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Agrément Certificate
10/4738
Product Sheet 1

WAVIN UNDERFLOOR HEATING SYSTEMS

WAVIN UNDERFLOOR HEATING SYSTEM WITH WAVIN COMPOSITE MANIFOLD

This Agrément Certificate Product Sheet(1) relates to the Wavin Underfloor Heating System with Wavin Composite Manifold, used in conjunction with 15, 16 and 20 mm polybutylene (PB) barrier pipes Kitemarked to BS EN ISO 21003 : 2008, for use as a space heating system in domestic, commercial or public buildings.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Safe working temperatures and pressures — the system has adequate resistance to the temperatures and pressures likely to be found in underfloor heating systems (see section 7).

Chemical resistance — the materials used in the system will not be adversely affected by accidental contact with linseed-oil-based sealing compounds and will be unaffected by soft, hard or aggressive wholesome water (see section 8).

Durability — the system will have a life at least equivalent to that expected from a traditional installation with metal pipes (see section 12).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Third issue: 21 October 2016

Originally certificated on 21 October 2015

Brian Chamberlain
Head of Technical Excellence

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Wavin Underfloor Heating System with Wavin Composite Manifold, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**L1(a)(ii)(b)**	**Conservation of fuel and power**
Comment:		The system can contribute to satisfying this Requirement. See sections 6.5 and 6.6 of this Certificate.
Regulation:	**7**	**Materials and workmanship**
Comment:		The system is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Primary energy consumption rates for new buildings (applicable to Wales only)**
Comment:		The system can contribute to satisfying these Regulations. See *Design Considerations* and *Installation* in this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The use of the system satisfies this Regulation. See section 12 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	6.1	Carbon dioxide emissions
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.1.2(1)(2) and 6.1.3(1)(2). See *Design Considerations* in this Certificate.
Standard:	6.4	Insulation of pipes, ducts and vessels
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.4.1(1)(2) and 6.4.2(1)(2). See sections 6.5, 6.6 and 6.7 of this Certificate.
Standard:	6.7	Commissioning building services
Comment:		The system can contribute to satisfying this Standard, with reference to clause 6.7.1(1)(2). See sections 11.4 and 14 of this Certificate.
Standard:	6.9	Energy Performance Certificates
Comment:		The system can contribute to satisfying this Standard, with reference to clause 6.9.2(1)(2). See *Design Considerations* in this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		All comments given for this system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1)(2) and Schedule 6(1)(2).

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(a)(i)(iii)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See section 12 and the *Installation* part of this Certificate**.**
Regulation:	**39(a)(ii)(b)(c)**	**Conservation measures**
Comment:		The system can contribute to satisfying this Regulation. See sections 6.5 and 6.6 of this Certificate.
Regulation:	**40(1)**	**Target carbon dioxide emission rate**
Comment:		The system can contribute to satisfying this Regulation. See sections 6.5 and 6.6 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

In the opinion of the BBA there is no information in this Certificate which relates to the obligations of the client, designer (including Principal Designer) and contractor (including Principal Contractor) under these Regulations.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Wavin Underfloor Heating System with Wavin Composite Manifold, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 8.1 *Internal services*.

Byelaws

In the opinion of the BBA, the Wavin Underfloor System satisfies the requirements of:

Water Supply (Water Fittings) Regulations 1999 (England and Wales), *Water Byelaws* 2014 (Scotland) and *Water Resources (Environmental Impact Assessment)* (Northern Ireland) 2005.

Technical Specification

1 Description

1.1 The Wavin Underfloor Heating System comprises Wavin composite manifolds and Wavin 15, 16 and 20 mm underfloor heating barrier pipes.

1.2 The pipes are manufactured from polybutylene and Kitemarked to Class 4 for use with the manifold to BS EN ISO 21003-1 : 2008 and BS EN ISO 21003-2 : 2008. The pipes are also Kitemarked to Class S to BS 7291-1 : 2010. The available sizes are given in Table 1.

