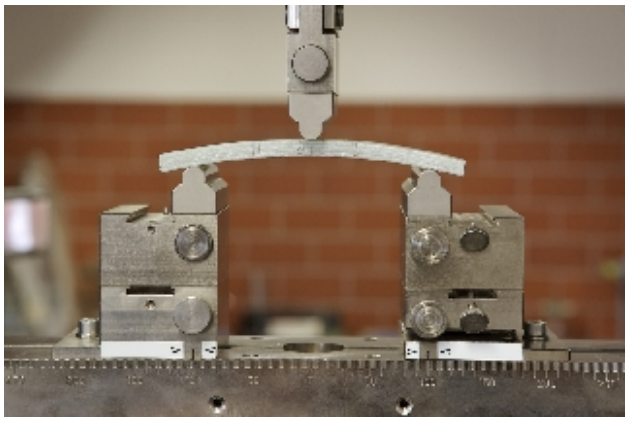
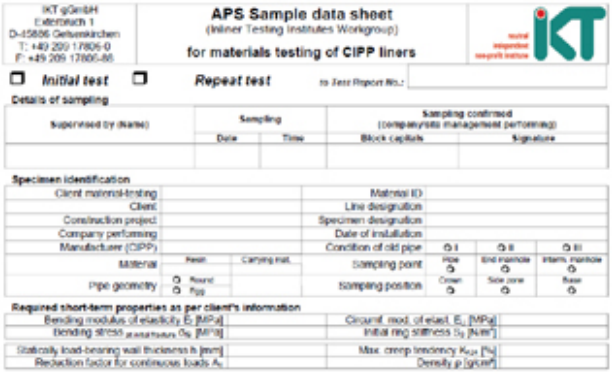
# CIPP Liner

**Test Centre for CIPP liners**



Three-point bending test on a CIPP-Liner

The IKT Test Centre is a supervisory body for CIPP liners and short-liners and is recognised by the **German Institute for Construction Technolog**y (DIBt). It is **accredited** to European Standards (DIN EN ISO/IEC 17025) for selected mechanical and technical tests on polymeric components of pipe and **CIPP liner systems** and samples of **GRP laminate**.
The IKT Test Centre thus fulfils the requirements for the performance of **materials tests** in accordance with ZTV Materials Testing (CIPP liner test standards), DWA-M 144-3 and DWA-A 143-3.



IKT gGmbH
Exterbruch 1
D-45886 Gelsenkirchen
T: +49 209 17806-0
F: +49 209 17806-88

**APS Sample data sheet**
(Inliner Testing Institutes Workgroup)
**for materials testing of CIPP liners**

☐ *Initial test* ☐ *Repeat test* to Test Report No.:

**Details of sampling**

| Supervised by (Name) | Sampling | | Sampling confirmed (company/site management performing) | |
|---|---|---|---|---|
| | Date | Time | Block capitals | Signature |
| | | | | |

**Specimen identification**

| | | | | | | |
|---|---|---|---|---|---|---|
| Client material-testing | | | Material ID | | | |
| Client | | | Line designation | | | |
| Construction project | | | Specimen designation | | | |
| Company performing | | | Date of installation | | | |
| Manufacturer (CIPP) | | | Condition of old pipe | ☐ I | ☐ II | ☐ III |
| Material | Resin | Carrying mat. | Sampling point | Pipe ☐ | End manhole ☐ | Interm. manhole ☐ |
| Pipe geometry | ☐ Round ☐ Egg | | Sampling position | Crown ☐ | Side zone ☐ | Base ☐ |

**Required short-term properties as per client's information**

| | | | |
|---|---|---|---|
| Bending modulus of elasticity $E_f$ [MPa] | | Circumf. mod. of elast. $E_r$ [MPa] | |
| Bending stress at maximum $\sigma_{fm}$ [MPa] | | Initial ring stiffness $S_0$ [N/m²] | |
| Statically load-bearing wall thickness h [mm] | | Max. creep tendency $K_{v,t}$ [%] | |
| Reduction factor for continuous loads $A_c$ | | Density ρ [g/cm³] | |

