

# HAPAS

## Roads and Bridges

### Naylor Drainage Ltd

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Agrément Certificate  
No 08/H131

## PRODUCT SHEET 1 — NAYLOR METRO-DUCT

This Certificate is issued under the Highway Authorities' Product 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 Advisers' 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 replaces Certificate No 03/R132 and relates to Naylor Metro-Duct, a twinwall HDPE ducting system.

#### 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

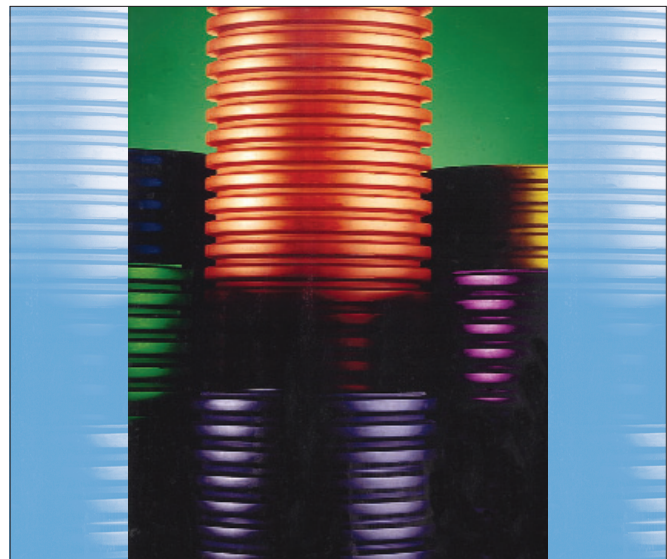
**Strength** — the ducts have adequate strength to resist the loads likely to be encountered during installation and service (see section 4).

**Tightness of joints** — the joints in the ducts will have an adequate degree of protection to solid foreign objects and against water (see section 5).

**Resistance to elevated temperatures** — the ducts have adequate resistance to long-term deformation at an elevated temperature of 45°C (see section 6).

**Practicability of installation** — the ducts have an adequately smooth internal surface to allow installation and withdrawal of cables and are easily installed (see section 8).

**Durability** — the ducts will have adequate durability when installed and used in accordance with this Certificate (see section 9).



The BBA has awarded this Agrément Certificate for Naylor Metro-Duct to Naylor Drainage Ltd as fit for its intended use provided it is installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Greg Cooper: Chief Executive

Date of First issue: 14 January 2008

*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](http://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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# HAPAS Requirements

The requirements for ducting are contained in the Manual of Contract Documents for Highway Works (MCHW)<sup>(1)</sup>, Volumes 1 and 2, including any amendments.

Further requirements are contained in Volume 3, including any amendments.

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, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.2) and 10 *Installation – General* (10.1).

## General

This Certificate relates to Naylor Metro-Duct, a twinwall HDPE ducting system.

The product is for use in highways as underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for telecommunications. The product has been evaluated for ducting only.

The design and construction of the product must be in accordance with the requirements of the Highways Agency (HA) acting on behalf of the Department for Transport, the Scottish Executive, the Welsh Assembly Government and the Department for Regional Development, Northern Ireland and the conditions set out in the *Design Data* and *Installation* parts of this Certificate.

## Technical Specification

### 1 Description

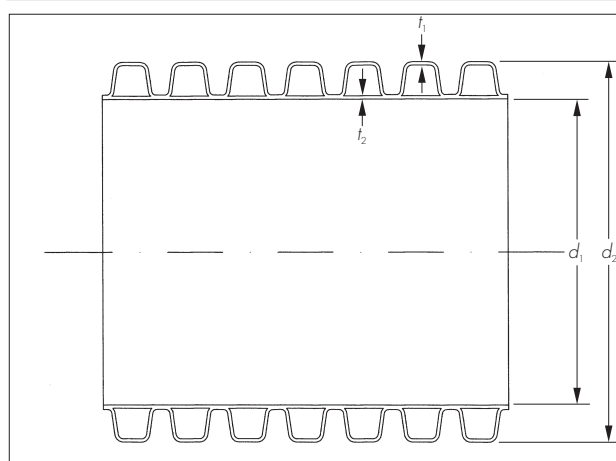
1.1 Naylor Metro-Duct is a high-density polyethylene (HDPE) twin-walled pipe, manufactured by a twin-extrusion process. Two pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process.

1.2 The outer wall is corrugated and the inner wall is smooth finished. Details and dimensions are given in Table 1 and Figure 1.

