

Australian/New Zealand Standard™

On-site domestic wastewater treatment units

Part 2: Waterless composting toilets



AS/NZS 1546.2:2008

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee WS-013, On-site Domestic Wastewater Management. It was approved on behalf of the Council of Standards Australia on 16 May 2008 and on behalf of the Council of Standards New Zealand on 9 April 2008.
This Standard was published on 25 May 2008.

The following are represented on Committee WS-013:

Association of Accredited Certification Bodies (Australia)
Association of Rotational Moulders (Australasia)
Auckland Regional Council
Australian and New Zealand Clinical Waste Management Industry Group
Australian Industry Group
Australian Water Association, National On-site Systems Special Interest Group
Business New Zealand
Commerce Queensland
Department of Conservation, New Zealand
Department of Health and Community Services, Northern Territories
Department of Health, South Australia
Department of Health, Western Australia
Department of Human, Services Victoria
Department of Justice, Tasmania
Engineers Australia
Institute of Environmental Science and Research Ltd
Institution of Professional Engineers New Zealand (IPENZ)
Local Government New Zealand
Master Plumbers and Mechanical Services Association of Australia
Master Plumbers, Gasfitters and Drainlayers New Zealand Inc.
Master Plumbers, New South Wales
Ministry of Health, New Zealand
National Precast Concrete Association of Australia
New South Wales Health Department
New Zealand Water and Wastes Association, Small Wastewater and Natural Systems Special Interest Group
Queensland Department of Infrastructure and Planning
Queensland Health
Queensland University of Technology
The University of Auckland
Wastewater Practitioners' Association, Queensland

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.standards.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

Alternatively, both organizations publish an annual printed Catalogue with full details of all current Standards. For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR 06928.

Australian/New Zealand Standard™

On-site domestic wastewater treatment units

Part 2: Waterless composting toilets

Originated in Australia and New Zealand as AS/NZS 1546.2:2001.
Revised and reissued as AS/NZS 1546.2:2008.

COPYRIGHT

© Standards Australia/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

FOREWORD

This Standard is one of a series revised by the Joint Standards Australia/Standards New Zealand Committee WS-013 on On-site Domestic Wastewater Management. It supersedes AS/NZS 1546.2:2001 *On-site domestic wastewater treatment units Part 2: Waterless composting toilets*. The other Standards revised by the committee are:

AS/NZS 1547:2000	On-site domestic-wastewater management;
AS/NZS 1546.1:1998	On-site domestic-wastewater treatment units Part 1: Septic tanks; and
AS/NZS 1546.3:2001	On-site domestic wastewater treatment units Part 3: Aerated wastewater treatment systems.

There are four objectives in AS/NZS 1546.2. The first is to provide a set of performance statements which set out the requirements for a domestic waterless composting toilet. The second is to provide performance evaluation tests as a base against which any conventional or innovative domestic waterless composting toilet may be assessed. The third is to provide manufacturers of waterless composting toilets with basic test requirements that will confirm the conditions under which such toilets will function satisfactorily. This will enable certification bodies to verify that a product conforms to the Standard. The fourth objective is to ensure a waterless composting toilet is operated and maintained in a safe manner that meets basic health requirements for the removal of composted or partially composted material.

The revised Standard has no significant design recommendations. The changes are confined to layout changes and clarification of intent.

COPYRIGHT

© Standards Australia/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published jointly by Standards Australia Ltd,
GPO Box 476, Sydney, NSW 2001, Australia, and
Standards New Zealand,
Private Bag 2439, Wellington 6140, New Zealand.

CONTENTS

FOREWORD	2
1 GENERAL	4
1.1 Objective	4
1.2 Scope and interpretation	4
1.3 Application	4
1.4 Legislation	5
1.5 Referenced documents	6
1.6 Definitions	7
1.7 Abbreviations	9
2 PERFORMANCE REQUIREMENTS AND PERFORMANCE CRITERIA	10
2.1 Scope	10
2.2 Performance objective	10
2.3 General	10
2.4 Performance requirements	11
2.5 Performance criteria – Public health and environment	12
2.6 Performance criteria – Construction	13
3 DESIGN FACTORS	16
3.1 Scope	16
3.2 General	16
3.3 Design considerations – Public health and environment	16
3.4 Design considerations – Construction	17
3.5 Composting requirements	18
3.6 Marking	19
3.7 Testing	19
3.8 Monitoring	19
3.9 Non-residential design guidelines	19
4 INFORMATION AND INSTRUCTIONS	20
4.1 Scope	20
4.2 Installation, operation, and maintenance manual	20
5 MARKING	22
5.1 Minimum information	22
5.2 Permanence and visibility	22

