



BRANZ Appraised
Appraisal No. 1149 [2021]

INTELLO HUMIDITY VARIABLE INTELLIGENT AIRTIGHTNESS SYSTEM

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BRANZ Appraisals

Technical Assessments of
products for building and
construction.



Pro Clima (NZ) Ltd

7 Daly Street
Lower Hutt 5010
Tel: 04 589 8460

Email: welcome@proclima.co.nz

Web: www.proclima.co.nz



BRANZ

1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz



Product

- 1.1 The INTELLO Humidity Variable Intelligent Airtightness System utilises synthetic membranes for use as a humidity-variable vapour control layer and as part of an air barrier system fitted to the inside face of ceilings and external walls. The INTELLO membranes consist of a polyethylene copolymer with a polypropylene fleece backing. Accessories include adhesive, tapes and penetration seals which are supplied as part of the system.
- 1.2 The purpose of the system is to reduce air infiltration through the building fabric to reduce heat loss and to control the diffusion of water vapour through the building envelope.

Scope

- 2.1 The INTELLO Humidity Variable Intelligent Airtightness System has been appraised for use as a vapour control layer and air barrier on buildings within the following scope:
 - constructed with timber framing in accordance with NZS 3604, or to a specific engineering design; or
 - constructed with steel framing in accordance with NASH Standard Part Two, or to a specific engineering design; and
 - used on walls and ceilings which incorporate fibrous thermal insulation.
- 2.2 The use of the INTELLO Humidity Variable Intelligent Airtightness System in buildings with high moisture loads such as swimming pools, commercial laundries and kitchens or with non-vented membrane roof coverings has not been assessed and is therefore outside the scope of this Appraisal. Contact Pro Clima (NZ) Ltd for use of the INTELLO Humidity Variable Intelligent Airtightness System in these building types.



Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, INTELLO Humidity Variable Intelligent Airtightness System, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.2. The INTELLO Humidity Variable Intelligent Airtightness System will meet these requirements. See Paragraphs 9.1 and 9.2.

Clause E3 INTERNAL MOISTURE: Performance E3.3.1. When used with an adequate combination of thermal resistance, ventilation and space temperature in habitable spaces, the INTELLO Humidity Variable Intelligent Airtightness System will contribute to meeting this requirement. See Paragraphs 12.1-12.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The INTELLO Humidity Variable Intelligent Airtightness System meets this requirement.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1[b], limiting uncontrollable airflow. The INTELLO Humidity Variable Intelligent Airtightness System will contribute to meeting this requirement. See Paragraph 15.1.

Technical Specification

- 4.1 INTELLO membranes consist of a polyethylene copolymer with a polypropylene fleece backing and have a mass of 85 g/m². INTELLO PLUS is the same base product with the addition of a polypropylene reinforcing mesh. Its overall mass is 110 g/m².
- 4.2 The products are supplied in rolls 1.5 m wide x 20 m and 50 m long, and 3 m wide x 50 m long. The products are coloured white and are printed with the INTELLO or INTELLO PLUS logo repeated along the length of the roll. The rolls are wrapped in clear polythene film.

Accessories

- 4.3 Accessories used with the INTELLO Humidity Variable Intelligent Airtightness System which are supplied by Pro Clima [NZ] Ltd are:
- INTELLO PLUS CONNECTION STRIP – strips of INTELLO PLUS, 300 mm wide x 50 m long.
 - TESCON VANA Multi-purpose adhesive tape – self-adhesive tape supplied in rolls 60 mm wide x 30 m long. Alternatively, TESCON EXTORA can be used.
 - TESCON PROFIL Corner sealing tape – self-adhesive tape supplied in rolls 60 mm wide x 30 m long. Alternatively, TESCON EXTORA PROFIL can be used.
 - ROFLEX and KAFLEX – a range of sealing grommets manufactured of flexible EPDM.
 - PRESSFIX Tool – an application tool to aid installation of the tapes.
 - ORCON CLASSIC Multi-purpose liquid adhesive – supplied in 310 ml cartridges and 600 ml sausages.
 - TESCON PRIMER RP – a white acrylic primer supplied in 1 L bottles.
 - INSTAABOX Installation box for sealing behind electrical flush boxes – 320 mm high x 190 mm wide x 55 mm deep moulded polyethylene box.
 - CONTEGA IQ Window and Door Connection Strips – self-adhesive tapes supplied in rolls 90 mm wide x 30 m long, with either 1 or 2 self-adhesive strips.
- 4.4 Accessories used with the INTELLO Humidity Variable Intelligent Airtightness System which are supplied by the installer are:
- Membrane fixings – zinc-plated or stainless steel staples with a 8-10 mm crown width and 8 mm long legs.