Table 1 Dimensions

Nominal size (mm)	Internal dia ( $d_1$ ) (mm)	Nominal external dia ( $d_2$ ) (mm)	$t_1$ mean min (mm)	$t_2$ mean min (mm)	Nominal weight ( $\text{gm}^{-1}$ )
50	51.0–53.0	63	0.35	0.35	245–265
94	93.4–95.6	110	0.35	0.30	580–600
100	98.5–101.1	116	0.35	0.30	620–640
125	123.8–126.8	145	0.40	0.30	880–900
137	135.9–139.1	160	0.40	0.30	980–1000
150	148.0–152.0	178	0.40	0.30	1110–1130

Figure 1 Duct dimensions



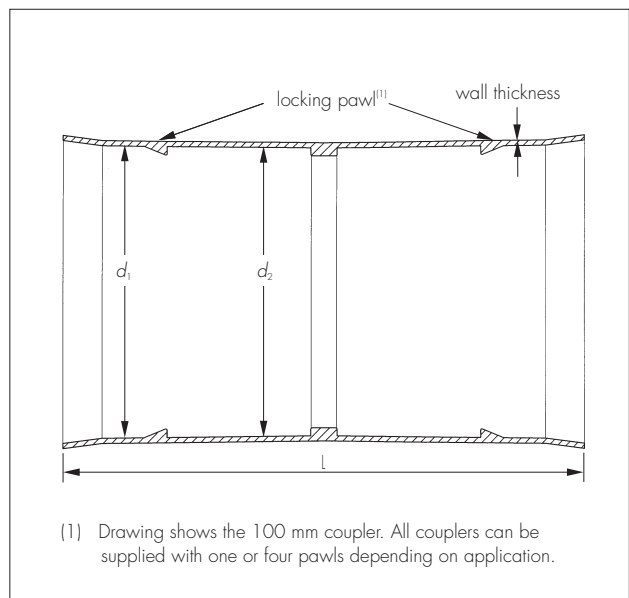
1.3 The product is available in a colour range of black, purple, orange, green, blue, yellow, red, grey and brown. The ducts are marked appropriately in accordance with the customer's requirements.

1.4 A black polypropylene coupler is used to join the ducts. The 50 mm, 94 mm, 100 mm, 125 mm and 150 mm couplers are manufactured by the Certificate holder and the 137 mm coupler is manufactured by a sub-contractor to one specification. Details of the couplers are given in Table 2 and Figure 2.

Table 2 Coupler dimensions

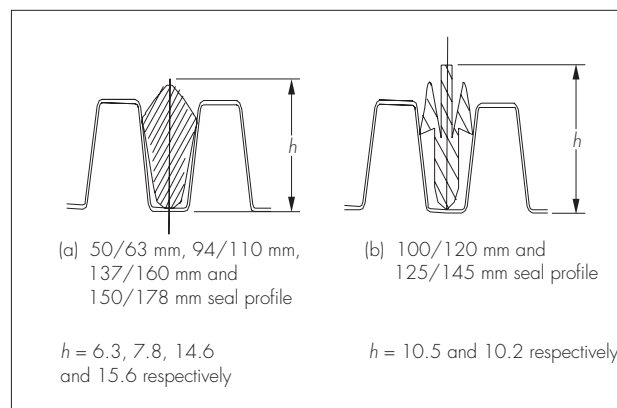
Nominal size (mm)	Internal dia at entrance ( $d_1$ ) (mm)	Internal dia ( $d_2$ ) (mm)	Nominal length (mm)	Minimum wall thickness (mm)
50	64.0–65.0	63.5–64.5	110	1.6
94	112.0–113.0	110.5–111.5	200	1.7
100	119.0–120.0	117.2–118.2	200	1.9
125	146.5–147.5	145.0–146.0	200	2.2
137	162.9–163.9	160.5–161.5	240	2.8
150	179.6–180.6	177.8–178.8	180	2.1

Figure 2 Couplers



1.5 Seals are manufactured to BS EN 681-1 : 1996 (see Figure 3) and must be fitted in accordance with the installation instructions to ensure a watertight joint.

Figure 3 Seals (dimensions in mm)



1.6 Quality control includes checks on raw materials, dimensional checks, compression and impact tests.

## 2 Delivery and site handling

2.1 The product is delivered to site strapped to pallets.

2.2 When used for electrical cables, the ducts are marked with the legend 'electric cable duct'. For other services the marking/colour coding must comply with the requirements of the relevant authority concerned.

