Three-phase Separator

Three-phase separator is a basic component of petroleum production system, which is used to separate reservoir fluid into oil, gas and water. These separated flows are transported to the downstream for processing.

In general, a mixed fluid can be considered as a small amount of liquid A or gas B dispersed in a large amount of fluid C. In this case, the dispersed liquid A or gas B is called the dispersed phase, while the large amount of continuous fluid C is called the continuous phase. For gas-liquid separation, it is sometimes necessary to remove tiny droplets of liquid A and C from large amount of gas B, where gas B is the continuous phase, and liquid A and C are the dispersed phases. When only one liquid and gas is considered for separation, it is called a two-phase separator or a liquid-gas separator.

The basic principle of separator is gravity separation. By making use of the density difference of different phase states, the droplet can settle or float freely under the combined force of gravity, buoyancy, fluid resistance and intermolecular forces. It has good applicability for both laminar and turbulent flows.

The separation of liquid and gas is relatively easy, while the separation efficiency of oil and water is affected by many factors:
The higher the viscosity of the oil is, the more difficult it is for the molecules of the droplets to move.
The more evenly oil and water are dispersed in each other's continuous phase and the smaller the droplets sizes are, the greater the separation difficulty is.

The higher the degree of separation is required, and the less liquid residual is allowed, the longer time it will take.
The longer separation time requires the larger size of the equipment and even the use of multi-stage separation and a variety of auxiliary separation means, such as centrifugal separation and collision coalescence separation. In addition, chemical agents and electrostatic coalescing are also often used in the crude oil separation process in refinery plants to achieve the best separation fineness. However, such a high separation precision is far from needed in the mining process of oil and gas fields, so usually only one three-phase separator is usually put into operation for every well.

**Application**
- Exploration well testing
- Extended well testing
- Clean-ups and flowback operations
- Multiphase flow metering

**Features**
- Modular skid for onshore operation
- Durable internals
- Certified and reliable flow control valve and instruments
- Instrument gas scrubber
- Sample points for oil, gas, water and inlet medium
- High / Low alarm points and pressure relief valves

**Design Code & Standards**
- ASME Section VII, DIV 1
- NACE MR0175
- API 12J
- UL, Exp
- PED
- CE
- API 6D
- ANSI B31.3 Class M (H2S)
The Three Phase Test separators (3P Test Separator)

The Three Phase Test separators (3P Test Separator) are used in well testing, well clean-ups and other flow operations for efficient and safe separation and efficient measurement of oil, gas and water. 3P Test Separators are usually supplied with high-accuracy instruments, control and shut-off valves, piping and skid, and referred as Test Separator Package / Module / Skid.

Separator vessel is equipped with internal components, such as inlet deflector, vane pack, coalescer, wave breaker, weir plates, and mist extractor. Separator modular unit can be used both offshore and onshore, and as standalone item or part of the package, and designed to fit the trailer for ensure fast and effective mobility during operation.

Basic Specification Data

Separator can be designed as per client’s operation conditions depending on flowrate, temperature, pressure, working medium and other operation data. Most of the clients, prefer size 42 in. x 10 ft, and pressure of 1440 psi for well test operation.

<table>
<thead>
<tr>
<th>Design Pressure</th>
<th>Vessel Size</th>
<th>Liquid Capacity*</th>
<th>Dimensions (L x W x H)</th>
<th>Dimensions (L x W x H)</th>
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<tr>
<td>psi</td>
<td>bar</td>
<td>Mpa</td>
<td>inch x foot</td>
<td>cm</td>
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* For reference only, may varies according to customer's retention time.