

NAYLOR METRODRAIN TWINWALL HIGHWAY DRAINAGE SYSTEM

NAYLOR METRODRAIN 150 MM BENDS

This HAPAS Certificate Product Sheet⁽¹⁾ is issued by the British Board of Agrément (BBA), supported by Highways England (HE) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government and the Department for Infrastructure, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers Group and industry bodies. HAPAS Certificates are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to Naylor Metrodrain 150 mm Bends, for use in conjunction with Naylor Metrodrain Twinwall Highway Drainage System pipes (the subject of Product Sheet 1 of this Certificate) in highway drainage.

CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations 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

Strength — the products have adequate strength for the intended application (see section 6).

Performance of joints — the products will remain watertight under normal service conditions (see section 7).

Durability — the products will have an expected service life in excess of 50 years (see section 10).



The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 6 April 2021



Hardy Giesler
Chief Executive Officer

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 MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

Requirements

In the opinion of the BBA, Naylor Metrodrain 150 mm Bends, when used in accordance with the provisions of this Certificate, will meet or contribute to meeting the requirements of the *Manual of Contract Documents for Highways Works* (MCHW)⁽¹⁾, Volume 1 *Specification for Highways Works* (SHW) and Volume 2 *Notes for Guidance on the Specification for Highway Works*.

The general requirements for thermoplastic structured wall pipes and fittings are contained in the MCHW, Volume 1, Clause 518. Further requirements are detailed in the MCHW, Volume 3, Section 1, F series, Drawing Nos F1 and F2.

Additional site requirements may be included on particular contracts.

(1) The MCHW is operated by the Overseeing Organisations: Highways England (HE), Transport Scotland, the Welsh Assembly Government and the Department for Infrastructure (Northern Ireland).

Regulations

Construction (Design and Management) Regulations 2015

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

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.1) of this Certificate.

Additional Information

CE marking

The Certificate holder has taken the responsibility of CE marking the elastomeric sealing rings in accordance with harmonised European Standard BS EN 681-1 : 1996.

Technical Specification

1 Description

1.1 Naylor Metrodrain 150 mm Bends comprise a range of black injection-moulded polypropylene bends, with the details and dimensions given in Figure 1.

1.2 The raw material specification of the bends is given in Table 1.

Table 1 *Material properties and specifications*⁽¹⁾

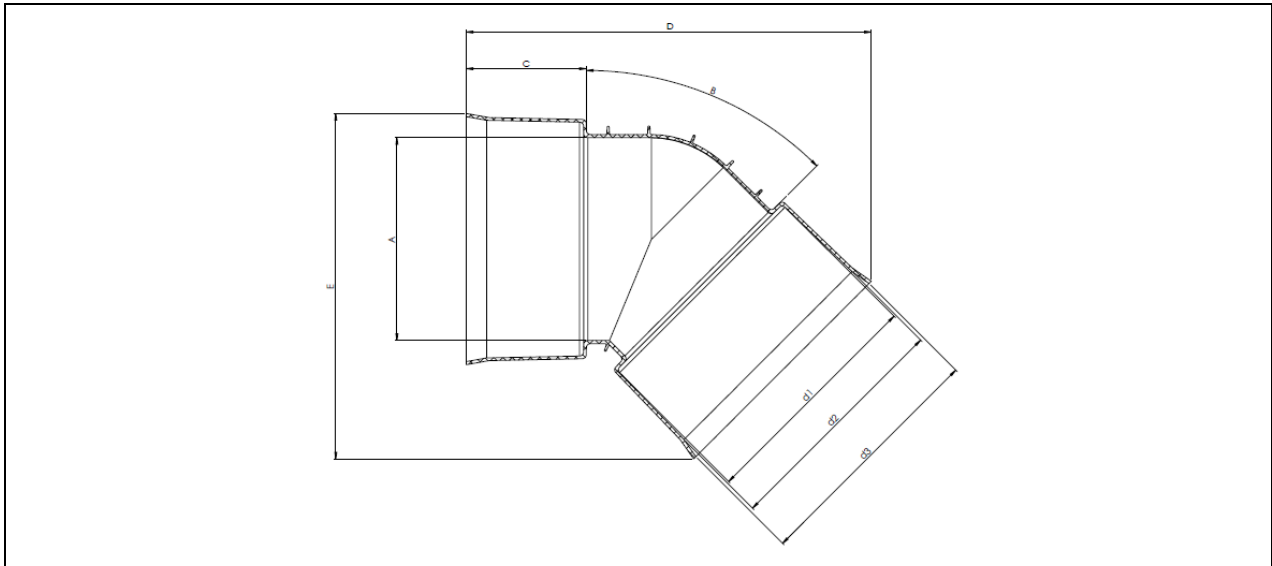
Property	Test method/reference	Specification
Tensile properties	BS EN ISO 527-1	≥ 18 MPa (1B at 50 mm·min ⁻¹)
Oxygen induction time	BS EN 728	≥ 4 min
Melt flow rate	BS EN ISO 1133-1	≤ 13 g (10 min) ⁻¹ (2.16 kg at 190°C)
Density	BS EN ISO 1183-1	> 890 kg·m ⁻³
Effects of heating	BS EN ISO 580	150°C±2°C (Pass)

