



Inspection and testing of ISO containers for refrigerated gases

TD 34/19/E

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1 Introduction

ISO containers are used for transporting refrigerated Gases by road or sea in the region. These containers have to go through periodic maintenance to ensure safe and optimized transportation.

2 Scope

The scope of this document is to provide guidance on the inspection and periodic certification of ISO containers for transport of cryogenic liquids for road or sea transport worthiness.

3 Purpose

The document provides a guide to understand the needs of the periodic inspection and maintenance of ISO containers used for cryogenic liquids.

4 Definitions

4.1 Jacket

Jacket means the outer insulation cover or cladding which may be part of the insulation system;

4.2 Shell

Shell means the pressure vessel enclosure which holds the product under positive pressure (inner vessel in case of vacuum insulated tanks) ;

4.3 Leak proofness test

Leak proofness test means a test using gas subjecting the shell and its service equipment, to an effective internal pressure not less than 90% of the MAWP;

4.4 Maximum allowable working pressure (MAWP)

Maximum allowable working pressure means the maximum effective gauge pressure permissible at the top of the shell of a loaded portable tank in its operating position including the highest effective pressure during filling and discharge;

4.5 Maximum permissible gross mass (MPGM)

Maximum permissible gross mass means the sum of the tare mass of the portable tank and the heaviest load authorized for carriage;

4.6 Test pressure

Test pressure means the maximum gauge pressure at the top of the shell during the pressure test.

5 Inspection and testing

The shell and items of equipment of each portable tank shall be inspected and tested before being put into service for the first time (initial inspection and test is typically carried out by the manufacturer) and thereafter at not more than five-year intervals (5 year periodic inspection and test) with an intermediate periodic inspection and test (2.5 year periodic inspection and test) midway between the 5 year periodic inspections and tests. The 2.5 year inspection and test may be performed within 3 months of the specified date. An exceptional inspection and test shall be performed regardless of the last periodic inspection and test when the portable tank shows evidence of damaged or corroded areas, leakage, or any other conditions that indicate a deficiency that could affect the integrity of the portable tank.

The initial inspection and test of a portable tank shall include a check of the design characteristics, an internal and external examination of the portable tank shell and its fittings with due regard to the refrigerated liquefied gases to be carried, and a pressure test. For shells with vacuum insulation the test pressure shall not be less than 1.3 times the sum of the MAWP and 100 kPa (1 bar). In no case shall the test pressure be less than 300 kPa (3 bar) (gauge pressure).

The pressure test may be performed as a hydraulic test or by using another liquid or gas with the agreement of the competent authority or its authorized body. Before the portable tank is placed into service, a leakproofness test and a check of the satisfactory operation of all service equipment shall also be performed. When the shell and its fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test. All welds subject to full stress level shall be inspected during the initial test by radiographic, ultrasonic, or another suitable non-destructive test method. This does not apply to the jacket.

The 5 and 2.5 year periodic inspections and tests shall include an external examination of the portable tank and its fittings with due regard to the refrigerated liquefied gases carried, a leakproofness test, a check of the satisfactory operation of all service equipment and a vacuum reading, when applicable. In the case of non-vacuum insulated tanks, the jacket and insulation shall be removed during the 2.5 year and the 5 year periodic inspections and tests but only to the extent necessary for a reliable appraisal.

The tank may not be filled and offered for carriage after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as mentioned earlier. However a ISO tank filled prior to the date of expiry of the last periodic inspection and test may be carried for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a ISO tank may be carried after the date of expiry of the last periodic test and inspection:

- (a) After emptying but before cleaning, for purposes of performing the next required test or inspection prior to refilling; and
- (b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection, in order to allow the return of dangerous goods for proper disposal or recycling. Reference to this exemption shall be mentioned in the transport document.

The exceptional inspection and test is necessary when the portable tank shows evidence of damaged or corroded areas, leakage, or any other conditions that indicate a deficiency that could affect the integrity of the portable tank. The extent of the exceptional inspection and

test shall depend on the amount of damage or deterioration of the portable tank. It shall include at least the 2.5 year inspection and test requirements.

The internal examination during the initial inspection and test shall ensure that the shell is inspected for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, that might render the portable tank unsafe for carriage.

