

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS

PTS 01.00.01.30
JANUARY 2010



PTS Circular January 2010 – PTS 01.00.01.30			
PTS No:		01.00.01.30	
Publication Title:		Definition of Temperature, Pressure and Toxicity Level	
Base PTS Version:		Release 13	

This revision of PTS **01.00.01.30 – Definition of Temperature, Pressure and Toxicity Level** has been updated incorporating 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 PTS **Revision 1, March 2001** will be removed from PTS binder/ e-repository from herein onwards.

Document Approval

	Name	Designation	Date	Signature
Prepared/ Reviewed	M Rosdi Naim b. Mat	TP (Technical Professional)	22.01.10	
Approved	Zainab Bt. Kayat	TP (Technical Authority)	22.01.2010	
Verified	Samsudin Dato' Harun	Senior Manager, Process Engineering - GTS	22/1/10	
Verified	Pau Kiew Huai	General Manager, Engineering –GTS	22.1.10	
Endorsed	Pau Kiew Huai	Acting- Senior General Manager, GTS	22.1.10	

Revision History

Date	Version	Description of Updates	Author
October 1995	0		
March 2001	1		
January 2010	2	PTS Review	

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.

Subject to any particular terms and conditions as may be set forth in specific agreements with users, PETRONAS disclaims any liability of whatsoever nature for any damage (including injury or death) suffered by any company or person whomsoever as a result of or in connection with the use, application or implementation of any PTS, combination of PTS or any part thereof. The benefit of this disclaimer shall inure in all respects to PETRONAS and/or any company affiliated to PETRONAS that may issue PTS or require the use of PTS.

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.

TABLE OF CONTENTS

1.	INTRODUCTION.....	5
1.1	SCOPE.....	5
1.2	DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS.....	5
1.3	DEFINITIONS	6
1.4	CROSS-REFERENCES.....	8
1.5	SUMMARY OF CHANGES SINCE PREVIOUS EDITION	8
2.	GENERAL INFORMATION.....	9
3.	PRESSURE SYSTEM.....	10
4.	TEMPERATURE AND PRESSURE LEVELS.....	11
4.1	TEMPERATURE	11
4.2	PRESSURE	13
5.	VERY TOXIC SUBSTANCES	21
6.	REFERENCES.....	22
7.	ATTACHMENT 1.....	24

1. INTRODUCTION

1.1 SCOPE

This PTS specifies requirements and gives recommendations for consistent terminology for the various temperature and pressure terms used in design and operation. Use of this terminology will facilitate communication between process designers and mechanical designers. It also defines very toxic substances for which the PTS system may specify additional requirements.

This PTS also gives guidelines to determine temperature and pressure levels essential for safe and efficient design and operation.

The rules given in this specification do not relate to atmospheric storage tanks.

This PTS is a revision of the PTS of the same number dated March 2001, a summary of the main changes is given in (1.5).

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorized by PETRONAS, the distribution of this PTS is confined to companies forming part of the PETRONAS, and to Contractors nominated by them (i.e. the distribution code is "C" as defined in PTS 00.00.05.05).

This PTS is intended for use in oil refineries, gas plants and, where applicable in chemical plants, exploration/production and new ventures.

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, 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 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 authorized to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions and abbreviations

Intended operation	Process conditions, i.e. temperature, pressure, flow, fluid compositions, etc., are stable and in accordance with the process design.
Pressure relief valve	Generic term for relief valves, safety valves or safety/relief valves.
Pressure relief device	Generic term for pressure relief valves, bursting disks, or other mechanical emergency relief appliances.
Two-thirds rule	Pressure consideration for heat exchangers tube rupture case according to API RP 521 Section 3.18.2. In case design codes are applied where the actual test pressure of the low-pressure side is less than 150% of its design pressure, this lower pressure should be used to determine whether overpressure protection is needed.
Toxicity	<i>is the degree to which a substance can harm humans or animals.</i>
LD₅₀	Dose of substance which will kill 50% of an exposed population of rats (or other designated animal), expressed in mg substance/kg body weight
LC₅₀	concentration of substance which will kill 50% of an exposed population of rats, expressed in mg substance/litre of air/exposure duration of 4 hours or ppm-mole in air/exposure duration of 4 hours
ppm-mole	Molar concentration of a substance in parts per million. For gas, the ppm-mole is calculated as: $\text{ppm-mole} = (\text{mg/m}^3) \times (24.45) / (\text{MW of substance})$ ▪ mg/m^3 is the substance concentration in milligrams per cubic meter; ▪ 24.45 is the molar gas volume at normal temperature and pressure conditions (25°C and 760 torr) ▪ MW is the gram molecular weight of the substance

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 (6.).

1.5 SUMMARY OF CHANGES SINCE PREVIOUS EDITION

The previous edition of this PTS was dated March 2001. Other than editorial changes, the following are the main changes since that edition:

Old section	New section	Change
		Title changed
1.3.2	1.3.2	More terms defined
2	2	Added note regarding design condition
3	3	Added requirement regarding freezing, blocking Added note regarding elevation of equipment
4.2.1.3.1	4.2.1.3.2	Removed reference to CMF Report
4.2.1.3.5	4.2.1.3.5	Modified application of "two-thirds" rule
4.2.2	4.2.2	Rearranged to add definition of lift, opening pressure and closing pressure.
---	5	New section on toxicity
5	6	References updated
---	7	New section on attachment