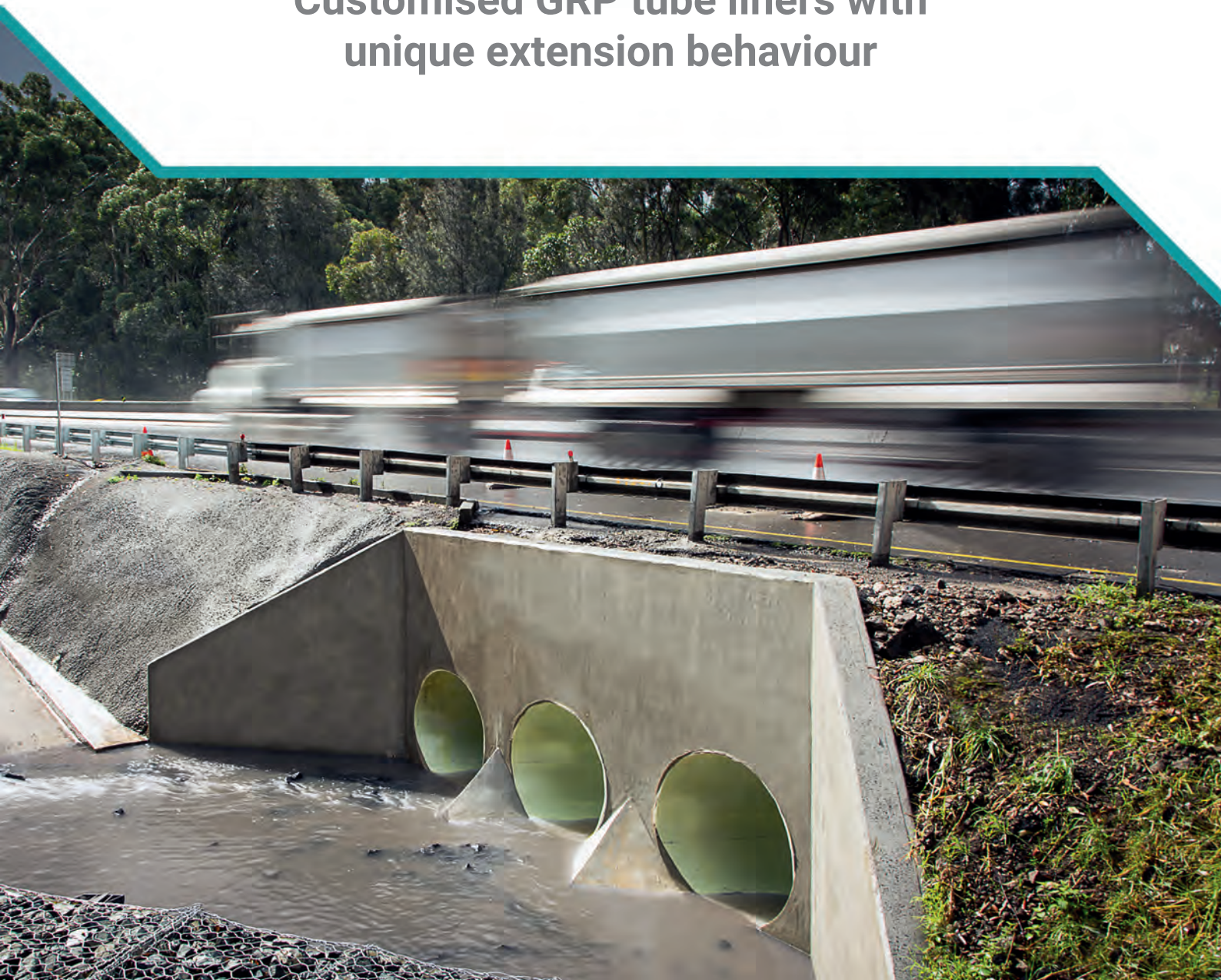
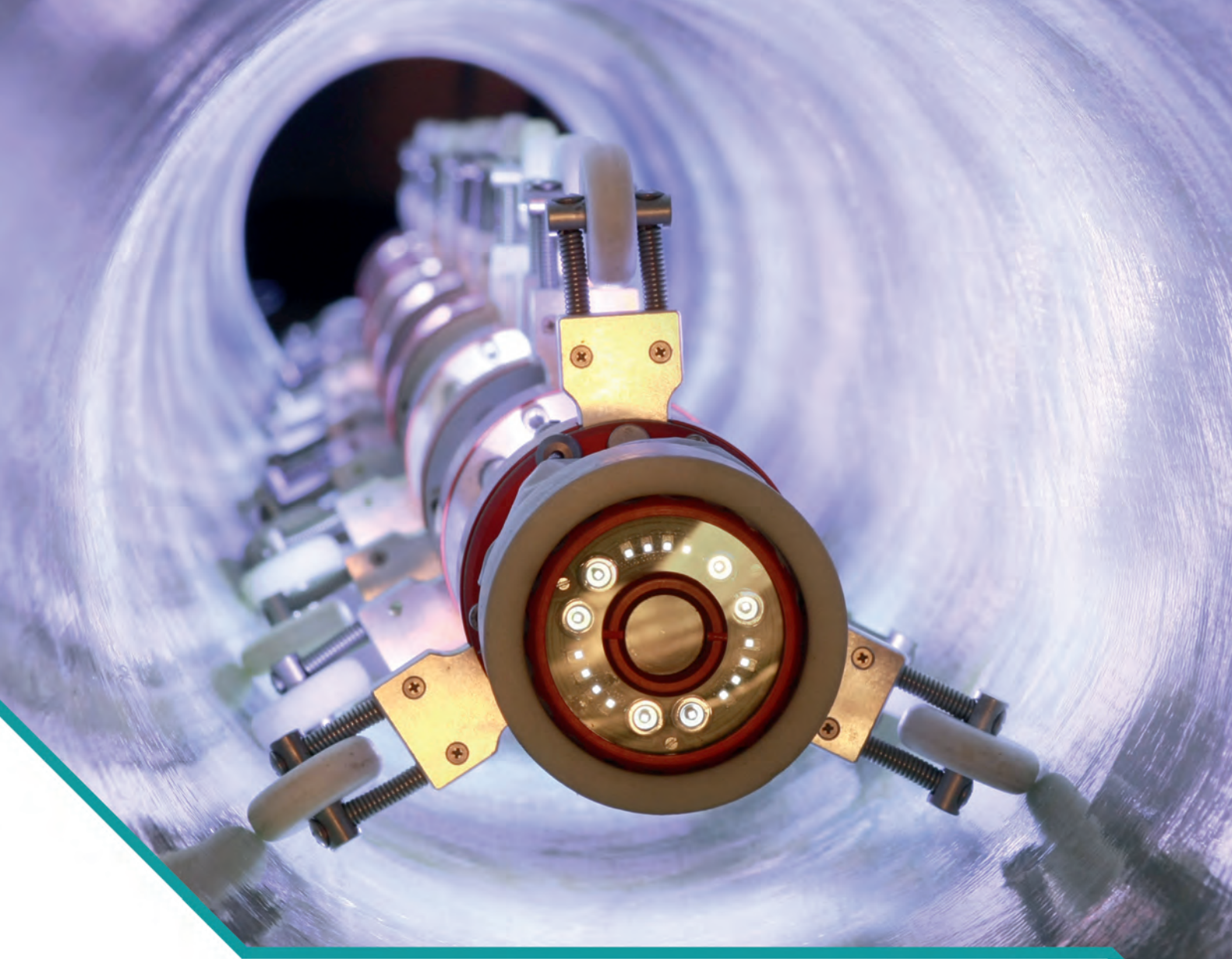


