

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

MANUALS

INSPECTION AND FUNCTIONAL TESTING OF INSTRUMENTS

PTS 62.10.08.11

NOVEMBER 2009



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This revision of PTS **62.10.08.11– Inspection and Functional Testing of Instruments** 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 (**December 2007**) will be removed from PTS binder/ e-repository from herein onwards.

Document Approval

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Revision History

Date	Version	Description of Updates	Author

Summary of Changes

Section	Description of Changes
3. FACTORY ACCEPTANCE TEST (FAT)	Paragraph 3 (changes in bold) A factory inspection/test, if required, shall be carried out by an instrument inspector who represents the Contractor. The qualification of the instrument inspector shall be approved by the Principal. The Principal maybe represented by an observer at the inspection. The Principal shall indicate which inspections it wishes to observe.
4.1 WAREHOUSE VERIFICATION TEST	Para 4.1 Is a new clause added to these PTS. Clauses added were as follows: All incoming instrument devices shall be tested or verified to ensure it is healthy and functional. Exceptions for test shall be approved by the Principal. The test shall be carried out on all instruments by energizing using stabilized DC power supply to ensure functioning upon power up. Any verification test carried out on the instrument devices shall be executed by a qualified Instrument technician. Any verification test for control valves, and ESD valves shall require the use of dry clean (oil free) instrument air or nitrogen from bottles, in addition to suitable power supply to stroke the valve from full open to close and vise versa. This would ensure that the valves are not damaged or defected during the shipment, which is not visible from the physical inspection.

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 requirements and gives recommendations for inspection and testing of instruments, before and after installation, during the construction and start-up phases of new plants or after planned shutdowns. It deals with activities and requirements to confirm that instrumentation conforms to the Principal's requirements and is installed and functioning according to the approved engineering/construction drawings and data.

The PTS is a guide for the whole process in managing the quality, time and cost of verifying that instrumentation performs as it should. It provides the users with relevant details, or a way to find any details, that support and contribute to the preparation of an overall plan.

This PTS is a revision of the PTS with the same number dated December 1997.

The contractor shall use inspection sheets derived from the quality documents. A common database such as "IN-tools" can also be used to generate these sheets automatically.

The document explains five stages of activities:

1. Factory Acceptance Test (FAT).
2. Check on incoming instruments and installation materials.
3. Installation and field inspection, including systems and system cabinets.
4. 'Internal Function Check' (IFC) for control building-based systems and interconnections.
5. 'Operational Function Check' (OFC): comprising the functional testing, commissioning and start-up activities needed to bring the plant into production.

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 PETRONAS, and to Contractors nominated by them.

This PTS is intended for use in oil refineries, chemical plants, gas plants, oil and gas production facilities, and supply/marketing installations. 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 which carries out all or part of the design, engineering, procurement, construction, inspection, testing, 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 authorised to act for, and on behalf of, the Principal.

The word **shall** indicate a requirement.

The word **should** indicate a recommendation.

1.3.2 Specific definitions Process Instruments

All instruments used in process and utility units, including process stream analysers.

In-situ Calibration/Testing

Calibration and testing carried out directly on the plant, using test equipment.

Control Centre Equipment

All instruments and instrument systems located in control and auxiliary rooms and field auxiliary rooms.

Inspection of Instruments

Carrying out all the procedures needed to check that instruments and instrument systems conform to the Principal's requirements.

Field Inspection

Verification of field instruments installation and setup in accordance to the Principal's requirements.

Internal Function Check

Check for correct operation for all Control Centre Equipment items and its interfaces. It also means checking that the settings and adjustments of all items are as they should be (as specified) for correct and safe operation of the plant (this includes time delay settings, alarm and trip settings, controller settings etc.).

Operational Function Check

Check for correct operation of the instruments in a complete section of the instruments, systems and subsystems, in preparation for start-up activities. It includes all instrument loops for correct set-up, operation and functionality, as well as checking the settings of controlling function, time delays, alarm and trip settings.