



**BRANZ Appraised**  
Appraisal No. 916 [2016]

## MULTITUBO PE-RT INVERSE PIPE SYSTEM FOR UNDERFLOOR HEATING

**Appraisal No. 916 [2016]**

Amended 19 July 2019



### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



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## Product

- 1.1 The Multitubo PE-RT Inverse Pipe System incorporates a polyethylene raised temperature (PE-RT) pipe and brass fittings for use in underfloor heating systems.

## Scope

- 2.1 The Multitubo PE-RT Inverse Pipe System has been appraised for use as components for cast-in heating elements in concrete floors and cement or gypsum screeds.
- 2.2 The Multitubo PE-RT Inverse Pipe System has been appraised for use with water operating at temperatures of up to 70°C and pressures up to 600 kPa.

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, the Multitubo PE-RT Inverse Pipe System if designed, installed, used and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the New Zealand Building Code [NZBC]:

**Clause B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years, and B2.3.1 (b) 15 years. The Multitubo PE-RT Inverse Pipe System meets these requirements. See Paragraphs 8.1 - 8.3.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. The Multitubo PE-RT Inverse Pipe System will not present a health hazard to people.

**Clause G10 PIPED SERVICES:** Performance G10.3.1 (a). The Multitubo PE-RT Inverse Pipe System meets this requirement.

- 3.2 This Appraisal assesses an **Alternative Solution** in terms of New Zealand Building Code compliance.

## Technical Specification

### Description

- 4.1 The Multitubo PE-RT Inverse Pipe consists of a polyethylene (PE-RT) pipe with an embedded oxygen diffusion (EVOH) barrier, and is available in the following nominal sizes and coil lengths:
  - 16 x 2.0 mm, 300 m and 500 m coils; and,
  - 20 x 2.0 mm, 300 m and 500 m coils.
- 4.2 The pipes are orange and continuously marked along their length, every metre, with information including the name of the pipe, its size, pipe type, the standards that it complies with, date and time of manufacture and distance from the end of the coil.
- 4.3 Brass connectors are used for connecting the pipe to distribution panels.

## Handling and Storage

- 5.1 The Multitubo PE-RT Inverse Pipe should be handled with care to prevent damage. The pipe must be stored where it will not be exposed to sunlight.

## Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Multitubo PE-RT Inverse Pipe. 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 The Multitubo PE-RT Inverse Pipe is a component of hot water-based underfloor heating systems which are installed in buildings such as housing, communal residential and non-residential, commercial and industrial structures. The system is normally embedded in new concrete slab-on-ground or suspended concrete floors.
- 7.2 The Multitubo PE-RT Inverse Pipe has been Appraised for use at temperatures up to 70°C and pressures of 600 kPa. Most embedded heating systems run at significantly lower temperatures and pressures than this, and do not run continuously throughout the year.
- 7.3 Details on the advantages, limitations, design, installation and use of embedded floor heating systems are given in BRANZ Bulletin No. 586, and are relevant to the Multitubo PE-RT Inverse Pipe.
- 7.4 Heat sources and components such as pumps, valves, manifolds and thermostats, have not been assessed and are outside the scope of this Appraisal.
- 7.5 The minimum bending radius for Multitubo PE-RT Inverse Pipes is 5 times the pipe diameter.
- 7.6 The hot water heating system must not be connected to the potable water supply system.
- 7.7 The system must be designed so that no joints in the pipe are cast within the concrete. Pipework should not be laid under walls or closer than 150 mm to external walls, internal walls, or positions where heavy items such as machinery or storage racks will be permanently located.
- 7.8 Plumbing and electrical services may be installed above or below the Multitubo PE-RT Inverse Pipe, however layouts should be designed to avoid this if possible.
- 7.9 Successful installation of the Multitubo PE-RT Inverse Pipe will involve the co-operation of various tradespeople to avoid damage during worksite operations.

### Heating Design

- 7.10 The heating system design, including the layout of the pipe, must be carried out by a suitably qualified designer.

### Floor Design

- 7.11 Specific flooring design must be in accordance with AS/NZS 1170 and NZS 3101: Part 1. Non-specific flooring design must be in accordance with NZS 3604 or NZS 4229 as amended by NZBC Clause B1/AS1. Construction must be in accordance with NZS 3109.
- 7.12 Concrete cover to the top of pipework must be at least 25 mm.

### Damp-Proof Membrane

- 7.13 A damp-proof membrane complying with NZS 3604 Clause 7.5.4.2 must be used under concrete slab-on-ground floors.
- 7.14 The damp-proof membrane must be placed between the granular fill and the insulation.

### **Insulation**

- 7.15 In housing, the building envelope must be designed to meet the requirements of NZBC Clause H1 Energy Efficiency. If the Schedule Method of NZBC Acceptable Solution H1/AS1 is used as a means of compliance, a heated floor slab must have a minimum R-value of R1.9 in all climate zones.
- 7.16 Design and insulation of non-residential buildings must be carried out in accordance with NZBC Clause H1 Verification Method VM1 or Acceptable Solution AS1.

### **Floor Coverings**

- 7.17 Floor coverings should be selected so that they offer the minimum resistance to the upward flow of heat. Floor coverings such as carpet or cork, will reduce the efficiency of heated floors. Refer to BRANZ Bulletin No. 586 for further details.

### **Durability**

- 8.1 The Multitubo PE-RT Inverse Pipe will provide a serviceable life of at least 50 years.
- 8.2 The brass fittings for use with the Multitubo PE-RT Inverse Pipe will provide a serviceable life of at least 15 years.
- 8.3 The Multitubo PE-RT Inverse Pipe must be protected from sunlight at all times as UV radiation will cause deterioration to the pipes.

