

# The most important tests for CIPP

## Standard tests

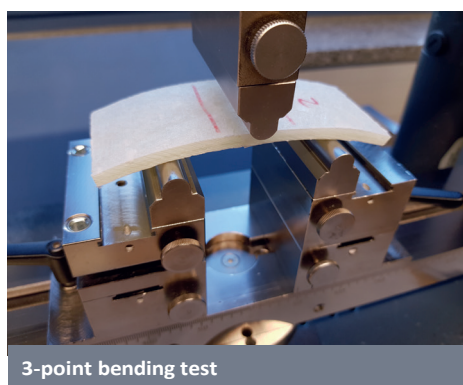
### These questions are answered:

Are the mechanical properties of the pipe liner fulfilled?

Does the installed pipe liner meet its requirements?

Is the liner impermeable to water?

Can the required service life be met?



### 3-point bending test

- Determination of the mechanical properties of the cured pipe liner using a representative wall section
- Test specimen lies on two supports, is loaded in the circumferential direction with a vertically acting force and the resulting deformation is determined.
- Stress / strain diagram is recorded

#### Result:

Bending stress

Bending E-modulus

Static load-bearing wall thickness

#### Applicable standards / regulations:

DIN EN ISO 178, DIN EN ISO 11296-4

DWA-A 143-3

### Vertical crushing test

- Determination of the strength and form properties of the pipe using a representative pipe section
- Pipe section (ring) is loaded in longitudinal direction with a vertically acting force and the resulting deformation is determined.

#### Result:

Initial ring stiffness

Hoop E-modulus

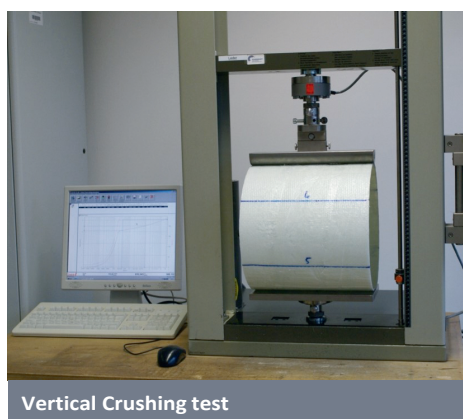
Statically load-bearing wall thickness

#### Applicable standards / regulations:

DIN EN 1228, ISO 7685

DWA-A 143-3

**Note:** Usually, the 3-point bending test is carried out on the pipe wall section as a substitute for checking the static characteristic values, as ring sections are not usually available as a representative sample.



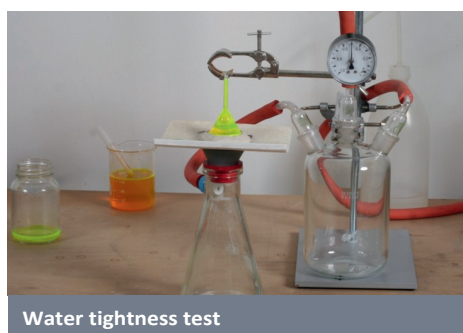
### Water tightness test

- Testing the water tightness of the cured laminate without inner foil (installation aid) or with inner foil / lamination (permanent element of the liner)
- Sample is subjected to a water pressure of 0.5 bar on one side for 30 minutes.

#### Applicable standards / regulations:

Based on DIN EN 1610

DWA-A 143-3



# Additional examinations

These tests should be ordered if the target values from the standard tests have not been met or if the samples show abnormalities. All tests should be carried out promptly after renovation.

## These questions are answered:

Are the serviceability requirements of the liner met?

Are the static requirements fulfilled?

Does the reduction factor still fit?

Can a static recalculation be carried out?

