APPLICATION PROFILE

SURFACE PROCESSING FACILITIES

INTRODUCTION

The primary activity in surface processing facilities is separating the produced fluids into streams of oil, gas and water for sale and disposal. This separation is accomplished largely by gravity segregation, drawing the lighter gas off the top of the separator vessels, the heavier water off the bottom, with only the oil remaining.

The first pressure vessel the fluid will enter at the central facility is the gas separator, typically referred to as “the separator.” It removes the free gas from the liquid. Most separators are two-phase, separating the gas phase from the liquid phase, which includes both water and oil. Vertical separators are used for low volume operations, while horizontal separators are typically used in high volume, high GOR “Gas/Oil Ratio” applications. Three phase separators that divide the production into three streams of oil, gas and water are usually used with high gravity oils that readily separate from the water.

Water Knockouts are installed downstream from the separators when the wells produce large volumes of free water. Knockouts are usually horizontal pressure vessels providing adequate retention time for free water to drop out of the emulsion.

Emulsions are mixtures of two insoluble liquids with small quantities of one of the liquids in small, discrete droplets dispersed throughout the other, continuous liquid. Oilfield emulsions are usually water in oil. Oilfield emulsions are broken in the surface facilities by several processes:

- Applying Heat (Heater Treaters)
- Chemicals
- Retention (Water Knock Outs)

ONSHORE - FACILITY LAYOUT

Typical onshore facilities are for oil, gas and water to be separated by gravity segregation. Emulsion-breaking measures are sometimes required. The oil and/or gas are metered and sold. The produced water it is usually disposed of into a subsurface formation.

OFFSHORE - FACILITY LAYOUT

The facility’s separator platform is normally segregated from the well and living quarter platforms whenever possible. They may be tied together by walkways. This is a safety measure reflecting that fired processing facilities have the highest risk of all offshore facilities.

OFFSHORE DEEPWATER - FACILITY LAYOUT

As the water gets deeper, the operations become more expensive. The producer often forgoes the added safety of separated facilities. Instead, all three functions are combined onto a single platform, which also functions as a drilling platform in the early stages. These closely combined processes increase the opportunity for catastrophic accidents.

The purpose of this application guide is to provide an understanding of the need for, and use of, rupture discs as pressure relief devices. This document is intended to be a guideline and is not applicable to all situations. If you have any questions, please contact Fike Oilfield or our sales representative in your area.

Form No. OFAP001

704 SW 10th Street • P.O. Box 610 • Blue Springs, Missouri 64013-0610 U.S.A.
Phone: 816•229•3405 • www.fike.com

PROBLEM:

Fluids from oil and gas production typically go through a separation phase as the first step in processing. Separator process vessels are known to experience overpressure conditions that could lead to dangerous, or catastrophic events. Protective measures should always be considered to provide for:

- Depressurization of Vessels
- Emergency Relief of Processing Equipment
- Provide Disposal of Vapors by Vent

Some reasons to consider overpressure protection of these systems are:

- Protect Human Life
- Prevent Environmental Damage
- Protect the Investment
- Protect the Ability to Generate Profits

SOLUTION: RUPTURE DISC

Rupture discs are non-reclosing pressure relief devices, designed to burst at a designated pressure. Rupture discs are typically solid metal diaphragms that are very accurate and reliable when compared to mechanical pressure relief devices. Rupture disc applications will typically fall into one of the following three categories:

Primary Relief (Figure 1):
Where a pressure relief device is used as the primary, or sole relieving device, a rupture disc may be used as the only means of over pressure protection. See fig 1. In this application the ASME code indicates that the set pressure should not exceed the MAWP (Maximum Allowable Working Pressure), and the device should be sized to prevent the pressure from rising more than 10% above the MAWP.

Secondary Relief (Figure 2):
The rupture disc device may be used to provide secondary (back up) relief to other rupture disc or pressure relief valves. See fig. 2. The ASME code allows secondary relief devices to be set as high as 105% of the MAWP, and sized to prevent pressure from rising more than 116% of the MAWP.

Combination (Figure 3):
A non-fragmenting rupture disc may be located between a pressure relief valve and the process, thus preventing leakage or weeping through the pressure relief valve. A rupture disc installed in this manner also protects pressure relief valve internals from corrosive media and prevents clogging or plugging of the valve. Application of rupture disc on the outlet side of pressure relief valves may be appropriate if atmospheric corrosion is a consideration, or if two or more valves share a common discharge manifold. This prevents contamination from adjacent valves through the discharge manifold upon relief.

Figure 1

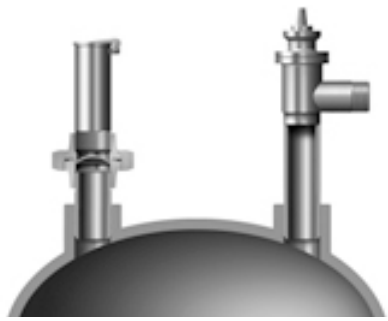

Figure 2

Figure 3

FEATURES/BENEFITS:

Primary and Secondary:

- Reliable
- Responsive
- Range
- Temperature
- Tolerance

Combination:

- Acts as a leakproof seal to prevent fugitive emissions
- Extends valve life by protecting it from corrosives
- Allows use of less expensive valve trim
- Prevents build-up of process material in valve
- Permits in-place valve testing without an isolation valve

APPLICATIONS:

Oil and gas separators can be vertical, horizontal, spherical, stage separation (first, second, etc.), two-phase, three-phase, low-temperature, or expansion. See figure 4 to view typical location of rupture disc devices on a vertical separator.

