

## Hydrogen Sulfide (H<sub>2</sub>S) Health & Safety Instruction

Fluids processed in the oil and gas industry often contain hydrogen sulfide (H<sub>2</sub>S). This is a highly toxic, flammable, colorless gas that may cause great harm to the body if it evaporates into the air. For this reason the H<sub>2</sub>S concentration in the pump fluid (measured in ppm – parts per million) has to

be reviewed carefully. Respective safety measures for the operating staff must be followed, especially in case of mechanical seal or pump failure. Accordingly, the respective instructions in the EagleBurgmann operating manual must be followed at all times. EagleBurgmann recommended seal

selection is according to current best practice. The following table shows which seal arrangement is required based on the concentration of H<sub>2</sub>S present in the pump fluid and the safety risks which have to be considered. All arrangements refer to API 682 (4th edition).

Concentration of H <sub>2</sub> S in the pump fluid	Mechanical seal arrangement according to API 682	EagleBurgmann remarks
< 50 ppm	Single seal	H <sub>2</sub> S safety risk due to possibility of product leakage (H <sub>2</sub> S) to the atmosphere. For increased safety it is EagleBurgmann recommendation to change to a single seal in combination with a leakage detection system (e.g. API Plan 65) already with H <sub>2</sub> S content < 50 ppm.
50 ppm – 200 ppm	Single seal, API 682 piping plan 65	H <sub>2</sub> S safety risk due to possibility of product leakage (H <sub>2</sub> S) to the atmosphere. For increased safety it is EagleBurgmann recommendation to change to an unpressurized dual seal already with H <sub>2</sub> S content ≤ 200 ppm.
200 ppm – 1,000 ppm	Dual seal, e.g. API 682 piping plan 52 (unpressurized)	A high leakage rate into the supply system (e.g. API Plan 52) must be monitored carefully. The concentration of H <sub>2</sub> S in the buffer fluid has to be limited because the back-up seal may release too much H <sub>2</sub> S into the environment. Therefore, we recommend to change the buffer fluid on a monthly basis. Otherwise the remarks of a single seal will apply.
≥ 1,000 ppm	Dual seal, e.g. API 682 piping plan 53 (pressurized)	In a longtime operation a certain amount of H <sub>2</sub> S will be found in the barrier medium. This physical effect cannot be eliminated. Thus the H <sub>2</sub> S concentration in the barrier fluid has to be checked regularly.

### Important note

The purchaser is aware that EagleBurgmann recommends only installing mechanical seals corresponding to this EagleBurgmann H<sub>2</sub>S health & safety instruction. Should any claim be filed against EagleBurgmann by a third party as a result of the mechanical seals being installed or operated by the customer beyond the threshold planned, the purchaser shall immediately indemnify EagleBurgmann from said claim.

In the event that a claim is filed against EagleBurgmann on the basis of product liability, the purchaser shall undertake to indemnify EagleBurgmann from such claim if and insofar as the damages caused are resulting from the use of the mechanical seal outside the thresholds of what is stipulated in this EagleBurgmann H<sub>2</sub>S health & safety instruction.

The purchaser shall assume any and all costs and expenses in the above cases, including the costs of any legal action or recall. Furthermore, the statutory provisions shall apply.