Sample data sheet

# Sample data sheet
# Materials testing of CIPP liners

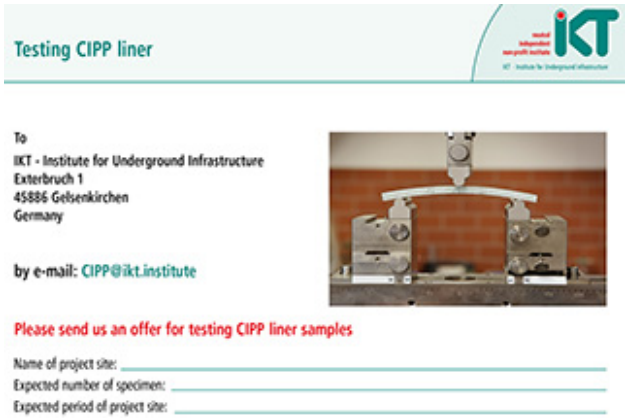
Please enclose this form when you send us your samples. This ensures that your **sample** can be correctly identified.
Please complete a **sample data sheet** for each individual site sample you send us.

Sample data sheet for CIPP liners

# Site sample

- What must be the **dimensions** of a site sample?
- What else is important?

Dimensions of site samples



Testing CIPP liner

To
IKT - Institute for Underground Infrastructure
Exterbruch 1
45886 Gelsenkirchen
Germany

by e-mail: CIPP@ikt.institute

Please send us an offer for testing CIPP liner samples

Name of project site: _____
Expected number of specimen: _____
Expected period of project site: _____

Request for quotation CIPP liners

# Request for quotation
# Materials testing of CIPP liners

Do you require standard or expanded-scope tests?
We will provide a quotation **tailored** to your needs, to ensure that your QA requirements are met.

Request for quotation CIPP liners

## Accredited Quality Assurance

Unlike factory-finished pipes, **CIPP liners** attain their ultimate geometrical and mechanical properties only after in-place curing at the installation site. The quality of the work performed on site is thus critical for the quality of the end product.

To address this issue, the **tests** explained in more detail below are **required** in ZTV Materials Testing (CIPP liner test standards) as well as DWA Code of Practice 144-3 and DWA Standard 143-3 for quality assurance purposes.

Deutsches Institut für Bautechnik DIBt

IKT is a DIBt-accredited test centre for building products

IKT is an accredited test and supervisory body recognised by the **German Institute for Construction Technology** (DIBt) for the performance of tests on CIPP liners and plastics.
IKT tests samples of CIPP liners taken on-site **impartially** and **independently** on behalf of project clients. The test report documents in detail whether the required quality criteria have been achieved.

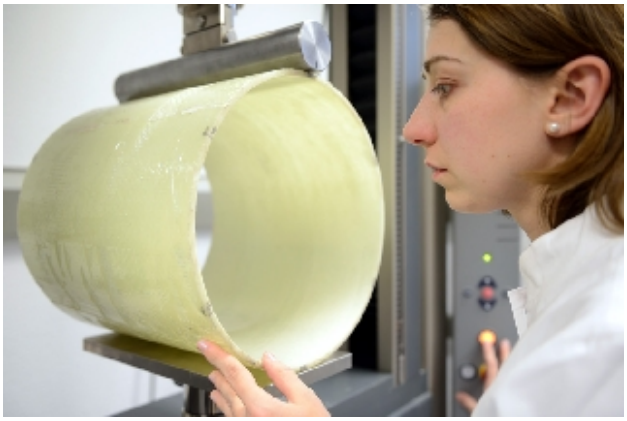
The institute publishes its IKT LinerReport **each year** detailing the performance of both liner systems and contractors.

## Overview of test and inspection criteria

Three-point bending test on a CIPP-Liner

**Modulus of elasticity** (short-term flexural modulus)

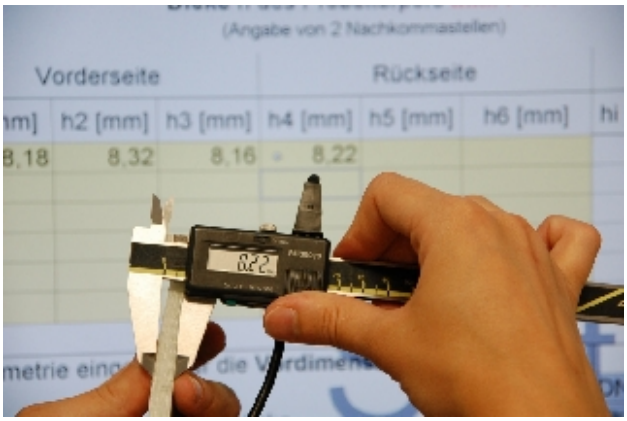
- CIPP liners must be capable of withstanding loads such as those arising from groundwater, road traffic and soil pressure
- The modulus of elasticity is an indicator of load-bearing capability
- Stability may be endangered if the modulus of elasticity is too low
- Test method: Three-point bending test as per DIN EN ISO 178 and DIN EN ISO 11296, Part 4



