



## **Air Liquide contribution to ground base versatility and modularity for future microlaunchers**

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The emergence of micro launchers across Europe involves developing more launch pads towards ever greater flexibility, standardization and modularity.

Mastering a complete value chain bringing together the supply and storage of LOx, LCH4, LH2, LN2, GN2, GHe propellants as well as the study and management of a chronology, Air Liquide is adapting to this market by developing a versatility and modularity of ground equipment. The target market is both future launch systems for small satellites and engine tests for development or qualification.

The proposed approach to illustrate this versatility is based on 3 axes.

- the ability to deliver to any location in the world an ISO container potentially already filled with propellants capable of self-pressurizing during the feeding phase or test phase.
- Skid modules, stored on a cart or a container performing the functions of inerting / flushing, filling, venting but also connectable and remotely controllable.
- The supply of cryogenic flexible lines with a suitable length to interface with the launcher environment.

Based on a state of the art and the studied characteristics of the micro launchers under development, the modules for a versatile launch pad offered by Air Liquide meet all of these characteristics concerning the fluidic part, whether for a launch or for engine tests.

This abstract can lead to a round table in which Air Liquide will be delighted to participate or an Air Liquide plenary presentation on the subject or a poster, to be defined by the GBSF organization.