HAPAS

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HAPAS Certificate
02/H069
Product Sheet 1 Issue 4

JFC CORRIPIPE HIGHWAY DRAINAGE SYSTEM

JFC CORRIPIPE TWINWALL PIPES AND COUPLERS

This Product Sheet(1) is issued by the British Board of Agrément (BBA). The Highways Authorities Product Approval Scheme (HAPAS) is supported by National Highways (NH) (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.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to JFC Corripipe Twinwall Pipes and Couplers, ranging from 150 to 600 mm in diameter, for use in non-pressure underground highway drainage systems, as carrier and filter drains, for the collection and disposal of surface and sub-surface water, in accordance with the *Manual of Contract Documents for Highway Works* (MCHW), Volumes 1 and 2, and the *Design Manual for Roads and Bridges* (DMRB), CG 501 *Design of highway drainage systems*.

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 complying with the requirements of the BBA HAPAS Certification Scheme according to the assessments set out in this Certificate.

On behalf of the British Board of Agrément

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1 Product Description

1.1 The Certificate holder specifies the products under assessment, JFC Corripipe Twinwall Pipes and Couplers, for use in conjunction with Corripipe Twinwall Fittings (the subject of Product Sheet 2 of this Certificate), in highway drainage systems, as carrier and filter drains, for the collection and disposal of surface and sub-surface water, in accordance with the MCHW, Volumes 1 and 2, and DMRB, CG 501.

1.2 JFC Corripipe Twinwall Pipes and Couplers comprise 150 to 600 mm diameter (nominal size internal diameter DN/ID 150, 225, 300, 375, 450, 600) filter and carrier black high-density polyethylene (HDPE) pipes, black polypropylene (PP) (150 to 300 mm) and low-density polyethylene (LDPE) (375 to 600 mm) couplers and ethylene propylene diene monomer (EPDM) seals.

1.3 The pipes and couplers are manufactured to the characteristics given in Table 1.

Table 1 Material Characteristics

Characteristic (unit)	**Pipes**	**Couplers**	
Dimensions	150 – 600	150-300	375-600
Material	HDPE	PP	LDPE
Test Method	**Specification**		
Tensile properties to BS EN ISO 527-2 : 1996	≥ 18 MPa		17 MPa(1)
Melt mass-flow rate to BS EN ISO 1133 : 2000	≤ 0.75 g (10 min)$^{-1}$ 2.16 kg at 190°C	8 - 15 g (10 min)$^{-1}$ 2.16 kg at 230°C	4 - 6 g (10 min)$^{-1}$ 2.16 kg at 190°C(2)
Reference density to BS EN ISO 1183-3 : 1999	≥ 935 kg·m^{-3}	—	935 - 941 kg·m^{-3}

(1) ASTM D638.
(2) ASTM D1238.

1.4 The pipes have structured-wall construction and a corrugated outer and smooth inner wall. The outer and inner wall is black in colour. They are manufactured with two plain ends.

1.5 The pipes are manufactured with either slotted, or unslotted. For the 150, 225 and 300 mm diameter pipes, slots are cut in every dwell between corrugations and are equally spaced around the pipe circumference. For the larger pipe sizes, the slots are cut in every alternate dwell. The couplers are used for jointing the pipes.

1.6 Sealing of the joints requires rubber sealing rings supplied by the Certificate holder. The seals are manufactured from EPDM to BS EN 681-1 : 1996, Type WC.

1.7 Product codes follow the pattern:

- pipes batches eg, AIR131115, where 'A' or 'B' corresponds to 'Dayshift' (for 'A') and 'Nightshift' (for 'B'), 'IR' or 'UK' for production location and '131115' the date of manufacture
- couplers are moulded in nameplate giving the nominal size, product code, and the JFC Plastics Ltd logo.
- seals contain the manufacturer's name, nominal size and EN Standard reference printed on them.

2 Requirements

Requirements for the products are outlined in the BBA HAPAS Certification Scheme and Technical Specifications Documents, and have been established from the following specification documents:

- the MCHW(1), Volume 1, Series 500 and specifically Clause 518
- the MCHW, Volume 2, Series NG 500 and specifically Clause NG 518
- the DMRB, CG 501.

