

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

TECHNICAL SPECIFICATION

PIG SIGNALLERS : INTRUSIVE TYPE

PTS 31.40.21.33

FEBRUARY 2010



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This revision of **PTS 31.40.21.33 – PIG SIGNALLERS : INTRUSIVE TYPE (February 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 **31.40.21.33 (September 2002)** will be removed from PTS binder/ e-repository from herein onwards.

The custodian of the PTS is:

Name: Mohd Zazli B Mohd Zabidi

Tel No: 603 27836216

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

Document Approval

	Name	Designation	Date	Signature
Prepared	M Fadhli B Azami	Pipeline Engineer (Design), GTS	25/2/10	
Reviewed	M Zazli B M Zabidi	Staff Engineer (Onshore Design), GTS	25/2/10	
Reviewed	Rosman B Ariffin	Technical Authority	5/3/10	
Verified	Hashim B Zainal Abidin	Technical Manager, Civil, Structure & Pipeline, Engineering, GTS	09/03/10	
Endorsed	Pau Kiew Huai	General Manager, Engineering, GTS	13/3/2010	

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PREFACE

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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.

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1. INTRODUCTION

1.1 SCOPE

This PTS gives minimum requirements for the design, fabrication and testing of shop fabricated intrusive type pig signallers for onshore and offshore carbon steel pipelines (except subsea) with a nominal diameter of DN 100 to DN 1400, design pressures not exceeding 250 bar, and a temperature range of -20 °C to 120 °C. This PTS is not applicable to non-intrusive types of pig signallers.

Pig signallers are used to indicate the passage of a pig. Intrusive types are normally mounted on pig trap systems but may also be installed at other locations along the pipeline. It is assumed that they will be installed permanently in an open environment. *Bi-directional indication capability can be optional and acceptable.*

The requirements of this PTS are based on the assumption that the intrusive type pig signallers are mounted on the pipeline via a DN 50 branch connection into which the pipeline fluid will enter and pressurise the housing of the pig signaller.

The adherence to this PTS ensures that the relevant requirements of ISO 13623 for the pressure containing components of the pig signaller will be complied with.

This PTS shall be used in conjunction with Data/Requisition sheet PTS 31.40.21.95.

This PTS is a revision of the previous publication of the same title and number, dated September 2002. A summary of changes from the previous edition is given in (1.7).

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

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

This PTS is primarily intended for use in oil and/or gas transmission pipelines and related 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, construction and 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

Data/Requisition sheet	The Data/Requisition sheet PTS 31.40.21.95., which is to be used in conjunction with this PTS.
Pig	A device that can be propelled through a pipeline by fluid flow and is normally used for cleaning, batching, inspection or other activities.
Pig signaller	A device installed on a pipeline or pig trap to give an indication of the passage of a pig. a) Intrusive type: a pig signaller with a trigger penetrating into the bore of the pipeline and into which the transported fluid will enter and pressurise the housing of the pig signaller. b) Non-intrusive type: a pig signaller that is externally mounted on the pipeline and therefore not exposed to the transported fluid or the internal pressure in the pipeline.
Pig trap	An ancillary item of pipeline equipment, comprising a barrel, end closure and instruments, for introducing a pig into a pipeline or removing a pig from a pipeline. Pig traps are further described in PTS 31.40.10.13.

1.4 ABBREVIATIONS

DN	Diameter Nominal (mm)
HAZ	Heat Affected Zone

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 (15).

1.6 ACTION ITEMS

The Data/Requisition sheet PTS 31.40.21.95 shall be fully completed by the Principal or the Contractor as appropriate. Items requiring a statement in the Data/Requisition sheet are identified with an asterisk (*) in the margin.

1.7 SUMMARY OF CHANGES FROM THE PREVIOUS EDITION

The previous edition of this PTS was dated September 2002. Other than editorial changes, the following are the main changes since that edition :

- Pig signaller bi-directional indication capability to be optional and acceptable
- Intrusive type pig signaller not recommended for underground service. For underground service, non-intrusive type is preferred

1.8 COMMENTS ON THIS PTS

Comments on this PTS may be sent to the PTS Administrator at kamilma@petronas.com.my . PETRONAS staff may also post comments on this PTS on the Axis Knowledge Repository Website under the PETRONAS Technical Standard folder.

2. COMPONENT DESCRIPTIONS AND FUNCTIONAL REQUIREMENTS

2.1 COMPONENT DESCRIPTION

The pig signaller should consist of the following components:

- a trigger penetrating into the main bore of the pipe, and which will be moved by a passing pig;
- a transfer mechanism to transfer the movement of the trigger, causing the trip of a mechanical indicator and/or electrical switch;
- a pressure housing, containing the transfer mechanism connected with the trigger, having a flange DN 50 for installation onto the pipeline;
- a mechanical and/or electrical indicator mounted externally on the pressure housing.

Additionally, for pig signallers on pipeline sections which cannot be depressurised for pig signaller maintenance, or on pipelines at buried locations:

- a flanged ball valve DN 50, with or without a flanged extension, to isolate the pig signaller from the pipeline;
 - a portable jacking tool for safe lifting of the transfer mechanism, complete with the trigger through the isolating valve with the main pipeline under pressure;
 - a means of safely releasing pressurised fluid that may be trapped in the head of the pig signaller when the isolation valve is closed.
- * The Principal shall identify on the Data/Requisition sheet whether the Manufacturer shall provide a portable jacking tool.

NOTE: If an existing jacking tool is to be used, the Manufacturer's confirmation shall be obtained that this tool is suitable for the offered pig signaller model.

2.2 FUNCTIONAL REQUIREMENTS

The functional requirements for the pig signaller are as follows:

- the trigger shall trip either the mechanical indicator for local indication or an electrical switch for remote indication (or both) when a pig passes the pig signaller in any direction;
- after the pig has passed the pig signaller, the internal mechanism shall re-set automatically to the position required for indicating the passage of the next pig. The mechanical signal indicator shall only be reset manually. The electrical switch shall be reset automatically;
- the mechanical signal flag or the electrical switch shall not be triggered by the flow or pressure of the pipeline fluid;
- the trigger shall not obstruct or damage a passing pig and the trigger shall not be damaged by a passing pig;
- the penetration of the trigger into the main pipe shall be kept to a minimum to avoid unnecessary obstruction of the fluid flow;
- the trigger shall be corrosion resistant over the specified design life.

3. SERVICE AND INSTALLATION REQUIREMENTS

3.1 SERVICE REQUIREMENTS

The pig signaller shall be designed for maintenance-free operation and permanent installation in an open environment.

Intrusive signaller not recommended for underground services (due to presence of flanged connection). For underground installation, non-intrusive type is preferred.

Basic configurations:

- for horizontal below-ground main pipes, with a soil cover not exceeding 1.2 m in depth, the pig signaller shall be installed vertically at the 12 o'clock position with an extension and an isolation valve configuration as shown in Figure 1;
 - for horizontal above-ground main pipes, the pig signaller shall be installed vertically at the 12 o'clock position with an isolation valve configuration as shown in Figure 2, or without an isolation valve as shown in Figure 3;
 - for vertical above-ground main pipes, the pig signaller shall be installed horizontally at any position, with or without an isolation valve configuration.
- * The requirement for an isolation valve shall be stated by the Principal in the Data/Requisition sheet.

Pig signallers designed for replacement with the main pipeline under pressure shall have a liftable internal mechanism to allow the isolating valve to be closed and the pressure of the isolated part to be safely released when the valve is closed.

The trigger and the transfer mechanism shall be suitable for a passage through a branch with a minimum ID of 38 mm.