Title	**Describe and operate an in-vessel composting plant at a composting facility**		
Level	**3**	**Credits**	**15**

Purpose	People credited with this unit standard are able to describe the operational principles, components, and controls of an in-vessel composting plant, and operate an in-vessel composting plant, at a composting facility.

Classification	Resource Recovery > Composting

Available grade	Achieved

Guidance Information

1 All work practices must comply with the: Health and Safety at Work (HSW) Act 2015; Resource Management Act 1991; Hazardous Substances and New Organisms (HSNO) Act 1996; NZS 4454:2005 Composts, soil conditioners and mulches; The New Zealand Waste Strategy: Reducing Harm, Improving Efficiency 2010 Ministry for the Environment, available at http://www.mfe.govt.nz; and HSNO Codes of Practice for Hazardous Substances available at https://worksafe.govt.nz/.

2 Personal protective equipment (PPE) must be used throughout operations in accordance with company procedures. PPE includes but is not limited to – gloves, eye protection, appropriate footwear, overalls, hearing protection, respirator or facemask, high visibility clothing, fire extinguisher, first aid kit, eye wash kit, face shield/mask; hard hat.

3 Definitions
Company procedures mean the documented methods for performing work activities and include health and safety, environmental, and quality management requirements. They may refer to manuals, codes of practice, or policy statements.
Feedstock is a mixture of raw materials that form a composting recipe.
In-vessel composting refers to composting systems that enclose degrading feedstock in order to control the atmosphere, oxygen content, and negate the release of odours and/or harmful materials. The two generic types of in-vessel composting are aerobic (high oxygen) and anaerobic (low oxygen).
Organic in this industry refers to materials that are putrescible or are of animal or vegetable origin.
Raw materials (compostable organic materials) may include but are not limited to – plant materials, food waste, wood and timber, sawdust, wood shavings, crop residuals, forestry residuals, manures, biosolids, sewage grit and screenings, fats and oils, organic sludges, paper-based materials, paper mill wastes, animal mortalities.

Outcomes and performance criteria

Outcome 1

Describe the operational principles, components, and controls for an in-vessel composting plant at a composting facility.

Performance criteria

1.1 In-vessel composting process is described in terms of its basic principles of plant operation.

Range ingredients (feedstock), moisture level, temperature, oxygen level (aerobic or anaerobic), retention time, air filtration, carbon to nitrogen ratios, amendments.

1.2 Components of in-vessel composting plant are described in terms of their functions, temperature, aeration, and oxygen control.

Range feeding system, main chamber, harvesting system.

1.3 Operational controls of in-vessel composting plant are identified and described in terms of their use.

Range start, shutdown, alarms, monitoring systems.

1.4 Emergency message indicators or sounds are identified and explained in relation to the operating of an in-vessel composting plant.

1.5 Health and safety risks are described in relation to operation of in-vessel composting plant.

Outcome 2

Operate an in-vessel composting plant at a composting facility.

Performance criteria

2.1 Feedstock is evaluated for suitability for site conditions, in-vessel type and size, and the composting product being produced.

Range particle size, mix of wet and dry, carbon to nitrogen ratios, temperature control, absence of leachate and pest and/or vermin.

2.2 Feedstock is fed into the plant to produce continuous composting or a continuous batch in accordance with company procedures and manufacturer's instructions.

2.3 The temperature is monitored and maintained in accordance with company procedures and the in-vessel plant type.

Range monitoring may include but is not limited to – temperature probe, moving windrow to pads of different temperatures.

2.4 Odour and oxygen are monitored and controlled throughout the process in accordance with company procedures.

2.5 Product quality and process control are monitored throughout the process in relation to product type and in accordance with company procedures.

Range maturation, time, contaminants.

2.6 Hazards are identified, risk assessed, reported, and managed in accordance with company procedures and the HSW and HSNO Acts.

Range hazards may include but are not limited to – low oxygen environments, biological diseases, heat, working around heavy machinery.

2.7 Data collected from monitoring process is recorded throughout the process for each batch in accordance with company procedures.

Range temperature, oxygen level, carbon to nitrogen ratio, moisture, odour.

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	23 April 2007	31 December 2025
Rollover and Revision	2	28 March 2019	31 December 2025
Review	3	27 March 2025	31 December 2025

Consent and Moderation Requirements (CMR) reference	0014

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