2.3 The HDPE ducts and polypropylene couplers have good resistance to UV degradation but to avoid damage or deterioration in storage it is recommended that the ducts should be protected from direct sunlight. However, if this is unavoidable, the following mechanism of deterioration should be considered:

- up to three months' daily exposure to direct sunlight will cause negligible UV degradation but extreme surface temperatures of up to 80°C are possible on exposed surfaces and may cause some localised distortion
- three to 12 months' daily exposure to direct sunlight may have a significant effect on the impact resistance and physical properties of the duct
- over 12 months' daily exposure to direct sunlight will damage the duct and should be avoided.

# Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Naylor Metro-Duct.

## Design Considerations

### 3 Use

Naylor Metro-Duct when installed in accordance with the recommendations given in this Certificate and in MCHW, Volumes 1 and 2, is suitable for use in highways as underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for cable television and telecommunications.

### 4 Strength

4.1 The product has adequate strength to resist the loads likely to be encountered during service when used and installed in accordance with the recommendations given in this Certificate.

4.2 The ducts satisfy the requirements for structural wall thermoplastic pipes listed in MCHW, Volume 1, Table 5/2 *Pipes for Ducts*.

4.3 The ducts will have adequate resistance to the impact loads normally encountered during handling and installation.

4.4 When tested in accordance with BS EN ISO 9967 : 1995, the ducts have an adequate resistance to long-term deformation.

4.5 The ducts meet the impact requirements defined as 'normal duty', and the resistance-to-compression requirements defined as 'type 450', in BS EN 50086-2.4 : 1994.

### 5 Tightness of joints

When joined with seals and couplers in accordance with the installation instructions, the ducts produce a system with a degree of protection to solid foreign objects to BS EN 60529 : 1992, first characteristic numeral 4 and a degree of protection against water to BS EN 60529 : 1992, second characteristic numeral 7. This equates to an IP code of 47 to BS EN 60529 : 1992.

### 6 Resistance to elevated temperatures

6.1 The maximum temperature to which the ducts and couplers will be subject in service as an electrical cable duct is dependent on the ground thermal conductivity, of burial, ground temperature and the heat load imposed by the electrical cable.

6.2 In general, cables with a surface temperature of up to 60°C will not affect the integrity of the ducts. For example, in a typical installation with a 300 mm<sup>2</sup> copper cable carrying a current of 600 amps imposing a heat load of 25 Wm<sup>-1</sup>, the cable would have a surface temperature of 60°C; this would result in a mean internal duct temperature of 45°C.

6.3 The ducts have adequate resistance to long-term deformation at an elevated temperature of 45°C.

### 7 Resistance to chemicals

The high-density polyethylene used in the manufacture has an adequate resistance to attack from chemicals likely to occur in soils and groundwater. Details of chemical resistance of high-density polyethylene are given in CP 312-1 : 1973.

### 8 Practicability of installation

8.1 The ducts can be installed easily under normal site conditions.

8.2 The ducts have a smooth internal surface and, when tested in accordance with ESI 12-24, Test TT3 *Static friction coefficient*, have a static coefficient of less than 0.22. The ducts and their joints do not present any internal projection or impedance to the installation or withdrawal of cables through the duct run.

### 9 Durability

When used in the context of this Certificate, the materials from which the pipes and couplers are manufactured will not significantly deteriorate and the anticipated life of a system will be in excess of 50 years.

