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Review Haelok – District Heating Distribution Line WV Illighausen, Thurgau, Switzerland December 2015

Background:

The dairy in Illighausen is to be supplied steadily with 95° C flow temperature hot water by a woodchip combustion plant. The system pressure is at 2.5 bar. The pipe system is covered by approximately 0.85m of soil.

The DN 50 connection line is roughly 50m long:

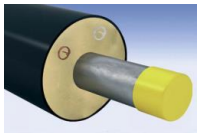
Bird's eye view of the pipeline - source Google

Tube selection options:

1. Flexible plastic pipe systems (isopex):
   Is ruled out because the system temperature of 95 ° C is too high (life span reduced too much).

2. Rigid preinsulated bonded pipe (KMR):
   Suitable. High demands on underground work. Static has to be considered (linear expansion). Complex pipework. Time-consuming laying process. Material relatively inexpensive.

3. Flexible preinsulated corrugated stainless-steel pipe (Isowell):
   Good but more expensive than option 2. 20-30% more heat losses than option 2. Ca. 20% lower undergroundwork costs as option 2



→ Customer choice / Consultant's advice = Option 2: Rigid pre-insulated bonded pipe (KMR), 1x reinforced.

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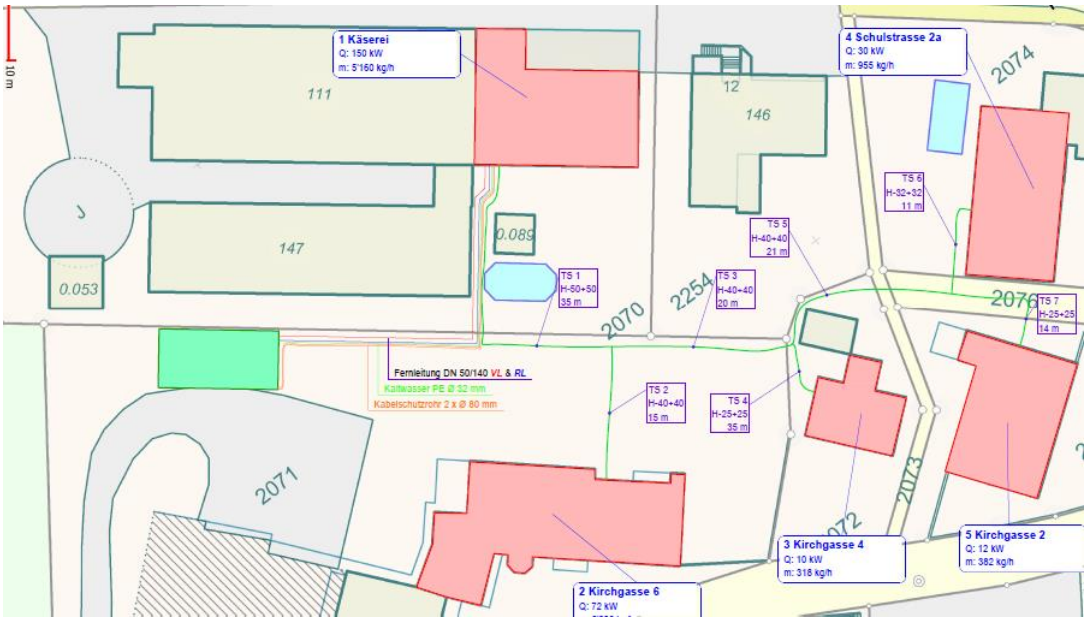


Network pipeline route - source engineering planners

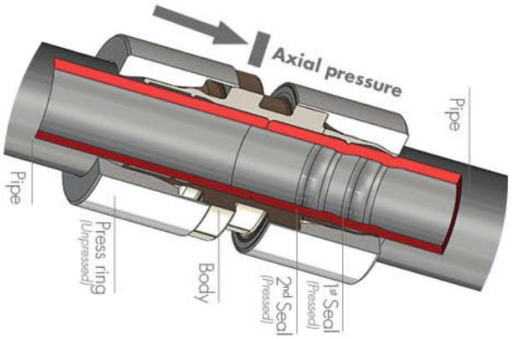
Connection technology:

I. Welding:

a. Low material costs. Costly in terms of time. High demands on excavation work/civil engineering. Limited to certain weather conditions. High requirements for weld inspection.

