

ADVANCED ENGINEERED PRODUCTS

INTRODUCTION

Pressure relief and activation are required throughout the entire process of drilling, completion and production of oil and gas wells. Rupture discs used for pressure relief and activation provide safety for personnel and the environment, as well as efficient, reliable operation of tooling downhole.

A listing of common applications of Rupture Discs as pressure relief and activation devices in oil and gas production follows:

- Pressure Vessel Protection
- Well Head Protection
- Deepwater Casing Protection
- Hydraulic Tubing Drain
- Tubing Conveyed Perforation
- Hi-Pressure Test Units
- BOP Stack Testing
- Staged Cementing
- Liner Hangers
- Inflatable Packers
- Gravel Pack



The purpose of this application guide is to provide a better understanding of the possible innovative solutions achieved when using a rupture disc for your pressure relief and activation requirements. This document is intended to be a guideline and is not applicable to all situations. If you have any questions, please contact the Fike Oilfield Product Group or our sales representative in your area.

THE PROBLEM

Failure of pressure activation devices is a major problem in oil and gas drilling, completion and production operations. These failures cause downtime, add expense and endanger the environment. Numerous factors can contribute to these failures, such as:

- Downhole Temperatures
- Shear Pin Mounting Holes Not Consistent, Wear Factor
- Multiple Shear Pins Not Functioning Simultaneously
- Corrosion

THE SOLUTION: ADVANCED ENGINEERED PRODUCTS (AEP)

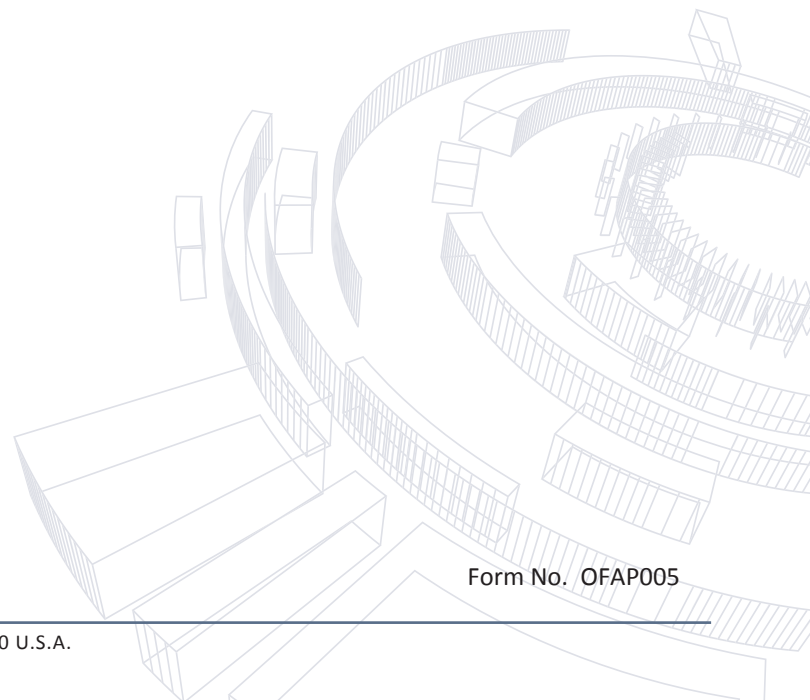
Fike has addressed this problem, applying nearly 70 years of experience in the application of rupture disc technology to produce reliable and accurate pressure relief and activation devices. The rupture disc performs two necessary functions:

- It provides a leak tight seal until;
- A combination of conditions allow (cause) it to rupture (open) in a predictable and controlled manner.

These devices surpass the performance of conventional brass shear pin devices, and other devices, by delivering narrow-tolerance pressure relief and activation, with the highest accuracy and reliability.

