



IKT Product Test "Short Liner for House Connections": They also cause serious damage.

In the IKT goods test, the providers showed that many of the severe damage to service connections - so-called A-damage - can be reliably sealed with **short liners**.

This involved damage groups "outbreaks/cracks" and "offsets/bends" which were examined in more detail in the test.

Although in principle the damage patterns with nominal diameter and material change could be sealed with some procedures, four providers reached their limits. Their short liners showed some significant weaknesses that led to **infiltration** of the repaired damage patterns. In one case, immediately after installation of the short liner, an infiltration rated as "water surge" was detectable under external water pressure.

House connection repairs affecting nominal width and material change obviously require a **special execution** of quality and care.

In Germany the **warranty period** for sewer technology products is a maximum of five years. This is a very short time compared to the intended **useful lives**.

Of particular disadvantage for sewer clients are damages that appear only after the expiration of the warranty period with recourse to the provider possible only in the rarest cases. As a result, there is a significant financial risk for the network operators, which can be reduced by before and after rehabilitation product testing.



In February 2019, Roland Waniek, IKT's Managing Director, met with Chuck Hansen, CEO, & Mike App, VP, Electro Scan Inc. to discuss results using Focused Electrode Leak Location (FELL) testing to provide rapid assessment of CIPP Short-Liners.

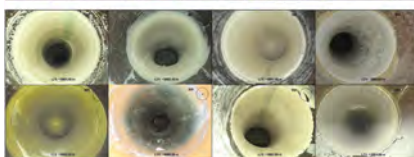
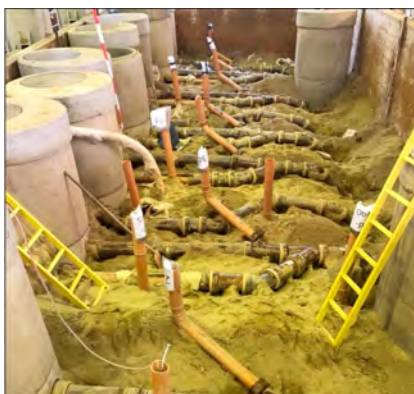


Bild 15 Dicht saniertes Schadensbild (keine Auffälligkeiten)



Bild 16 Feuchtigkeit und Verfärbung



Bild 21 Dicht saniertes Schadensbild (keine Auffälligkeiten)



Bild 22 Feuchtigkeit ohne Infiltration

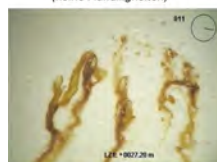


Bild 17 Verfärbung



Bild 18 Tropfen



Bild 23 Verfärbung, Beispiel 1



Bild 24 Verfärbung, Beispiel 2



Bild 19 Fließen



Bild 20 Wasserschwall



Bild 25 Fließen



Bild 26 Wasserschwall



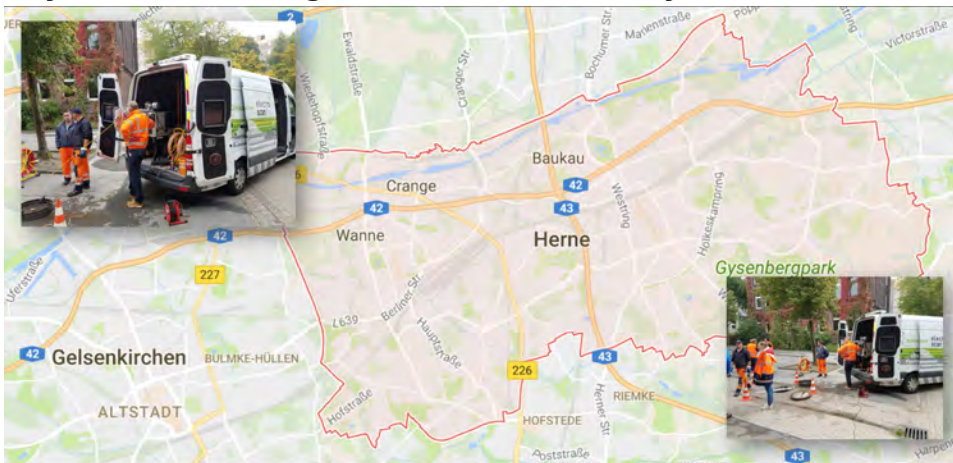
Problem

The lining of sewer mains and reinstatement of lateral house connections has long been responsible for shifting infiltration from bad joints and pipe wall cracks to improperly reconnected service connections and laterals, often resulting in the same amount of infiltration and additional costs of repair. Given the number of types, materials, and methods of lateral rehabilitation, research was needed on the effectiveness of short liners.

