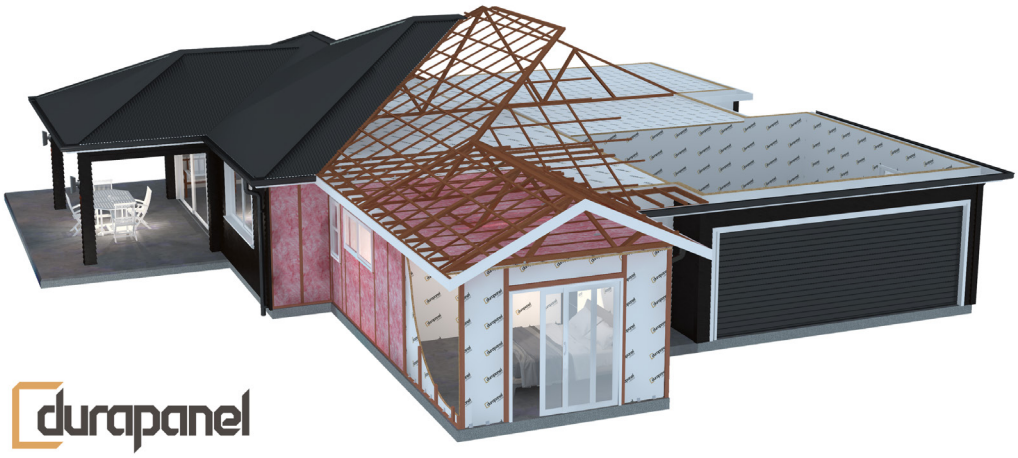
BRANZ Appraised
Appraisal No. 1202 [2021]

DURAPANEL STRUCTURAL PANEL SYSTEM



Appraisal No. 1202 (2021)

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 The Durapanel Structural Panel System is a structural wall and ceiling panel system for use in the construction of Durapanel houses. All other aspects of the design and construction of the Durapanel houses, such as foundations, floors, roofs, joinery, cladding, services and interior finishings are conventional.

1.2 Durapanel wall panels are 36 mm thick, and Durapanel ceiling panels are 18 mm thick. Durapanels are manufactured to consist of a strandboard core flanked by two outer layers of fibreboard.

1.3 Wall and ceiling panels are factory cut to shape and size, including window and door openings, by Durapanel Limited. All panel surfaces and exposed edges are pre-painted by Durapanel Limited, prior to delivery to site.

1.4 On-site, the wall panels are connected by specified structural connectors to a ground floor platform of either concrete slab-on-ground, or suspended timber-framed floor. The exterior wall panels are strengthened externally by vertical battens, and the lintels can be strengthened either with a double thickness of Durapanel or conventional timber lintels.

1.5 For two-storey houses, the mid-floor construction is of standard timber framing and the upper floor wall panels are connected to the floor.

1.6 Ceiling panels are installed over the wall panels and roof trusses are fixed over the ceiling panels. Conventional ceiling systems may also be used. The building is then completed using conventional construction.

Scope

2.1 The Durapanel Structural Panel System has been appraised for use in single unit (detached) Risk Group SH housing, which meets the scope of Clause 1.1.2 of NZS 3604 with the following limitations:

- buildings must be single or two-storey; and,
- in NZS 3604 Wind Zones up to, and including, Extra High; and,
- in all NZS 3604 Earthquake Zones; and,
- the ground floor construction platform must comprise of a concrete slab-on-ground or a suspended timber-framed floor constructed in accordance with NZS 3604; and,
- the first (upper) floor is a suspended timber floor constructed in accordance with NZS 3604; and,
- the first floor live load does not exceed 1.5 kPa; and,
- roof construction must comprise of trusses or roof framing in accordance with NZS 3604; and,
- roof pitches must not exceed 35°, nor be less than 3°; and,
- Durapanel ceiling panel diaphragms must not exceed 8 m in length.

2.2 This Appraisal does not cover the general or wet area finishing to walls or ceilings.

2.3 The use of Durapanel wall and ceiling panels in the following situations has not been assessed and is outside the scope of this Appraisal:

- sauna rooms and the like, where they may be exposed to sustained high humidity (greater than 95% relative humidity (RH)) or liquid water.
- where temperatures are in excess of 35°C over large areas for prolonged periods (e.g. ceiling heating installations) or in excess of 50°C in localised areas (e.g. the area adjacent to a fuel burning appliance - refer to Paragraph 11.1).
- in skillion roofs.