APPENDIX

A Composted end product quality (Normative)	23
B Determination of watertightness (Normative)	24
C Sampling of composted end product (Normative)	25
D Performance evaluation process (Normative)	28
E Design factors and information (Informative)	31
F Demonstrating manufacturing compliance with AS/NZS 1546.2 (Normative)	34
G Procedure for monitoring (Informative)	38
H Operation and maintenance (Informative)	40
J Risk management plan (Informative)	43
K Safe handling of solid and liquid end products (Informative)	45

TABLE

A1 Requirements for composted end product quality	23
C1 Sampling	26
E1 Non-residential/public facilities	31
F1 Type tests	36
F2 Batch release tests	37

FIGURE

E1 Time v temperature graph	38
-----------------------------------	----

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

**Australian/New Zealand Standard
On-site domestic wastewater management****Part 2: Waterless composting toilets****1 GENERAL****1.1 Objective**

The objective of this Standard is to provide:

- (a) A set of performance statements which set out the requirements for a domestic waterless composting toilet (WCT) as defined by this Standard;
- (b) A performance evaluation test against which any conventional or innovative domestic WCT may be assessed;
- (c) Manufacturers or suppliers of a domestic WCT with basic test requirements that will enable quality assessors to verify that a product conforms to the Standard; and
- (d) Guidelines for the operation and maintenance of a domestic WCT so that public health and environmental requirements will be met.

1.2 Scope and interpretation**1.2.1 Scope**

This Standard covers the requirements of WCT which are intended primarily as stand-alone units for residential use but may be suitable for non-residential applications.

1.2.2 Interpretation

The word 'shall' identifies a mandatory requirement for compliance with the Standard. The word 'should' refers to practices, which are advised or recommended.

Clauses prefixed by 'C' and printed in italic and shaded are comments, explanations, and summaries of technical background, or recommended practice. They may also suggest approaches that satisfy the intent of the Standard, but are not to be taken as the only or complete interpretation.

The terms 'Normative' and 'Informative' have been used in this Standard to define the application of the Appendices to which they apply. A 'Normative' Appendix is an integral part of the Standard, whereas an 'Informative' Appendix is for information and guidance only.

Where the term WCT(s) is used, it refers to WCT(s) primarily for domestic use only.

The full titles of referenced documents cited in this Standard are given in 1.5.

1.3 Application

This Standard is intended for use by consultants, designers, manufacturers and suppliers, certifying bodies, installers and regulators. AS/NZS 1546.2 shall be read in conjunction with AS/NZS 1547.

1.3.1 Conventional designs and materials

This Standard includes traditionally used materials, designs, and techniques.

C1.3.1

WCTs are broadly categorised into continuous or batch systems. Both are manufactured with a range of capacities.

1.3.2 Non-standard materials, installations or designs

This Standard does not preclude the manufacture of a WCT from any material, or in any unusual design, or installation in any non-standard fashion, provided the completed and installed product meets the performance requirements and performance criteria given in section 2 of this Standard.

C1.3.2

It may be necessary to obtain and supply evidence of third party certification or opinion from a person or organisation recognised as having the capability of providing this before a regulatory authority will accept a new material or design.

1.3.3 Operation and maintenance

Operation and maintenance requirements are included in this Standard as WCT systems require regular removal of the composted end product material and maintenance.

1.4 Legislation

This Standard shall be read in conjunction with the bylaws and regulations of the regulatory authorities in Australia and in conjunction with the relevant New Zealand legislation, including the New Zealand Building Act 2004.

1.4.1 Australia

1.4.1.1 Approval

Approval of a manufactured WCT is the responsibility of the State or Territory regulatory authority. Approval to install a WCT is generally the responsibility of the local regulatory authority.

1.4.1.2 Building Code of Australia

The Building Code of Australia (BCA) and State/Territory appendices to the BCA may impact on installation and other requirements in relation to WCTs.