The external examination shall ensure that:

- (a) The external piping, valves, pressurizing/cooling systems when applicable and gaskets are inspected for corroded areas, defects, or any other conditions, including leakage, that might render the portable tank unsafe for filling, discharge or carriage;
- (b) There is no leakage at any manhole covers or gaskets;
- (c) Missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;
- (d) All emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;
- (e) Required markings on the portable tank are legible and in accordance with the applicable requirements; and
- (f) The framework, the supports and the arrangements for lifting the portable tank are in satisfactory condition.

The inspections and tests shall be performed or witnessed by an expert approved by the competent authority or its authorized body. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the portable tank. While under pressure, the portable tank shall be inspected for any leaks in the shell, piping or equipment.

In all cases when cutting, burning or welding operations on the shell of a portable tank have been affected, that work shall be to the approval of the competent authority or its authorized body taking into account the pressure vessel code used for the construction of the shell. A pressure test to the original test pressure shall be performed after the work is completed.

When evidence of any unsafe condition is discovered, the portable tank shall not be returned to service until it has been corrected and the test is repeated and passed.

6 References

1. Det Norske Veritas (DNV): Certification Note 2.7-1, Offshore Containers;89
2. Det Norske Veritas (DNV): Certification Note 2.7-2, Offshore Service Containers;
3. EN 12079: Part 3 :Offshore Containers - Periodic Inspection, examination & testing.

Appendix A: Examples of ISO tanks used for transporting refrigerated liquids

**Figure C-1—Portable tank for refrigerated liquefied gas
(20 ft cryogenic vacuum insulated tank container)**



**Figure C-2—Portable tank for refrigerated liquefied gas
(40 ft cryogenic vacuum insulated tank container for helium with a nitrogen shield)**




Figure C-3—Portable tank for refrigerated liquefied gas
(20 ft thermally insulated tank container for carbon dioxide)



Figure C-4—Portable tank for liquefied gas
(20 ft non-insulated tank container with sunshield)

Appendix B: Example of Certification

DET NORSKE VERITAS		Certificate No.: 23060
 CERTIFICATE FOR TANK CONTAINER OR PORTABLE TANK		
I. APPROVAL INFORMATION		
This certificate is issued under the authority of the Government of: Norway		Tank instruction ¹ or IMO tank type: T75
Approval reference no (for codes listed below) N-NV/475/12/11	Type approved by: DNV GL	DNV Type Approval no: S-6874
<input type="checkbox"/> IMDG/ ADR/ RID Chapter 6.7.2 <input type="checkbox"/> IMDG/ ADR/ RID Chapter 6.7.3 <input checked="" type="checkbox"/> IMDG/ ADR/ RID Chapter 6.7.4 <input type="checkbox"/> ADR Chapter 6.8 <input type="checkbox"/> RID Chapter 6.8 <input checked="" type="checkbox"/> CSC, Convention for Safe Containers <input checked="" type="checkbox"/> ISO 1496/ 3	<input checked="" type="checkbox"/> DNV Rules for Certification of Freight Containers <input type="checkbox"/> DNV Certification Note 2.7-1 <input checked="" type="checkbox"/> AAR 600 <input checked="" type="checkbox"/> Tank Instruction T75 <input type="checkbox"/> <input type="checkbox"/>	
Design Pressure Vessel Code: EN 13530-2		
The tank complies with the design and construction requirements of the regulations for carriage of the goods as specified in VII on page 2.		
In accordance with the above mentioned provisions, the following special dispensations, equivalents etc. have been permitted:		
II. OWNER		
Name and address: Air Liquide Oil & Gas Services Greenbank Road AB12 3BQ Aberdeen United Kingdom		DNV customer No.: 10548700
		Owner's serial No.: ALOU 010053 8
III. Particulars of tank and frame		
External dimensions (LxWxD): 6058 x 2438 x 2591 mm		Water capacity at 20°C: 20730 litres
Max. gross mass: 36000 kg	Tare mass: 8080 kg	Payload: 27920 kg
Tank material: Stainless steel 1.4301 acc. EN 10028-7	Actual thickness of shell: 8.9 mm Eq. thickness of shell in reference steel: 11.9 mm	Max. design temperature (if above 50°C): °C Min. design temperature (if below -20°C): -196 °C
Max. allowable working pressure: 18 bar	Setting of pressure relief devices: 18 bar	Design vacuum: 1 bar
Additional information (delete as appropriate).		
Capacity of each compartment (tanks with several compartments): litres		Max. allowable working pressure of coils: 18 bar
Lining material:	Stacking capacity (static load): 192000 kg	Transverse racking strength: 15240 kg
Other particulars of design: ICC-20-P-18/PS		
IV. Manufacturer		
Name and address: Chart Ferro, a.s. Ústecká 30 405 30 DECIN Czech Republic		DNV customer No.: 114978
		Manufacturer's serial No.: 63741
Date manufactured: 2015-11-06		
<small>If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.</small>		
DET NORSKE VERITAS, VERITASVEIEN 1, N-1322 HØVIK, NORWAY, TEL INT: +47 67 57 99 00, TELEFAX: +47 67 57 99 11 Form No.: 49.04x/a Issue: March 2004		

