

DEP SPECIFICATION

**SPECIAL PURPOSE STEAM TURBINES
(AMENDMENTS/SUPPLEMENTS TO API STD 612:2014)**

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DESIGN AND ENGINEERING PRACTICE

DEM1



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These views are based on the experience acquired during involvement with the design, construction, operation and maintenance of processing units and facilities. Where deemed appropriate DEPs are based on, or reference international, regional, national and industry standards.

The objective is to set the standard for good design and engineering practice to be applied by Shell companies in oil and gas production, oil refining, gas handling, gasification, chemical processing, or any other such facility, and thereby to help achieve maximum technical and economic benefit from standardization.

The information set forth in these publications is provided to Shell companies for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual Operating Units to adapt the information set forth in DEPs to their own environment and requirements.

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PART I INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for the design, materials, fabrication, inspection, testing and preparation for shipment of steam turbines for special purpose applications.

This DEP is based on API STD 612, 7th edition: 2014. Part II of this DEP amends, supplements and deletes various clauses of API STD 612. Part II of this DEP follows the clause numbering of API STD 612 for easy reference.

All clauses of API STD 612 not modified by this DEP remain valid as written.

This DEP contains mandatory requirements to mitigate process safety risks in accordance with Design Engineering Manual (DEM) 1 – Application of Technical Standards.

This DEP is a revision of the same number dated February 2016. See (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorisation to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in oil refineries, chemical plants, gas plants, exploration and production facilities and, where applicable, supply/distribution installations. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases, the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

NOTE: In API STD 612, the term **Vendor** is used. In this DEP, the term **Vendor** shall be understood to mean the Manufacturer/Supplier.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

NOTE: In API STD 612, the term **Purchaser** is used. In this DEP, the term **Purchaser** shall be understood to mean the Principal.

The lower-case word **shall** indicates a requirement.

The capitalised term **SHALL [PS]** indicates a process safety requirement.

The word **should** indicates a recommendation.

The word **may** indicates a permitted option.

1.3.2 Specific definitions

See (Part III, clause 3).

1.3.3 Abbreviations

Term	Definition
NDE	Non Destructive Examination
NEMA	National Electrical Manufacturers Association

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section or clause number is shown in brackets (). Other documents referenced by this DEP are listed in (Part IV).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated February 2016. The only changes are to DEP cross-references to reflect changes in the DEP library in 2017

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://www.shell.com/standards . Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com .

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.8 NON NORMATIVE TEXT (COMMENTARY)

Text shown in italic style in this DEP indicates text that is non-normative and is provided as explanation or background information only.

Non-normative text is normally indented slightly to the right of the relevant DEP clause.

PART II GENERAL

Part III of this DEP is written as amendments and supplements to API STD 612:2014.

Wherever reference is made to API STD 612, it shall be understood to mean API STD 612:2014 as amended/supplemented by this DEP.

For ease of reference, the clause numbering of API STD 612 has been used throughout Part III of this DEP.

Clauses in API STD 612, which are not mentioned in this DEP, shall remain valid as written.

PART III AMENDMENTS/SUPPLEMENTS TO API STD 612:2014**2 NORMATIVE REFERENCES**

Add the following to this clause:

1. Standards referred to in this DEP are listed in (Part IV).

3 TERMS AND DEFINITIONS

Add the following new definition:

3.62 MINIMUM PRESSURIZATION TEMPERATURE

1. Lowest possible ambient temperature of the casing (or container, piping, etc.) at which the casing (or container, piping, etc.) may be pressurized to 25% or more of its design pressure during warm up.

6 BASIC DESIGN**6.1 GENERAL****6.1.8**

Add the following to sub-clause g):

1. The Manufacturer shall present the maximum swing certification for the turbine pressure retaining components according to NEMA or IEC.
2. If the turbine is capable of operating levels greater than the NEMA or IEC swing pressure levels, the Manufacturer shall specify those limits for which the turbine is designed.

6.1.13

Add the following new clause:

6.1.13.2

1. All left-handed threads shall be identified, marked and visible on the fasteners and in the supporting documents.

Add the following new clauses:

6.1.22

1. The Manufacturer shall state in the proposal that the offered design details and materials have been used on new turbines for a minimum of two (2) years or have acquired at least 16,000 hours of successful operation.
 - a. If the above criteria are not met, the Principal shall perform a novelty assessment.
2. The Manufacturer shall confirm that at least two units of similar rating and mechanical design have been produced at the Manufacturer's proposed manufacturing plant.

6.1.23

1. In the event of any design or manufacturing error, faulty material or damage relating to any turbine part, the component in question shall be replaced unless otherwise agreed by the Principal.

6.2 NAMEPLATES AND ROTATION ARROWS

6.2.4

Add the following to this clause:

- n. Year of manufacture

Add the following new clause:

6.2.6

1. Nameplates shall be in the English language.
2. Data units shall be same as shown on approved datasheets.

7 CASINGS

7.1 PRESSURE CASINGS

7.1.13

Replace the first sentence of this clause with the following:

1. All penetrations into the pressure containing casing shall be designed with reinforcement bosses and spot faced for flange interface.

7.1.15

Replace the first sentence of sub-clause f) with the following:

1. All the bolt/stud sizes 25 mm (1 in) and above shall be designed for the use of hydraulic bolt tensioning.
2. Manufacturer shall provide the torque values for wet (lubricant) and dry conditions and the recommended lubricant type.

Add the following new clause:

7.1.20

1. The residual Gaussian magnetic flux density in fabricated steel casings and steel castings shall be not greater than as specified in 16.2.2 Table 6.

7.2 CASING CONNECTIONS

7.2.3

Replace sub-clause a) with the following:

- a. Pipe nipples shall be provided with a weld neck flange.

Add the following new sub-clause:

- c. There shall be no threaded pipe connections to the casing.

7.2.6

Add the following to this clause:

1. Cast iron flanges shall not be used.

Add the following new clause:

7.2.14

1. All condensing turbines shall have down connections at the exhaust end.
2. Any other type of exhaust connections shall be reviewed and approved by the Principal.