

Certificate

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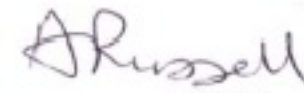
This is to certify that the following product or service has met the requirements detailed below

BKP Berolina Polyester GmbH & Co KG

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Germany

This service meets the requirements set out in assessment schedule
PT/265/0407- AS

Berolina-Liner Manhole to Manhole Lining System


assessor


director

02/05/2007

issue date

02/05/2012

expiry date



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certificate number



Assessment of the Berolina-Liner full length lining system - schedule

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1. Scope

To assess the performance of the Berolina-Liner System which is an ultra-violet (UV) light cured in place pipe (CIPP) full length lining system. The lining is used for the rehabilitation of gravity pipes with internal diameters 150mm to 1000mm and egg shaped pipe between 200x300mm (DN250 equivalent) to 700x1050mm (DN900mm equivalent).

The system comprises a glass reinforced woven sleeve which is impregnated with a UV cure polyester or vinylester resin.

The conduit is cleaned and isolated. A 'pre-liner' is winched in via CCTV and the factory impregnated lining sleeve is winched in place into the host pipe on the way back. The lining sleeve is then inflated and the UV light train pulled through the lining at the correct speed (dependent upon diameter, shape and wall thickness of the lining sleeve) to cure the resin. The ends of the resultant CIPP lining are grouted into the manholes and the connections to the laterals re-made.

Approval exclusions:

- i. The installation or reconnection of the laterals.
- ii. Hydrophilic rubber seals (these are an option which may be specified by the client).

2. Assessment schedule

The assessment comprises the following:

- The design of the CIPP lining;
- Review of the quality systems for the manufacture, supply, materials handling and storage of the

sleeves, resins and resin impregnation;

- Technical audit of all instructions for pre-installation procedures, environmental, planning, site preparation, receipt and storage of lining on-site and installation of the system;
- Mechanical properties of the CIPP lining;
- Technical audit of the installation of the lining in accordance with the Berolina-Liner System installation manual, and;
- Quality control tests of installed CIPP.

3. Review of properties

The following tests in accordance with BS EN 13566-4: 2002 for cured in place pipes:

- Resin characteristics, Table 2, Section 4.3, of EN 13566-4:2002 ;
- Mechanical characteristics of the CIPP lining, the tests are listed in Table 1 below, from Table 5, Section 7.5 of EN 13566-4:2002;
- Strain corrosion of the CIPP lining, Table 6, Section 7.7 of EN 13566-4:2002.

Table 1 Mechanical characteristics

Parameter	Requirement
Long-term flexural modulus under wet conditions	Declared value not less than 300MPa Declared value is 5500 MPa
Short-term flexural modulus	Declared value not less than 1500 MPa Declared value is 8,000 MPa
Long term strain corrosion test	Minimum extrapolated failure strain at 50 years $\geq 0.45\%$ Declared value is 0.713%



4. Quality control tests

One sample taken from each length of CIPP lining and tested in accordance with BS EN 13566-4:2002 as shown in Table 2.

Table 2 Quality control tests

Parameter	Requirement in BS EN 13566-4
Wall structure	Clause 7.4.1
Wall thickness	Clause 7.4.2
Initial specific ring stiffness or short-term flexural modulus	Clause 7.5
Flexural stress at first break	Clause 7.5
Flexural strain at first break	Clause 7.5

5. Review of procedures

- Design of CIPP lining
- Factory manufacturing process
- Site installation

6. Reference documents

- Berolina-Liner System installation manual.
- BS EN 13566-4:2002, Plastic piping systems for renovation of underground non-pressure drainage and sewerage networks. Part 4 Cured-in-place-pipes.