



37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

Fortezza da Basso • FLORENCE (Italy)

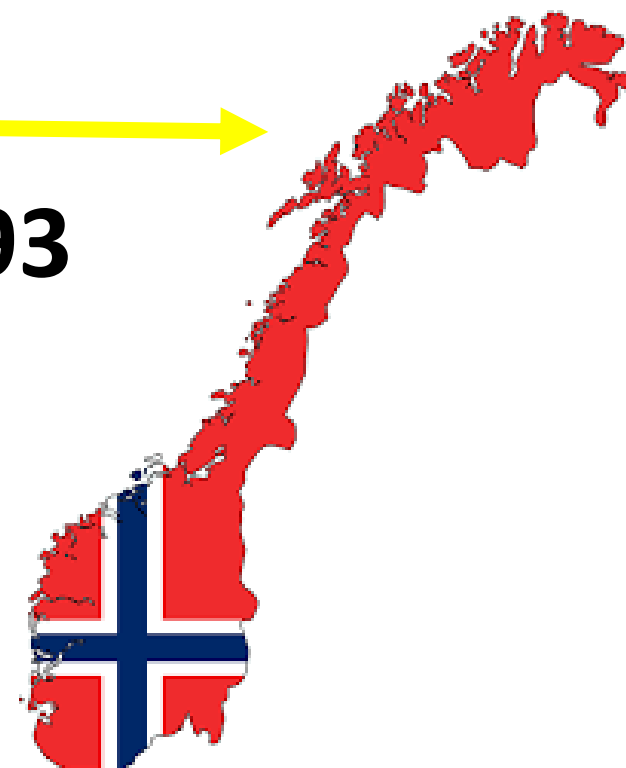
30th September • 2nd October 2019

EXPERIENCES WITH REHABILITATION OF POTABLE WATER PIPES
IN NORWAY

HENDRIK PANMAN



1993



Hendrik Panman - 1967



Scandinavian Society for Trenchless Technology

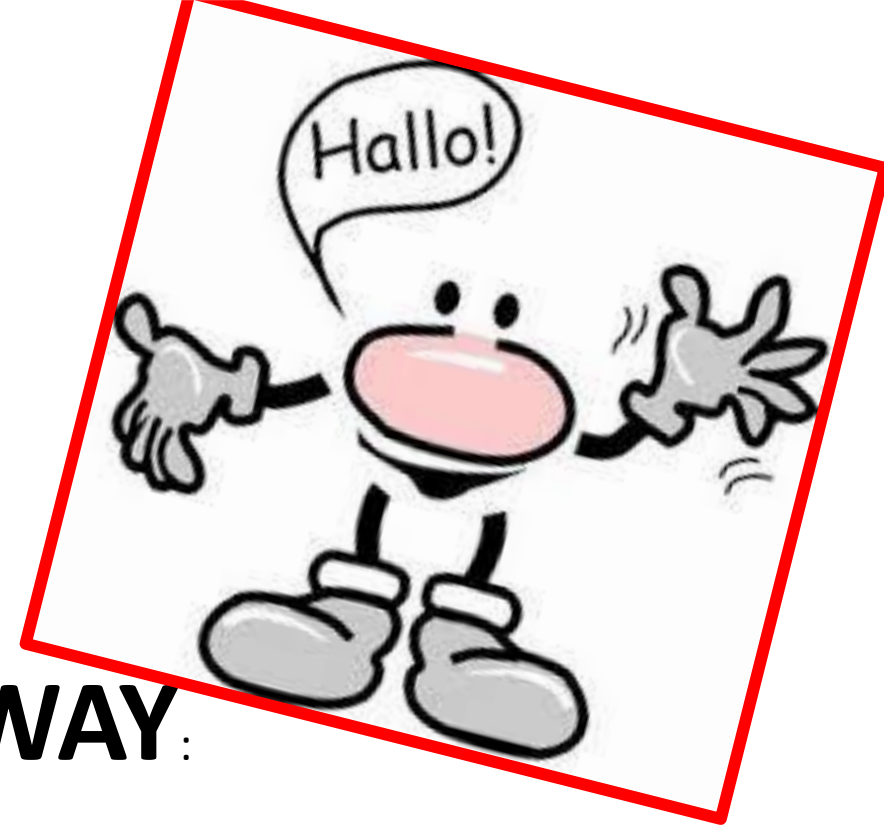
Hello!





NORWAY:

5 Million People



NORWAY:

- 2 % Settlement
- 4 % Agriculture
- 82 % Nature
- 11 % Lakes - swamp
- 1% Ice







Relineeurope and Kjeldaas have set up a new Alphaliner record:
352 m Alphaliner500G with a wall thickness of 6,5 mm
installed and cured by REE 4000 Professional
in one installation step!

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Kjeldaas

RELINEEUROPE®



INE

HALLO



PRIMUS  LINE





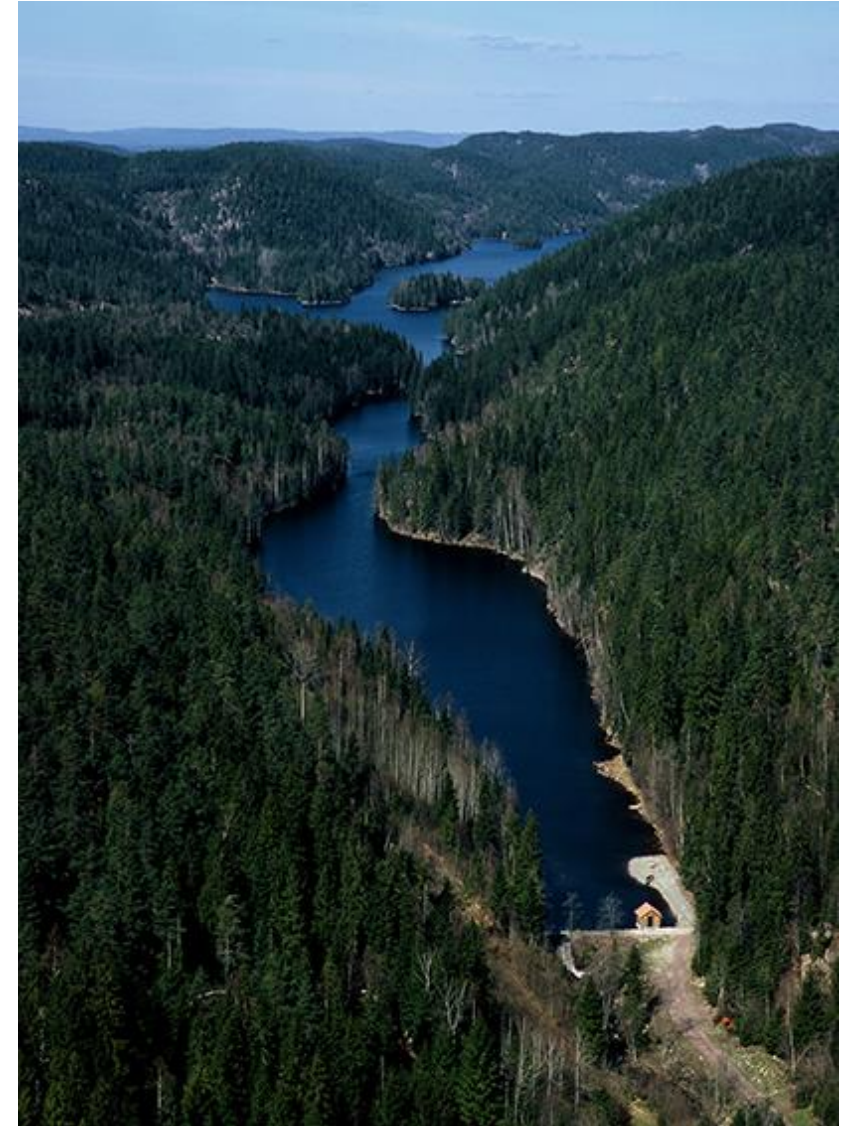




hallo!

Where do we get the water

- Lakes 90 %
- Borehole 10%
- 96% People get from public water works (1011)
- 4% People get from private water works (570)

