Innovative piping system in COOL DH

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Low temperature District Heating - norms and standards

AS-IS: Standard pipe systems today is preinsulated steel pipes.

- Steel service pipe, minimum 30 years service life, continuous operation 120 ^{0}C and peak temperature of 140 ^{0}C
- Minimum requirements to the preinsulated components and system is defined in the European standards

TO-BE: With a low temperature system running between 55 -85 ^{0}C the calculated theoretical life time of the pipe system is beyond 1000 years.

- For a low temperature 4th generation District Heating system this is over engineered and too expensive. We need to start pushing for updated standards to fit the real needs

European standards for preinsulated pipe systems

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- EN253 – pipes
- EN448 – Fittings
- EN488 – Steel valves
- EN489 – Joints
- EN15698 – Twin pipes (part 1 and 2)
- EN13941 – Design and installation
- EN14419 – Surveillance system
- EN15632 – Flexible systems
  - Part 1 – general and test methods
  - Part 2 – Bonded plastic service pipes
  - Part 3 – non bonded system with plastic service pipes
  - Part 4 – Bonded system with metal media pipes

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“Bubbles/new ideas” that is being evaluated and proven/tested by field test

New service pipe material on flexible pipes- PE-RT

Better insulation properties

Collect and reuse heat loss from straight pipes – multi pipe system

New connection methods on flexible pipes– welding

Alarm wires for leak detection together with plastic service pipes

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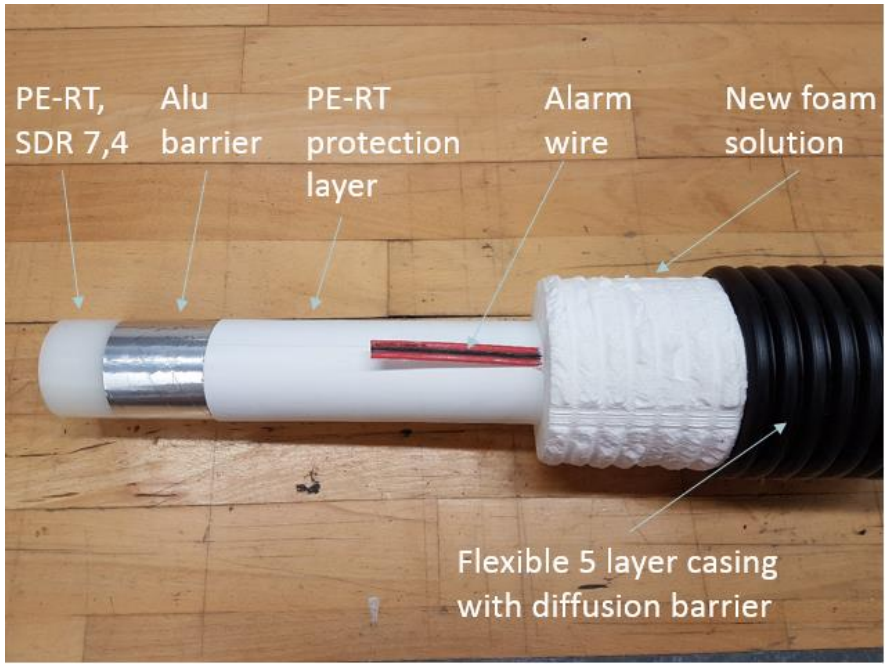
New developed service pipes for flexible pipes- PE-RT

New service pipe material on flexible pipes- PE-RT

Aim:

- Flexible pipes that can be **welded together** in 100 m length as well in 12 m length.
- With oxygen and water **vapour barrier**.
- Can be in **different pressure classes and temperature limits like PEX** – here 10 bar, max. 65 ^{0}C
- Service pipe dimensions **up to D110 mm**.

- D32 mm and below: **a multilayer AluPERT pipe – within the flexible standard EN15632**
- Above D32 mm: **a mono layer AluPERT pipe. Fully tested according to the flexible standard – but outside anyway**



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New connection methods for flexible pipes– welding

New connection methods on flexible pipes– welding

Aim:

- Usage of existing press and compression couplings available on marked today
- Pipes that can be welded together
  - Butt/mirror welding – single pipes
  - Electrofusion welding. Still in progress as no supplier today offer this in the right material!

