



Australian Government

PMAOPS512 Determine mass transfer loads

Release: 1

PMAOPS512 Determine mass transfer loads

Modification History

Release 1. Supersedes and is equivalent to PMAOPS512B Determine mass transfer loads

Application

This unit of competency covers the skills and knowledge required to determine mass transfer loads and flow rates. 'Flow rate' and similar terms refer to the flow rate in terms of kg/h, or kg/batch or similar conceptual flows.

This unit of competency applies to activities which aim to resolve identified plant or process problems, such as improving materials efficiency or specification of new or modified equipment.

This unit of competency applies to any mass transfer mode, including

- mass flow
- density variations with changes in temperature (and pressure where appropriate)
- simple (physical) mixing
- simple (physical) separation
- changes in component mass flow rates due to chemical reaction (including mixing and separation using chemical reaction).

This unit of competency applies to senior technicians or those in similar roles who are required to calculate mass transfer and change in mass contained for a plant item/plant area in order to determine mass transfer efficiency or losses from/gains to the system. It may require the determination of the yield from a chemical reaction. 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 essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Prepare for mass balance	1.1	Identify purpose of mass balance
		1.2	Determine possible boundary for analysis
		1.3	Identify plant and mass sources and sinks within boundary
2	Calculate mass flow rates of streams	2.1	Calculate mass flow rate of plant streams from volumetric data, correcting for changes in density
		2.2	Calculate mass flow rate of individual components of plant streams from their concentrations
		2.3	Calculate mass accumulation (+ or -) within a plant item
3	Calculate mass change due to a chemical reaction	3.1	Determine yield from reaction of all significant products
		3.2	Determine mass output of all significant products arising from the reaction for specified reactant inputs
4	Conduct mass balance over process components	4.1	Determine desired boundaries for mass balance calculation
		4.2	Determine possible sources of data required from the plant
		4.3	Match and adjust sources of data to desired boundary for mass balance
		4.4	Determine overall mass balance
		4.5	Determine mass balance for each significant component/ reactant and product
		4.6	Interpret results to meet purpose of the mass 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

Release 1. Supersedes and is equivalent to PMAOPS512B Determine mass transfer loads

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for PMAOPS512 Determine mass transfer loads

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria, and include the ability to:

- determine the boundaries of the system to be studied
- collect the required plant data from measurements, readings or calculated quantities
- calculate the mass transfer loads
- conduct mass balances
- report the results as required by the purpose of the mass balance.

Knowledge Evidence

Evidence must be provided that demonstrates knowledge of:

- stoichiometry of chemical reactions
- changes in density with temperature (and pressure where appropriate)
- mass balances
- plant equipment, its characteristics and limitations
- process-specific science.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence based on a holistic assessment of the evidence.
- The collection of performance evidence is best done from a report and/or folio of evidence drawn from:
 - a single project which provides sufficient evidence of the requirements of all the elements and performance criteria
 - multiple smaller projects which together provide sufficient evidence of the requirements of all the elements and performance criteria.
- A third-party report, or similar, may be needed to testify to the work done by the individual, particularly when the project has been done as part of a project team.
- Assessment should use a real project in an operational workplace. Where this is not possible or practical, assessment must occur using a sufficiently rigorous simulated environment reflecting realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.

- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition, the assessor or anyone acting in subject matter expert role in assessment must demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they must assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
 - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed
 - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
 - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
 - conducting on-the-job training/assessments of the type of work being assessed
 - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work.

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