**NZQA**

**Approved**

Achievement standard: 91357 Version 3

Standard title: Undertake effective development to make and trial a prototype

Level: 2

Credits: 6

Resource title: Composting toilet

Resource reference: Generic Technology VP-2.4 v2

Vocational pathway: Construction and Infrastructure

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| Quality assurance status | These materials have been quality assured by NZQA. NZQA Approved number A-A-02-2015-91357-02-8254 |
| Authenticity of evidence | Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material.Using this assessment resource without modification may mean that learners’ work is not authentic. Assessors/ educators may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform. |

Vocational Pathway Assessment Resource

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Learner instructions

# Introduction

This assessment activity requires you to undertake effective development to make and trial a composting toilet prototype that would be suitable for use in emergency situations.

You are going to be assessed on how you undertake effective development to make and trial a composting toilet and justify your decision making.

The following instructions provide you with a way to structure your work so you can demonstrate what you have learnt and achieve success in this standard.

Assessor/educator note: It is expected that the assessor/educator will read the learner instructions and modify them if necessary to suit their learners.

# Task

The brief, which must include a conceptual statement and specifications, needs to be provided, or you could develop these and confirm them with the assessor/educator.

Familiarise yourself with the brief that has been agreed on with your assessor/educator, which may include a working drawing, showing what is required in the development of the composting toilet.

Make and trial a composting toilet prototype able to be used in a civil emergency situation (for example flooding, earthquakes).

## Materials and/or Components

Research and evaluate materials and/or components that could be suitable to use in making your prototype. For example, consider the physical and functional properties of a composting toilet (ventilation pipes, holding tank, bucket with lid and toilet seat), materials and/or components that are suitable, where it will be located and the specifications (which might include working drawings) of the brief.

## Practical Techniques and Processes

Trial techniques and processes that you could apply to your selected materials to determine their suitability for use in making the composting toilet.

Using stakeholder feedback, evaluate and determine the most appropriate techniques and processes to use with the selected materials and/or components, tools and equipment for the composting toilet in its intended location. For example, the required size needed for the amount of potential users during a civil emergency.

## Making and trialling the prototype

Using the materials and/or components, tools and equipment you have selected, apply the selected practical techniques and processes to the making of the composting toilet.

Combine the evidence gathered from ongoing testing and stakeholder feedback and draw conclusions to make informed decisions (i.e. synthesise) in making and trialling the composting toilet.

Trial the composting toilet in its intended social environment (who will be interacting with the outcome in an emergency situation), and physical environment (where the outcome will be situated). That is, undertake prototyping to establish the outcome’s ability to address the brief when situated in its intended environment (i.e. fitness for purpose).

Justify why the composting toilet is suitable (or needs modification) for use in an emergency situation. Your justification should reflect feedback from the potential users of the composting toilet.

## Evidence

Submit to your assessor/educator:

* the brief that you used
* the completed prototype of the composting toilet
* evidence of all trials, tests, evaluations and decisions
* justification that the prototype is fit for purpose or that it should be modified.

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Assessor/Educator guidelines

# Introduction

The following guidelines are supplied to enable assessors/educators to carry out valid and consistent assessment using this internal assessment resource.

As with all assessment resources, education providers will need to follow their own quality control processes. Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material. Using this assessment resource without modification may mean that learners' work is not authentic. The assessor/educator may need to change figures, measurements or data sources or set a different context or topic. Assessors/educators need to consider the local context in which learning is taking place and its relevance for learners.

Assessors/educators need to be very familiar with the outcome being assessed by the achievement standard. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing learners against it.

# Context/setting

This activity requires learners to undertake effective development to make and trial a justified prototype that addresses an assessor/educator-approved brief.

The prototype is for a composting toilet able to be used in a civil emergency situation (i.e. flooding, earthquakes).

# Conditions

This activity is an individual assessment.

The brief, which must include a conceptual statement and specifications, needs to be provided, or these could be developed by the learner and confirmed by the assessor/educator.

# Resource requirements

Assessors/educators must provide a brief and specifications, which may include working drawings that are suitable as a starting point or confirm specifications developed by the learner.

