# Container certification quality scheme

## Part IV. Guidance for certification of tanks for transport of dangerous goods

CLIENT INFORMATION NOTE

### Foreword.

At LRQA we are a certifying Authority. The goal is to perform container design, inspection, and certification requirements in a clear and concise set of rules for both LRQA and its clients.

It covers the three main types of intermodal equipment for both new construction and in-service inspection:

1. **CSC/ISO/Intermodal Containers.**
2. **Offshore containers and equipment.**
3. **Tanks for the transport of dangerous goods.**

## General

The LRQA Container certification Quality Scheme is published over four individual procedures.

| | |
|---|---|
| **CQS Part I** | General Guidance. |
| **CQS Part II** | CSC/ISO/Intermodal Containers, (Part A: New Manufacture & Part B: In-service). |
| **CQS Part III** | Offshore containers and equipment, (Part A: New Manufacture & Part B: In-service). |
| **CQS Part IV** | Tanks for the transport of dangerous goods, (Part A: New Manufacture & Part B: In-service). |

# Contents

## PART NEW TANK CONTAINERS



## PART B: IN-SERVICE TANK CONTAINERS

# Part A: Certification of New Construction for Tank Containers

## 1. Introduction

The LRQA Container Certification Quality Scheme (CQS), encompasses the certification of transportable CSC/ ISO/Intermodal containers, offshore containers and tanks for the transport of dangerous goods when constructed or inspected in-service at manufacturer's works on an individual basis or on a quality assured series production line basis. The scope of LRQA CQS Part IV is the certification of New Build & In-Service tanks for the transport of dangerous goods.

Reference to EN 12972:2018 latest edition unless otherwise stated in ADR/RID during its biannual updates.

LRQA CQS Part IV also complies with the requirements of CSA B625-20 and USDOT CFR49, unless noted.

The LRQA Surveyor shall ensure that they comply with the safety requirements to perform surveys safely with particular focus on working at heights, working in confined spaces and safety in pressure testing.

Certain applicable Equipment covered by ADR and RID Chapter 6.8 must also be certified to the TPED 2010/35/EU if in the scope and used within the EC or Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended) when used within UK.

It is in the scope of the TPED if the contents are Class 2 substances and/or the following substances:

- UN1051 - Hydrogen Cyanide, Stabilized (Class 6.1)
- UN1052 - Hydrogen Fluoride, Anhydrous (Class 8)
- UN1790 - Hydrofluoric Acid (Class 8)
- UN1745 – Bromine Pentafluoride (Class 5.1)
- UN1746 - Bromine Trifluoride (Class 5.1)
- UN2495 – Iodine Pentafluoride (Class 5.1)

Legal precedence is primarily with the regulations, which is ADR, RID and IMDG; plus USDOT CFR49 for use in USA and Canadian Transport of Dangerous Goods Regulations for use in Canada as applicable, and how they are implemented in the country issuing approval to the approved inspection body: i.e. in the UK the DFT/ VCA conditions of appointment, CDG regulations and VCA interpretations ; and in Netherlands the "Regulations for the Recognised Bodies for the Transport of Dangerous Goods" (Regeling erkende instanties vervoer gevaarlijke stoffen) and ILT requirements.

Second in hierarchy, is with the inspection and test standard EN 12972 is mandatory for 6.8 equipment and recommended for 6.7 equipment. EN 12972 has certain sections (e.g. 5.3.6.1) where the following text is used "shall be carried out in accordance with the relevant regulation and the technical code used for design and construction of the tank or, if there is no requirement in the technical code, the requirements given in.." which allows the relevant section of EN 12972 to take precedence.

Third in hierarchy is the product standard, followed by recommended ACOP's or other guidance notes as applicable.

## 2. Responsibility

The primary responsibility for equipment meeting regulatory requirements is with the Manufacturer and their QC department for new construction equipment and the owner/operator when the equipment is in-service. Equipment shall not be presented to LRQA, which is knowingly non-compliant with regulations unless the non-conformity is advised prior to survey. LRQA as the Inspection Body / Notified Body/ Appointed Body undertake the inspection and certification of equipment covered by the procedure under ISO 17020 accreditation for LRQA Verification Limited and LRQA Nederland B.V.

## 3. Design appraisal & type approval

### 3.1 Design Appraisal

The manufacturer shall submit their technical file for design review, together with the list of approvals sought. These details are to be reviewed by an authorised LRQA design surveyor to verify that the unit complies with the requested regulations/standards, and that the unit will safely transport cargo using normal road, rail, and sea transport systems.

On satisfactory completion of a design review, a Design Appraisal Document (DAD) is issued. The DAD shall define which prototype testing is required as per section 5.1 of this document and whether full or partial testing is required depending on the application or if previous prototype testing is to be considered.

### 3.2 Type Approval

Tanks for the transport of dangerous goods are required to have a "Type Approval". It is the client's responsibility to ensure that the type approval for the units being manufactured complies with the latest reference standards detailed in the regulations. Type approvals which do not comply with or are outside of the 10-year validity period, unless revoked earlier by the regulation need to be re-appraised and tested where applicable.

As part of the type approval process the manufacturer is required to perform prototype testing under the supervision of LRQA and have their design appraised by an LRQA design surveyor.

Type approvals are specific to a manufacturer and its location. Where a manufacturer requests to transfer previous approvals to a new facility the requirements specified shall be met.

The client submits technical documentation and details of the units, together with the list of approvals sought.

The type approval submission should be in line with the submission requirements of LRQA.

In cases where a manufacturer undergoes a relocation or intends to transfer approvals to another facility while retaining the same Quality Management System (QMS), it may not always be requisite to re-prototype test their units. Instead, it is advisable for the manufacturer to notify LRQA in advance of the transfer. LRQA will conduct an assessment to determine the appropriate actions and ensure compliance with technical standards and regulations.

