

Silencio and EcoLIN

Sustainable, efficient, and quiet refrigerated transport with liquid nitrogen

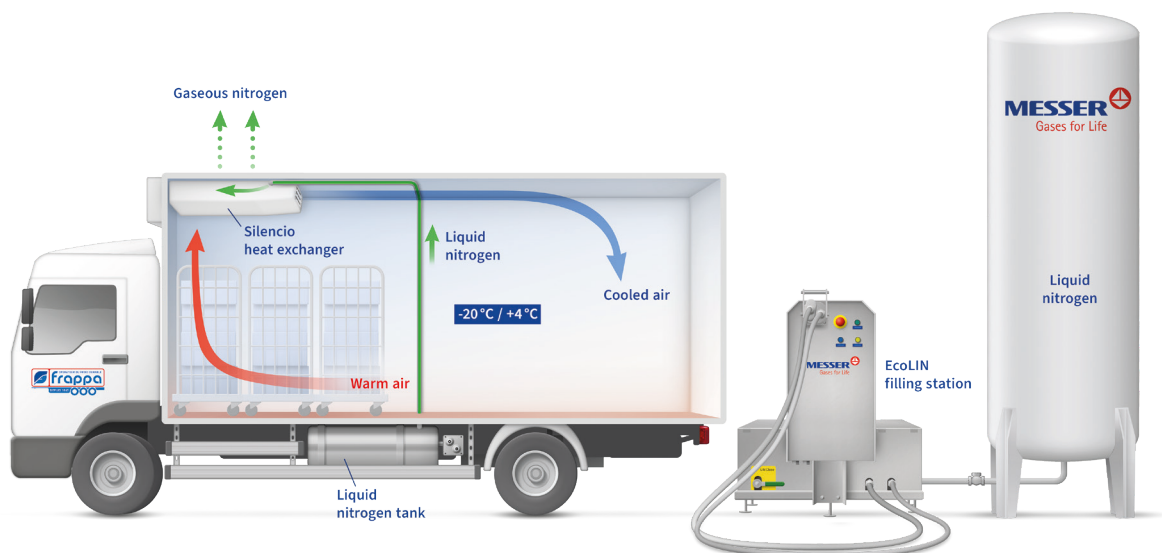


Refrigerated road transport plays a key role in maintaining the cold chain, ensuring that products are kept at the required temperature until they reach their destination, especially in urban areas. However, this comes with numerous challenges, as industry professionals must comply with stringent regulations (e.g., Low Emission Zones), optimize operating costs, reduce their carbon footprint, navigate a complex logistics ecosystem, and guarantee food safety.

Cryogenic refrigeration solutions from Messer, a global expert in cryogenic refrigeration, and FRAPPA, the French leader in sustainable refrigerated transport, are innovative and eco-friendly alternatives to address these challenges while gaining a competitive edge. Specifically designed for urban deliveries with frequent door openings, the 'Silencio and EcoLIN' solution uses liquid nitrogen as a natural energy source to maintain optimal temperatures for both chilled and frozen products throughout transportation. Chilled products are kept between 0 °C and +4 °C, while frozen products are held at -20 °C. This established on-board cryogenic technology uses the cooling power of

liquid nitrogen at -196 °C to provide precise and rapid temperature control, ensuring that products remain at the desired temperature for up to 12 hours. This helps preserve food quality and safety while meeting the strict requirements of the transport refrigeration sector. Additionally, the system enables night-time deliveries in city centers with minimal impact on residents and the environment, as it operates quietly and doesn't release CO₂, NO_x, or particulate matter. Finally, this innovation is compatible with more sustainable vehicle propulsion systems, including natural gas, battery electric, and fuel cell electric vehicles, offering a high-performance alternative for cleaner and quieter temperature-controlled deliveries in urban areas.

Depending on your needs, the 'Silencio and EcoLIN' turn-key solution is available for trucks and semi-trailer trucks. FRAPPA supplies the refrigerated trucks equipped with Silencio cryogenic refrigeration units, while Messer provides the EcoLIN filling station and ensures the reliable supply of liquid nitrogen from local production sites.



Your benefits at a glance

- **Versatile:** dry, chilled, and frozen products can be transported simultaneously.
- **Autonomous:** the refrigeration unit works independently of the propulsion system, even when it is off.
- **Powerful:** the temperature drops twice as fast as with a diesel-powered refrigeration unit.
- **Reliable:** the cooling power of liquid nitrogen is constant, maintaining the cold chain regardless of the outside temperature.
- **Sustainable:** no emissions of harmful substances (e.g., NOx) or CO₂ during operation.
- **Flexible:** compatible with all vehicle propulsion systems (e.g., natural gas, electric, hydrogen).
- **Quiet:** only 45 dB, compliant with the Piek standard and perfect for night-time deliveries.
- **Safe:** indirect cooling system.
- **Driver-friendly:** popular among drivers. Quick, safe, and easy refuelling with the EcoLIN filling station.
- **Cost-effective:** low maintenance costs as the system operates without a compressor.



The EcoLIN filling station ensures an automatic, quick, safe, and traceable nitrogen filling process in just 10 minutes.

How does it work?

Step 1

The refrigerated truck is equipped with a special insulated liquid nitrogen tank, which is supplied by the EcoLIN filling station.

Step 2

From the tank, the liquid nitrogen passes through a heat exchanger, thereby indirectly cooling the air in the refrigerated trailer. This heat transfer changes the state of the nitrogen from liquid to gas.

Step 3

Fans circulate the cooled air inside the truck trailer, keeping the cargo at the desired temperature and ensuring a cold, stable atmosphere in the compartment.

Step 4

While the refrigeration unit is operating, the nitrogen – the main component of air – evaporates and is released as a gas into the atmosphere.



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applications.messergroup.com