Handling and Storage

- 5.1 Handling and storage of the product and accessories, whether on-site or off-site, is under the control of the installer. The rolls must be protected from damage and weather. The rolls of INTELLO membrane must be stored flat, under cover, away from ultraviolet [UV] light, in clean, dry conditions and must not be crushed.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the INTELLO Humidity Variable Intelligent Airtightness 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 INTELLO membranes function as an air barrier to limit air infiltration between the indoor and outside environments. Controlling air leakage contributes to improving the thermal efficiency of a building, as it reduces the heat lost from uncontrolled air flows, particularly for fibrous insulation as the R-value is reduced due to air infiltration. Controlling air leakage can also reduce the chance of interstitial condensation, because it can help prevent moist air reaching any surfaces that may be colder than the dew point of the moist air. Whilst limiting uncontrolled air infiltration is desirable from an energy and building durability standpoint, it is important that adequate ventilation levels are provided for indoor air quality.
- 7.2 INTELLO membranes can function as a vapour control layer to lessen diffusion between the indoor and outside environments. If it is desired to lessen the rate of diffusion through the building envelope, INTELLO membranes can be used because they have a higher vapour resistance under normal operating conditions than the materials typically used in walls and roofs. Under typical winter conditions, this has the effect of lowering the vapour pressure (and consequently the relative humidity) at the locations outboard of the membrane. The general rule of thumb is to have the highest vapour resistance in the wall on the warm side of the insulation in winter.
- 7.3 INTELLO membranes are not what has been traditionally referred to as a 'vapour barrier'. Under normal operating conditions they have a moderate vapour resistance. This means that they can reduce the rate of diffusion through the wall, not eliminate it. In the event that there is liquid water in the wall, the vapour resistance of the membrane is such that water vapour can diffuse through it i.e. the wall can still dry to the inside, in much the same way as 'typical' New Zealand walls.
- 7.4 The vapour diffusion resistance for the product varies depending on the relative humidity [RH] from 1.25 MN s/g to 125 MN s/g. INTELLO has a specific moisture profile (vapour resistance versus relative humidity). At an RH of 70%, the vapour resistance is 10 MN s/g and at an RH of 60% the vapour resistance is 7.5 MN s/g. During 'winter' conditions the vapour resistance increases preventing water vapour from moving from the building interior to the exterior. In 'summer' conditions the vapour resistance decreases, allowing vapour to flow from the building structure to the building interior.
- 7.5 INTELLO and INTELLO PLUS membranes are not vapour barriers. The product is fitted to the inside-face of the building envelope on the warm side of the thermal insulation.
- 7.6 The designer must consider the intended and future occupancy of the building and provide adequate ventilation mechanisms (e.g. openable windows and doors, mechanical ventilation systems), appropriate to the expected moisture loading and occupancy.



WUFI® Software

- 7.7 WUFI® is computer software developed by the Fraunhofer Institute for Building Physics that allows modelling of heat and moisture flows through building elements. The software may be used to model buildings that are to incorporate the INTELLO Humidity Variable Intelligent Airtightness System. The WUFI® properties for the INTELLO membrane are contained within WUFI® software. Modelling must be undertaken by a competent and appropriately qualified person, using relevant parameters appropriate to New Zealand conditions, for the intended building site.

Blower Door Tests

- 7.8 The quality of airtightness is determined by the freedom from air leakage in the building envelope. To verify the airtightness of the complete building, Blower Door testing should be completed prior to installation of internal linings in accordance with the Technical Literature and AS/NZS 9972 or EN 13829. Typical airtightness targets are $< n_{50}=3$ air changes per hour [ACH] or < 1.5 ACH for buildings with a balanced heat recovery ventilation system. Remedial work may be required to seal air leakage paths in the building prior to installation of the internal linings, to achieve the desired airtightness target.

Ceilings

- 7.9 Timber ceiling battens are fixed conventionally to the underside of the ceiling rafters over the INTELLO membrane. Steel ceiling battens are also fixed directly to the underside of the ceiling rafters without using the clips/hangers that are typically part of these ceiling systems. Installation should then follow the lining supplier's instructions.

Walls

- 7.10 INTELLO membranes can be fitted directly over the wall framing or under battens used to form a cavity. This cavity can be used for small services such as water supply pipework.