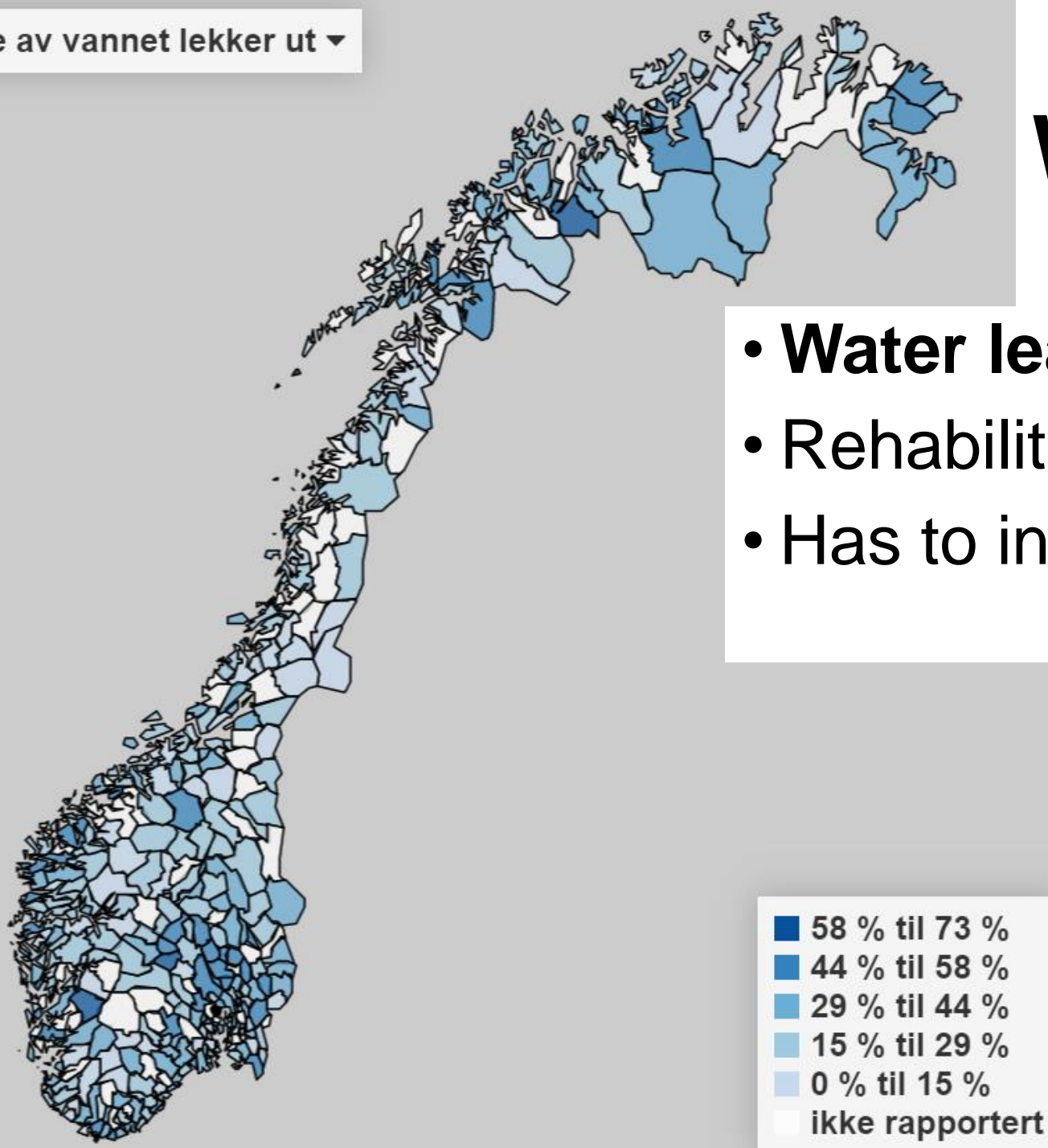


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Så mye av vannet lekker ut ▼

Water loss Norway

- **Water leakage 35%**
- Rehabilitation 0,7%
- Has to increase 1,2 % up to 2040



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Manholes

- Valves
- Fire hydrants
- Frostdepth 1,8 meter



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2012 Start CIPP - UV

- April → 2nd hand truck
- Mai → IFAT - robotics
- Mai → Training at BKP Berolina
- Juni → First installation



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The world's first UV-light-cured GRP-liner for potable water pipes



Sande
Asbestos
DN250
500 meter
2 sections

May 2016



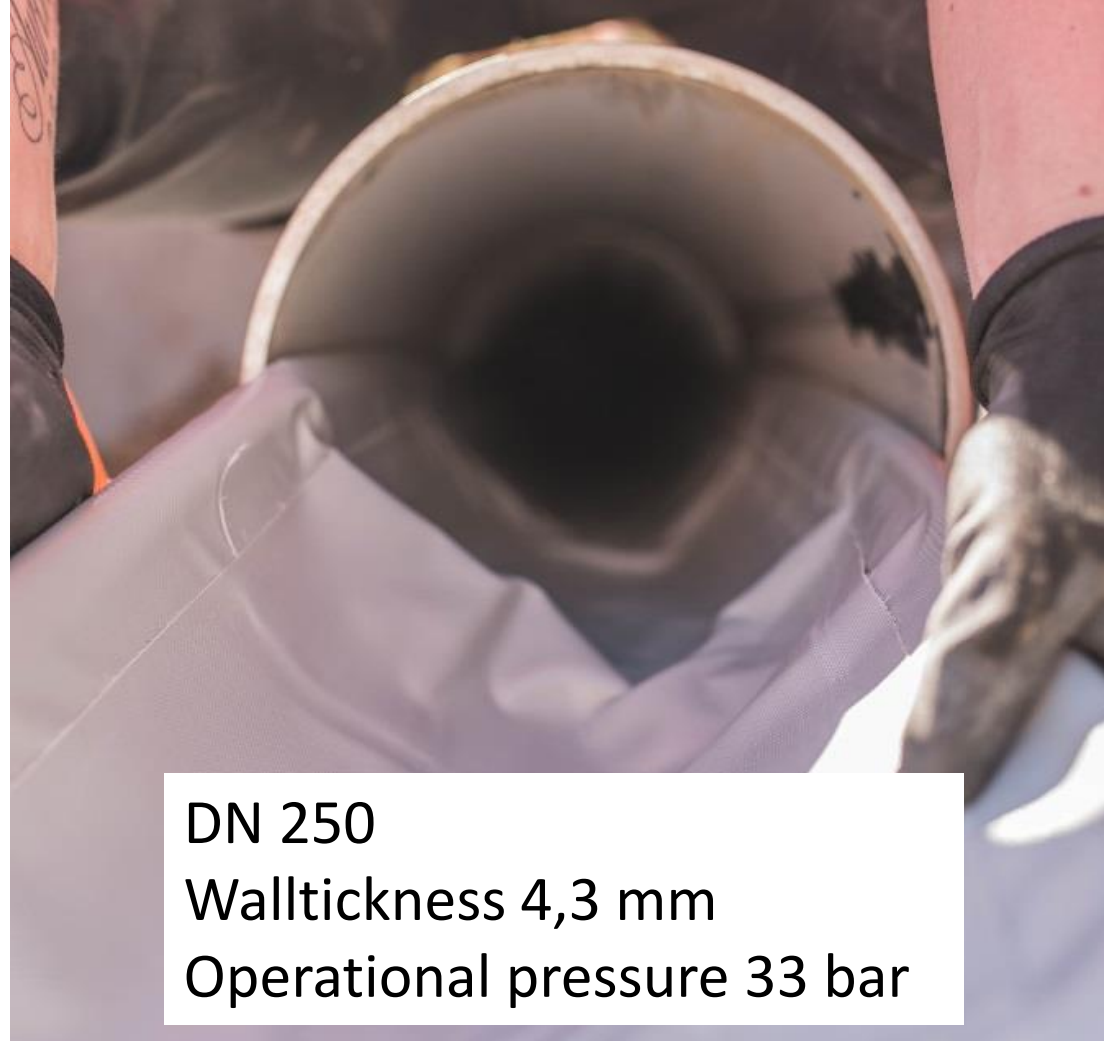
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250 meter liner in the box



UV cured



DN 250
Wallthickness 4,3 mm
Operational pressure 33 bar

The Kjeldaas and SAERTEX multiCom® team presenting the product at IFAT

IFAT 2016



Saerbeck, September 2016

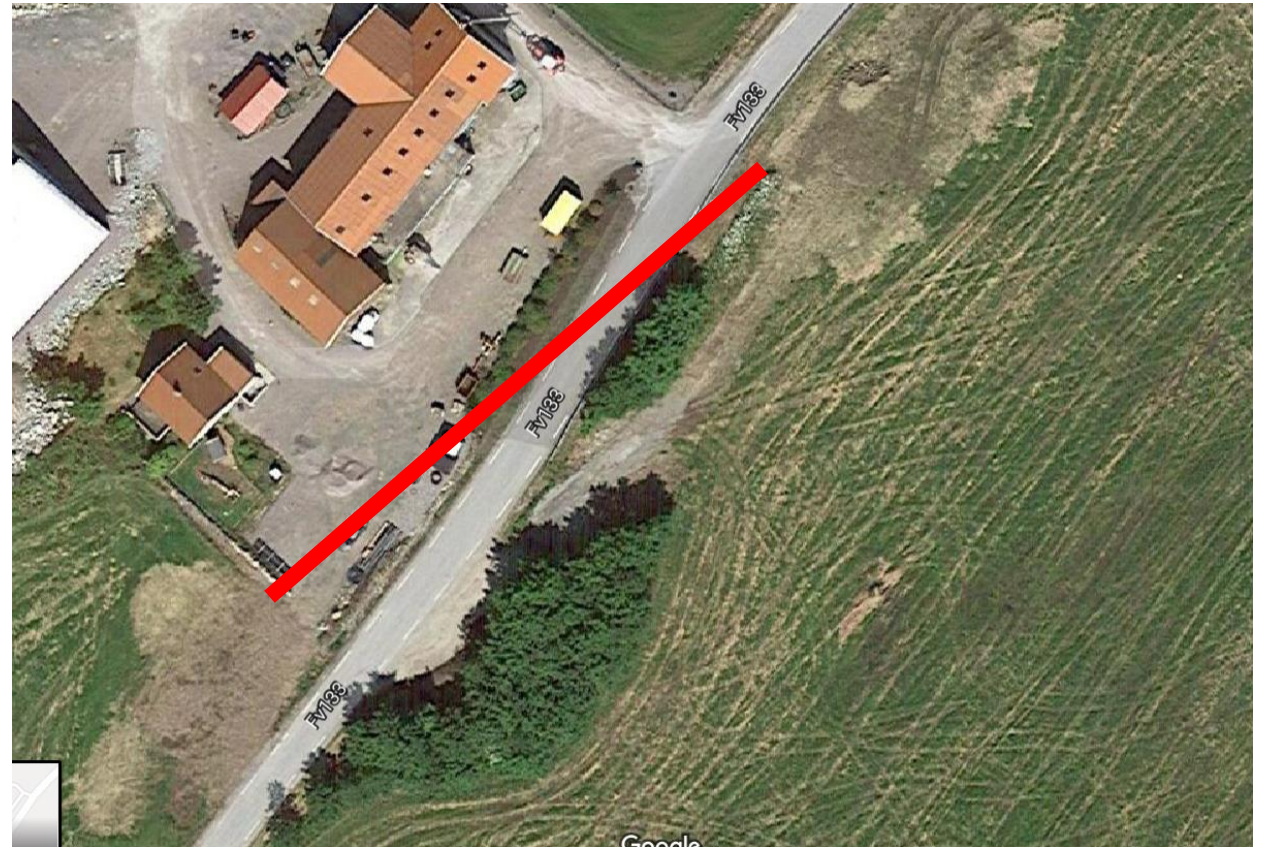
Norway is one step ahead of the rest of Europe with its trenchless rehabilitation of an asbestos cement potable water pipe with the SAERTEX-LINER® H₂O



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Stavanger Concrete DN900 75 m

June 2017



Kjeldaas



DN 900 – wallthickness 8,3 mm – structurall strength – operational pressure 7,9 bar



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I·V·A·R



SAERTEX
multiCom **H₂O**

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Saerbeck / Stavanger, 14 Juni 2017

Unique worldwide: Tab connection
succesful installed to a
rehabilitated potable water pipe!