If the manufacturer intends to sub-contract part of the fabrication to another company who do not utilize the same quality management system, welding procedures, welder qualifications an initial audit shall be performed by LRQA and new type approvals will be required.

## 4. Factory Quality Management System

The manufacturer shall be competent to manufacture the units, have a suitable Quality Management System equivalent to ISO 9001 and QC department to ensure that equipment presented for inspection meets the regulatory requirements and that the manufacturing equipment, competency and qualifications of personnel shall comply with the requirements set out in the regulations / technical code.

Each manufacturer shall have a Quality Control Manual.

A new requirement of EN 12972: 2018 is section 5.3.4, where the manufacturer shall also operate a weld quality assurance system in line with the technical code. Where the technical code does not detail requirements for the weld quality assurance system the requirements of EN ISO 3834-2 and EN ISO 14731 shall be met to the extent as applicable. This requirement shall be assessed at

the point of review of the manufacturer's quality management system or competent manufacturer audit. Where the manufacturer is certified to the above standards, a check of the dates of validity and the scope of the certificate are required.

During the competent manufacturer audit a review of all testing activities is required, with a particular focus on in-house activities not covered by ISO 17025.

## 5. Inspection of UN portable tanks/ Tank Containers

The manufacturer shall be competent to manufacture the equipment and have a suitable QMS and QC department with the correct competencies and qualifications of personnel to ensure that the equipment presented for inspection meets the regulatory / technical code. It is recommended that this is documented within the LRQA audit report when performing Competent Manufacturer Scheme Audit.

The aide-memoires should be consulted by the LRQA surveyor inspecting the equipment. The numbering system employed in this procedure follows the (updated) convention from EN 12972 (2018).

For USDOT portable tanks the inspection criteria shall be in accordance with USDOT CFR49 §173.32, §178.273 & §178.274.

| Type of Inspection (Subclause) | Type Approval | Initial Inspection |
|---|---|---|
| Examination of documents (5.2) | ✓ | ✓ |
| Check of the design characteristics (5.3) | ✓ | ✓ |
| Internal Inspection (5.4) | ✓ | ✓ |
| External Inspection (5.5) | ✓ | ✓ |
| Hydraulic Test (5.6) | ✓ | ✓ |
| Vacuum Testing (5.7) | ✓ | |
| Leakproofness Test (5.8) | ✓ | ✓ |
| Determination of Water Capacity (5.9) | ✓ | ✓ |
| Inspection of Service Equipment (5.10) | ✓ | ✓ |
| Frame Inspection / Structural Equipment (5.11) | ✓ | ✓ |
| Dynamic Longitudinal Impact Test (5.12) | ✓ | |
| Test Report. Certificate and Marking (5.13) | ✓ | ✓ |

The materials used on the tanks shall be suitable for the intended use and are to be compatible when joined with other materials of different composition in the structure. The manufacturer's material traceability system shall be to the satisfaction of the application standard which will be verified by the attending LRQA surveyor. The material used shall be identifiable to a cast, grade, standard and all pressure bearing parts shall be certified to EN 10204 3.1 as a minimum, unless specified differently within the Technical Code / Regulation.

The dimensions of the container corner fittings must comply with the International Standard BS ISO 1161:2016.

Generally corner castings shall be supplied with a material certificate equivalent to EN 10204: type 3.1, from a manufacturer with a QMS approved by a recognised Approved inspection Body/ Notified Body, however for offshore containers, ISO 10855:2018 specifically asks for ISO 10474/ 10204 type 3.2 material certification for corner fittings and padeyes, in which case this would take precedence.

For the tank and frame, approval of welding procedures and / welders shall be performed by Independent Inspection Authorities accredited for witnessing/ certification of welding. Welders of the frame shall be approved to a recognised welding standard applicable to the regulation / technical code.

For further guidance of CSC testing and certification of the frame refer to procedure CQS Part II. For offshore refer to CQS Part III as applicable.

In the case of non-conformities, a Non-Acceptance Note (NAN) shall be issued. For tanks certified under the UK accreditation scheme a VCA Certificate of Refusal shall be issued.

### 5.1 Prototype testing

The test sequence and acceptance criteria for witnessing the prototype test shall be agreed prior to the manufacture of the prototype unit.

NOTE: The rail impact test (dynamic longitudinal impact test) must be undertaken at a facility approved by LRQA, using an authorised LRQA surveyor for the witnessing activities.

***NOTE:*** *Refer to the CSC definition of a container.*

Where prototype testing is not to be undertaken the client shall fill in LRQA Form 2556, which compares the production unit to the prototype unit. The LRQA design surveyor verifies that a previous prototype test covers the requirement for the current unit/batch.

### 5.2 Examination of documents

All documentation shall be submitted in advance and must comply with the requirements of the relevant Manufacturing Standards, technical code and Regulations. Where information is missing or unclear the issue shall be raised with the manufacturer who has the responsibility for supplying the required documentation. Where an unsatisfactory response is received a Non-Acceptance Note (NAN) will be issued.

All documents shall comply with the requirements listed within ADR/RID, 1.8.7.2, 1.8.7.7.1 and 1.8.7.8 for Type Approval, section 1.8.7.3, 1.8.7.7.2 for supervision of manufacture and Section 1.8.7.4, 1.8.7.7.3 for initial inspection and test. All documents submitted for examination shall be approved by LRQA.

### 5.3 Check of the design characteristics

The LRQA surveyor shall verify that the unit(s) being manufactured is/are covered by the type approval. If it differs from the prototype a design appraisal of the variation is required. This check shall verify that:

- The type approval is still valid, i.e. it is less than 10 years old, and the standard specified has not been revoked in ADR/RID Section 6.8.2.6.

