



Australian Government

PMAOPS511 Determine energy transfer loads

Release: 1

PMAOPS511 Determine energy transfer loads

Modification History

Release 1. Supersedes and is equivalent to PMAOPS511B Determine energy transfer loads

Application

This unit of competency covers the skills and knowledge required to determine energy transfer loads. It applies to activities which aim to resolve identified plant or process problems, such as ensuring that systems are adequate for the load, improving heat/cooling efficiency or specification of new or modified equipment.

This unit of competency applies to any heat transfer mode, including conduction, convection (forced and natural), radiation, and combined conduction/convection/ radiation. It applies to sources of heating/cooling, such as:

- chemical reaction (including combustion)
- water cooling
- air cooling
- steam heating (calculations for saturated steam only)
- evaporative cooling
- hot fluid (e.g. oil) heating.

This unit of competency applies to senior technicians or those in similar roles who are required to calculate heat transfer and temperature change for a plant item/plant area in order to determine heating/cooling load or efficiency or losses from/gains to the system. This may be done as a step to improve efficiency, for plant/process design/improvement or other reasons.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Operations

Unit Sector

Elements and Performance Criteria

Elements describe the Performance criteria describe the performance needed to

essential outcomes.	demonstrate achievement of the element.
1 Prepare for energy balance	1.1 Identify purpose of energy balance 1.2 Determine possible boundary for analysis 1.3 Identify plant and energy sources and sinks within boundary
2 Calculate heat transferred from/to items	2.1 Calculate conductive heat transfer to/from an object 2.2 Calculate convective heat transfer to/from an object 2.3 Calculate radiative heat transfer to/from an object 2.4 Calculate combined heat transfer to/from an object, including resistances in series and parallel
3 Calculate temperature change	3.1 Calculate temperature change caused by heating/cooling of process materials in typical examples of processing equipment 3.2 Calculate change in heat content caused by chemical reaction 3.3 Calculate temperature rise caused by chemical reaction
4 Select appropriate heating and/or cooling mechanism for an application	4.1 Compare rates of heat transfer/overall heat transfer coefficients for major methods/media of heating and cooling 4.2 Determine appropriate methods of varying/controlling rates of heat transfer 4.3 Calculate heat transfer rates under a range of conditions 4.4 Recommend most appropriate heat transfer mechanism/medium for this application
5 Conduct energy balance over	5.1 Determine desired boundaries for energy balance calculation

process components	5.2	Determine possible sources of data required from the plant
	5.3	Match and adjust sources of data to desired boundary for energy balance
	5.4	Determine overall heating load
	5.5	Determine overall cooling load
	5.6	Interpret results to meet purpose of the energy balance

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Regulatory framework The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used, and include one or more of the following:

- legislative requirements, including work health and safety (WHS)
- industry codes of practice and guidelines
- environmental regulations and guidelines
- Australian and other standards
- licence and certification requirements

All operations to which this unit applies are subject to stringent health, safety and environment (HSE) requirements, which may be imposed through state/territory or federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

Procedures All operations must be performed in accordance with relevant procedures. Procedures are written, verbal, visual, computer-based or in some other form,

include one or more of the following:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant

Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=9fc2cf53-e570-4e9f-ad6a-b228ffdb6875>