

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

ROTARY-TYPE POSITIVE DISPLACEMENT COMPRESSORS (AMENDMENTS/SUPPLEMENTS TO API 619)

PTS 31.29.40.32

DECEMBER 2010



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PTS Circular 2010 – 31.29.40.32



PTS No:	31.29.40.32
PTS Title:	Rotary-Type Positive Displacement Compressors (Amendments/Supplements to API 619)

This PTS 31.29.40.32- Rotary-Type Positive Displacement Compressors (Amendments/Supplements to API 619) has been updated to incorporate PETRONAS Lessons Learnt, Best Practice and new information issued by relevant industry code and standards. All updates in the document are highlighted in *italic* font.

The previous version of this 31.29.40.32 (December 1999) will be removed from PTS binder / e-repository from herein onwards.

The custodian of this PTS is:

Name: Uppala Sivarama Krishnaiah

Tel. No: 03-2783 6637

Please direct any questions regarding this PTS to the above-named.

Document Approval

	Name	Designation	Date	Signature
Prepared/ Reviewed	Uppala Sivarama Krishnaiah	Staff Engineer, Engineering, GTS	06/12/2010	
Reviewed	Ir. M Nizam B A Wahab	Principal Engineer, Engineering, GTS	09/12/10	
Reviewed/ Approved	MK Shrivastava	Custodian Engineer Engineering, GTS	09/12/10	
Verified	Pau Kiew Huai	General Manager, Engineering, GTS	10.12.10	
Endorsed	Sazali Hamzah	Senior General Manager, GTS	13/12/10	

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Dec 1999	1		
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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 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.
- 2) Other parties who are authorized to use PTS subject to appropriate contractual arrangements.
- 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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PART I INTRODUCTION

1.1 SCOPE

This PTS specifies requirements and gives recommendations for dry and flooded helical lobe rotary compressors. This is a revision of the PTS of the same number dated September 1983.

This PTS is based on API 619, Third Edition, June 1997. Part III of this PTS amends, supplements and deletes various clauses and paragraphs of API 619.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by PETRONAS the distribution of this PTS is confined to companies forming part of PETRONAS or managed by a Group company, and to Contractors and Manufacturers nominated by them (i.e. the distribution code is "F", as defined in PTS 00.00.05.05).

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

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 as regards 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 with the object of obtaining agreement to follow this PTS as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party which 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 which manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party which 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 the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Very toxic (substances)	<i>substances that are very hazardous for the environment or human health, as specified in PTS 01.00.01.30 (which also identifies "toxic" substances by reference to chemical substances databases).</i>
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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 by this PTS are listed in (Part IV).

1.5 SUMMARY OF MAIN CHANGES

This PTS is a revision of the PTS of the same number dated December 1999 and it is impractical to summarise the differences here.

PART II GENERAL INFORMATION

This PTS is written in four parts, of which Part III gives amendments and supplements to API 619, third edition, June 1997. Wherever reference is made to API 619, it shall be understood to mean API 619 as amended/supplemented by this specification.

For ease of reference, the clause numbering of API 619 has been used throughout Part III of this PTS. Clauses in API 619 which are not mentioned remain valid as written.

A bullet (•) in the margin against certain clauses in API 619 indicates that a decision by the Principal is required. This PTS addresses the decisions required by most of the API 619 bullet clauses. The remaining 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.

Note: The data/requisition sheets for rotary type positive displacement compressors have the number PTS 31.29.42.93.

PART III AMENDMENTS/SUPPLEMENTS TO API 619

1. SCOPE

Replace the first sentence of this clause by:

See Part I, section 1.1 of this PTS.

1.2 CONFLICTING REQUIREMENTS

Replace this clause by:

In the event of conflict between documents relating to the enquiry or purchase 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.

Add new clause:

1.3 MANUFACTURER'S RESPONSIBILITIES

1.3.1 The Manufacturer shall be responsible for the design and engineering, the total mechanical/thermodynamic performance, and the guarantee of the entire compressor unit. This includes the compressor, driver, power transmission equipment and all auxiliary equipment furnished by sub-suppliers when purchased by the Manufacturer. This responsibility shall include determining critical speeds and performing the lateral rotor dynamic analysis for each major component of the unit and the torsional analysis for the entire unit, as well as any other analysis specified in the data/requisition sheets.

1.3.2 The Manufacturer shall have an implemented and effective quality system in accordance with ISO 9001 or an equivalent standard acceptable to the Principal.

In addition, the Manufacturer shall have an implemented and effective design release system, which will indicate and present any design changes for approval by the Principal.