1.4.2 New Zealand

1.4.2.1 New Zealand Building Code

WCT come within the description of a building in section 8 of the Building Act 2004. The First Schedule of the Building Regulations 1992 (known as the New Zealand Building Code), Clause G14 includes performance requirements for systems that store and treat liquid waste.

Waterless composting toilets constructed to this Standard meet the following requirements of the New Zealand Building Code:

Clause B1	Structure
Clause B2	Durability
Clause G1	Personal hygiene
Clause G14	Industrial liquid waste.

1.4.2.2 Resource Management Act

The Resource Management Act (RMA) is operated by local authorities (regional councils and territorial authorities) and, through regional plans, imposes environmental constraints on systems and the effluent produced.

Through the RMA, regional councils will have established regional plans which identify permitted, controlled, discretionary, and prohibited activities. Territorial authorities will give consent under the Building Act to install a system and will advise if resource consent under the RMA is required.

1.4.2.3 Health Act

The Health Act 1956 gives territorial authorities a duty to 'improve, promote and protect' public health (section 23), primarily through the detection and abatement of 'nuisances', that is, conditions likely to be offensive or injurious to health. Section 54 relates to sludge collection and disposal and under Schedule 3 specifies that nightsoil collection and disposal is an 'offensive trade', which requires authorisation by the territorial authority and the Medical Officer of Health.

1.5 Referenced documents

The following documents are referred to in this Standard:

AUSTRALIAN

AS 1668.2:2002	Mechanical ventilation for acceptable indoor-air quality
AS 2031:2001	Selection of containers and preservation of water samples for microbiological analysis
SA HB 18.28:2005	Conformity assessment – Guidance on third-party certification system for products (also known as ISO/IEC Guide 28)
AS ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories

JOINT AUSTRALIAN/NEW ZEALAND

AS/NZS 1546.1:2008	On-site domestic wastewater treatment units – Septic tanks
AS/NZS 1547:2008	On-site domestic-wastewater management
AS/NZS 3000:2007	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3500.0:2003	Plumbing and drainage – Glossary of terms
AS/NZS 3500.2:2003	Plumbing and drainage – Sanitary plumbing and drainage
AS/NZS 3820:1998	Essential safety requirements for low voltage electrical equipment
AS/NZS 4360:2004	Risk management
AS/NZS 5667.1:1998	Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
SAA/SNZ HB 436:2004	Risk management guidelines – Companion to AS/NZS 4360:2004

NEW ZEALAND

NZS 4241:1999	Public toilets
NZS 4303:1990	Ventilation for acceptable indoor air quality
NZS ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories

AMERICAN

ASTM D4959:2007	Standard test method for determination of water (moisture) content of soil by direct heating
-----------------	--

NEW ZEALAND LEGISLATION

Building Act 2004
 Building Regulations 1992
 Health Act 1956
 Resource Management Act 1991

OTHER DOCUMENTS

American Public Health Association, Standard Methods for Examination of Water and Wastewater. Standard Method Test 9260 Detection of Pathogenic Bacteria
 American Public Health Association, Standard Methods for Examination of Water and Wastewater. Standard Method Test 9221 F Escherichia coli Procedure, 21st edition or later. Standard Method Test 9223 B Enzyme Substrate Test.
 Chapman, P D. Composting toilets: An option for human waste disposal at remotes sites. Thesis submitted to Lincoln University. Canterbury, 1993
 Department of Building and Housing, New Zealand Building Code (NZBC)
 Department of Housing and Works, Building Code of Australia (BCA)

LATEST REVISIONS

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Amendments for Australian, New Zealand, and Joint Australian/New Zealand Standards can be found on www.standards.org.au or www.standards.co.nz.

1.6 Definitions

For the purpose of this Standard the definitions given in AS/NZS 3500.0 and those below apply:

Access opening	An opening in the top or side of the chamber fitted with a cover which is removable to allow access for inspection of the interior and contents, and for operations and maintenance, but not intended to allow people to enter a tank
Batch system	A process for operating a waterless composting toilet in which two or more chambers or bins are moved aside when full to complete the composting process
Bin	(See Chamber)
Bulking agent	Material added and mixed into the composting material to improve air flow for promoting aerobic bacteria and to assist with achieving the optimum carbon/nitrogen ratio for promoting microbial growth in the composting process
Chamber	A container usually situated beneath the pedestal to receive human excreta, domestic organic matter and bulking agents and in which the composting process takes place, (with some batch processes the container is called a Bin)
Composted end product	Material which has undergone decomposition within a WCT and which is suitable for disposal

