

I. LIQUIDS SEPARATION

1.1 Two/Three/Four Phase Production Separator



Oil-Gas-Water Separator for Light and Medium Oil

Technical index

- Water content in outlet oil should be $\leq 0.3\%$;
- Oil in outlet sewage should be $\leq 300\text{mg/L}$;
- Liquid in outlet gas should be $\leq 0.05\text{g/Nm}^3$;

Physical Properties of Fluid

No.	Item	Unit	qty
1	Specific gravity (d_{4}^{20})		0.75~0.9162
2	viscosity (5 0 °C)	mPa.s	1.5~85.0
3	Condensation point	°C	14~53
4	Wax content	%	10~43
5	Asphalt content	%	5.6~19.43
6	Colloid content	%	4.2~26.32

Oil-Gas-Water-Sand Separator for Medium and Heavy Oil

Technical index for medium oil

- Water content in outlet oil: $\leq 0.5\%$;
- Oil content in outlet sewage: $\leq 300\text{mg/L}$;
- Liquid content in outlet gas: $\leq 0.05\text{g/Nm}^3$;

Technical index for thick oil and extra thick heavy oil

- For thick oil Gas bubble diameter $\geq 150\mu\text{m}$, the removal rate: $\geq 95\%$;
- Dehydration rate: 90~98%
- Sand (particle size $\geq 75\mu\text{m}$) removing rate: $\geq 95\%$
- Liquid content of outlet gas: $0.01\text{g/Nm}^3 \sim 0.05\text{g/Nm}^3$
- Oil content of oily water: 500~1000mg/L
- Water content of outlet oil: 5~15%

Physical Properties of Fluid

name	50°Cviscosity (mPa.s)	specific weight (d_{4}^{20})	gas oil ratio (Nm^3/t)	sand content (%)	water content (%)
medium oil	<100	0.87~0.92	1~100	0.1~0.5	50~98
thick oil	100~10000	0.92~0.95	1~70	0.1~0.5	50~98
extra thick oil	10000~50000	0.95~0.98	1~70	0.1~0.5	50~98

FPSO/Offshore Oil-Gas-Water-Sand Separator

Technical index

Item	Unit	Value
Water in inlet oil	%	15~90
Oil-gas ratio	Nm ³ /t	10~100
Sand content in oil	%	0.2~1.0
Water cut in outlet oil for medium oil	%	≤0.5
Water cut in outlet oil for heavy oil	%	≤10
Oil in outlet sewage for medium oil	mg/L	≤500
Oil in outlet sewage for heavy oil	mg/L	≤1000
Liquid content in gas	g/Nm ³	≤0.05
Sand removal rate with diameter ≥75μm	%	≥95

Fluid Physical Properties

No.	Item	Unit	Parameter
1	Specific gravity(d_{4}^{20})		0.8651~0.98
2	Viscosity(50℃)	mPa.s	15~2000
3	Wax content	%	5.0~35
4	Asphalt content	%	10~20.8
5	Colloid content	%	11.0~38.53
6	Aromatic hydrocarbon content	%	16~33.72
7	Satisfied hydrocarbon content	%	7.5~35.96



1.2 Metering Separator

Oil-Gas-Water Separation & Metering Skid for (Condensate) Gas Field



Technical index

- Water content in outlet condensate oil: ≤ 0.2%;
- Oil in outlet sewage: ≤150mg/l;
- Liquid content in outlet gas: ≤0.05g/Nm³;
- Natural gas, condensate oil, water metering errors: ≤±5%.

Fluid Physical Properties

No.	Item	Unit	Parameter
1	Specific gravity (d_{4}^{20})		0.75~0.80
2	viscosity (5 0℃)	mPa.s	0.45~2.0
3	Average molecular weight of gas	C Unit	17.64~21.5
4	Design temperature	℃	-10~100
5	Design pressure	MPa	≤18

Oil-Gas Separation & Metering Skid for (Extra) Thick Heavy Oil

Technical index

- For bubbling gas with diameter $\geq 150\mu\text{m}$ in thick oil, the removal rate: $\geq 95\%$;
- For liquid drop in outlet gas with diameter $\geq 10\mu\text{m}$, the removal rate: $\geq 98.5\%$;
- Gas, liquid metering errors: $\leq \pm 5\%$.
- Liquid content in outlet gas: $0.01\text{g}/\text{Nm}^3 \sim 0.05\text{g}/\text{Nm}^3$;

Fluid Physical Properties

Crude oil	50°C Viscosity (mPa.s)	Specific gravity (d_{4}^{20})	Oil-gas ratio (Nm^3/t)
Regular thick oil	100~10000	0.92~0.95	5~200
Extra thick oil	10000~50000	0.95~0.98	5~200

Description
For the extra thick oil with viscosity (50°C) larger than 50000mPa.S and specific gravity d_{4}^{20} larger than 0.98, if gas content is very more, this series equipment is also available.



