

<b>Title</b>	<b>Demonstrate knowledge of brewhouse operations and wort production</b>		
<b>Level</b>	<b>3</b>	<b>Credits</b>	<b>6</b>

<b>Purpose</b>	People credited with this unit standard are able to: demonstrate familiarity with the layout and purpose of vessels and plant used in a brewhouse; explain the significance of malt handling, milling and grist composition for the production of wort; explain the processes of mash conversion and wort extraction; explain the process of wort boiling; explain the process of wort clarification; explain the process of wort cooling; explain the process of wort collection; and explain the requirements of wort composition for brewing.
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<b>Classification</b>	Food and Related Products Processing > Food Production - Beverages
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<b>Available grade</b>	Achieved
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**Guidance Information**

- 1 This unit standard is a general introduction to wort production. For more specific unit standards that cover the actual milling and production of wort see unit standards 7863 and 7697.
- 2 *Plant* refers to the machinery contained within a brewhouse.

**Outcomes and performance criteria**

**Outcome 1**

Demonstrate familiarity with the layout and purpose of vessels and plant used in a brewhouse.

**Performance criteria**

- 1.1 The general layout of a brewhouse is described in terms of the vessels and plant contained within it, and the movement of materials between them.
- 1.2 The purpose of brewhouse vessels and plant are described in terms of the operations which take place within them.

Range operations – milling, cooking, mashing, lautering, boiling and cooling.

- 1.3 The principal features of vessel and plant design for a brewhouse are related to those found in a typical New Zealand brewery.

Range material type, vessel shape.

## Outcome 2

Explain the significance of malt handling, milling and grist composition for the production of wort.

### Performance criteria

- 2.1 The explanation gives the purpose of milling.
- 2.2 The explanation relates the inspection of raw materials to the requirements of malt handling and milling.
- 2.3 The explanation illustrates the inter-relationships between the choice of malts, degree of milling, grist composition and wort yield for at least two beer styles.
- 2.4 The explanation describes malt cleaning and conditioning for wet and dry milling in terms of the effect on the milling process.
- 2.5 The explanation outlines the main milling types and details the malt milling process used in a brewery.
- Range dry or wet milling using hammer, roller or disc mills.
- 2.6 The explanation illustrates the inter-relationships between malt specifications, mashing processes, and wort composition for at least two beer styles.
- Range malt specifications – colour, modification, diastatic power, pH (alkalinity).
- 2.7 Process checks and quality control for malt handling, milling and grist composition are described as they relate to a typical New Zealand brewery's quality control system.
- 2.8 Awareness of dust hazards and safety requirements are displayed in accordance with a typical New Zealand brewery's safety systems.

## Outcome 3

Explain the processes of mash conversion and wort extraction.

### Performance criteria

- 3.1 The explanation gives the purpose of mashing.

- 3.2 The explanation outlines physical mashing processes used, and details one of the physical mashing processes in terms of the way it is used in a typical New Zealand brewery.
- Range physical mashing processes – infusion mashing, decoction mashing, double mashing, temperature programmed mashing.
- 3.3 The explanation describes the main biochemical stages of the mashing process in terms of the breakdown of starch into simple fermentable sugars.
- Range biochemical stages – pre-processing, liquification, gelatinisation, enzymatic process.
- 3.4 The explanation names the two most important enzymes at work during mashing and outlines the factors under the brewer's control which can optimise the process of starch conversion.
- Range factors may include but are not limited to – malt, grist, structure, mixing, time, temperature, pH.
- 3.5 The explanation describes the process of wort separation in terms of the equipment used to achieve the separation in a typical New Zealand brewery.
- Range equipment – mash filter, lauter tun; evidence of one is required.
- 3.6 Process checks and quality control for mashing are described as they relate to a typical New Zealand brewery's quality control system.

#### **Outcome 4**

Explain the process of wort boiling.

#### **Performance criteria**

- 4.1 The explanation gives the purpose of wort boiling in terms of the changes which take place in the wort.
- Range changes to – flavour, microbial and enzyme activity, behaviour of proteins.
- 4.2 The explanation describes the type and operation of boiling kettles in terms of use of pressure, temperature range, use of agitation, and relative advantages.
- Range un-pressurised kettles, pressurised calandria kettles, pressurised continuous boiling systems; evidence of one is required.

- 4.3 The explanation names possible additions to wort and describes procedures for their dissolution.
- Range additions – adjuncts, process aids;  
evidence of one of each is required.
- 4.4 Process checks and quality control for wort boiling are described as they relate to a typical New Zealand brewery's quality control system.
- 4.5 The explanation includes potential hazards of wort boiling as they relate to a typical New Zealand brewery's health and safety system.

### Outcome 5

Explain the process of wort clarification.

#### Performance criteria

- 5.1 The explanation includes the purpose of wort clarification in terms of its importance to producing wort of suitable quality for brewing.
- 5.2 The explanation describes wort separation in terms of plant type and operation.
- Range plant type – hops back or separator, whirlpool, wort centrifuge;  
evidence of one is required.
- 5.3 Process checks and quality control for wort clarification are described as they relate to a typical New Zealand brewery's quality control system.

### Outcome 6

Explain the process of wort cooling.

#### Performance criteria

- 6.1 The explanation includes the purpose of wort cooling in terms of its importance to producing wort for fermentation.
- 6.2 The explanation describes wort cooling in terms of plant type and operation.
- Range plant type – open coolers, coolships, closed coolers, plate heat exchangers;  
evidence of one is required.
- 6.3 The explanation relates plant energy efficiency to energy conversion, hot water recovery and utilisation.
- 6.4 Process checks and quality control for wort cooling are described as they relate to a typical New Zealand brewery's quality control system.

**Outcome 7**

Explain the process of wort collection.

**Performance criteria**

- 7.1 The explanation gives the purpose of wort collection in terms of its efficiency and speed of recovery, and wort quality.
- 7.2 The explanation describes the process of wort collection in terms of collection vessels used and plant hygiene requirements.
- 7.3 The explanation includes the process used to measure and assess raw material yields in terms of the economics of materials usage.
- 7.4 The explanation describes the significance of wort strength and original gravity values in terms of their influence on the product.
- 7.5 Process checks and quality control for wort collection are described as they relate to a typical New Zealand brewery's quality control system.

**Outcome 8**

Explain the requirements of wort composition for brewing.

**Performance criteria**

- 8.1 The explanation relates the characteristics of wort to brewery quality and fermentation requirements.
- Range microbial integrity, clarity, taste.
- 8.2 The explanation describes the process of wort analysis in terms of routine analytical tests made.
- Range analytical tests – extract/strength, fermentation limit, bitterness, pH, colour, haze/turbidity, soluble nitrogen, iodine reaction; evidence of four is required.
- 8.3 The explanation describes the differences in composition between wort and beer in terms of the relationship between analytical results and potential beer styles.

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**This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.**

**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	6 May 1999	31 December 2022
Review	2	19 August 2004	31 December 2022
Review	3	28 January 2021	31 December 2022

<b>Consent and Moderation Requirements (CMR) reference</b>	0111
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

This unit standard is expiring.