

1. SCOPE

This schedule specifies requirements for the Berolina-Liner and Berolina-HF-Liner liner systems as manufactured by BKP Berolina Polyester GmbH & Co. KG. Both systems are applicable to the renovation of gravity sewers and drains.

The approval is not applicable to:

- leaktightness of end seals.
- reconnection of laterals.

2. PRODUCT DESCRIPTION

2.1 Introduction

The liner systems comprise of a glass fibre reinforcement woven sleeve which is factory impregnated with an ultra-violet (UV) light curing polyester or vinyl ester thermosetting resin. When installed and cured this forms a full length cured-in-place structural liner within the host pipe.

The Berolina-Liner and Berolina-HF-Liner liner systems have a range of internal diameter from 150mm to 1600mm and egg-shaped pipes between 200mm x 300mm (DN250 equivalent) and 1200mm x 1800mm (DN1600mm equivalent).

2.2 Relevant Standards

The following relevant standard was identified for cured-in-place pipe liners:

- BS EN ISO 11296-4:2018+A1:2021⁽¹⁾

2.3 Approval History

The BKP Berolina-Liner system has been WRc Approved™ since 2007:

- PT/265/0407
- PT/331/0512

- PT/405/0417

PT/331/0512 was revised July 2015 for an increase in diameter to 1600mm.

3. REQUIREMENTS AND TESTING

3.1 Product Design

The Berolina-Liner systems shall be structurally designed in accordance with DWA-A143-2⁽²⁾, ASTM F1216⁽³⁾ or ASTM F2019-20⁽⁴⁾.

3.2 Type Testing

The BKP Berolina-Liner systems shall comply with the following test requirements which are based upon BS EN ISO 11296-4.

Appearance: The internal surface of the liner shall be smooth, clean and free from scoring, cavities, wrinkling and other surface defects that would prevent the Berolina-Liner systems from meeting the general fitness for purpose requirement.

Mechanical Characteristics Testing: Mechanical testing requirements of BS EN ISO 11296-4 are listed in Tables 1, 2 and 3.

**Table 1 Berolina-Liner system
mechanical characteristics**

Characteristic	Declared value (mean)
Short-term flexural modulus	10,000 MPa
Long-term flexural modulus	6,800 MPa
Short-term stress at first break	150 MPa
Long-term flexural stress	105 MPa

Table 2 Berolina-HF-Liner system mechanical characteristics

Characteristic	Declared value (mean)
Short-term flexural modulus	17,000 MPa
Long-term flexural modulus	14,200 MPa
Short-term stress at first break	280 MPa
Long-term flexural stress	235 MPa

Table 3 Berolina-Liner and Berolina-HF-Liner liner systems long-term strain corrosion

Characteristic	Requirement
Long-term strain corrosion test	Minimum extrapolated failure strain at 50 years > = 0.45%. Declared value = 0.713%

Quality control tests

Samples are taken each day or from each batch of impregnated lining and cured. The cured sample is tested in accordance with BS EN ISO 11296-4 as detailed in Table 4.

Table 4 Quality control tests

Characteristic	Requirement
Wall structure	Clause 8.4.2
Wall thickness	Clause 8.4.3
Initial specific ring stiffness or short-term flexural modulus	Clause 8.5.2 Table 5
Flexural stress at first break	Clause 8.5.2 Table 5
Flexural strain at first break	Clause 8.5.2 Table 5

3.3 Manufacture

To ensure the quality and performance of the Berolina-Liner and Berolina-HF-Liner liner systems, the manufacturing process shall include appropriate systems for:

- Verification that component materials received are to specification.
- Handling and storage of all component materials and finished linings.
- Records of manufacture.
- Inspection and maintenance of manufacturing equipment.

The production of the Berolina-Liner and Berolina-HF-Liner liner systems and related Quality Control procedures shall comply with requirements to ensure the stated performance of the product is reliably achieved.

3.4 Installation

When installed in accordance with the installation documentation⁽⁵⁾, the installation shall be practicable and suitable for conditions that could reasonably be expected on site.

PT/496/0422 - AS April 2022

**Assessment Schedule for the Berolina-Liner
and Berolina-HF-Liner liner systems as
manufactured by BKP Berolina Polyester
GmbH & Co. KG**



independent certification of your products & services

4. APPROVAL

5. Berolina-Liner System installation manual, Version 18-1, July 2018.

The Berolina-Liner and Berolina-HF-Liner liner systems have been audited and have successfully met all of the requirements stated within this assessment schedule.

Signed:

A handwritten signature in black ink that reads 'A Russell'.

Valid until: 30th April 2027

5. REFERENCES

1. BS EN ISO 11296-4 Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 4 Lining with cured-in-place-pipes, 2018+A1:2021.
2. DWA-A 143.2 Rehabilitation of drainage systems outside buildings - Part 2: Static calculation for the rehabilitation of wastewater pipes and pipes with lining and assembly methods (July 2015).
3. ASTM F1216-2021 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
4. ASTM F2019-20 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled In Place Installation Of Glass Reinforced Plastic Cured-In-Place (GRP-CIPP) Using the UV-Light Curing Method.