FEATURES AND BENEFITS

- Eliminates Shear Pin Devices
- Easy Installation and Removal
- High Accuracy, Burst Tolerances as Low as $\pm 2\%$
- Low Cost
- Eliminates Mechanical Moving Parts
- 90% Operating Ratio to Burst Pressure Ratio
- Wide Range of in Stock Burst Pressures
- Resists Corrosion
- Positive Sealing Capabilities
- Compact One-piece Design
- Restores Valve to Original Specification with each Disc



Form No. OFAP005

Advanced Engineered Products surpass the requirements of conventional rupture disc devices manufactured for various industries. Traceability, accountability, and reliability are the hallmarks of good manufacturing practice. Our extensive experience in the oil and gas industry allow us to provide comprehensive customer assistance when developing or revising your pressure relief or activation device. The design process begins by gathering as much information about the application as possible. To determine the best solution to demanding or unique applications, our engineers and sales staff consider many important factors to make sure you have been provided the best solution possible.

The following area a few of the solutions we have provided, with detail explanations of the benefits of using our rupture disc technology:

Hydraulic Tubing Drain (HTD) Advantages:

- Metal to Metal Seal
- No O-Rings
- Minimal Temperature Effect
- Non-Fragmenting
- Minimum wall thickness need for side wall installation
- Burst Tolerance $\pm 5\%$
- Eliminates Mechanical Moving Parts
- Resists Corrosion
- Eliminated a Shear Pin Device

PAD Advantages:

- Eliminated Shear Pin Devices
- Burst Tolerance $\pm 2\%$
- Positive Sealing Capability
- Compact One-Piece Design
- Low Cost
- Easy Installation and Removal

FIKE DESIGNED SOLUTIONS FOR OILFIELD INDUSTRY

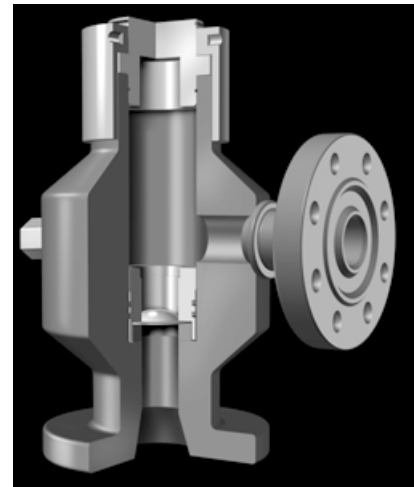
Failure of pressure activation devices is a major problem in the drilling, completion, and production phases of the oil and gas industry. Fike has addressed this and other oilfield problems with the application of rupture discs, some of the industry's most accurate and reliable devices. Whether it is 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 holders.

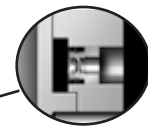
Pressure Activation Device (PAD) - The PAD is offered in two configurations, PAD-A for pressure activation from the annulus and the PAD-I for pressure activation from within the casing/tubing/drill string. The PAD can be used in any application where pressure activation is required. Common applications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

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.

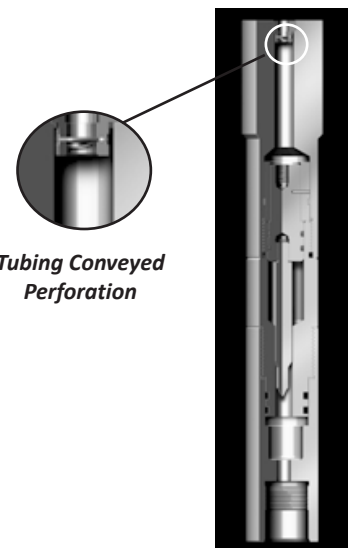
Advanced Engineered Products (AEP) - Application of rupture disc technology for demanding applications is a Fike strength. Fike has produced a number of devices that provide significant improvements to drilling, completion and production phases in the oil and gas industry, and have become standard equipment 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.



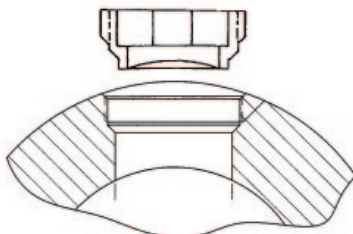
WOM's Pump Saver



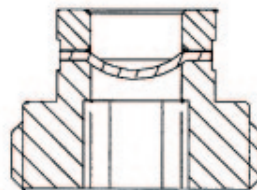
Fill Up Valve



Tubing Conveyed Perforation



Wall mounted, metal to metal sealed disc



PAD-I