  Where a variation is not the same as the existing type approval a new type approval is required. A dimensional check is required for each tank, unless a jig is approved, and a competent manufacturer audit has passed.

***Note:*** *EN 12972 is quite clear, it does not override the requirements of the regulations, thus EN 12972 can be applied when ASME VIII: Div.1 is used as a design code for UN Portable Tanks (ADR 6.7), however where Tank Containers (ADR 6.8) is applied EN 12972 is mandatory plus the additional requirements set out in referenced standards shown in section 6.8.2.6.1 of ADR (e.g EN 14025 or EN 13530-2 dependent on the tank type).*

## 6. Inspection of the materials and wall thicknesses

As part of the inspection the LRQA surveyor shall verify that the tank thickness is not less than the required thickness from the drawing or of that detailed in the Type Approval documents, in accordance with EN12972 section 5.3.3. For each batch of material, the shell and ends shall be either ultrasonically thickness checked or measured by calibrated vernier calipers. This shall be performed by either the LRQA surveyor or the manufacturer.

The LRQA surveyor shall ensure that the measuring instrument is calibrated, and its calibration certificate is available at the time of inspection. The results from the thickness measurements should be entered into a suitable report, verified, and signed by the LRQA surveyor. Where other physical thickness measurements of the shell and ends are determined by the LRQA surveyor. For frame structures and piping, the thickness specified on the material certificate shall be verified by the attending LRQA surveyor, using one of the methods above.

***NOTE:*** *It is anticipated that the thickness will be verified by the manufacturer at goods inwards and spot checked on the tank. For a batch of material at a large tank manufacturer is estimated that thickness checks will be required on approximately 10% of the tanks produced to cover the different batches of material, however it is the responsibility of the manufacturer to demonstrate this.*

## 7. Non-Destructive Examination (NDE)

NDT of welds shall be carried out in accordance with the relevant regulation and the technical code used for design and construction of the tank.

**This section is only valid if the design standard does not specify its own requirements** – e.g. ASME VIII: Div.1 specifies these requirements thus this section is not applicable, but EN 14025 does not, therefore this section is applicable.

Refer to section 5.3.6 and Table 1 of EN 12972 for NDT.

All NDT of the welds shall be carried out after heat treatment of welds (as applicable).

***Note:*** *The Tee-Sections shall always be subject to 100% UT or RT (see below) (whatever the λ factor), unless specified otherwise in the Technical code.*

**Note:** *NDT Methods, qualification, & acceptance criteria shall be in line with the relevant technical code.*

NDT shall be undertaken in accordance with the requirements of the technical code. If a code is dual qualified (e.g. T11 to ASME VIII: Div.1 and L4BN to EN 14025) then both requirements shall be met (i.e. Dual qualified welding & NDT). Although NDT companies are not subcontracted by LRQA, the result of the NDT has a significant influence on the acceptance of the tank. The requirements are summarised below.

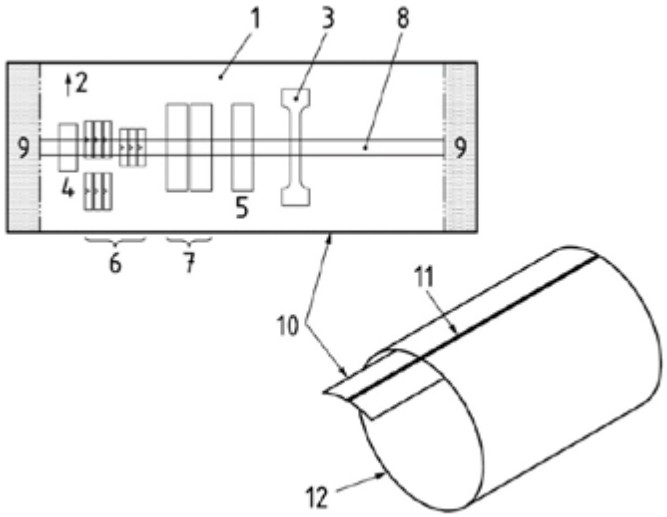
1. **All radiographs shall be independently reviewed by the LRQA attending surveyor.**
2. **The NDT procedures and NDT operator qualifications shall be reviewed and accepted by the LRQA attending surveyor.**
3. **Sample radiographs shall be verified against the tank weld to ensure accuracy and traceability.**
4. **The calibration status of equipment used by the NDT company shall be verified and accepted.**

## 8. Mechanical testing

This section is only valid if the regulation/ technical code does not specify its own requirements. Test plates shall be tested after PWHT, when applicable. The test plate shall be aligned in continuity with the longitudinal welds. If the circumferential welds are carried out using a different qualified welding process the test plates shall be prepared separately. When it is necessary to weld the test plates separately, the procedure used should duplicate that used in the construction of the tank.

The requirements below are in addition to the requirements set out in 6.8.5 of the regulation and section 5.3.7 of EN 12972, the regulation and technical code always takes precedence.

1. **Test plate detail**
2. **Rolling direction**
3. **Tensile test**
4. **Macro**
5. **Face bend test**
6. **Charpy impact test**
7. **Root bend test**
8. **Longitudinal welded seam**
9. **Discard this area**
10. **Test plate**
11. **Longitudinal weld**
12. **Shell**




*'Figure above is used in courtesy of ISO 10855-1 section 5.3.7.1'*

The type and number of specimens to be taken from the test plate after final heat treatment as detailed above.

