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Design, Installation, and Operation of Thermoplastic Liners for Oilfield Pipelines

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ABSTRACT

This NACE International standard practice defines the process necessary to design, install, and operate a thermoplastic-lined oilfield pipeline and provides a foundation for proper use of thermoplastic liners in cases where there is no established standard. It is not intended to replace existing national or corporate standards and requirements based on specific local experience. This standard is intended for use by liner installers, owners of lined pipelines and pipelines that might at some point need a liner, liner materials suppliers, and consultants, and engineering firms engaged in the subject field. The intent is that project specifications be developed based on this standard. The standard provides a common design basis consistent with best engineering practices. 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 represents minimum requirements and should not be interpreted as a restriction on the use of better procedures or materials.

KEYWORDS

annulus, buckling, critical buckling pressure, hoop compression, hoop tension, NACE Publication 35101, oilfield pipelines, ovality, thermoplastic liners, thermoplastic polymer, TG 037

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Foreword

In NACE standards, the terms shall, must, should, and may are used in accordance with the definitions of these terms in the NACE Publications Style Manual. The terms shall and must are used to state a requirement, and are considered mandatory. The term should is used to state something good and is recommended, but is not considered mandatory. The term may is used to state something considered optional.

Thermoplastic liners for pipelines are being specified with increasing frequency to protect new and rehabilitated pipelines in corrosive oilfield services. Thermoplastic liner systems are described in NACE Publication 35101.[1] The Plastics Pipe Institute (PPI)(1) published a report on pipeline rehabilitation by sliplining with polyethylene (PE) pipe.[2] Svetlik has reviewed tight-fitting liner technologies in an ASTM(2) publication.[3] The Canadian Standards Association(3) has also addressed thermoplastic liners.[4] Some oil and gas companies have developed internal standards and specifications.

This NACE International 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. This standard is intended for use by liner installers, owners of lined pipelines and pipelines that might at some point need a liner, liner materials suppliers, and consultants, and engineering firms engaged in the subject field.

The growth of interest in liners is driving the emergence of installation contractors engaged in supplying liners for pipeline owners. If the owner has internal specifications and performance requirements that must be met by the contractor, or if the contractor is experienced and has expertise in all aspects of liner design and installation, it is likely that the right choices will be made and the lined pipeline will operate successfully for the designed lifetime. This case implies the participation of companies with substantial technical resources that can be brought to bear on the project. Successful implementation of a lined pipeline system requires experience and expertise on the part of both the installer contractor and the operator.

The intent is that project specifications be developed based on this standard. It provides a common design basis consistent with best engineering practices. 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 represents minimum requirements and should not be interpreted as a restriction on the use of better procedures or materials.

This NACE standard was originally published in 2004 and revised in 2016 by NACE Task Group (TG) 037, "Pipelines, Oilfield: Thermoplastic Liners." TG 037 is administered by Specific Technology Group (STG) 03, "Coatings and Linings, Protective—Immersion and Buried Service," and is sponsored by STG 10, "Nonmetallic Materials of Construction"; STG 33, "Oil and Gas Production—Nonmetallics and Wear Coatings (Metallic)"; and STG 35, "Pipelines, Tanks, and Well Casings." This standard is published under the auspices of STG 03.

(1) Plastics Pipe Institute (PPI), 105 Decker Court, Suite 825, Irving, TX 75062.
(2) ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
(3) Canadian Standards Association (CSA), 5060 Spectrum Way, Mississauga, ON L4W 5N6 Canada.

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