Subsea Umbilical Termination (SUT) Design Recommendations

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0 Introduction

General

This document was generated, by means of the UMSIRE Joint Industry Project (JIP) in response to the increasing difficulties in installation of high-functionality Subsea Umbilical Terminations (SUTs), due to their increasing size. The JIP committee comprised a representative cross section of experienced industry personnel from engineering, installation and operational organizations.

Whilst there are universally accepted standards for the design of an SUT and its sub-systems, none of these standards specifically address the subject of the risks of installation, and the measures required to minimize these risks.

The UMSIRE deliverables are two API documents, 17TR9, *Subsea Umbilical Termination (SUT) Selection and Sizing Recommendations* (under development) and 17TR10, *Subsea Umbilical Termination (SUT) Design Recommendations*.

This document is intended to be used as a reference guide by operators, UTA and umbilical specifiers, installers and FEED companies. It is also intended to be used as a reference document to enable reviews to be undertaken to ensure that installation risk has been properly considered as part of SUT design and operation reviews.

Additionally, the document has been designed to be educational such that persons new to the industry, or, less experienced persons within the industry, can understand the implications of UTA design on installation feasibility.

The intent with describing these project stages (see Figure 0.1) is to clarify when within the umbilical project timeline each UMSIRE document should be referenced, and the interested parties that should be involved in discussions during each stage.

Use of the Document

The users of these Design Recommendation TRs are primarily intended to be operators, SUT designers, and FEED companies. Umbilical system design and manufacturing roles and responsibilities are defined in Annex A.

Applicability

Figure 0.2 and Figure 0.3 are pictorial examples of the equipment covered by this TR.

This Design TR aims at capturing the primary aspects impacting on the overall dimensions and weight of the UTA, and highlighting the consequences of design choices.

This document excludes multibore hub connection-type (MHC) UTAs which can connect the umbilical directly to other subsea hardware. Although MHC UTAs are out of scope, many of the guidelines in this document would apply.

Designers should be aware that integration of multiple distribution outlets leads to a significant increase in size and therefore weight of the UTA. For the purpose of reducing the size and weight of the UTA, this document discourages the use of multiple distribution outlets wherever possible.

It is however acknowledged that having a separate Subsea Distribution Unit (SDU) may have an impact on the overall cost. This decision should be made with consideration for the limiting dimension and weight of the UTA.

The document has an educational purpose and is intended to be descriptive rather than prescriptive.

It is important to note that none of the following sections should be read in isolation.