The test plate shall be of sufficient size to allow for the required specimens including an allowance for retests. Prior to cutting the test pieces, the test plate shall undergo non-destructive testing to ensure that the test specimens are taken from sound weld areas. There shall be a consideration where the mechanical properties of the weld are less than the parent metal, e.g. nickel shell with austenitic filler.

| Mechanical Test | Symbol | Test Method | Acceptance criteria | Comments |
|---|---|---|---|---|
| Tensile Test | | EN ISO4136 | EN ISO 15614-1 | |
| Impact Testing | See below | EN ISO 9016 | EN ISO 15614-1 | |
| Face Bend Test | FB | EN ISO 5173 | EN ISO 15614-1 | |
| Root Bend Test | RB | EN ISO 5173 | EN ISO 15614-1 | |
| Macro Examination | Ma | EN ISO 17639 | EN ISO 17639: Table 1/ EN ISO 15614-1 | |
| Micro Examination | Mi | EN ISO 17639 | | Only for material groups 8.2 and 10 |
| Hardness Test | HT | EN ISO 9015-1 | EN ISO 15614-1 | Only for material groups 1.1, 1.2, 8.1, 8.2, 8.3 |

**Requirements for Impact Testing:**

| Thickness | Notch in the Centre of the Welded Joint | Notch in the Heat Affected Zone |
|---|---|---|
| 5mm < e ≤ 10mm | 3 specimens | 3 specimens |
| 10mm < e ≤ 20mm | 3 specimens (in the centre of the thickness) | 3 specimens |
| e > 20mm | 3 specimens upper face<br>3 specimens lower face | 3 specimens upper face<br>3 specimens lower face |

The tests shall be carried out at the minimum design temperature, except for minimum design temperatures colder than –196 °C, for which –196 °C shall be used. The impact tests (Charpy V-notch) for the base material shall be carried out in accordance with the requirements of EN ISO 148-1. Impact tests for the welds shall be carried out according to EN ISO 9016:2012, VW and VH.

## 8.1 Internal visual examination

The internal inspection of the tank container shall verify that it is free from the following defects that might render the tank unsafe for carriage:

- Laminations
- Weld defects
- Corrosion
- Pitting
- Cracks
- Deformations and dents (use design code and LRQA internal procedures for guidance)
- Visual damage due to grinding operations

The requirements of technical / design code shall be met, where EN 12972 is mandated, the requirements are detailed within section 5.4.

The condition of the protective lining or coating shall be inspected and tested by appropriate methods, e.g. spark test in accordance with the lining or coating manufacturer's specification.

## 8.2 External visual examination

To undertake the external inspection, it is recommended that the inspection location has a gantry system. The external inspection will be performed by the LRQA surveyor, they shall check for the following:

- Manhole covers and gaskets to determine that there is no evidence of leakage.
- The condition of the bolts or nuts on any flanged connection or blank flange to ensure that they will not give rise to leakage.
- That emergency devices and valves are free from corrosion, distortion, and any damage or defect that could prevent their safe operation.
- Remote closure devices and self-closing stop valves shall be operated to demonstrate proper operation.
- Conditions that might render the portable tank unsafe for loading, unloading, or transport of dangerous goods.
- Verify that safety devices are vented safely away from the operator of the tank.

The LRQA surveyor shall confirm that the required markings are legible and in accordance with the applicable requirements.

Shells which are required to be fitted with at least one earth connection shall be clearly marked with the earth symbol adjacent to the point capable of being electrically connected.

***Note:*** *The correct earth symbol is shown here - Any other earth symbol shall not be accepted, and the tank will be rejected. Non-Acceptance note shall be issued.*

Where required it shall be confirmed that electrical continuity meets the requirements of the manufacturer's technical specification. If there is no value specified it is suggested that a value of not more than 10 ohms exists between the earth pin(s) and the following:

1. **The tank shells**
2. **All service equipment**
3. **The wheels of rear axles**
4. **The hose reel (where fitted)**
5. **The hose reel to connection nozzle (where fitted)**

It shall be confirmed that the electrical continuity between the earth pin(s) and the hose reel swivel joint (where fitted) meets the requirements of the manufacturer's technical specification. Where this is not specified, the acceptance criteria shall not be more than 1 megohms.

The external inspection shall be performed before addition of cladding, lagging, painting, or any other external covering.

## 8.3 Hydraulic test

The pressure test shall include each compartment (with adjacent compartment empty and un-pressurised, for subdivided tanks), and the whole tank.

The fluid normally used for hydraulic pressure testing is water. Other test mediums may be considered if required by Regulation / Technical code. When other test mediums are required they must be approved prior by LRQA and the correct accreditations shall be in place.

The hydraulic test shall typically follow the standard procedure, namely fill the compartment(s) with a test liquid to approximately 99% of full capacity and subsequently pressurise above the test liquid up to the test pressure described below. The hydraulic test pressure for tanks shall be as governed by regulations / technical code the more stringent pressure shall be applied.

A safety device shall be used in the pressurising system to prevent over-pressurisation during pressure testing. The device shall ensure that the pressure in the shell does not exceed 105% of the required test pressure. The tank shall be held at test pressure for a minimum of 30 minutes.

For pressure strengthening tests a procedure shall be produced by the manufacturer and approved in advance of the test. Only water can be used as the test medium for pressure strengthening.

A pressure test shall be deemed to have failed if there is:

1. **An unaccountable fall in pressure during the test period**
2. **Visible permanent deformation**
3. **A leak was detected.**

Heating equipment shall be tested at a pressure shown below.

| Type of heating equipment | Test pressure |
|---|---|
| Internal and external heating pipe (not connected with the tank shell) | 1,5 × working pressure of heating equipment |
| External heating channel and heating tub (connected with the tank shell) | 1,3 × working pressure of heating equipment |

The pressure gauge used shall be in calibration and traceable back to National Standards and traceable to a pressure gauge tested by an independent test laboratory accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full-scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of accuracy shall be demonstrated. For

selection and installation of mechanical pressure gauges EN 837-2 shall be used. Electronic pressure gauges may be used in the range attested by the gauge manufacturer. Reference must be made for specific gauge requirements against the applicable manufacturing standards.