## Gas Chromatography (GC)

- Verification of the curing quality of pipe liner samples
- Determination of the residual monomer content by means of gas chromatography
- Reactive resin moulding materials contain reactive solvents (e.g. styrene or acrylates), which act as reaction partners and are bound in the resin matrix after curing. The proportion of free, non-bound monomers provides information about the curing of the component.
- Suitable for most unsaturated polyester resin systems (UP) and vinyl ester resin systems (VE)

<b>Result:</b>	<b>Applicable standards / regulations:</b>
Content of monomeric	DIN 53394-2, ISO 4901
Residual styrene / acrylate	DWA-A 143-3



Gas chromatography (GC)

## DSC analysis

- Verification of the curing quality of pipe liner samples
- Thermal analysis to determine the glass transition temperature of EP systems
- Standardised test method for assessing the quality of sewer lateral liners in combination of testing the Wall construction and wall thickness, if no or only small Samples can be obtained
- DSC = Differential Scanning Calorimetry

<b>Result:</b>	<b>Applicable standards / regulations:</b>
Glass transition temperature	DIN EN ISO 11357-2
Enthalpy	DWA-A 143-3



Differential Scanning Calorimetry (DSC)





## 24h creep test

- Checking the deformation behaviour of the sample over time
- Testing in 3-point bending arrangement or as a ring compression arrangement

### Result:

24h creep tendency

### Applicable standards / regulations:

DIN EN ISO 899-2  
DIN EN 761,  
ISO 7684 or ISO 10468  
DWA-A 143-3



24 h creep test

## Calcination process

- Checking the composition of the pipe liner
- A test specimen is calcined at 635 °C and the non-combustible portion (textile glass and mineral filler) is determined by weighing

### Result:

Textile glass content  
Mineral filler content  
Resin content

### Applicable standards / regulations:

DIN EN ISO 1172  
DWA-A 143-3



Calcination process

## Density measurement

- Checking the laminate quality with regard to impregnation / presence of air pockets

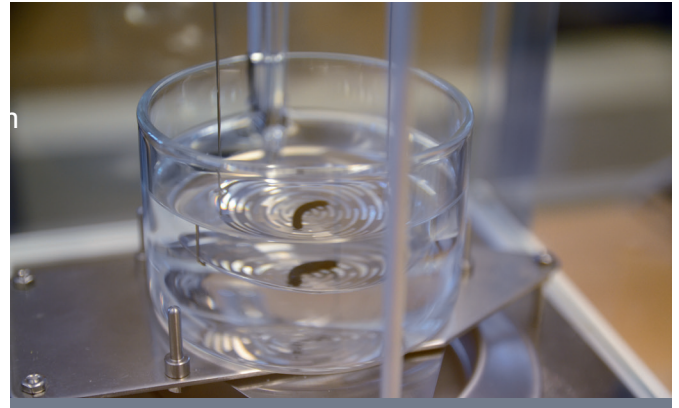
**Result:**

Density

**Applicable standards / regulations:**

DIN EN ISO 1183-1

DWA-A 143-3



Density measurement

## Spectral analysis

- Checking the conformity of the resin quality
- With the help of spectral analysis, a FT-IR spectrometer, which allows a characterisation of the used substances. A comparison of spectra is carried out.

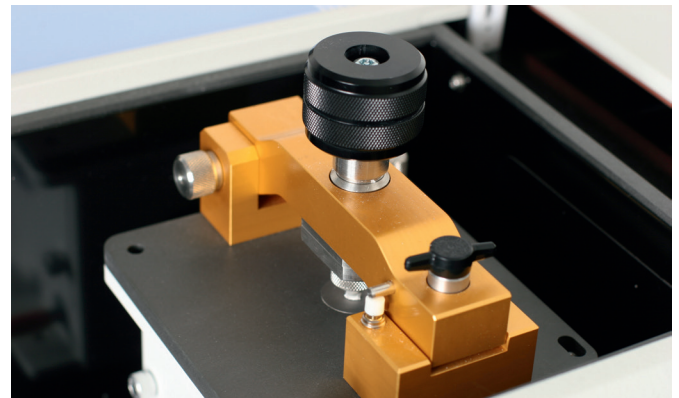
**Result:**

Specification of the resin quality

**Applicable standards / regulations:**

ASTM D 5576

DWA-A 143-3

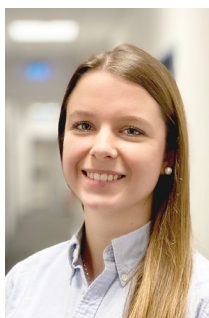


Spectral analysis

## Your contact persons



**Dipl.-Ing. Andreas Haacker**  
a.haacker@siebert-testing.com



**B. Sc. Michelle Peeck**  
m.peeck@siebert-testing.com



**B. Eng. Stefan Schwarzer**  
s.schwarzer@siebert-testing.com