Berolina-Liner System

Customised GRP tube liners with
unique extension behaviour





Berolina-Liner System: trenchless – fast, effective and efficient

The Berolina-Liner System is a cost-effective and efficient for sewer pipe rehabilitation. Time-consuming excavation work can be avoided - the disruption to infrastructure is minor and short-term. Compared with other methods energy consumption is reduced significantly thanks to optimised production,

transportation and installation conditions. Since 1997, BKP has successfully produced UV light-curing and glass fibre reinforced tube liners. Different liner types are available to meet most requirements for sewers in need of rehabilitation.

BKP Berolina – We Protect Pipes

BKP Berolina Polyester GmbH & Co. KG is an international and innovative system provider of trenchless pipe rehabilitation solutions. Manufacturing of protective pipe coatings based on glass-reinforced

plastic (GRP) as well as products for rehabilitation of lateral service pipes for household wastewater complete BKP's offer from our factory in Velten, near Berlin.

Berolina-Liner: high mechanical characteristics enable low cross-section loss

The Berolina-Liner provides optimum benefits for trenchless rehabilitation of wastewater sewers, for every user. The factory resin-impregnated liner is pulled into the existing pipe to be rehabilitated, pressed against the old pipe by with compressed air and cured using UV light. The sewer pipe is thus sealed from the inside and its structural load-bearing capacity is restored. Depending on the requirements, the glass fibre layers of the liner are impregnated with high-quality unsaturated polyester or vinyl ester resins. They are arranged in such a way so as to overlap

and offset with each other between two water and polystyrene-tight film tubes. The glass fibre orientation is also matched to the existing pull-in forces of the liner. Thanks to the glass fibre reinforcement, small wall-thicknesses are sufficient to strengthen the old pipe permanently. The loss in cross-section of a rehabilitated pipe is thus reduced to a minimum and the load-bearing capacity of the pipe system is simultaneously improved. Curing speeds vary depending on the diameter and wall thickness of the Berolina-Liner.

High adaptability due to particular flexibility

The seamless and undersized initial construction provides the Berolina liner with a high degree of variability and in particular extensibility or elasticity, which enables the liner to lie flush with an old pipe made of any material. If planned and preassembled appropriately, it adapts itself to any profile; small cross-sections or profile changeovers up to a maximum of eight percent of the nominal diameter are generally not a problem. The structural glass orientation in the circumferential direction optimises the flow of force

without limiting the extension. All BKP Berolina liners are produced with a protective inner film included, which is particularly resistant and is easy to remove after installation. The UV-tight outer film bonded onto the liner is also standardised. At the request of the customer, the tube liners can also be offered with optional Integrated Enhanced Security (IES), as a substitute for the conventional smooth slip film, for less damaged sewers. In addition, Berolina-Liners have an abrasion protective layer on the inside.

1 Inner film

Multi-layer composite film with polystyrene barrier layer. It is only required for the installation process and is removed after the liner has cured.

2 Abrasion protective layer

A Resin-rich layer, consisting of PES nonwoven impregnated with resin, which serves as a wear protection layer.

3 Different glass layers

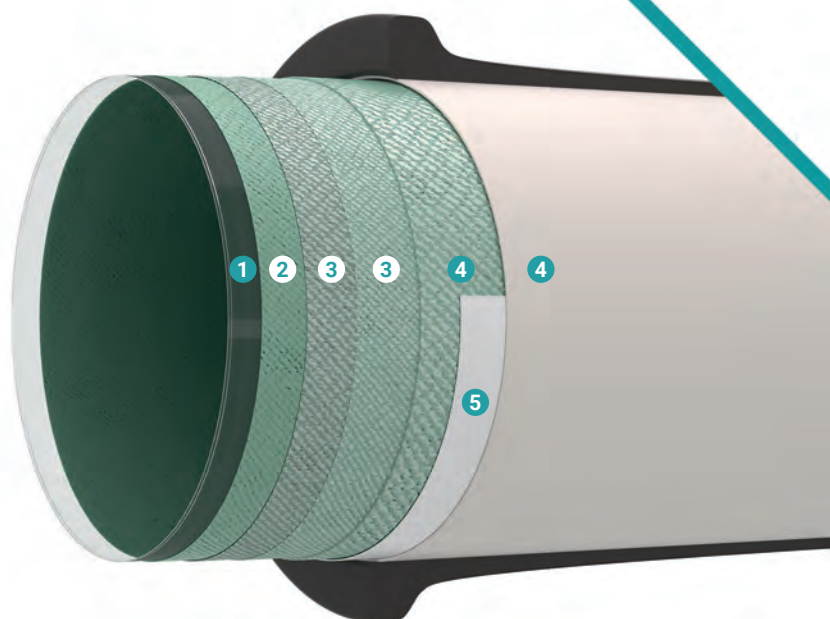
Consisting of glass fibre mats and fabric, which are impregnated with polyester resin or vinyl ester resin.

4 Outer film with UV protective film

Multi-layer composite film, with polystyrene layer and bonded on light protection film, protects against external effects during transport and installation. Also prevents resin leakage, exposure to light and premature, unwanted curing.