Lærling med på verdenspremiere

Vannspeilet 3-2017

Vannspeilet 3-2017



“Trainee on the world premiere”



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Holiday 2017 – biking along the west coast of Norway

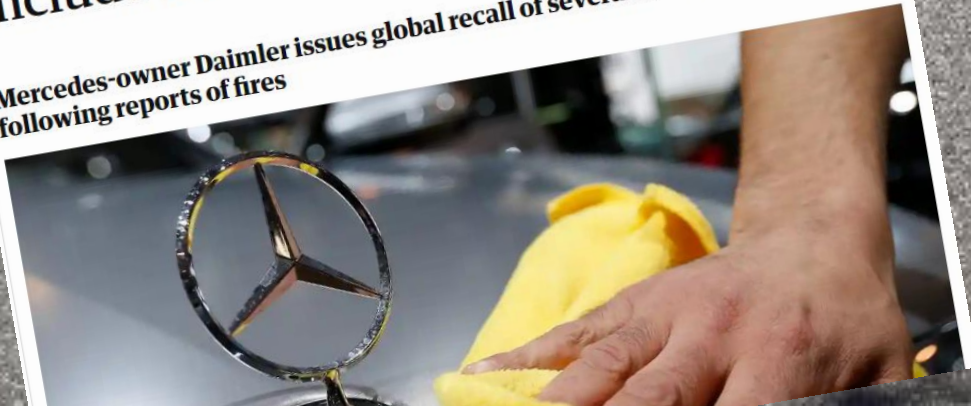


Apple innrømmer iPhone-feil: Telefoner skruer seg plutselig av

Har du opplevd at iPhone din tar tidlig kvelden, selv om det er mye batteri igjen?
Apple lover nå å fikse telefonene de mener er rammet.

Global recall of 1m Mercedes cars 'could include 75,000 in UK'

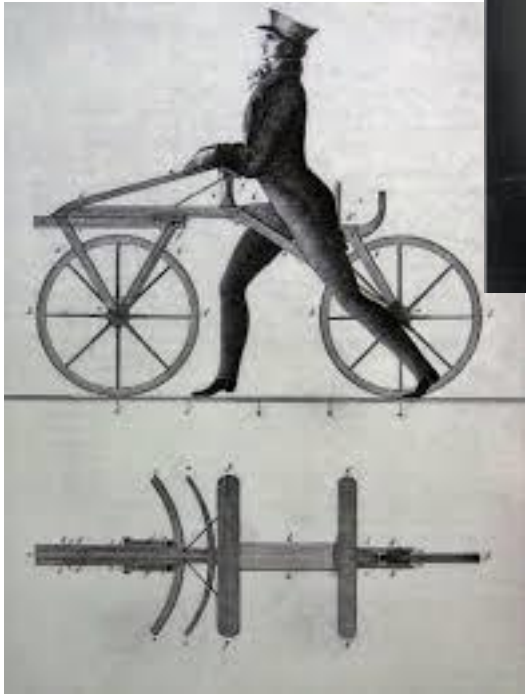
Mercedes-owner Daimler issues global recall of several models
following reports of fires



Tesla tilbakekaller 11.000 biler av typen Model X

Årsaken er feil med bilsetene, sier Tesla i en melding til CNBC.





Imagine a world without innovation



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Good information – take responsibility



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March 2018



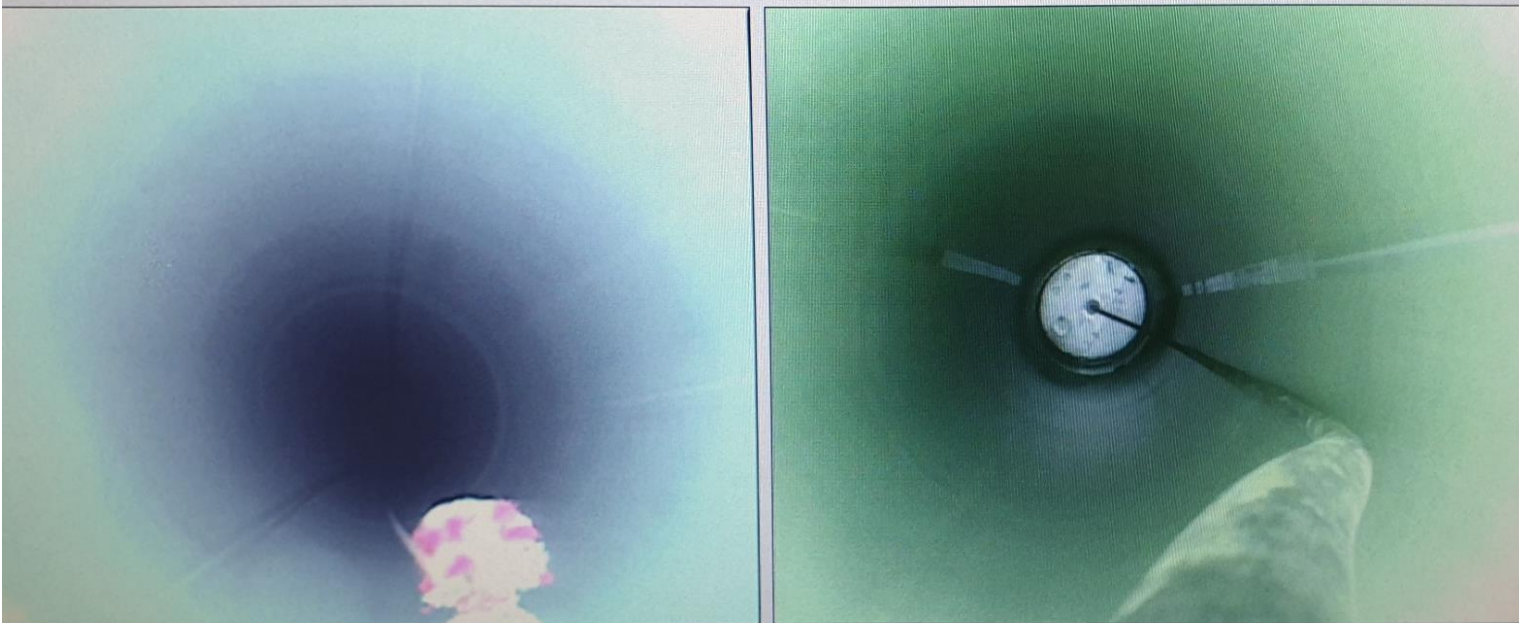
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**Curing
DN 900
8,3 mm
120 meter**



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SAERTEX
multiCom^{H₂O}



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Drammen Iron cast DN 600 - 860 meter

Omfattende vegarbeider i Rosenkrantzgata i sommer

Informasjon

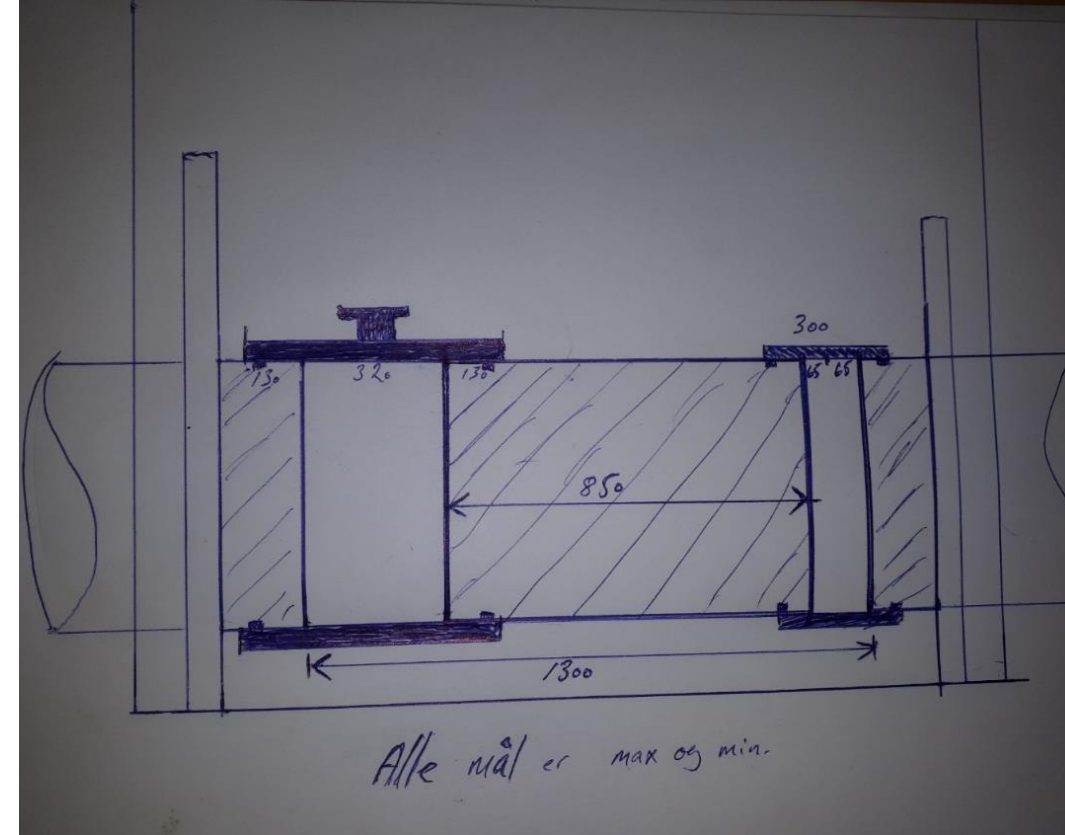
Juni 2017



August 2017



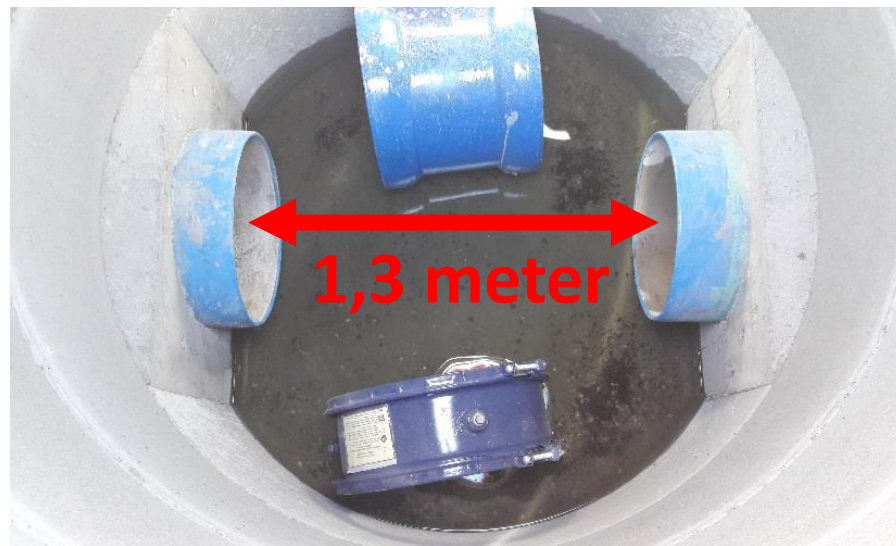
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Manhole production «on side»



