White paper

Limiting hydrocarbon evaporation and VOC emissions, an essential concern for the oil industry: performance, safety and regulatory compliance

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In the oil industry, managing volatile organic compounds (VOC) emissions represents a major challenge on multiple levels. These emissions mainly result from the evaporation of hydrocarbons stored in tanks and can trigger significant risks in economic, safety, and environmental terms.

A direct impact on the profitability of storage terminals

The evaporation of hydrocarbons represents a significant economic loss for storage terminals. Every liter of evaporated product reduces the available stock, thereby lowering the profitability of operations. To address this issue, many companies have adopted solutions such as floating roofs, which effectively limit these losses. A well-optimized solution can reduce evaporation by up to 99%, thus improving infrastructure performance and maximizing operator profits.

A critical safety concern

Hydrocarbon vapors are highly flammable. An accumulation of these vapors in an uncontrolled area can, upon contact with an ignition source, cause fires or explosions with potentially devastating consequences. Reducing VOC emissions is therefore essential to limit these risks and ensure the safety of storage terminals.

A growing regulatory and environmental constraint

As VOCs are major air pollutants, most countries have implemented strict regulations to control their emissions. Failure to comply with these limits exposes companies to significant financial penalties and can damage their reputation with authorities and the general public. Beyond their environmental impact, VOCs are also responsible for strong odors, which can affect residential and industrial areas near oil sites. Prolonged exposure to these vapors can also pose health risks to both workers and nearby residents. Controlling evaporation has thus become a key lever to ensure regulatory compliance, minimize the environmental impact of oil activities, and reduce odor-related nuisances.

How can hydrocarbon evaporation be limited to increase storage terminals efficiency, ensure infrastructure safety, and comply with environmental regulations?

There are several solutions to limit hydrocarbon evaporation and reduce VOC emissions. Different approaches exist to mitigate losses caused by hydrocarbon evaporation, thereby reducing VOC emissions. Three main technologies are used in the oil industry, each with its own advantages and disadvantages.

1

Nitrogen blanketing by pressurization

Nitrogen blanketing involves maintaining a pressure of inert gas in the tanks to reduce hydrocarbon evaporation.