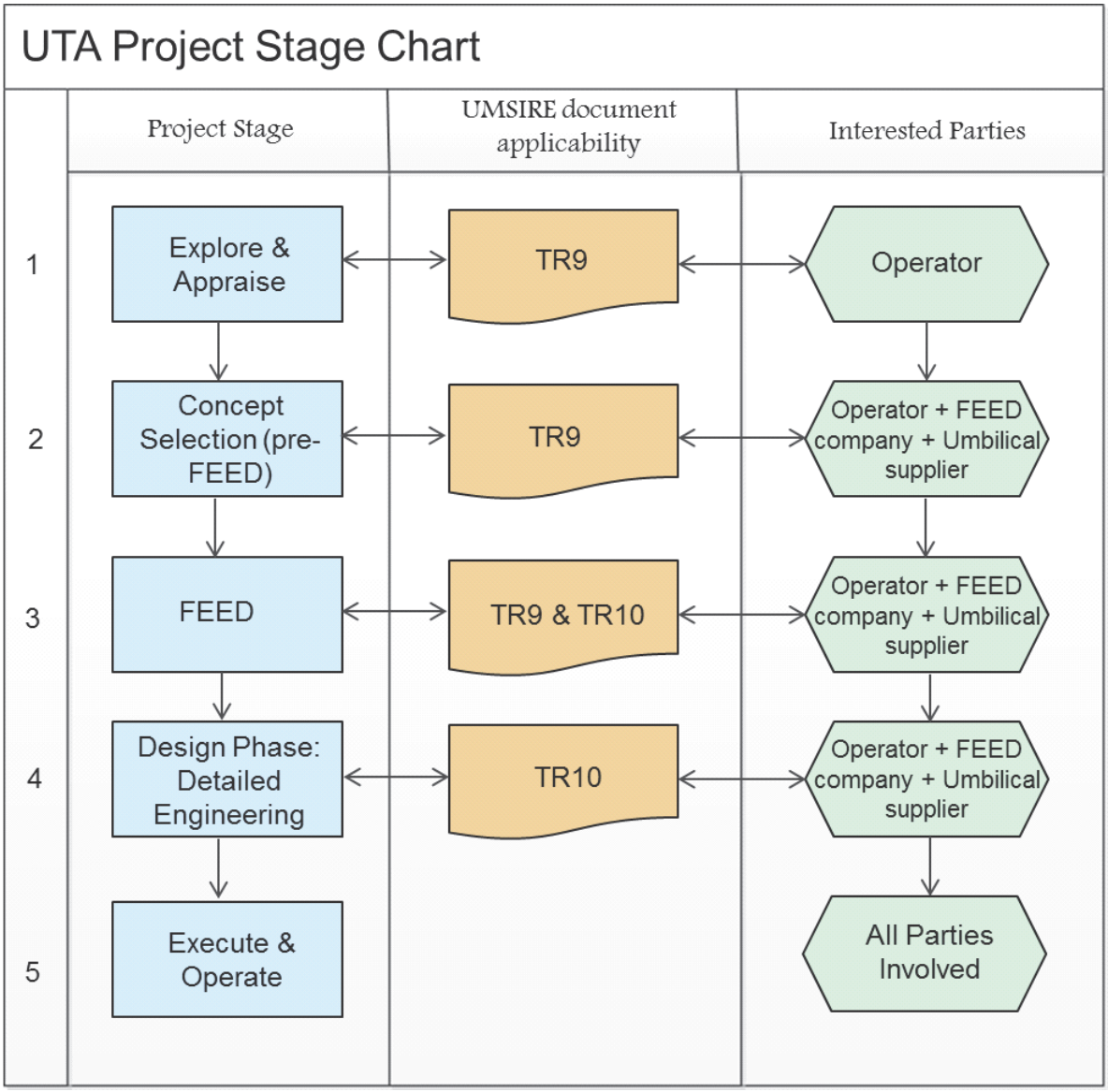

Figure 0.1—Project Stage Chart

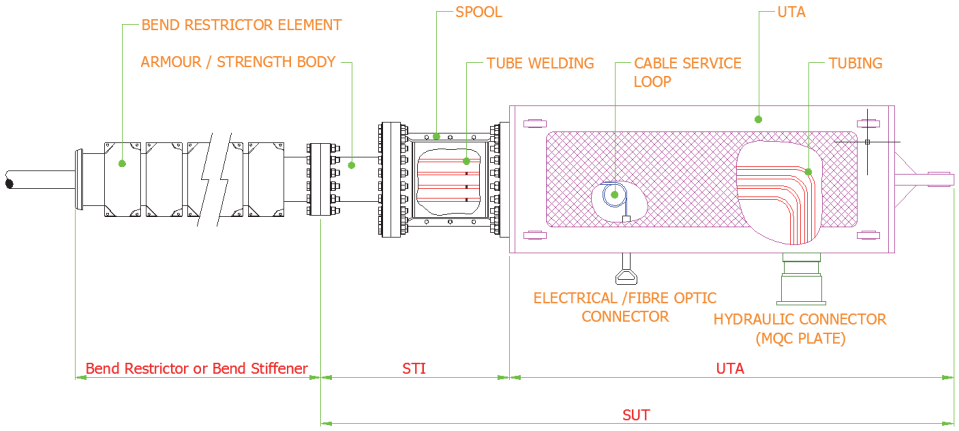

Figure 0.2—Steel Tube Umbilical or Thermoplastic Umbilical with Spool

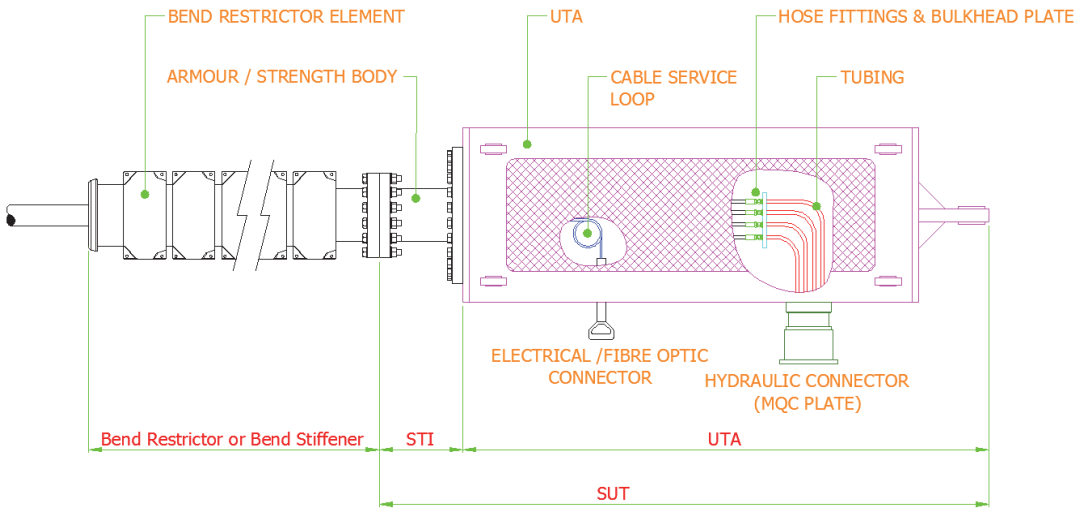

Figure 0.3—Thermoplastic Umbilical

Subsea Umbilical Termination (SUT) Design Recommendations

1 Scope

This document aims to provide best practice technical guidance for SUT design, in order to aid in making informed choices during the design phase.

This document is intended to be read in conjunction with API 17TR9 (under development), which highlights technical and commercial risks associated with high functionality umbilical terminations, the implications of decisions made early in the umbilical and SUT planning, selection and design phases, and provides guidance on specification and sizing of SUTs.

2 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 Recommended Practice 17A, *Design and Operation of Subsea Production Systems—General Requirements and Recommendations*

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

API Specification 17E, *Specification for Subsea Umbilicals*

API Specification 17F, *Specification for Subsea Production Control Systems*

API Recommended Practice 17H, *Remotely Operated Vehicle (ROV) Interfaces for Subsea Production Systems*

API Recommended Practice 17P, *Design and Operation of Subsea Production Systems - Subsea Structures and Manifolds*

ASME B31.3 [1], *Process Piping Guide*

ASME B16.5, *Pipe Flanges and Flanged Fittings, NPS 1/2 through NPS 24 Metric/Inch Standard*

ASME B16.47, *Large Diameter Steel Flanges, NPS 26 through NPS 60 Metric/Inch Standard*

DNV RP B401 [2], *Cathodic Protection Design*

DNV RP F112, *Design of Duplex Stainless Steel Subsea Equipment Exposed to Cathodic Protection*

DNV RP H103 or DNV VMO (DNV-OS-H101 to H206), *Modeling and Analysis of Marine Operations*

3 Terms, Definitions, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

[1] ASME International, Two Park Avenue, New York, New York 10016-5990, www.asme.org.
[2] Det Norske Veritas, Veritasveien 1, 1322, Hovik, Oslo, Norway, www.dnv.com.