HAPAS
Roads and Bridges

Naylor Drainage Ltd
Clough Green
Cawthorne
Barnsley
South Yorkshire S75 4AD
Tel: 01226 790591 Fax: 01226 790531
e-mail: allan.elliott@naylor.co.uk
website: www.naylorducting.co.uk

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
09/H145
Product Sheet 2

NAYLOR TWINWALL HIGHWAY DRAINAGE SYSTEM

NAYLOR TWINWALL HIGHWAY DRAINAGE SYSTEM 150 MM TO 600 MM FITTINGS

This Certificate is issued under the Highway Authorities' Products Approval Scheme (HAPAS) by the British Board of Agrément (BBA) in conjunction with the Highways Agency (HA) (acting on behalf of the overseeing organisations of the Department for Transport; the Scottish Executive; the Welsh Assembly Government; the Department for Regional Development, Northern Ireland), the County Surveyors' Society, the Local government Technical Advisors' Group, and industry bodies. HAPAS Agrément Certificates are normally each subject to a review every five years.

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Naylor Twinwall Highway Drainage System 150 mm to 600 mm Fittings, for use in conjunction with 150 mm to 600 mm Naylor Twinwall pipes, as covered by Product Sheet 1 of this Certificate, in highway drainage.

AGRÉMENT 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 five-yearly review.

KEY FACTORS ASSESSED

Strength — the products have adequate strength to resist loads associated with installation and service (see section 5).

Performance of joints — the products will remain watertight under normal service conditions (see section 6).

Durability — the products will have a service life in excess of 50 years (see section 9).

The BBA has awarded this Agrément 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 Third issue: 6 October 2010

Originally certificated on 29 June 2009

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
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.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

HAPAS Requirements

Requirements

The general requirements for drains are contained in the Manual of Contract Documents for Highway Works (MCHW)[1], Volume 1 and Volume 2.

The general requirements for structured wall pipes and fittings are contained in the MCHW, Volume 1, Clause 518.

Further information and guidance is given in the MCHW, Volume 3, Drawing Numbers F1 and F2.

Additional site requirements may be included on particular contracts.

(1) The MCHW is operated by the Overseeing Organisations : The Highways Agency (HA), Transport Scotland, the Welsh Assembly Government and The Department for Regional Development (Northern Ireland).

Regulations

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.1) and 10 *General* of this Certificate.

General

This Certificate relates to Naylor Twinwall Highway Drainage System 150 mm to 600 mm Fittings.

The fittings comply with the MCHW, Volume 1, Clause 518, and are for use in conjunction with 150 mm to 600 mm pipes covered by Product Sheet 1 of this Certificate for the collection and disposal of surface and sub-surface water in highway drainage.

Technical Specification

1 Description

1.1 Naylor Twinwall fittings are fabricated from pipes and couplers as described in Product Sheet 1 of this Certificate, welded together and surrounded with a polypropylene sleeve. Details and dimensions of the fittings are given in Figure 1 and Figure 2.

1.2 The ring seals described in Product Sheet 1 are available for each size of pipe for connection to the fittings.

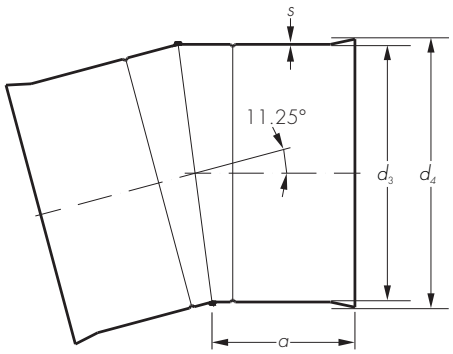
1.3 Continuous quality control is exercised during manufacture. Checks include:

- dimensional accuracy
- airtightness
- visual appearance.

1.4 A label bearing the BBA identification mark incorporating the number of this Certificate is attached to each fitting.