(1) This Table is in the format of Appendix 5/7 of the MCHW, Volume 2. It is used to satisfy Clause 518.2 of the MCHW, Volume 1.

1.3 Naylor Metrodrain 150 mm Seals covered in Product Sheet 1 of this Certificate, are to be used with the Naylor Metrodrain 150 mm Bends.

1.4 Each bend requires two rubber seals manufactured to BS EN 681-1 : 1996, available from the Certificate holder and covered in Product Sheet 1 of this Certificate. The seals must be fitted in accordance with the installation instructions to ensure a watertight joint.

Figure 1 Bends (all dimensions in mm)



Angle	Nominal ID	Socket Length	Dimensions		Bend Radius	Socket Internal Dimensions		
			D	E		d ₁	d ₂	d ₃
B	A	C	D	E				
11.25	150	72	240	205	85	172.75	174.5	180.5
22.5			266	224	80			
45			298	254	80			
90			274	274	76			

All dimensions are nominal values, wall thickness to be $\geq 2\text{mm}$ throughout unless otherwise specified.

2 Manufacture

2.1 The bends are manufactured from black polypropylene by injection moulding process.

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 Naylor Drainage Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate FM 01420).

3 Delivery and site handling

3.1 Bends are delivered in plastic bags.

3.2 The bag or pallet have a label attached identifying product batch, machine operator, date of manufacture, and who packed the bends. The bends have an embossed logo including the BBA certificate number and a month/year date wheel to identify approximate manufacture time.

3.3 Handling, storage and transportation of the bends must be in accordance with the Certificate holder's instructions, with care taken to avoid damage by dropping or dragging. They should be adequately supported at all times, and contact with sharp projections, protuberances and abrasive surfaces should be avoided.

3.4 When long-term storage is envisaged, the fittings must be protected from direct sunlight. If protection cannot be provided, consideration must be given to the effects of daily exposure to direct sunlight:

- up to 3 months — negligible UV degradation but possible extreme surface temperatures of up to 80°C may cause some localised distortion
- 3 to 12 months — may have significant effect on the impact resistance and physical properties of the products
- over 12 months — damage will occur unless protection is provided.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Naylor Metrodrain 150 mm Bends.

Design Considerations

4 Use

Naylor Metrodrain 150 mm Bends comply with the requirements of the MCHW, Volume 1, Clauses 518.6 and 518.7. When installed with Metrodrain pipes (subject of Product Sheet 1 of this Certificate) in accordance with the recommendations given in this Certificate, the products are satisfactory for use in highways for the collection and disposal of surface and sub-surface water.

