HAPAS

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HAPAS Certificate
11/H178
Product Sheet 1

RADIUS DUCTING

RADIUS TWINWALL CABLE PROTECTION DUCTING

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 Assembly 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 Radius Twinwall Cable Protection Ducting, a high-density polyethylene (HDPE) ducting product, for use in highways as underground ducting for electricity, gas, water supply services, street lighting cables and fibre-optic cabling for telecommunications.

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 ducts have adequate strength to resist the loads likely to be encountered during installation and service (see section 5).

Tightness of joints — the joints in the ducts will have an adequate degree of resistance to solid foreign objects and the ingress of water (see section 6).

Resistance to elevated temperatures — the ducts have adequate resistance to long-term deformation at elevated temperatures (see section 7).

Resistance to chemicals — the ducts have adequate resistance to the types and levels of chemicals likely to be found in soils in highway applications (see section 8).

Durability — when installed and used in accordance with this Certificate the material from which the ducts are manufactured will have an anticipated lifespan in excess of 50 years (see section 11).

The BBA has awarded this Certificate to the company named above for the product described herein. This product 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 Second issue: 16 May 2018

Originally certificated on 22 December 2011

Paul Valentine
Technical Excellence Director

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

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Requirements

In the opinion of the BBA, Radius Twinwall Cable Protection Ducting, 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), Volumes 1 *Specification for Highways Works* (SHW) and 2 *Notes for Guidance on the Specification of Highway Works.*

Further requirements are contained in the MCHW, Volume 3 *Highway Construction Details,* and additional site requirements may be included in 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* (3.3) of this Certificate.

Technical Specification

1 Description

1.1 Radius Twinwall Cable Protection Ducting is a range of twinwall HDPE pipes, available in 6 m lengths and diameters of 110, 120 and 175 mm with the dimensions shown in Figure 1 and Table 1. The pipes are supplied with plain ends and are joined together using separate couplers and seals (see Figure 2 and Table 2) to form continuous ducting for the sub-ground conveyance and protection of water, gas and electricity supply services, and cabling, for applications such as telecommunications, television, electronic signage and street lighting.

1.2 The product is available in a colour range of black, green, grey and purple(1). The colour coding is in accordance with NJUG guidelines. The ducts are marked appropriately in accordance with the customer's requirements and the specifications listed in BS EN 61386-24 : 2010.

(1) Other colours are available to special order.

Figure 1 Detail of pipe

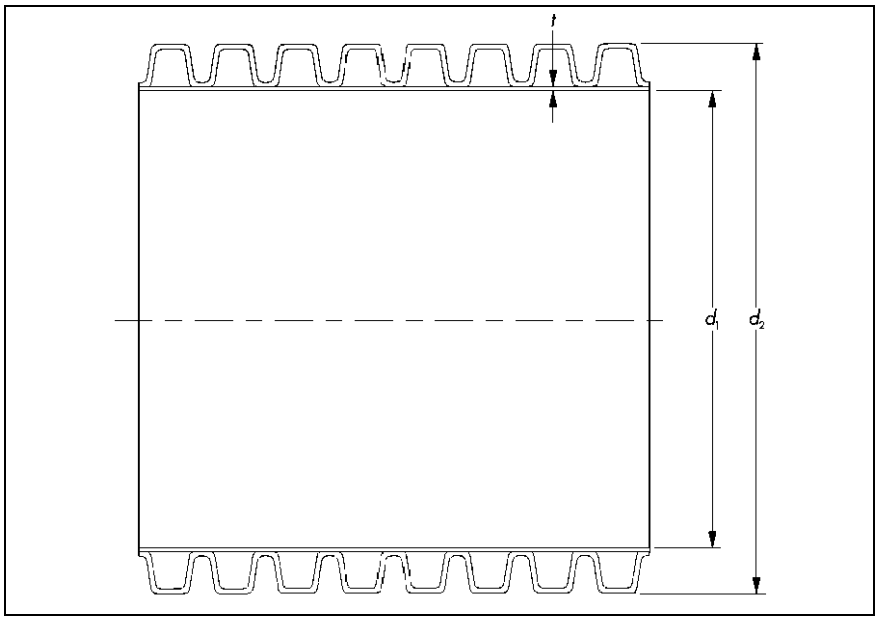


Table 1 Pipe dimensions

Nominal internal diameter (d_1) (mm)	Nominal external diameter (d_2) (mm)	Nominal inner wall thickness (t) (mm)
94	110	0.7
100	118	0.7
150	178	0.8

