



Australian Government

FBPTEC4004 Apply basic process engineering principles to food processing

Release: 1

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Modification History

Release	Comments
Release 1	This version released with the FBP Food, Beverage and Pharmaceutical Training Package Version 2.0.

Application

This unit of competency describes the skills and knowledge required to apply the principles of engineered systems and equipment commonly used in the food processing industry. It includes mapping production processes and measuring outputs, including yields and material variances.

The unit applies to individuals who work with systems and equipment used for heat transfer, refrigeration, pumping, evaporation and drying equipment in the food processing industry. They provide solutions to a range of predictable and sometimes unpredictable problems.

No occupational licensing or certification requirements apply to this unit at the time of publication. However, legislative and regulatory requirements for food processing exist, so local requirements must be checked. All work must comply with Australian food safety standards and relevant codes of practice.

Pre-requisite Unit

Nil

Unit Sector

Technical (TEC)

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Map a production process	1.1 Identify the scope of a production process for mapping 1.2 Select and use appropriate process mapping symbols 1.3 Develop a map that identifies the relationship of each step in the

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	process
2. Calculate yields and efficiencies of a production process	2.1 Identify inputs and outputs of a production processing system 2.2 Collect information required to monitor the performance of a production process 2.3 Calculate yields, efficiencies and material variances
3. Apply principles of fluid flow to a production process	3.1 Identify fluid properties of food that affect flow 3.2 Identify components and related equipment used in a food pumping process 3.3 Identify features of the system design that affect performance of the pumping system 3.4 Identify the effect of pumping on fluid properties 3.5 Establish the operating capacity of pumping systems used in the production process 3.6 Review or establish procedures for the safe use of pumping equipment
4. Apply principles of heat transfer to a production process	4.1 Identify types of heat transfer in a food production process 4.2 Identify methods and related equipment used to transfer heat 4.3 Recognise types of heat transfer media 4.4 Identify and contrast operating principles of cooling, chilling and freezing processes 4.5 Assess effects of heat transfer on product and material properties 4.6 Establish operating capacity of heat transfer equipment used in the production process 4.7 Review or establish procedures for the safe use of heat transfer equipment
5. Apply principles of evaporation to a production process	5.1 Identify methods and related equipment used for controlling evaporation in food processing 5.2 Analyse the effect of evaporation on product and material properties 5.3 Identify tests used to determine the concentration of a liquid 5.4 Establish the operating capacity of evaporation equipment used in the production process

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	5.5 Review or establish procedures for the safe use of evaporation equipment
6. Apply principles of drying to a production process	6.1 Identify methods and related equipment used for drying food 6.2 Assess the effect of drying on product and material properties 6.3 Identify tests used to determine moisture content of materials and products 6.4 Establish operating capacity of drying equipment used in the production process 6.5 Review and establish procedures for the safe use of drying equipment
7. Apply principles of process control to management of production processes	7.1 Locate sensors and instrumentation providing input information to the control system 7.2 Identify consequences of a system malfunction

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	Interpret and analyse system specifications and other documentation to determine requirements
Writing	Produce written and diagrammatic documents that convey information about components of food processing and engineered solutions
Numeracy	Perform mathematical calculations to interpret and record complex engineering principles for food production processes
Get the work done	Problem-solve issues as they arise

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
FBPTEC4004 Apply basic process engineering principles to food processing	FDFTEC4004A Apply basic process engineering principles to food processing	Updated to meet Standards for Training Packages Prerequisites removed Minor changes to Performance Criteria for clarity	Equivalent unit

Links

Companion Volume Implementation Guides are found in VETNet: -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=78b15323-cd38-483e-aad7-1159b570a5c4>

Assessment Requirements for FBPTEC4004 Apply basic process engineering principles to food processing

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Performance Evidence

An individual demonstrating competency in this unit must satisfy all of the elements and performance criteria of this unit.

There must be evidence that the individual has effectively applied basic process engineering principles in a food processing environment on at least one occasion, including:

- mapping a production process and applying process mapping protocols and symbols used in the workplace to describe a production process and its operating parameters
- applying engineering principles to a food production context, including:
 - fluid transfer
 - heat transfer
 - evaporation
 - drying
- performing calculations for engineering solutions, including performance and yield.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- the basic operating features and components of pumps commonly used and typical applications, including:
 - rotodynamic (centrifugal) pumps
 - positive displacement pumps, including reciprocating piston pumps, rotary pumps (including gear and lobe pumps), screw pumps, eccentric rotor pumps (including progressive cavity or mono pumps) and flexible vane pumps
- related components of the pumping system, including valves, taps and pipework and, where required, Australian Standards and workplace protocols for indicating materials carried by pipework
- features in the pumping system design that affect pumping efficiencies, including length of pipework, number and placement of valves and fittings, height of inlet and discharge points, internal surface and diameter of the pipe

- the following terms and how they are applied in the food processing industry:
 - pressure and pressure drop
 - velocity
 - head
- equipment components of a drying process
- the effects that the drying process has on food
- equipment components of an evaporation process
- the effects the evaporation process has on food
- heat transfer requirements and equipment used in a production process
- typical tests carried out to determine process outcomes on material/product
- operational and safety features of pumps and heat transfer equipment
- inspections required to identify signs of faulty performance and/or wear
- main types of sensors used in food processing to provide input data to control systems, and how these sensors operate.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
 - skills must be demonstrated in a workplace setting or an environment that accurately represents a real food processing workplace
- resources, equipment and materials:
 - production process equipment for fluid transfer, heat transfer, evaporation and drying
 - tests used to report relevant product/process information and recorded results
 - methods and related software systems for collecting data and performing calculations
- specifications:
 - manufacturers' advice and operating procedures.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

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