(1) The MCHW is operated by National Highways (NH) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government; and the Department for Infrastructure, Northern Ireland).

3 Summary of Product Assessment

The products were assessed on the basis of the following characteristics in accordance with HAPAS requirements.

3.1 Mechanical resistance and stability

3.1.1 Mechanical properties

Table 2 Characteristics for mechanical properties

Product assessed	Assessment method	Requirement	Outcome
Pipes	Impact resistance at 0 and 23°C to BS EN 1411 : 1996	No failure	Pass
Pipes DN ≤ 350	Longitudinal bending to the MCHW, Vol 1, Clause 518.11	Deflection < 5%	Pass

The assessment showed that the products comply with HAPAS requirements for this characteristic.

3.1.2 Performance of joints

Table 3 Characteristics for performance of joints

Product assessed	Assessment method	Requirement	Outcome
Pipes	Dimensions	As per drawings	Pass
System (pipe, coupler and seal)	Tightness of joints to BS EN 1277 : 2003	No leakage	Pass

The assessment showed that the products comply with HAPAS requirements for this characteristic.

3.1.3 Strength and stability

Table 4 Characteristics for strength and stability

Product assessed	Assessment method	Requirement	Outcome
Pipes	Ring Stiffness to BS EN ISO 9969 : 2007	≥ 6 $kN \cdot m^{-2}$	Pass
Pipes (perforated and half perforated)		Strength reduction < 5% compared to unperforated pipes	Pass

The assessment showed that the products comply with HAPAS requirements for this characteristic.

3.2 Hygiene, health and the environment

3.2.1 Water infiltration

Table 5 Characteristics for water infiltration

Product assessed	Assessment method	Requirement	Outcome
Perforated pipes	Infiltration cross section area to the MCHW, Vol 1, Clause 518.3	Permeable area minimum 1000 $mm^2 \cdot m^{-1}$ Perforation size: circular: 3 – 10mm Rectangular: 0.6 – 4mm	Pass

The assessment showed that the products comply with HAPAS requirements for this characteristic.

3.3 Sustainable use of natural resources

The products are manufactured from polyethylene and polypropylene, which can be recycled.

3.4 Durability

Table 6 Characteristics for durability

Product assessed	Assessment method	Requirement	Outcome
Pipes	Creep ratio to BS EN ISO 9967 : 1995	≤ 4	Pass
PE and PP material	Resistance to chemicals to the MCHW, Vol 1, Clause 518.2. For guidance see PD ISO/TR 10358 : 2021	Product confirming to the MCHW, Vol 1, Clause 518	Pass
Seals material	Resistance to chemicals to the MCHW, Vol 1, Clause 518.2. For guidance see PD ISO/TR 7620 : 2005		Pass
PE material	Thermal stability (OIT) to BS EN 728 : 1997	Declared value	≥ 4 min

3.4.1 The assessment showed that the products comply with HAPAS requirements for this characteristic.

3.4.2 The assessment showed that the products comply with HAPAS requirements for chemical resistance, subject to the water discharged being rainwater, surface water and ground water, excluding chemically contaminated wastewaters, such as industrial discharges. In situations where the piping system is to be exposed to the excluded influents, specific chemical and temperature resistance must be taken into account by a suitably experienced and competent individual. Material used in the manufacture of the product is expected to have an adequate resistance to the types and levels of chemicals likely to occur in soils and groundwater in civil engineering applications.

3.4.3 Under normal service conditions, the products will have a life of at least 60 years, provided they are designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

3.5 Cleaning and maintenance

Table 7 Characteristics for cleaning and maintenance

Product assessed	Assessment method	Requirement	Outcome
Pipes	Resistance to water jetting (high-volume, low pressure jetting) to WIS 4-35-01 : 2000	Failure pressure ≥ 137 bar	Pass
Pipes ≤ DN 350	Rodding resistance to the MCHW, Vol 1, Clause 518.12	Average failure energy > 3 joules. No damage	Pass

The assessment showed that the product complies with HAPAS requirements for this characteristic.

