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Abstract

The vast majority of in-service pipelines were built without explicit considerations for high longitudinal loading. Nevertheless, these pipelines can experience high longitudinal loading in service. Field experiences demonstrate the tolerance level of these pipelines to longitudinal loading vary greatly. Some pipelines can tolerate strains well over 2%; others could fail at strains as low as 0.2%.

This paper covers the general framework of strain-based integrity assessment, including the following key areas:

- Conditions in which the strain-based approach becomes necessary in contrast to stress-based approach,
- Compliance with codes and standards,
- Framework of conducting strain-based assessment,
- Methods of estimating strain demands, and
- Methods of estimating strain capacity, including considerations of the vintage of pipelines.

Guidance on performing successful assessment and cautionary notes will be provided.

Keywords

Linepipe, Modern microalloyed steels, Strain hardening, Hardenability, HAZ softening, Girth weld failures, Strain capacity