



association of consulting and engineering



PRODUCER STATEMENT – PS1 DESIGN

BUILDING CODE CLAUSE(S): B1 | **JOB NUMBER:** 2EJ345

ISSUED BY: 2E Consulting Ltd
(Engineering Design Firm)

TO: Apricus eco hot water
(Owner/Developer)

TO BE SUPPLIED TO: Territorial Authority
(Building Consent Authority)

IN RESPECT OF: Seismic fixing of Okofen wood pellet boilers, Easypell 16, 20, 25 & 32
(Description of Building Work)

AT: Various localities in New Zealand
(Address, Town/City)

LEGAL DESCRIPTION: Varies | **N/A**

We have been engaged by the owner/developer referred to above to provide (Extent of Engagement):
Mechanical engineering design for assessment of seismic support of the Okofen wood pellet boilers
in respect of the requirements of the Clause(s) of the Building Code specified above for All, 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, clause 13.1 - design to NZS 4219. 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: Suitability of the floor, refer to notes for mounting requirements.
- 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 CM 1 level of construction monitoring.

I, (Name of Engineering Design Professional) Edward Wall, am:

- CPEng number 168163 and hold the following qualifications B.Tech (E&A)

The Engineering Design Firm holds a current policy of Professional Indemnity Insurance no less than \$200,000
The Engineering Design Firm is not a member of ACE New Zealand.

SIGNED BY (Name of Engineering Design Professional): Edward Wall
(Signature below):

Digitally signed by Edward Wall
Date: 2023.04.24 10:46:54
+12'00'

ON BEHALF OF (Engineering Design Firm): 2E Consulting Ltd

Date: 1/5/2023

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:

Seismic design - OKOFEN Easypell 16, 20, 25 & 32
Ramset trubolt anchor design M10

GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on the Engineering New Zealand website

<https://www.engineeringnz.org/engineer-tools/engineering-documents/producer-statements/>

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects (NZIA), Institution of Professional Engineers New Zealand (now Engineering New Zealand), Association of Consulting and Engineering New Zealand (ACE NZ) in consultation with the Building Officials Institute of New Zealand (BOINZ). The original suite of producer statements has been revised at the date of this form to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with part of the reasonable grounds necessary for the issue of a Building Consent or a Code Compliance Certificate, without necessarily having to duplicate review of design or construction monitoring undertaken by others.

PS1 DESIGN Intended for use by a suitably qualified independent engineering design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

PS2 DESIGN REVIEW Intended for use by a suitably qualified independent engineering design review professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

PS3 CONSTRUCTION Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011²

PS4 CONSTRUCTION REVIEW Intended for use by a suitably qualified independent engineering construction monitoring professional who either undertakes or supervises construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

Competence of Engineering Professional

This statement is made by an engineering firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its personnel.

The person signing the Producer Statement on behalf of the engineering firm will have a professional qualification and proven current competence through registration on a national competence-based register such as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand provides additional assurance of the designer's standing within the profession. If the engineering firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent engineering professional".

Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard practice for the relationship between the BCA and the engineering firm.

Professional Services during Construction Phase

There are several levels of service that an engineering firm may provide during the construction phase of a project (CM1-CM5 for engineers³). The building Consent Authority is encouraged to require that the service to be provided by the engineering firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Refer Also:

- 1 Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
- 2 NZIA Standard Conditions of Contract SCC 2011
- 3 Guideline on the Briefing & Engagement for Consulting Engineering Services (ACE New Zealand/Engineering New Zealand 2004)
- 4 PN01 Guidelines on Producer Statements

www.acenz.org.nz
www.engineeringnz.org

Seismic Design

Project: **Apricus - boilers**
 Client: **Apricus - eco-energy**
 Title: **Seismic anchor design for Wood Pellet boilers - OKOFEN Easypell 16, 20, 25 & 32**
 By: Eddie Wall 2E Consulting

rev	date	comment	issued by
0	22/03/2021	initial issue	ECW
1	23/06/2021	Mounting locations revised	ECW
2	24/04/2023	Calcs revised	ECW

Aim: Determine the potential loads to the hot water wood pellet boilers from Earthquakes
 Design the restraint system
 Develop typical support details
 Summarise support requirements on drawings and std details.