4 Summary of Process Assessment

Manufacturing process and quality control	Complies with HAPAS requirements
Delivery and site handling	Complies with HAPAS requirements
Installation	Complies with HAPAS requirements

4.1 Manufacture

4.1.1 The BBA has undertaken the following tasks for the assessment of product manufacture and has established that the manufacture complies with BBA HAPAS Certification Scheme requirements:

- the BBA has recorded and evaluated the manufacturer's documentation of the methods adopted for quality control procedures and product testing against HAPAS requirements
- the BBA has assessed the quality control operated over batches of incoming materials and formulations against HAPAS Requirements
- the BBA has evaluated the process for management of non-conforming work
- the BBA has audited the production process and verified that it is in accordance with the documented process
- the BBA has checked that equipment has been properly tested and calibrated.

4.1.2 The BBA has undertaken to review 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.

† 4.1.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of ISO/IEC 9001 : 2015 by BSI and OMNI (Certificates FM38354 and OMNI-00065-QMS respectively).

4.2 Delivery and site handling

† 4.2.1 The Certificate holder states that the products are delivered to site as follows:

- each pack of pipes bears a label including the product type, product size, production date, product length (per unit), pack quantity, a unique production number traceable to that production run, and the BBA logo incorporating the number of this Certificate
- pipes are packed in wooden support frames and secured by banding
- number of pipe lengths, depending on pipe diameter, per pack: 150 mm – 33 units; 225 mm – 14 units; 300 mm – 8 units; 375 mm – 5 units; 450 mm – 4 units; 600 mm – site strapped with steel banding in pairs
- couplers are palletised to match the quantity of pipe in any given load. The seals are packed in plastics bags
- seals are brought in-house from third party with individual markings.

4.2.2 To achieve the performance described in this Certificate, delivery and site handing must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

- compliance with the requirements of the MCHW 1, Volume 1, Series 500, Clause 518
- care must be taken not to drop products of their ends, particularly during cold weather conditions
- pipes must be stored on a flat surface
- loose length pipes must not be stacked more than 4 m high
- protection of the products from direct sunlight when long-term storage is envisaged. 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
  - over 12 months — damage will occur unless protection provided.

4.3 Design

4.3.1 Structural design

4.3.1.1 Specific combinations (when prescribing loads that each component must be able to withstand or any special safety factors to be used etc) must be supported by calculations carried out by a suitably experienced and competent individual in accordance with BS 9295 : 2020, BS EN 1295-1 : 2019 and PD CEN/TR 1295-2 : 2005.

4.3.1.2 Calculated prediction of the actual pipe's behaviour depends on the framework conditions used for it. Applied values must be monitored through exhaustive soil survey assessments and by supervising the installation.

4.3.2 Hydraulic design of the system

4.3.2.1 The internal surface of the products is hydraulically smooth, and the design of joints and fittings ensures good hydraulic performances. An appropriate value of roughness coefficient must be selected when designing the drainage system. For new pipes, a value of 0.006 mm is applicable, but for designs, a value of 0.6 mm is generally used.

4.3.2.2 The products have normal flow characteristics associated with thermoplastics pipes.

4.4 Installation

4.4.1 The Certificate holder's instructions for installation of the products were confirmed as meeting the BBA HAPAS Certification Scheme requirements.

4.4.2 To achieve the performance described in this Certificate, the products must be protected from damage from site construction traffic.

4.4.3 To achieve the performance described in this Certificate, the products must be installed and tested in accordance with:

- the Certificate holder's instructions
- the DMRB, CD 533
- the MCHW Volume 1, Series 500; Volume 2, Series NG 500 and Volume 3, Drawings F1 and F2
- BS EN 752 : 2017 and BS EN 1610 : 2015.

† 4.4.4 The Certificate holder's instructions advise the following:

- the pipes are cut using conventional hand tools and should be cut square between the corrugations
- for a watertight joint, the pipe end and socket/coupler/fittings 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/coupler should be lubricated and the pipe pushed fully home to the central register, either by hand or using a lever if necessary
- care should be taken during backfill to maintain the line and level of the pipelines. If necessary, the pipe should be restrained to prevent uplift
- all pipework must be laid with the correct bedding and surrounding material.

4.4.5 To achieve the performance described in this Certificate, installation of the products must be carried out by a competent general builder, or a contractor, experienced with this type of product.