2.4 Durapanel Structural Panel System must be installed by trained installers, approved by Durapanel Limited.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the Durapanel Structural Panel System, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. The Durapanel Structural Panel System meets the requirements for loads arising from self-weight, imposed gravity loads arising from use, earthquake, snow and wind [i.e. B1.3.3 (a), (b), (f), (g) and (h)]. See Paragraphs 8.1-8.8.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. The Durapanel Structural Panel System meets this requirement. See Paragraph 9.1.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Durapanel Structural Panel System meets this requirement. See Paragraph 15.1 and 15.2.

Technical Specification

Durapanels

4.1 The Durapanels used with the Durapanel Structural Panel System are supplied by Durapanel Limited. They are a three-layered wood panel product with a medium density fibreboard surface, 2-3 mm thick, on both sides of a non-oriented strandboard core. Durapanel wall panels are 36 mm thick, with a nominal density of 615 kg/m^3, and with maximum dimensions of 4,000 x 2,450 mm. Durapanel ceiling panels are 18 mm thick, with a nominal density of 635 kg/m^3, and with maximum dimensions of 4,000 x 2,500 mm.

4.2 Durapanel wall and ceiling panels are cut to size, including all door and window openings, and electrical cut-outs, and all surfaces of the panels are pre-painted to provide limited protection during construction.

4.3 Components that are supplied by Durapanel Limited include:

- **HDPE packers** - 60 x 30 x 6 mm HDPE packers.
- **Battens** - wall battens are SG8, H1.2 treated, kiln dried 75 x 50 mm radiata pine (dry dressed 70 x 45 mm) with a moisture content of 18% or less.
- **Brackets and connectors** - a range of brackets and connectors are used for connecting the Durapanel wall and ceiling panels to each other and the rest of the structure. The brackets and connectors supplied by Durapanel Limited include:
  - **DS03 Bracket** - 40 x 80 mm galvanised brackets for connecting walls to floors.
  - **DS06 Bracket** - 160 x 80 mm galvanised bracket for 6 kN connections on exterior and bracing walls.
  - **Brace strap** - 1 x 300 mm brace strap for 6 kN connection.
  - **Ceiling clip** - galvanised bracket for attaching ceiling to roof framing.
- **Fasteners** - a range of standard nails and screws are used with the Durapanel Structural Panel System. For details, refer to the Technical Literature.

4.4 The remaining materials and components required to construct a house are supplied by the building contractor. These are in accordance with the contract documents and are building project specific. These have not been assessed by BRANZ and are outside the scope of this Appraisal.

Handling and Storage

5.1 Durapanel wall and ceiling panels are trucked to the site and normally lifted into position. To minimise storage and handling on-site, and to maximise construction efficiency, panel transport from the Durapanel Limited factory should be carefully timed to coincide with the approximate time of erection. Panels must be handled carefully at all times to avoid physical damage and kept dry under cover until ready for construction.

5.2 For long term storage, Durapanel wall and ceiling panels must be kept dry, under cover and be stacked horizontally on fillets at 1,200 mm maximum spacing to allow air circulation. Durapanel wall and ceiling panels must be protected from direct sunlight whilst in storage.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Durapanel Structural Panel System. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 Buildings are constructed using the information in the Technical Literature and NZS 3604. The Durapanel Structural Panel System has been designed in accordance with AS/NZS 1170 to comply with the appropriate design loadings for domestic buildings built within the scope of NZS 3604.

7.2 The ground floor construction platform is to be designed and constructed in accordance with NZS 3604 and the requirements of the Technical Literature.

7.3 Durapanel wall panel and wall batten requirements for various applications are selected directly from tables in the Technical Literature.

7.4 The Durapanel wall battens provide supporting framing, including around joinery openings, equivalent to conventional timber wall framing. From this point on, the remainder of the wall construction is conventional. A wall underlay and cladding system (either direct-fixed or drained cavity) complying with NZBC Acceptable Solution E2/AS1 is installed over the battens. Window and door joinery is conventionally fixed, also in accordance with NZBC Acceptable Solution E2/AS1.

7.5 Durapanel ceiling panels provide an effective ceiling diaphragm. The ceiling is screw-fixed to the top of the Durapanel wall panels, and connected to the floor joists, trusses or rafters with ceiling brackets.

7.6 The thermal insulation of floors and ceilings are conventional. The Durapanel wall battens provide a framing cavity for the inclusion of thermal insulation materials, which must comply with AS/NZS 4859 or AS 1366. The design of building thermal envelopes and the thermal insulation materials have not been assessed by BRANZ and are outside the scope of this Appraisal.