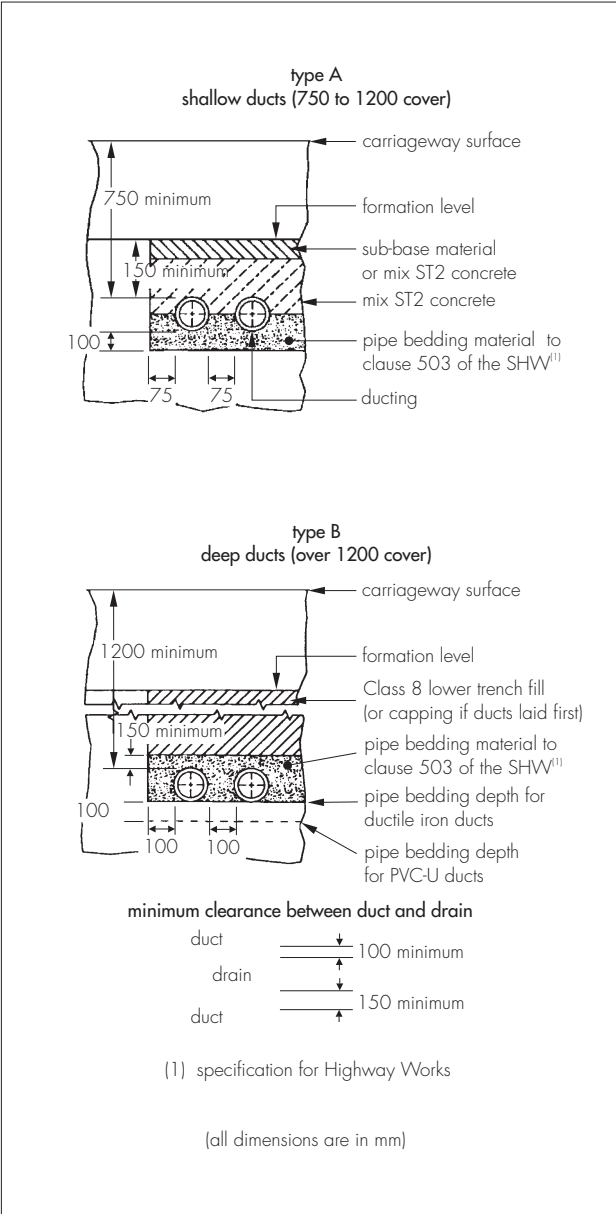
## 10 General

- 10.1 The Naylor Metro-Duct ducting system must be installed in accordance with the general requirements and any additional site requirements.
- 10.2 The general requirements are to be in accordance with MCHW, Volume 3, as shown in Figure 4.
- 10.3 Ducting laid in depths of cover other than those specified in Figure 4 must be laid in accordance with the procedures described in the contract with the Highways Agency (HA).
- 10.4 The product must be adequately protected against damage from site construction traffic and from agricultural or similar operations.
- 10.5 When used as ducts for fibre optic cabling the recommendations in BS 50174-3 : 2001 should be followed.

## 11 Procedure

- 11.1 The product should be installed in accordance with the manufacturer's current literature. Ducting should be cut using a coarse-toothed saw or heavy duty jig saw. Before jointing ensure the pipe ends are free of sharp edges, swarf and grit.
- 11.2 The seal should be placed on the third rib of the duct.
- 11.3 Naylor lubricant should be applied to the outside edge of the seal and the inside of the coupler.
- 11.4 Ensure that the pipe end and seal are free from dirt and grit and introduce the ducting to the coupler and push home, ensuring the pipe end is flush.

Figure 4 Highway construction details



## Technical Investigations

The following is a summary of the technical investigations carried out on Naylor Metro-Duct.

### 12 Tests

Tests were carried out to determine:

- dimensional accuracy
- resistance to compression to BS EN 50086-2.4 : 1994
- impact strength at  $-5^{\circ}\text{C}$  to BS EN 50086-2.4 : 1994
- creep ratio at  $45^{\circ}\text{C}$  to BS EN ISO 9967 : 1995
- resistance to sharp objects to MCHW, Volume 1, Clause 518.13
- static friction coefficient to ESI (12-24), TT3 at  $20^{\circ}\text{C}$
- ease of jointing
- degree of protection against foreign objects to BS EN 60529 : 1992, first characteristic numeral 4, Test condition 13.2
- watertightness of joints to BS EN 60529 : 1992, second characteristic numeral 7, Test condition 14.2.

### 13 Investigations

13.1 An examination was made of data relating to:

- material properties
- durability.

13.2 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.

## Additional Information

The management systems of Naylor Drainage Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2000 by the British Standards Institution Quality Assurance.

## Bibliography

- BS EN 681-1 : 1996 *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Vulcanized rubber*
- BS EN 50086-2.4 : 1994 *Specification for conduit systems for cable management — Part 2.4 : Particular requirements for conduit systems buried underground*
- BS EN 50174-3 : 2001 *Information technology — Cabling installation — Installation planning and practices outside buildings*
- BS EN 60529 : 1992 *Specification for degrees of protection provided by enclosures (IP code)*
- BS EN ISO 9001 : 2000 *Quality management systems — Requirements*
- BS EN ISO 9967 : 1995 *Thermoplastics pipes — Determination of creep ratio*
- CP 312-1 : 1973 *Code of practice for plastics pipework (thermoplastics material) — General principles and choice of material*
- ESI (Electricity Supply Industry) 12-24 *Plastic ducts for buried electric cables*
- Manual of Contract Documents for Highway Works, Volume 1 : *Specification for Highway Works* : May 2001 edition
- Manual of Contract Documents for Highway Works, Volume 2 : *Notes for Guidance on the Specification for Highway Works* : 2001
- Manual of Contract Documents for Highway Works, Volume 3 : *Highway Construction Details* : 2001, Drawing Nos F1 and F2 (1991)
- Manual of Contract Documents for Highway Works, Volume 3 : *Highway Construction Details* : 2001, Drawing No F13 (1991)

## 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 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

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.