

GENERAL SPECIFICATION

Drilling & Wells

GS EP FP 336

Conductor, riser, casing and tubing connection qualification requirements
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1. Scope

The scope of this document is to provide general technical requirements for the connections of the conductor, casing and tubing for use within Total and its affiliates in order to ensure appropriate level of connection performance in regards to Company's well integrity and operational performance.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
API RP 5C5	Recommended Practice on Procedures for Testing Casing and Tubing Connections
API RP 5C6	Welding connection to Pipe
API RP 17G	Recommended Practice for Completion/Workover Risers
API SPEC 5CT + errata 1 & 2	Specification for Casing and Tubing
API TR 5C3	Technical Report on Equations and Calculations for Casing, Tubing, and Line Pipe used as Casing or Tubing; and Performance Properties Tables for Casing and Tubing
DNV-RP-C203	Fatigue Design of Offshore Steel Structures
ISO 11960	Petroleum and natural gas industries — Steel pipes for use as casing or tubing for wells
ISO 13628-7	Petroleum and natural gas industries – Design and operations of subsea production systems – Part 7: Completion/workover riser systems
ISO 13679	Procedures for testing casing and tubing connections
ISO/FDIS 13679:2011	Procedures for testing casing and tubing connections – Final Draft 2011

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Reference	Title
GS EP FP 330	Manufacturing and qualification specification for new seamless OCTG carbon & low alloy material
GS EP FP 335	Manufacturing Specification for new seamless OCTG in corrosion-resistant material
GS EP FP 339	Manufacturing & Welding of Connectors to Conductor Pipe

3. General Connection Approval Guidelines

Due to an ever-growing demand from projects to evaluate the “qualification” status of different configurations of proprietary (premium seal threaded) connections, connectors with resilient and/or premium seals for conductors and riser application, the Company has attempted to consolidate, rationalize and simplify the review of such connections.

As the result of this work, a number of guidelines have been defined.

3.1 Qualified vs Approved

In the past, the terms qualified and approved have been used interchangeably and without being properly defined. To avoid confusion and misunderstandings, the term *approved* has been defined by the Company as the standard when referring to a proprietary connection whose claimed performance has been reviewed and accepted by the Company for a particular and specific use (pressure, structural load and temperature scenarios). The term qualified or qualification will be understood to make reference to the tests that the connection may have undergone, but does not have any value in terms of authorization for use within the Company.

3.2 Definition of Approved Proprietary Connection

An approved proprietary connection is a connection for which sufficient data is available (physical test results, FEA analysis, extrapolation evaluation, fatigue test/model data, etc) to attest for the performance of such connection under certain load scenarios. In other words, the claimed performance of the connection has been proven and accepted for use by the Company.

Approval of a connection is given for specific configurations of tension, compression, internal/external pressure and temperature and, where applicable, applied fatigue SN curves and SCF data. A fit-for-purpose check has to be done between the potential well loads to be seen by the connection in a particular well, and the approved envelope. The fatigue model has also to be verified where applicable.

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3.3 Approval of a Proprietary Connection

It is the responsibility of the proprietary connection's supplier to provide the necessary data (physical test results, FEA analysis, extrapolation evaluation, fatigue test/model data, etc.) to prove the claimed performance of the connection under specific load scenarios.

The corresponding documentation package will be reviewed by the Company to verify that the conditions under which the tests were performed, the test protocol, the fatigue model (where applicable) and the procedures comply with international standards. Once reviewed and accepted, the proprietary connection will be approved for use in specific load scenarios consistent with the load cases evaluated in the tests and/or the FEA analysis.

Approved connections are registered in the Company's FP Approved Connection library. This library lists several configurations (OD, wt, grade, connection) of proprietary connections, summarizes their approval status and has available for review the completed and approved Connection/Connector Product Data Sheets (PDS) as per Total template given in Appendix 1 and 2.

3.4 Mandatory fit-for-purpose check before use of proprietary connection

Approved connections have to undergo a mandatory fit-for-purpose check prior to selection and use. This check is to be performed by the end-user (Company's casing design engineer). A fit-for-purpose check compares the well loads to be experienced by the connection with the load cases for which it was approved. This process may be achieved by comparing the connection performance envelope (VME) against the well load case envelope obtained from the FP recommended Casing design Well Stress analysis software.

4. Connection Design Approval Requirements

The Connector Supplier shall provide evidence of sealability, galling, operational and structural performances by undertaking the verification process outlined below of which results shall be compiled in the required approval documentation package.

Connection Supplier shall be able to pertinently answer any and all requests relating to the connection in question and provide support data during the review and approval process but also during the whole life of the wells where the connection has been installed.

4.1 Casing and tubing

The following subjects shall be evaluated by the Company's Connection Specialist in Drilling & Wells Entity at HQ in conjunction with the Casing Design Champion, and Project Well Architecture Engineer in order to approve the connection for use within the Company.

4.1.1 Tests in accordance with [ISO 13679](#) or [API RP 5C5](#)

Connection performance envelope shall be proven by physical tests in accordance with [ISO 13679](#) (any revision and draft) or [API RP 5C5](#).

The Company concedes that these sort of tests are generally very resource demanding and time-consuming, and for this reason, it is at Company's Connection Specialist discretion to consider and accept deviations or abbreviated versions of such tests.

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In any case, deviations or abbreviated versions of the tests will only be considered for single connection references for which a history of full-tests exists for the given connection product line.

A connection reference is to be understood as the specific OD-weight-grade-connection configuration (i.e. 9 5/8" 53.5ppf L80 Proprietary Connection X). Depending on the number of connection references that needs to be evaluated and approved, the Company, in agreement with the Connection Supplier may decide to follow a *single connection reference* approval or a *connection product line* approval.

It is recognized that the current international standards place a limit of 180°C on CAL IV testing. Where expected service conditions exceed this temperature, bespoke supplementary tests may be requested taking into account the worst case temperature domain (either static or flowing conditions).

4.1.1.1 Single connection reference approval

Single connection reference approval may be selected when a limited and specific number of connection references need to be evaluated or when there is insufficient data for a connection product line approval.

For single connection reference approval, the Connection Supplier shall submit:

- Full test report of [ISO 13679](#) (any revision and draft) or [API RP 5C5](#) based test for the requested level of performance (CAL I to IV of different [ISO 13679](#) revisions and drafts).

Executive summaries of tests may be acceptable at Company's Connection Specialist discretion.

- If the connection reference has not been tested, but similar connection references have, an Extrapolation / Scaling Report may be submitted.

Extrapolation / Scaling is the theoretical methodology by which the Connection Supplier is able to demonstrate that the connection reference in question can be assumed to have a similar performance rating as an already tested connection reference (or group of connection references). Extrapolation / Scaling rules are to be agreed with Company. Extrapolation / Scaling may be done by FEA and criticality analysis for connection references which follow the same design criteria elements¹ (justification to be included in Extrapolation / Scaling Report).

¹Design criteria elements as per [ISO/FDIS 13679:2011](#) § G.3.

- Connection/Connector Product Data Sheet following Company template provided in Appendix 1 and 2.

4.1.1.2 Connection product line approval

Connection product line approval may be proposed by the Connection Supplier or requested by the Company considering that full-scale physical testing on every connection reference is not practical.

Connection product line approval shall follow the framework presented in [ISO/FDIS 13679:2011](#) Annex G and as such Connection Supplier shall submit the following documents for connection production line review: