PT/580/0626-AS (June 2026)

Assessment Schedule for the Standard GRP Liner as manufactured by Channeline International Fibreglass Manufacturing L.L.C. for non-pressurised applications

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1. SCOPE

This schedule specifies the requirements for the circular and non-circular Standard GRP Liner as manufactured by Channeline International Fibreglass Manufacturing L.L.C. for the rehabilitation of man-entry gravity foul, combined and surface water lines with discrete pipe liners between manholes.

It is applicable for circular and non-circular Type II structural design in accordance with the WRc Sewerage Rehabilitation Manual(1) for gravity sewer and storm water lines.

The approval is not applicable to:

- The installation or reconnection of laterals.

2. PRODUCT DESCRIPTION

2.1 Introduction

Channeline's Standard GRP Liners are manufactured with a socket and spigot joint, with adequate clearance and tolerance such that one panel connects easily into the next when positioned into the pipeline, sewer or culvert.

Channeline panels are usually manufactured in 2.4m (8 ft) long sections up to 6m diameter. Shorter lengths can be manufactured if desired.

Optional in-line jointing can be facilitated where it is necessary to provide a liner of maximum external diameter and minimum annular gap, thus eliminating the 10 mm (0.4 in) allowance required for the socket overlap.

2.2 Product installation

A pre-lining inspection survey is undertaken to ensure the host structure has been adequately prepared. Typically, any lateral connections are diverted to the nearest manhole.

Individual discrete Glass-Reinforced Plastic (GRP) liner sections are conveyed and located via trolleys from the access point to the furthest end of the sewer. They are restrained with wooden chocks, jointed to form a lining and the circumferential joints are sealed with a flexible elastomeric sealing ring.

Further liner sections are added and at appropriate locations headwalls are constructed from mass-concrete to seal the annulus between the lining and host structure. Bleed-tubes are inserted into the isolated annulus and a suitable grouting system is used to fill the annulus following the grouting plan lift requirements. The bleed-tubes minimise grout pressure, remove standing water and ensure that full annular void filling is achieved.

After grouting, the bleed-tubes are capped, and the lining is inspected to ensure that full joint sealing has been achieved, and no grout infiltration has occurred into the lined section.

On completion, a full CCTV inspection of the lining is undertaken.

2.3 Applicable standards

The following standards are applicable to this product:

1. BS EN ISO 23856:2021(2).

2. BS ISO 16611:2017(3).

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3. ASTM D3262-20[4].

4. IGN 4-34-02[5].

2.4 Approval History

This is the first WRc Approved certification for the Standard GRP Liner for the rehabilitation of man-entry non-pressurised pipelines.

3. REQUIREMENTS AND TESTING

3.1 General

Appearance

The internal surface of the Standard GRP Liner shall be smooth, clean and free from scoring, cavities, wrinkling and other surface defects that would prevent the liners from meeting the general fitness for purpose requirement.

3.2 Materials and Components

The Standard GRP Liner shall be constructed using:

- Chopped and/or continuous glass filaments, strands or rovings, mats or fabric, synthetic veils, and polyester resin.
- Type C or ECR glass shall be used for the surface tissue.
- Type E or ECR glass shall be used for the reinforcement.
- The resin used in the structural layer shall be unsaturated, thermosetting polyester (or vinylester) and have a temperature of deflection of at least 70°C when tested in accordance with BS EN ISO 75-2:2013[6].
- The particle size of aggregates and fillers shall not exceed 1/5 of the total wall thickness of the pipe or fitting or 2.5 mm, whichever is the smaller.
- Elastomeric seals shall conform to BS EN 681-1:1996[7].

3.3 Type Testing

The Standard GRP Liner shall meet the characteristic requirements as stated in Table 1.