Learners require:

* equipment and materials for developing and testing prototypes
* internet and library access
* access to suppliers, experts and stakeholders.

# Additional information

None.

## Other possible contexts for this vocational pathway

Other possible contexts are undertaking development to make and trial a prototype for a small structure e.g. a garden swing.

# Assessment schedule: Generic Technology 91357 – Composting toilet

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner undertakes effective development to make and trial a prototype by:* evaluating materials and/or components to determine their suitability for use in making a composting toilet
* trialling practical techniques and processes to determine their suitability for use in making a composting toilet
* selecting appropriate materials and/or components, tools and equipment; and applying practical techniques and processes to make the composting toilet

For example:The learner used portfolio notes, drawings and research to evaluate possible materials and components for the composting toilet. A range of different styles was considered and after stakeholder consultation the learner chose a semi-portable plan that was more suited to setting up and using in case of a wide range of emergency situations. The learner chose a range of different types of materials suitable for their water resistance – plywood and plumbing pipe being the most effective. These were presented to the stakeholder. Different sizes of plastic plumbing pipes were tested to see which gave the best ventilation for the size of holding tank required. Different drills, drill bits and fasteners were trialled with a sample of plywood, to work out which would be most suitable for fixing the components to the holding tank in a way that was stable, safe for the family to use and tidy to look at, and also allowed for minimal insect invasion. The learner trialled different methods of joining the frame during the development of the composting toilet, and photographed the results, deciding that a biscuit joint would be sufficient for the required box shaped holding tank.* using results from testing and stakeholder feedback to inform the making and trialling of the composting toilet

For example:The learner found that the pipe initially selected for the vents was too small to effectively fit into the cut out space on the holding tank; allowing insects to gain access to the holding tank and the possibility of increased smell. The stakeholder was consulted about other possibilities and a decision was made to add foam padding to fill any gaps.* undertaking prototyping to gain specific evidence of the composting toilet’s fitness for purpose in its intended physical and social environment

For example:The learner installed the composting toilet outside in a sunny spot in the stakeholder’s back garden as it was suggested having vegetation around it, grass, trees etc. would reduce the smell (growing plants absorb ammonia). The stakeholder stated that it looked unobtrusive and would be easy to access in case of a civil emergency as specified in the brief.* explaining any decisions to accept and/or modify the composting toilet

For example:The learner found that by putting fly screen over the vents and foam padding tape to reduce any gaps between the seating and holding tank, insects were unable to gain access and the smell was reduced.*The above expected learner responses are indicative only and relate to just part of what is required.* | The learner undertakes effective development to make and trial a refined prototype by:* evaluating materials and/or components to determine their suitability for use in making a composting toilet
* evaluating practical techniques and processes to determine their suitability for use in making a composting toilet
* selecting appropriate materials and/or components, tools and equipment; and applying practical techniques and processes to make the composting toilet

For example:The learner used portfolio notes, drawings and research to evaluate possible materials and components for the composting toilet. A range of different styles was considered and after stakeholder consultation the learner chose a semi-portable plan that was more suited to setting up and using in case of a wide range of emergency situations. The learner chose a range of different types of materials suitable for their water resistance – plywood and plumbers pipe being the most effective. These were presented to the stakeholder. Different sizes of plastic plumbing pipes were tested to see which gave the best ventilation for the size of holding tank required. Different drills, drill bits and fasteners were trialled with a sample of plywood, to work out which would be most suitable for fixing the components to the holding tank in a way that was stable, safe for the family to use and tidy to look at, and also allow for minimal insect invasion. The learner tested different heights to decide on the best ergonomic fit (i.e. the potential user was able to sit comfortably and fit a bucket or half barrel inside the holding tank). Methods of joining the frame of the holding tank were trialled, and a builder consulted to help evaluate the most suitable method for the required result. These were photographed and notes were made about the suitability of each method. The learner talked to the stakeholder about the results and confirmed that a biscuit joint would give the best results for the box shaped holding tank, with clips to hold down the lid.* using evidence from ongoing testing and stakeholder feedback to inform the making and trialling of the composting toilet