Table 1 Pipe dimensions

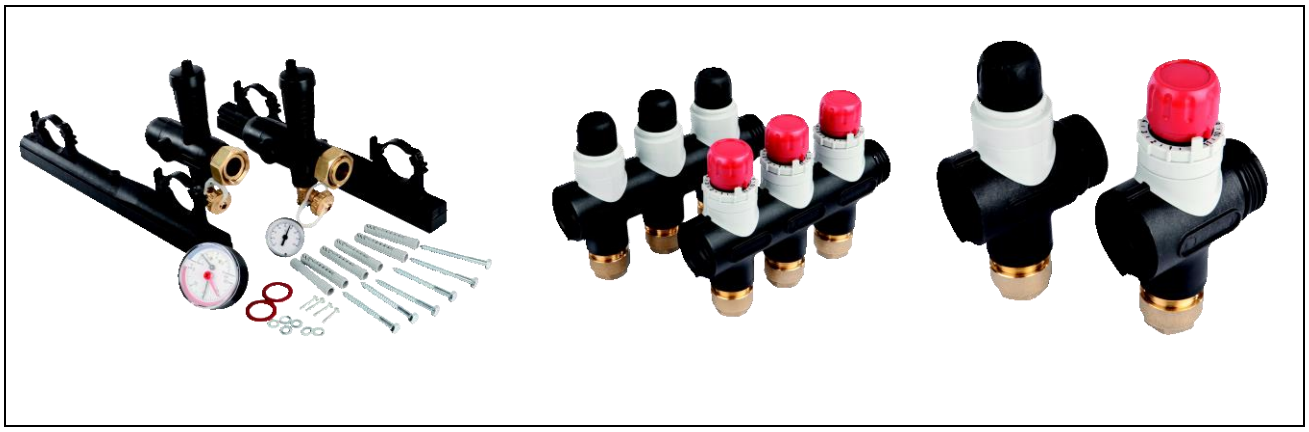
Nominal outside diameter (mm)	15	16	20
Minimum wall thickness (mm)	1.80	1.80	1.90

1.3 The pipe includes an inner and outer layer of polybutylene with an internal ethylene vinyl alcohol copolymer (EVOH) oxygen diffusion barrier. The EVOH layer is held in place by adhesive.

1.4 The manifolds control the flow of heated water through the underfloor pipe circuits. The manifolds are made of glassfibre-reinforced black polyamide.

1.5 Composite manifolds comprise one-port and/or three-port manifold bodies, combined inlets and end caps (see Figure 1). The manifolds are available in a range of sizes to connect one to fifteen circuits by combining the one-port and three-port manifold bodies.

Figure 1 Composite manifolds



1.6 Items (such as the boiler, pumps or controls necessary to complete the heating system) which are assumed to be conventional items are outside the scope of this Certificate.

2 Manufacture

2.1 The pipe is produced by an extrusion process. The plastic components of the composite manifolds are injection moulded from glassfibre-reinforced black polyamide.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by the Istituto Italiano dei Plastici (IIP) (Certificate 7).

3 Delivery and site handling

3.1 The manifolds and other small components are supplied in cardboard packaging.

3.2 All components should be stored under cover until required, to prevent UV exposure and site damage.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Wavin Underfloor Heating System with Wavin Composite Manifold.

Design Considerations

4 Use

4.1 The Wavin Underfloor Heating System with Wavin Composite Manifold fulfils the requirements of ISO 10508 : 2006, Application Class 4 (underfloor heating and low temperature radiators) for a lifetime of 25 years and a design pressure of 4 bar. The polybutylene pipes used with the manifold have a typical period of 50 years, to BS EN ISO 21003-1 : 2008.

4.2 The system can be installed in new or existing buildings.

4.3 The pipes and manifolds are capable of carrying cold water with a minimum temperature of 5°C. The design and installation of cold water systems are outside the scope of this Certificate.

5 Practicability of installation

The system is designed to be installed by a competent general builder, or a contractor, experienced with this type of system.

6 Design Procedure

Heating design

6.1 The heating demands for particular rooms are evaluated in accordance with the CIBSE Guide A: *Environmental Design*, 2015.

