



BRANZ Appraised

Appraisal No.773 [2012]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 773 (2012)**

Amended 12 August 2013

**AQUATHERM ORANGE
SURFACE HEATING
PIPES SYSTEM**

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Product

1.1 This Appraisal relates to the aquatherm orange Surface Heating Pipes System, which incorporates a polyethylene raised temperature (PE-RT) pipe with a red outside EVOH-barrier.



Scope

2.1 The aquatherm orange Surface Heating Pipes System has been appraised for use as components for cast-in heating elements in concrete floors or cement screeds.

2.2 The aquatherm orange Surface Heating Pipes System has been appraised for use with water operating at temperatures of up to 60°C and pressures up to 400 kPa.

Building Regulations

3.1 In the opinion of BRANZ, the aquatherm orange Surface Heating Pipes 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) at least 50 years, and B2.3.1(b) 15 years. The aquatherm orange Surface Heating Pipes System meet these requirements. See Paragraphs 8.1 - 8.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The aquatherm orange Surface Heating Pipes System will not present a health hazard to people.

Clause G10 PIPED SERVICES: Performance G10.3.1(a). The aquatherm orange Surface Heating Pipes 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 aquatherm orange Surface Heating Pipes System consists of polyethylene pipes (PE-RT) with an oxygen diffusion barrier coating, and are available in the following nominal sizes and coil lengths:

- 16 x 2.0 mm, 250 m and 500 m coils; and,
- 20 x 2.0 mm, 250 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 aquatherm Surface Heating Pipes 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 aquatherm orange Surface Heating Pipes 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 The aquatherm orange Surface Heating Pipes System 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 aquatherm orange Surface Heating Pipes System has been Appraised for use at temperatures up to 60°C and pressures of 400 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. 491, and are relevant to the aquatherm orange Surface Heating Pipes System.

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 the aquatherm Surface Heating 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 aquatherm Surface Floor Heating Pipes System pipework, however layouts should be designed to avoid this if possible.

7.9 Successful installation of the aquatherm orange Surface Heating Pipes System 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 45 mm. If the aquatherm screed additive floor mix is used the nominal thickness of concrete cover can be reduced to 30mm. This additive has not been assessed and is outside the scope of this Appraisal.

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. 491 for further details.

Durability

8.1 The aquatherm Surface Heating Pipes will provide a serviceable life of at least 50 years.

8.2 The brass fittings for use with the aquatherm orange Surface Heating Pipes System will provide a serviceable life of at least 15 years.

8.3 The aquatherm Surface Heating Pipes must be protected from sunlight at all times as UV radiation will cause rapid deterioration to the pipes.

Maintenance

8.4 The aquatherm orange Surface Heating Pipes System as assessed does not require any special maintenance.

Fire

9.1 When aquatherm Surface Heating Pipes are 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 aquatherm orange Surface Heating Pipes System 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 aquatherm orange Surface Heating Pipes System is laid. Connecting pipework should run through passageways and doorways. The position of all plumbing and electrical work must be established before laying the aquatherm Surface Heating Pipes.

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. aquatherm NZ Ltd 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 aquatherm Surface Heating Pipes where they cross 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, however BRANZ Bulletin No. 491 recommends 4 months, especially in winter, before the system is commissioned by the installer. If using the aquatherm special floor mix the floor must be heated after 21 days at a flow temperature of 25°C for 3 days and then the maximum flow temperature for another 4 days. This system has not been assessed and is outside the scope of this Appraisal.

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 aquatherm Surface Heating Pipes by SKZ in accordance with their HR3.16 specification. 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 aquatherm Surface Heating Pipes 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 aquatherm Surface Heating Pipes are certified by Süddeutsche Kunststoff-Zentrum (SKZ), testing and inspection mark A403.

16.2 aquatherm NZ Ltd 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 Structural Design Actions.
- BRANZ Bulletin No. 491 Embedded floor heating, October 2007.
- NZS 3101 Part 1:2006 Concrete Structures Standard.
- NZS 3109:1997 Concrete construction.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4229:1999 Concrete masonry buildings not requiring specific design.
- New Zealand Building Code Handbook Department of Building and Housing, Third Edition (Amendment 12, 10 October 2011).
- The Building Regulations 1992.



BRANZ

In the opinion of BRANZ, **aquatherm orange Surface Heating Pipes 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 **aquatherm 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. **aquatherm 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 **aquatherm 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 **aquatherm NZ Ltd** or any third party.

For BRANZ

P Burghout
Chief Executive

Date of issue: 21 December 2012

Amendment No. 1, dated 12 August 2013.

This Appraisal has been amended to change the Product Name.