II. Pressfitting (Haelok):

a. High material costs compared to welding. Minimum installation time. Little excavation work. Not dependent on weather conditions.



Functionality Haelok connection technology

Construction worker holding press tool

→ Customer choice / Consultants advice = II: Compression connectors (Haelok).

Structural analysis of the pipe:

Conventional pipe laying (without thermal prestressing) is used with the permissible limit according to EN 253 for temperature and laying length. The maximum force is limited by the expansion bend. The maximum permissible axial stress of 190 N/mm^2 for straight pipes is covered by the chosen Haelok connection technology system.

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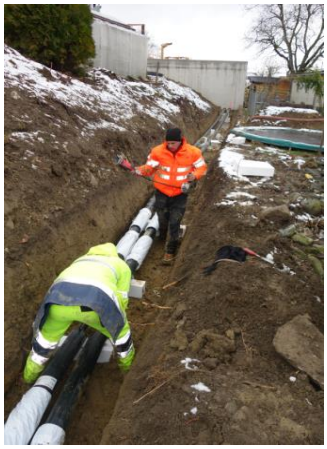
Experiences:
✓ Despite the most adverse weather conditions, the installation and the connection was fast and executed without any problem:

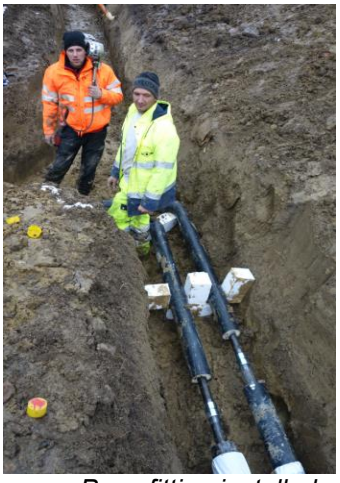

Confined spaces


Adverse Conditions


Welding not possible


No room for welding


Assembly expansion bend


Pressfitting installed


One side of the fitting is pressed. Then the other side of the tube is inserted.

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Cost effectiveness (Prices in CHF, excluding VAT):

A total of 20 Haelok press fittings were used for the pipe system (type: HLK 10SF-60-CC). The complete pipeline installation (including transportation from construction depot, laying, cutting and connecting the pipes).was completed by three workers in five hours. After a successful pressure test the workers were able to seamlessly continue the remaining insulation work. All the work was completed within two days and was presented to the public at the end of day two!

Cost DN50 pipe line (excl. underground work) in the **system Haelok** (about 120.- CHF per connection) incl. laying and post-isolation:

- Approximately 14'000.- CHF = CHF 280.- / meter route

Cost DN50 pipe line (excl. underground work) with **system Welding / X-ray** incl. laying and post-isolation:

- Approximately 20,000 CHF = CHF 400.- / meter route

Cost pipe route (excl. underground work) with **system corrugated stainless steel pipe (Isowell)** incl. laying and post-isolation:

- Approximately 18'000.- CHF = CHF 360.- / meter route.

Cost pipe route (excl. underground work) with **system PEX (isopex)** incl. laying and post-isolation:

- Approximately 10,000 CHF = CHF 200.- / route meters = not suitable due to the 95 °C water temperature

In the costs shown above, the potential savings with respect to underground work (smaller trenches, lower workspaces) were not included in the calculations!!

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✓ Impressions

Pressing (approximately 80 seconds per installation) – one battery charge was sufficient for the whole project.

Pressed fittings flow- and return line during pressure test

Condition at house entrance: Does not allow for welding.

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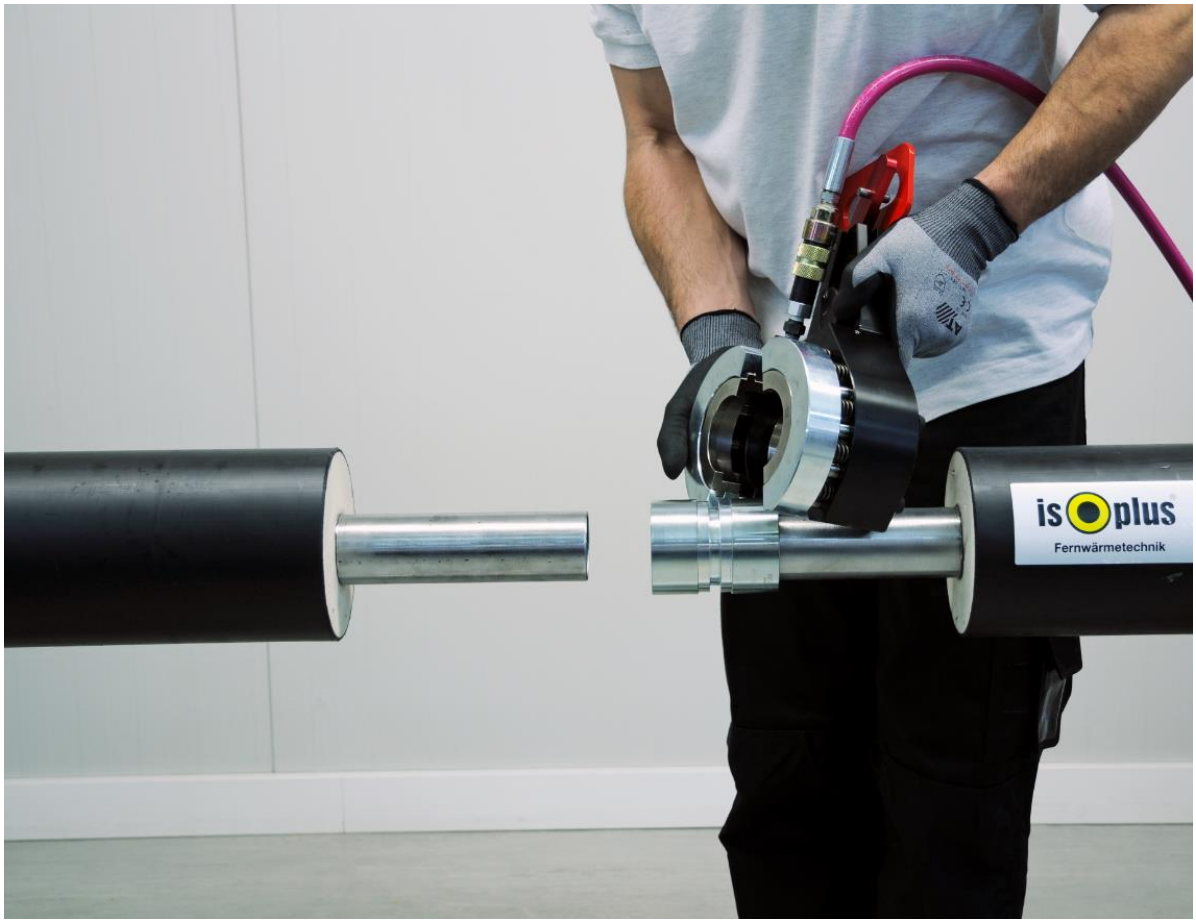
✓ **Conclusion**:

The ISOPLUS installation team was impressed by the simplicity of the tool, especially in these adverse weather conditions. The actual installation time was cut to abou half of the projected time! The joining of the pipe ends with the Haelok-fittings went surprisingly easy without any need of additional tooling.

Outlook:
The potential of this joining technique is currently underexploited. With these positive pilot projects, , the system should quickly find nationwide distribution.



Isoplus (Switzerland) AG
Urs Peter

CEO

Islikon, 24th December 2015