Emission Reduction Impact of Aluminum Internal Floating Roofs in Oil Tanks

Lianyungang, Jiangsu Mar 3, 2026 (Issuewire.com**)** - As global environmental regulations tighten and the oil and chemical industries accelerate their transition toward low-emission operations, storage tank vapor control has become a top priority for terminal operators. In this context, the **Aluminum internal floating roof for storage tanks** has emerged as a highly effective engineering solution to reduce evaporative losses and volatile organic compound (VOC) emissions. Responding to this industry

shift, Lianyungang Hechang Machinery Co., Ltd. continues to deliver advanced storage and transfer technologies that support safer, cleaner, and more efficient tank farm operations worldwide.

This press release explores the emission reduction mechanisms of aluminum internal floating roofs (IFRs), their operational advantages in oil storage environments, and how integrated engineering capabilities from Hechang help energy operators achieve both regulatory compliance and long-term cost efficiency.

Growing Pressure to Reduce Tank Emissions

Across refineries, tank farms, and petrochemical terminals, evaporative losses from fixed-roof storage tanks have historically been a major source of VOC emissions. These emissions contribute to:

- Air pollution and smog formation
- Product loss and revenue leakage
- Increased fire and explosion risk
- Stricter compliance burdens under environmental regulations

Regulators worldwide—including those governing major oil and gas hubs—are imposing tighter limits on storage tank breathing losses and standing losses. As a result, operators are actively upgrading tank vapor control systems, with internal floating roofs becoming one of the most widely adopted retrofit solutions.

How Aluminum Internal Floating Roofs Reduce Emissions1. Minimizing Vapor Space

The primary emission reduction mechanism of an internal floating roof is straightforward but highly effective. By floating directly on the liquid surface, the roof:

- Dramatically reduces vapor space inside the tank
- Limits hydrocarbon evaporation
- Minimizes oxygen ingress
- Stabilizes internal tank pressure

Compared with fixed-roof tanks without floating systems, properly designed IFRs can reduce VOC emissions by up to 90% or more, depending on product volatility and seal performance.

Aluminum IFRs further enhance this effect through lightweight structural behavior that maintains consistent contact with the liquid surface.

2. Advanced Peripheral Sealing Systems

Emission performance depends heavily on rim seal effectiveness. Modern aluminum IFR systems typically incorporate:

Primary liquid-mounted seals

Secondary vapor seals

Low-friction sliding mechanisms

Chemical-resistant sealing materials

These sealing systems minimize vapor escape at the tank shell interface—the most common leakage point.

Hechang's engineering approach focuses on tight manufacturing tolerances and optimized seal geometry, helping operators maintain long-term emission control even under:

Temperature fluctuations

Tank shell deformation

Frequent filling cycles

High-volatility fuel storage

3. Lightweight Aluminum Structural Benefits

Material selection plays a crucial role in emission performance over the lifecycle of the tank.

Key advantages of aluminum IFR structures include:

- Excellent corrosion resistance
- Lower structural load on tank walls
- Reduced risk of sinking or tilting
- Longer maintenance intervals
- Improved installation efficiency

Unlike heavier steel floating roofs, aluminum designs place less stress on support components and maintain better buoyancy stability, which directly supports consistent seal performance and emission reduction.

In coastal refineries and humid chemical parks, corrosion resistance becomes particularly critical, making aluminum IFRs increasingly preferred.

4. Fire Safety and Operational Stability

Beyond emission control, aluminum internal floating roofs contribute to safer tank operation.

Safety benefits include:

- Reduced vapor accumulation
- Lower explosion risk
- Compatibility with floating suction systems
- Integration with tank gauging and monitoring
- Optional anti-static grounding systems

By minimizing hydrocarbon vapor concentration inside the tank, IFRs help operators meet both environmental and process safety objectives simultaneously.

5. Lifecycle Economic Impact

Emission reduction is not only an environmental requirement—it also has direct financial implications.

Operators typically realize savings through:

- Reduced product evaporation losses
- Lower environmental compliance costs
- Fewer odor complaints and community risks
- Extended tank service life
- Reduced maintenance frequency

When evaluated over a multi-year horizon, aluminum IFR retrofits often deliver strong return on investment, particularly in high-throughput fuel terminals and large tank farms.

Engineering Considerations for Optimal Performance

To achieve maximum emission reduction, several design factors must be carefully engineered:

Tank Compatibility

Proper dimensional matching ensures:

- Smooth floating movement
- Effective seal compression
- Minimal roof tilt
- Reliable drainage

Buoyancy Design

Engineers must calculate sufficient buoyancy margin to handle:

- Product density variations
- Rainwater accumulation
- Long-term structural fatigue

Drainage and Access Systems

Well-designed IFR systems include:

- Anti-clog deck drains
- Inspection ports
- Maintenance walkways
- Gauge pole sleeves

These features support safe inspection while preserving vapor tightness.

Hechang's Core Advantages in Storage & Transfer Solutions

While aluminum internal floating roofs play a vital role in emission control, their performance depends

heavily on overall system integration and engineering expertise. Lianyungang Hechang Machinery Co., Ltd. brings strong competitive advantages to global clients through its full lifecycle service model.

Comprehensive Engineering Capability

Established in 2009, Hechang specializes in loading, unloading, storage, and transportation system solutions for the oil, chemical, gas, and energy industries. The company provides:

- Technical consulting
- Engineering design
- Equipment manufacturing
- Inspection and testing
- On-site installation guidance
- After-sales operation and maintenance

This integrated approach ensures that floating roof systems function reliably within the broader terminal infrastructure.

Broad Product Portfolio and Application Scenarios

Hechang's core products span both terminal and onshore handling equipment, including:

- Marine loading arms
- Tanker loading arms (standard, gantry, cryogenic LNG, pneumatic/electric/hydraulic, intelligent auto-alignment)
- Fully automatic intelligent loading systems
- Quantitative loading control systems
- Quick release hooks
- Gangways and hose handling systems
- Steel trestles and floating pontoons

These solutions are widely deployed in:

- Refineries
- Oil and gas terminals
- Chemical industrial parks
- Storage tank farms
- LNG receiving stations
- Pharmaceutical and metallurgy facilities
- Energy engineering projects

Proven Global Project Experience

To date, Hechang has served more than **2,000 domestic and international clients** and successfully completed **over 6,000 projects**. This extensive field experience enables the company to:

- Customize solutions for diverse regulatory environments
- Optimize equipment for harsh marine and coastal conditions
- Deliver reliable performance in high-throughput terminals
- Support long-term operational stability

Clients benefit from both standardized engineering quality and flexible customization capabilities.

Conclusion: A Strategic Path Toward Low-Emission Storage

As environmental compliance and operational efficiency become increasingly intertwined in the global energy sector, aluminum internal floating roofs are proving to be one of the most practical and cost-effective emission reduction upgrades for existing oil storage tanks.

By minimizing vapor space, improving seal performance, and leveraging corrosion-resistant lightweight materials, modern aluminum IFR systems significantly reduce VOC emissions while enhancing tank safety and economic performance.

With its strong engineering foundation, broad product ecosystem, and proven project delivery record, Lianyungang Hechang Machinery Co., Ltd. is well positioned to support energy operators pursuing cleaner, safer, and more efficient storage infrastructure.

For more information, please visit: https://www.chinaloadingarm.com/

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