

Liner Hanger Equipment

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Introduction

This specification has been developed by users/purchasers and suppliers/manufacturers of liner hanger systems and related equipment as defined herein and is intended for use in the petroleum and natural gas industry worldwide in order to give requirements and information to both parties in the selection, manufacture, testing, and use. Further, this document addresses the minimum requirements with which the supplier/manufacturer is to comply so as to claim conformity with this document.

This specification has been structured with two types of liner hanger systems (conventional and expandable) and two types of activation mechanisms for conventional liner hanger systems (mechanical-set and hydraulic-set).

This specification has been structured with grades of increased requirements in quality control and design validation. These grades allow the user/purchaser to select the level of requirements that are required for a specific application.

There are three quality grades. Quality grade QL3 is the minimum grade and aligns with supplier/manufacturer-defined quality requirements. Quality grade QL2 is an increased level of quality and generally allows the sampling of components to verify quality requirements are met. Quality grade QL1 is the highest grade provided.

There are three design validation grades for products. Design validation grade V3 is the minimum grade and aligns with supplier/manufacturer-defined product validation. Design validation grade V2 requires testing with liquid as a test medium, while validation grade V1 requires testing with nitrogen.

There are three design validation grades for systems. System design validation grade VS3 is the minimum grade and aligns with the supplier/manufacturer-defined validation methods. System design validation grade VS2 requires system testing with liquid as a test medium, while validation grade VS1 requires system testing with nitrogen. Grades VS2 and VS1 can be achieved by testing an entire system, or by combining individual validated products.

Annexes A, B, C, D, and G are informative requirements, where Annexes E, F, and H are normative.

The International System of Units (SI) is used in this document; however, US Customary (USC) or other units are also shown for reference.

Users of this specification should be aware that requirements beyond those outlined in this document may be needed for individual applications. This specification is not intended to inhibit a supplier/manufacturer from offering, or the user/purchaser from accepting, alternative equipment or engineering solutions. This can be particularly applicable where there is innovative or developed technology. Where an alternative is offered, it is the responsibility of the supplier/manufacturer to identify any variations from this specification.

Liner Hanger Equipment

1 Scope

This specification provides requirements for conventional and expandable liner systems, including liner hangers, liner packers, liner hanger packers, tie-back/polished-bore receptacles (TBR/PBRs), seal assemblies, setting adaptors, sleeves, and running/setting tools as defined herein for use in the oil and natural gas industry. This specification provides minimum requirements for the functional specification and technical specification, including design, design verification and validation, materials, quality control, documentation and data control, repair, shipment, and storage.

Products covered by this specification apply only to applications within a conduit. Installation and field maintenance are outside the scope of this specification. Also not covered in this specification are casing crossover subs, expandable tubulars and expandable connections, end connections to the liner, cementing aids, liner top plugs and drill pipe darts, landing collars, float equipment, wellhead/casing hanger, sub-mudline suspension equipment, and cementing heads. Products covered by other API specifications are not in the scope of this specification.

2 Normative References

The following referenced documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Recommended Practice 5C5, 4th Edition, *Procedures for Testing Casing and Tubing Connections*

API Specification 5B, *Threading, Gauging, and Thread Inspection of Casing, Tubing, and Line Pipe Threads*

API Specification 5CT, *Specification for Casing and Tubing*

API Specification 5L, *Specification for Line Pipe*

API Specification 7-2, *Specification for Threading and Gauging of Rotary Shouldered Thread Connections*

API Specification 11D1, *Packers and Bridge Plugs*

API Specification Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

API Technical Report 5C3, *Calculating Performance Properties of Pipe Used as Casing or Tubing*

ANSI/NACE MR0175-1, *Petroleum and Natural Gas Industries—Materials for Use in H₂S-Containing Environments in Oil and Gas Production*

ASME Boiler and Pressure Vessel Code² (BPVC), Section VIII: Rules for Construction of Pressure Vessel—Division 1, UW-40: Procedures for Post-weld Heat Treatment

ASME Boiler and Pressure Vessel Code (BPVC), Section IX: Welding and Brazing Qualifications

ASNT RP-SNT-TC-1A³, *Personnel Qualification and Certification in Nondestructive Testing*

¹ NACE International, 15835 Park Ten Place, Houston, Texas 77084, www.nace.org.

² American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990, www.asme.org.

³ American Society for Nondestructive Testing, PO Box 28518, 1711 Arlingate Lane, Columbus, OH 43228-0518, www.asnt.org.