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NZBC: B1 Structure - Verification method, clause 13 'Seismic performance of engineering systems in buildings' use NZS 4219 - subject to zone factor >0.3for Christchurch

Design code: AS/NZS 2919: 2009, section 3.7 - floor mounted components - seismic restraint

Hot Water Boilers

Calculations:
 3.3.1 Importance level table 1 **IL2** Normal building - Boiler room is not a building with crowds of people
 3.3.2 Components table 2 **P3** components representing a hazard to individual life
ULS limit state

3.4 EQ load demand
 $C = 2.7 Ch Z Cp Rc$ (but >3.6)
 Ch **1** for components at or below ground floor
 Z **0.6** Zone factor for NZBC B1, clause 13 requires min Z of 0.3, use highest Z factor for NZ, see table 3
 Cp **0.85** performance factor Appendix C Pressure tank (floor mounted cradle) - use 0.85 as it covers all the components
 Rc **0.9** Component risk factor P3 & IL2

C = **1.24** horizontal loading coefficient

there are 4 nominal sizes 16, 20, 25 & 32 kW), but only 2 physical sizes (20 & 32)

Mass of boiler unit

	Easypell 20	Easypell 32
Overall dry weight =	350 kg	430 kg
Water capacity =	70 kg	108 kg
Pellet day hopper capacity =	165 kg	190 kg
Total working load =	585 kg	728 kg

use the formulas from NZS 4219 to calculate loads at anchor fixings

Horz $R_h = \frac{CW}{N}$ eqn 3.5

	Easypell 20	Easypell 32
C	1.24	1.24
W	585 kg	728 kg
N	4 No. hold down bolts	4 No. hold down bolts

Horz load/bolt $R_h =$ **181.2 kg** **1.78 kN** **225.6 kg** **2.21 kN**

Vert $R_{vc} = \frac{+/-CWh}{nB} + W/N$ eqn 3.6

	Easypell 20	Easypell 32	
C	1.24	1.24	
W	585 kg	728 kg	see mass assessment above
h	0.8 m	0.8 m	assume mass centre is located near the top (conservative)
n	2	2	No. fixings under tension
B	0.6 m	0.6 m	supports will be spread around cog
N	4	4	total No. of fixings

	Easypell 20		Easypell 32	
Rvc =	629.6 kg	Compression	load to floor	6.2 kN
Rvt =	-337.1 kg	Tension	load to anchor fixing	-3.3 kN
Rvc =	783.5 kg	Compression	load to floor	7.7 kN
Rvt =	-419.5 kg	Tension	load to anchor fixing	-4.1 kN

4 x M10 Ramset - Trubolt stud anchor is sufficient
 each bolt has allowable load
 tension **6.1 kN** **0.54 Utilisation**
 shear **10.7 kN** **0.17 Utilisation**
 tension **6.1 kN** **0.67 Utilisation**
 shear **10.7 kN** **0.21 Utilisation**

Note: The base of the Easypell 20 is 0.75 x 0.72, assume min 0.6m x 0.6m fixing spacings
 The base of the Easypell 32 is 0.8 x 0.76, assume min 0.6m x 0.6m fixing spacings

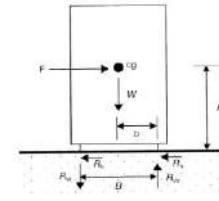


Figure 5 - Forces on floor-mounted components

Mounting requirements for OKOFEN Easypell 16 or 20 wood pellet boiler (at ground level).

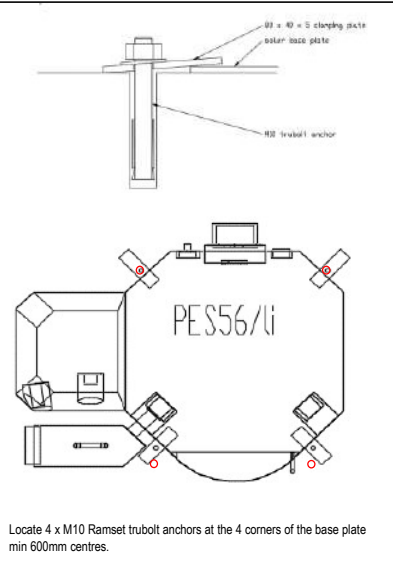
- Fixing to concrete slab or other floor structure. The floor must be suitable for the following loads: (If in doubt obtain confirmation from a structural engineer)

