Installing Rubber Expansion Joints Outdoors

The benefits, challenges and maintenance of these components.

MICHAEL LASSAS | Fluid Sealing Association member, Proco Products, Inc.

Rubber expansion joints play a crucial role in various piping applications, helping to absorb movement, reduce vibration and compensate for thermal expansion and contraction in piping systems. Whether utilized in heating, ventilation and air-conditioning (HVAC), power plants, water and wastewater treatment, chemical or oil and gas processes, rubber expansion joints face additional challenges when installed outdoors, including exposure to harsh environmental conditions. Understanding the benefits, potential challenges and necessary maintenance strategies is essential to ensure their long-term functionality.

Benefits of Rubber Expansion Joints in Outdoor Installations

1. *Flexibility and vibration absorption:* The flexibility of rubber expansion joints is highly beneficial, as it allows them to absorb movements in piping systems due to temperature fluctuations, seismic activity or mechanical vibrations. This flexibility is particularly beneficial in outdoor environments where temperature variations can be extreme.
2. *Corrosion resistance:* Unlike metal expansion joints, rubber expansion joints are resistant to corrosion caused by moisture, chemicals and atmospheric pollutants. This makes them ideal for outdoor applications in industries such as water treatment, power processing, chemical processing, HVAC systems and many other outdoor applications.
3. *Noise reduction:* Rubber expansion joints help dampen noise generated by fluid flow and mechanical vibrations, contributing to quieter operation in industrial and municipal settings (Fluid Sealing Association Technical Handbook Rev. 8.1, Appendix F).
4. *Weather and UV resistance:* Modern rubber expansion joints are designed to withstand UV radiation, ozone exposure and varying weather conditions. Special elastomers, such as ethylene propylene diene monomer (EPDM), offer enhanced resistance to sunlight and extreme temperatures. A chlorosulphonated polyethylene (CSM) coating is also an available option for enhanced UV protection.

Another option for both ozone and personnel protection is the utilization of external covers (shields). When designed correctly, the covers will still allow the expansion joint(s) to reach full movement capability and will protect personnel from direct spray in case of failure.

Challenges of Outdoor Installation

1. *UV and ozone degradation:* Prolonged exposure to UV rays and ozone can cause rubber to deteriorate over time, leading to cracks, hardening and loss of flexibility. Using UV-resistant rubber materials—and adding protective coatings such as CSM—can mitigate this risk. External covers as described above are also great tools in protecting expansion joints against the danger of UV and ozone degradation.

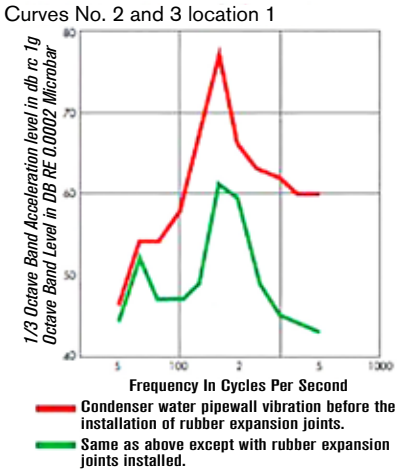

IMAGE 1: Noise reduction graph (Images courtesy of Proco Products, Inc.)

IMAGE 2: Degradation of the cover of an expansion joint from UV exposure

2. *Temperature extremes:* Outdoor installations may be exposed to freezing temperatures in winter and high heat in summer. Some rubber compounds, such as EPDM, perform well across a wide temperature range, while others, like natural rubber, may degrade faster in extreme conditions. It is important to consider the required environment temperature when selecting an elastomer that is compatible with the media, as this step helps ensure the longevity of the expansion joint in these conditions.
3. *Chemical exposure:* Industrial environments may expose rubber expansion joints to chemicals, oils or pollutants. Selecting the right elastomer based on the surrounding environment is critical to prevent premature failure.
4. *Physical damage:* Outdoor settings

pose a higher risk of physical damage from debris, wildlife or accidental impacts. Protective barriers or shields can help prevent this physical damage.

Maintenance & Inspection Strategies

1. ***Regular visual inspections:*** Routine inspections should check for cracks, hardening, swelling or deformation. Any visible damage may indicate degradation that could lead to failure if left unaddressed.
2. ***Cleaning and protective coatings:*** Periodic cleaning removes dirt, chemicals and debris that may accelerate rubber wear. Applying UV-resistant coatings or covers can extend the life of expansion joints exposed to direct sunlight.
3. ***Torque check on flanges:*** Bolted connections should be checked for proper torque to prevent leaks and ensure a secure fit. Loose bolts may cause misalignment or failure under pressure.
4. ***Replacement schedule:*** Even with proper maintenance, rubber expansion joints have a finite lifespan. Replacing them before they fail is crucial to prevent costly downtime or system damage.
5. ***Surveys:*** Preventive maintenance expansion joint surveys are beneficial for system reliability and the protection of critical equipment and people, allowing for smooth operation and cost savings. Benefits include:
   - Improving system reliability
   - Avoiding unplanned failures and outages
   - Maximizing efficiency and reducing energy costs

Manufacturers will routinely conduct site surveys, if asked, on their expansion joints that are installed on any jobsite.

Rubber expansion joints are vital components in all outdoor piping systems, providing flexibility, vibration damping and durability. However, their performance can be compromised by UV exposure, temperature extremes and physical damage. By selecting the right materials, conducting regular inspections and applying protective measures, industries can maximize the lifespan and reliability of these essential components. ■

FLUIDSEALING ASSOCIATION

We invite your suggestions for article topics as well as questions on sealing issues so we can better respond to the needs of the industry. Please direct your suggestions and questions to sealingsensequestions@fluidsealing.com.

Michael Lassas has held a variety of roles at Proco Products, Inc., since he joined the company in 1994, including assistant market/advertising manager, regional sales manager and vice president. He is now the president and CEO. For more, visit procoproducts.com.