



BRANZ Appraised

Appraisal No. 539 [2016]

AQUATHERM GREEN PIPE AND LILAC PIPE SYSTEMS

Appraisal No. 539 [2016]

This Appraisal replaces BRANZ Appraisal No. 539 [2013] and BRANZ Appraisal No. 629 [2008]



BRANZ Appraisals

Technical Assessments of products for building and construction.



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Product

- 1.1 The aquatherm green pipe and lilac pipe systems consist of polypropylene random (PP-R [80] and PP-RP) pipes and fittings.
- 1.2 The aquatherm green pipe system is for use in hot and cold potable water supply services and hot water circulation heating systems.
- 1.3 The aquatherm lilac pipe system is for the distribution of cold non-drinking water, including recycled and reclaimed water.

Scope

- 2.1 The aquatherm green pipe system has been appraised for use as the piping components for water supply and as pipe for proprietary heating systems subject to specific design.
- 2.2 The aquatherm green pipe SDR 11 has been appraised for cold water distribution only. The aquatherm green pipes SDR 7.4, SDR 7.4 MF and SDR 9 MF RP have been appraised for both hot and cold water use.
- 2.3 The aquatherm lilac pipe system has been appraised for use in cold non-drinking water supply and distribution.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 **In the opinion of BRANZ, the aquatherm green pipe and lilac pipe systems, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet 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 B2.3.1 (c) 5 years. The aquatherm green pipe and lilac pipe systems meet these requirements. See Paragraphs 8.1 - 8.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The aquatherm green pipe and lilac pipe systems meet this requirement and will not present a health hazard to people.

Clause G10 PIPED SERVICES: Performance G10.3.1 (a). The aquatherm green pipe system meets this requirement when used in heating systems. See Paragraph 9.1 - 9.3.

Clause G12 WATER SUPPLIES: Performance G12.3.2 (c), G12.3.3, G12.3.4 and G12.3.7 (a) and (b). The aquatherm green pipe and lilac pipe systems contribute to meeting these requirements. See Paragraphs 9.1 - 9.3 and 12.1 - 12.5.

Technical Specification

Description

- 4.1 The aquatherm green pipe and lilac pipe and fittings are manufactured from fusiolen® polypropylene random copolymer [PP-R (80)], SDR 9 MF RP pipes are manufactured from PP-RP, which is a PP-RCT classified material.
- 4.2 Four aquatherm green pipes and two lilac pipes are covered by this Appraisal. The pipe sizes and fields of application are defined in Table 1. aquatherm green pipes and lilac pipes are specified by their standard dimension ratios [SDR] diameter/wall thickness ratio.
- 4.3 aquatherm green pipe SDR 11 and SDR 7.4 are single layer pipes. aquatherm green pipe SDR 7.4 MF is a multi-layer pipe with inner and outer layers of PP-R (80) and a middle layer of fibre reinforced PP-R (80). aquatherm green pipe SDR 9 MF RP is also a multi-layer fibre-composite raised pressure [RP] pipe.
- 4.4 The aquatherm lilac pipes are available in SDR 7.4 and SDR 11 single layer pipes.
- 4.5 The pipes are continuously marked along their length with aquatherm, the pipe type, the pipe size, material type, certification information and date and time of manufacture.
- 4.6 The fittings for use with the aquatherm green pipe and lilac pipe systems are also made from fusiolen® PP-R (80), with some of the fittings also incorporating dezincification-resistant brass where metallic threads are required. All fittings are marked with the diameter of the pipe it is to be used for, "a" [for aquatherm] and PP-R Typ3.

Tools

- 4.7 The tools specified by aquatherm NZ Ltd for installation are outside the scope of this Appraisal, however only aquatherm and brand matched tools should be used.

