The Bellows Bottom Line

Practical advice on expansion joints

by Greg Perkins JAN 2013

This month - GE Cross-Over Toroid Bellows Replacements

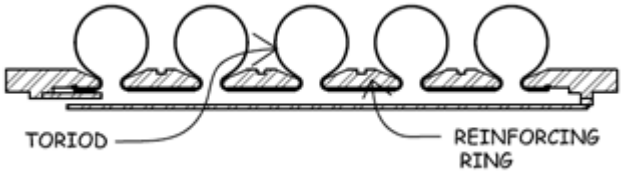
Protect the turbine with identical OEM designs

Beware of substitutions

Think twice, no think *three times* before allowing your original GE cross-over toroid expansion joint to be replaced by a different bellows design.

Many GE cross-over expansion joints have a toroid bellows profile, and some users get sold that the more common U-profile will be an adequate in-kind replacement. Don't believe it.

Toroid bellows are a great design, getting their name from the circular shape of their profile.



It is true that a U-profile bellows can be designed to take the same pressure, temperature, and movements as a toroid, but that's not the full story.

Design aside, the real reason not to change profiles is proven successful operational history of the part AND the turbine it was designed to protect.

Significant design differences

Three reasons to stay with the original Toroid profile:

Spring Rate. Often the redesigned U-profile bellows has a higher spring rate – that's bad long-term for the turbine. Even if the replacement bellows can be designed with a lower spring load, any such change can result in unexpected bellows harmonic behavior - in short, it might vibrate differently and fail way too soon.

Corrosion. Most folks attempting to build an aftermarket bellows don't know that the GE toroid bellows are vacuum annealed after forming. Annealing improves resistance to stress corrosion cracking in the material.

Pressure rating. Toroid bellows have burst pressures far in excess of U-profile bellows. That may be overkill but is just extra insurance.

Caution

I'm not saying a substituted U profile bellows will always fail in a cross-over designed for a toroid bellows - but I know several case studies where they have, for the reasons already listed.

The Bottom Line

U-profile bellows are not evil and do have their place – just not on your GE turbine that was designed to go with a toroid bellows cross-over.

Next Issue - Inspection of steam turbine cross-over bellows

The Bellows Bottom Line is a publication of Oakridge Bellows - for a free subscription sign up at www.oakridgebellows.com
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