7.7 Adequate roof space ventilation is required, particularly for low roof pitches, to control roof space moisture levels and temperature.

7.8 Durapanel wall panels are finished internally, either directly with a paint system or wallpaper, or they may be battened out for internal linings, e.g. where impervious linings or waterproofing membranes are required in wet areas or to accommodate services.

7.9 Roof trusses must be designed in accordance with NZS 3604 or subject to a specific design. Purlins and other roof framing must be in accordance with Section 10 of NZS 3604. Roof cladding must be in accordance with NZBC Acceptable Solution E2/AS1.

Structure

Wall Loads

8.1 The structural design of the system is based on the action of a configuration of connected Durapanel wall and ceiling panels with perimeter Durapanel wall panels being stiffened by face-fixed timber wall battens.

8.2 Walls comprising Durapanel wall panels and wall battens have been designed as an integral unit. The stiffness and strength of the walls and lintels are adequate to resist gravity, wind and earthquake loads to the same level as conventional timber framing, with similar deflections.

Live Loads

8.3 The maximum first floor live load is 1.5 kPa. All other live loads are those prescribed by AS/NZS 1170 for NZS 3604 applications.

Wall Bracing Resistance

8.4 The Technical Literature provides bracing resistance values for a number for Durapanel wall panel configurations in order to satisfy the requirements for earthquake and wind bracing which are determined from the tables in Section 5 of NZS 3604.

8.5 The in-plane rigidity of a Durapanel wall panel is high, and the wind and earthquake bracing resistance it provides is limited by the connections. Sliding is prevented by connections at the floor and ceiling. Overturning is prevented by connections to abutting walls, and for external walls, by connections to the floor. Connection to other wall panels and the ceiling is by nailing or screwing. Connections to the floor are by galvanised steel angles, nails, screws and cast-in floor framing anchors. Adhesive used at panel joints is ignored in terms of structural resistance.

Wind Loads

8.6 Housing built with Durapanel wall and ceiling panels, in accordance with the provisions of the Technical Literature and this Appraisal, is suitable for use in all NZS 3604 Wind Zones up to, and including, Extra High. This is provided all other aspects are rated for the appropriate Wind Zone.

Impact

8.7 Durapanel wall panels are robust and have a high resistance to soft body impacts, and most hard body impacts associated with normal use situations.

Service Penetrations

8.8 Penetrations details for piping and electrical cabling are provided in the Technical Literature. All other penetrations are outside the scope of this Appraisal and Durapanel Limited must be consulted for advice.

Durability

9.1 The Durapanel wall and ceiling panels are expected to have a serviceable life in excess of 50 years. The durability of Durapanel wall and ceiling panels is dependent on the panels and the connections remaining dry in service. It is also dependent on the Durapanel wall and ceiling panels not being exposed to sustained high humidity, liquid water or high temperatures (refer to Paragraph 2.3).

Maintenance

10.1 The exterior cladding system including joints, openings and perimeter junctions, must be maintained to ensure adequate protection is continually provided against water ingress. The internal linings, finishing (including joints, openings and the perimeters), and floor coverings must be maintained to provide protection from internal moisture. Regular inspections (at least annually) of the external cladding system and the internal linings and finishes must be made, and any damage or deterioration repaired or restored. The Technical Literature contains details of how Durapanel wall and ceiling panels must be maintained.

Prevention of Fire Occurring

11.1 Separation or protection must be provided to the Durapanel Structural Panel System from heat sources such as fireplaces, heating appliances, and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

Control of Internal Fire and Smoke Spread

12.1 There is no internal surface finish requirement for the Durapanel Structural Panel System when it is used in buildings with a SH Risk Group classification (refer to Paragraph 12.3).

12.2 Durapanels have been tested in accordance with ISO 5660 and have a Group Number of 3. When an applied finish is used over Durapanels, the Group Number must be obtained from the manufacturer or supplier of the finish product or system, for the complete lining system.

12.3 Where foamed plastics form part of the Durapanel Structural Panel System i.e. when used as thermal insulation, the completed system, including any applied finish, shall comply with the flame propagation criteria as specified in AS 1366 for the type of material being used.

External Moisture

13.1 Buildings must be designed such that aspects relating to external moisture comply with NZBC Clause E2. This is achieved by the building envelope being designed and constructed in accordance with NZBC Acceptable Solution E2/AS1.