Table 1: aquatherm green pipe and lilac pipes and their applications.

	aquatherm green pipe SDR 7.4	aquatherm green pipe SDR 7.4 MF	aquatherm green pipe SDR 9 MF RP	aquatherm green pipe SDR 11	aquatherm lilac pipe SDR 7.4	aquatherm lilac pipe SDR 11
Colour	Green	Green with 4 dark green stripes	Green with 4 dark green stripes	Green with 4 blue stripes	Lilac	Lilac
Field of Application	Cold and hot water supply Heating systems	Cold and hot water supply Heating systems	Hot water supply Heating systems	Cold water supply	Cold non-drinkable water	Cold non-drinkable water
Pipe Diameter (mm). Available in 4 m lengths	16, 20, 25, 32, 40, 50, 63	20, 25, 32, 40, 50, 63, 75, 90, 110, 125	32, 40, 50, 63, 75, 90, 110, 125	25, 32, 40, 50, 63, 75, 90, 110, 125	20, 25	32, 40, 50, 63, 75, 90, 110, 125
Pipe Diameter (mm). Available in 5.8 m lengths	-	160, 200, 250	160, 200	160, 200, 250	-	-

Handling and Storage

- 5.1 aquatherm green pipe and lilac pipe system components must be handled and stored with care to prevent damage. The pipes must be stored flat, supported every metre and in a position where they will not be exposed to sunlight.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for information on the Technical Literature for the aquatherm green pipe and lilac pipe systems. 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 aquatherm green pipe systems must be designed and installed in accordance with the requirements of NZBC Acceptable Solution G12/AS1. Specific design installations may be designed in accordance with AS/NZS 3500.1 and AS/NZS 3500.4.
- 7.2 aquatherm lilac pipe systems must be designed and installed in accordance with the requirements of NZBC Acceptable Solution G12/AS1. Specific design installations may be designed in accordance with AS/NZS 3500.1.
- 7.3 aquatherm green pipes are suitable for use as circulation pipes for radiator type heating systems, subject to the limitations of Paragraph 9.1 and 9.2 below. These systems are to a specific design by the heating system proprietor and components other than the aquatherm green pipe and fittings are outside the scope of this Appraisal.
- 7.4 In hot water reticulation systems where PP-R is mixed with copper piping it is recommended that water temperatures do not exceed 70°C and the velocity not exceed 1.0 m/s, to avoid erosion of the copper pipework and downstream deleterious effect to aquatherm pipes and fittings.
- 7.5 The aquatherm green pipe must not be connected directly to auxiliary heaters such as solar collection panels or wet-backs without the installation of temperature protection devices in the system. Without protection, temperatures may exceed the operating limits. Pipes and fittings must not be installed within 1 metre of an inlet or outlet of a water heater.
- 7.6 The aquatherm lilac pipe system is intended for non-drinking water (non-potable water), including recycled and reclaimed water, at ambient temperatures.
- 7.7 The aquatherm green pipe and lilac pipe systems must not be used where they will be subject to direct sunlight.
- 7.8 Cold water supply pipes must be insulated when embedded in heated concrete slabs. Where water supply pipes must pass through concrete slabs they must do so at right angles to the surface of the slab and be lagged with an impermeable flexible plastic material of not less than 6 mm thickness for the full depth of the slab penetration.
- 7.9 Where the aquatherm green pipe and lilac pipe systems are to be used in or under concrete, refer to Tables 2 and 3 for working pressures and temperatures for a 50 year serviceable life.
- 7.10 Other non-aquatherm brands of PP-R pipes and fittings must not be used in the aquatherm green pipe and lilac pipe systems.
- 7.11 aquatherm green pipes have been independently tested to determine their performance with water containing chlorine of up to 4 parts per million. This aspect is outside the scope of this Appraisal. For further information contact aquatherm NZ Ltd.
- 7.12 Where aquatherm green pipe is used in hot water ring mains, suitable temperature and pressure control mechanisms must be in place to ensure that maximum permissible working temperatures and pressures are not exceeded.

Durability

- 8.1 The NZBC durability performance requirements for pipe systems vary depending on the difficulty or ease to access.

Service Life

- 8.2 The service life of the aquatherm green pipe system relating to pipe type, permissible working pressure and temperature is given in Tables 2 and 3 below. The Technical Literature gives a greater range of design options for these variables.
- 8.3 The service life of aquatherm lilac pipe system (incorporating the fusiotherm welded fittings only) is expected to exceed 50 years for the operating pressures and temperatures given in Paragraph 9.1. The serviceable life of the aquatherm lilac piping system, including all fittings, is expected to exceed 15 years.

