

<b>Title</b>	<b>Demonstrate knowledge of physical and chemical principles used in pulp and paper manufacturing</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>10</b>

<b>Purpose</b>	People credited with this unit standard are able to: demonstrate knowledge of the structure of matter; explain the physical principles of: electricity, light, and filtration; demonstrate knowledge of the production of steam and the steam generation of electricity; and chemical principles used in pulp and paper manufacturing.
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<b>Classification</b>	Wood Fibre Manufacturing > Pulp and Paper Technology
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<b>Available grade</b>	Achieved
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### Explanatory notes

- 1 All evidence requirements must be demonstrated and assessed in accordance with the reference text *Demonstrate knowledge of concepts of matter and chemistry used in the wood processing industries*, (Auckland: Competenz, 2004).

### Outcomes and evidence requirements

#### Outcome 1

Demonstrate knowledge of the structure of matter.

#### Evidence requirements

- 1.1 Atomic structure is explained in terms of protons, electrons, neutrons, and nucleus.
- 1.2 Elements used in pulp and paper manufacturing are identified by their chemical symbols.  
  
Range evidence of ten elements is required.
- 1.3 Principles of chemical structure used in pulp and paper manufacturing are explained in terms of elements, molecules, compounds, mixtures, and solutions.

1.4 Chemical equations are used, and explained, to outline reactions in pulp and paper manufacturing.

Range a minimum of two equations are required.

## Outcome 2

Explain the physical principles of electricity used in pulp and paper manufacturing.

### Evidence requirements

2.1 Operation of a basic electrical circuit is explained.

Range circuit components – source of electricity, complete circuit of conducting material, switch, load.

2.2 Relationship of electrical force, flow, and resistance is explained in terms of Ohms law.

2.3 Principles of operation of an electric motor are explained in terms of magnetic fields, current, and voltage.

2.4 Components of an electric motor are identified and their purpose explained.

Range rotor, armature, field, stator, termination box, cable.

2.5 Operation of direct online electric motor starters is explained.

2.6 Operator checks for safe and efficient performance of electric motors are explained.

Range heat, vibration, noise, smell, moisture, corrosion, structural deterioration.

## Outcome 3

Explain the physical principles of light and filtration as used in pulp and paper manufacturing.

### Evidence requirements

3.1 Principles of light transmission, absorption, and reflectance are explained, and their application in pulp and paper manufacturing is explained.

3.2 Principles of filtration are explained in terms of solid and liquid separation, and their application in pulp and paper manufacturing are explained.

**Outcome 4**

Demonstrate knowledge of the production of steam and the steam generation of electricity as used in pulp and paper manufacturing.

**Evidence requirements**

- 4.1 Power boiler construction and operation are explained in terms of the components and steam and water flows.
- 4.2 Principles of steam distribution and condensate recovery are explained in terms of pipe and joint types, pressures and flows, heat loss, and condensate system economics.
- 4.3 Generation of electricity using steam turbines is explained in terms of equipment used and steam flows.
- 4.4 The impact of electricity generation on the economics of a pulp and paper operation is described.

**Outcome 5**

Demonstrate knowledge of chemical principles used in pulp and paper manufacturing.

**Evidence requirements**

- 5.1 Properties of ionic, covalent, and metallic substances are explained, and examples of the application of each in pulp and paper manufacture are described.
- 5.2 Physical and chemical change is explained and the distinction between them is identified.
- 5.3 The terms 'acid', 'alkali' (base), and 'neutralisation' are defined and the pH scale and its application in pulp and paper manufacturing are explained.
- 5.4 Differences between inorganic and organic compounds are explained, showing pulp and paper applications.

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<b>Replacement information</b>	This unit standard replaced unit standard 17860.
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<b>Planned review date</b>	31 December 2020
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	19 March 2015	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0173
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

**Please note**

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

**Comments on this unit standard**

Please contact Competenz [qualifications@competenz.org.nz](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.