For example:The materials initially chosen for the holding tank were not sufficiently water resistant so the stakeholder was consulted to discuss other possibilities. Several other options were considered from the original trialling (i.e. plastic barrels and marine plywood). Costs were considered and agreed by the stakeholders and the final material (marine plywood) was selected due to its functional and aesthetic properties.* undertaking prototyping to gain specific evidence of the composting toilet’s fitness for purpose in its intended physical and social environment

For example:The learner installed the composting toilet outside in a sunny spot in the stakeholder’s back garden as it was suggested having vegetation around it, grass, trees etc. would reduce the smell (growing plants absorb ammonia). The stakeholder stated that it looked unobtrusive and would be easy to access in case of a civil emergency as specified in the brief.* explaining any decisions to accept and/or modify the composting toilet

For example:The learner found that by putting fly screen over the vents and foam padding tape to reduce any gaps between the seating and holding tank, insects were unable to gain access and the smell was reduced.*The above expected learner responses are indicative only and relate to just part of what is required.* | The learner undertakes effective development to make and trial a justified prototype by:* evaluating materials and/or components to determine their suitability for use in making a composting toilet
* evaluating practical techniques and processes to determine their suitability for use in making a composting toilet
* selecting appropriate materials and/or components, tools and equipment; and applying practical techniques and processes to make the composting toilet

For example:The learner used portfolio notes, drawings and research to evaluate possible materials and components for the composting toilet. A range of different styles was considered and after stakeholder consultation the learner chose a semi-portable plan that was more suited to setting up and using in case of a wide range of emergency situations. The learner chose a range of different types of materials suitable for their water resistance – plywood and plumbers pipe being the most effective. These were presented to the stakeholder. Different sizes of plastic plumbing pipes were tested to see which gave the best ventilation for the size of holding tank required. Different drills, drill bits and fasteners were trialled with a sample of plywood, to work out which would be most suitable for fixing the components to the holding tank in a way that was stable, safe for the family to use and tidy to look at, and also allow for minimal insect invasion. The learner tested different heights to decide on the best ergonomic fit (i.e. the potential user was able to sit comfortably and fit a bucket or half barrel inside the holding tank). Methods of joining the frame of the holding tank were trialled, and a builder consulted to help evaluate the most suitable method for the required result. These were photographed and notes were made about the suitability of each method. The learner talked to the stakeholder about the results and confirmed that a biscuit joint would give the best results for the box shaped holding tank, with clips to hold down the lid.* synthesising evidence from ongoing testing and stakeholder feedback to inform the making and trialling of the composting toilet

For example:Testing showed that materials initially chosen for the holding tank were not sufficiently water resistant so several other options were considered (i.e. plastic barrels and marine plywood). Costs of both were compared and the stakeholder consulted with the results. Although increasing the costs overall the stakeholder agreed marine plywood was best suited to address the functional and aesthetic properties specified in the brief. After further research of possible finishes (oils, varnish) and testing these on plywood, a decision was made to use two layers of varnish. This would give the plywood an increased life expectancy, an important specification for an outdoor product.* undertaking prototyping to gain specific evidence of the composting toilet’s fitness for purpose in its intended physical and social environment

For example:The learner installed the composting toilet outside in a sunny spot in the stakeholder’s back garden as it was suggested having vegetation around it, grass, trees etc. would reduce the smell (growing plants absorb ammonia). The stakeholder stated that it looked unobtrusive and would be easy to access in case of a civil emergency as specified in the brief.* justifying any decisions to accept and/or modify the composting toilet

For example:Throughout the making the learner tested for quality workmanship and continually checked and adjusted the fit of all components to reduce the possibility of insects gaining access, but could not test if the holding tank was completely secure until it had been installed in the back garden and left for a period of time. After leaving the composting toilet outside for a week the learner found that insects were unable to gain access to the holding tank and the smell was minimal.*The above expected learner responses are indicative only and relate to just part of what is required.* |

Final grades will be decided using professional judgement based on an examination of the evidence provided against the criteria in the Achievement Standard. Judgements should be holistic, rather than based on a checklist approach.