

Characterization of components for CSP molten salt plants. The SolarPaces and Sfera III experience

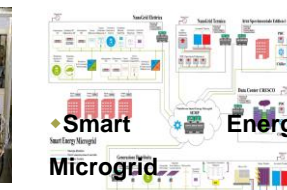
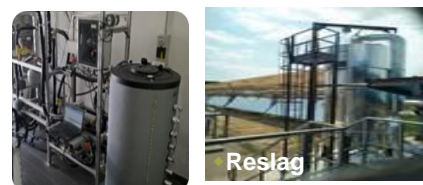
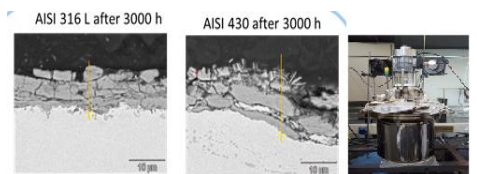
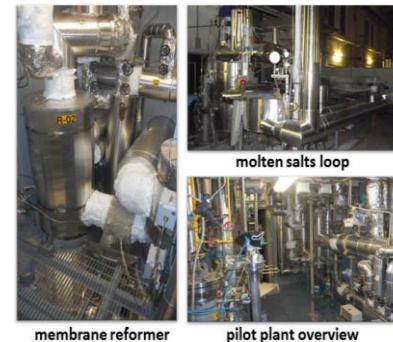
ENEA' Facilities for characterization of components

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Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

ENEA's ACTIVITIES ON CSP/CST TECHNOLOGY



Molten salts tecnology

Thermal Storage

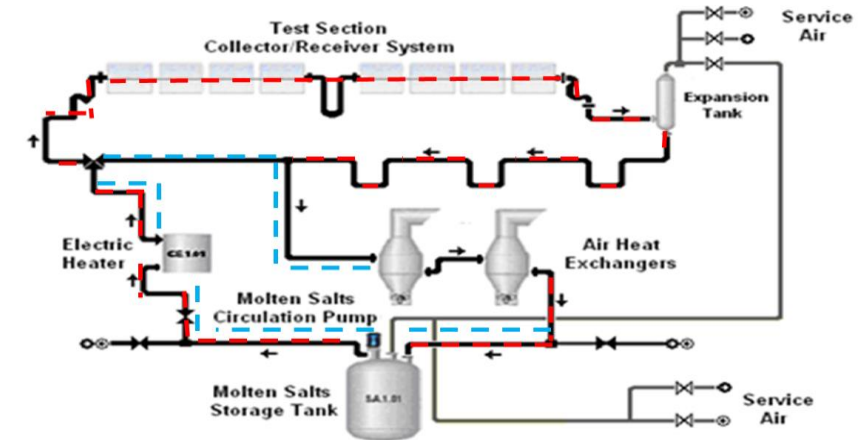
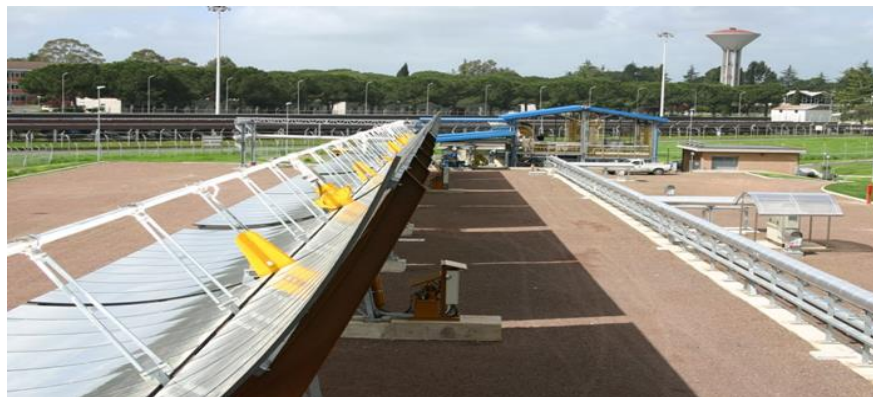
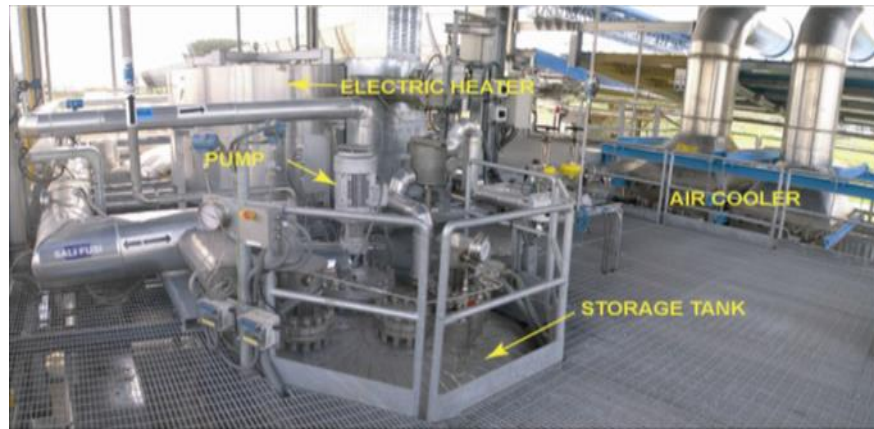
Heat for Industrial Processes

Solar Chemistry

Components qualification

Smart Sector integration

PCS facility



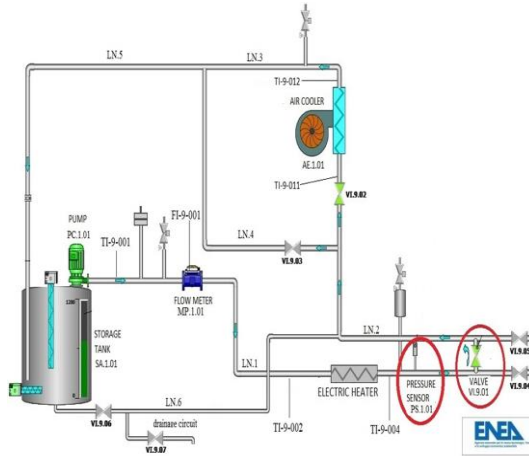
Description	values	u.m.
Fluid Type	Salts mixture	
40% KNO ₃ – 60% NaNO ₃		
Flow rate min / max	4,5 / 6,5	kg/s
Temperature min / max	270 / 550	° C
Pressure pump delivery side	0,8	MPa
Storage tank:		
diameter	2	m
height	2,8	m
design pressure	0,2	MPa
electric heaters power	100	KW
stored salts quantity	12000	Kg
Heater max electric power	400	kW
Air exchangers max thermal power	400	kW
Test Section nominal length	100	m
Test Section mirrors surface	540	m ²

PCS facility



- Built at ENEA Casaccia National Labs (Rome) technologies at 2003-2004
- 10 years of operation
- Experimental tests of various components
- 55,000+ hr operation in hot stand by condition
- 1400+ filling/draining cycles
- 9500+ hr operation with circulation of molten salts

MoSE facility

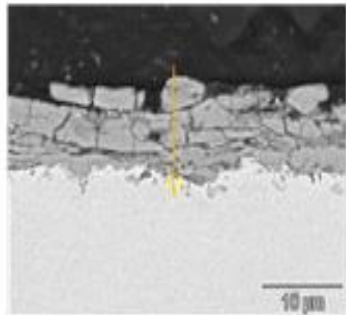


Built at ENEA Casaccia National Labs (Rome) technologies at 2001 (The maximum flow rate of molten salts 0.5 - 1.3 kg/s, maximum operating temperature 550 °C and pressure 4 bar).

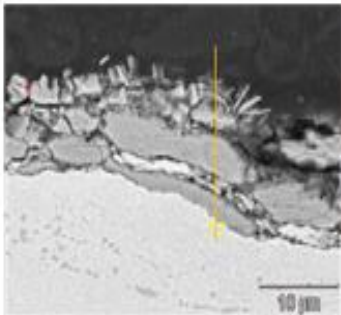
8000 hours of continuous operation

- ◆ dynamic corrosion resistance tests on structural with cyclical and long-lasting variations;
- ◆ sensor characterization tests;
- ◆ component qualification tests;
- ◆ thermo-fluid dynamic tests for molten salts fluid;

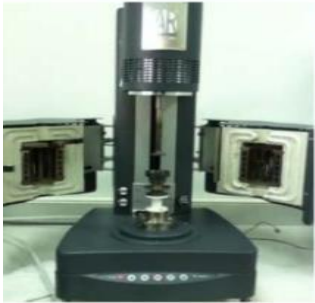
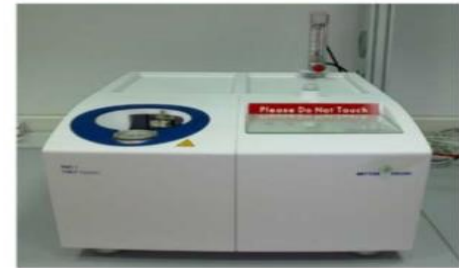
AISI 316 L after 3000 h



AISI 430 after 3000 h



Solar Chemical laboratory



Experimental characterization thermophysical properties of materials: possible heat and onset of phase change, specific heat, viscosity, density, freezing point, Environmental safety and toxicity etc.

A very important parameter is chemical stability of thermal fluids, both with respect to temperature and contact with other materials.

Being the relatively limited data in the literature in this area, the solar chemistry laboratory has dedicated particular attention to this topic, defining and applying specific criteria and experimental methodologies

System for studying the thermal stability of thermal fluids, up to approximately 650°C.

Thanks for the attention