Technical Bulletin
Applications with CO_2, H_2S, H_2O - Fugitive Emissions Packing

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Issue 2

Introduction

- On an oil well additional pressure is required to push the oil up the well during secondary and tertiary phases of production. Oil producers inject CO_2 into the well to avoid less oil staying behind inside the well, and optimize oil production. Also, CO_2 interacts better with oil than water.
- The oil produced now has a chance to contain levels of CO_2, H2S and water once it is pushed out of the well. The existence of CO_2, H2S and water will require the need of different materials for the valves depending on the concentration of each component.
- It is very important to consider the amount of CO_2, H2S and water in the media, as the reaction between these components can create carbonic acid (H2CO3). The presence of this acid is capable of corroding carbon steel, debilitating the effectiveness of certain O-Rings, and increasing the cavitation effect. These issues can cause leaks in the valve which can harm field operators near the installation, and create delays in oil production.

Possible symptoms from exposure to different concentrations of H2S

Exposure Level	Concentration, ppmv	Sympton
LOW	0-10	Irritation of the eyes, nose, and throught
MODERATE	50-200	Coughing, hoarsness, shortness of breath, pneumonia, loss of smell (> 100 ppmv)
HIGH	200-500	Changes in respiratory tissue (200-400 ppmv per laboratory animals) Rapid respiratory distress and failure (acute exposure at > 500 ppmv for 1 to 4 hours)[2]
VERY HIGH	>2,000	Coma and death after single breath[4], known as "knockdown effect" with immediate immobilization and unconsciousness, possibly from disruption of oxidative metabolism in the brain

Possible symptoms from exposure to different concentrations of CO_2

Exposure Level	Concentration, ppmv	Sympton
LOW	20,000 to 30,000	Shortness of breath, deep breathing
MODERATE	50,000 75,000	Breathing becomes heavy, sweating, pluse quickens Headaches, dizziness, restlesness, breathless-ness, increased heart rate and blood pressure, visual distortion
HIGH	100,00	Impaired hearing, nausea, vomiting, loss of consciouness
VERY HIGH	300,000	Coma, convulsion, death[5]

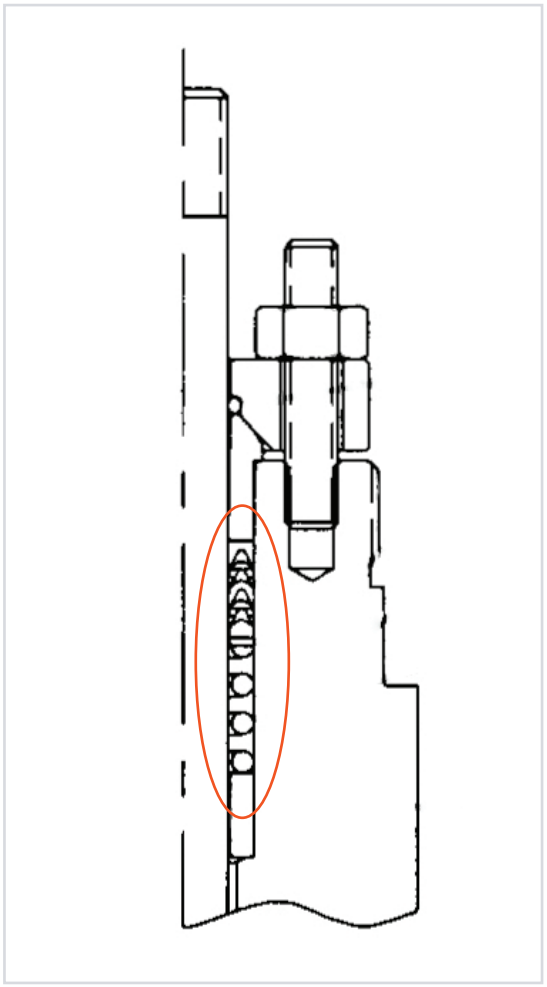
Solution

- Offer Valves Series 2220/2200 or 2700a/2720 with metallurgies suitable for H2S, CO_2 and water. Body and bonnets made in 316 SS, plug seals in Aflas® or Peroxide Cured Buna.
- NACE compliant materials are also available for our valves which are suitable for medias with low concentration of H2S, CO2 and water.
- Fugitive Emission packing (FES) with Aflas or Kalrez® can also be offered in our Series 2700 to diminish the risk of H2S and CO_2 being released uncontrollably to the atmosphere.

Benefits

- Protects the field operators and other users nearby valve installations from dangerous exposure to H2S or CO2 and avoid its possible dangerous effects.
- It allows the customer to use the same quality valve from Norriseal for other applications where the media is harder to handle to its corrosive and damaging nature.
- Increases the life of the valve by offering materials that will last longer against the formation or carbonic acid as a result from the presence of H2S, CO_2 and water.

ELASTOMER/TEFLON V-RING (5 RINGS)



Pic. Example of a Fugitive Emission packing (FES)