



TANKSALOT

SLIMLINE TANK RESTRAINT KIT DESIGN MANUAL

A23113
7 June 2024
REV9

TANKSALOT – SLIMLINE TANKS

The Tanksalot Slimline range features a series of corrugated steel retention and detention tanks used primarily for stormwater catchment in residential environments. The tanks may act as standalone structures or located adjacent to a building.

Richards Consulting Auckland Limited has been engaged by Tanksalot Ltd to prepare a standard design statement on the restraint fixings for the tank to provide stability during a design level earthquake or wind event. The scope of this design manual covers only the tank restraint fixings and tank foundation support system. It does not cover the design of the tank itself or any verifications on the tank structure to support the earthquake and wind loads as prescribed herein.

DESIGN PHILOSOPHY

The following design uses wind speeds taken from NZS1170.2:2021 which relate to Wind Zones as referenced in NZS3604:2011, and earthquake loads from NZS1170.5:2004. These load values are Ultimate Limit State (ULS) design loads.

The stability of the tank is provided through metal clamping plates installed around the perimeter of the tank. The clamping plates are fixed into a level reinforced concrete slab, which supports the tank. The strength of the clamping plates and the structural stability of the concrete slab has been designed to the loads outlined in the following section.

The tank restraint fixing design is in compliance with the New Zealand Building Code (NZBC) Section B1.

DESIGN LOADS AND LOAD CASES

The maximum allowable site loads for the tank restraint system are:

- Wind: 'Very High' Wind Zone (50m/s) – relating to an Annual Probability Exceedance of 1/500 years
- Earthquake: Any EQ Zone, Soil Class "D" – relating to an Annual Probability Exceedance of 1/500 years.

The site loads can be determined from:

- Wind: Local council wind maps found on the relevant council websites or from the BRANZ website <https://www.branz.co.nz/branz-maps-zones>

The following design load cases have been applied to the tank structure:

- $G + E_u + \Psi_E Q$ (earthquake overturning - ULS)
- $0.9G + W_u$ (wind overturning - ULS)

DESIGN LIMITATIONS

The following design assumptions apply to the design statement:

- The tank is considered an Importance Level 1 structure (as defined in Table 3.2 AS/NZS1170.0:2002)
- The site where the tank will be founded on is relatively flat, in order to provide a level foundation for the tank

- A minimum Geotechnical Ultimate Bearing Capacity of 100kPa is available beneath the proposed tank slab
- The tank and the tank support slab will be a standalone structure
- As the building is classified as an Importance Level 1 structure, no serviceability performance criteria are required (in accordance with Table 3.3 AS/NZS1170.0:2002). Therefore, the effects of soil expansivity and liquefaction on the tank supporting slab has not been considered
- The design is limited only to the Slimline tank range (and limited to the applicable tank dimensions listed in Table 1)
- The site loads must fall within the limits given in the previous section. All sites which exceed this maximum design loading are subject to Specific Engineering Design (SED)
- Other external de-stabilising actions have not been designed for e.g., impact loads
- The design manual is limited to installations within New Zealand only

DESIGN EXCLUSIONS

The following items are specifically excluded from this design statement:

- Design and compliance of the tank structure itself
- Connection of the tank system to any adjacent structures e.g., a dwelling
- Alternative foundations to support the tank e.g., on timber piles and framing
- Structural integrity of the tank to resist design level wind and earthquake actions
- Weatherproofing and the durability of the tank

MATERIAL AND SECTION PROPERTIES

The structural member properties are as follows:

Concrete compressive strength 20MPa (25MPa in Exposure Zone “D” – refer to BRANZ map)

Steel E = 200GPa

$f_y = 300\text{MPa}$

DURABILITY

The steel fixings for the tank have been designed with a durability of 50 years (minimum of 10 years to first maintenance). To ensure the design life is achieved, we recommend routine inspections to identify areas of rust. Ensure removal of any rust spots and repair with spot galvanising to maintain galvanised layer. In more corrosive environments where the anchor has shown considerable rust, we recommend the anchor to be replaced.

