

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE (CORE)

TECHNICAL SPECIFICATION

PIPELINE OVERPRESSURE PROTECTION

PTS 31.40.10.14

JANUARY 2010



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This revision of **PTS 31.40.10.14 – PIPELINE OVERPRESSURE PROTECTION (January 2010, Revision 1)** 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 **31.40.10.14 (November 2003)** will be removed from PTS binder/ e-repository from herein onwards.

The custodian of the PTS is:

Name: Shaikh Abdullah B Shaikh Othman

Tel No: 603 27836214

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

Document Approval

	Name	Designation	Date	Signature
Prepared	Noraswad B M Daud	Pipeline Engineer (Integrity), GTS	29/1/2010	
Reviewed	M Nizam B M Rashid	Senior Pipeline Engineer (Pipeline Design), GTS	18/2/2010	
Reviewed	Shaikh Abdullah B Shaikh Othman	Staff Engineer (Pipeline Integrity), GTS	3/03/2010	
Verified	Hashim B Zainal Abidin	Technical Manager, Civil, Structure & Pipeline, Engineering, GTS	05/03/10	
Endorsed	Pau Kiew Huai	General Manager, Engineering, GTS	10.3.2010	

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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 standardisation.

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, the Principal will expect 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 Principal or its technical advisor.

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1. INTRODUCTION

1.1 SCOPE

This PTS specifies minimum requirements and gives recommendations for the protection of pipelines against overpressure. The following subjects are covered:

- possible pipeline pressure sources;
- requirements for determining pipeline operating and incidental pressures;
- description of possible methods and guidance on selection;
- minimum engineering, operations, maintenance and inspection requirements.

For determining allowable pipeline pressures, refer to PTS 31.40.00.10. For specific requirements relating to the classification, implementation and management of Instrumented Protective Functions, refer to PTS 32.80.10.10 and PTS 32.80.10.12.

This PTS is a revision of the PTS of the same title and number dated March 1994; a summary of the main changes from that edition is given in (1.6).

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 or managed by the PETRONAS, and to Contractors nominated by them.

This PTS is intended for use by Functions in the Group that are involved in the design, material procurement, construction and operation of pipelines. 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 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 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.

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, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Pressures

Accumulated Pressure - Pressure which is built up in a pipeline during the period of activation of an overpressure protection system.

Internal Design Pressure - The maximum internal pressure at which the pipeline is (or sections thereof are) designed in accordance with the applicable design standard.

Incidental Pressure - Pressure occurring in a pipeline with limited frequency and duration. Pressures due to surges or heating of blocked-in static fluid are considered incidental pressures, providing they are not regular operating occurrences.

Maximum Allowable Incidental Pressure - The maximum pressure that is allowed to occur in a pipeline with a limited frequency and duration, determined in accordance with the applicable design standard.

Maximum Allowable Operating Pressure - The maximum pressure at which a pipeline system is (or sections thereof are) allowed to operate under steady state process conditions, in accordance with the applicable design standard.

Maximum Operating Pressure - The maximum pressure at which a pipeline system (or sections thereof) will be operated under steady state process conditions.

Surge Pressure - Pressure due to mass flow velocity changes caused by operational activities, e.g. valve closures, pump shutdown, or start-up.

Thermal Pressure - Pressure due to thermal expansion effects on a fluid in a blocked-in pipeline or blocked-in pipeline section.

Others

Instrumented Protective Function – A function comprising one or more Initiators, a Logic Solver and one or more Final Elements whose purpose is to prevent or mitigate hazardous situations. An IPF is intended to achieve or maintain a safe state for the process, in respect of a specific hazardous event, e.g., overpressure.

Pressure Recorder Alarm (High) - System for warning and registering the occurrence of pressures in excess of allowable values.

Pressure Safety Relief Valve - Valve for protecting a pipeline against overpressure by releasing fluid from the pipeline.

Source - The facility located immediately upstream of the pipeline, characterised by the type and the pressure of the produced fluid. The Source may be a well or group of wells, a treatment facility, a pump or compressor station, or a feeding pipeline.

Specified Minimum Yield Strength - Minimum yield strength required by the specification or standard under which the pipeline material is purchased.

1.4 ABBREVIATIONS

IPF	Instrumented Protective Function
MAIP	Maximum Allowable Incidental Pressure
MAOP	Maximum Allowable Operating Pressure
MOP	Maximum Operating Pressure
PSV	Pressure Safety Relief Valve
PRA(H)	Pressure Recorder Alarm (High)
SMYS	Specified Minimum Yield Strength

1.5 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 (6).