Composting period	A minimum period that allows the human and domestic organic matter to decompose to the degree necessary for public health and environmental protection
Compost pile	Human excreta, other organic material and bulking agent in the WCT for composting
Continuous system	A process for operating a WCT in which only one chamber is available to receive new material at all times and in which the composting process is completed
Decibel (dB)	The term used to identify 10 times the logarithm to the base 10 of the ratio of two like quantities proportional to intensity, power, or energy NOTE: Previous conventions of adding an 'A' to the units (for example, dBA) shall not be used when reporting sound levels in accordance with this Standard. In accordance with international conventions, where a sound level is A-frequency weighted this shall be denoted by an 'A' subscript in the descriptor, for example, $L_{Aeq} (15 \text{ min})$.
Design capacity	The maximum number of people for a specified use
Disposal	The removal of Composted End Product from the WCT for its burial or for further processing
Domestic wastewater	Wastewater originating from household or personal activities including water closets, urinals, kitchens, bathrooms (including shower, washbasins, bath, spa bath but not spa) and laundries. Includes wastewater from facilities serving staff/employees/residents in institutional, commercial and industrial establishments, but excluding commercial and industrial wastes, large-scale laundry activities and any stormwater flows
Excess liquid	Waste liquid composed of urine, condensation and water from cleaning operations
<i>Escherichia coli</i> (<i>E. coli</i>)	A member of the faecal coliform group of bacteria, and is indicative of faecal contamination
Manufacturer	Any person, company or firm and any nominated representative of the company or firm that manufactures the WCT
Operator	The person contracted by the system owner to regularly maintain the waterless composting unit, (may be the system supplier)
Performance requirements	The functions that a system has to perform in order to operate as defined

Performance criteria	The qualitative or quantitative description of the performance requirements
Regulatory authority	An authority which is empowered by statute to be responsible for managing or controlling an aspect of on-site domestic wastewater management systems
Serviceable life	The period of time in which with only normal and routine maintenance, the WCT system and associated fittings perform satisfactorily without failure
Testing agency	An organisation that is accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) or a competent person/s authorised by the regulatory authority to examine all or identified aspects of the performance of the WCT
Type test	A test that is used to ensure or assess compliance of a product or system and any subsequent redesign or modification to that product or system with this Standard
Waterless composting toilet (WCT)	A device that receives and treats human excreta, domestic organic matter and bulking agents using natural, aerobic stabilisation processes to produce a product that is suitable for disposal.

1.7 Abbreviations

The following abbreviations are used in this Standard:

L_{Aeq}	Equivalent continuous A-weighted sound pressure level
MPN	Most probable number
NZBC	New Zealand Building Code
WCT	Waterless composting toilet.

2 PERFORMANCE REQUIREMENTS AND PERFORMANCE CRITERIA

2.1 Scope

This section of the Standard specifies the performance requirements and performance criteria that a WCT shall achieve.

2.2 Performance objective

A WCT shall collect and treat human excreta and any other organic material and bulking agents from a household or non-residential facility in a manner that reduces the risk to public health and the environment.

2.3 General

This Standard is intended to ensure that appropriate control measures reduce health and environmental risks from the handling of the composted end product. The composted end product is not intended for reuse under this Standard where there is any potential for direct or indirect contact with the material.

2.3.1 Function

The function of a WCT is to collect and treat human excreta and any other added organic material and bulking agents from a household or non-residential facility. The composting process used to treat the human excreta usually requires little or no added water. For this reason, urine and condensation may be separated from the compost pile. The WCT provides the conditions necessary for natural processes to convert the compost pile to a safer, more stable and less offensive product. Some WCTs encourage a dehydrating process and may use auxiliary heating and/or a forced air process at a point separate from the compost pile. Excess liquid is treated separately.

At the completion of the composting processes, the composted end product shall meet the criteria in Appendix A. The composted end product shall be buried in the soil or be removed for disposal, in a manner approved by the regulatory authority.

2.3.2 Context of use

Depending on size and design, a WCT is either installed with a toilet pan pedestal above floor level and a collection chamber below, or complete and free-standing on a floor if the components are small enough.

