

Translated from German language

Application technology
Materials testing
Quality assurance

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Test Report

Report no. 21101265

Ring gap analysis on a pipe section for the gap between the old pipe and the CIPP liner

Sample identification acc. to the information provided by the Client:

Manufacturer (liner):	Inpipe Sweden AB (INPIPE-Liner)
Material:	UP / glass fibre
Material ID:	69303
Pipe geometry:	DN 225
Pipe stretch designation:	Test pipe
Sample designation:	Test liner (in a steel pipe)
Installation date:	17.11.2021
Samples received on:	07.12.2021
Order date:	07.12.2021
Client:	INPIPE Sweden AB Ekorrvägen 12 912 32 Vilhelmina Sweden

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This report includes 4 pages (incl. this cover page) and 1 Annex page(s).
It may only be handed over to third parties in unabridged form and with the approval in writing of SIEBERT+KNIPSCHILD GmbH.
The test results relate exclusively to the delivered test specimens.
The accreditation is valid for the scope specified in the annex to certificate no. D-PL-11222-01-00
In case of doubt the German report shall be valid.

1 Task

The company INPIPE Sweden AB commissioned the engineering office Siebert + Knipschild GmbH to determine the mean ring gap between the old pipe and the CIPP hose liner on a pipe section supplied by the client.

2 Sample material description

The sample material provided to us was a ring section of a CIPP hose liner in a shell pipe with a diameter of approx. DN 225. The length of the ring section was approx. 50 cm. The shell pipe was a steel pipe with a wall thickness of approx. 3 mm. The cured CIPP liner inside had a wall thickness of approx. 3 mm.

3 Test execution

In order to determine any gap between the shell pipe and the CIPP liner the ring gap is measured in twelve positions with an offset of 30° between them. The ring gap is determined on both cutting surfaces using a feeler gauge (scaling 0.05 mm). The diameter of the shell pipe is determined all around in 60° intervals in line with DIN EN 1228.

Fig. 1 and Fig. 2 show the ring section with marks for the measuring spots on both sides.

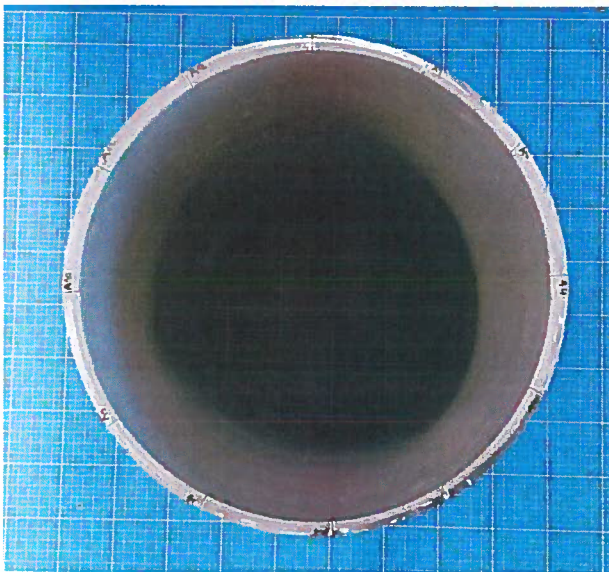


Fig. 1: Material sample 21101265 with 12 marks in 30° intervals (side A)

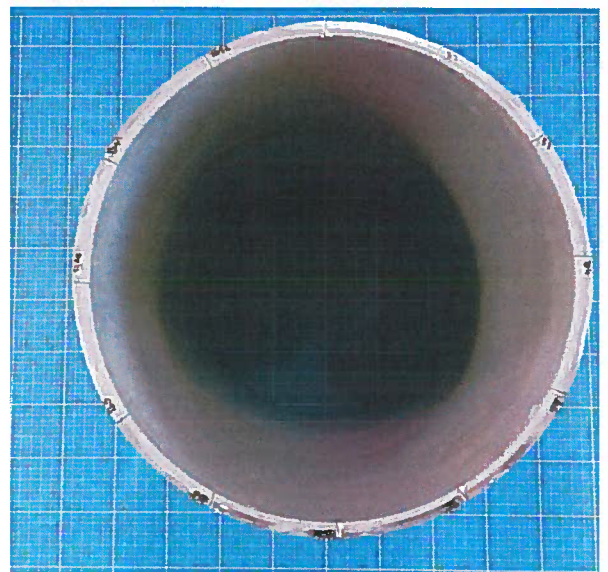


Fig. 2: Material sample 21101265 with 12 marks in 30° intervals (side B)

The gap was determined acc. to DWA-A 143-2 "Static Calculations for the Rehabilitation of Sewers and Sewage Pipelines with Lining and Installation Procedures.

Equation 1 for ring gap formation:

$$\omega_s = \frac{w_s}{r_L} \cdot 100\%$$

where:

w_s = gap width between liner and old pipe (ring gap)

r_L = outer radius of the liner

ω_s = gap formation

4 Results

The table below shows the measurement results for the ring gap w_s . The ring gap was determined all around in twelve measurement spots with a 30° offset between them on both sides of the ring section. The diameter of the old pipe (steel pipe) was determined all around in 60° intervals on both pipe sides in line with DIN EN 1228.

Table: Summary of test results (mean values):

sample designation	test date	ring gap w_s [mm]	inner liner diameter d_{iR} [mm]	gap formation ω_s [%]
test liner (in steel pipe)	10.01.2022	0.00	223.98	0.00

The test log is enclosed as Annex.

5 Evaluation of results

On a ring section we determined the ring gap between an INPIPE liner and a steel pipe. On the basis of the measured results we can derive information on the shrinkage behaviour of the hose liner when it cures.

The static calculations on the rehabilitation of sewers and sewage pipelines by hose lining were made acc. to DWA-A 143-2. Before the start of rehabilitation a theoretical gap formation of $\omega_s = 0.5 \%$ is assumed as a safety parameter. During installation after inflation the liner shall be in full contact with the old pipe and shall not leave a planned gap. The ring gap to be taken into account in static calculations results from the thermal and chemical shrinkage of the resin system.

On the INPIPE liner in a steel shell pipe that was provided as sample material we could not determine any ring gap nor gap formation. The hose liner is in full contact with the shell pipe.

Oststeinbek, January 11, 2022



Technical Director
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Annex: measurement log



Tester in charge
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