

SUNSTORE® 4 Design of the Water Storage

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PlanEnergi:
Consultant Engineers
30 years with
renewable energy

- biomass
- biogas
- solar thermal
- heat pumps
- district heating
- energy planning





The SUNSTORE Concept in Marstal



Design and Implementation of the Storage



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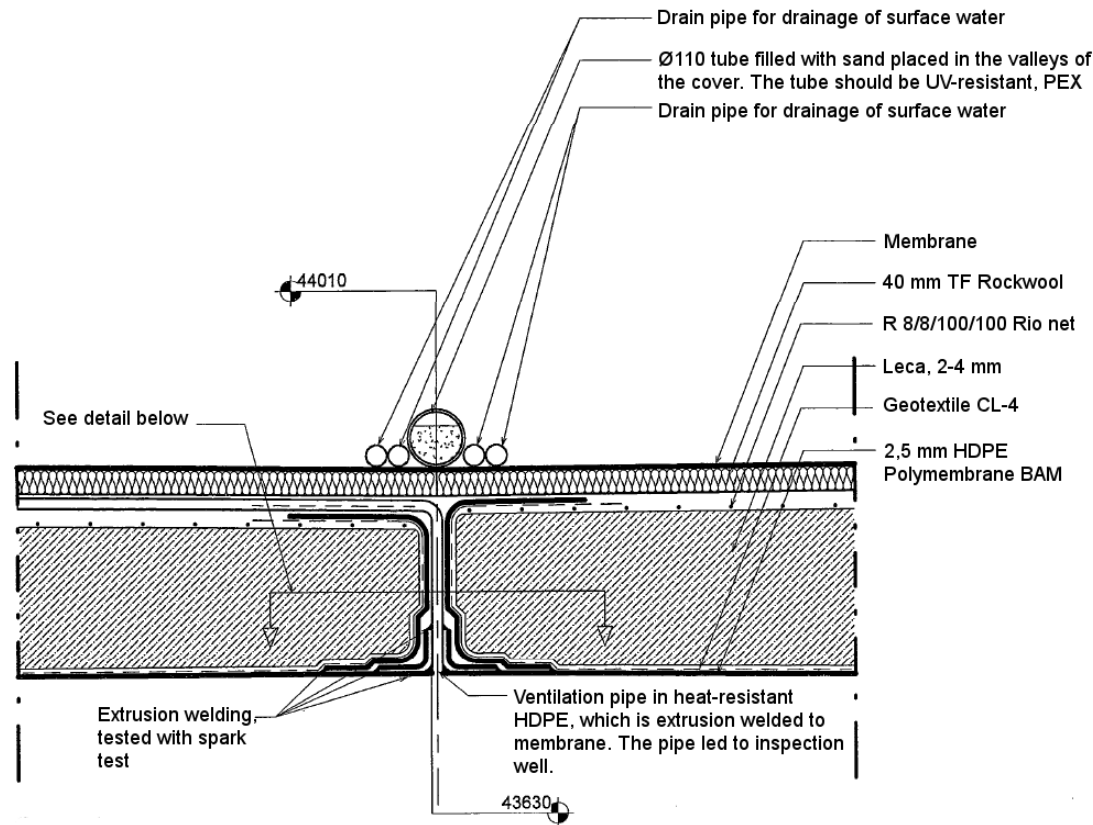


Design of the Lid

Three Principles investigated:

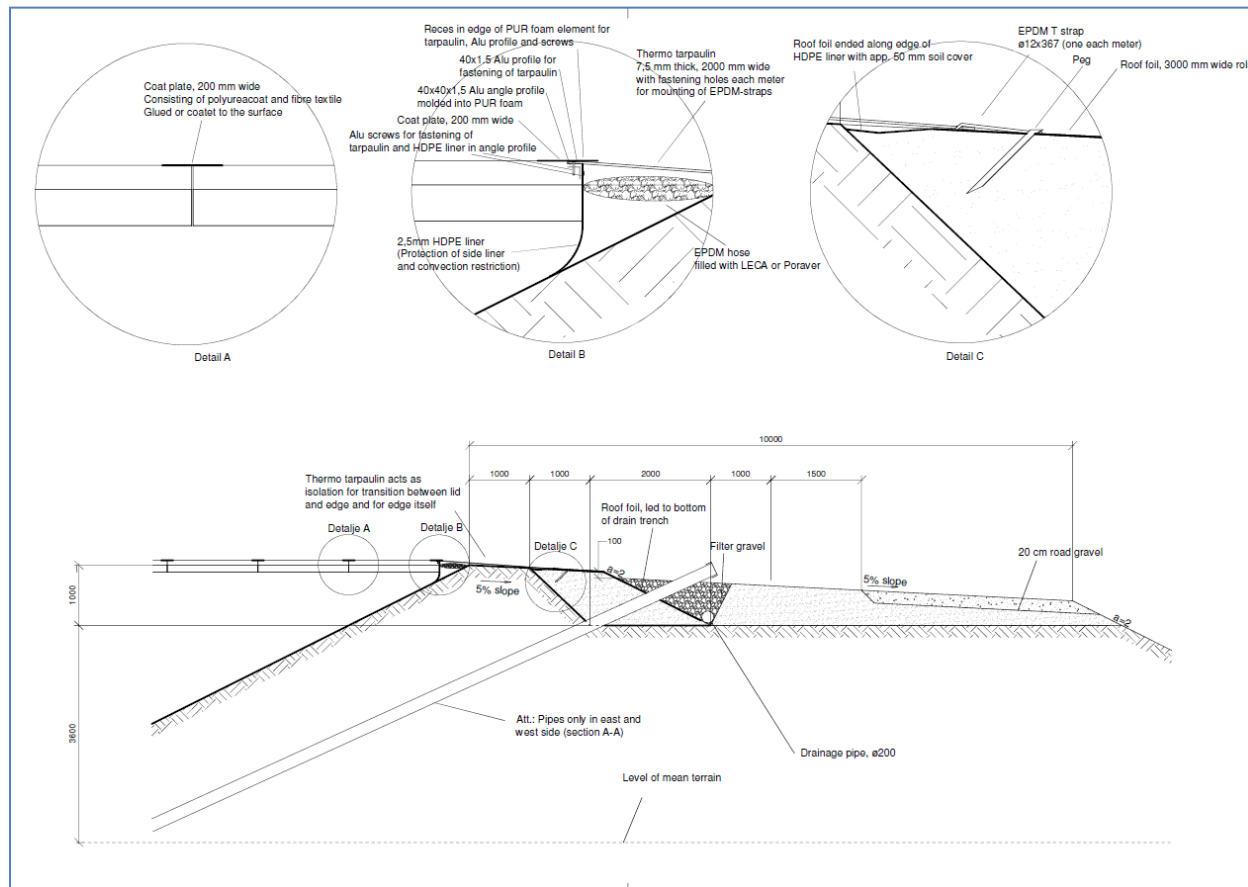
- 1) Expanded Clay Insulation and HDPE Liner
- 2) Floating PUR Foam insulation
- 3) PE Foam insulation and HDPE Liner

Expanded Clay Insulation and HDPE Liner



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Floating PUR Foam Elements



PE Foam Insulation and HDPE Liner

Typical Floating Cover Layout

Floating Cover Insulation Layout

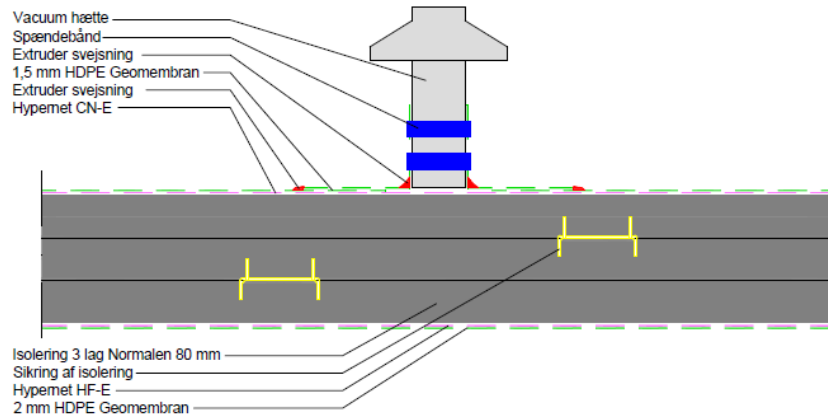
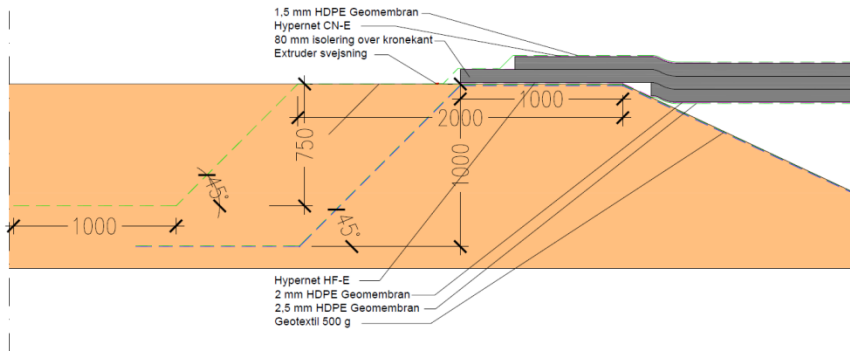
Typical Section Thru Float at Berm

Not to scale

Not to scale

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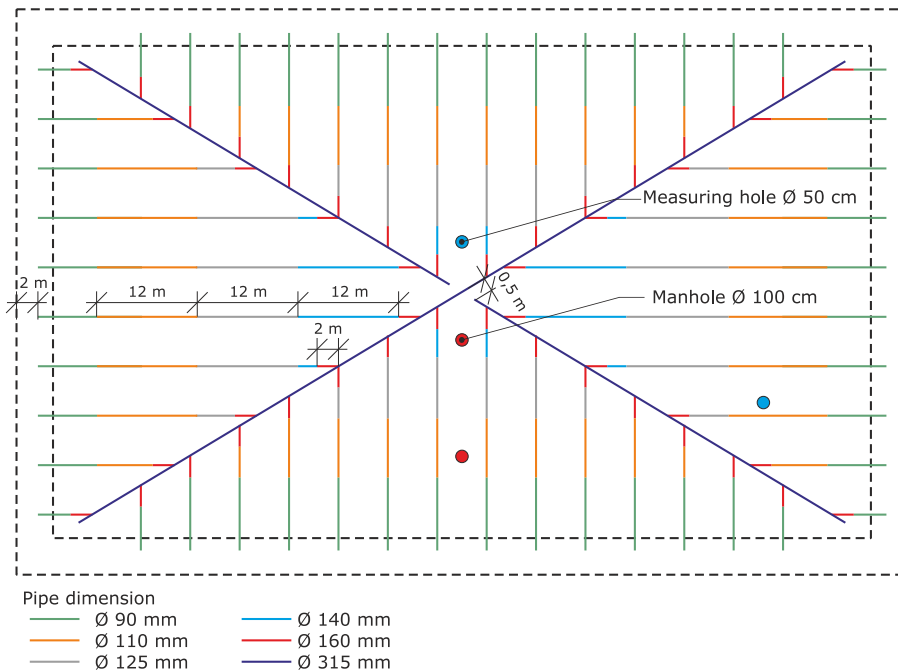
PE Foam Insulation and HDPE Liner



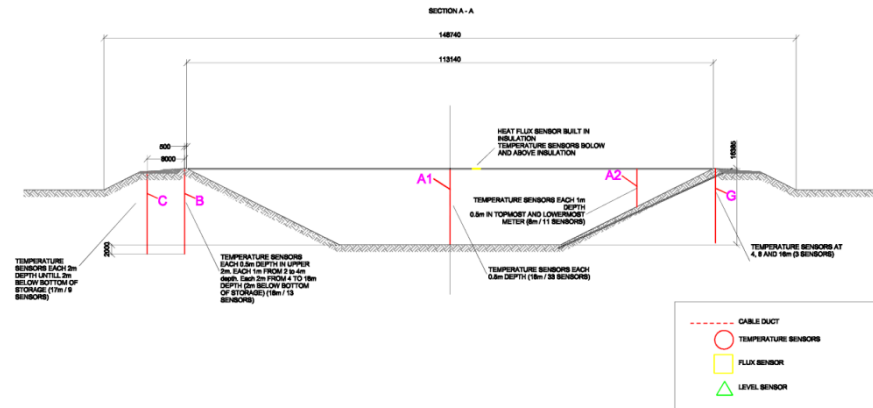
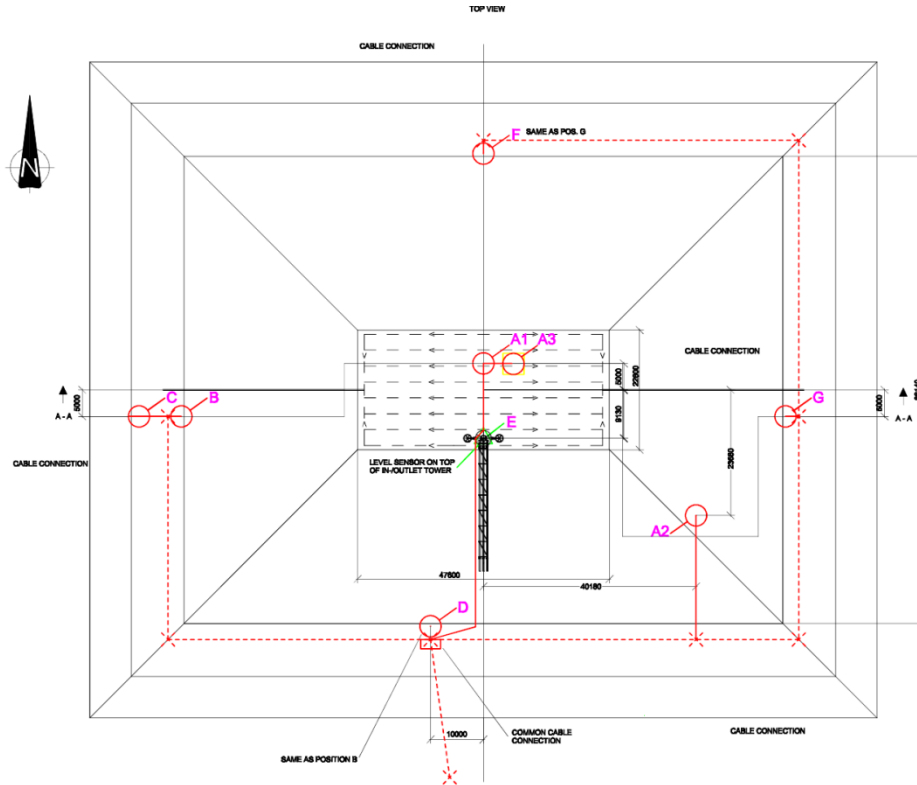
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Data for the pit heat storage in Marstal

- Built 2011-12
- Size: 75,000 m³ water
- Price 2.65 mio. € excl. transmission pipe or 35.5 €/m³ or 0.38 €/kWh
- Temperatures 10 – 90° C
- Capacity: 6,960 MWh
- Charge and discharge capacity: 10.5 MW
- Calculated heat loss: 2,475 MWh/year

Experiences during operation

- Water quality and corrosion
- Leakage control and leakage repair
- Adjustment and improved fixation of insulation

Future improvements

- HDPE liner with improved temperature resistance
 - 20 years @ 90°C constant
 - Material price: app. 7 €/m²
- Stainless steel liner
 - Material price: app. 25-30 €/m²
- Insulation with improved temperature and moisture resistance

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Thank you for your attention

