**Product Definition**

Crude oil wells contain oil, gas, water and various contaminants. To optimize field production, Frames Multiphase Separators perform the primary separation of other phases from crude. Multiphase separators are usually the first and most comprehensive set of equipment in the upstream oil production field, with downstream equipment completely dependent on the proper functioning of the multiphase separators.

Using state-of-the-art technologies, Frames Multiphase Separators guarantee adequate separation, with our clients benefiting from 30 years of process knowledge supported by Frames in-house CFD and R&D expertise.

**Product Description**

Multiphase separators are used to separate vapors from the liquid phase, which can be a single continuous phase or a mixture of two immiscible phases.
Multiphase Separators

Separation performance
Separator design is governed by:

- G/L performance: Normally acceptable performance is maximum liquid carryover in the gas phase of 0.1 USG/MMSCF
- L/L performance: Normally acceptable performance is 2% for water in oil, and 1000 ppm for oil in water.

Slugs
If required, the inlet of production separators is designed to receive ‘slugs’ from the upstream oil/gas flow. To achieve this, the 2-phase or 3-phase separator acts as a slug catcher, with attention given to the separator’s size, slug volume and incorporation of a robust inlet device and calming baffles.

Process Description
In a Frames Multiphase Separator, the crude oil mixture passes through an inlet device to disperse the momentum of the incoming fluids. Primary/bulk separation as well as flow distribution occurs in the inlet section (1). From the inlet section, the fluids are given adequate settling time to allow the heavier phase to settle beneath the light phase, while the flashed-off gas-phase occupies the free area above the liquids (2). Additionally, liquid-liquid separation enhancer internals such as plate pack coalescers are added to provide stringent performance guarantees.

Liquid levels are maintained by weirs and control valves. A gas-liquid separation device (typically a demisting device) is placed at the outlet section (3). This device ensures separation of small liquid particles in the gas phase by coalescence. Oil at the specified guarantee level is discharged at the oil outlet nozzle, while water and gas are discharged through their respective outlets.
For offshore applications such as an FPSO’s, Frames uses in-house CFD capabilities to study the negative effects of wave motions, and provides solutions which minimize phase re-mixture.

With three decades of separation experience coupled with in-house knowledge and computational fluid dynamics (CFD), Frames is able to optimize vessel design, so our clients benefit from lower CAPEX and OPEX.

Project Management

At Frames, we know that precise project management is only the starting point for completing complex oil and gas projects. Our clients can rely on sharp thinking and a deep understanding of their operating conditions to find the best solution. Our quality management system focuses on a process of continuous improvement, and our team is always looking for new solutions that improve productivity, cut operating costs, and give our clients a competitive edge.

In a challenging industry, we understand that safety is a priority. We also know that in order to deliver maximum value to our clients we must complete each project on schedule, in spec and within budget.

At Frames, our close-knit team of engineering experts is open, honest, and focused on delivering you the best possible outcomes. We are passionate about the oil and gas industry, and have been a leading provider of safe, high-productivity systems for more than 30 years.

Technical Details

- Optimization of vessel dimensions
- CFD verification of design
- Range of products: HP, LP, KOD, scrubbers
- 2-phase and 3-phase separators
- Custom-made equipment
- Wider turndown
- Lower sensitivity towards Sand
- Lower fouling

Added Value Frames

- Designed to match your unique crude oil composition and operating conditions
- 30 years of experience in generating the maximum value from the wellhead
- Robust and reliable units that drive downstream productivity
- Compact design that easily integrates into your production facility
- Cost-efficient units with low operating costs

References (selection)

- Haoud Berkaoui Project - Sonatrach, Algeria
- Kharir Field - Total E&P, Yemen
- Gathering Centers - KOC, Kuwait
- Nakhlia II - Wintershall, Libya
- Orinoco Belt - PDVSA, Venezuela
- Shaybah - Saudi Aramco, Saudi Arabia
- Rumaila field - BP Iraq N.V., Iraq
- Wafra Field / MGC Revamp - WJO, Kuwait
- Asab Field - ADCO, United Arab Emirates
- SARB Field Development Project - ADMA OPCO, United Arab Emirates
- Tyra South East Field - Maersk, Denmark
- Al Shaheen Block 5 - Maersk Oil Qatar, Qatar
- PB Litoral A Platform - PEMEX, Mexico
- Greater Stella - Ithaca Energy, United Kingdom
- Cluster 7 Field - ONGC, India
- P-63 FPSO - Petrobras, Brazil
- P-75 / P-77 FPSO - Petrobras, Brazil
- Cidade de Ilhabela FPSO - SBM, Brazil
- Mangaratiba FPSO (MV-24) - Modec, Brazil
- Stones FPSO - Shell, USA

Contact

+31 88 0033300
separation@frames-group.com
Frames Family Tree

Onshore

Multiphase Separation
- Production Separators (High & Low Pressure)
- Test Separator
- Degasser & Knock-Out Drum
- Water Oil Separator (WOSEP)

Compact Inline Separation
- SwirlSep

Electrostatic Coalescers
- Dehydrator
- Desalter

Produced Water Treatment
- Deoiling & Desanding
- Hydrocyclones
- Gas Floatation
- Media Filtration
- Solids Removal & Cleaning
- Stripping

Separation Internals
- Heat Exchangers

Integrated Solutions
- Total Plant Solutions
  - Industrial CO₂ Modules
  - Early Production Facilities
  - Wellsite Packages
  - Biogas

Offshore

Multiphase Separation
- Production Separators (High & Low Pressure)
- Test Separator
- Degasser & Knock-Out Drum
- Water Oil Separator (WOSEP)

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Gas

Gas Separation
- Demisting
- Scrubbers
- Filters
- SwirlSep

Heat Exchangers
- Shell & Tube Heat Exchangers

Air-Cooled Coolers

Gas Sweetening (H₂S & CO₂)
- Amines
- Thiopaq O&G
- Solid Bed Scavenger
- Membrane
- Molecular Sieve

Gas Dehydration
- Glycol (TEG)
- Molecular Sieve

Dew Point Control
- Low Temperature Separation (LTS)
- Solid Desiccant

Hydrate Inhibition
- MEG/DEG Recovery
- Methanol Recovery
- MEG/DEG Desalination

Light Hydrocarbon Recovery
- Condensate Stabilization
- Fractionation

Fuel Gas Treatment

Gas Separation
- Demisting
- Scrubbers
- Filters
- SwirlSep

Heat Exchangers
- Shell & Tube Heat Exchangers

Air-Cooled Coolers

Gas Sweetening (H₂S & CO₂)
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Fuel Gas Treatment

Flow Control & Safeguarding

Hydraulic Systems
- Wellhead Control
- Subsea Hydraulic Power Units
- Hydraulic Power Units
- IWOCS (Intervention Workover Control Systems)
- TUTU (Topside Umbilical Termination Unit)
- Cargo Ballasting Systems

Safety Instrumented Systems
- High Integrity Protection Systems (HIPS)

Chemical Injection Systems
- Chemical & Methanol Injection Systems
- Chemical Distribution Systems
- Seawater Electrochlorination Systems

Valve Automation Center
- Actuators and Actuated Valve Packages
- Control Systems

Automation
- Buoy Control
- Tank Farm Control & Safeguarding

Assets
- Life Cycle Management
- Maintenance & Field Services
- Commissioning
- Spare Parts
- Operator Training
- Engineering Studies
- Conceptual
- FEED and Basic