2

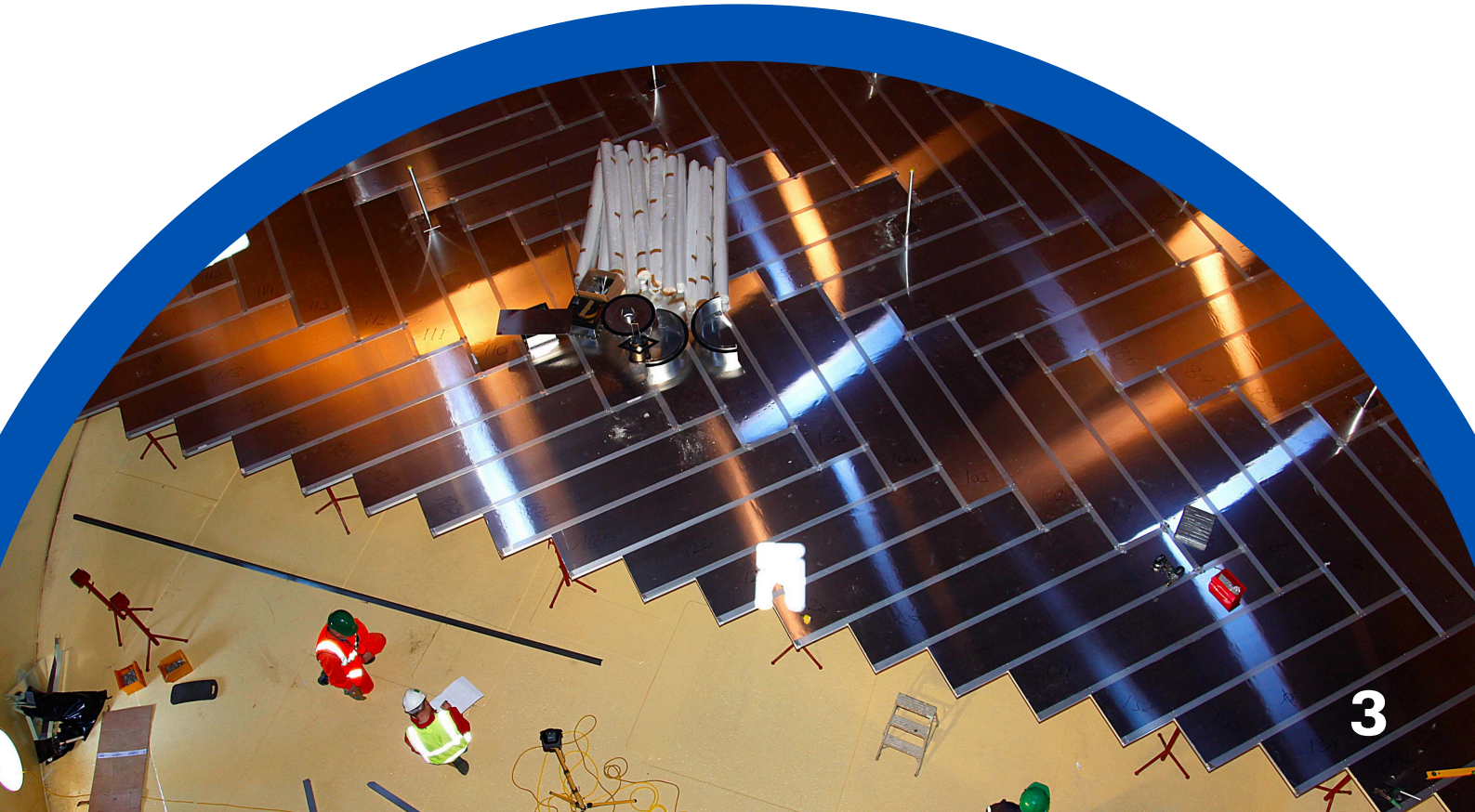
Internal floating roof

An internal floating roof is a membrane that rests directly on the stored product, thereby reducing the surface in contact with air and limiting evaporation.

3

External floating roof with geodesic dome

The external floating roof is a structure that can be adapted to existing tanks and is often combined with a geodesic dome for optimal efficiency.



Our Comparison:

Nitrogen blanketing by pressurization

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- Relatively low initial investment.
- Can be implemented quickly.

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- High operating costs (continuous nitrogen supply, increased maintenance).
- Risk of tank damage in case of poor management (collapse, overpressure).
- Requires strict monitoring to avoid operational incidents.

Internal floating roof

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- Reduces evaporation by 93% to 99%.
- Requires little maintenance.
- Limited operational risks.
- Fast return on investment (1 to 5 years on average).
- Durable solution (10 to 30 years).

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- Higher initial investment.
- May require modifications to the tank structure.
- Temporary tank shutdown needed for installation.

External floating roof with geodesic dome

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- Integrates well with existing infrastructure.
- Low maintenance requirements.
- Provides a long-term solution to limit losses.

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- Much higher initial investment, requiring significant and costly logistics.
- May require regulatory approvals to modify the tank structure.
- Longer downtime.

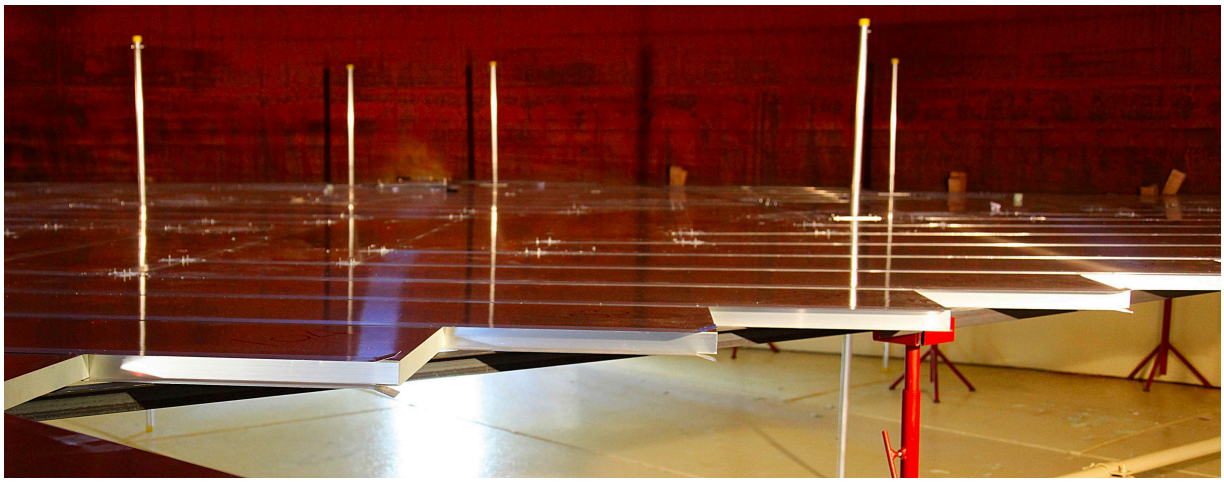
Which solution should you choose?

