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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

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.

TESTING OF EXPANSION JOINT SYSTEMS

This is the fourth and final installment of the *Tech Topics* series providing an overview of expansion joint systems. In the previous installments, we provided an explanation of what expansion joints are and why they are needed, an overview of commercially available expansion joints, and considerations in expansion joint selection. In this issue we look at testing that should be conducted on expansion joint systems to assure that a high quality product is provided.

Testing is typically conducted on expansion joints to:

- assure that they meet standardized test criteria (typically ASTM)
- provide "due care" data to determine the limits of the system's functionality
- determine the functionality of the expansion joint system in unique applications.
- investigate a failure to determine the root cause of the problem

Standardized Testing

Most standardized testing for expansion joints is based on the American Society of Testing and Materials (ASTM) standards. A listing of the tests typically conducted follows:

- D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
- D2240 – Standard Test Method for Rubber Property – Durometer Hardness
- D573 – Standard Test Method for Rubber – Deterioration in an Air Oven
- D471 – Standard Test Method for Rubber Property – Effect of Liquids
- D1149 – Standard Test Method for Rubber Deterioration – Surface Ozone Cracking in a Chamber
- D395 – Standard Test Method for Rubber Property – Compression Set
- D624 – Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- D792 – Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- D746 – Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
- D638 – Standard Test Method for Tensile Properties of Plastics
- D570 – Standard Test Method for Water Absorption of Plastics
- D1299 – Test Method for Shrinkage of Molded and Laminated Thermosetting Plastics at Elevated Temperature
- E1399 – Standard Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Widths of Architectural Joint Systems

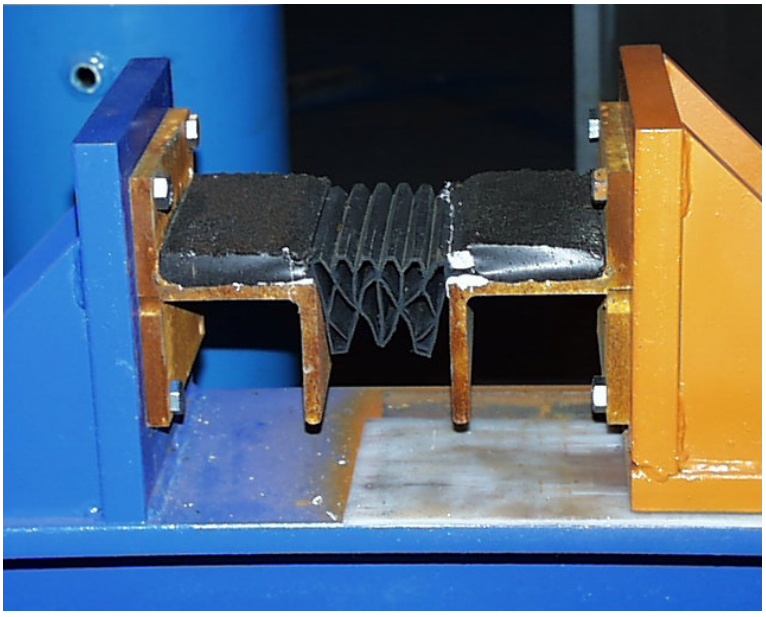
Due Care Testing

Due care testing is generally conducted to determine the limits of the expansion joint system's functionality. It is important for the manufacturer to understand how the system will function if it is subjected to conditions that exceed the published specifications for the product. This information allows the manufacturer to establish the movement criteria for the system, and also provides a basis for investigation of potential product failures.

Typical tests include:

- Tension testing beyond published movement criteria
- Compression testing beyond published movement criteria
- Cycle testing beyond published movement criteria
- Extreme temperature (hot, cold) testing
- Weather (rain, UV exposure) testing

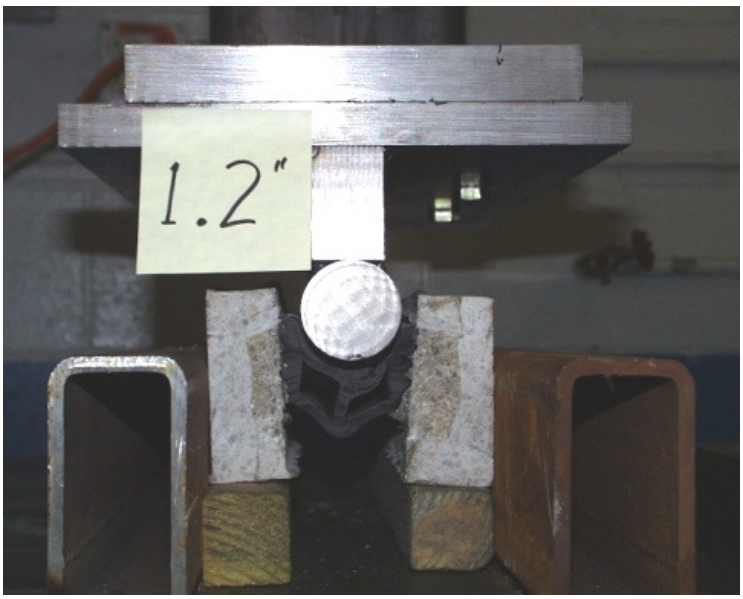
Extreme tension testing of JP-400 (4 inch) expansion joint system to almost 13 inches.



Cycle testing of wing expansion joint system

Unique Applications

There are occasions when expansion joint systems are used in applications that they are not “typically” designed for. In these situations, the system may be exposed to conditions or forces that they do not normally experience. These conditions can be simulated on a smaller scale in the laboratory to determine how the system will perform in real world conditions.



Pressure test of compression seal to determine if it would withstand water pressure in a holding tank

Compression testing of pre-compressed foam seal against window glass to assure that the glass and seal will not be affected

Investigative Testing

Occasionally, there will be an issue in the area where an expansion joint is installed. The problem may be with the expansion joint system, the installation, the substrate supporting the system, or other causes. When this situation arises, it is critical to avoid "finger pointing" and conduct an investigation to determine the root cause of the problem. Once the actual cause is defined, corrective actions can be taken. The investigation may involve various types of testing, including obtaining samples from the field that are used for evaluation purposes in a test laboratory.

Core samples taken from header material of wing expansion joint system to determine the cause of failures. Bond testing may also be conducted in the laboratory.

This concludes the “Overview of Expansion Joint” Tech Topics Series. The next Tech Topic series will be “Potential Issues with Expansion Joint Systems”. This series will provide examples of expansion joint failures and discuss how these failures may be avoided at each project phase (design, installation, inspection, maintenance).