Recommended Practice on Subsea Production System Reliability, Technical Risk, and Integrity Management

API RECOMMENDED PRACTICE 17N
SECOND EDITION, JUNE 2017

ADDENDUM 1, MAY 2018
REAFFIRMED, APRIL 2023

AMERICAN PETROLEUM INSTITUTE

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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.

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Introduction

Reliability and integrity can have major environmental, safety, and financial impacts for all organizations involved in designing, manufacturing, installing, and operating subsea equipment. The complexity of technical and organizational challenges in subsea projects and operations requires continual attention to detail to achieve high reliability and integrity performance.

Equipment reliability is important both to system integrity and to production. For example, poor seal reliability in a flow line connector may result in loss of containment with the potential for environmental damage. Valves that fail to close on command may prevent isolation and compromise safety. Valves that fail to open on command may compromise production.

Budget and schedule constraints can lead to limited information and time for making decisions. This can introduce varying levels of uncertainty that have the potential to affect equipment reliability, integrity, and associated operational risks. In particular, any potential failures that lead to loss of containment or loss of production should be thoroughly investigated and actions taken to manage the risks that such events generate.

This recommended practice (RP) provides a structured approach that organizations can adopt to manage technical uncertainty throughout the life cycle of a subsea system. This may range from the management of general project risk through to the identification and mitigation of potential equipment failure modes, affecting integrity or production.

Most organizations will find much that is familiar and recognized as good practice. Some sections of the annexes may only be of interest to the reliability and integrity specialist. The basic approach, however, is simple and consistent and when applied correctly has the potential to greatly reduce the financial, safety, and reputational risks, arising from potential failures, throughout the life cycle of subsea systems.

Although this RP is focused on subsea production equipment, the guidance is generic and may be easily adapted to address the design of subsea hardware used for drilling operations including the subsea blowout preventer and lower marine riser package.

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1 Scope

This recommended practice (RP) aims to provide operators, contractors and suppliers with guidance on the management and application of reliability and integrity management (RIM) engineering techniques in subsea projects and operations within their scope of work and supply. It is applicable to:

— standard and nonstandard equipment (within the scope of API 17A);

— new field developments, further development of existing fields and field upgrades;

— all life cycle phases from feasibility through design, manufacture, and operation to decommissioning.

NOTE API 18LCM [1] gives additional guidance on general requirements for life cycle management of equipment.

This RP is **not** intended to replace individual company processes, procedures, document nomenclature, or numbering; it is a guide. For example, this RP does not prescribe the use of any specific equipment or process. It does not recommend any actions, beyond good engineering practice. However, this RP may be used to enhance existing processes, if deemed appropriate.

2 Normative References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document applies.

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

API Recommended Practice 17Q, *Technology Qualification for Subsea Equipment*, Second Edition

NOTE API 17Q, Second Edition is planned for publication in 2017. Annexes E and F are included in this document to provide interim guidance and will be removed once API 17Q, Second Edition is published. For all references in the text to API 17Q, the reader should refer to these annexes until API 17Q is published.

API Recommended Practice 75, *Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities*

API Recommended Practice 580, *Risk-Based Inspection*

BS [1] IEC [2] 62198:2001, *Project risk management—Application guidelines*

DNV-RP-A203 [3], *Technology Qualification*, July 2013

IEC 61508, *Functional safety of electrical/electronic/programmable electronic safety-related systems*

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[1] British Standards Institution, Chiswick High Road, London, W4 4AL, United Kingdom, www.bsi-global.com.

[2] International Electrotechnical Commission, 3, rue de Varembé, P.O. Box 131, CH-1211 Geneva 20, Switzerland, www.iec.ch.

[3] DNV GL, Veritasveien 1, 1363 Hovik, Norway, www.dnvgl.com.