

APÉNDICE A

PROCESS CONSIDERATIONS

A.1 This Appendix provides a general discussion of the functional requirements of Oil and Gas Separators and their controls as used in this specification.

A.2 Separator Components. The function of a separator is to provide removal of free gas from oil and/or water at a specific pressure and temperature. For efficient and stable operation over a wide range of conditions, a gas-liquid separator normally has the following features:

A.2.1 Primary Separation Section — This section is for removing the bulk of the liquid in the inlet stream. Liquid slugs and large liquid particles are removed first to minimize gas turbulence and re-entrainment of liquid particles in preparation for the second step of separation. To do this, it is usually necessary to absorb the momentum and change the direction of flow by some form of inlet baffling.

A.2.2 Secondary Separation Section — The major separation principle in this section is

of several designs (a series of vanes, woven wire mesh pad or a centrifugal device). The mist extractor removes from the gas stream the small droplets (normally down to 10 micron diameter) of liquid before the gas leaves the vessel. Liquid carryover is normally less than 0.1 gallon per MMSCF.

A.2.5 Process Controls — The operating pressure may be controlled by a weight loaded, spring loaded, or pilot operated gas back pressure valve. Where the gas is being delivered to a pipeline, the minimum separator pressure is usually set by the transmission or gathering system pressure. Separators should be equipped with one or more liquid level controls. Usually a liquid level control for the liquid accumulation section of two-phase separators activates a liquid dump valve to maintain the required liquid level. Two liquid level control systems are normally used for three-phase separators. Internal weirs and baffles are used in conjunction with these liquid level controls. Separators are equipped with gauge glasses or sight glasses to indicate one or two levels. A pressure gauge and thermometer well are usually installed on separators.

A.2.6 Relief Devices — All separators, regardless of size or pressure, shall be provided with pressure protective devices and set in accordance with ASME Code requirements. Multiple pressure relieving devices such as a pressure relief valve in conjunction with a rupture disk may be used to provide the necessary relieving capacity. The relief valve is normally set at the maximum

gravity settling of liquid from the gas stream after its velocity has been reduced. The efficiency of this section depends on the gas and liquid properties, particle size and degree of gas turbulence. Some designs use internal baffling to reduce turbulence and to dissipate foam. The baffles may also act as droplet collectors.

A.2.3 Liquid Accumulator Section — The liquid(s) is (are) collected in this section. The liquid should have a minimum of disturbance from the flowing gas stream. Sufficient capacity is necessary to allow for surges and to provide the retention time necessary for efficient separation of gas breaking out of solution and separation of free water from oil in three-phase separators. A vortex breaker may be located over the liquid outlet nozzle(s) to prevent gas or oil entrainment with the bottom liquid.

A.2.4 Mist Extraction Section — The mist extractor of the coalescing section can be one

allowable working pressure (MAWP). The rupture disk is normally selected to relieve above the set pressure of the relief valve. The pressure relief devices need not be provided by the separator manufacturer, but over-pressure protection shall be provided prior to placing the separator in service. The purchaser should determine who has the responsibility to furnish relief devices.

A.2.7 Discharge Lines — Discharge lines from pressure relief devices should receive consideration on an individual basis. A detailed discussion is beyond the scope of this standard. Recommendations for discharge line consideration may be obtained from Appendix M, Installation and Operation, of the ASME Code as well as API RP 520, "Design and Installation of Pressure Relieving Systems in Refineries" and API RP 521, "Guide for Pressure Relief Systems and Depressuring Systems."

A.2.8 When specified by the purchaser, separators may be equipped with other controls and accessories such as the following:

- a. Inlet shut-in valve
- b. Pressure sensor or control
- c. Level sensor or control
- d. Temperature sensor or control

A.3 Separator Shapes — There are three different shapes of separators: vertical, horizontal, and spherical. The four main components are located differently in the various vessels. In Figure A-1 are given typical two-phase separator configurations for vertical, horizontal, and spherical separators.