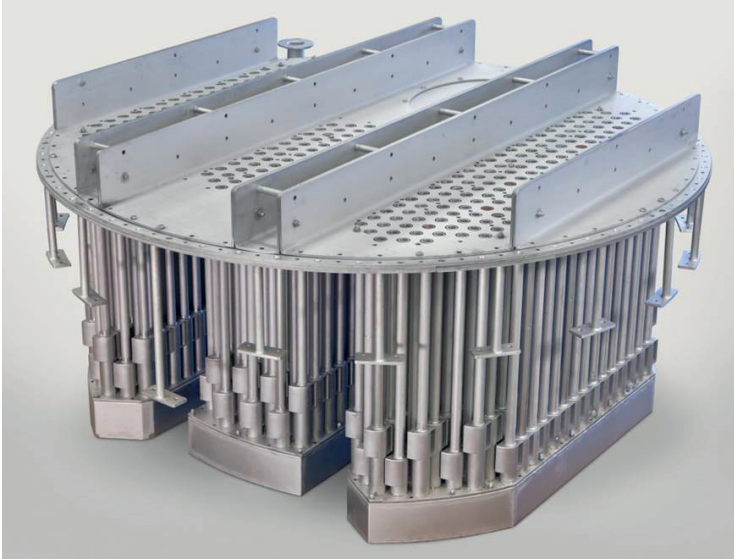


## Gas Separation



Tangential Cyclones

### Product Definition

**Our clients apply gas scrubbers, gas filters and slug catchers for removal of entrained liquids and/or solids for offshore and onshore facilities. The treated gas can be used as fuel gas, lift gas or export gas. In order to meet stringent process guarantees, Frames designs solutions that enhance the separation performance required for further gas treatment.**

### Product Description

Efficient and reliable gas scrubbers, filters and slug catchers are crucial for the continuity and efficiency of operations. After all, they protect important downstream equipment, such as compressors.

By understanding the composition of the raw gas as well as the output demands of the gas scrubbers, filters and slug catchers our team of engineers uses sharp design solutions to produce clean, ready-to-use gas streams, perfect for use as fuel or lift gas, or ready for resale.

#### Integrated slug catchers

Slug Catchers are used to accommodate possible slugs in the oil/gas flow in the upstream separation train. The vessels are designed to prevent sudden overload of the system.

Our two/three phase separators designs can be based on such type of possible slugs. In that case, the two/three phase separator acts as a slug catcher, integrated in the separator vessel.

#### Offshore

In offshore fields, high- or low pressure scrubbers can be used for the removal of entrained liquids. These liquids can be hydrocarbons, water and also glycol (downstream gas dehydration systems). The scrubbers are designed to deal with wave motions, so they can achieve the required performance on both FPSOs and platforms.

#### Black powder solutions

Black powder is a 'powder like' contaminant that can collect in gas pipelines as a result of corrosion and erosion in gas pipelines.

Black powder is a predominant form of Iron Oxide or Iron Sulfide. Sometimes it may occur combined with other contaminants such as water, chemicals, salts, chlorides, sand and dirt.

Operational challenges associated with Black Powder

- Protection downstream equipment
- Erosion of pipeline
- Pressure loss
- Maintenance costs

Frames Separation Technologies can offer a range of solutions to minimize the operational challenges. Selection of the separation system largely depends on the parameters mentioned below.

- Solids loading (Mg/MMSCFD)
- Particle size distribution (micron)
- Fluid properties
- Wet/dry black powder

## Gas Separation



Black Powder - Single Stage Filter System

Frames offerings:

- Single stage filtration system [Filter Cartridges]
- Double stage filtration system [Filter Cartridges + Tangential cyclones]
- Integrated system are available [Filter Cartridges + Tangential cyclones]

## Process Description

Using CFD analysis and our in-house test facility, Frames continually optimizes and develops the process internals for a range of applications. This enhances total separation performance, meeting the process guarantees required for further gas treatment



Axial Cyclones

The FAVID/Schoepentoeter inlet device breaks the momentum of the incoming stream and performs primary gas/liquid separation. Further gas/liquid separation is achieved by wire mesh demisters, cyclones and/or coalescing filter elements. During the final step, a Vane-type outlet device removes any remaining droplets from the gaseous phase to achieve the required performance.

The liquid droplets are collected at the bottom of the vessel, from where they can be removed through an outlet nozzle.



Compressor Scrubber



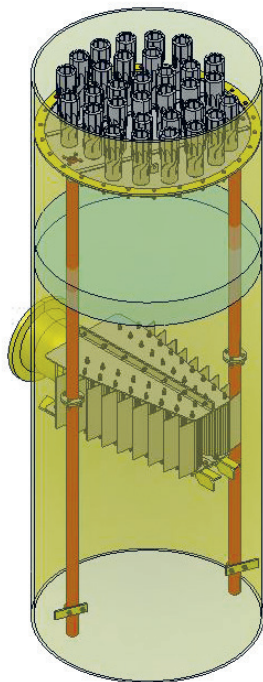
Gas Scrubbers

# Gas Separation

## 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, to spec and within budget. At Frames, our close-knit team of engineering experts is open, honest, and focused on delivering our clients 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.



Scrubber with FAVID, Wire Mesh Demister & Axial Cyclones

## Technical Details

- Vertical vessel with process internals:
  - Frames Advanced Vane-type Inlet Device (FAVID) / Schoepentoeter
  - Wire Mesh Demister
  - Tangential / axial cyclones
  - Coalescing filter elements
  - Vane-type Outlet Device
- Outlet nozzle

## Added Value Frames

- Designed according to the system's unique requirements, with vessel dimension optimization
- Fully integrates into operational systems, optimizing production processes
- Proven processes and cutting-edge technology
- Worldwide, 24/7 service with full, expert support

## References (selection)

- Bab Gas Phase II - ADCO, United Arab Emirates
- Okoloma Gas Plant - Shell, Nigeria
- TCO Asset Development Project, Tengizchevroil, Kazakhstan
- Norg-Zuid, onshore - NAM, The Netherlands
- Langed Pipeline - Statioil, United Kingdom
- Martin Linge Field - Total E&P, Norway
- Q1-B Platform - Winterhall, The Netherlands
- Habshan Platform - ADMA-OPCO, United Arab Emirates
- P-63 FPSO - Petrobras, Brazil
- P-76 FPSO - Petrobras, Brazil
- Cidade de Ilhabela FPSO - SBM, Brazil

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# Frames Family Tree

