



CONNECTIONS FOR TRANSPORTABLE AND STATIC STORAGE TANKS FOR CRYOGENIC GASES

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1. Introduction

Across the Middle East, there have, traditionally, not been any standards for product inlet / outlet connections for transportable and static storage vessels for bulk liquefied cryogenic gases. The prevalence of large numbers of alternative connections within the industry and the consequent dependence on adaptors to connect between them is regarded as being potentially hazardous as there is a high risk of the wrong product(s) being introduced to the consumer's supply system.

The hazards associated with connecting the wrong products to the consumer's supply system include loss of production, property damage and injury, or even death to personnel.

There is a need for standardization of the product connections for bulk liquefied cryogenic gases to eliminate filling errors at source and incorrect product delivery to the consumer's supply systems.

Adoption of the below standards will mitigate the risks associated with filling transportable equipment and /or static tanks with the incorrect product and will also eliminate the need for using adaptors.

2. Scope

This document is pertinent to connections associated with the filling and discharge of transportable and static storage vessels for bulk liquefied cryogenic air gases and liquid carbon dioxide gas.

It applies specifically to the following list of bulk liquefied cryogenic gases for industrial and medical applications

- **Liquefied Oxygen**
- **Liquefied Nitrogen**
- **Liquefied Argon**
- **Liquefied Carbon Dioxide**

3. Definitions

Adaptor: A device enabling two different acceptable CONNECTIONS for the SAME PRODUCT (See Table 1 and 2) to be coupled for product transfer.

Connection: A recognized standard device and its mating device that discriminate between products defined in the scope of this document and typically mounted on the inlets/outlets of a transportable and static storage vessel(s) and or their transfer hoses.

Pressure: In this document, bar shall indicate gauge pressure unless otherwise noted, i.e. (bar, abs) for absolute pressure and (bar, dif) for differential pressure.

Shall: The use of the word "shall" in this document implies a very strong concern or instruction.

Should: The use of the word "should" in this document indicates a recommendation.

Static storage vessel: Static storage vessels are designed to be mounted on a foundation, typically at production and consumer sites.

Transportable storage vessel(s): Transportable storage vessel(s) are designed with a permanent chassis or designed to be transported on a chassis such as an ISO frame. Multiple vessels may be mounted on a single chassis.

Transfer Hose: Transfer hoses may be considered as an extension to the transportable or static storage vessel connections. They may also be considered as adaptors provided they meet the intent as per the definition.

4. Connections

4.1 Guidelines for connection selection

- Connections must discriminate and thus product specific and must not be in conflict, where "In conflict" means that the same connection is used for dissimilar products by different suppliers or in different geographic regions.
- Connections must be constructed of material compatible with the product service.
- Connections must be of reliable design and construction to eliminate failure during product transfer. Connections should be designed so that they cannot be modified easily to accommodate the transferring of other products.

4.2 Acceptable standard connections

Liquefied Oxygen, Nitrogen and Argon:

Based on a survey of the connections in use in Middle East and on the guidelines in this document, the following connections are classified as the **ACCEPTABLE STANDARD CONNECTIONS** for continued use.

- **CGA – ACME threaded type**

Table 1: Acceptable standard connections for Liquefied Oxygen, Nitrogen and Argon

Product	Type	Connection No. / size
Liquefied argon	CGA	AR-150 (1 1/2") AR-250 (2 1/2")
Liquefied nitrogen	CGA	NI-150 (1 1/2") NI-250 (2 1/2")
Liquefied oxygen	CGA	OX-150 (1 1/2") OX-200 (2")

Liquefied carbon dioxide:

Based on a survey of the connections in use and on the guidelines in this document, the following categories of connections are classified as the **ACCEPTABLE STANDARD CONNECTIONS** for continued use.

- **CGA – ACME threaded type**

Table 2: Acceptable standard connections for Liquefied Carbon dioxide

Product	Type	Connection no. / size
Liquefied carbon dioxide	CGA	CO2-100 (1 ")
		CO2- 150 (1 1/2")

5. Safety

5.1 General

- Connections should be adequately affixed to transportable and static storage vessels as well as transfer hoses such that they cannot be easily removed.

5.2 Identification and labeling

- Connections should be adequately identified for the product service
- Proper labeling for transportable and static storage vessels is also critical for proper product identification. All labeling should be clearly visible.

5.3 Control of the use of adaptors

- The use of adaptors should be limited and if possible eliminated.
- Strict procedure and control should be in place to control the fabrication, storage and the use of adaptors.
- Can only be designed to adapt between **ACCEPTABLE STANDARD CONNECTIONS** for same product service.

Adaptors should be permanently constructed by means such as welding, silver soldering or brazing.

6. Supplier Responsibilities

- Prior to fill and delivery of transportable and static storage vessels, the product supplier has the responsibility to ensure that the containers are correctly labeled and fitted with the appropriate connections.
- Connections should be visually inspected prior to filling to verify that there is no damage or contaminants and that they are suitable for the service intended.
- Suppliers should ensure that the correct mating connections are available at receiving / delivery sites thus mitigating the use of adaptors. Suppliers are responsible for developing and implementing appropriate procedures for the fabrication, storage and use of adaptors.
- Suppliers should provide adequate training for all personnel involved in transferring of bulk liquefied gases included but not limited to the requirement of this standard.

7. Implementation

- Industrial gas associations and product suppliers should adopt this standard in its entirety with full compliance not later than December 2014. For medical oxygen supplies the standard should be adopted within 6 months from date of publication of the technical document.

8. References

AIGA 024 / 05 -Connections for transportable and static bulk storage tanks.