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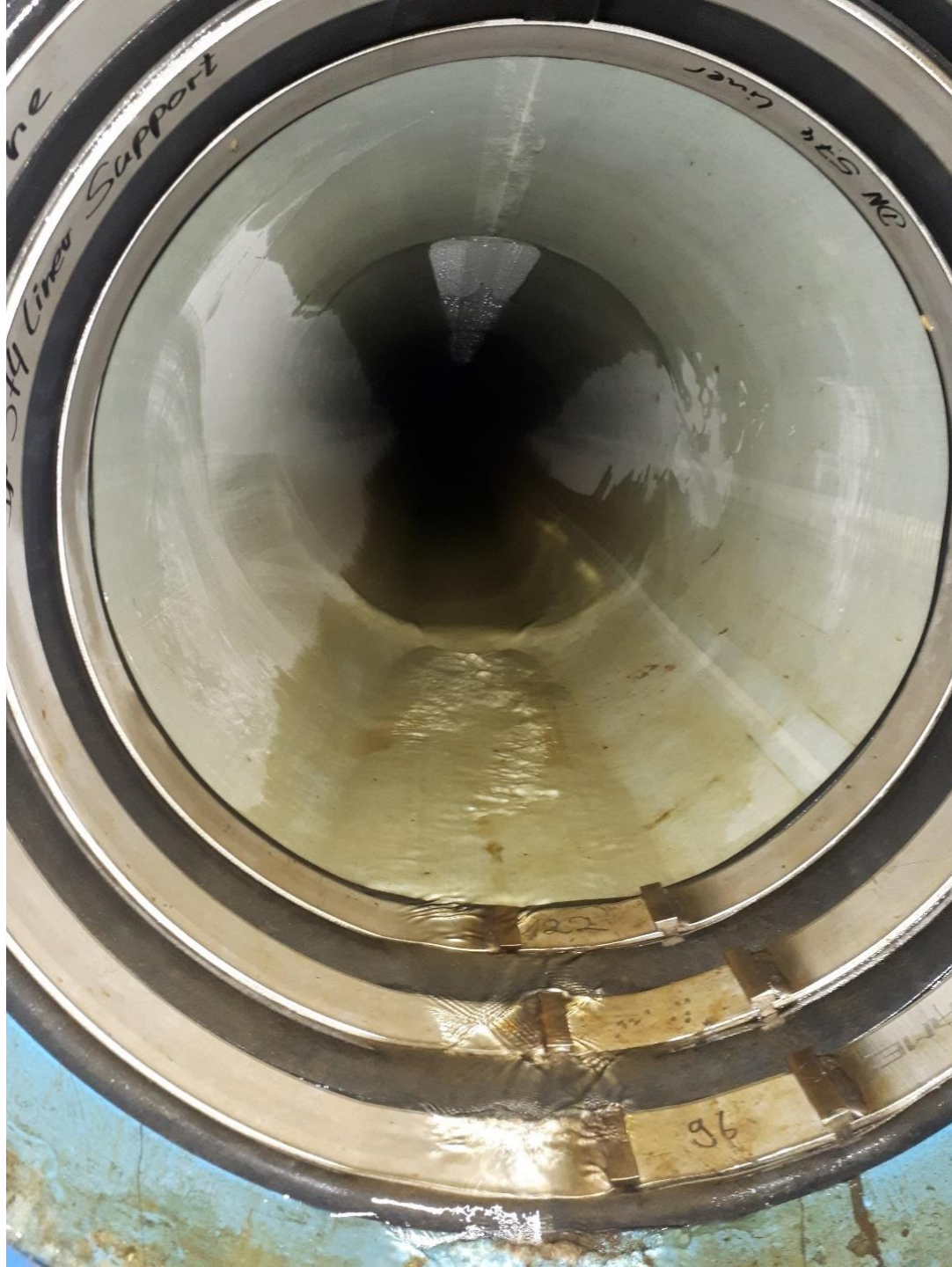


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Longest installation 265 meter DN 600



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PVC DN 280

350 meter



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New record???
350 meter
one section



December 2018



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Shooting a mouse with a canon



Seartex H2O liner
DN 250 – 4,3 mm
8 kg pr meter



Swivel



Pulling force 10 tonn



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Asker Iron cast DN 200 GRP flange 50 + 75 meter

RELINTEAPTEC
Advanced Liner for Pressure Pipes



Certified to
NSF/ANSI 61

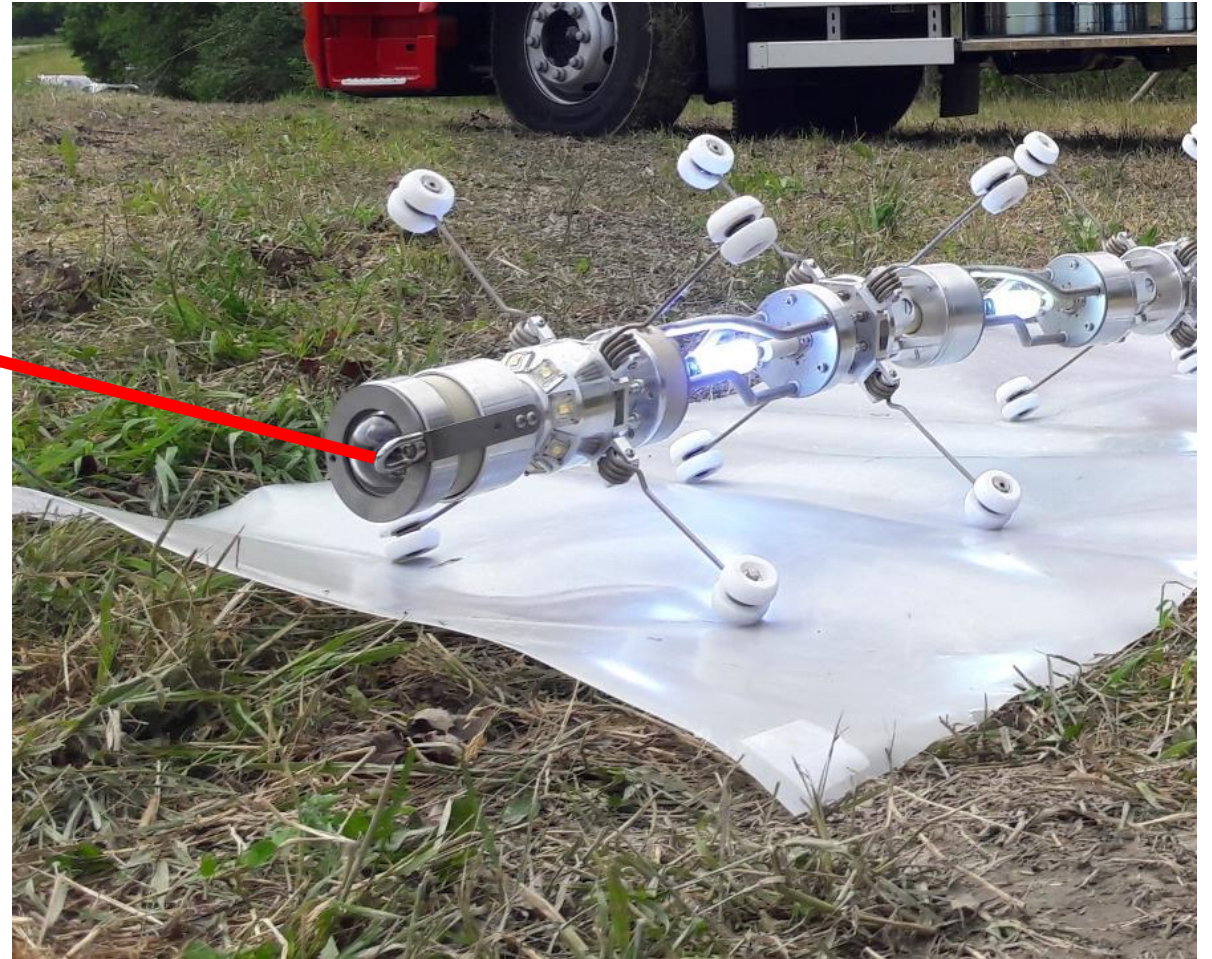
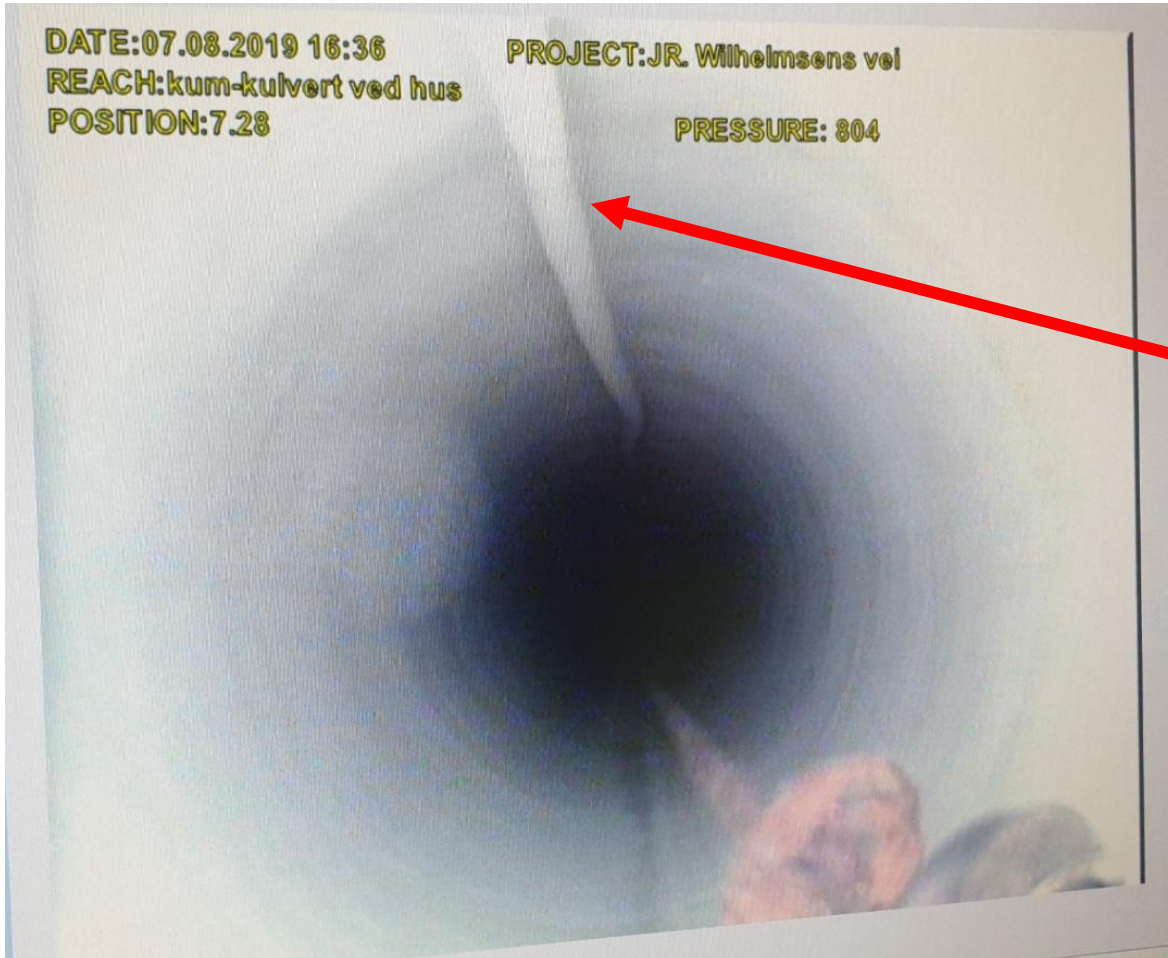


