

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

MANUAL

HEAT TRANSFER FLUID (HTF) SYSTEMS

PTS 20.05.50.10

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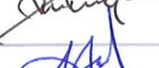
This revision of PTS 20.05.50.10 – Heat Transfer Fluid (HTF) Systems (January 2011, Revision 1) has been updated *either* to incorporate PETRONAS Lessons Learnt, Best Practice *and/or* new information issued by relevant industry code and standards. All updates in the document are highlighted in *italic* font.

The previous version of this PTS 20.05.50.10 – Heat Transfer Fluid (HTF) Systems (December 1998) will be removed from PTS binder/ e-repository from herein onwards.

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Revision History

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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 requirements and gives recommendations for the design of heat transfer fluid (HTF) systems operating at bulk temperature levels up to 400 °C. It includes the application of the organic (both mineral and synthetic) and silicone-based types of HTFs but excludes water/steam and molten, inorganic salts. The scope of this PTS is restricted to liquid phase operation only.

This PTS refers to HTFs as defined in (1.3.2) and explicitly excludes 'Hot Oils'. HTFs have the ability of long term operation at far higher operating temperatures than hot oils, at relatively low pressure and with low degradation and fouling.

This PTS is a revision of the PTS of the same number dated December 1998.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

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

This PTS is intended for use in oil refineries, chemical plants, gas plants and, where applicable, in exploration and 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, commissioning or management of the 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 HTFs, 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 typically specify the technical requirements. The Principal may also appoint 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

The temperature and pressure terms used in this PTS are defined in PTS 01.00.01.30. Further terms are defined below.

Expansion vessel	A vessel to accommodate expanded volume and surge of the HTF, and allows for venting of low boiling point components from the system.
Heat transfer fluid (HTF)	A fluid capable of transporting heat energy within a specified temperature range. Specific hydrocarbon-based fluids are available on the open market for use in heat transfer applications. Generally, this includes synthetic aromatic, silicone-based and a limited selection of specific HTF designated mineral oils.
Heater	The heat energy producer in the system. Either a heat exchanger, a furnace or a waste heat recovery unit (WHRU).
Hot oil	A mineral oil product/process stream used for heat transfer purposes but not commercially available as branded HTF.
HTF system	All heaters, piping, pumps, vessels, heat exchangers and auxiliaries that constitute the closed circuit containing the HTF.
Maximum allowable bulk temperature (MABT)	The maximum bulk temperature of the HTF allowed anywhere in the circuit, as specified by the Manufacturer of the HTF. NOTE: The Principal may specify a Maximum Operating Temperature that is lower than the MABT for a specific application.
Maximum allowable film temperature (MAFT)	The maximum temperature to which the HTF may be subjected in the heater. This highest temperature is on the tube inner wall of the heater and is determined by the heat flux and heat transfer coefficient. The Manufacturer of the HTF recommends the MAFT.
Maximum operating temperature (MOT)	The maximum HTF bulk temperature at which the system is designed to operate, as measured at the outlet of the heat source.
Minimum operating temperature	The lowest HTF bulk temperature at which the system is designed to start up. It should always be higher than the pumpability limit. NOTE: This temperature shall be selected so that the HTF viscosity is lower than the pumpability limit (HTF viscosity 150 mm ² /s to 300 mm ² /s, depending on pump size) and so that the MAFT is not exceeded in the heater during start-up.
Return temperature	The temperature at which the HTF returns to the heater.
Storage tank	A tank for storage of HTF
Supply temperature	The temperature at which the HTF is made available to the battery limit of the users.
Trim cooler	A cooler in the heating circuit, used to trim the temperature of the HTF.
Pump-out cooler	A cooler in the run-down line to the storage tank to cool down hot HTF in case of evacuation of the system. NOTE: The Trim Cooler may also be used as Pump-out Cooler.