Working Pressures and Temperatures

- 9.1 Table 2 gives the permissible working pressures for the aquatherm green pipe system for a 50 year service life and a working temperature of 20°C. Table 3 gives the permissible working pressures for a 50 year service life at 60°C.
- 9.2 The permissible working pressure for the aquatherm green pipe SDR 7.4 MF for a 50 year service life at 70°C is 0.81 MPa.
- 9.3 The permissible working pressure for the aquatherm green pipe SDR 9 MF RP for a 50 year service life at 70°C is 1.02 MPa.
- 9.4 The permissible working pressure for the aquatherm lilac piping system for a 50 year service life at 30°C is 1.0 MPa. Higher working pressures or temperatures will decrease the expected service life.

Table 2: Permissible working pressures for a 50 year service life at 20°C

Pipe	Pressure [MPa]
aquatherm green pipe SDR 7.4	2.04
aquatherm green pipe SDR 7.4 MF	2.45
aquatherm green SDR 9 MF RP	2.31
aquatherm green pipe SDR 11	1.29

Table 3: Permissible working pressures for a 50 year service life at 60°C

Pipe	Pressure [MPa]
aquatherm green pipe SDR 7.4	1.01
aquatherm green pipe SDR 7.4 MF	1.21
aquatherm green pipe SDR 9 MF RP	1.23

Note: The above tables are based on intermittent use of heated water through the pipes. Long uses at higher temperatures will reduce the service life.

Maintenance

- 10.1 The aquatherm green pipe and lilac pipe systems do not require any special maintenance. Items such as valves and control equipment must be maintained to ensure the maximum working pressures and temperatures are not exceeded.

Control of Internal Fire and Smoke Spread

- 11.1 In all applications where aquatherm green pipe and lilac pipe pass through a fire rated element of a structure, the opening must be fire-stopped in a way that will permit thermal movement of the pipe.

Water Supplies

- 12.1 The aquatherm green pipe system has been tested to AS/NZS 4020 and is suitable for potable water supply use in accordance with AS/NZS 3500.1 Paragraph 2.3, AS/NZS 3500.4, Paragraph 2.3 and NZBC Acceptable Solution G12/AS1, Paragraph 2.1.2.
- 12.2 The aquatherm lilac pipe system is for use with non-drinking water. For compliance with NZBC Clause G12.3.3, when the aquatherm lilac pipe system is used for personal hygiene it must be protected from High and Medium hazards as defined by NZBC Clause G12/AS1, Paragraph 3.3. Where backflow protection is required it must be in accordance with Paragraphs 3.1 to 3.7 of NZBC Clause G12/AS1.
- 12.3 The aquatherm lilac pipe is lilac in colour and marked 'non-potable' for compliance with NZBC Clause G12.3.4. NZBC Clause G12/AS1, Paragraph 4.2 requires signs to be provided at outlets for non-potable water.
- 12.4 The aquatherm lilac pipe system has adequate pipe and fitting size options for water supplies to comply with NZBC Clause G12.3.7 [a].

- 12.5 The aquatherm lilac piping system has demonstrated by test to DIN 8078 that it avoids the likelihood of leakage.

Energy Efficiency

- 13.1 All domestic type hot water distribution pipes must be insulated in accordance with the requirements of NZS 4305, Sections 3.7 and 3.8.

Installation Information

Installation Skill Level Requirements

- 14.1 Installation of the aquatherm green pipe system for potable water and the aquatherm lilac pipe system for recycled and reclaimed water, must always be carried out by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class.