Table 1 Characteristic requirements for the Standard GRP Liner

Characteristic	Test Method	Minimum/Declared Value
Initial ring stiffness	BS ISO 7685[8]	Pass
Long-term creep ring stiffness	ISO 10468[9]	0.65
Initial resistance to failure in a deflected condition	ISO 10466[10]	Pass
Initial longitudinal tensile strength	BS ISO 8513[11]	20.5 MPa
Short-term flexural modulus	ASTM D790[12] BS EN ISO 178[13]	Minimum 10,000 MPa

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Long-term flexural modulus	ASTM D790 BS EN ISO 178	Minimum 6,560 MPa
Short-term flexural strength	ASTM D790 BS EN ISO 178	Minimum 120 MPa
Long-term flexural strength	ASTM D3681(14) ISO 10952(15)	82.74 MPa
Short-term circumferential tensile strength at first break	ASTM D638(16)	Minimum 34.5 MPa
Long-term circumferential tensile strength at first break	ASTM D638	Minimum 22.632 MPa
Poisson's ratio	ASTM D638	0.30
Long-term strain corrosion	ISO 10952	0.77%
Joint tightness	ISO 8639(17) ASTM D4161(18)	No leakage

3.4 Marking

The Standard GRP liner shall have marking requirements as follows:

- All lining units shall be indelibly marked at each end on the inside face. No method of marking shall prejudice the performance of the lining in-service.
- The manufacturer's name, initials or identification mark.
- The project title, client or contractor, contract number.
- Identification of the shift, production line and date of manufacture.

3.5 Manufacture

To ensure the quality and performance of the Standard GRP Liner, the manufacturing process shall include appropriate systems for the:

- Specification of component materials.
- Verification component materials received are to specification.
- Handling and storage of all component materials and finished units.
- Detailed drawing / schedule for manufacture.
- Manufacture / assembly of the Standard GRP Liner, and;
- Fabrication and quality control of workmanship.

The production of the Standard GRP Liner and related quality control procedures shall conform to requirements to ensure the stated performance of the product is reliably achieved.

3.6 Installation

When installed in accordance with the installation documentation(19), the Standard

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GRP Liner shall be reasonably expected to perform as described.

4. APPROVAL

The Standard GRP Liner has been audited and successfully met all the requirements stated within this assessment schedule for non-pressurised application.

Signed:

Valid until 25th June 2031

5. REFERENCES

1. WRc Sewerage Rehabilitation Manual, 7th Edition, 2025.

2. BS EN ISO 23856:2021 Plastics piping systems for pressure and non-pressure water supply, drainage or sewerage — Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin.

3. BS ISO 16611:2017: Plastics piping systems for drainage and sewerage without pressure. Non-circular pipes and joints made of glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resins (UP). Dimensions, requirements and tests.

4. ASTM D3262-20 Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.

5. IGN 4-34-02:April 1986 Issue 1 Specification for Glassfibre Reinforced Plastics (GRP) Sewer Linings.

6. BS EN ISO 75-2:2013 Plastics. Determination of temperature of deflection under load. Plastics and ebonite.

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

8. BS ISO 7685:2019 Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial ring stiffness.

9. BS EN ISO 10468:2023 Glass-reinforced thermosetting plastics (GRP) pipes. Determination of the ring creep properties under wet or dry conditions.

10. ISO 10466:2021 Glass-reinforced thermosetting plastics (GRP) pipes — Test method to prove the resistance to initial ring deflection.

11. BS ISO 8513:2023 Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Test methods for the determination of the initial longitudinal tensile strength.

12. ASTM D790-17 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials..

13. BS EN ISO 178:2019 Plastics. Determination of flexural properties.

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14. ASTM D3681-23 Standard Test Method for Chemical Resistance of “Fiberglass” (Glass–Fiber–Reinforced Thermosetting-Resin) Pipe in a Deflected Condition.

15. ISO 10952:2021 Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of the resistance to chemical attack for the inside of a section in a deflected condition.

16. ASTM D638-22 Standard Test Method for Tensile Properties of Plastics.

17. ISO 8639:2023 Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods for leaktightness and proof of structural design of flexible joints.

18. ASTM D4161 – 24 Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.

19. Method statement for the generic installation of Channeline GRP structural liners.

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