

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

GENERAL-PURPOSE STEAM TURBINES (AMENDMENTS/SUPPLEMENTS TO API 611)

PTS 31.29.60.30
DECEMBER 2010



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PTS Circular 2010 – 31.29.60.30



PTS No:	31.29.60.30
PTS Title:	General Purpose Steam Turbines (Amendment/Supplement to API 611)

This revision of PTS 31.29.60.30- General Purpose Steam Turbines (Amendment/Supplement to API 611) has been updated to incorporate PETRONAS Lessons Learnt, Best Practice and new information issued by relevant industry code and standards.

The previous version of this PTS 31.29.60.30 (August, 2000) will be removed from PTS binder / e-repository from herein onwards.

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PREFACE

PETRONAS Technical Standards (PTS) publications reflect the views, at the time of publication, of PETRONAS OPU/Divisions.

They are based on the experience acquired during the involvement with the design, construction, operation and maintenance of processing units and facilities. Where appropriate they are based on, or reference is made to, national and international standards and codes of practice.

The objective is to set the recommended standard for good technical practice to be applied by PETRONAS' OPU/Divisions in oil and gas production facilities, refineries, gas processing plants, chemical plants, marketing facilities or any other such facility, and thereby to achieve maximum technical and economic benefit from standardization.

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

When Contractors or Manufacturers/Suppliers use PTS they shall be solely responsible for the quality of work and the attainment of the required design and engineering standards. In particular, for those requirements not specifically covered, it is expected of them to follow those design and engineering practices which will achieve the same level of integrity as reflected in the PTS. If in doubt, the Contractor or Manufacturer/Supplier shall, without detracting from his own responsibility, consult the owner.

The right to use PTS rests with three categories of users:

- 1) PETRONAS and its affiliates.
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- 3) Contractors/subcontractors and Manufacturers/Suppliers under a contract with users referred to under 1) and 2) which requires that tenders for projects, materials supplied or - generally - work performed on behalf of the said users comply with the relevant standards.

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Without prejudice to any specific terms in respect of confidentiality under relevant contractual arrangements, PTS shall not, without the prior written consent of PETRONAS, be disclosed by users to any company or person whomsoever and the PTS shall be used exclusively for the purpose they have been provided to the user. They shall be returned after use, including any copies which shall only be made by users with the express prior written consent of PETRONAS.

The copyright of PTS vests in PETRONAS. Users shall arrange for PTS to be held in safe custody and PETRONAS may at any time require information satisfactory to PETRONAS in order to ascertain how users implement this requirement.

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PART I INTRODUCTION

1.1 SCOPE

This PTS specifies requirements and gives recommendations for general-purpose steam turbines.

This PTS is based on API 611, fifth edition, 2008. Part III of this PTS amends, supplements and deletes various clauses of API 611.

This PTS is a revision of the PTS of the same number dated August 2000; see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by PETRONAS, the distribution of this PTS is confined to PETRONAS companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them.

This PTS is intended for use in oil refineries, chemical plants, gas plants and exploration and production facilities.

When PTSs are applied, a Management of Change (MOC) process should 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 may be more stringent than in this PTS, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regard 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 PTS 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 PTS 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, installation, and commissioning or management of a project or operation of a facility. The Principal may sometimes undertake all or part of the duties of the Contractor.

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

The **Principal** is the party that initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant, authorised to act for, or on behalf of the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.4 CROSS-REFERENCES

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

1.5 SUMMARY OF MAIN CHANGES

The previous edition was based on API 611, 4th edition, 1997. This PTS is now based on API 611, 5th edition, 2008. Due to the major changes in the base standard, it is impractical to list the changes herein.

PART II GENERAL

Part III of this PTS is written as amendments and supplements to API 611, fifth edition, 2008. Wherever reference is made to API 611, it shall be understood to mean API 611 as amended/supplemented by this PTS.

For ease of reference, the clause numbering of API 611 has been used throughout Part III of this PTS.

Clauses in API 611, which are not mentioned in this PTS, shall remain valid as written.

A bullet (•) in the margin against certain clauses in API 611 indicates that a decision by the Principal is required. These decisions shall be indicated directly on the relevant data/requisition sheet when provisions are made for them; otherwise they shall be indicated on the data/requisition sheet(s) under the heading 'Additional Requirements' or stated in the purchase order.