### **Maintenance**

- 8.4 The Multitubo PE-RT Inverse Pipe as assessed does not require any special maintenance.

### **Fire**

- 9.1 When Multitubo PE-RT Inverse Pipe is used as a component in an underfloor heating system intended for use with fire resistant rated (FRR) suspended floor construction, an appropriate consultant should be engaged to ensure compliance with NZBC requirements.

### **Water Supplies**

- 10.1 Heating systems incorporating the Multitubo PE-RT Inverse Pipe must be isolated from potable water systems.

## **Installation Information**

### **General**

- 11.1 Installation of the pipe and the fittings must be in accordance with this Appraisal and the Technical Literature.
- 11.2 Installers should be aware of all relevant walls and floor fixtures such as cabinetry before the Multitubo PE-RT Inverse Pipe is laid. Connecting pipework should run through passageways and doorways. The position of all plumbing and electrical work must be established before laying the Multitubo PE-RT Inverse Pipe.
- 11.3 The damp-proof membrane is placed on top of the granular base fill and the floor insulation is placed on top of the damp-proof membrane.
- 11.4 Pipework is positioned in areas marked on the floor plans of the building.
- 11.5 Pipework is tied using cable ties or reinforcing bar ties to the reinforcing steel mesh of the concrete slab. It may also be clipped down to foam insulation using proprietary clips.
- 11.6 The concrete floor or screed should be placed within two to three days of installation of the pipework. Care must be taken to ensure the concrete is well-compacted around the pipework. Voids can reduce the efficiency of the system.
- 11.7 Pumping, rather than barrowing, is the preferred method of concrete placement as tipping concrete from barrows is more likely to displace or damage pipes. If wheel barrows are used for concrete placement they should be limited to runways which are clear of pipework.

- 11.8 If a pipe is damaged then this should be repaired before concrete is placed. Central Heating New Zealand Limited should be contacted for information on repair techniques. The jointing of pipes in the concrete has not been assessed and is outside the scope of this Appraisal.
- 11.9 A sleeve must be fitted around the Multitubo PE-RT Inverse Pipe where it crosses control joints.
- 11.10 After concrete finishing, the position of pipework should be marked on an as-built floor plan and supplied to the site supervisor so that damage may be avoided during subsequent worksite operations, such as slab-cutting, and the placement of fasteners or services.
- 11.11 Heat must not be applied to the underfloor heating system until the concrete has cured for at least 28 days.

### Charging and Pressure Testing

- 12.1 All circuits in the system must be flushed with water so that they are free from trapped air.
- 12.2 The system should be tested to 1500 kPa at ambient temperature. The pressure must remain stable at 1500 kPa for a minimum of 30 minutes.

### Commissioning Underfloor Heating Systems

- 13.1 When the concrete has cured, water at 20°C – 25°C is introduced into the system and maintained for 72 hours, increasing by 5°C every 24 hours thereafter, until the maximum operational flow temperature has been reached. The system must then be allowed to cool until the working temperature is acquired.
- 13.2 Floor coverings which are impermeable to moisture must not be installed until the moisture content of the concrete is such that it is sufficiently dry to give a relative humidity reading of less than 75% at the time of laying, in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 10.2 [d]. Measurement must be carried out as outlined in NZBC Acceptable Solution E2/AS1, Paragraph 10.3.2. It should be noted that the manufacturers of sheet vinyl or ceramic tile adhesives, or floor sealers and paints, may recommend lower concrete moisture levels for their products, in which case these should take precedence.

## Basis of Appraisal

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

### Tests

- 14.1 Tests have been carried out on the Multitubo PE-RT Inverse Pipe by Exova to the requirements of ISO 9080 and by SKZ to the requirements of ISO 21003-5. The test results have been reviewed by BRANZ experts and found to be satisfactory.

### Other Investigations

- 15.1 An assessment was made of the durability of the Multitubo PE-RT Inverse Pipe by BRANZ technical experts.
- 15.2 Site visits were carried out to assess the practicability of installation.
- 15.3 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.

### Quality

- 16.1 The Multitubo PE-RT Inverse Pipe are certified by Süddeutsche Kunststoff-Zentrum (SKZ), testing and inspection mark A666.
- 16.2 Central Heating New Zealand Limited is responsible for the quality of the product supplied.
- 16.3 Quality of installation on site is the responsibility of the installer.



### Sources of Information

- AS/NZS 1170: 2002 Structural Design Actions.
- BRANZ Bulletin No. 586 Embedded floor heating, August 2015.
- NZS 3101 Part 1:2006 Concrete Structures Standard.
- NZS 3109:1997 Concrete construction.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4229:2013 Concrete masonry buildings not requiring specific design.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

### Amendments

#### **Amendment No. 1, dated 21 June 2017.**

This Appraisal has been amended to clarify the location of the EVOH oxygen barrier layer, and update Paragraphs 7.12 and 8.3.

#### **Amendment No. 2, dated 28 May 2018.**

This Appraisal has been amended to increase the maximum water operating temperature from 60°C to 70°C and the pressure from 400 kPa to 600 kPa.

#### **Amendment No 3, dated 19 July 2019.**

This Appraisal has been amended to decrease the concrete cover depth to at least 25mm for floor design.



In the opinion of BRANZ, **Multitubo PE-RT Inverse Pipe System for Underfloor Heating** 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 **Central Heating New Zealand 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. **Central Heating New Zealand 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 **Central Heating New Zealand 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 **Central Heating New Zealand Ltd** or any third party.

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For BRANZ



**Chelydra Percy**

Chief Executive

Date of Issue:

20 May 2016