

Product Technical Statement

Nudura™ Insulated Concrete Form System

Description and Purpose

The Nudura Integrated Building Technology™ Insulated Concrete Form System (ICF) consist of expanded-polystyrene (EPS) foam-plastic panels each 67mm thick connected with plastic cross-ties. It is used as stay-in-place formwork for structural concrete, load-bearing and non- load bearing on both above and below grade walls.

The forms are used in construction of plain and reinforced concrete beams, lintels, exterior and interior walls, and foundation and retaining walls. The forms remain in place after placement and curing of concrete. Faces are then clad (external) or lined (internal). External faces below grade are covered in a membrane.

Size Options

Nudura standard form panels and hinged web forms are available in a standard length of 2438 mm and a standard height of 457mm Nudura™ Forms are available in widths of 235, 286, 337, 388 and 438 mm to enable formation of 102 mm, 152 mm, 203 mm, 254 mm and 305 mm thick flat monolithic concrete walls respectively.

Ancillary Components

In addition to the Standard (straight run wall) Form Units, system components include:

- 90 degree Corner Form Units
- 45 degree Corner Form Units
- T-Form Units (enabling the construction of 25 possible combinations of thickness main wall and T wall intersection across the 5 core thicknesses of forms)
- Taper Top Form Units (enabling concrete to approach the exterior or interior (or both) edges of the form at its top edge)
- Brick Ledge Form Units (for creating corbelled ledges for support of brick or stone masonry veneers)
- Brick Ledge Extension Forms (enabling creation of brick ledges at ANY desired height or angle)
- End Caps (for capping end wall runs or window/door openings)
- Horizontal Cavity Closures
- Height Adjuster Forms (enabling the adjustment of form stacking to an incremental height difference of 76 mm) or 305 mm if required to suit an application)
- Factory Cut Radius Forms (site assembled forms which are factory cut to suit any custom installation)
- CIP Masonry veneer tie
- Brick Pintle

- Joist hanger ICF – connector
- Vertical Joint Clips
- Rebar Clips
- Form Lock
- Nudura™ Waterproofing Membrane

Scope of Use

1. The Nudura™ System can be used for all structures within the Scope of B1/VM1.

Compliance Statement

The Buildings constructed with the Nudura™ system will comply with or contribute to compliance with the following provisions of the New Zealand Building Code:

B1 Structure B1.3.1, B1.3.2, B1.3.3 (a, b, d, f, h, i, j, q) (self-weight, imposed gravity loads, earth pressure, earthquake, wind, fire, impact and time dependent effects (respectively), B1.3.4

B2 Durability B2.3.1 (a) (50 years) B2.3.2

C6—Structural stability C6.2

E2 Weathertightness E2.3.3, E2.3.7

E3 External Moisture E3.1.1

F2 Hazardous Building Materials F2.3.7

G4 Ventilation G4.3.1

G6 Airborne and impact sound G6.3.1

H1 Energy Efficiency H1.3.1 and H1.3.2E

When specified and installed in accordance with the following conditions and limitations:

1. Design of the concrete and associated reinforcing must be done by a Chartered Professional Engineer (Structure) using B1/VM1 (AS/NZS and NZS 1170 series of Standards for Structural Design actions and NZS 3101: Concrete structures standard).
2. The constructability of the system must be confirmed by the structural engineer to ensure that no voids or other defects in the concrete are formed during the concrete pouring and curing process.
3. The design and installation must be completed in accordance with the installation manual ND 1803E (published March 2018).
4. All internal faces must be covered by an appropriate internal lining which meets the appropriate Code obligations for linings relevant to the internal area it is lining (e.g. internal moisture requirements for wet areas and areas adjacent to sanitary fixtures, material surface linings (for those areas of buildings where those obligations exist) and spaces for food preparation areas).

5. External walls must be clad with a cladding system that meets the requirements of E2-External moisture for the location of the building. Wall underlays as set out in 9.1.7 of E2/AS1 are not required. Where underlays to wall openings are required, the Nudura™ Waterproofing Membrane can be used (including as a flashing tape).
6. For buildings within the Scope of C/AS2 (paragraph 1.1.1) the Nudura™ system can be used with any compliant cladding system where the building is greater than 1m of the relevant boundary and building height equal or less than 10m.
7. For buildings outside the requirements of para 6 specific design is required to meet the requirements of Clause C3—Fire affecting areas beyond the fire source for the particular building cladding type, size, height, importance level and location with respect to relevant boundaries.
8. Areas of the Nudura® walls below the ground are to be protected with the Nudura™ Waterproofing Membrane or an equivalent product with either a Product Certificate (Codemark) or a BRANZ Appraisal with compliance with B2.3.1 (a) and E2.3.3.
9. All habitable spaces must be provided with ventilation meeting the requirements of G4/AS1.
10. Where the Nudura™ are used to form an intertenancy wall the minimum thickness of the concrete must be 150 mm and a density of 400 kg/m² of face area.
11. Where the Joist hanger ICF – connectors are used, they must be installed in accordance with the installation manual ND 1803E (published March 2018).
12. EPS foam surfaces remaining in any exposed state beyond 90 days must be covered.
13. Where any timber is in permanent contact with the concrete or any other items within the system e.g. it must be treated to the appropriate level as set out in NZS3602: Timber and wood-based products for use in buildings.
14. Where the building is to be clad with masonry veneer systems the Nudura™ CIP Masonry ties must be installed into the Nudura™ forms in accordance with the installation manual ND 1803E (published March 2018) to the spacing and location details as set out in E2/AS1 section 9.2.