Internal Moisture

14.1 Ventilation must meet the performance requirements of NZBC Clause G4.3.1. Roofs and walls complying with the Schedule Method for Compliance with NZBC Clause H1.3.2 (E) will have adequate thermal resistance to comply with NZBC Acceptable Solution E3.

14.2 Some permanent ventilation, not reliant on window openings, must be provided in wet areas, such as bathrooms and laundries. Vented windows, wall or ceiling mounted extract fans, or similar fittings are recommended in all building wet areas. Extract fans for moisture laden air must be vented externally.

14.3 The incorporation of vented windows and other forms of permanent ventilation are recommended in all rooms to ensure adequate air circulation and to prevent the build-up of moisture levels.

14.4 In wet areas (where sanitary fixtures and appliances are installed), the surface of Durapanel wall panels must be finished with an impervious lining or finish which is easily cleaned. All joints must be impervious to water. Impervious floor coverings should be in accordance with NZBC Acceptable Solutions E3/AS1 with coved or sealed joints where they meet the walls. Shower and bath areas must be protected by impervious sheet lining materials or waterproofing membranes finished with tiles.

Hazardous Building Materials

15.1 Although Durapanel wall and ceiling panels are manufactured using melamine fortified urea formaldehyde adhesive, vapour emissions are minimal because the panels are encapsulated by a paint coating.

15.2 The degree of health hazard caused by vapour release will depend on the total amount of vapour released from all sources in the building including flooring and furniture, the ventilation rate and the degree of encapsulation provided by surface finishes, such as coatings and carpets. The permanent ventilation required and recommended to control moisture levels (refer to Paragraphs 14.1-14.4) will also minimise any accumulation of formaldehyde gas.

Energy Efficiency

16.1 Compliance to NZBC Clause H1.3.1 and H1.3.2 E is achieved by using NZBC Acceptable Solution H1/AS1, NZBC Verification Method H1/VM1 and the Building Performance Index for Housing.

Installation Information

Installation Skill Requirements

17.1 All design and building work must be carried out in accordance with the Durapanel Structural Panel System Technical Literature and this Appraisal. Durapanel wall and ceiling panel installation must be undertaken by Durapanel Limited trained and approved installers. Where the work involves Restricted Building Work this must also be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License Class.

General

18.1 Durapanel wall and ceiling panels must be constructed in accordance with the non-specific design information contained within the Technical Literature. The following is a summary of important aspects.

18.2 Durapanel wall and ceiling panels must be inspected for water damage before, during and after installation and damaged panels repaired or replaced.

18.3 Particular care must be taken that the foundations and building platform are level and square, and that perimeter dimensions are accurate. This is important as Durapanel wall and ceiling panels are accurately factory cut to size.

18.4 All timber framing including battens must have a moisture content of not more than 18% at the time of enclosure.

18.5 To minimise the use of temporary braces, the erection sequence for Durapanel wall panels are best planned so that during construction, the panels at right angles support each other. Checks for final location should be made before fixing Durapanel wall panels into position.

18.6 Battens must be screw or nail-fixed in place in accordance with the details in the Technical Literature. Sometimes battens are fitted at the Durapanel Limited factory.

18.7 External wall panels are tied down to concrete slabs using DS03 galvanised brackets at maximum 400 mm centres. The brackets are fixed with screws or nails into the Durapanel wall panels and concrete screws into the concrete slab. Ensure there is a suitable DPC or 6 mm HDPE packers in between the wall panels and concrete floors. External wall panels are connected to the timber-framed floor by screws or nails angled from both sides at a maximum of 200 mm centres or connected with DS03 galvanised brackets at maximum 400 m centres.

18.8 All external walls require a 6 kN bracket fixing on either side of every doorway, every corner and every 4 m around the perimeter - refer to Durapanel Structural Panel System Technical Literature for bracket details.

18.9 Bracing panels require an additional 6 kN bracket at each end and a solid nog is required under the bracket for timber-framed floors under the bracket to take the screw bolts.

18.10 Integral and separate Durapanel lintel options are detailed in the Technical Literature. Lintels may be strengthened either by the installation of an additional Durapanel lintel panel section, or flitched together with a rear splice cleat. Details are shown in the Technical Literature.

18.11 Durapanel ceiling panels are temporarily supported on purpose-built ceiling support frames. They are then screwed to the top of the walls at 200 mm centres. Joints are supported by a solid 300 x 18 mm backing cleat, which is screwed down over the top of all ceiling joints.