DESIGN MANUAL NOTES

The person or people installing the tank foundations and fixings should have a good understanding of the construction techniques required and abide by the following:

- Only the attached connection details shall be used
- The material specifications must be within the appended fixing details
- No substitution with the products included in this manual is permitted
- Following a seismic event, the owner shall do a visual inspection of the baseplate and connections to identify signs of deformation. The baseplate and anchors shall be replaced accordingly, if damage is identified.

SLIMLINE TANK RANGE

Table 1 below shows the range of Slimline tanks which this product manual covers. Refer to Table 1 when using the below design flowchart.

MAXIMUM TANK HEIGHT (MM)	MAXIMUM TANK LENGTH (MM)	MINIMUM TANK WIDTH REQUIRED (MM)
1000	4000	500
1500	4000	700
1500	2400	600
2000	4000	1100
2000	3200	1000
2000	2700	800
2000	2200	600
2500	3800	1150 (max. 10000L capacity)

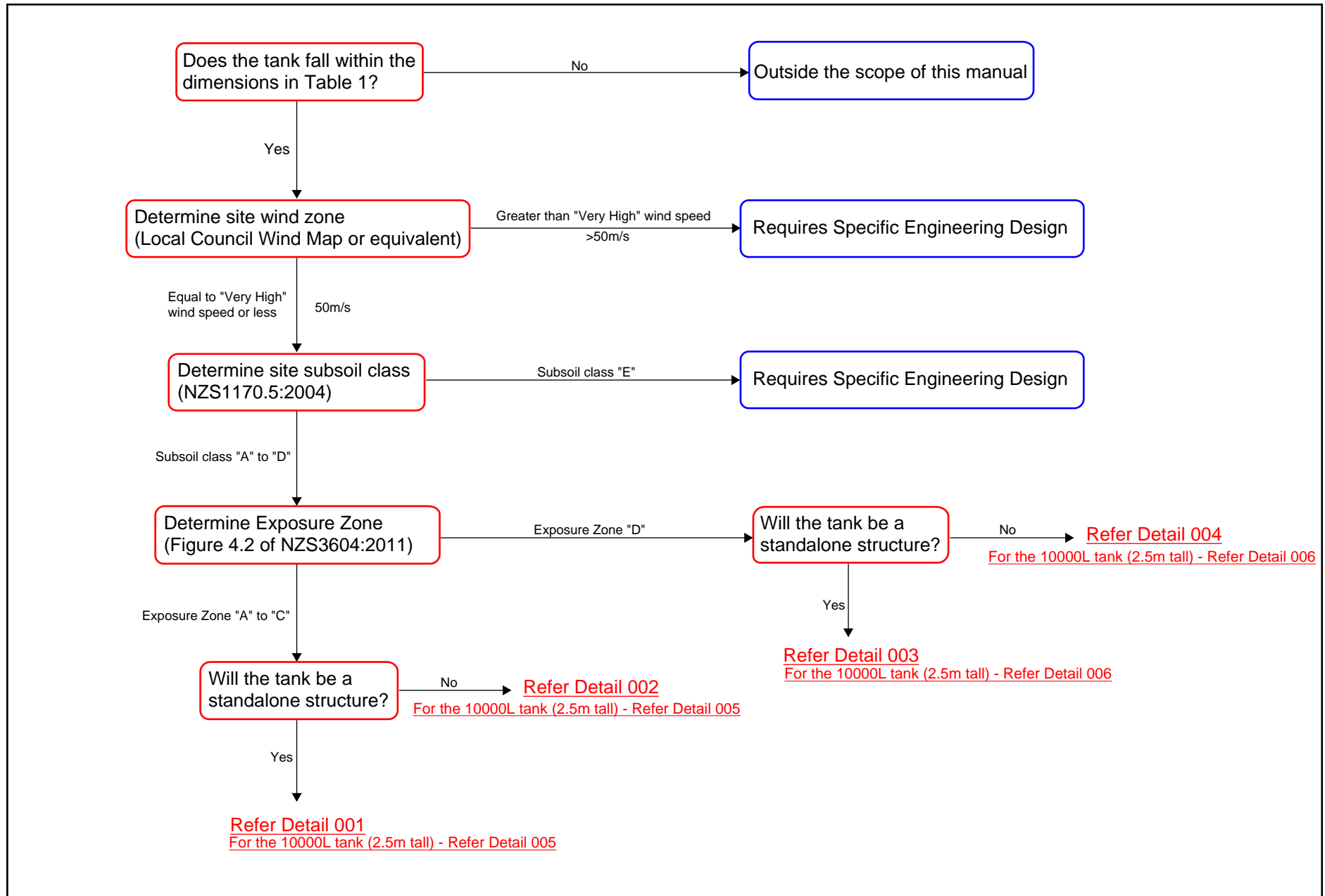
Table 1: Range of Slimline tank dimensions covered by this product manual. A minimum of one row of requirements must be met.