The ambient temperature and the weather condition shall be considered by the LRQA surveyor before the test commences. If the ambient temperature is below 0°C, then testing can only proceed once it is established that the liquid test medium will not freeze. For carbon steel tanks the LRQA surveyor shall consider the risk of brittle fracture for temperature less than 7°C, where materials used are at risk of brittle fracture. Additionally, if there are small bore nozzles then precautions need to be undertaken to avoid water freezing inside the nozzles. The risk of stress corrosion cracking caused by high levels of chlorine in the test water shall be considered if the water source is suspected of being at risk, e.g. a manufacturer's well or water containers. The LRQA surveyor can ask for confirmation of the chlorine content of the test water, to be supplied by the organisation carrying out the hydro testing of the unit.

### 8.4 Vacuum test

Where the regulation / technical code specifies a vacuum test to be undertaken, this will be performed on the prototype tank. The following formula may be used, up to a maximum of -1 Barg (Note –it is noted that -1 Barg may not be achievable, and that -0.9 Barg is thus satisfactory if testing from the equipment pump for certain equipment – refer to EN 12972). For practical reasons, it is sufficient for vacuum-operated waste tankers to apply a negative internal pressure of 0.9 bar.

If required, the vacuum test will be specified on the DAD.

| | | |
|---|---|---|
| $P_{vac}$ | Vacuum Test Pressure | $P_{vac} := 1.5.P_{ext}.\frac{t}{t_c}$ |
| $P_{ext}$ | External Pressure condition of the tank | |
| t | Thickness of tank | |
| $t_c$ | Thickness of corroded tank | |

***Note:*** *It is recommended in addition to the formula to multiply the value by the ratio of Young's Modulus.*

***Note:*** *The technical code requirements are that the tank shall start the test empty and at atmospheric pressure. All openings of the tank shall be closed except the discharge openings. A pressure of 1.5 times more severe than the external pressure shall be created inside the tank held for 5 minutes minimum. The vacuum test is a prototype test used to validate the design of tank where there is unusual design condition, typically for a large diameter tank in an ISO frame where part of the stiffener is removed to maximise the diameter within the frame.*

*However, using the above formula is recommended. It is not mandatory but if the above formula is not used there is a strong possibility that in-service a vacuum test may be requested when the tank has reached its maximum corrosion allowance as it will not be covered by the type approval vacuum test at this condition.*

*The pressure gauge used shall be in calibration and traceable back to National Standards and traceable to a pressure gauge tested by an independent test facility accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of the accuracy shall be given. For selection and installation of mechanical pressure gauges EN 837-2 shall be used. Electronic pressure gauges may be used in the range attested by the gauge manufacturer.*

## 8.5 Leakproofness test

The leakproofness test shall include each compartment (with adjacent compartment empty and unpressurised, for subdivided tanks), and the whole tank. The tank shall include all fittings, piping and service equipment unless those rated below 0.2 Bar, e.g. for gravity discharge tanks. The tank shall be dry and clean externally before the test commences to enable the LRQA surveyor to observe any leakage.

The ambient temperature and the weather condition shall be considered by the LRQA surveyor before the test commences. If the ambient temperature is below 0°C, then testing can only proceed once it is established that the liquid test medium will not freeze. For carbon steel tanks the LRQA surveyor shall consider the risk of brittle fracture for temperature less than 7°C, where materials used are at risk of brittle fracture. Additionally, if there are small bore nozzles then precautions to be undertaken to avoid water freezing inside the nozzles. The risk of stress corrosion cracking caused by high levels of chlorine in the test water shall be considered if the water source is suspected of being at risk, e.g. a manufacturer's well or water container.

The leakproofness test shall be witnessed by a LRQA surveyor, including pipework and service accessories at a pressure of:

- **25% of maximum allowable working pressure for T1-T50 portable tanks**
- **90% of maximum allowable working pressure for T75 cryogenic portable tanks**

The leakproofness test shall be held for 5 minutes minimum but shall be long enough for the LRQA Surveyor to assess the whole assembly for leak tightness. Acceptance criteria shall be in line with the applicable regulations and technical code.

The leakproofness test pressures of other tank types including their respective substances can be found in table 9 of EN 12972.

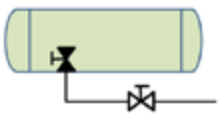
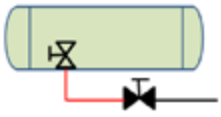
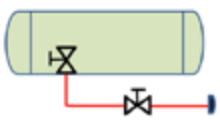
Leakproofness test is different to the vapour tightness test of petrol tankers, and is generally performed at the set pressure of the pressure vacuum vent valves.

The pressure gauge used shall be in calibration and traceable back to national standards and traceable to a pressure gauge tested by an independent test facility accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full-scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of accuracy shall be demonstrated. For selection and installation of mechanical pressure gauges EN 837-2 shall be used. Electronic pressure gauges may be used in the range attested by the gauge manufacturer.

A safety device shall be in the pressurising system to prevent over-pressurisation during pressure testing. The device shall ensure that the pressure in the shell does not exceed 105% of the required test pressure. Pressurising with gas is covered in LRQA Safety Guidelines, which must be followed. The following notes are taken from EN 12972.