18.12 After the ceiling has been installed, the roof trusses or the first floor framing are placed in position and fixed to the Durapanel ceiling panels. The ceiling support frames are then removed.

18.13 Mid-floor, roof trusses and Durapanel ceiling panels must be supported by Durapanel wall panels. Floor joists must be blocked at all wall supports. Blocking must be the same size as the joists. Blocking and joists at supports must be skew-nailed to the walls or lintels below.

18.14 Roof trusses must be restrained against wind uplift by using one of the hardware fixing options shown in the Technical Literature.

18.15 All exposed, pre-cut Durapanel wall and ceiling panel edges are protected by a factory paint coating. It is important that any site cut, or site exposed edges are similarly protected using the sealing paint supplied with the Durapanel wall and ceiling panels. The pre-painted surfaces of the panels provide adequate protection against occasional rain wetting during construction. To minimise exposure, however, roof and wall claddings should be installed as soon as possible. Panels must not be exposed to wet weather for more than two weeks. When Durapanel wall and ceiling panels are exposed for longer than 14 days, waterproof covers such as tarpaulins must be provided to keep them dry.

Inspection

18.16 For inspection reference must be made to the Technical Literature, especially for confirmation of fixing types and spacings.

Services

19.1 Electrical switch box holes are hole sawn or routed into Durapanel wall panels after walls have been installed, and ducts are drilled to them from the appropriate panel edge. Wiring may be fed through the ducts or fixed to the outside surface of external Durapanel wall panels. PVC sheathed electrical cables must not come into contact with any EPS insulation. Where electrical cabling is located in recesses cut into the face of Durapanel wall panels, vertical routing is recommended. Horizontal or diagonal recesses, particularly through the middle third height of the Durapanel Wall panels, should be avoided as this weakens the walls.

19.2 Plumbing and pipework is run through the foundation platform, where possible up behind or in fitted joinery, or through ducts mounted on the Durapanel wall panel face.

Panel Finishing

20.1 Where a fine surface is required, surface sanding of the Durapanel wall and ceiling panels are recommended.

20.2 All dust should be removed from the surface of Durapanel prior to applying a paint or paper finish.

Health and Safety

21.1 Safe use and handling of the Durapanel Structural Panel System is provided in the Technical Literature.

21.2 Suitable protective masks must be worn to prevent inhalation of dust resulting from cutting or working with Durapanel and suitable personal protective equipment must be worn when handling Durapanel products.

Basis of Appraisal

The following is a summary of the technical investigation carried out:

Tests

22.1 Tests have been carried out to establish characteristics strengths and stiffnesses of the wall and ceiling panels, the panel to panel connections, the batten to wall connection and the wall panel to floor connections. This work has been reviewed by BRANZ and found to be satisfactory.

22.2 Cyclic humidity tests were carried out by BRANZ to establish the durability of Durapanel wall and ceiling panels.

Calculations

23.1 Calculations to justify the structural adequacy of the Durapanel Structural Panel System have been examined by BRANZ and found to be satisfactory.

Other Investigations

24.1 The satisfactory performance of Durapanel wall and ceiling panels in New Zealand since 1987 has been recognised by BRANZ. BRANZ have inspected a number of Durapanel houses.

24.2 Site inspections at various stages of construction, to assess installation methods and to examine completed installations, have been made by BRANZ.

24.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

25.1 The manufacture of Durapanel wall and ceiling panels by Durapanel Limited has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

25.2 The quality of the Durapanel supplied is the responsibility of Durapanel Limited.

25.3 Quality on-site is the responsibility of the building contractor.

25.4 Building owners are responsible for the maintenance of Durapanel houses and their connections in accordance with the Technical Literature.

Sources of Information

- AS 1366.3:1992 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polystyrene - Moulded.
- AS/NZS 1170 Structural design actions.
- AS/NZS 4859.1:2018 Materials for the thermal insulation of buildings.
- NZS 3602:2003 Timber and wood-based products for use in buildings.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4218:2004 Energy efficiency – housing and small building envelope.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

BRANZ

In the opinion of BRANZ, Durapanel Structural Panel System is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Durapanel Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
   a) relates only to the product as described herein;
   b) must be read, considered and used in full together with the Technical Literature;
   c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
   d) is copyright of BRANZ.
2. Durapanel Limited:
   a) continues to have the product reviewed by BRANZ;
   b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
   c) abides by the BRANZ Appraisals Services Terms and Conditions;
   d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
   a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
   b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
   c) any guarantee or warranty offered by Durapanel Limited.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Durapanel Limited or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
21 December 2021