Title	**Describe membrane separation processing in a dairy processing operation**		
Level	**3**	**Credits**	**5**

Purpose	People credited with this unit standard are able to describe: the characteristics of feed materials and products produced in membrane separation processes; membranes used; key process control parameters in membrane processing and typical causes for variations; the procedures for installing and removing membranes; and procedures for plant inspections and sampling of membrane plants, in a dairy processing operation.

Classification	Dairy Processing > Milk Products

Available grade	Achieved

Guidance Information

1 Legislation and regulations relevant to this unit standard include but are not limited to:

- Animal Products Act 1999;
- Health and Safety at Work Act 2015;
- Animal Products (Dairy) Regulations 2005;

and any subsequent amendments.

2 Definitions

Fines – sedimentary particles.
Nanofiltration – loose reverse osmosis.
Organisational requirements – instructions to staff on policies and procedures which are documented in memo, electronic or manual format and are available in the workplace. These requirements include but are not limited to – site specific requirements, company quality management requirements, hygiene, health and safety, regulatory and legislative requirements.
Pore size – refers to the size of molecules that membranes retain or allow to pass through. Can also be referred to as molecular weight cut off.
Volume concentration factor – ratio of feed volume over retentate volume.

Outcomes and performance criteria

Outcome 1

Describe the characteristics of feed materials and products produced in membrane separation processes in a dairy processing operation.

Performance criteria

1.1 Describe composition and physical properties of membrane feed materials in terms of upstream processes and how these affect the performance of the membrane separation process.

Range composition may include but is not limited to – fat, fines;
physical properties may include but are not limited to – pH, aeration;
evidence of one composition and one physical property is required.

1.2 Describe types of products produced from membrane processing in terms of common end-use applications.

Range evidence of two end use applications is required.

Outcome 2

Describe membranes used in a dairy processing operation.

Performance criteria

2.1 Describe membrane separation technologies in terms of application, products and separation mechanisms.

Range technologies may include but are not limited to – reverse osmosis, nanofiltration, ultrafiltration, microfiltration;
evidence of two technologies is required.

2.2 Describe membranes in terms of physical dimensions, pore size, and application.

2.3 Describe membrane separation in terms of membrane separation parts and/or processes.

Range parts and/or processes may include but are not limited to – end plugs, anti-telescoping devices, permeate tubes, turbidity, volume concentration factor, retentate, permeate, flux;
evidence of at least four parts and/or processes is required.

2.4 Describe membrane manufacturing defects in terms of identification and reporting according to organisational requirements.

Outcome 3

Describe key process control parameters in membrane processing and typical causes for variations in a dairy processing operation.

Performance criteria

3.1 Describe control of membrane processing in terms of key process variables that affect membrane plant performance and products.

Range process variables include but are not limited to – flow rate, volume concentration factor, feed and retentate composition.

3.2 Describe causes for composition variations in terms of valve limitations, membrane leakage and flow-meter errors.

Range composition variations may include retentate and permeate streams;
evidence of one stream is required.

3.3 Describe fouling of membranes in terms of detection and influence on fluxes, flow rates and composition in final product.

3.4 Describe quality requirements for membrane plant water in terms of factors affecting the composition of water, methods for treatment and reasons why water used in a membrane plant must meet specified standards.

Range quality requirements may include but are not limited to – purity, pH, filtration, dosing, demineralisation, product safety, plant protection;
evidence of three quality requirements is required.

Outcome 4

Describe the procedures for installing and removing membranes in a dairy processing operation.

Performance criteria

4.1 Describe procedures for removal of membranes in terms of organisational requirements.

Range procedures include but are not limited to – plant isolation, plant opening, removal and re-use of end plugs, anti-telescopic devices, removal and disposal of membranes.

4.2 Describe membrane installation procedures in terms of organisational requirements.

Range procedures include but are not limited to – use of membrane maps, membrane fitting, fitting of o-rings and lip-seals, plant reassembly.

4.3 Describe testing procedures of newly installed membranes in terms of organisational requirements.

Outcome 5

Describe procedures for plant inspections and sampling of membrane plants in a dairy processing operation.

Performance criteria

5.1 Describe inspections of membrane plants in terms of organisational requirements.

Range inspections may include but are not limited to – timing, pump seals, pressure checks, permeate checks, flux, composition, flows, balance tank levels, retentate, solids, turbidity, diafiltration; evidence of four inspections is required.

5.2 Describe sampling of membrane plants for microbial monitoring in terms of organisational requirements.

Replacement information	This unit standard replaced unit standard 4834 and unit standard 20368.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 June 2015	31 December 2024
Review	2	25 March 2021	31 December 2024
Revision	3	29 July 2021	N/A
Revision	4	26 January 2023	N/A

Consent and Moderation Requirements (CMR) reference	0022

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact the Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.