- **The test area shall be sufficiently quiet enough to hear the noise of a gas escape from a leakage.**
- **A written permit to work shall be given to any personnel necessary to be present in the vicinity of the tank regarding the risk of a leakproof test with gas and the precautions necessary for safety at work.**
- **During the test duration no work shall be carried out on the tank.**

The leakproofness test shall include the pipework and valves in series, all of which shall be tested in sequence. The diagram below gives guidance on how to perform these activities:

| Test No. | Purpose | Pressure | Valve 1 | Valve 2 | Valve 3 | Diagram |
|---|---|---|---|---|---|---|
| 1 | Check the leak proofness of valve 1 | As per table above | Closed | Open | Open |  |
| 2 | Check the leak proofness of valve 2 | As per table above | Open | Closed | Open |  |
| 3 | Check the leak proofness of valve 3 | Static Head (*1) | Open | Open | Closed |  |

**1: As per ADR 6.7.2.6.3c and 6.8.2.2.2 the screw cap shall provide a liquid tight closure at the end of the discharge pipe.*

Where necessary, pipework shall be isolated immediately adjacent to the pump / gas extractor / air eliminator / meter to facilitate the testing of the pipework and manifold (if fitted).

***Note:*** *UN Portable Tanks, in accordance ADR 6.7.2.1, 6.7.3.1 and 6.7.4.1 must be tested with a gas. For 6.8 Tanks it is also recommended that a gas (e.g. air) is used as the test medium, however in accordance with EN 12972 water is permitted as the test medium where the test temperature is > 0°C, subject to the acceptance of the LRQA surveyor that the testing with water is acceptable.*

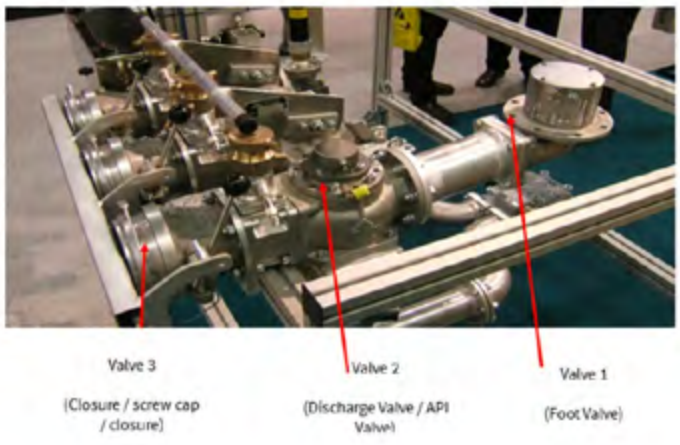



*Figure 2 – Remote Operating Device.*

## 8.6 Determination of water capacity

The water capacity shall be measured by the manufacturer using appropriate calculation such as volumetric or gravimetric methods, for filling the tank prior to the hydraulic test for a tank at 20 °C. Where a calculation method is proposed the request shall be forwarded to the LRQA design surveyor for review.

Variations in capacity (and tare) of 1% are permitted to a maximum of 250 Litres (or kg) without additional design consideration if the maximum gross weight / rating is not itself increased.

The volumetric or gravimetric determination of water capacity of the tank and, where appropriate, each compartment shall be carried out by completely filling the tank or compartment with water. When it is not possible to completely fill the shell or the shell compartment because of its shape or construction, this reduced capacity shall be used for the determination of the degree of filling and for the marking of the tank.

***Note:*** *An appropriate method of determination of water capacity can be found in the International Organisation of Legal Metrology's Recommendation OIML R 80 [12].*

## 8.7 Inspection of service equipment

The inspection of the piping, service equipment, heating/cooling system, gaskets and safety devices shall be checked for signs of leakage or defects in welds that might render the tank unsafe for filling, discharge, or carriage.

All safety valves shall be bench tested and witnessed by the attending LRQA surveyor to make sure they open / close with their tolerances set out by the manufacturing standard and regulation. This activity can be waived if it has been determined that the safety valve has already been tested and witnessed by an ISO 17020 inspection body. All burst disc's shall be visually inspected.

For manlids where bolts are used in replacement of studs and nuts to secure the bolted manway lid, care shall be taken at the time of manufacture, maintenance, and periodic testing to ensure that the bolts used are of the correct length, so that they can be fully tightened and torqued to the recommended value.

The LRQA surveyor shall check that the location of the pressure relief valve is at the top space of the shell as close to the longitudinal and lateral centre, so that they always remain in contact with the gas or vapour space. The safety valve shall always be vented to safe space.

The pressure relief valve is normally protected within a spill box, clustered with airlines, and the LRQA surveyor shall check that the spill box, if fitted with a lid does not restrict the flow of air in such a way that will render the siting of the pressure relief valve unsafe.

When three shut of devices are required the first (foot valve) must be fitted with a remote operating device. This device consists of steel cable, often plastic-coated stainless steel, or a rod which leads from the foot valve along one side of the unit. Should an incident occur where the loading / discharge process has been halted, then the steel wire is pulled hard operating the foot valve immediately and closing the valve.

For offshore portable tanks, alternate options for remote closures can be considered. Where the option deviates from ADR/RID/IMDG requirements it shall be forwarded to the competent authority for consideration of the "alternate approach", which if accepted will require the addition of "AA" to the nameplate, as per the requirements of ADR.

The LRQA surveyor shall also check the hoses and expandable joints to ensure that the couplings are in good condition, the hoses are free of kinks and deformations. The hoses and flexible joints shall not show any sign of hardening or damage.

For cryogenic tanks where fittings are added (e.g. tri-way for addition of transport valve) the LRQA surveyor shall check it has been 'plumbed' correctly and that the safety valves will discharge correctly.

### 8.8 Frame/ structural inspection

The inspection of structural welds shall meet the requirements of the applicable construction standard.