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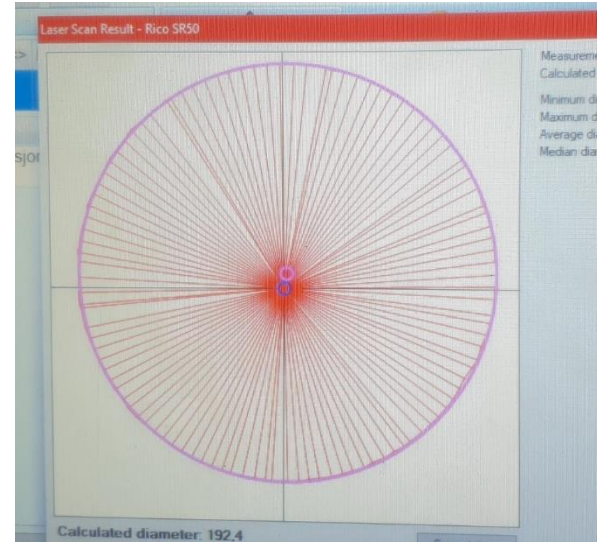
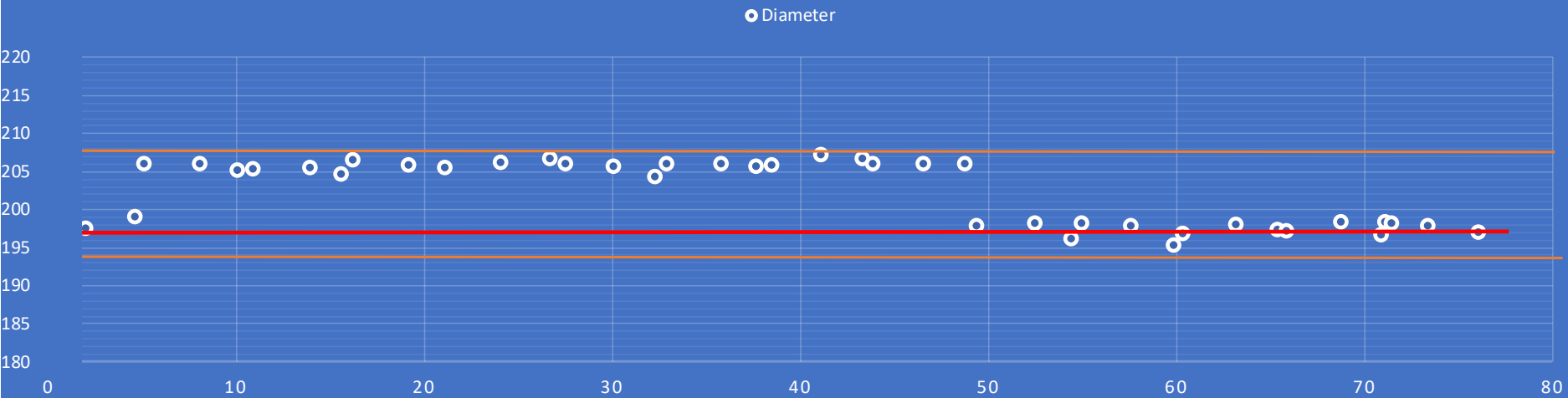
You see what you get



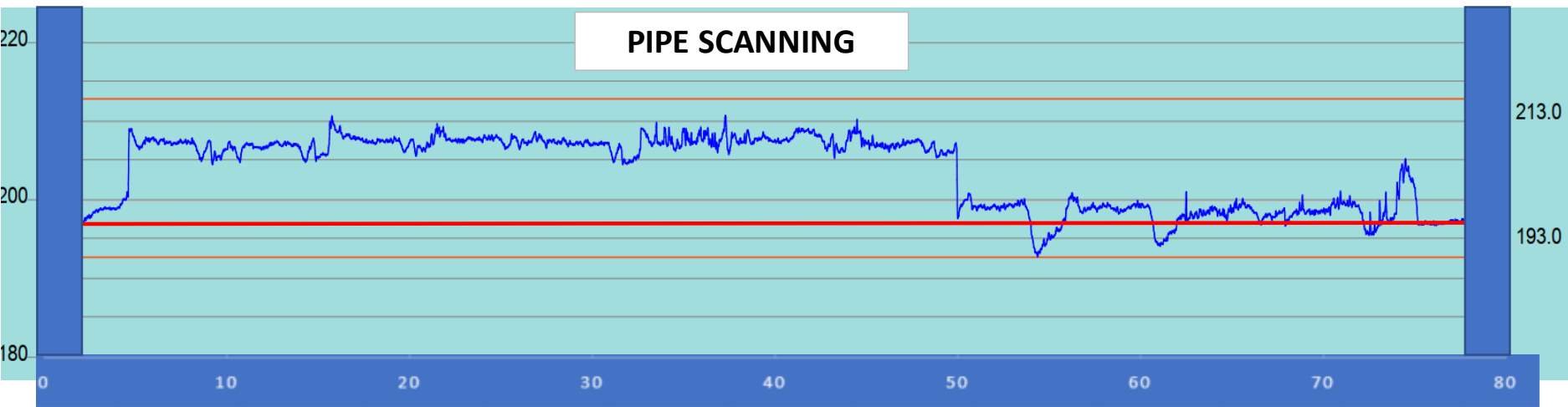
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POINT MEASUREMENT EVERY 3 METER



PIPE SCANNING



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Advantage with the GRP flange

“One small step for man, one giant leap for mankind”



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Advanced Liner for Pressure Pipes



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GRP liners do not like bends





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Sørum
PVC
DN 150
165 meter
1 section
2 bends