The chamber(s) of a WCT shall retain all material hygienically and safely.

Adequate information on the capacity, design, operation, and maintenance of a WCT shall be provided to the user and to the satisfaction of the regulatory authority. Further, proper operation and maintenance of a WCT is essential to ensure that the performance objective of a WCT is achieved in accordance with public health and environmental requirements, and with the requirements of AS/NZS 1547.

C2.3.2

The chambers may be installed freestanding, partially in-ground or buried. In these situations they will be subject to internal and external loads or pressures and to any ground movement. The chamber and other components can become corroded internally by the waste materials and externally by the environment.

2.4 Performance requirements

2.4.1 General

The compost pile shall not be allowed to putrefy. The composting process shall produce composted end products that are of low health risk and do not pollute the environment.

The WCT and associated fittings shall hold the compost pile securely and safely. They shall be constructed of durable materials, be watertight, be capable of withstanding imposed internal or external loads. If installed in the ground, the chamber shall be constructed and installed so that it will not float or structurally fail.

2.4.2 Public health and environment

The design, operation, and installation of a WCT shall ensure that:

- (a) Designs that use a composting process promote aerobic biological decomposition;
- (b) There is no contact between a person using the toilet and the compost pile;
- (c) There are no hazards which could cause injury to any persons installing, adjusting, servicing or using the toilet;
- (d) A child could not fall through the pedestal opening;
- (e) Neither material that has not been fully composted, nor any liquid can make contact with any person, or spill from the chamber, during operation, maintenance, removal or cleaning;
- (f) The likelihood of foul air and gases creating a nuisance and entering buildings is avoided;
- (g) The entire structure of the chamber and any associated inspection and access covers and/or extensions are integrally sound, and exclude penetration by roots; or entry of groundwater, insects and vermin;
- (h) Soils, groundwater and waterways are not contaminated; and
- (i) The risk to public health is reduced.

2.4.3 Construction

A WCT shall be constructed:

- (a) To provide adequate capacity for the treatment of the compost pile;
- (b) To allow for the retention of the compost pile for the composting/treatment time period;
- (c) To provide for storage or transfer of excess liquid for further treatment;
- (d) To avoid the likelihood of blockage;
- (e) To provide access for removal of the contents of the chamber or for maintenance;
- (f) To reduce the likelihood of unauthorised access;
- (g) From materials which are resistant or impervious to the compost pile in the chamber, the associate liquids to soil and to groundwater, for the serviceable life of the toilet;
- (h) To prevent the likelihood of damage from any superimposed loads or normal ground movement;
- (i) To resist hydrostatic uplift pressures;
- (j) To remain integral for its serviceable life; and
- (k) To perform adequately with normal maintenance over its serviceable life.

2.4.4 Mechanical and electrical equipment

Mechanical and electrical equipment shall be safe and accessible for maintenance or replacement.

2.4.5 Serviceable life

In each of the following circumstances, the serviceable life of the toilets shall be:

- (a) A minimum period of 50 years with only normal maintenance for a WCT that has difficult access and hidden components and attachments (for New Zealand refer to NZBC Clause B2 Durability);
- (b) A minimum period of 15 years with normal maintenance for a WCT that has moderately easy access and fixings to the external envelope and attachments that are not difficult to replace (for New Zealand refer to NZBC Clause B2 Durability); and
- (c) Electrical and mechanical components complying with 2.4.4 are excluded from (a) or (b).

C2.4.5

The New Zealand Building Code currently requires a durability of 15 years for the envelopes, non-hidden fittings and other elements of a WCT having moderate ease of access but which are difficult to replace.

2.5 Performance criteria – Public health and environment

All designs or developments shall meet the performance requirements of 2.4, the associated performance criteria in this section, and the relevant performance requirements of AS/NZS 1547.

2.5.1 Non-contact with compost pile

All designs shall guard against the possibility of contact between a person and the compost pile that is not yet a composted end product.

To avoid contact the distance between the user when seated on the pedestal and the expected top of the compost pile shall not be less than 400 mm. If there is a barrier above the compost pile, typically 60-70 mm below seat level, this distance may be reduced to 200 mm. If a barrier is used across the pedestal opening it shall be easily cleaned.

C2.5.1

The height of the compost pile is often controlled by use of a compost-levelling device.