Every frame shall be inspected in accordance with the pass/fail criteria of this document, CQS part II for CSC and CQS part III for offshore and to ensure it is in acceptable condition.

### 8.9 Dynamic longitudinal impact tests

This test may be required for new type approvals or for type approval where previous frame test reports do not cover dynamic longitudinal impact test. Testing must be in accordance with manual of tests and criteria, Part IV, Section 41.

Where there is a requirement for the dynamic longitudinal impact test, it shall be reviewed by the LRQA design surveyor and detailed on the Design Appraisal Document (DAD).

### 8.10 Marking and stamping


APPROVAL INFORMATION
Approval country
Authorized body for design approval
Design approval number
Shell design code (pressure vessel code)
PRESSURES
MAWP
Test pressure
Initial pressure test date
Witness stamp
External design pressure
MAWP for heating/cooling system
TEMPERATURES
Design temperature range
MATERIALS
Shell material(s) and material standard reference
Equivalent thickness in reference steel
Lining material
CAPACITY
Tank water capacity at 20 °C
Water capacity of compartment ___ at 20 °C
PERIODIC INSPECTIONS / TESTS
Test type
Test date
Witness stamp and test pressure

Note the requirements of Section 5.1.8 of CSA B625. The LRQA surveyor shall check that the tank container possesses the necessary plates, markings, and decals for the regulations to be complied with. The LRQA surveyor shall:

- Stamp the nameplate on final acceptance of the tank.
- Forward their inspection report, inspection and test plan to their regional container design officefor technical review and issuance of certification.
- Issue a non-conformity via the Non-Acceptance Note (NAN) application, when applicable.

## 9. Reporting & certification

Where the UK authorisation is used a VCA certificate shall be issued utilising the VCA database along with LRQA certification. When using LRQA Dutch accreditation VCA system is not required, only LRQA certification shall be issued. Where the inspection is unacceptable a non-acceptance note shall be issued. Additionally, if the UK authorisation is used a VCA refusal note shall be produced.

Repairs to the shell during manufacture, which have been subsequently accepted, shall be noted in the remarks section of the inspection certificate.

A copy of all the relevant documentation including certificates shall be retained by LRQA.

# Part B: Certification of In-Service Tank Containers

## Introduction

The LRQA Container Certification Quality Scheme (CQS), encompasses the certification of transportable CSC/ISO/Intermodal containers, offshore containers and tanks for the transport of dangerous goods when constructed or inspected in-service at manufacturer's works on an individual basis or on a quality assured series production line basis. The scope of LRQA CQS Part IV is the certification of New Build & In-Service tanks for the transport of dangerous goods.

Reference to EN 12972:2018 latest edition unless otherwise stated in ADR/RID during its biannual updates.

LRQA CQS Part IV also complies with the requirements of CSA B625-20 and USDOT CFR49, unless noted.

The LRQA Surveyor shall ensure that they comply with the safety requirements to perform surveys safely with particular focus on working at heights, working in confined spaces and safety in pressure testing.

Certain applicable Equipment covered by ADR and RID Chapter 6.8 must also be certified to the TPED 2010/35/EU if in the scope and used within the EC or Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended) when used within UK.

It is in the scope of the TPED if the contents are Class 2 substances and/or the following substances:

- UN1051 - Hydrogen Cyanide, Stabilized (Class 6.1)
- UN1052 - Hydrogen Fluoride, Anhydrous (Class 8)
- UN1790 - Hydrofluoric Acid (Class 8)
- UN1745 – Bromine Pentafluoride (Class 5.1)
- UN1746 - Bromine Trifluoride (Class 5.1)
- UN2495 – Iodine Pentafluoride (Class 5.1)

Legal precedence is primarily with the regulations, which is ADR, RID and IMDG; plus USDOT CFR49 for use in USA and Canadian Transport of Dangerous Goods Regulations for use in Canada as applicable, and how they are implemented in the country issuing approval to the approved inspection body: i.e. in the UK the DFT/VCA conditions of appointment, CDG regulations and VCA interpretations ; and in Netherlands the "Regulations for the Recognised Bodies for the Transport of Dangerous Goods" (Regeling erkende instanties vervoer gevaarlijke stoffen) and ILT requirements.

Second in hierarchy, is with the inspection and test standard EN 12972 is mandatory for 6.8 equipment and recommended for 6.7 equipment. EN 12972 has certain sections (e.g. 5.3.6.1) where the following text is used "shall be carried out in accordance with the relevant regulation and the technical code used for design and construction of the tank or, if there is no requirement in the technical code, the requirements given in." which allows the relevant section of EN 12972 to take precedence.

Third in hierarchy is the product standard, followed by recommended ACOP's or other guidance notes as applicable.

## 1. In-service inspection

The owner is responsible for submitting the unit for its periodic examination, within the statutory time limits. Tanks shall be inspected safely, must be easily accessible and clean / gas free. If an internal inspection is required, the tank must be certified as gas free, as required by regulations.

To comply with ADR/RID the requirements of EN 12972 as a minimum shall be complied with for in-service inspection, noting the special requirements and/or exemptions for (UN/IMO) portable tanks (e.g. every inspection requires internal examination unless for dedicated service, levels of NDT etc.), with the exception for Transport Canada regulations where an internal inspection is always required.

It is the responsibility of the depot or owner to notify the LRQA surveyor if any repairs or modifications have been undertaken on the tanks since its last inspection. It is recommended that this clause is added to the contract.

The following inspections are required for intermediate and periodic inspections.