CONSTRUCTION MONITORING

To verify that the structure is constructed in accordance with the design and is structurally adequate. It is required that the following construction monitoring be undertaken:

	Structural Element	Construction monitoring method	Notes/date completed
1	Foundation pad pre-pour supporting the stormwater tank	Local Chartered Structural Engineer or Local territorial authority	
2	Stormwater tank base steel fixings	Local Chartered Structural Engineer or Local territorial authority	

Slimline Tank Restraint Fixing: Design Flow Chart



REFERENCES

- AS/NZS1170: 2011
- NZS3603: 1993
- NZS3604: 2011
- NZS3101: 2006
- BRANZ Maps zone information

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APPENDICIES

- PS1
- A23113 - Stormwater Tank Lateral Restraint Product Manual - Structural drawings - REV 7



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engineering



PRODUCER STATEMENT – PS1 DESIGN

BUILDING CODE CLAUSE(S): B1 only
ISSUED BY: Richards Consulting Auckland Limited
(Engineering Design Firm)
TO: Tanksalot Limited
(Owner/Developer)
TO BE SUPPLIED TO: Any BCA in NZ
(Building Consent Authority)
IN RESPECT OF: Tanksalot Slimline tank restraint fixings and foundation design only
(Description of Building Work)
AT:
(Address, Town/City)
LEGAL DESCRIPTION:

JOB NUMBER: A23113

N/A

We have been engaged by the owner/developer referred to above to provide *(Extent of Engagement)*:
 Engineering design for the proposed Slimline tank restraint fixings and foundation support
 in respect of the requirements of the Clause(s) of the Building Code specified above for Part only, as specified in
 the Schedule, of the proposed building work.

The design carried out by us has been prepared in accordance with:

- Compliance documents issued by the Ministry of Business, Innovation & Employment *(Verification method/acceptable solution)* B1/VM1 & B1/VM4 and/or;
- Alternative solution as per the attached Schedule.

The proposed building work covered by this producer statement is described on the drawings specified in the Schedule, together with the specification, and other documents set out in the Schedule.

On behalf of the Engineering Design Firm, and subject to:

- Site verification of the following design assumptions: Site parameters have been calculated correctly
- All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that:

- the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the Schedule, will comply with the relevant provisions of the Building Code and that;
- the persons who have undertaken the design have the necessary competency to do so.

I recommend the **CM1** level of **construction monitoring**.

I, *(Name of Engineering Design Professional)* Nicholas Baker, am

- CPEng number 1016657
and hold the following qualifications BE(Hons)

The Engineering Design Firm holds a current policy of Professional Indemnity Insurance no less than \$200,000
 The Engineering Design Firm is a member of ACE New Zealand.

SIGNED BY *(Name of Engineering Design Professional)*: Nicholas Baker
(Signature below)

ON BEHALF OF *(Engineering Design Firm)*: Richards Consulting Auckland Limited

Date: 07/06/2024

Note: This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Engineering Design Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, is limited to the sum of \$200,000.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

SCHEDULE TO PS1

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below:

- Tanksalot Slimline Tank Restraint Kit Design Manual referenced A23113 – REV9, dated 07 June 2024
- A23113 - Stormwater Tank Lateral Restraint Product Manual - Structural drawings - REV 7