6.2 When designed in accordance with the procedures and data contained in the CIBSE Guide A and BS EN 1264-2 : 2008, the specification of an underfloor heating system can produce acceptable room temperatures and restrict air temperature swings. The output of the system is limited by the acceptable surface temperature of the floor. Generally, this temperature would be limited to 29°C in accordance with BS EN 1264-2 : 2008. A temperature up to 35°C may be acceptable on floor areas that are seldom walked upon in peripheral and non-sedentary zones, and which have temperature-resilient floor finishes. Designers and installers of the system should ensure that these maximum temperatures are not exceeded.

6.3 Heat sources used in conjunction with the system must meet the requirements given in:

England and Wales — Approved Documents L1A, L1B, L2A and L2B, Section 1
Scotland — Technical Handbooks, clauses 6.3.1[(1)(2)] and 6.3.2[(1)(2)]
(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).
Northern Ireland — Technical Booklets F1 and F2.

6.4 Control of the underfloor heating system must be designed in such a way that it satisfies the requirements given in:

England and Wales — Approved Documents L1A, L1B, L2A and L2B, Section 1
Scotland — Technical Handbooks, clauses 6.3.1[(1)], 6.3.2[(1)] and 6.3.1[(2)]
(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).
Northern Ireland — Technical Booklets F1 and F2.

6.5 Where pipes pass through areas not contributing to space heating, they should be insulated.

6.6 Insulation for such pipes may be provided by following the guidance given in BS 5422 : 2009 for 'environmental thickness'.

6.7 For domestic buildings in Scotland heating designs, including resistance of insulation below the heat sources, must comply with the *Domestic Building Services Compliance Guide for Scotland*.

Structural design

6.8 Floor constructions must be designed to comply with the relevant technical specifications selected from:

- BS EN 1992-1-1 : 2004 + A1 : 2014
- BS EN 1995-1-1 : 2004
- the national Building Regulations:

England and Wales — Approved Document A 1/2, Section 1
Scotland — Regulation 9 *Building standards applicable to construction*, Standard 1.1(a)(b)(c) *Structure*
Northern Ireland — Part D, Regulation 30 *Stability*.

7 Safe working temperatures and pressures

7.1 The maximum design temperature and pressure for the system is 4 bar at 70°C in accordance with Application Class 4 of BS EN ISO 15876-1 : 2003.

7.2 Polybutylene pipe must not be used within 350 mm of a concentrated heat source, such as a boiler, where the safe operating temperature may be regularly exceeded.

8 Chemical resistance

8.1 The materials used in the system will not be adversely affected by accidental contact with linseed-oil-based sealing compounds, although these materials should not normally be used in making joints to the pipe.

8.2 Polybutylene is unaffected by soft, hard or aggressive (soft and acidic) wholesome water.

8.3 Composite manifolds are made of hydrolysis-resistant, heat-stabilised polyamide resin reinforced by glassfibres.

9 Properties in relation to fire

9.1 Where a pipe passes through an element of structure or cavity barrier, the opening should be fire-stopped in a way that will permit thermal movement. Floors incorporating an underfloor heating system cannot satisfy Building Regulation requirements where these specifically require the floor construction to be non combustible.

9.2 Service openings should be constructed in such a way that they satisfy the requirements given in:

England and Wales — Approved Document B, Volume 1, Section 7, and Approved Document B, Volume 2, Section 10
Scotland — Technical Handbooks, clauses 2.1.14(2), 2.2.6(2), 2.2.9(1), 2.4.6(1) and 2.4.8(2)
(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).
Northern Ireland — Technical Booklet E, Section 3.

10 Flow characteristics

The bore of the 15, 16 and 20 mm underfloor heating barrier pipes is less than the bore of copper or stainless steel pipe of an equivalent outside diameter. The consequent reduction in flow rate for a given pressure head should be considered when designing underfloor heating systems.

11 Maintenance

11.1 An underfloor heating system incorporating polybutylene pipe does not require special maintenance unless it is damaged. Normally, work will be confined to regular maintenance of the associated heating and control equipment.

11.2 Components above ground, such as manifolds and couplings, can be replaced, if required.

11.3 In the event of a leak in the polybutylene pipe due to local damage, repairs can be made by a heating contractor using a replacement section of pipe in conjunction with an appropriate fitting. However, locating the source of the leak and subsequent repair can cause considerable disruption and inconvenience to users of the building.