Crown pressure test on a CIPP liner

**Flexural strength** (flexural stress at rupture)

- This indicates the point at which the liner fails due to excessively high stress
- If flexural strength is too low, the liner may rupture before the permissible deformation is reached
- Test method: Increase of load up to failure in the three-point bending test in accordance with DIN EN ISO 178 and DIN EN ISO 11296, Part 4 (short-term flexural strength)




Mean combined thickness of a liner is measured using a

precision slide gauge

**Wall thickness** (mean combined thickness)

- Minimum values are specified in the structural-analysis calculations for liners
- Wall thickness and modulus of elasticity jointly determine the stiffness of the liners
- Excessively low wall thickness can endanger stability
- Test method: Mean combined thickness is measured in accordance with DIN EN ISO 11296, Part 4 using a precision slide gauge

Water tightness: checking if red dyed water penetrates through a CIPP-Liner

**Water tightness**

- A cut is made into the inner film if the latter is not an integral component of the liner; the outer film (if any) is removed

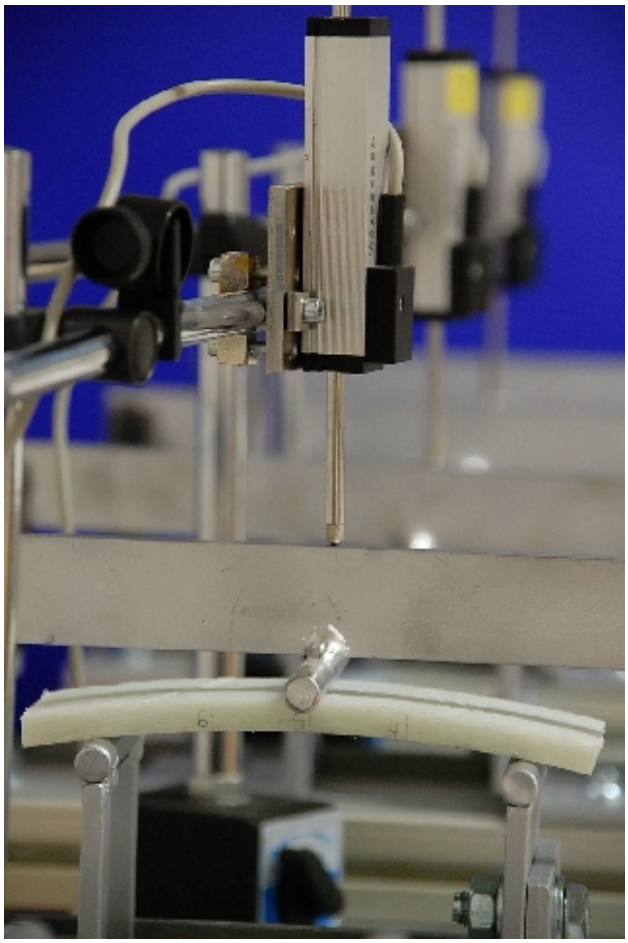
- Water containing a red dye is applied internally
- A 0.5 bar partial vacuum is applied externally
- The liner is “Not tight” if water penetrates through
- Test period: 30 min.

DSC analysis of resin samples

**Glass transition temperatures** (DSC analysis)

- This indicates the curing of epoxy resin, e.g. in sewer-lateral liners
- If the glass transition temperature is too low, the resin is not cured completely
- The temperature can be determined using a small sample of 20 mm cross-section
- It is determined if it is not possible to take a sample for mechanical testing

# Expanded-scope tests



24 hour creep test for CIPP liners

The **minimum scope** of testing for CIPP liners consists of the three-point bending test for determination of modulus of elasticity and bending stress, and the water tightness test. Further tests are available, as defined in the ZTV Materials Testing for CIPP liners specification, which make it possible to determine the quality of CIPP liners even more precisely.

They include:

- Spectral analysis
- Determination of trace styrene content
- Determination of filler material and glass content
- 24 hr creep
- Density

The importance and benefits of these expanded-scope tests for the project client are explained in detail here:

Overview of expanded-scope CIPP liner tests

## Contact

The IKT is a DIBt-accredited test centre for building products

**Dieter Homann**
**Dipl.-Ing.**
T: 0209 17806-24
E: homann@ikt.de