Verification and Validation of Subsea Connectors

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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Contents

Introduction

This technical report has been prepared to provide a validation test protocol for subsea connectors for validating the verification analysis. The verification analysis methodology provides guidance to generate connector performance capacity charts.

The intention is to facilitate and complement the connector selection process by ensuring that capacities are determined using common industry design criteria, and to demonstrate leak tightness and structural capacities through testing. This report is not intended to replace sound engineering judgement, nor should it limit additional scope validation tests.

Verification and Validation of Subsea Connectors

1 Scope

This Technical Report provides requirements and recommendations for the verification and validation of subsea connectors. It is intended to serve as a common reference for designers, manufacturers, and users to improve the performance assessment of subsea connectors and to improve the reliability and integrity of subsea systems.

This technical report is applicable to subsea connectors along the vertical centerline of subsea hardware (i.e. tree, tubing head, tree cap, tree running tool, well control package connectors, and EDP connectors), the subsea wellhead, and the completion/workover riser. The methodology provided herein may also be used in other connector designs. Connectors outboard of the vertical centerline are addressed in API 17R.

The scope of this Technical Report includes connectors subjected to structural and pressure loads for wellhead, tree, tubing head, tree cap, tree running tool, and EDP connectors, and is intended to define general performance capacities for API 17D, API 17G, and other applications.

In the development of this Technical Report, verification and validation of casing and tubing connectors and welded connectors are recognized as ongoing work. At this time, casing and tubing connectors and welded connectors are not within the scope of this document and are deferred to their applicable specifications.

Differential external pressure effects are not within the scope of this document—refer to API 17TR12.

Fatigue verification through analysis is included. Fatigue testing of subsea connectors is not a mandatory requirement.

2 Normative References

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

API Specification 6A, *Specification for Wellhead and Christmas Tree Equipment*

API Specification 17D, *Design and Operation of Subsea Production Systems—Subsea Wellhead and Tree Equipment*

API Recommended Practice 17G, *Recommended Practice for Completion/Workover Risers*

API Technical Report 17TR8, *High-pressure High-temperature Design Guidelines*

ASME BPVC Section VIII, *Rules for Construction of Pressure Vessels Division 2—Alternative Rules*

ASME BPVC Section VIII, *Rules for Construction of Pressure Vessels Division 3—Alternative Rules for Construction of High Pressure Vessels*

BS 7608: Guide to fatigue design and assessment of steel products

DNVGL-RP-C203: Fatigue design of offshore steel structures