Figure 2 Details of coupler and seal

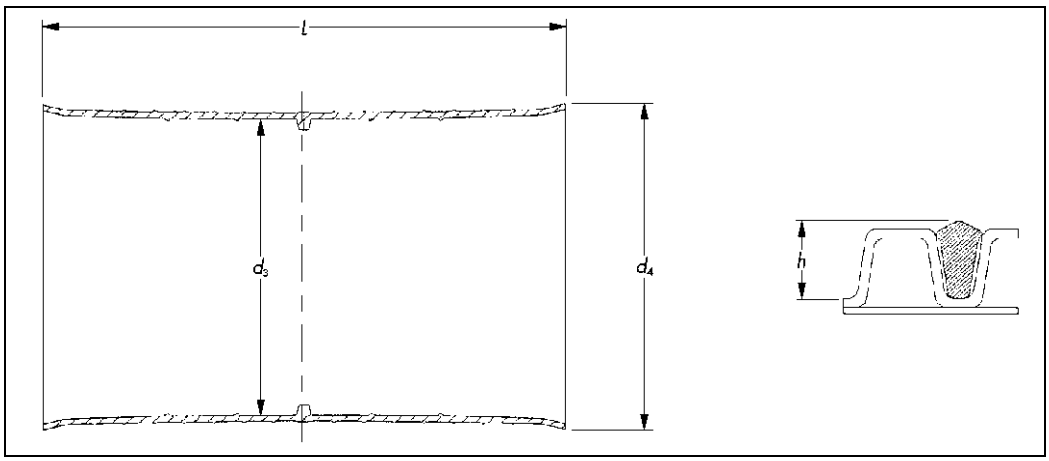


Table 2 Coupler and seal dimensions

Nominal external pipe diameter (mm)	Nominal internal diameter (d_3) (mm)	Nominal overall diameter (d_4) (mm)	Nominal length (L) (mm)	Nominal seal height (h) (mm)
110	110	123	175	10
118	118	128	180	14
178	176	188	260	17

1.3 The ducting is manufactured to conform to the performance requirements of BS EN 61386-24 : 2010 (all sizes to 450 N strength), from HDPE with other additives necessary for the required properties of the finished product. The Certificate holder has a recycling facility and, in agreement with the customer, can manufacture ducts from surplus reground material from the original manufacturing run (using virgin material).

1.4 The outer wall of the ducts is corrugated and the inner wall is smooth finished.

1.5 Joints between sections of ducting are made by applying ring seals to the pipe and push-fitting into HDPE couplings.

1.6 Quality control on the product includes impact, heat, chemical and compression resistance tests, dimensional checks and visual inspections. Finished ducts are individually printed or labelled according to customer requirements and to allow traceability in accordance with the Certificate holder's quality management system to BS EN ISO 9001 : 2015.

1.7 Various bends and other fittings associated with the ducts are available but are outside the scope of this Certificate.

2 Manufacture

2.1 The pipes are manufactured by the Certificate holder from HDPE in a twin extrusion process. Two pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process. The pipes are manufactured using a specific colour coding in accordance with the type of application and/or use.

2.2 The couplers are manufactured from polypropylene (PP) using a conventional injection moulding technique.

2.3 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 being operated by the manufacturer are being maintained.

2.4 The management system of Radius Systems Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate FM 507228).

3 Delivery and site handling

3.1 The pipes are delivered to site in pre-packed bundles and should be retained in the packaging until required for installation.

3.2 The pipes are marked with batch numbers giving coded information on the date of manufacture, the line number and shift.

3.3 When long-term storage is envisaged, the pipes and couplers 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 localised distortion
- 3 to 12 months — may have significant effect on the impact resistance and physical properties
- over 12 months — damage will occur unless protection provided.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Radius Twinwall Cable Protection Ducting.

Design Considerations

4 Use

Radius Twinwall Cable Protection Ducting, when installed in accordance with the provisions of this Certificate and the MCHW, Volumes 1 and 2, is suitable for use in highways as underground ducting for electricity, gas and water supply services, and for cabling for such uses as street lighting, telecommunications, television and electronic signage.

5 Strength

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

5.2 The ducts satisfy the requirements for structural wall thermoplastic pipes listed in the MCHW, Volume 1, Series 500, Table 5/2 *Pipes for Ducts*.

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

5.4 The ducts meet the impact and resistance-to-compression requirements defined in BS EN 61386-24 : 2010.

6 Tightness of joints

Joints made in accordance with the Certificate holder's installation instructions and this Certificate will resist solid foreign objects and the ingress of water, and will adequately protect services and cabling.

7 Resistance to elevated temperatures

7.1 The maximum temperature to which the product will be subject to in service, when used as an electrical cable duct, is dependent on the ground thermal conductivity, ground temperature and any heat imposed by the electrical cable.

7.2 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^2 copper cable carrying a current of 600 amps imposing a heat load of 25 $W \cdot m^{-1}$, the cable would have a surface temperature of 60°C; this would result in a mean internal duct temperature of 45°C.

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

8 Resistance to chemicals

The HDPE used in the manufacture has adequate resistance to attack from the quantities and types of chemicals typically found in soils and groundwater in civil engineering applications.

9 Practicability of installation

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

10 Maintenance

As the ducts are buried underground and have adequate durability, maintenance is not required. However, damage (eg accidental during subsequent excavations) should be repaired immediately to maintain the integrity of the ducts and ensure continued protection to the services and cables therein.