The Heater Treater is a three-phase separator with fire tubes, which can be vertical, horizontal or spherical. See figure 5 to view typical location of rupture disc devices on a heater treater.

Water Knock-outs are separators that fall into two categories; free-water and total liquid knock-outs. Free-water is used to separate the three phases from a combined gas, oil and water. The total liquid knock-out is often used to remove liquids from a high pressure gas. See figure 6 to view typical location of rupture disc devices on a horizontal water knock-out.

Oil and gas separators can be vertical, horizontal, spherical, stage separation (first, second, etc.), two-phase, three-phase, low-temperature, or expansion. See figure 4 to view typical location of rupture disc devices on a vertical separator.

The Heater-Treater is a three-phase separator with fire tubes, which can be vertical, horizontal or spherical. See figure 5 to view typical location of rupture disc devices on a heater treater.

Water Knock-outs are separators that fall into two categories; free-water and total liquid knock-outs. Free-water is used to separate the three phases from combined gas, oil and water. The total liquid knock-out is often used to remove liquids from a high pressure gas. See figure 6 to view typical location of rupture disc devices on a horizontal water knock-out.

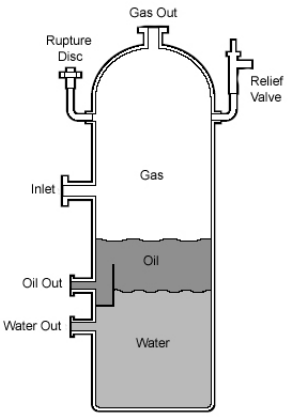

Figure 4 - Vertical Two-Phase Separation

FIKE SOLUTIONS FOR THE OILFIELD INDUSTRY

Failure of pressure activation devices is a major problem in the drilling, completion, and production phases of the oil and gas industry. Fike has addressed this and other oilfield problems with the application of rupture discs, some of the industry's most accurate and reliable devices. Whether it is a downhole pressure activation device, or pressure relief on a surface storage tank, Fike provides reliable and comprehensive rupture disc solutions for the oil and gas industry.

Conventional Pre-bulged Disc (CPD) - Fike's standard pre-bulged rupture disc is the most widely used in industry today. The CPD is available in a wide range of burst pressures, and is typically installed in standard union type or hammer union holders. Available in stock.

Pressure Activation Device (PAD) - The PAD is offered in two configurations, PAD-A for pressure activation from the annulus and the PAD-I for pressure activation from within the casing/tubing/drill string. The PAD can be used in any application where pressure activation is required. Common applications include downhole completion, perforating, cementing tools, gravel pack, stimulation, drill stem testing and coiled tubing equipment. Stock burst pressure available.

Hydraulic Tubing Drain (HTD) - Provides a positive method to equalize the fluid level in tubing strings, without mechanical manipulations. Standard sizes and pressure are available.

Advanced Engineered Products (AEP) - Application of rupture disc technology for demanding applications is a Fike strength. Fike has produced a number of devices that provide significant improvements to drilling, completion and production phases in the oil and gas industry, and have become standard equipment in those applications. Bring us your difficult or unusual pressure relief and activation problems and we can design a custom solution. Design flexibility, a wide choice of materials, and suitability for narrow-tolerance critical uses, make these devices the best solution for a wide range of sealing, activation, venting, one-time valving, or pressure relief requirements.

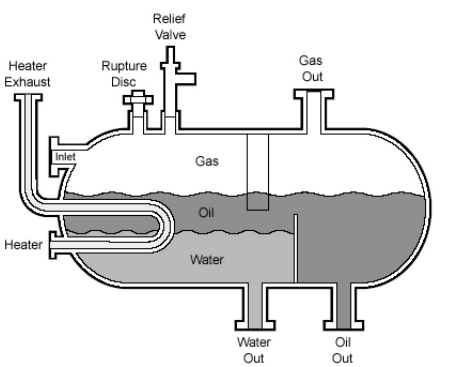

Figure 5 - Horizontal Heater-Treater

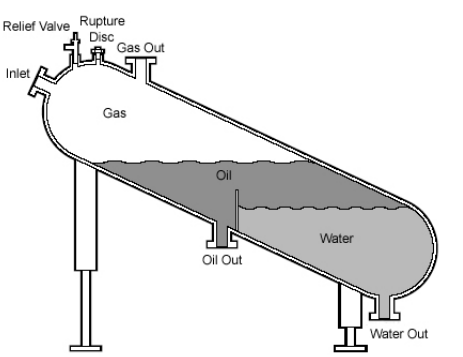

Figure 6 - Horizontal Water Knock Out

Form No. OFAP001 , December 2005. Specifications are subject to change without notice.