Mid- Floors

- 7.11 Where the INTELLO Humidity Variable Intelligent Airtightness System is used in multi-level construction, the airtightness must be detailed to be continuous. Refer to the Technical Literature for detailing options.

Structure

- 8.1 The use of the INTELLO Humidity Variable Intelligent Airtightness System installed in conjunction with internal sheet lining bracing systems has not been assessed and is outside the scope of this Appraisal.

Durability

- 9.1 The INTELLO Humidity Variable Intelligent Airtightness System meets code compliance with NZBC Clause B2.3.1 [a] not less than 50 years when used behind internal linings with a NZBC durability requirement of not less than 50 years, e.g. linings for fire rated load-bearing walls; and code compliance with NZBC Clause B2.3.1 [b] 15 years when used where the internal lining durability requirement is 15 years, e.g. shower linings.

Serviceable Life

- 9.2 Provided the internal lining is maintained in accordance with the lining manufacturer's instructions and the lining remains sound, the INTELLO Humidity Variable Intelligent Airtightness System is expected to have a serviceable life equal to that of the internal lining.

Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to INTELLO membranes from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1, C/AS2 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.



External Moisture

- 11.1 During 'summer' conditions, the INTELLO Humidity Variable Intelligent Airtightness System permits drying of the building fabric to the building interior. This can contribute to the building meeting the requirements of NZBC Performance Clause E2.3.6.

Internal Moisture

- 12.1 Although NZBC Clause E3 covers the accumulation of internal moisture, the Acceptable Solution E3/AS1 makes no specific reference to the requirements and characteristics of barriers to airflow within the concealed spaces in buildings, such as within the wall or ceiling structure.
- 12.2 Where possible, moisture sources should be controlled at their origin.
- 12.3 As with all buildings, appropriate levels of ventilation must be provided in buildings fitted with the INTELLO Humidity Variable Intelligent Airtightness System, in accordance with NZBC Performance Clause G4. Where there is a risk that passive ventilation options may not be utilised by building occupants, then installation of permanent ventilation solutions should be considered (e.g. mechanical ventilation systems).

Ventilation

- 13.1 Adequate ventilation must be provided to the building in accordance with NZBC Clause G4 Ventilation.

Air Infiltration

- 14.1 Air infiltration is the uncontrolled movement of air through the building envelope. Air infiltration has traditionally provided background 'ventilation' in New Zealand buildings. However, this is uncontrolled and can cause discomfort to occupants as well as potential damage to the building fabric.
- 14.2 The INTELLO Humidity Variable Intelligent Airtightness System reduces air infiltration by providing an airtightness layer and when used in conjunction with controlled ventilation measures such as passive ventilation and/or mechanical ventilation systems, can minimise air infiltration.
- 14.3 Airtightness should form part of a balanced package of thermal insulation and ventilation measures.

Energy Efficiency

- 15.1 NZBC Performance Clause H1.3.1[b] requires that the building envelope enclosing spaces where the temperature and humidity (or both) are modified must be constructed to limit uncontrollable airflow. As INTELLO membranes have an airtightness greater than 0.1 MNs/m³ units, they can contribute to limiting airflow. Thermal insulation must still be installed in the building as required by NZBC Performance Clause H1.3.1[a].

Installation Information

Installation Skill Level Requirements

- 16.1 Installation must always be carried out in accordance with the INTELLO Humidity Variable Intelligent Airtightness System Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

INTELLO Installation

- 17.1 Ensure all insulation and services are in position before the INTELLO membrane is applied over the framing. Check that the wall or ceiling framing where the INTELLO membrane is to be installed is free of surface contaminants and protrusions such as splinters and nails which could puncture the membrane. As the INTELLO membrane is bonded to the floor, the floor must be free from dust and other contaminants which could affect the adhesive bond.
- 17.2 The moisture content of timber framing and any battens must be at the minimum level required by the lining supplier prior to installation of the INTELLO membrane.