Operating weight	585 kg	15.9 kpa
Boiler foot print	0.36 m ²	
Seismic shear load	725 kg	7.1 kN total or 1.78 kN per each anchor fixing
Seismic tension load	337 kg	3.3 kN per anchor fixing
- Remove panels and boiler components to expose the base plate.
- Mark the location for the 4 anchor fixings
- Drill the anchor holes into the floor structure in accordance with the manufactures requirements
 - Min concrete depth 120mm, min concrete strength 25 Mpa.
 - Drill dia 10mm to 80mm
 - Clean out the drilled hole
 - Insert the Ramset M10 trubolt anchors (Zinc or Galv) through the clamping plate and into the drilled hole, use washers as required.
 - Torque the trubolt to the manufactures requirements. (45 Nm.)

Mounting requirements for OKOFEN Easypell 25 or 32 wood pellet boiler (at ground level).

- Fixing to concrete slab or other floor structure. The floor must be suitable for the following loads: (If in doubt obtain confirmation from a structural engineer)

Operating weight	728 kg	19.8 kpa
Boiler foot print	0.36 m ²	
Seismic shear load	902 kg	8.9 kN total or 2.21 kN per anchor fixing
Seismic tension load	419 kg	4.1 kN per anchor fixing
- Remove panels and boiler components to expose the base plate.
- Mark the location for the 4 anchor fixings
- Drill the anchor holes into the floor structure in accordance with the manufactures requirements
 - Min concrete depth 120mm, min concrete strength 25 Mpa.
 - Drill dia 10mm to 80mm
 - Clean out the drilled hole
 - Insert the Ramset M10 trubolt anchors (Zinc or Galv) through the clamping plate and into the drilled hole, use washers as required.
 - Torque the trubolt to the manufactures requirements. (45 Nm.)



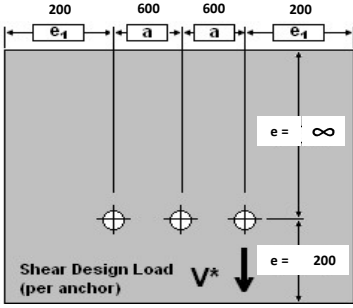
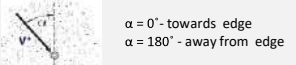
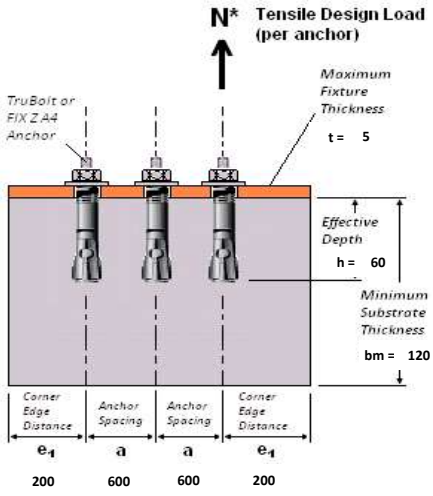
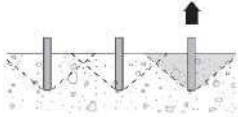
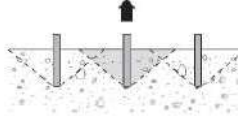


Locate 4 x M10 Ramset trubolt anchors at the 4 corners of the base plate min 60mm centres.

Cracked Concrete - TruBolt Stud Anchor Design Calculator

European Technical Assessment: ETA-15-0893

Design Methods: AS 5216:2018 (formerly TS101) or EN 1992-4 (formerly ETAG/TR029)