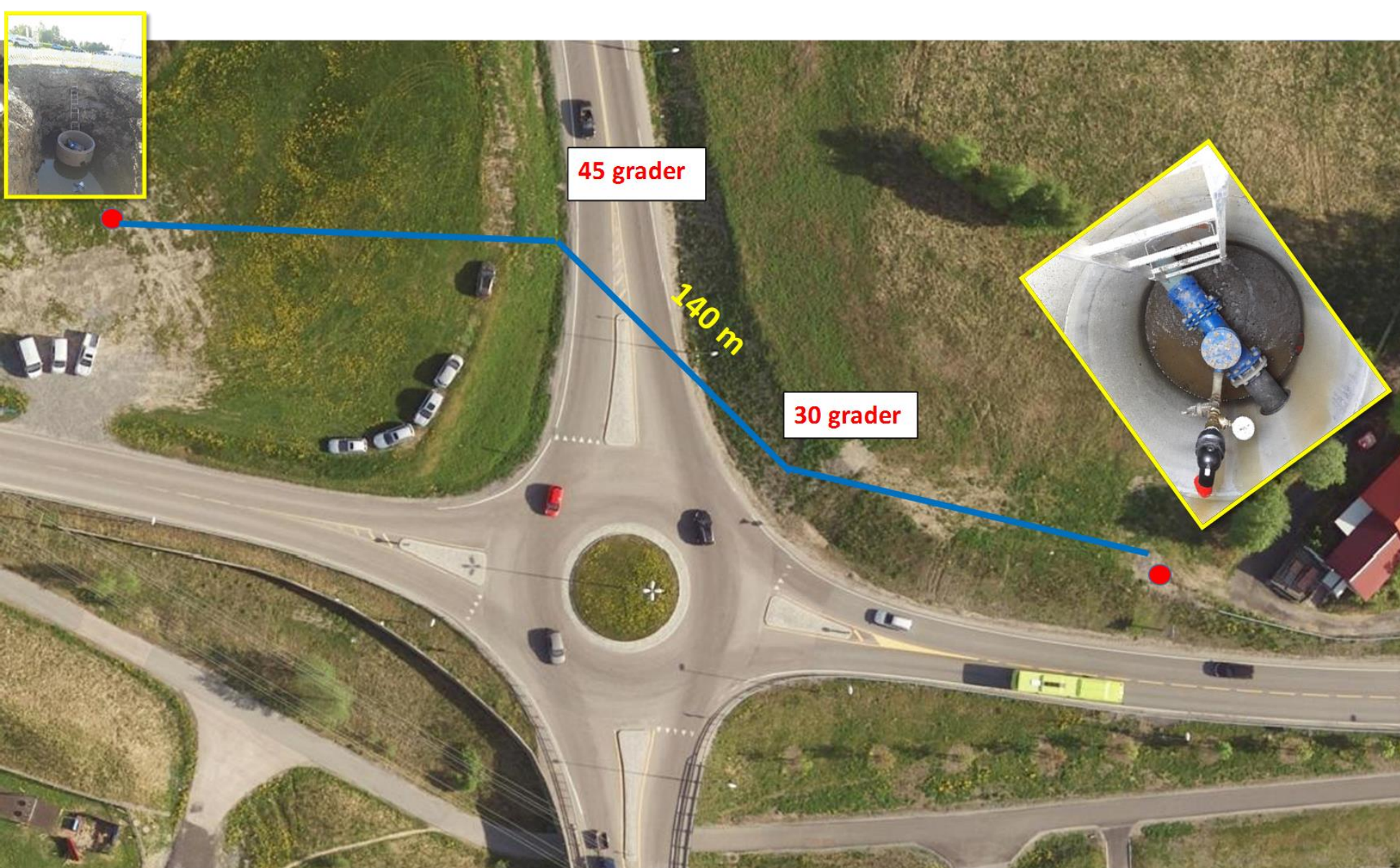


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The prime solution for pipes.

Kjeldaas





Ås
Asbestos
DN 150
140 meter
1 section
2 bends

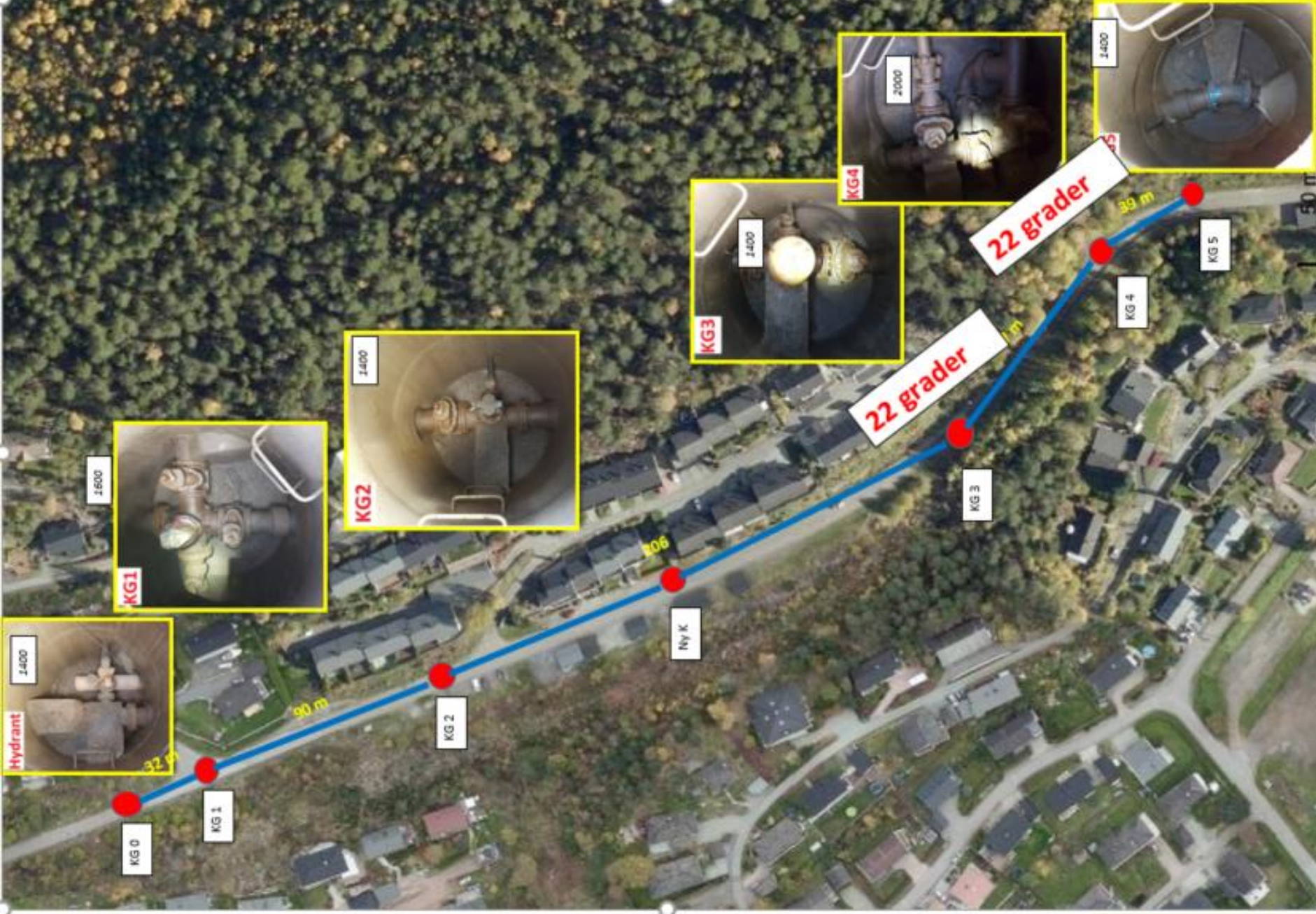
PRIMUS  **LINE**
The prime solution for pipes.

May 2018



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**Sande
Asbestos
DN 200
430 meter
1 section
2 bends**

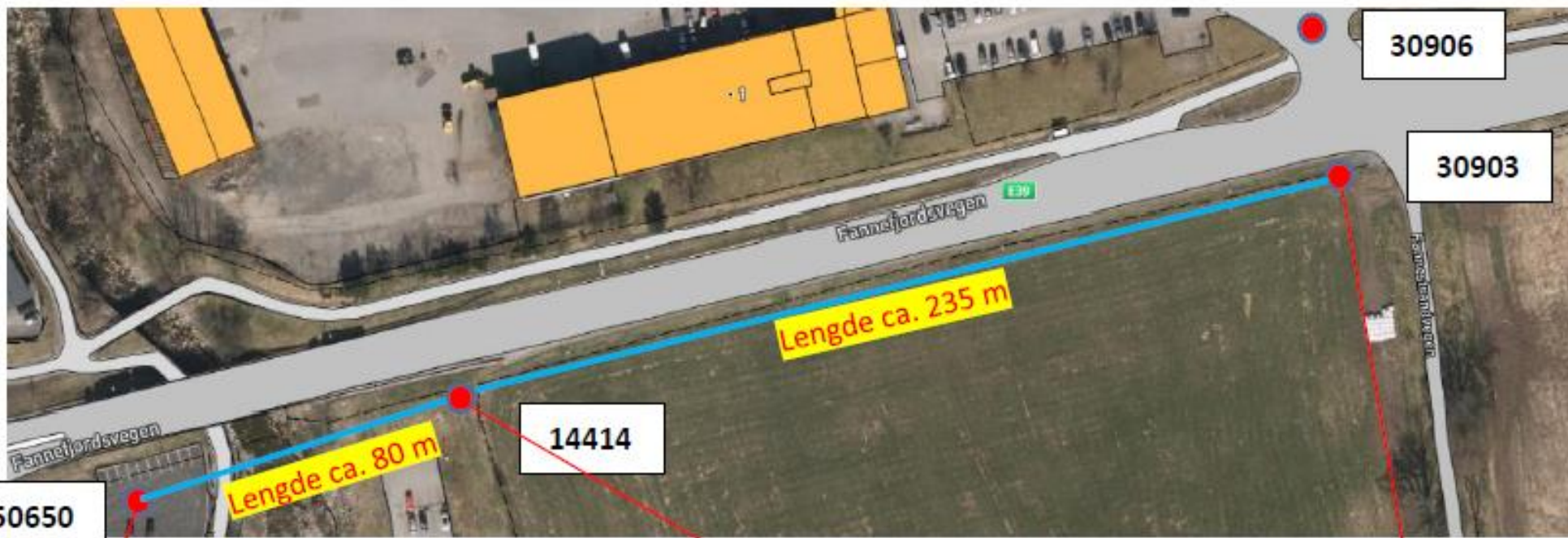


PRIMUS LINE
The prime solution for pipes.

August 2018



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Molde
Asbestos
DN 150
315 meter
1 section
2 bends



Sarpsborg
Iron cast
DN 500
630 meter
1 section
4 bends



PRIMUS  **LINE**
The prime solution for pipes.



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Avavi as
16.01.19 11:13 F 0.00 P -1.2° R -1.0°
Sarpsborg Baterød Vannverk
E < G
Stål sirkulært 500



DN 500

Before scraping



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«Potable» water?