- 17.3 The first layer of INTELLO membrane is run horizontally along walls 1.47 m above floor level, with the printed face facing towards the building interior. The membrane must overhang at the bottom by 20 mm to allow a flap to be bonded to the floor. This flap is adhered to the floor with a continuous 5 mm bead of ORCON CLASSIC adhesive.
- 17.4 The membrane is fixed at maximum 100 mm centres to all framing members with staples. The membrane must be pulled taut over the framing before fixing.
- 17.5 Subsequent layers of INTELLO must overlap the lower layer by minimum 100 mm. End laps must be made over framing and be no less than 150 mm wide. To assist with achieving the correct lap dimension, INTELLO membrane has a 100 mm lap line printed continuously along the top face. All laps are taped with a continuous layer of TESCON VANA tape, applied with the PRESSFIX tool.
- 17.6 The INTELLO membrane is fixed to the ceiling supports in a similar fashion to walls, so that both are completely covered with the INTELLO membrane. Laps must be taped with TESCON VANA tape.
- 17.7 At corners or tight junctions, the membrane may be taped with TESCON PROFIL tape, instead of TESCON VANA tape.
- 17.8 When the INTELLO membrane meets window or door openings with reveals, the membrane is sealed to the window or door reveal with TESCON VANA or TESCON PROFIL. For windows and doors without reveals, CONTEGA IQ strips are used to seal the INTELLO membrane to the window or door frame.
- 17.9 When installing Pro Clima tapes on difficult to bond substrates, TESCON PRIMER RP may be used.
- 17.10 Pipes and cables which penetrate through the INTELLO membrane are sealed with ROFLEX or KAFLEX sealing grommets.
- 17.11 INSTAABOXES are installed behind electrical outlets and taped to the INTELLO membrane to provide an airtight seal. The INSTAABOXES should be located adjacent to a framing member to provide a fixing location for flush boxes.
- 17.12 Any damaged areas of INTELLO membrane, such as tears, holes or gaps around service penetrations, must be sealed. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears with TESCON VANA tape.
- 17.13 Wall and ceiling battens are fixed over the INTELLO membrane in accordance with the Technical Literature.
- 17.14 The airtightness of the building should be verified by a 'Blower Door test' operated in accordance with AS/NZS 9972 or EN 13829, prior to installation of the internal linings. Remedial work may be required to identify and rectify air leakage paths prior to installation of the internal linings.

Inspections

- 18.1 The Technical Literature must be referred to during the inspection of INTELLO Humidity Variable Intelligent Airtightness System installations.

Basis of Appraisal

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

Tests

- 19.1 Testing of the long-term adhesion of the components of the INTELLO Humidity Variable Intelligent Airtightness System to a variety of substrates has been completed by BRANZ.
- 19.2 Testing of mechanical properties of the INTELLO membranes has been completed by overseas laboratories. The results have been reviewed by BRANZ technical experts.



Other Investigations

- 20.1 A durability opinion has been given by BRANZ technical experts.
- 20.2 The practicability of installation of the INTELLO Humidity Variable Intelligent Airtightness System has been assessed by BRANZ and found to be satisfactory.
- 20.3 The Technical Literature, including installation instructions, has been examined by BRANZ and found to be satisfactory.

Quality

- 21.1 The manufacture of INTELLO membranes has been examined on behalf of BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has also taken note of product certifications issued for the product by the British Board of Agrément (BBA) and the Deutsches Institut für Bautechnik (DIBt).
- 21.2 The quality of supply to the market is the responsibility of Pro Clima [NZ] Ltd.
- 21.3 Building designers are responsible for the design of the building, and for the incorporation of the INTELLO Humidity Variable Intelligent Airtightness System into their design in accordance with the instructions of Pro Clima [NZ] Ltd.
- 21.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Pro Clima [NZ] Ltd.

Sources of Information

- AS/NZS 9972: 2015 Thermal performance of buildings - Determination of air permeability of buildings - Fan pressurization method.
- BBA Agrément Certificate 14/5155 Pro Clima Intelligent Vapour Control and Airtight Systems, Intello and Intello Plus.
- BRANZ Study Report SR344 [2016] Vapour control in New Zealand walls, 2016.
- Determination 2011/050 The code compliance of a vapour-control membrane system to a house at 12 Mystery Grove, Queenstown. Department of Building and Housing.
- Deutsches Institut für Bautechnik (DIBt), European Technical Assessment ETA-18/114 for Humidity-dependent vapour control layers INTELLO and INTELLO PLUS, issued 28 November 2019.
- EN 13829:2001 Thermal performance of buildings - Determination of air permeability of buildings - Fan pressurization method.
- NASH Standard Part Two: 2019 Light Steel Framed Buildings.
- NZS 3604: 2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



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19 May 2021

INTELLO HUMIDITY VARIABLE
INTELLIGENT AIRTIGHTNESS
SYSTEM



In the opinion of BRANZ, the **INTELLO Humidity Variable Intelligent Airtightness 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 **Pro Clima [NZ] Ltd**, 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. **Pro Clima [NZ] Ltd**:
 - 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 **Pro Clima [NZ] Ltd**.
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 **Pro Clima [NZ] Ltd** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

19 May 2021