General

- 14.2 Installation of the aquatherm green pipe and lilac pipe systems must be in accordance with NZBC Clause G12/AS1, in particular Section 7, or AS/NZS 3500.4.
- 14.3 The aquatherm green pipe and lilac pipe and the associated fittings must be designed and installed in accordance with the requirements of this Appraisal and installation information in the Technical Literature.
- 14.4 When installing aquatherm green pipe and lilac pipe in framed walls, the holes must be accurately sized to allow pipework to expand and contract. In metal framework grommets must be used to protect the pipe from sharp edges.
- 14.5 20 mm, 25 mm and 32 mm diameter aquatherm green pipe SDR 11 and 16 mm and 20 mm diameter aquatherm green pipe SDR 7.4 may be bent with a minimum radius of 20 times the pipe diameter. The 32 mm diameter aquatherm lilac pipe SDR 11 and 20 mm diameter aquatherm lilac pipe SDR 7.4 may be bent with a minimum radius of 8 times the pipe diameter; however it is preferred to carry out changes in pipe direction with aquatherm pipe fitting joints. Larger diameter aquatherm green pipes, MF pipes and lilac pipes must not be bent. For these pipes all changes in pipe direction must be achieved through aquatherm joints.

Connecting Pipes and Fittings

- 14.6 There are two methods of connecting the aquatherm green pipe and lilac pipes and fittings together, either by heating the two components with a welding device and pushing them together, or through the use of aquatherm green pipe-electrofusion sockets. aquatherm green pipe and lilac pipe systems must only be installed by Licensed Plumbers who have undergone and passed training by aquatherm NZ Ltd.
- 14.7 In locations where joints between pipes that will be concealed within or beneath concrete slabs or screeds, only fusion welding is to be used; mechanical joints must not be used. The location of these joints should be recorded.

Charging and Pressure Testing

- 15.1 Prior to enclosing the pipe system, whether it is for piping in wall or floor cavities, or heating systems, a visual check of every fitting is required to ensure all fusion welds have been properly formed.
- 15.2 All circuits within the system must be flushed with fresh, clean water so that they are free from trapped air and any foreign matter that may have entered the system.
- 15.3 When all air has been bled from the system, it must be pressure tested.
- 15.4 Piped services used for potable hot and cold water supply or recycled or reclaimed water must not show any leakage when subjected to testing in accordance with the aquatherm NZ Ltd requirements as well as when subjected to a pressure of 1500 kPa at 20°C for a period of not less than 30 minutes, in accordance with AS/NZS 3500.1.
- 15.5 A non-potable water service must be tested in accordance with AS/NZS 3500.1, Paragraph 9.6 to ensure that there is no cross-connection between potable and non-potable water supplies.

15.6 Heating systems must be tested to the heating system manufacturer's requirements.

Basis of Appraisal

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

Tests

- 16.1 Tests have been carried out on the aquatherm green pipe system by SKZ [Suddeutsches Kunststoff-Zentrum] Testing Laboratory in accordance with HR3.10 and HR3.28. The test results have been reviewed by BRANZ experts and found to be satisfactory.
- 16.2 Tests have been carried out on the aquatherm green pipe system by TGM [Technologisches Gewerbemuseum]. The test results have been reviewed by BRANZ experts and found to be satisfactory.
- 16.3 Tests have been carried out on the DR brass fittings in accordance with AS 2345. The test results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 17.1 An assessment was made of the durability of the aquatherm green pipe and lilac pipe systems by BRANZ technical experts.
- 17.2 Site inspections were carried out by BRANZ to examine completed installations and installation methods.
- 17.3 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.

Quality

- 18.1 The aquatherm green pipe and lilac pipes are manufactured by aquatherm GmbH, under an ISO 9001 Quality Management System.
- 18.2 The aquatherm green pipe is certified by DVGW.
- 18.3 aquatherm NZ Limited is responsible for the quality of the product supplied.
- 18.4 Quality of installation on site is the responsibility of the installer.

Sources of Information

- AS 2345:2006 Dezincification resistance of copper alloys.
- AS/NZS 3500.1:2003 Plumbing and drainage - Water services.
- AS/NZS 3500.4:2003 Plumbing and drainage - Heated water services.
- AS/NZS 4020:2005 Products for use in contact with drinking water.
- NZS 4305:1996 Energy efficiency - Domestic type hot water systems.
- DIN 8078: 1996 Types 1,2 and 3 polypropylene [PP] pipes. General quality requirements and testing. DIN, Berlin, Germany.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.





In the opinion of BRANZ, **aquatherm green Pipe and lilac Pipe Systems** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are 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



Chelydra Percy

Chief Executive

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