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27.02.19 12:39 F 0.00 P -4.1° R 12.3°
Batterød
E -> A
Støpejern, grått 500

DN 500

After scraping

19.8m 2.0bar 11.39_{min} 12:00↑ Y -135°↙



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Length transport reel – 6 m



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Calibrating



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Assembling connector



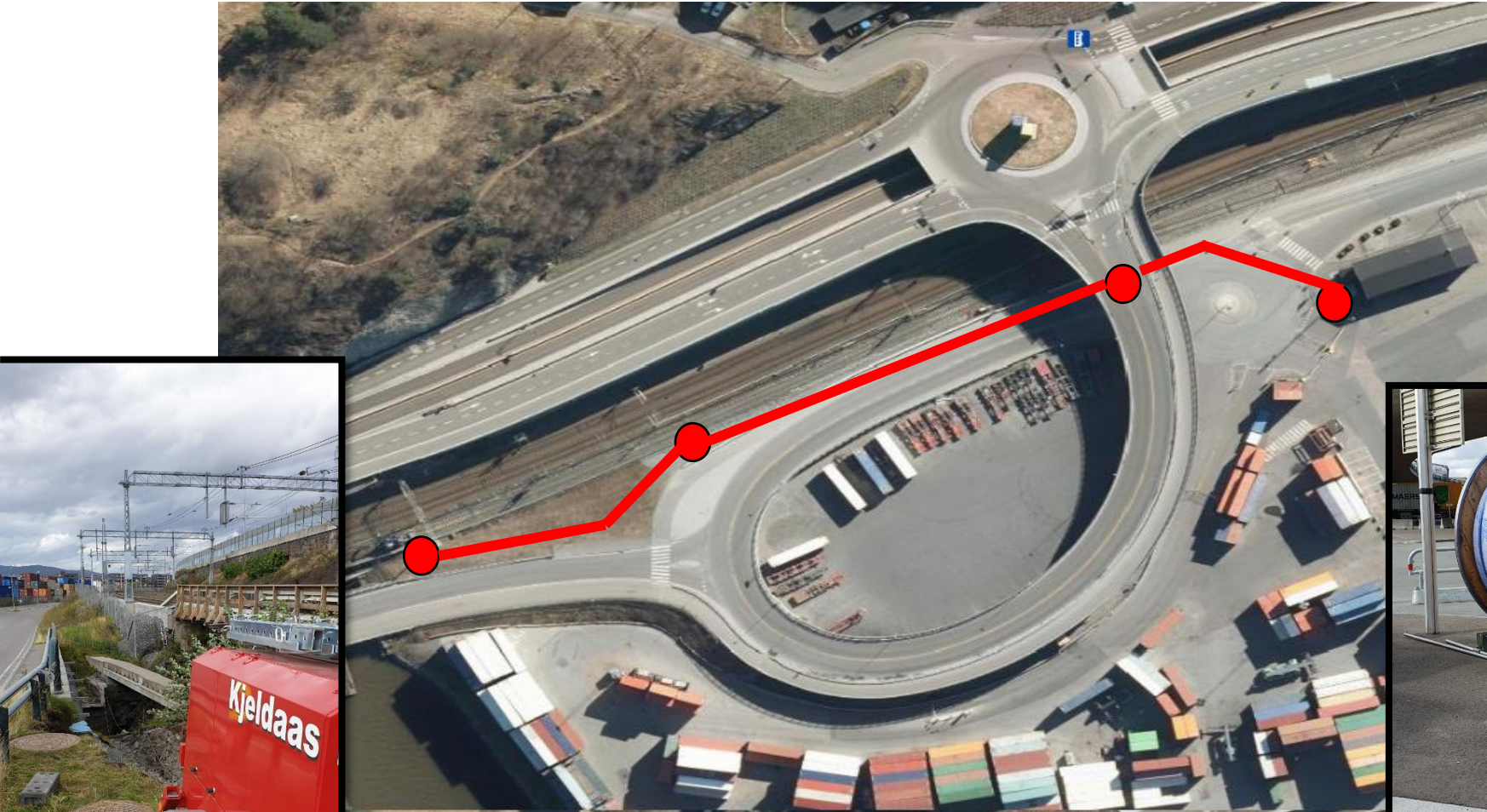
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Primus Line connector DN 500



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Oslo
DN 300
230 meter
1 section
2 bends



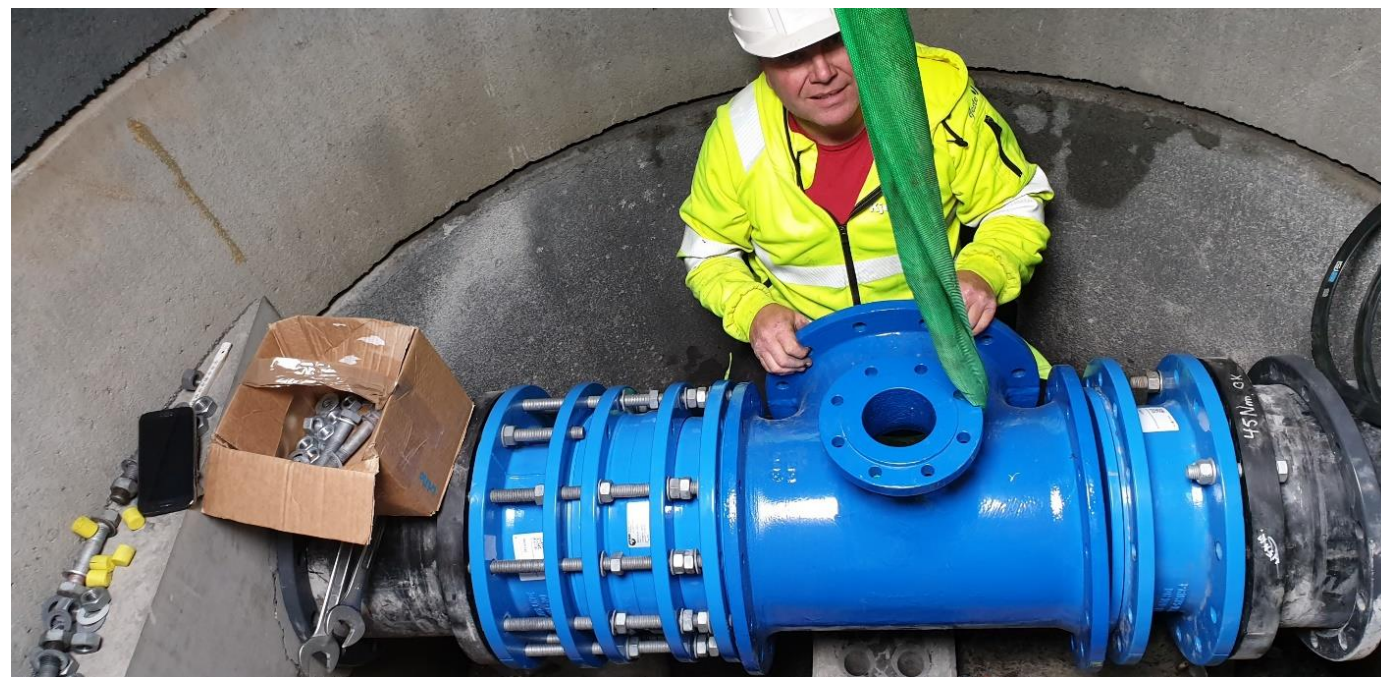
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Manhole C