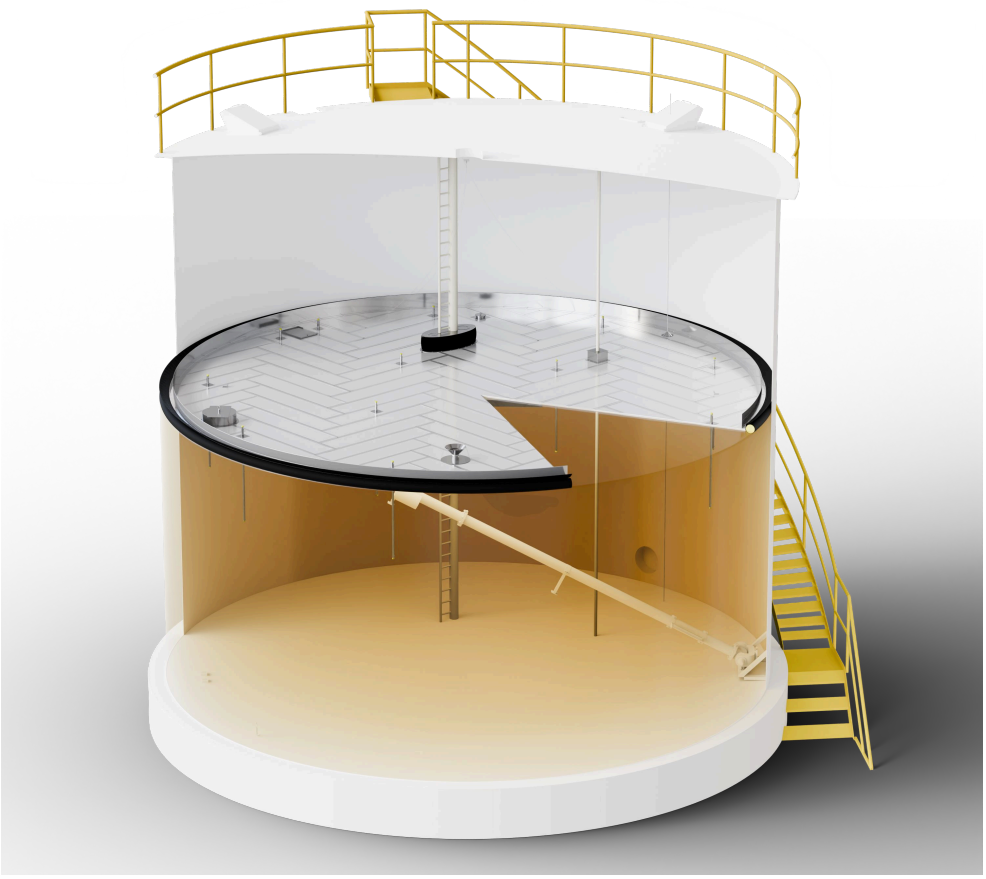
Among these three solutions, the internal floating roof appears to be the best compromise in terms of cost, maintenance, and efficiency. It offers a significant reduction in evaporation, a quick return on investment, and few operational constraints. In the next section, we will look at how to choose a floating roof suited to the specific characteristics of your tanks and facility.

How to choose a floating roof suited to your tanks?

The choice of a floating roof must meet several technical and operational criteria to ensure optimal performance and smooth integration into existing infrastructure:

- Avoid structural modifications to the tank: favor solutions that do not require altering the tank structure, thus minimizing costs and downtime, while preserving its integrity.
- Limit gas phases: choose a technology that minimizes the presence of gas between the product and the floating roof to enhance both efficiency and safety.
- Opt for a non-submersible solution: a floating roof that does not sink in case of a malfunction provides greater safety and reliability.
- Choose a roof compatible with the stored product: ensure that the stored product will not alter the floating roof (for example, ethanol is quite corrosive).
- Optimize storage space: prioritize floating roofs with minimal thickness to maximize the tank's usable volume.
- Compatibility with the existing environment: make sure the floating roof allows for easy integration of instruments and accessories, and can adapt to tank deformations.





The LARCO COVERFLOTE®, a floating roof combining performance and practicality

The LARCO COVERFLOTE® floating roof stands out thanks to its innovative features tailored to the needs of storage terminals:

- **Installation without structural modification of the tank:** the COVERFLOTE® arrives on-site in the form of standard rectangular panels and is assembled directly inside the tank, avoiding any heavy intervention on the structure. All components required for assembly can be passed through the 24-inch manhole.
- **Full contact technology:** it eliminates the presence of gas phases and ensures maximum sealing.
- **Unsinkable and safe:** the roof is made of self-floating panels, which prevents it from sinking. Its design allows one or two people to stand on the roof for assembly and maintenance.
- **Storage optimization:** with a thickness of only 40 mm, it is the thinnest roof on the market, allowing for more profitable use of storage space.
- **Fast delivery and installation times:** thanks to the use of standard rectangular panels kept in stock, reducing tank downtime.

Interested in the COVERFLOTE®?

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