



# TECHNOLOGY *for* FUTURE *and* AGEING PIPELINES

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## **MANAGING STANDARDS WITH EVOLVING INDUSTRY PRACTICE – LESSONS LEARNED FROM GIRTH WELD FAILURES IN NEWLY CONSTRUCTED PIPELINES**

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### **ABSTRACT**

There have been at least 10 girth weld incidents in newly constructed pipelines in North America. Similar incidents have occurred in Asian and South America. In total, at least 30 such girth weld incidents are known to have occurred in newly constructed pipelines, including in-service failures and hydrostatic test leaks. The primary contributors to the failures in North America are (1) weld strength undermatching, (2) heat-affected zone (HAZ) softening, and (3) elevated stress/strain in the affected girth welds.

The girth weld failures have exposed gaps or disconnects among standards that govern the different phases of a pipeline's life. For instance, the selection of pipes for welding procedure qualification in most of the current standards makes no connection with the possible strength range of the linepipes, while the linepipe standards permit a large range of strength for a given grade of linepipes. Another example is that the welding procedure qualification requirements can be inadequate for loads imposed on the welds under realistic field conditions. The requirements in the customary stress-based design do not reflect these field conditions either. Some of these gaps are exacerbated by the continuously evolving industry practice, such as linepipe manufacturing and field girth welding. For instance, girth welding standards have historically focused on the detection and prevention of weld flaws. However, many of the girth weld failures mentioned above did not involve flaws of discernible size.

This paper is intended to promote fresh thinking in reference to some well-established assumptions which may not be well-founded as demonstrated by newly available data. The paper starts with a brief review of girth weld incidents and contributing factors. Elements in current standards that are relevant to those contributing factors are examined. The paper closes with a brief summary of identified gaps and proposes possible changes to relevant standards.

### **KEYWORDS**

Pipeline, standards, new and ageing pipelines, girth weld failures