		Anchor Mat'l: Zinc CRACKED CONCRETE				
Anchor Type : TruBolt™ Xtrem™		Anchor Size $d_b = M 10$				
Input Description (Strength Limit State Design)	Input Data (per anchor)	Plan View - Generic Dimensions in (mm)		Project Details		
1. Number of anchors (n)	n = 4			Project Name:-		
2. Anchor Spacing (a)	a = 600 mm			Project Site Address:-		
3. Concrete Edge Distance (e)	e = 200 mm			New Zealand		
4. Concrete Cylinder Strength (f'c)	f'c = 25 MPa			Company Name:-		
5. Cracked Conc. (C) or Non-Cracked (N)	C or N C			Design Identification:-		
6. Effective Depth (hmin)	h _{min} = 60 mm			Date:-		
7. Anchor size (d _b) - M10 → M20	d _b = 10 mm					
8. Concrete Edge Distance Corner (e ₁)	e ₁ = 200 mm					
9. Internal to a row (I) or end of row (E)	I or E E					
10. Effective Depth - Actual (h)	h = 60 mm					
11. Drill hole depth (h ₁)	h ₁ = 80 mm					
12. Min Concrete Sub'te Thickness (b _m)	b _m = 120 mm					
13. Anchor Material	Mat'l = Zinc Zn	Cracked or Non-Cracked Concrete		Material "Specification"		
14. Anchor Type	Type TruBolt Xtrem	CRACKED CONCRETE		Mat'l: Zinc		
15. Fixture Thickness (t)	t = 5 mm			Part No. T10085X		
16. Effective Length (L _e)	L _e = 65 mm					
17. Design Tensile Load-per anchor (N*)	N* = 5 kN	Hole Diameters (mm)		Capacity Reduction Factors		
18. Design Shear Load-per anchor (V*)	V* = 3 kN	Drill d _h = 10 Fixture d _f = 12		Conc Tens/Shear - 1/1.5 = φ = 0.67 Steel Tens/Shear - 1/1.5 = φ = 0.67		
19. Direction of Shear design load (α)	α = 0 °					
20. Seismic & Cracked Concrete (S _{cr})	S _{cr} or NO NO					
21. Optimize spacing (a _m) or edge (e _m)	a _m or e _m am					
Output Description (Strength Limit State Design)	Output Data (per anchor)	Elevation View - Generic Dimensions in (mm)		Anchor Loaded		
DESIGN O.K.		MIN. CRITERIA for a,e & h - O.K.		"E" Anchor end of a row		
Design CONCRETE Tensile Capacity	φN _{urc} = 11.8 kN					
Design STEEL Tensile Capacity	φN _{us} = 19.6 kN			"I" Anchor internal to a row		
Design Pull-out Capacity	φN _{urp} = 6.1 kN					
Design CONC. Edge Shear Capacity	φV _{urc} = 17.8 kN					
Design STEEL Shear Capacity	φV _{us} = 10.7 kN					
Design Pryout Failure	φV _{urp} = 23.8 kN					
Drill hole diameter	d _h = 10 mm					
TENSION O.K.						
Design Red. Ult. Tensile Capacity	φN _{ur} = 6.1 kN					
Tension Design Check	N*/φN _{ur} = 0.82 < 1					
SHEAR O.K.						
Design Red. Ult. Shear Capacity	φV _{ur} = 10.7 kN					
Shear Design Check	V*/φV _{ur} = 0.28 < 1					
COMBINED TENSION SHEAR O.K.						
Combined Check - N*/φN _{ur} + V*/φV _{ur} =	1.10 < 1.2					
Anchor Size	d _b	Metric	10	12	16	20
Drill hole diameter	d _h	(mm)	10.0	12.0	16.0	20
Stressed Area	A _b	(mm ²)	58.0	84.3	157.0	245
Reduced Char. Steel Tensile Capacity	φN _{us}	(kN)	19.6	25.6	43.3	66.4
Reduced Char. Steel Shear Capacity	φV _{us}	(kN)	10.7	15.4	30.2	40.9
Edge distance for no conc.cone reduction	e _c	(mm)	1.5xh	1.5xh	1.5xh	1.5xh
Anchor spacing for no conc.cone reduction	a _c	(mm)	3xh	3xh	3xh	3xh
Absolute Minimum edge distance	e _m	(mm)	70	100	100	120
Absolute Minimum anchor spacing	a _m	(mm)	55	60	90	100
Effective Depth - h		Design Reduced Ultimate tensile capacity φN _{ur} (kN per anchor) Based on edge distance (ec) and anchor spacing (ac) for no conc.cone reduction				
60	(mm)	6.1				
70	(mm)		9.1			
85	(mm)			12.9		
100	(mm)				17.5	
The design engineer should ensure the structural element is capable of supporting these loads. Refer to Ramset™ Specifiers Anchoring Resource Book ANZ Ed2 for more information or explanation of Tech. Data.						
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