



Expansion Joint Failure Caused by Uncontrolled Pipe Movement in a Pulp & Paper Boiler System



Application:

Holz Rubber Company engineered a custom rubber expansion joint for a condensate water piping system serving a boiler used for heat and energy generation in a pulp and paper manufacturing facility.

Condensate piping systems within pulp and paper mills experience continuous thermal expansion, pressure fluctuations, equipment vibration, and pipe movement during normal operation. Properly engineered rubber expansion joints help absorb these movements while protecting boilers, pumps, valves, and connected piping from excessive stress.

When piping systems lose proper anchoring or mechanical restraint, uncontrolled movement can quickly lead to premature expansion joint failure, costly repairs, and unexpected production downtime.

Problem:

After approximately 6½ years of continuous service, a rubber expansion joint experienced catastrophic failure, forcing an unplanned outage. An engineering evaluation determined that the failure was not caused by the expansion joint itself, but by excessive lateral movement within the piping system.

Over time, the pipe anchor points loosened, allowing the flanges to move laterally during operation. As the piping shifted from side to side, the flange bolts repeatedly rubbed against the outside arch of the rubber expansion joint.

This constant mechanical abrasion eventually wore through the expansion joint body, creating a weak point that ultimately failed under operating pressure. Without adequate pipe restraint, the expansion joint was subjected to movement beyond its intended design limits, dramatically reducing its service life.

Solution:

After the facility repaired the failed pipe anchors, Holz Rubber's distributor carefully evaluated the installation and measured the existing expansion joint. Rather than duplicating the failed component, Holz Rubber engineered a custom hand-built rubber expansion joint specifically designed for the corrected piping system.

The engineered replacement included:

- A custom ½-inch shorter face-to-face dimension
- A built-in 5/8-inch lateral offset (3–6 position) to accommodate actual piping conditions
- Recommendations to reverse the flange bolts so threaded ends faced away from the rubber arch
- Installation of control rods to mechanically limit excessive movement and protect the expansion joint from future over-travel

By addressing both the failed expansion joint and the underlying piping issues, Holz Rubber delivered a complete engineered solution designed to improve long-term reliability and reduce future maintenance.



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Why Pipe Movement Control Matters:

Many rubber expansion joint failures are actually the result of piping system problems, not defective expansion joints. Loose anchors, improper guiding, excessive lateral movement, incorrect bolt orientation, and insufficient mechanical restraints can all shorten expansion joint life and increase maintenance costs.

Proper expansion joint performance depends on:

- Secure pipe anchoring
- Proper pipe guides
- Mechanical control rods when required
- Correct bolt installation
- Application-specific expansion joint design
- Custom-engineered movement compensation

Evaluating the complete piping system—not just the failed component—helps maximize equipment reliability while reducing unplanned outages and maintenance costs.

Holz Rubber's engineering team partners with OEMs, consulting engineers, contractors, distributors, and industrial facilities to diagnose expansion joint failures and develop custom-engineered solutions for demanding industrial applications.

Results:

Eliminated the Root Cause

Increased Expansion Joint Service Life

Reduced Risk of Unplanned Downtime

Improved Boiler System Reliability

Engineered for Long-Term Performance

Holz Rubber Specializes In:

- Rubber Expansion Joints
- Condensate Water Expansion Joints
- Boiler Expansion Joints
- Pulp & Paper Expansion Joints
- Custom Hand-Built Expansion Joints
- Expansion Joint Failure Analysis
- Pipe Movement Compensation
- Thermal Expansion Solutions
- Industrial Boiler Piping Systems
- Control Rod Applications
- Industrial Piping Expansion Joints
- Custom Elastomer Engineering Solutions

“Experience the Difference”

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