11 Durability

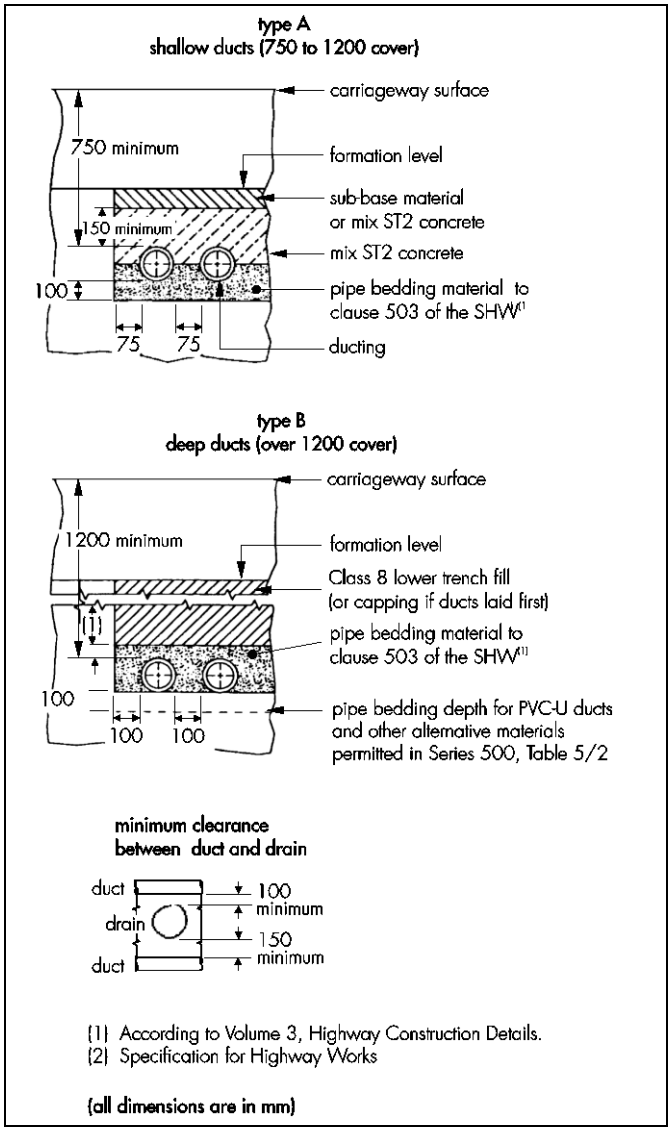
When installed and used in accordance with this Certificate, the material from which the ducts are manufactured will not significantly deteriorate and will have an anticipated lifespan in excess of 50 years.

12 General

12.1 The ducts must be installed in accordance with the general requirements and any additional site requirements.

12.2 The general requirements are to be in accordance with the MCHW, Volume 3, as shown in Figure 3.

Figure 3 Highway construction details



12.3 Ducting laid in depths of cover other than those specified in Figure 3 must be laid in accordance with the procedures described in the contract with Highways England (HE).

12.4 The product must be adequately protected against damage from site construction traffic and from future excavations.

12.5 When used as ducts for fibre optic cabling, the recommendations in BS EN 50174-3 : 2013 should be followed.

13 Procedure

13.1 The trench is prepared in accordance with section 12.2, and any necessary bedding for the ducting is laid.

13.2 Precautions are taken to minimise the possibility of water entering the ducting and accumulating during installation. Ground water is pumped out and holes/chambers covered, especially if rain is likely. Incomplete duct ends are sealed, particularly if they are to be left for any length of time (eg overnight).

13.3 The laying of ducts must be in accordance with the Certificate holder's current literature. Ducting is cut using a coarse-toothed saw or heavy-duty jig-saw.

13.4 A check is made to ensure the spigot end is free of sharp edges, swarf and grit. Chamfering of the spigot end will assist the jointing process.

13.5 The socket to accept the spigot end is cleaned and all traces of dust and grit removed. The ring seal is cleaned and checked to ensure it is free from damage.

13.6 Lubricant is applied to the spigot end.

13.7 The spigot is inserted into the socket and pushed fully home, ensuring the pipe end is flush.

13.8 When duct installation is complete, the trench is filled with as-dug backfill (CAT8 graded) in accordance with section 11.2.

13.9 Pipework and cables are pulled through the completed ducts by a suitable method recommended by the Certificate holder and via manholes and chambers incorporated into the installation.

Technical Investigations

14 Tests

Tests were carried out on the product to determine:

- dimensions
- compression resistance
- impact resistance
- resistance to point loads
- resistance to foreign objects
- resistance to ingress of water
- resistance to flame propagation
- ease of jointing
- resistance to penetration of sharp aggregate
- static friction coefficient
- creep resistance.

Bibliography

BS EN 50174-3 : 2013 *Information technology — Cabling installation — Installation planning and practices outside buildings*

BS EN 61386-24 : 2010 *Conduit systems for cable management — Particular requirements — Conduit systems buried underground*

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

NJUG guidelines on the positioning and colour coding of underground utilities' apparatus

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*

15 Conditions

15.1 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.

15.2 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.

15.3 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.

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

15.5 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.

15.6 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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