temperature/Moisture Guidelines

Expansion joint systems should be installed when the substrate temperature is between 40°F and 90°F. If the substrate temperature is outside of this range, special installation techniques and/or products may need to be used.

Moisture content is also important when installing expansion joint systems. The moisture content should be below 5%. Simple tools can be used to verify the temperature and moisture content prior to installing the expansion joint system.

Restoration Issues



Restoration projects involving expansion joint systems present unique challenges for the installing contractor including:

- Removal of existing expansion joint systems
- Repair/remediation of existing joint opening and/or blockouts
- Poor existing substrate

Many of these conditions are not evident until the existing expansion joint system is removed. This can lead to additional costs for repair that were not initially included in the project bid. The contractor should be aware of these potential problems and have the ability to address these issues as they are encountered.

Care and Supervision During Installation

It is primarily the manufacturer's responsibility to decide how much supervision the installing contractor requires during the project. Factors influencing this determination include:

- Level of experience of the on-site crew
- Complexity of the project/installation
- Length of time since last certification

This is an extreme example of what can happen when there is a lack of care and/or supervision on a job site.

Lack of Inspection Prior to Acceptance

Prior to issuing a warranty, the manufacturer and/or their representative should do a final inspection of the expansion joint system installation to assure that it was properly installed. Any issues with the system can be addressed at this time, before they become a major problem.

Lack of Proper Maintenance

Proper maintenance of the expansion joint is critical to its longevity. When dirt, debris, and stones are not removed from an expansion joint, they act like sand paper, abrading the sides of the system where the seal attaches to the substrate, eventually causing the seal to fail.

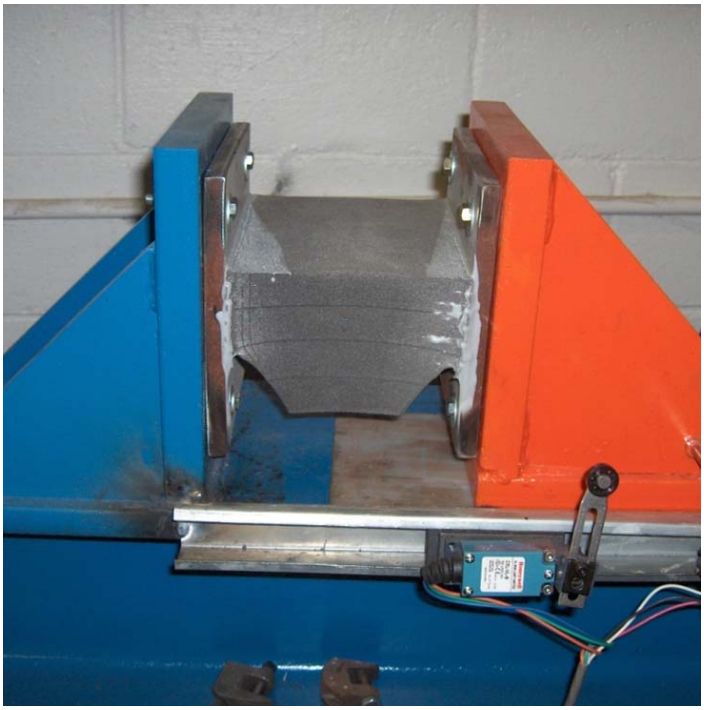
In addition to maintenance being a requirement for warranty purposes, properly maintaining an expansion joint system can significantly extend the life of the joint beyond the warranty period.

Defective Product/Lack of Adequate Testing

In addition to the standard tests conducted on expansion joint systems and individual components (primarily to ASTM specifications), manufacturers need to conduct “due care” testing to assure that their products will meet published data (and beyond).

R&D testing of potential new expansion joint system component.

“Due care” pull testing of a product beyond its published movement criteria



"Due care" cycle testing of a product beyond its published movement criteria

In the next installment of *Tech Topics* we will continue to explore the subject of potential issues with expansion joint systems by looking at the steps that can be taken proactively to alleviate these problems before they arise.