

HYDRAULIC TUBING DRAIN

INTRODUCTION

During the production phase of oil and gas wells it is necessary to place equipment downhole to facilitate or enhance the production operation. Temporary packers, anchors, seating nipples, sucker rod pumps (SRP), electrical submersible pumps (ESP) and progressive cavity pumps (PCP) are just a few of the devices used downhole.

These tools are set and operated in various manners: rotating, picking up, setting down, electrically, or pressuring up on the tubing. They are designed to be fully retrievable. This equipment can usually be run and retrieved from downhole operation without complications. Experience tells us that something will eventually get stuck, postponing further production of the well. Pumps get stuck, packers, anchors and other production tools get hung in the hole. It then becomes necessary to drain or circulate the tubing string to ease retrieval of the stuck tooling.

There are several types of tubing drain that use various methods of actuation:

Rotating - Rotating drains must have a back-up to actuate them in the hole, and are typically used in conjunction with a rotating anchor

Drop Bar - A bar is dropped down the tubing string from the surface to shear a plug type device

Shear Pin - Shear Pins are placed in multiples to provide the resistance to applied pressure or mechanical manipulations

Pressure Relief - Pressure is applied up to a predetermined amount, opening the device

The Fike HTD is a pressure relief device designed for this application, utilizing rupture disc technology to provide accurate and reliable actuation of drain openings downhole.

The purpose of this application profile is to provide an understanding of a better way to perform downhole actuation of a draining mechanism to enhance production and aid in the retrieval of trapped equipment. 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: DRAIN TUBING OR CIRCULATING DEBRIS FROM STUCK TUBING

When running any type of downhole equipment, the possibility of having to pull a wet string due to malfunctioning equipment, or stuck tubing, always exists. Sand, paraffin, corrosion, scale, solids, and other debris settle around and in between the tool and the casing and the tubing wall often causing malfunctions in the downhole tools. In steam flood applications where temperatures reach as high as 500°F, draining the tubing string and killing the well becomes a must for the operator.

Operators and producers have to be constantly aware of these situations and be prepared to deal with them efficiently and effectively. Not being prepared could result in unnecessary downtime, safety issues, and environmental concerns. A reliable solution could easily save the day, as well as saving the well.

THE SOLUTION: FIKE HYDRAULIC TUBING DRAIN (HTD)

Using a Fike HTD as a preventative strategy with any downhole tool could extend the service life of that tool, tubing string and the well. The Fike HTD will drastically reduce the frequency of having stuck tubing strings, or having to pull wet strings. Experience has shown that rotating, drop bar and shear pin tubing drain devices are all helpless when the tubing is stuck due to solids, sand, paraffin, or corrosion. The only way to drain the tubing, or circulate the tubing string from being stuck, is by having a Fike HTD installed in the proper location as a preventative strategy.

The following are proven solutions for given applications:

Packers/Anchors

Packers are screwed directly into the production tubing string. They typically employ a flexible rubber sealing element that closes off the space between the outside of the tubing and the inside of the casing. Mechanical dogs dig into the casing to prevent the packer from being pumped up or down the hole by pressure differential. Anchors are similar to packers but do not employ the sealing elements, and are used primarily to prevent reciprocation of the tubing during the production operation.

Packers and anchors should never be run without a drain. The Fike HTD provides a positive means of dumping and/or circulating the fluid from within the tubing string, without mechanical manipulation of the tubing. See figure 1. When the packer or anchor becomes stuck in the hole due to solids or debris the Fike HTD can be activated by pressure at the surface to circulate the solids or debris from the packer or anchor. The packer, or anchor, can then be worked loose and retrieved.