4.5 Maintenance

4.5.1 To achieve the performance described in this Certificate:

- access to the system for cleaning must be provided by conventional means
- 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 product and must not be used
- the product has adequate resistance to cleaning by water jetting and rodding. However, it is recommended that low-pressure, high-volume jetting method is used in accordance with the MCHW, Volume 1, Clause 521 and general advice as stated in Clauses 520.1 to 520.4.

5 Fulfilment of Requirements

5.1 The conclusion of this BBA assessment is that JFC Corripipe Twinwall Pipes and Couplers, when used in accordance with the provisions of this Certificate, complies with the BBA HAPAS Certification Scheme requirements.

5.2 In order for the products to continue to meet Scheme requirements, it must be installed, used and maintained as per the Certificate holder's instructions and as detailed in the Certificate.

6 Validity of Certificate

Continuing validity of this Certificate is dependent on the following factors:

- continuing compliance with product or process requirements, as described in the HAPAS Scheme document, and the specification documents referred to therein
- ongoing BBA surveillance of factory production control, to verify that the specifications and quality control being operated by the manufacturer are being maintained
- formal triennial Review of the Certificate, and Reissue for required technical or non-technical updates
- compliance with ongoing Certificate obligations by the Certificate holder and manufacturers.

†7 Additional 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.

CE marking

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

8 Bibliography

ASTM D638 *Standard Test Method for Tensile Properties of Plastics*

ASTM D1238 *Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer*

BS 9295 : 2020 *Guide to the structural design of buried pipes*

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 *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

BS EN 752 : 2017 *Drain and sewer systems outside buildings – sewer system management*

BS EN 1277 : 2003 *Plastic piping systems – Thermoplastic piping systems for buried non-pressure applications – Test methods for leak tightness of elastomeric sealing ring type joints. Methods P1, P2 and P3 under Condition D*

BS EN 1295-1 : 2019 *Structural design of buried pipelines under various conditions of loading — General requirements*

BS EN 1411 : 1996 *Plastic piping and ducting systems – Thermoplastics pipes — Determination of resistance to external blows by the staircase method*

BS EN 1610 : 2015 *Construction and testing of drains and sewers*

BS EN ISO 527-2 : 1996 *Plastics — Determination of tensile properties — Test conditions for moulding and extrusion plastics*

BS EN ISO 1133 : 2000 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics — Standard method*

BS EN ISO 1183-3 : 1999 *Plastics — Methods for determining the density of non-cellular plastics — Gas pyknometer method*

BS EN ISO 9967 : 1995 *Thermoplastics pipes — Determination of creep ratio*

BS EN ISO 9969 : 2007 *Thermoplastics pipes — Determination of ring stiffness*

Design Manual for Roads and Bridges, CD 533 Determination of pipe and bedding combinations for drainage works Version 1.1.0. (12/21)
Design Manual for Roads and Bridges, CG 501 Design of highway drainage systems, Version 2.1.0 (08/22)

ISO/IEC 9001 : 2015 *Quality management systems — Requirements*

Manual of Contract Documents for Highways Works, Volume 1 *Specification for Highway Works, Series 0500, Drainage and Service Ducts (02/20)*
Manual of Contract Documents for Highways Works, Volume 2 *Notes for Guidance on the Specification for Highway Works, Series NG 0500, Drainage and Service Ducts (02/20)*
Manual of Contract Documents for Highways Works, Volume 3, *Highway Construction Details, F Series – Drainage (05/06)*

PD ISO/TR 10358 : 2021 *Plastics pipes and fittings — Combined chemical-resistance classification table*

PD ISO/TR 7620 : 2005 *Rubber materials — Chemical resistance*

PD CEN/TR 1295-2 : 2005 *Structural design of buried pipelines under loading — Part 2: Summary of nationally established methods of design*

Water Industry Specification (WIS) 4-35-01 Issue 1: 2000 *Specification for Thermoplastics Structured Wall Pipes, Joints and Couplers with a smooth bore for gravity sewers for the size range 150-900 inclusive*

9 Conditions of Certification

9.1 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.

9.2 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.

9.3 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.

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

9.5 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 UKCA marking and CE marking.

9.6 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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