2.5.2 Opening at pedestal base

The largest unobstructed dimension, measured in the horizontal plane of the opening at the toilet pedestal base shall not exceed 190 mm.

2.5.3 Ventilation

The WCT shall be ventilated through the pedestal in a manner that minimises the risk of odour creating a nuisance and entering buildings.

Any venting system shall be constructed according to the manufacturer's instructions and for mechanical venting systems to AS 1668.2 in Australia, and to NZS 4303 in New Zealand.

2.5.4 Insect and vermin control

The chamber(s) of a WCT shall be designed and fabricated to minimise entry of insects or vermin into any part in which there will be biological activity.

2.5.5 Watertightness

Chambers and component parts of a WCT shall be designed and fabricated to prevent infiltration of water or escape of liquid. When tested according to Appendix B there shall be no leakage or damp patches.

2.5.6 End product quality**2.5.6.1 Composted end product**

Composted end product produced by a WCT shall meet the requirements as set out in Table A1.

C2.5.6.1

It should never be assumed that the composted end product is safe to handle. Composting is a natural process and is significantly affected by ambient conditions and other factors including temperature and moisture content of the composting mass. The degree of composting and the residual pathogen content will vary. This variability means that there is always a health risk with the composted end product.

The sampling procedure is described in Appendix C and a performance evaluation process is described in Appendix D.

2.5.6.2 Liquid end product

Excess liquid diverted or separated from the compost pile in a WCT shall be collected and treated in accordance with AS/NZS 1547, or treated in another manner approved by the regulatory authority.

2.6 Performance criteria – Construction**2.6.1 Access openings and covers to chambers****2.6.1.1 General**

Access openings are not intended to allow people to enter the chamber. Where it is envisaged that a person must be able to enter (such as for the purposes of repairs and maintenance) the access opening size shall comply with the requirements of the regulatory authority.

2.6.1.2 Access covers

Access covers shall be secured and be designed to prevent opening by children.

2.6.2 Materials**2.6.2.1 Degradation**

All WCT fabrication materials that may come into contact with the compost pile, associated liquids or composted end product shall not undergo any change or degradation that would impair the performance or life of the WCT.

2.6.2.2 Exposure to the environment

WCT fabrication materials exposed to the environment shall be resistant to degradation for the serviceable life of the WCT.

2.6.2.3 Cleaning

The internal surfaces of the chute and/or any other surfaces accessible to the user shall be designed for easy cleaning.

2.6.3 *Loads*

2.6.3.1 *General*

WCTs shall be designed and constructed to resist loads incurred during transport, installation and normal use. Free-standing chambers shall be anchored against ground movement or seismic loads, if such requirement is applicable. If installed in the ground, chambers shall resist soil, hydrostatic and any other applied loads.

2.6.3.2 *Integrity during handling or installation*

2.6.3.2.1 *General*

There shall be no structural failure when the chamber is lifted, transported or moved during installation.

2.6.3.2.2 *Verification test*

The chamber shall be lifted using the manufacturer's nominated lifting method and shall show no structural failure or cracking after being lifted for 5 minutes. Only cured chambers (chambers that conform to the manufacturer's normal delivery package) shall be selected.

2.6.3.3 *In-ground installation*

Chambers for installation in the ground shall be designed so that there is no structural failure or undue distortion due to external hydrostatic ground water and soil loading. Chambers shall meet the verification test methods shown in either Appendix H or Appendix J of AS/NZS 1546.1. Either test shall be used.

2.6.3.4 *Hydrostatic uplift*

If installed in the ground, the chamber shall not move when subjected to uplift forces generated by surrounding groundwater.

2.6.3.5 *Top loads*

The chambers of a WCT shall be designed to withstand a top load at least equivalent to the weight of a person. When tested in accordance with Appendix K of AS/NZS 1546.1 (with a load of 1.5 kN substituted for those in Table K1), there shall be no cracking or other failure.

2.6.4 *Inspection and maintenance*

Component parts shall be accessible for inspection, cleaning, repair, or replacement.

2.6.5 *Mechanical and electrical equipment*

Mechanical equipment shall:

- (a) Be durable;
- (b) Require minimal maintenance;
- (c) Be adequately protected from any aggressive environment; and
- (d) Be capable of being easily serviced.

C2.6.5

AS/NZS 3000 and AS/NZS 3820 specify requirements relevant to electrical wiring and equipment respectively.