5 Optional: Integrated Enhanced Security (IES)

Made of tear-resistant, high-quality polyethylene fabric. No additional installation protection is required. Installation takes place between the outer film and UV protection film.





Environmentally friendly and efficient

Uniquely, with light-curing liners the addition of process water (and its subsequent disposal) and the use of thermal energy are eliminated. Production, storage and transport do not require any additional energy for cooling. Curing is almost emissions-free. With this method a new pipe is created inside the old pipe that is environmentally friendly. In the shortest possible time, without extensive earthworks and with minimal disruption to surrounding infrastructure. The Berolina-Liner, produced "continuously" can be packed in one

length, up to 1000 metres, and can be pulled into the sewer directly from the pallet. In general, installation requires little space as all installation-related equipment fits into one truck. Controlled UV light curing enables short installation times and assures that the high quality requirements are maintained. Due to the close fit of the liner, inlets generally stand out very clearly inside the pipe. Complete opening of the inlets is possible directly after curing.

Area of use of the Berolina-Liner

- Gravity sewers
- Circular profiles: DN 150 (6") - 950 (37")
- Ovoid cross-sections: 200/300 mm (8"/12") - 700/1.050 mm (28"/41")
- available with IES up to DN 600

Other sizes and cross-sections are possible on request.

The technical data for the Berolina-Liner are available on our website: bkp-berolina.de





Berolina-HF-Liner: faster curing due to smaller wall thickness

Due to the special construction of the glass sheets and higher glass content, the Berolina-HF-Liner achieves higher mechanical characteristics resulting in a reduction of the structurally required wall thickness compared to the normal Berolina-Liner. The resulting lower weight allows easier handling. The Berolina HF liner is also available with Integrated Enhanced Security (IES) – a smooth slip film is no longer necessary for the pulling in with the result that installation time can be reduced by up to 60 minutes.

Area of use:

- Gravity sewers
- Circular profiles: DN 400 (16") - DN 1,600 (63")
- Ovoid cross-sections: 350/525 mm (14"/21") - 1,200/1,800 mm (47"/71")

Other sizes and cross-sections are possible on request.

The technical data for the Berolina-HF-Liner are available on our website: bkp-berolina.de

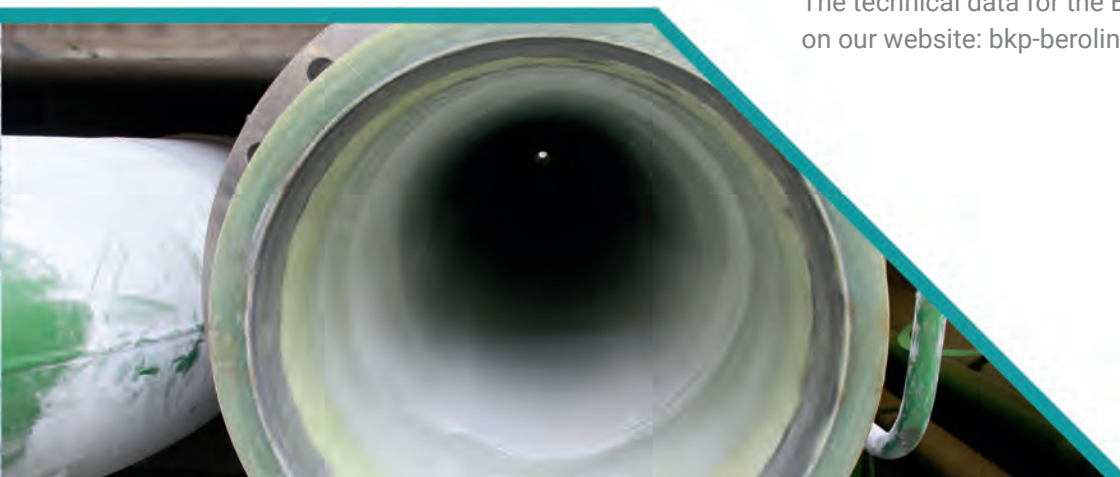
Berolina-LP-Liner: reaching the target with low pressure

The Berolina-LP-Liner (LP = Low Pressure) is used in wastewater pressure pipes. By using very resistant glass and the particularly favourable structural arrangement of the glass sheets, a maximum internal operating pressure of 3 bar is possible.