Beyond New Zealand Building Code Performance

1. The Nudura™ system will exceed the minimum performance requirements of the New Zealand Building Code in the following areas:
 - a. Building elements which have a durability requirement of 50 years have a serviceable life of at least 100 years subject to:
 - i. The structural design considering the design working life as being 100 years

- ii. The requirements for a 100 year specified intended life as set out in NZS3101:2006 are followed
- iii. the building being examined for cracking following any earthquake events beyond any SLS to ensure that any reinforcing steel is not likely to be exposed to the external environment.
- b. The calculated R value (thermal resistance) of the wall system is 4.155 compared with R value of 2 for typical weatherboard clad building.

Maintenance

1. The Nudura™ system has no specific maintenance requirements once the system has been installed and all EPS faces have been covered as required.

Summary of Evidence Base to support compliance

1. Compliance with B1-Structure is through B1/VM1, B2 – Durability through B2/AS1, H1 through calculation.
2. In service performance through the Nudura™ system having been used in the North American, European and Middle Eastern areas for 20 years with environments (climatic and corrosive) similar to or worse than New Zealand. The system has been used in New Zealand for 10 years without any complaints concerning performance attributes required by the New Zealand Building Code.
3. The Nudura™ holds:
 - a. A statement of compliance with the International Building Code by the International Codes Committee Evaluation Service (ICC-ES) (Report ESR-2092 dated November 2020). Compliance includes: Structural, Surface-burning characteristics and Fire-resistance-rated construction.
 - b. CAN/ULC S-717.1 Canadian National Standard for Flat Wall Insulating Concrete Form (ICF) Units (dated January 07, 2013).
 - c. British Board of Agrément Assessment (ETA – 07/0034 dated 11/02/20) for ETAG 009 (*Guideline for European Technical Approval of Non Load-Bearing Permanent Shuttering Kits/Systems Based on Hollow Blocks or Panels of Insulating Materials and Sometimes Concrete*) for a range of attributes including mechanical resistance and stability, safety in case of fire (Euroclass E), resistance to fire, health, hygiene and the environment, durability, sound insulation and thermal resistance.
 - d. British Board of Agrément test report dated 29 January 2013 for Thermal Resistance.
 - e. Thermal Resistance Calculations of Nudura™ Insulated Concrete Form Wall Systems using Standard ASHRAE Thermal Resistance Values by Exova Canada dated 10th March 2010 (R value 4.155).
 - f. Canadian Construction Materials Centre (CCMC) Evaluation Report No. 14093-R** for Nudura™ Waterproofing membranes.

4. The panels are manufactured in Canada by Nudura™ who hold ISO 9001:2015 covering the manufacturing of the insulated concrete forms.
5. Detailed compliance assessment is available at www.energyefficientbuilding.co.nz

Warranty

The Nudura System is based by a 30 year warranty issued by Nudura Canada.

Preparation of this Product Technical Statement

This Product Technical Statement has been prepared by John Gardiner FEngNZ of Building Confidence Ltd in accordance with the MBIE Guidance on Product Technical Statements.

More information and Contact details

For more information including accessing ND 1803E (published March 2018) see:

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Revisions

Version 1	First issue Jan 2021
Version 2	Second issue Jan 2022 including addition of Nudura™ Waterproofing membrane and modification to condition and limitation number 5 regarding non-requirement for a wall underlay

About a Product Technical Statement

A product technical statement (PTS) is a document suggested by the Ministry of Business Innovation and Employment as a way that a supplier of a building product or method can provide the information to support the issuing of a building consent containing that product or method. The information on PTS see <https://www.building.govt.nz/building-code-compliance/product-assurance-and-multiproof/product-assurance/product-information-and-evidence/product-technical-statement/>

The purpose of a PTS is not to sell or specify the product but to provide the necessary information for consenting. In general, a PTS:

- Describes what building code clauses the product or method complies with or contributes to compliance with when included in building work
- Describes the buildings and types of buildings for which that compliance is valid
- Provides any limits or those compliance claims and any conditions on that compliance
- PTS uses the language and constructs of the building code system (e.g. classified uses, environmental zones (e.g. wind, corrosion, seismic)).