

SOLAR INDUSTRIAL PROCESS HEAT



Experience with different heat transfer fluids for solar process heat plants

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2012



Prix solaire suisse
Schweizer Solarpreis



Heat Transfer Fluids in NEP Solar Plants - Overview

Project Site	Max T (°C)	Min T (°C)	HTF	Particular	Experiences / Remarks
Almería (ESP)	220	-5	Therminol 55	Threaded joints	Leakage problems in threads -> welded
Newcastle (AUS)	180	0	Water		OK
Avignon (FR)	220	-5	Therminol SP	Threaded joints	Leakage problems Flowmeter dyn. range
Sevilla (ESP)	220	0	Shell S2	Fully welded	OK
Bever (CH)	190	-30	Fragoltherm FG-8	Extremely low ambient T. Fully welded	1 ½ years experience, very reliable
Saignelégier (CH)	130	-20	Water/Antifreeze JetFrost	Moderate supply T.	Collector hyd. balancing -> overheat danger
Fribourg (CH) <i>under construction</i>	170	-10	Water	Freeze protection with waste heat	Startup in April '13
Newcastle (AUS) <i>under construction</i>	320	0	Organic Fluid	Supercritical Fluid in Collectors	Startup in April '13
Basel (CH) <i>cancelled</i>	200	-10	Water/Steam	Direct Steam Gen. Vacuum drain back	Abandoned

Almería, Spain

230m² / 220°C / Thermal oil / Indirect Steam Generation / Desalination R&D



Newcastle, Australia

340m² / 170°C / Water / Double stage absorption chiller / Air conditioning



Avignon, France

30m² / 220°C / Thermal oil / Sludge drying demonstration



BEVER, Switzerland

115m² / 190°C / Thermal oil / Indirect Steam Generation / Milk processing



Saignelégier, Switzerland
627m² / 125°C / Water-Antifreeze / Milk processing



Fribourg, Switzerland

585m² / 165°C / Water / Waste heat for freeze protection / Milk processing



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Heat Transfer Fluids - Conclusion

Heat Transfer Fluid	Properties / Lessons
Thermal Oil	<ul style="list-style-type: none"> • Expensive and toxic (most of them) • Avoid threaded connections to avoid leaks • Choose flow meter for entire temperature and velocity range (properties very variable with T)
Water	<ul style="list-style-type: none"> • Heat circuit in winter if excess low T. waste heat available • Evaporation through overheat can block flow
Water / Antifreeze	<ul style="list-style-type: none"> • Antifreeze limited in max T
Steam	<ul style="list-style-type: none"> • Sub-zero temperatures are a challenge • Concept for closed system with drain back under vacuum developed • Other options: <ul style="list-style-type: none"> – Replace with air (if allowed) or N₂ – Keep at >0°C
Organic Fluid	<ul style="list-style-type: none"> • No experience yet