1.3 Test Separator

The purpose of a Test Separator is to check one well or flow line at a time.

FISHER pressure controller, level controller and pneumatic control valve are adopted which can realize the automatic measurement of separator pressure and the automation of level.

DANIEL orifice plate flowmeter and BARTON three-pen recorder are adopted for metering the natural gas and the turbine flowmeters are adopted for metering the produced oil and water, and the shrinkage tester is equipped for correcting the metering error of oil, gas and water.

Technical Parameters

Oil/water measurement accuracy: $\leq \pm 1\%$

Gas measurement accuracy: $\leq \pm 5\%$

Fluid Physical Property and Processing Capacity

Item	Unit	Value
Specific weight (d_4^{20})		0.75-0.96
Viscosity (122 °F)	mPa.s	0.45-2,000
Gas average molecular weight	Carbon unit	17.64-23.3
Operation temperature	°F	41-176
Operation pressure	Psi	250/600/700/1440
Maximum capacity (fluid)	BPD	10,000-17,000
Maximum capacity (gas)	MMSCFD	6-100
H2S		Yes



Test Separator on Trailer.



Test Separator on Skid.

1.4 Oil-Gas-Water-Sand Heating Separator for Heavy Oil

Technical index

- Water content of inlet oil: 15~90%
- Water content of outlet oil: 5~10%
- Oil content of outlet oily water: $\leq 500\text{mg/L}$
- Sand (particle size $\geq 75\mu\text{m}$) removing rate: $\geq 95\%$



1.5 Preheating Freewater Knockout Skid

Technical index

- Water content of inlet oil: $\leq 30\%$
- Outlet oil BS8W: $\leq 0.5\%$
- Oil content of outlet oily water: $\leq 500\text{mg/L}$
- Liquid content of outlet gas: $\leq 0.1\text{VSGAL/MMSCF}$

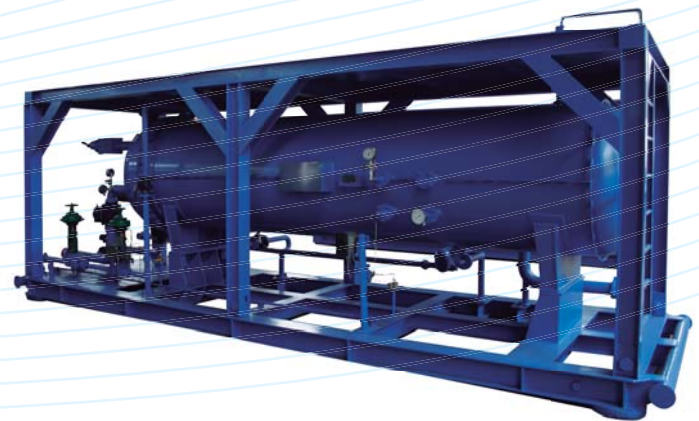


1.6 Indirect Fired Heater



In an Indirect Fired Heater, the heat from the firebox is transferred indirectly through a water bath in the body of the vessel to the emulsion being heated in the tube bundle. The coil tube bundle is divided into two sections, the upstream section and the downstream section in between is an adjustable nozzle is to adjust the flow rate of the media in the downstream coil so as to realize the more sufficient heat exchange. The operating pressure of coil is 5000 psi.

1.7 Steam Heat Exchanger



Steam heat exchanger is the direct steam heat exchanger, which is used to ensure the three phase test separator to work under the normal temperature. The steam from the steam generator enters directly into the shell of heat exchanger with pressure and heats up the coil directly.

The highest operating pressure of upstream coil: 5000psi
 The highest operating pressure of downstream coil: 5000psi
 The pressure of pressure shell: 180psi