

INSTALLATION

MANUFACTURING

DESIGN

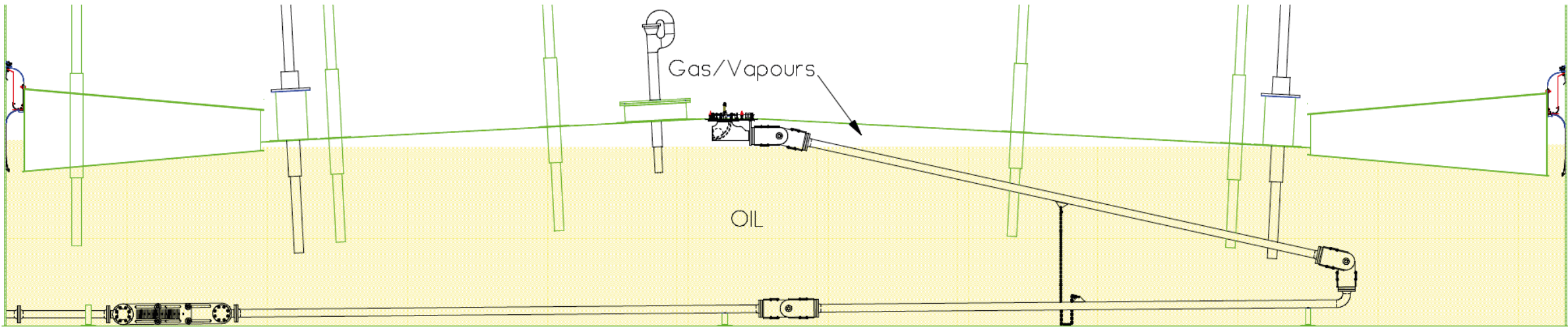
R&D

What evidence is there available to your operators and their maintenance teams that you have a ballooning problem with one of your floating roofs?

- External floating roofs are designed to retain vapour beneath the single skin of the centre deck.
- The first indication of ballooning is when an excess of vapour has built up on top of the stored liquid beneath the single skin of the centre deck, causing discolouration of the paint on the centre deck legs caused by vapour escaping from the leg pin holes.
- In more severe cases the legs and vacuum breakers syphon liquids onto the centre deck.
- In a tank containing crude oil, it is easy to see the oil discharged on the centre deck, however, for refined products, a closer inspection will reveal the evidence.
- In extreme cases, the entire floating roof becomes unstable and liable to tip. This allows trapped vapour to escape from beneath the roof having picked up sufficient speed to enable it to skim the surface of the stored liquid and force the liquid and vapour out from beneath the roof, past the seal system, onto pontoon deck into the foam dam area or even, when there is sufficient volume, onto the centre deck.
- One serious consequence is that liquid thrown onto the roof can enter the roof drain system.

What causes your centre deck to balloon?

1. Solar radiation heats the surface of the single skin of the centre deck causing the liquid beneath to boil thus increasing the vapour beneath the centre deck. The diurnal effect of the sun [cold at night hot during the day] increases the stresses on the welds of a single skin deck centre deck which leads to weld cracking releasing vapour and liquid from the centre deck. (N.B. A clean white painted centre deck conducts less heat than a dirty one covered in crude oil).
2. The composition of the stored liquid. Unstabilised crude oil or large quantities of butane in gasoline releases large quantities of vapour.
3. Height above sea level of the tank farm. The higher the elevation of the tank farm the less barometric pressure is available to contain the vapour in the stored liquid.

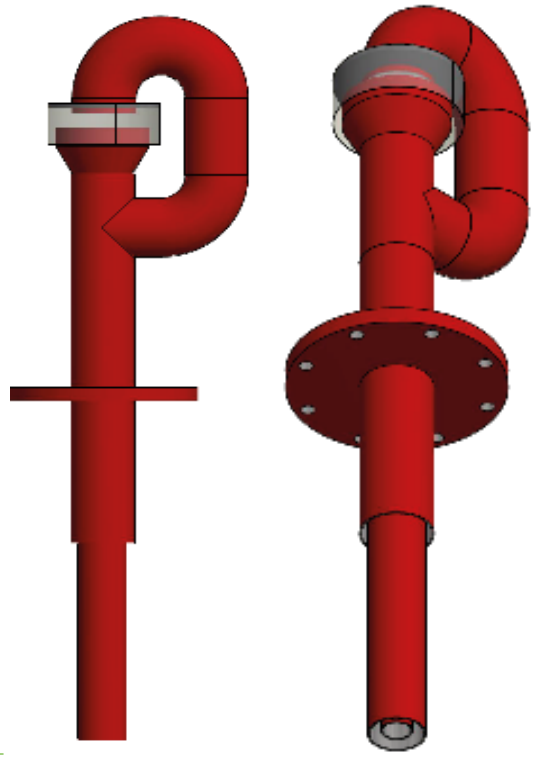


Cause and effect of vapour releases from beneath a ballooning centre deck.

| Cause | Effect |
|---|---|
| Small vapour releases. | <ul style="list-style-type: none">• Leg corrosion and early localised failure of paint coating. |
| Medium vapour releases. | <ul style="list-style-type: none">• Syphoning of liquid from the vacuum breaker and also from the roof leg sleeves onto the centre deck.• Requires regular cleaning of roof and failure of the paint coating. |
| Large vapour releases. | <ul style="list-style-type: none">• Tipping of the roof - liquids carried onto the centre deck. The roof then either sinks or hangs up, stuck at a steep angle to the horizontal at the point in the roof's travel where the tilting occurred. Either event would spoil your day. |
| Contents of the tank thrown onto the centre deck, flow into the roof drains polluting the rain water. | <ul style="list-style-type: none">• It is then no longer possible to be certain that the drain is not leaking.• The drain outlet valves may have to be shut and then a 24-hour watch established to open the drain in the event of rain.• Severe damage to the paint coating of the roof can only be attempted after a major cleaning of the entire roof. |

*Full data sheet supplied with initial quotation.

**Installation assistance if required.



- No hot work required for in-service installation as the manhole covers can be modified to accept the FBRV.

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