Still under development:

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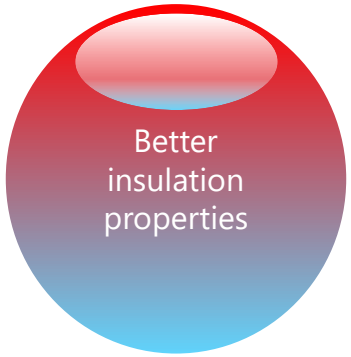
Development of better insulation properties



Aim:

- Improve the heat loss by new insulation properties with **lambda reduction of 0,001 - 0.002 W/mK**
  - **We have reached this – equal to an average heat loss reduction on up to 8-10 % compared to today. – Lambda 0,020 W/mK**

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Alarm wires for leak detection together with plastic service pipes

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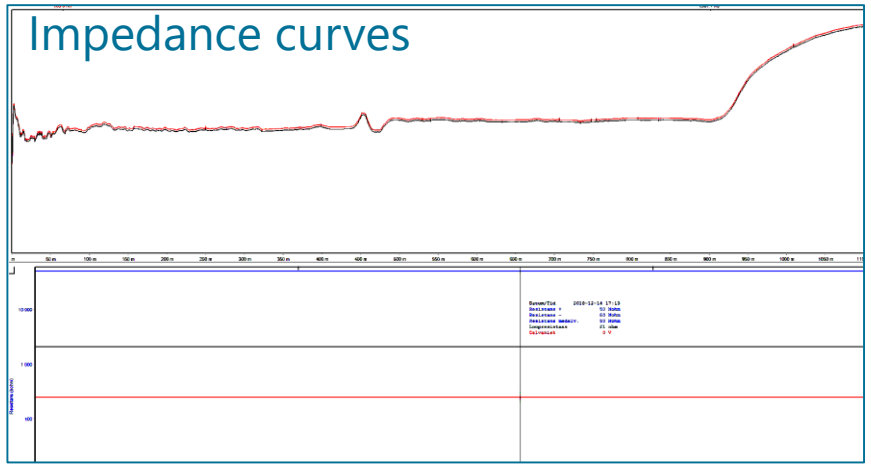
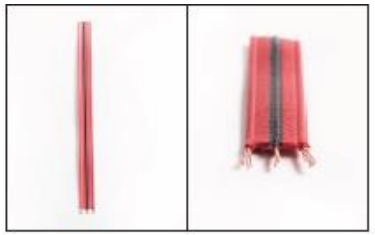
Aim:

- Offer leakage **alarm system** for pipes with plastic service pipes
- Ensure performance and **minimum heat loss** for the full lifetime





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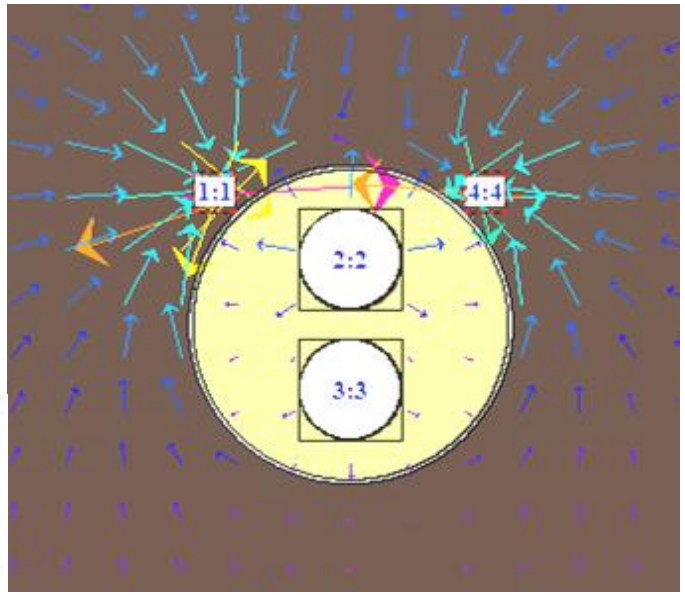
Collect and reuse heat loss from standard straight steel pipes

Collect and reuse heat loss from straight pipes – multi pipe system

Aim:

- New pipe system using adding heat recovery pipes connected to a heat pump to regain heat-loss from the District Heating pipes
- Different alternatives and positions have been simulated together with COWI
- In final design the simulation show **a positive energy recovery balance** together with ground heat from surrounding soil



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Main challenge is the existing EN Standards

How far are we to a real alternative to preinsulated steel pipes?

Main challenge here is the existing EN Standards!

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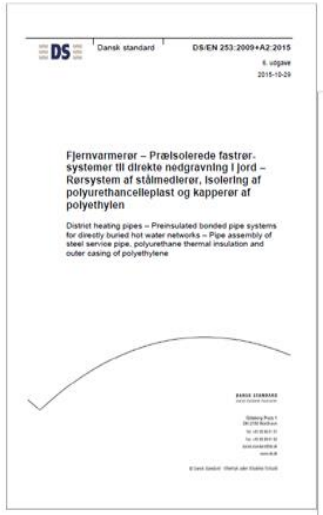

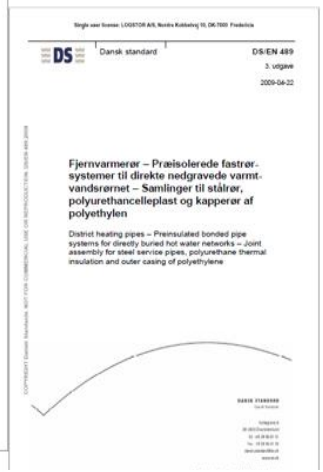

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