5 Practicability of installation

The products must be installed by competent contractors experienced with these types of products using traditional drain-laying methods in accordance with HE requirements and the MCHW, Volume 1, Clauses 503, 505, 518.8 and 518.9. The lightness of the fittings in weight, compared with other materials, is an advantage during handling and installation.

6 Strength

6.1 The bends have a ring stiffness equal to or in excess of $6 \text{ kN}\cdot\text{m}^{-2}$ tested to BS EN ISO 13967 : 2009.

6.2 The bends have adequate robustness to resist impact loads and loads associated with installation, and with subsequent use in the situations described in this Certificate.

7 Performance of joints

When correctly made, joints constructed from connectors with rubber seals remain watertight when subjected to deflection and distortion, and comply with the MCHW, Volume 1, Clauses 504.3 and 518.7 (see section 13).

8 Flow characteristics

When used with the pipes described in Product Sheet 1, the bends will increase the hydraulic resistance of the drainage system. For loss coefficients (K values), advice must be obtained from the Certificate holder.

9 Maintenance

9.1 Access to the products for cleaning should be provided by conventional methods.

9.2 Drains incorporating the products can be rodded readily using flexible drain rods. In common with other standard plastic drainage systems, toothed root cutters and rods with metal ferrules, as used with some mechanical clearing systems, could damage the fittings and should not be used.

10 Durability

In the opinion of the BBA, when the products are used in the context of this Certificate, the material from which the fittings are manufactured will not significantly deteriorate and the expected service life of the products will be in excess of 50 years.

11 Reuse and recyclability

The products are manufactured from or polypropylene, which is recyclable.

Installation

12 General

Drains utilising Naylor Metrodrain 150 mm Bends must be installed in accordance with HE requirements and the MCHW, Volume 1, Clauses 503, 505, 518.8 and 518.9.

13 Procedure

13.1 Typical laying, trench and backfilling specification details are given in section 14 of Product Sheet 1 of this Certificate.

13.2 To make a joint, the pipe end and fitting socket should be cleaned and a rubber seal fitted externally between the first and second corrugation in the pipe. The seal and inside of the socket should be lubricated with a Naylor-approved lubricant and the pipe pushed fully home to the register, either by hand or using a lever if necessary.

13.3 Pipes and fittings must be protected from site construction traffic.

Technical Investigations

14 Tests

14.1 Tests were carried out to determine compliance with the MCHW, Volume 1, Clause 518.6, on:

- dimensional accuracy
- rodding resistance
- ring stiffness
- impact strength

Material

- Tensile strength
- Oxygen induction time
- Melt flow rate
- Density
- Effects of heating.

14.2 Tests were carried out on joined pipe and fitting to establish compliance with the MCHW, Volume 1, Clause 518.7, on leaktightness of joints, when subjected to diametric and angular deflection from 0.5 to -0.3 bar.

15 Investigations

15.1 An assessment was made of data in relation to the effect of the production tolerances on the performance of the products.

15.2 An evaluation of existing data was made to assess material properties, chemical resistance and durability.

15.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS EN 681-1 : 1996 *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Vulcanized rubber*

BS EN 728 : 1997 *Plastic piping and ducting system — Polyolefin pipes and fittings — Determination of oxidation induction time*

BS EN ISO 527-2 : 2012 *Plastics — Determination of tensile properties — Test conditions for moulding and extrusion plastics*

BS EN ISO 580 : 2005 *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

BS EN ISO 1133-1 : 2011 *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Standard method*

BS EN ISO 1183-1 : 2019 *Plastics — Methods for determining the density of non-cellular plastics — Immersion method, liquid pycnometer method and titration method*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 13967 : 2009 *Thermoplastics fittings. Determination of ring stiffness*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*

Manual of Contract Documents for Highway Works, Volume 3 *Highway Construction Details*

16 Conditions

16.1 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 or 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.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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.