Area of use:

- Pressure pipes
- Operating pressure ≤ 3 bar
- Test pressure ≤ 5 bar
- Circular profiles: DN 150 (6") - DN 600 (24")

The technical data for the Berolina-LP-Liner are available on our website: bkp-berolina.de



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steps to complete pipe rehabilitation



1. Secure the construction site



2. Thoroughly clean the pipe to be rehabilitated



3. CCTV pipe inspection beforehand



4. Pull in the smooth slip film (not necessary for liners with IES)



5. Pull in the liner by means of a winch



6. Close off the pipe ends with end-cans



7. Pull in the UV light source



8. Inflate the liner against the pipe wall with compressed air



9. Cure the liner by means of a light source with a defined speed



10. Open the pipe ends (removal of the end-cans and flush cutting off)



11. Remove the inner film



12. Cut open the easy to find inlets

Common advantages of all GRP liners made by BKP Berolina

- Seamless construction
- Particular extensibility
- Ready for installations up to 500 meters or 1,000 meters (DN 200 [8"] to DN 300 [12"])
- Can be stored for 6 months (VE liners) or 12 months (UP liners)
- Fast curing
- Smooth surface
- Suitable for all standard pipe profiles
- Quality management in accordance with EN ISO 9001:2015
- Bridging small profile and cross-section changes
- Resin types depending on the requirement (polyester resin, vinyl ester resin, polystyrene-free resin)
- Abrasion protective layer

Our service commitment to you

We are always pleased to assist our customers with planning in advance and ensure optimum preparation, to ensure successful completion of a rehabilitation

project. We help our customers choose the right liner by producing project-specific structural calculations and calculation of the required wall thicknesses.



Quality standards

All of our production batches are documented and tested to ensure they meet our highest quality standards. Only batches meeting our requirements and

withstanding all tests are delivered to our customers. This ensures consistently the high quality level of all Berolina-Liners leaving our factory.

Regular control and certified production

The quality management system of BKP Berolina is globally aligned and is certified to EN ISO 9001 (2015). Annual monitoring audits by the DQS and international approval bodies assure our high standards. The production parameters are monitored continuously. Permanent in-line tests assure the material quality, quantity selection and mixing, and liner quality –

each production batch is accepted individually. The installation of the liner is also subject to comprehensive quality control, for example, by camera-assisted TV inspection before, during and after curing. All installation steps can be documented and recorded electronically by software.

The most important tests at a glance

1. Tests performed externally:

- HD flushing test according to the Hamburg model (60 flushing cycles)
- 10,000 hour tests
- Water penetration test (CP308)
- Darmstädter tipping through trial (abrasion resistance)
- Fire test
- Poisson's ratio
- Compressive strength
- Interlaminar shear strengths
- Tensile tests
- Immersion test
- Groundwater compatibility

2. Internal quality monitoring:

- Incoming inspections
- Job site simulations with production samples of all DN
- Leak tests
- Measurements of the wall thicknesses, density and weights per unit area
- Measurements of the initial ring stiffness, the ring modulus of elasticity and the tendency to creep
- 3-point bending tests, bending resistances and short-term modulus of elasticity
- Measurements of the resin and glass content
- Barcol hardness

3. External monitoring:

- Type approval by the DIBT
- Semi-annual monitoring of production and determining of the characteristics by TÜV Rheinland
- Checking compliance with approvals
- Annual monitoring audits by independent test bodies for conformity of the approvals abroad

Current product approvals and external test reports can be found in the download area of our website at: bkp-berolina.de



Training for your employees and high-quality installation equipment

Our applications technicians train teams to install the BKP liners, theoretically and practically, with various test section - the demonstration of liner installation and the handover of increasing responsibility. The training is followed by continued support in which BKP technicians are there to provide advice.

As a system supplier, we have a rental fleet including

UV systems for worldwide use in challenging environments. We offer our customers a large range of high-quality installation equipment, and are pleased to advise you and, together with you, put together the required equipment.

We offer an option where you can also purchase all equipment.



BKP Berolina – We Protect Pipes



BKP Berolina Polyester GmbH & Co. KG
Heidering 28
D-16727 Velten

Phone: +49 (0) 3304 20 88-100

Fax: +49 (0) 3304 20 88-110

Email: info@bkp-berolina.de

www.bkp-berolina.de