Certificate No.: 23060

V. Documentation																						
References to material certificates, inspection reports, notes etc.																						
Structural frame: S355JR, certificate 2.2 acc. to EN 10204																						
Tank fittings: ASTM A403WP 304/304L, ASTM A312TP 304/304L certificate 3.1 acc. to EN 10204																						
Tank shell: EN 10028-7/1.4301; certificate 3.1 acc. to EN 10204																						
Other equipment: Safety valves Herose SN: 2086308 and 1960063 set to 18 bar.																						
VI. Initial tests, inspection and marking																						
Internal and external inspection: satisfactory Surveyor: Štěpán Dlouhý	Hydrostatic test pressure: 24.7 bar Surveyor: Štěpán Dlouhý																					
Leak test (if inspection and pressure test is carried out separately): satisfactory Surveyor: Štěpán Dlouhý	Marking according to applicable code(s) and standard(s): satisfactory Surveyor: Štěpán Dlouhý																					
VII. Goods accepted for carriage																						
Goods that require a tank instruction as specified on page 1, or goods that require a tank instruction as permitted in 4.2.5.2.5 (ADR/RID/IMDG) based on the tank instruction specified on page 1, may be accepted for carriage. The goods accepted for carriage should have no adverse effect on any part of the tank and meet applicable tank special provision. All goods are subject to labelling, segregation, storage and operating requirements of the applicable code(s) and regulation(s). Specific goods may also be listed below under 1a), 1b) and/ or 2). Delete if not applicable.																						
1a)	<table border="1"> <thead> <tr> <th>UN No.</th> <th>Class or division</th> <th>Proper Shipping Name</th> </tr> </thead> <tbody> <tr> <td>1073</td> <td>2.2</td> <td>oxygen, refrigerated liquid</td> </tr> <tr> <td>1951</td> <td>2.2</td> <td>argon, refrigerated liquid</td> </tr> <tr> <td>1977</td> <td>2.2</td> <td>nitrogen, refrigerated liquid</td> </tr> <tr> <td>2201</td> <td>2.2</td> <td>nitrous oxide, refrigerated liquid</td> </tr> <tr> <td>1003</td> <td>2.2</td> <td>air, refrigerated liquid</td> </tr> <tr> <td>2187</td> <td>2.2</td> <td>carbon dioxide, refrigerated liquid</td> </tr> </tbody> </table>	UN No.	Class or division	Proper Shipping Name	1073	2.2	oxygen, refrigerated liquid	1951	2.2	argon, refrigerated liquid	1977	2.2	nitrogen, refrigerated liquid	2201	2.2	nitrous oxide, refrigerated liquid	1003	2.2	air, refrigerated liquid	2187	2.2	carbon dioxide, refrigerated liquid
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1b)	Special Conditions of Carriage:																					
2)	Products accepted for carriage and conditions of carriage are listed in appendix:																					
VIII. Validation																						
This certificate is valid until 09/ 20 (month/ year), subject to intermediate 2.5-year periodic inspection according to applicable code(s). The certificate may be renewed according to the conditions of the applicable code(s). Form No.: 49.05a should be used for renewal.																						
For manufacturer: Place: Date: Signature:	Decín, Czech Republic Chart Ferox, a.s. 19. 11. 15 Ústevská 30 CZ-406 30-Děčín <i>Lenka Proftová</i> 29																					
Stamp: DNV Office: Date: Signature:	Ostrava, Czech Republic 2015-11-14 Digitally Signed By: Dlouhy, Stepan Location: DNV GL Ostrava, Czech Republic Signing Date: 2015-11-14 Štěpán Dlouhý (DNV Surveyor)																					
IX. Remarks																						
Footnote: 1. As specified in chapter 4.2 in ADR/RID or IMDG Code.																						

CSC Safety Approval plate with periodic examination history