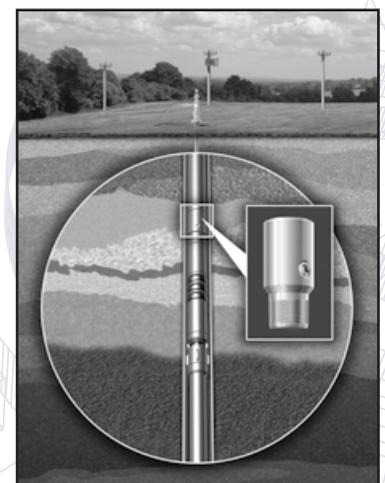


Figure 1

Form No. OFAP004

Sucker Rod Pump (SRP)

SRP's are run into the hole by a rodstring and latched into a seating nipple at the bottom of the tubing string. The pump consists of two telescoping cylinders - the plunger - and barrel - and two ball and seat valves. The fluid is passed through the plunger and barrel by the reciprocating motion allowing the two valves to stage the fluid until the entire fluid column is lifted to the surface and spills over at the surface.

It would be a good preventative strategy to position a Fike HTD in the string prior to any installation, because SRP's frequently get stuck in the hole due to produced solids, and rods break. Oversized tubing pumps often cannot be pulled from the hole, due to inoperative drain valves. Installing a Fike HTD in all sucker rod pump applications will eliminate the hazards of handling stuck pumps, by being able to pull dry strings minimize downtime and safety for workover personnel. See figure 2.

Electrical Submersible Pump (ESP)

ESP's are sophisticated, high-performance devices that are expensive to purchase, repair and operate. Using the HTD to protect your investment, you will have the ability to circulate any solids or debris that may cause the pump to stick. You may always drain the tubing above the check valve, installed to protect from fluid dumping back through the pump. See figure 3 for the ideal HTD location.

Progressive Cavity Pump (PCP)

PCP's consist of a rotating worm-shaped rotor inside of a flexible stator. The rotor is driven by a rod string inside the tubing that is rotated by a surface motor. See figure 4. PCP's are known for the capacity to pump increased amounts of solids over the other artificial lift systems. In doing so, the rotor can become stuck in the tubing string due to the produced solids. The rods can become unscrewed when backlash in the rod string occurs. Draining the tubing string will greatly enhance retrieval of the PCP. Properly installing a Fike HTD with PCP's will allow for this fluid to be drained safely and efficiently.

FIKE DESIGNED SOLUTIONS FOR OIL FIELD 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.

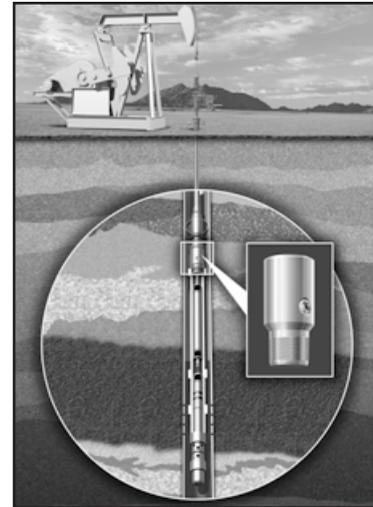


Figure 2

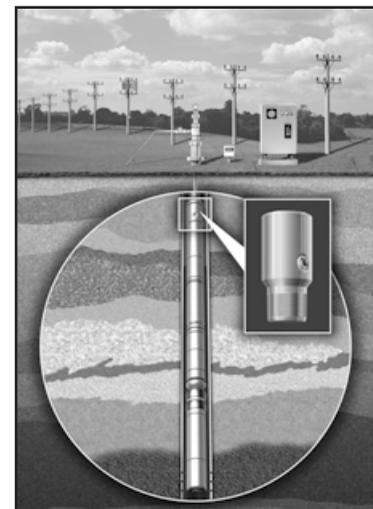


Figure 3

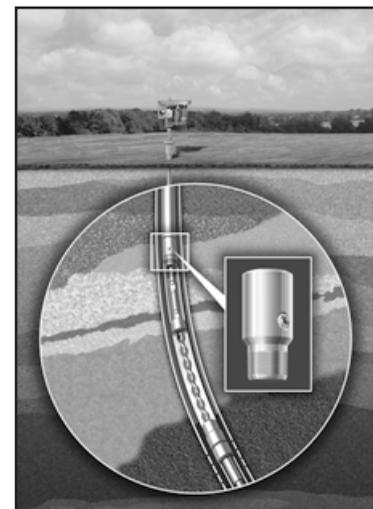


Figure 4