11.4 To encourage optimum energy efficiency, written information should be made available to the occupier on the operation and maintenance of the heating system.

12 Durability

12.1 The EVOH oxygen barrier virtually eliminates the diffusion of oxygen into the heating system. Provided the system is installed correctly, the requirement for the addition of a corrosion inhibitor will be the same as for that of a traditional installation with metal pipes and fittings.

12.2 Composite manifolds fulfil the relevant requirements for a lifetime of 25 years (see also section 3.2). They may require replacement within the life of the polybutylene pipe.

12.3 The system will have a life at least equivalent to that expected from a traditional plumbing installation.

Installation

13 General

13.1 Installation of the Wavin Underfloor Heating System must be carried out in accordance with the Certificate holder's instructions and BS EN 1264-4 : 2009.

13.2 Polybutylene pipe is flexible and cannot be used to support fittings, eg circulating pumps or zone valves.

13.3 Care must be taken during installation to ensure damage does not occur to the pipe, eg by penetration.

13.4 Care must be taken during installation to maintain the fire-resistant integrity of elements of structure and cavity barriers when the system penetrates such elements or barriers.

14 Procedure

14.1 When commissioning the system it must be flushed, filled with water, the pump started and residual air removed via the automatic air vents on the composite manifold(s). The system must be checked for leaks after all the air has been removed and before the floor is covered with either concrete screed or dry construction flooring panels.

14.2 The system should be commissioned and inspected in such a way that optimum energy efficiency is ensured.

14.3 A notice should be displayed in buildings when the system is installed, drawing attention to the risk of damage associated with nailing through the floor decks. To minimise this risk, the pipe loops should be kept clear of room perimeters and, where possible, doorways.

Over a concrete floor, in a screed

14.4 Where the pipe loops are laid in a screed, the screed should be laid in accordance with the relevant requirements of BS 8204-1 : 2003. To minimise the effects of cracking, a minimum of 75 mm thickness of screed containing reinforcement (consisting of steel fabric in accordance with BS 4483 : 2005, reference D49 or D98) should be placed over the pipes. The reinforcement should be placed centrally in the depth of the screed and should extend 250 mm on each side.

Technical Investigations

15 Tests

15.1 Tests were carried out by the BBA in relation to dimensional accuracy of composite manifolds.

15.2 An examination was made of data on composite manifolds relating to:

- material strength
- thermal stability
- resistance to internal pressure
- viscosity of the raw material before and after moulding
- resistance to internal pressure of the joints
- resistance to pull-out of the joints
- resistance to thermal cycling.

16 Investigations

16.1 An examination was made of data relating to:

- chemical resistance
- practicability of installation
- durability.

16.2 The manufacturing process for the composite manifold was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 4483 : 2005 *Steel fabric for the reinforcement of concrete — Specification*

BS 5422 : 2009 *Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range –40°C to +700°C*

BS 7291-1 : 2010 *Thermoplastics pipe and fitting systems for hot and cold water for domestic purposes and heating installations in buildings — General requirements*

BS 8204-1 : 2003 *Screeds, bases and in-situ floorings — Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*

BS EN 1264-2 : 2008 + A1 : 2012 *Water based surface embedded heating and cooling systems — Floor heating — Prove methods for the determination of the thermal output using calculation and test methods*

BS EN 1264-4 : 2009 *Water based surface embedded heating and cooling systems — Installation*

BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 : Design of concrete structures — General rules and rules for buildings*

BS EN 1995-1-1 : 2004 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 15876-1 : 2003 *Plastics piping systems for hot and cold water installations. Polybutylene (PB). General*

BS EN ISO 21003 : 2008 *Multilayer piping systems for hot and cold water installations inside buildings*

BS EN ISO 21003-1 : 2008 *Multilayer piping systems for hot and cold water installations inside buildings — General*
BS EN ISO 21003-2 : 2008 + A1 : 2011 *Multilayer piping systems for hot and cold water installations inside buildings — Pipes*

ISO 10508 : 2006 *Ed 2 Plastics piping systems for hot and cold water installations — Guidance for classification and design*

CIBSE Guide A *Environmental Design*, 2015

Domestic Building Services Compliance Guide for Scotland, 2015

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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