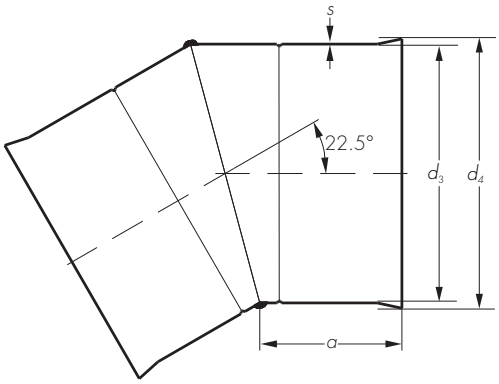
Figure 1 Twinwall bends (all dimensions in mm)

11.25° bends



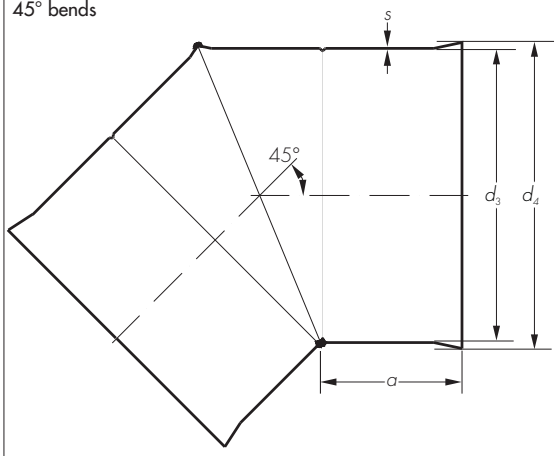
For pipe size (nominal internal pipe diameter)	Minimum internal diameter d_3	Minimum external diameter d_4	Nominal dimensions	
			a	*s*
150	177.8	192	95	3
225	267.1	290	160	4
300	354.8	384	200	5
375	434.3	444	225	5
450	520.0	533	275	6
600	694.0	711	325	7

22.5° bends



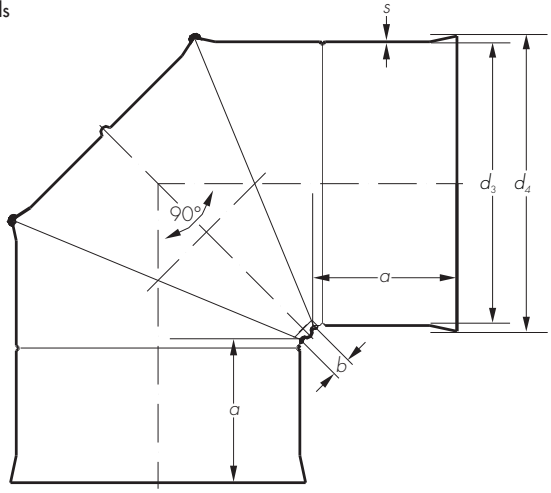
For pipe size (nominal internal pipe diameter)	Minimum internal diameter d_3	Minimum external diameter d_4	Nominal dimensions	
			a	*s*
150	177.8	192	95	3
225	267.1	290	160	4
300	354.8	384	200	5
375	434.3	444	225	5
450	520.0	533	245	6
600	694.0	711	325	7

45° bends



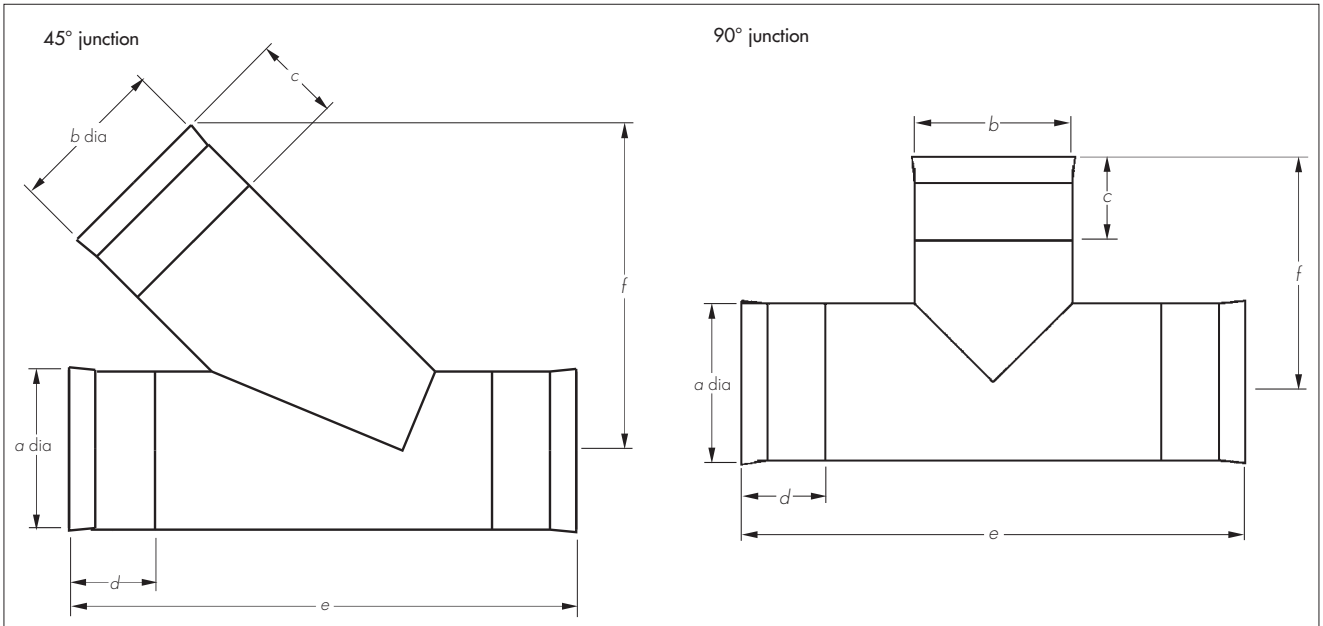
For pipe size (nominal internal pipe diameter)	Minimum internal diameter d_3	Minimum external diameter d_4	Nominal dimensions	
			a	*s*
150	177.8	192	95	3
225	267.1	290	160	4
300	354.8	384	175	5
375	434.3	444	225	5
450	520.0	533	245	6
600	694.0	711	325	7