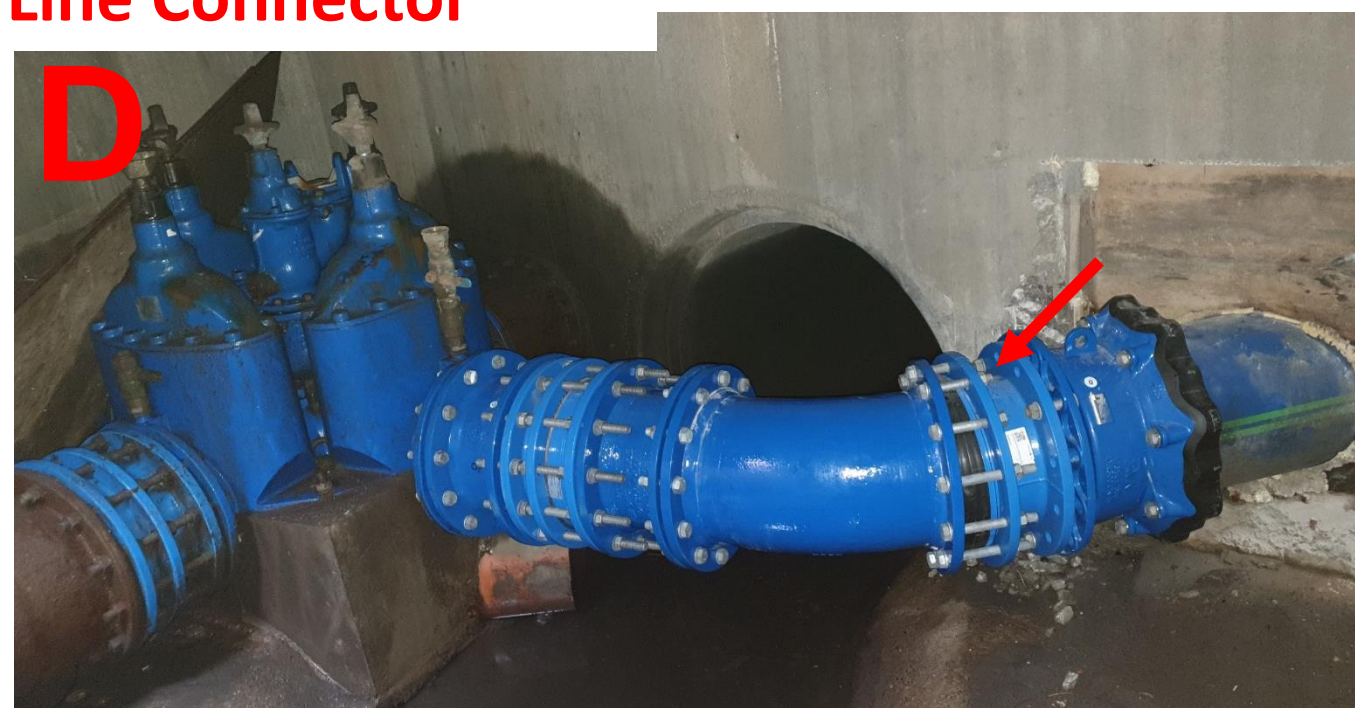
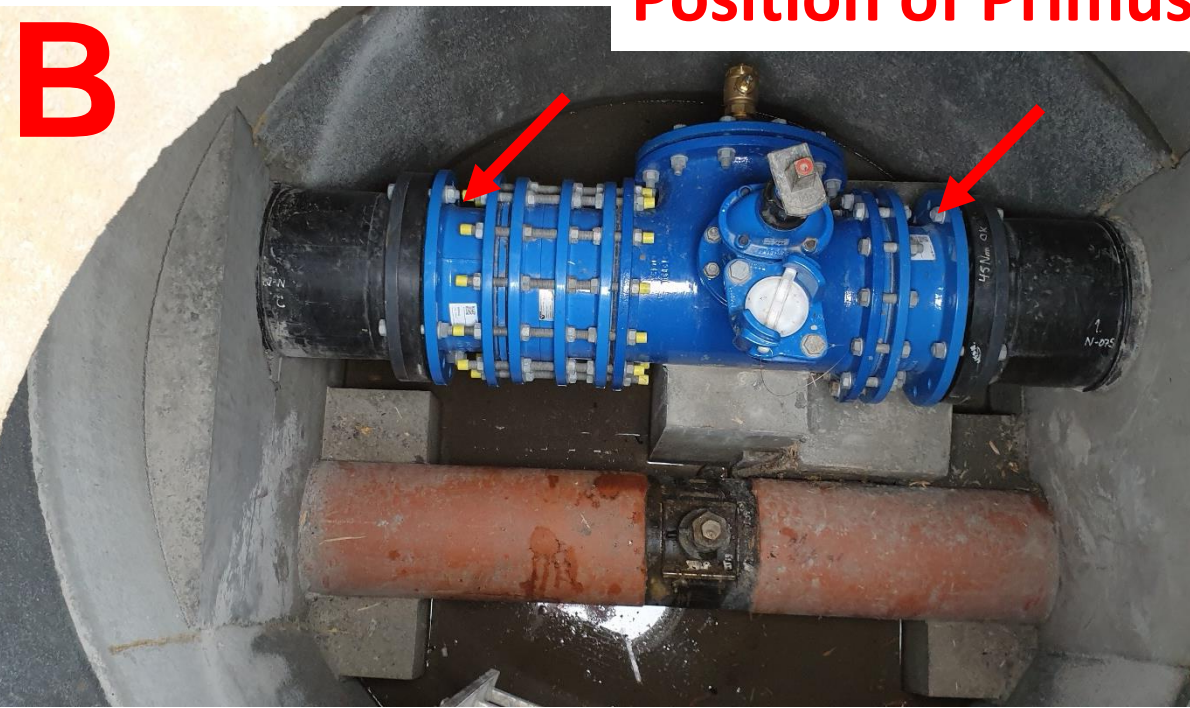
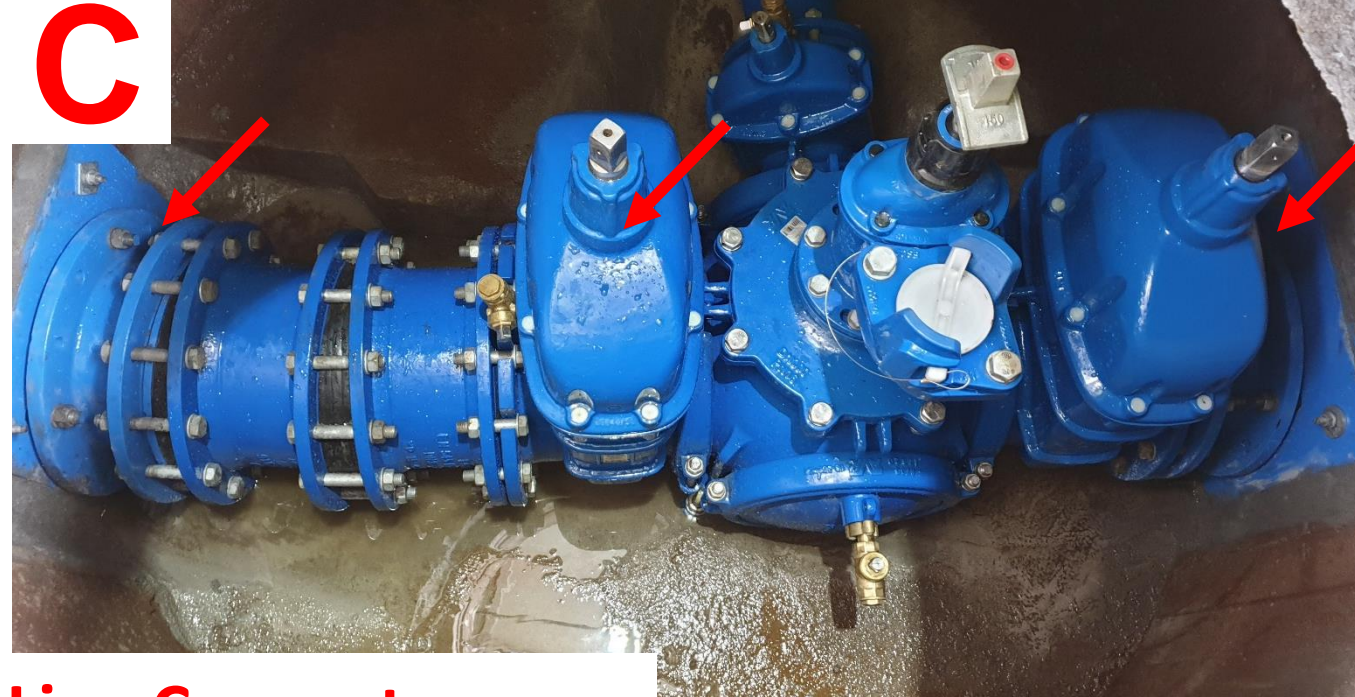




Assembling



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Position of Primus Line Connector

PU coating



PU rigg

Activator and Base



Airmotor



Bitumen in the pipe



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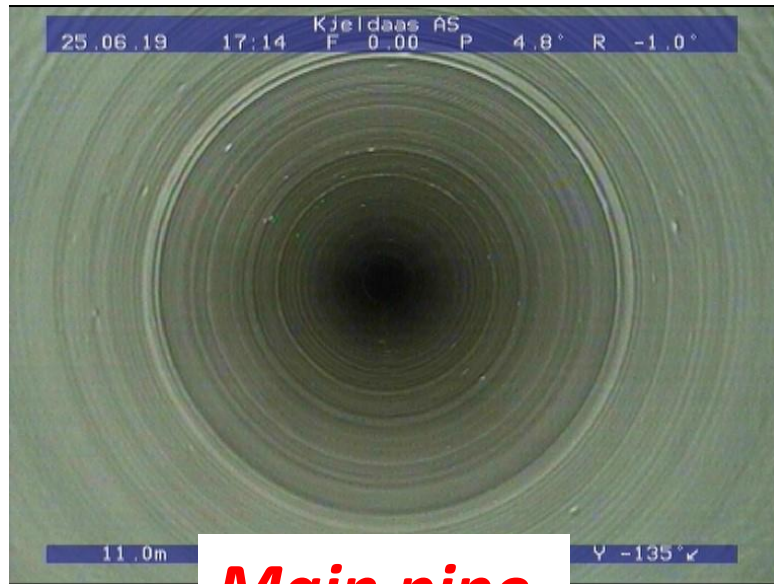
Weight check of base and activator



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House connection



Main pipe



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Such a feeling's comin' over me



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There is wonder in most every thing I see



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Not a cloud in the sky, got the sun in my eyes

And I won't be surprised if it's a dream



Everything I want the world to be



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Is now comin' true especially for me

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Advanced Liner for Pressure Pipes



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And the reason is clear, it's because you are here



You're the nærest thing to heaven that I've seen



SAERTEX
multiCom **H₂O**

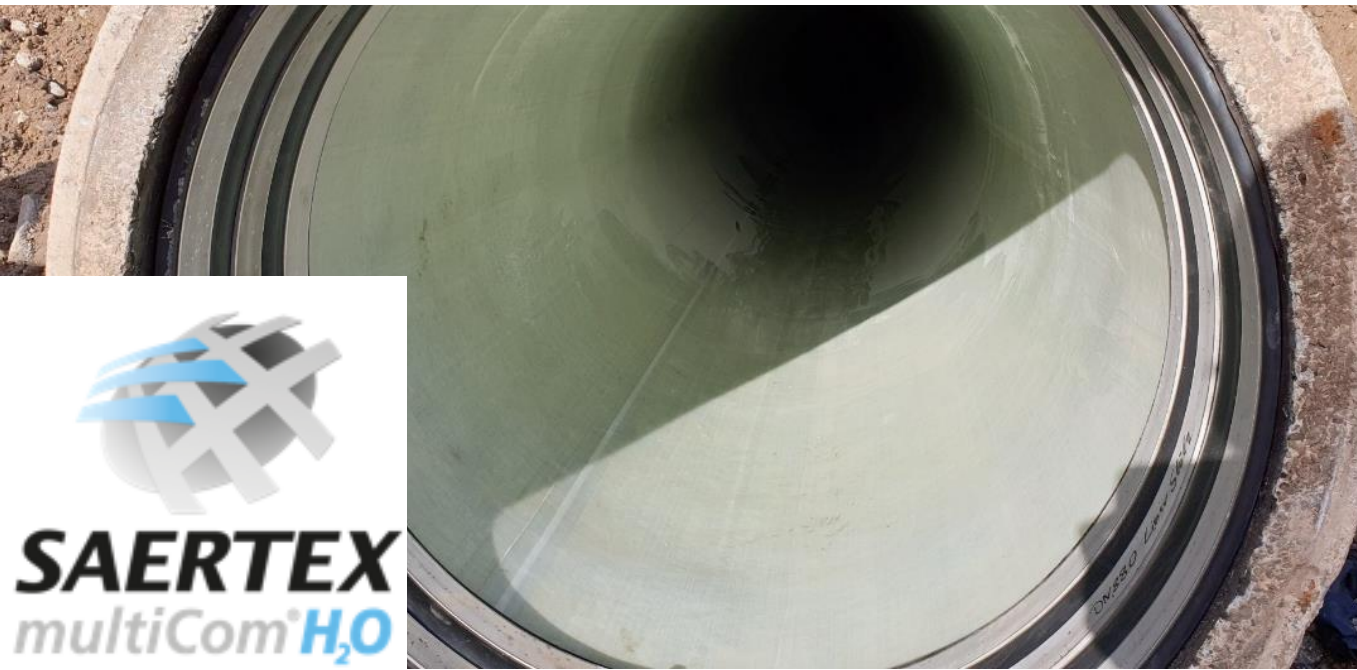


I'm on the top of the world lookin' down on creation

And the only explanation I can find



Is the love that I've found ever since you've been around



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Your love's put med at the top of the world

Thank you



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