1.3.3 The Principal reserves the right to review and check the design of any part of the equipment supplied. For this purpose the Manufacturer shall provide the necessary technical information of the subject part to the Principal to enable such verification or analysis. If required by the Manufacturer, the Principal shall agree not to divulge any of this information to any other party.

In the event of a conflict between the Manufacturer and the Principal regarding the interpretation of these design data, every effort shall be made to arrive at a mutually acceptable solution. If an agreement in this respect cannot be reached, the Principal shall have the right to insist that additional calculations and/or testing shall be made to ensure a design which is satisfactory to all parties involved.

However, it is recognised by the Principal that the Manufacturer's responsibilities, both contractually and in relation to the cost of any modifications and/or testing, shall be limited to the extent indicated in the Manufacturer's original design, unless it becomes evident that the Manufacturer's design was not adequate for the specified service.

1.3.4 The Manufacturer shall be responsible for co-ordination. This shall include at least:

- obtaining information required for fulfilling his obligations;
- communicating necessary data, specifications and other documents to sub-suppliers;
- negotiating interfaces with his sub-suppliers;
- standardising all components within the train, its auxiliaries and its utility requirements (such as oil type/grade etc.).

- 1.3.5** Factory representatives shall be provided to assist the Purchaser during initial installation (including piping checks specified in API 619, clause 4.1.11) and initial start-up. An outline of initial start-up procedures shall be prepared by the Manufacturer and shall be agreed upon by all parties involved before operations are commenced.
- 1.3.6** For reference purpose the physical properties of the process gas (Cp/Cv, molecular weight etc.) may be given on the data/requisition sheets in order to facilitate the compressor calculations. However, the Manufacturer shall base his performance calculations on the gas composition as stated in the data/requisition sheets.

The Manufacturer shall calculate the performance of all proposed compressors using his standard methods for computing the physical properties of the specified gases and shall take full responsibility for any design features affected. The Manufacturer shall state the values of all physical properties of the process gas used in his computations.

2. REFERENCES

2.1 *Add to this clause:*

Standards referenced by this PTS are listed in (Part IV).

4. BASIC DESIGN

4.1 GENERAL

4.1.1 *In this clause, replace the words "at least 3 years" by "at least 5 years".*

Add to this clause:

If the Vendor proposes to supply prototype equipment then the quotation shall state that the offered equipment is a prototype and it shall be accompanied by sufficient data for the Principal to thoroughly investigate its suitability for the intended duty.

NOTE: Equipment is not considered to be prototype if at least 3 units of similar type and size have each accumulated an uninterrupted operating time of at least 8000 hours in a duty similar to that pertaining to the enquiry in question.

4.1.2 *Replace by clause 1.3.1.*

4.1.3 *Add to this clause:*

The number of casings shall be as specified in the data/requisition sheet.

4.1.4 *Add to this clause:*

The Manufacturer shall state the operating limits of the compressor with respect to pressure and temperature.

4.1.5 *Replace this clause by:*

Cooling water systems shall be designed for the conditions specified in the data/requisition sheet and in no case shall they be designed for a working pressure of less than 6.9 bar (ga).

Provision shall be made for complete venting and draining of the system or systems.

4.1.7 *Add to this clause:*

a) All left-handed threads shall be clearly marked.

b) Any maintenance item with a mass greater than 20 kg shall be provided with lifting lugs or similar dedicated fixed lifting point(s). Screw-in eye-bolts may be used only for bearing housing covers and for internal components where other lifting arrangements are impractical. Holes for eye-bolts 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.

4.1.8 *Add to this clause:*

Throughout the service life specified in (2.1.1), spare parts for all components of the unit shall be available for purchase and all manufacturing drawings shall be retained.

4.1.11 *In the last sentence of this clause, delete the words "When specified"*

4.1.12 *Replace this clause by:*

All electrical components and installations shall be suitable for the area classification, gas grouping and temperature classes specified by the Principal in the data/requisition sheets.

4.1.13 *Replace this clause by:*

4.1.13.1 Noise Control

The Contractor shall comply with PTS 31.10.00.31 and thereby communicate to the Manufacturer the specified equipment noise limitations by using data sheet PTS 31.10.00.94, which forms part of the requisition. The Manufacturer is responsible for assuring that these equipment noise limitations have been specified.

4.1.13.2 Information to be submitted with the tender

The Manufacturer shall submit guaranteed sound power levels and sound pressure levels of the equipment, together with any other relevant information as requested in the data