90° bends



For pipe size (nominal internal pipe diameter)	Minimum internal diameter d_3	Minimum external diameter d_4	Nominal dimensions		
			a	*b*	*s*
150	177.8	192	95	25	3
225	267.1	290	120	40	4
300	354.8	384	185	25	5
375	434.3	444	250	90	5
450	520.0	533	290	100	6
600	694.0	711	370	100	7

Figure 2 Twinwall junctions (all dimensions in mm)



Nominal dimensions							
For pipe size (nominal internal pipe diameter)	Minimum internal diameter *a*	For pipe size (nominal internal pipe diameter)	Minimum internal diameter *b*	*c*	*d*	*e*	*f*
150	177.8	100	117.2	100	80	490	270
150	177.8	150	177.8	80	80	530	340
225	267.1	100	117.2	100	140	610	315
225	267.1	150	177.8	80	140	675	425
225	267.1	225	267.1	140	140	740	500
300	354.8	100	117.2	100	160	650	360
300	354.8	150	177.8	80	160	780	415
300	354.8	225	267.1	140	160	835	535
300	354.8	300	354.8	160	160	960	620
375	434.3	100	117.2	100	185	710	525
375	434.3	150	177.8	80	185	795	595
375	434.3	225	267.1	140	185	970	695
375	434.3	300	354.8	160	185	1100	795
375	434.3	375	434.3	185	185	1240	760
450	520.0	100	117.2	100	200	870	565
450	520.0	150	177.8	80	200	970	640
450	520.0	225	267.1	140	200	1130	735
450	520.0	300	354.8	160	200	1230	840
450	520.0	375	434.3	185	200	1390	800
450	520.0	450	520.0	200	200	1490	895
600	694.0	100	117.2	100	240	935	655
600	694.0	150	177.8	80	240	995	730
600	694.0	225	267.1	140	240	1190	825
600	694.0	300	354.8	160	240	1320	930
600	694.0	375	434.3	185	240	1505	890
600	694.0	450	520.0	200	240	1640	985
600	694.0	600	694.0	240	240	1900	1190

Nominal dimensions							
For pipe size (nominal internal pipe diameter)	Minimum internal diameter *a*	For pipe size (nominal internal pipe diameter)	Minimum internal diameter *b*	*c*	*d*	*e*	*f*
150	177.8	100	117.2	100	80	400	230
150	177.8	150	177.8	80	80	530	270
225	267.1	100	117.2	100	140	520	275
225	267.1	150	177.8	80	140	585	330
225	267.1	225	267.1	140	140	670	375
300	354.8	100	117.2	100	160	585	320
300	354.8	150	177.8	80	160	780	350
300	354.8	225	267.1	140	160	685	400
300	354.8	300	354.8	160	160	960	430
375	434.3	100	117.2	100	185	665	505
375	434.3	150	177.8	80	185	665	585
375	434.3	225	267.1	140	185	815	620
375	434.3	300	354.8	160	185	840	675
375	434.3	375	434.3	185	185	1000	500
450	520.0	100	117.2	100	200	710	570
450	520.0	150	177.8	80	200	710	580
450	520.0	225	267.1	140	200	815	665
450	520.0	300	354.8	160	200	870	720
450	520.0	375	434.3	185	200	980	540
450	520.0	450	520.0	200	200	1320	660
600	694.0	100	117.2	100	240	865	660
600	694.0	150	177.8	80	240	865	620
600	694.0	225	267.1	140	240	1060	665
600	694.0	300	354.8	160	240	1125	810
600	694.0	375	434.3	185	240	1190	630
600	694.0	450	520.0	200	240	1450	760
600	694.0	600	694.0	240	240	1650	825