PART III AMENDMENTS/SUPPLEMENTS TO API 611

1 SCOPE

1.1 *Replace the fifth sentence of this clause by:*

They are generally applied in non-condensing service with steam pressure not exceeding 48 bar (700 psig) and temperature not exceeding 400 °C (750 °F), or where the speed will not exceed 6000 r/min.

Delete the ninth sentence and replace by:

Requirements for special-purpose turbines are specified in PTS 31.29.60.31.

2 REFERENCES

2.1 *Add to this clause:*

Documents referenced in this PTS are listed in (Part IV).

3 DEFINITIONS

3.3 **circulating oil system**

Replace this definition by:

system in which oil is withdrawn from the housing of bearings equipped with oil rings, cooled in an external oil cooler, and then filtered in an external filter before being returned to the bearing housing.

3.11 **maximum allowable speed**

In this definition, replace 'operation' with 'operation at maximum specified steam inlet temperature'

3.15 **maximum exhaust casing pressure**

Delete the second sentence of the Note and add:

This pressure shall be used to size the full flow relief valve in the turbine exhaust.

4 GENERAL

Add new clause:

4.4 **ALTERNATIVE DESIGNS**

The Vendor's primary quotation shall be in accordance with this PTS. Alternative quotations may be submitted if they offer significant price, delivery, or technical advantages, but shall be clearly defined as alternative proposals.

Alternative quotations shall state any deviations from this PTS and complete engineering details of alternative design and/or materials shall be submitted to the Principal for review and approval.

5 REQUIREMENTS

5.1 **DIMENSIONS**

Replace this clause by:

Drawings and maintenance dimensions of turbines shall be in SI units or USC units. The use of an SI units datasheet indicates SI units shall be used, and the use of a USC units datasheet indicates that USC units shall be used.

5.3 **CONFLICTING REQUIREMENTS**

Replace this clause by:

In the event of conflict between documents relating to the enquiry or order, the following hierarchy of documents shall apply:

- upper level: purchase order and variations thereto;
- second level: data/requisition sheets and drawings;
- third level: this PTS.

6 BASIC DESIGN

6.1 GENERAL

6.1.1 *Replace '3 years' with '6 years'.*

Add to this clause:

Turbine ratings shall not exceed the limits of the Vendor's design and shall be within the range of the Manufacturer's actual experience. Only equipment that has proven its reliability in service is acceptable. A reference shall be provided to demonstrate that at least 3 units of the same type and size have each operated for at least 8000 h.

6.1.2 *Replace 'assume' with 'have'*

6.1.4 *Replace sub-clause 'b' by:*

b. Steam Turbines shall be capable of delivering normal power and speed with minimum inlet and maximum exhaust steam conditions. Hand valve(s) shall not be used for the purpose of meeting this requirement.

6.1.5 *Replace this clause by:*

Equipment shall be designed to run to at least 110 % of the trip speed without damage. Turbines shall be capable of continuously operating at relief valve set pressure without damage.

6.1.6 *Replace this clause by:*

General-purpose turbines shall be capable of immediate start-up to full load without preliminary warm-up period and without the benefit of a motor-driven lube oil pump or other energized electric circuitry. The Purchaser shall provide for proper drainage of inlet piping and of casing drains, steam chest and packing glands.

6.1.7 *Delete the second sentence of this clause.*

6.1.8 *Replace 'minimize' with 'prevent'*

6.1.9 *Add to this clause:*

Any maintenance item heavier than 20 kg (45 lb) shall be provided with lifting lugs or similar dedicated fixed lifting point(s). Screw-in eyebolts are only acceptable for bearing housing covers and for internal components where other lifting arrangements are impractical. Holes for eyebolts shall be permanently marked with the correct bolt size to be used. If this marking is impractical, bolt size information should be clearly indicated in the instruction manual.

6.1.10 *Replace second sentence of this clause by:*

The combined performance of the turbine and its driven equipment after installation shall be the responsibility of the Vendor which has been nominated as being responsible for the complete unit.

6.1.11 *Replace first sentence of this clause by:*

Cooling water systems shall be designed to the conditions specified on the data sheet; where conditions are not specified they shall be in accordance with Table 1. The minimum design working pressure of the system shall be 5 bar (ga) [75 psig].

Add to this clause:

Provision(s) shall be made for complete venting and draining of the system.