Solution

In September 2017, under contract to British-based WRC plc & American-based Electro Scan Inc. two-days of assessments were completed for both in-field & laboratory testing of lateral short liners confirming post-rehabilitation defects missed by closed-circuit television cameras could be identified using Focused Electrode Leak Location (FELL).

Day 1 - Field Investigations, Herne, Germany



Day 2 - Laboratory Testing, Gelsenkirchen, Germany



Table 1 Short-Liner Suppliers, By Company, Product Name, and Resin and Liner Material

	Short-Liner Supplier	Product Name	Resin & Liner Material
1	alocit Chemie GmbH	Alocit Kurzliner - System	Methacrylat-Harzsystem mit E-CR- Glasfasergewebe und Polyester-Nadel- filzvlies (3 Lagen)
2	BKP Berolina Polyester GmbH & Co. KG	Berolina Repair System*	Silikat-Isocyanat-Harzsystem mit E-CR- Glasfaserkomplex (2 oder 3 Lagen)
3	Bodenbender GmbH	Point-Liner - System*	Polyurethan-Harzsystem mit E-CR- Glasfasergewebe (2 Lagen)
4	Cosmic Engineering GmbH	TopHat Kurzliner	Polyester- oder Vinylester-Harzsystem mit E-CR-Glasfasergewebe
5	DIRINGER &	DS Kurzliner*	Methacrylat-Harzsystem mit Glasfaserlaminat
6	Evonik Industries AG	DEGAPLEX K 3010	Methacrylat-Harzsystem mit E-CR- Glasfasergewebe (3 Lagen)
7	Fluvius GmbH	Fluvius KurzPacker Verfahren*	Silikat-Harzsystem mit Glasfasergewebe (2 Lagen)
8	F. Willich Isoliersysteme GmbH & Co. KG	WILLKAT PL Short Liner System	Silikat-Isocyanat-Harzsystem mit E-CR- Glasfasergewebe (2 Lagen)
9	I.S.T. Innovative Sewer-Technologies GmbH	Spot Repair System Plus*	Silikat-Isocyanat-Harzsystem mit E-CR- Glasfaserkomplex (2 oder 3 Lagen)
10	KMG Pipe Technologies	KM-Kurzliner*	Epoxid-Harzsystem mit Glasfaserlaminat
11	MC-Bauchemie Müller GmbH & Co. KG	Konudur LM-Liner*	Organo-Mineral-Harzsystem mit E-CR- Glasfasergewebe (3 Lagen)
12	Minova CarboTech GmbH	CarboLith Spot Repair System	Silikat-Isocyanat-Harzsysteme mit E- CR-Glasfasergewebe (3 Lagen)
13	pmt GmbH & Co. KG	pmt-Kurzliner	Organo-Mineral-Harzsystem mit E-CR- Glasfasergewebe (2 Lagen)
14	resinnovation GmbH	PARTLINER*	Epoxid-Harzsystem mit Glasfasergewebe (2 Lagen)
15	RS Technik AG	RS MaxPatch*	Silikat-Isocyanat-Harzsystem mit E-CR-Glasfasergewebe (3 Lagen)
16	sikotec GmbH	3P-Plus-Kurzliner*	Silikat-Harzsystem mit Glasfasergewebe
17	Trelleborg Pipe Seals Duisburg GmbH	epros DrainPacker Verfahren*	Silikat-Harzsystem mit CRF(+)- Glasfasergewebe (2 Lagen)
18	Twinbond Liner GmbH	TbL-Verfahren*	Epoxid-Harzsystem mit Glasfaser- und Aramidgewebe

NOTES

- Eight (8) of 18 resin materials included Silicate resin which has no influence on Electro Scan Focused Electrode Leak Location (FELL) readings.
- Twelve (12) of 18 shown with (*) field tested with Electro Scan FELL as part of 1:1 IKT Short-Liner Research Study.

Table 2 IKT Defects in Pre-Rehabilitated Test Pipes