2 Delivery and site handling

2.1 Handling, storage and transportation should be in accordance with manufacturer's instructions. Care should be taken to avoid damage to the fittings by dropping or dragging. They should be adequately supported at all times and contact with sharp projections, protuberances and abrasive surfaces should be avoided.

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

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

2.3 Fittings are generally delivered prepacked on pallets and should be retained in their packaging until installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Naylor Twinwall Highway Drainage System 150 mm to 600 mm Fittings.

Design Considerations

3 General

Naylor Twinwall Highway Drainage System 150 mm to 600 mm Fittings, when used with the pipes described in Product Sheet 1 and installed in accordance with the recommendations given in this Certificate, are suitable for use in highways for the collection and disposal of surface and sub-surface water.

4 Practicability of installation

The products are installed easily by experienced operatives using traditional drain-laying methods in accordance with HA requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

5 Strength

5.1 The products have adequate strength to resist loads associated with installation and with subsequent use in the situations described in this Certificate.

5.2 The pipe from which the fittings are fabricated has a ring stiffness in excess of 6 $kN \cdot m^{-2}$, a creep ratio of less than 4 and has adequate resistance to static loads.

5.3 The fittings have adequate resistance to impact loads to which they may be subjected during installation and in service.

6 Performance of joints

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 12).

7 Flow characteristics

When used with the pipes described in Product Sheet 1, the products will increase the hydraulic resistance of the system. Loss coefficients (K values) may be taken as:

11.25° bends	0.20
22.5° bends	0.35
45° bends	0.70
90° bends	0.45
branch connections	1.00.

8 Maintenance

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

8.2 Drains incorporating the products can be rodded easily 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.

8.3 Drains incorporating the products have adequate resistance to water cleansing using pressure jetting equipment. It is recommended that low pressure, high volume systems are utilised in accordance with the MCHW, Volume 1, Clause 520.

9 Durability

The products can be expected to have a life equivalent to that of other plastics fittings listed in Table 5/1 of the MCHW, Volume 1.

Installation

10 General

Drains utilising the Naylor Twinwall Highway Drainage System 150 mm to 600 mm Fittings must be installed in accordance with HA requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

11 Procedures

11.1 Typical laying, trench and backfilling specification details are given in Product Sheet 1, sections 11 and 12.

11.2 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 and the pipe pushed fully home to the register, either by hand, or using a lever if necessary.

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

Technical Investigations

12 Tests

Tests were carried out to determine:

- dimensional accuracy
- rodding resistance to the MCHW, Volume 1, Clause 518.12
- fitting ring stiffness to ISO 13967 : 1998
- drop test to EN 12061 : 1999
- strength of flexibility of fabricated fittings to EN 12256 : 1998
- watertightness of fabricated fittings to EN 1053 : 1995
- joint test to BS EN 1277 : 2003, Method 4, Conditions A, B and C
- water jetting WRc method.

13 Investigations

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

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

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

Bibliography

BS 5955-6 : 1980 *Plastics pipework (thermoplastics materials) — Code of practice for the installation of unplasticized PVC pipework for gravity drains and sewers*

BS EN 1277 : 2003 *Plastics piping systems — Thermoplastics piping systems for buried non-pressured applications — Test methods for leaktightness of elastomeric sealing ring type joints*

BS EN 12061 : 1999 *Plastics piping systems — Thermoplastics fittings — Test method for impact resistance*

BS EN 12256 : 1998 *Plastics piping systems — Thermoplastics fittings — Test method for mechanical strength or flexibility of fabricated fittings*

EN 1053 : 1995 *Plastics piping systems — Thermoplastics piping systems for non-pressure applications — Test method for watertightness*

ISO 13967 : 1998 *Thermoplastic fittings — Determination of ring stiffness*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works,* August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works,* August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 3 *Highway Construction Details,* March 1998 (as amended)

14 Conditions

14.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

14.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

14.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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.
- remain in accordance with the requirements of Highways Authorities' Product Approval Scheme.

14.4 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

14.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk