

FSCC SUBSEA

FSCC – a small, compact, cost efficient and controllable passive subsea cooler



Several years' innovation has turned into an optimized 2nd generation passive subsea cooler with the ability to control the cooling rate over time.

FSCC is characterized by being simple, robust, reliable, and uses well-proven principles to operate.

REDUCED CAPEX AND OPEX THROUGH

- **Reduced size and weight** | reduced costs in fabrication, installation and maintenance
- **Controllability** | cooling can be adjusted to yield an optimal outlet temperature
- **Passive** | no energy consumption and minimized need for maintenance
- **Environmentally friendly** | reduced need for chemical injection and no CO₂-emissions

Depending on the application, the cooling requirement may change considerably during the lifetime for an oil/gas field. Changes in production rates and water content change the cooling requirements significantly. A controllable cooler reduces the risk for overcooling, thus preventing hydrate formation and wax precipitation. A controllable cooler contributes thereby to reduce the need for chemicals as well as the required amount of chemicals.

FSCC exploit the naturally buoyant flow of seawater around the cooler tubes to maximize the cooling rate and minimize the overall size and weight. FSCC is designed to operate in an environment with quiescent seawater, yet a significant sea current will increase its cooling performance.

APPLICATIONS

- **Pipeline inlet cooling** to enable the use of less expensive pipeline materials
- **Inter-stage and inlet cooling** for gas compressors to increase efficiency
- **Re-cycle cooling** for gas compressors and multiphase pumps
- **Subsea separation** for increased separation efficiency
- **«Cold flow»** to control hydrates and wax in pipelines



FSCC standalone solution

Future Technology AS has developed a flexible design tool (SIMCOOL) which predicts the cooling performance of FSCC for arbitrary flow rates and flow compositions. SIMCOOL calculates the heat exchange rate from the production fluid to the surrounding seawater, by taking all relevant factors into account, enabling detailed design output and optimization of the unit based on project specific input data. SIMCOOL is based on the knowledge from years of experimental and numerical research on passive subsea coolers and has been verified through large-scale tests.

FSCC has no moveable parts except for a valve and is designed with field proven components.

A new anti-fouling protection with only a minuscule influence on the cooling efficiency has been tested and optimized. The combination of high temperatures and a need for protection towards bio-fouling, scaling and corrosion has been an important factor for the development of FSCC.

Technical specification	
Process inlet temperature	Up to 150°C (higher on requests)
Pressure rating	5, 7.5 & 10 ksi (other on requests)
Cooling rate	Up to 50MW
Pressure drop	In accordance with client requests
Scalability	High flexibility
Controllability	5%-100%
Process Media	Gas, oil, condensate, water, MeOH, MEG, and other.
Operating Depth	Down to 2000 m
Material	Piping in Super Duplex
Dimensions and weight	Depends on required cooling rate
Control valve	Axial control valve
Sensors	3 Dual Temperature and Pressure Wellhead sensors
Design life	>25 years

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