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Design, Installation and Operation of Thermoplastic Liners for Oilfield Pipelines

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Foreword

Thermoplastic liners are used to protect new and rehabilitated pipelines from internal corrosion in oilfield service. This Standard Practice is intended for use by liner designers and installers, owners of lined pipelines, liner materials suppliers, consultants, and construction and engineering firms engaged in the subject field. It is intended to provide guidance to designers, specifiers, installers, and operators of oilfield pipelines that use thermoplastic liners as a corrosion and/or abrasion mitigation method.

Errors in design, material selection, installation, and operation can cause catastrophic failure of the lined system with undesirable release of pipeline contents and extended shutdown times while repairs are completed. With proper design, installation, and operation lined systems can protect steel host pipelines from internal corrosion for decades.

It is to the benefit of liner users and installers to have a standard for liner design, installation, and operation to help ensure that the installed product meets performance expectations. This Standard Practice is not intended to replace existing national or corporate standards and requirements based on specific local experience. It is intended to provide a foundation for proper use of thermoplastic liners in cases where there is no established standard.

Scope

This standard defines the process necessary to design, install, and operate a thermoplastic-lined oilfield pipeline. The design process includes an assessment of the service conditions, materials of construction, chemical compatibilities of liner materials with any service fluids and additives, pipeline geometry, and risk analysis. The installation process includes site surveys, pipeline preparation, insertion, termination, pressure testing, reburial, and safety. Operation of a lined system must take into consideration the service fluids, materials of construction, safety and environment, commissioning, normal operation, de-pressuring, and upset conditions, and inspection for liner integrity.

The subject liners are installed in the field after construction of the steel host pipeline is completed. The host pipeline must be capable of bearing the entire pressure load of the operating pipeline. The liners may be installed in new pipelines to prevent corrosion, or in existing pipelines for rehabilitation purposes. The liners consist of a free-standing thermoplastic pipe that is inserted into the existing steel host pipe and is designed in such a way that the liner pipe does not require the use of a third material to fill any gaps between the liner and the host pipe.

This standard is not intended to replace detailed procedures specific to the installation method developed by installers, nor is it intended to replace pipeline operating instructions developed by operators. It is intended to set minimum requirements for performance within the scope of these procedures and instructions. This standard is not intended to apply in all cases relating to the subject. Unpredictable circumstances can negate the usefulness of this standard in specific instances.

This standard is not applicable to thermoplastic pipes (often referred to as liners), that are inserted into a host pipe, but are required to contain the pressure of the service without the host pipe.

Rationale

This edition of NACE SP0304 is a major revision of SP0304-2016, adding more information about liner materials, design, and installation methods, and reorganizing the content for clarity. Comments from users of the 2016 edition identified a need to make the document less like a technical report and more like a normative standard. Some clauses have been made mandatory, and some clauses have been clearly identified as nonmandatory informative notes. Liner polymer material information has been moved from the body of the document to Appendix A (nonmandatory) with expanded content improving flow in the mandatory body of the document and adding clarity to the liner materials information.