

Critical Selection Of Natural Gas Wellhead Feedthroughs: Choosing The Safest, Most Reliable Solution

The importance of natural gas as an energy source for the United States has grown steadily since the mid-1990s. With continued political instability plaguing many of the world's major energy producers, North American natural gas reserves provide an attractive option for energy independence. Natural gas is an attractive fuel because it is clean-burning and efficient, and according to the Energy Information Association, natural gas demand is expected to rise by more than 20 percent by 2030.

While estimation of reserves is a complex and challenging process, the U.S. Geological Survey has estimated that there are more than 2,170 trillion cubic feet (Tcf) of gas resource in the United States alone, enough to serve our energy needs for decades to come. Much of this reflects new reserve calculations based on shale gas, as well as known coalbed methane, tight sand, and conventional onshore and offshore reserves.

FROM FORMATION TO WELLHEAD, RELIABLE SEALING IS ESSENTIAL

Extraction techniques vary depending upon the formation geology, but often include downhole electric submersible pumps and a variety of downhole instrument packages requiring power, control and sensor connections. In each application, extreme care must be taken to both prevent gas leakage as well as to isolate the flammable gas from potential sources of ignition, in order to avoid a potentially deadly incident. Documented cases of spark-induced explosions and fires at the well's electrical control box illustrate the magnitude of potential dangers.

Like most engineering solutions, there is more than one option available when it comes to sealing wellhead power, control and sensor feedthroughs. One of the most common methods used, and one of the most important to avoid, is

to squeeze rubber dams around the outside diameter of the cable at the point at which it penetrates the wellhead. There are two critical problems with this approach that can often be overlooked. First, it requires extreme precision in sizing and positioning penetration points to fit the outer jacket of the cable, and in aligning each penetration point with respect to the others. Second, this method does not account for leakage inside of the cable. Because the wellbore environment is under pressure, gas can penetrate the cable and migrate to the electrical control cabinet. The combination of an enclosed space, flammable gas and constantly activating electrical switches is nothing short of a dangerous accident waiting to happen. There are documented cases of employees being injured when gas was ignited at the wellhead.

The potential for personal injury and costly equipment damage resulting from gas migration through the power cable can be eliminated by the use of feedthroughs that seal the cable's interior at the wellhead joint rather than the outer diameter. Hermetically sealing the power cable and bonding it to the wellhead with epoxy effectively prevents gas penetration and therefore confines the gas released from the deposit to the wellbore.

FLEXIBLE CUSTOM FEEDTHROUGHS ADAPT TO ANY ESP CABLE CONFIGURATION

Epoxy-sealed hermetic feedthroughs are available in several configurations to meet a wide range of wellhead requirements. Feedthroughs can easily accommodate flat, round and armored cables and are available in different lengths and mounting options, including NPT, radial O-ring and bolt-on flange. In addition to providing more effective and reliable sealing, hermetic feedthroughs are also typically more compact and less costly than alternative cable sealing components.

QUICK DISCONNECTS HELP AVOID DAMAGE, MAINTAIN SAFETY

Whenever work is done on a wellhead, there is potential for damaging cables and feedthroughs. Disconnecting feedthrough styles that include a mating connector provide a convenient point to connect or disconnect the ESP control wires. Engineers and technicians can disconnect control wires while working on the wellhead to avoid damage. Should damage occur, these mated solutions reduce the costs associated with troubleshooting, as they are inexpensive to replace, easier to install and allow a rework option that does not involve breaking the hermetic seal at the wellhead.

A PROVEN SOLUTION

Providing safe and effective wellhead and ESP connections for natural gas extraction is not complicated when relying on the right equipment. Hermetic feedthroughs have inherent advantages over other alternatives in applications throughout the U.S., Canada and abroad. The same benefits that make hermetic feedthroughs the safer, more economical alternative also apply to other oil and gas extraction methods, such as induction heating applications on oil and gas rigs.