For USDOT portable tanks the inspection criteria shall be in accordance with USDOT CFR49 §180.605.

| Type of Inspection (Subclause) | Periodic Inspection | Intermediate Inspection |
|---|---|---|
| Examination of documents (5.2) | ✓ | ✓ |
| Check of the design characteristics (5.3) | | |
| Internal Inspection (5.4) | ✓ | ✓ (a) |
| External Inspection (5.5) | ✓ | ✓ |
| Hydraulic Test (5.6) | ✓ | |
| Vacuum Testing (5.7) | ✓ | |
| Leakproofness Test (5.8) | ✓ | ✓ |
| Determination of Water Capacity (5.9) | | |
| Inspection of Service Equipment (5.10) | ✓ | ✓ (a) |
| Frame Inspection / Structural Equipment (5.11) | | |
| Dynamic Longitudinal Impact Test (5.12) | ✓ | |
| Test Report. Certificate and Marking (5.13) | | |

### 1.1 Intermediate Inspection

The examination consists of:

- Examination of Documentation.
- Internal Inspection (only for UN portable tanks unless dedicated service in accordance with ADR 6.7.2.19.5, not for 6.8 equipment unless protective linings are to be inspected).
- External Inspection.
- Leakproofness Test.
- Inspection of Service Equipment.
- Frame / structural equipment Inspection.
- Test Report, Certification & Marking.

***Note:*** *An internal inspection is not undertaken as a routine for equipment covered by ADR Chapter 6.8 (e.g. L4BN type codes for road tankers, rail tankers and tank containers, unless protective linings are to be inspected. For cryogenic tanks it is also not a requirement, instead a measurement of the vacuum is undertaken (as per EN 13530-3: Section 15 / ISO 20421-2: Section 15).*

### 1.2 Periodic Inspection

The examination consists of:

- Examination of Documentation.
- Internal Inspection.
- External Inspection.
- Hydraulic Pressure Test.
- Leakproofness Test.
- Inspection of Service Equipment.
- Frame / structural equipment Inspection.
- Test Report, Certification & Marking

***Note:*** *Neither an internal inspection nor a hydraulic test is undertaken on cryogenic tanks, instead a measurement of the vacuum is undertaken (in accordance with EN 13530-3: Section 15 / ISO 21029-2: Section 15).*

## 1.3 Exceptional Inspection

An exceptional inspection is required when there is a repair or modification to the tank, service equipment, safety devices or frame/ structural items. The scope of work is dependent upon the repair or modification undertaken. For frame repairs, refer to the IICL Repair Manual.

For tank shell repairs, refer to this document and NBIC: Part 3: Repairs and Alterations, in addition, supplement 6 has specific requirements for transport tanks and transportable equipment which shall be met. NBIC: Part 3 also refers to ASME PCC-2: Repair of Pressure Equipment and Piping, which shall also be referred to for consideration for repair proposals.

The table from EN 12972, reproduced below, shall be followed. “Hot Work” is defined as where there is welding on the pressure envelope, this includes shell, ends, nozzles, flanges, and manlid covers. If the hot work has been performed on piping and not the tank then only the piping will need hydraulic testing, both piping and the tank will require a leak test. Hot work does not include welding or work to the frame or structural items ‘downstream’ of compensation pads connected to the shell. Hot work does not include the outer jacket of a cryogenic tank; however, this will require a vacuum test.

Repairs and modifications shall be accepted by the LRQA surveyor in the first instance and the LRQA design surveyor will determine whether a full or partial Design Appraisal is required. All modifications shall be detailed on an inspection certificate and for substantial repairs detailed on a Design Appraisal Document issued by an LRQA design surveyor.

Table from EN 12972 for Exceptional Checks.

| Type of Inspection (Subclause) | Damage or repair of the shell | Repair or replacement to Service Equipment | Repair or replacement to Service Equipment involving application of heat | Alteration of the tank or type approval | Repair of frame or structural equipment | Repair or replacement of protective lining or coating |
|---|---|---|---|---|---|---|
| EN 12972 Clause for Exceptional Check | 4.7.2 | 4.7.3 / 4.7.4 | 4.7.6 | 4.7.5 | 4.7.6 | 4.7.7 |
| Examination of documents (5.2) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Check of the design characteristics (5.3) | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Internal Inspection (5.4) | ✓ | | | ✓ | | ✓ |
| External Inspection (5.5) | ✓ | | | ✓ | | |
| Hydraulic Test (5.6) | ✓ | | ✓ | ✓ | ✓ | |
| Vacuum Testing (5.7) | | | | ✓ | | |
| Leakproof Test (5.8) | ✓ | ✓ | ✓ | ✓ (a) | | |
| Determination of Water Capacity (5.9) | | | | ✓ | ✓ | |
| Inspection of Service Equipment (5.10) | ✓ | ✓ | ✓ | ✓ | | |
| Frame Inspection / Structural Equipment (5.11) | ✓ | | | | ✓ | |
| Dynamic Longitudinal Impact Test (5.12) | | | | | | |
| Test Report. Certificate and Marking (5.13) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*(a) If required by regulation*

The repair depot shall be competent and have a suitable QMS to ensure that equipment presented for exceptional inspection meets the regulations / technical code requirements. The repair depot's quality system should meet the applicable requirements. It is recommended that this a Competent Repair Depot Scheme Audit is undertaken as a new requirement of EN 12972: 2018 is section 5.3.4, where the repairer shall also operate a weld quality assurance system in line with the technical code. Where the technical code does not detail requirements for the weld quality assurance system the requirements of EN ISO 3834-2 and EN ISO 14731 shall be met to the extent as is applicable.

All welders shall be approved to a recognised welder standard, using approved welding procedures. For the tank, approval of welding procedures and /or welders shall be performed by Independent Inspection Authorities accredited for the witnessing/certification of welding.

## 2.0 Inspection frequency

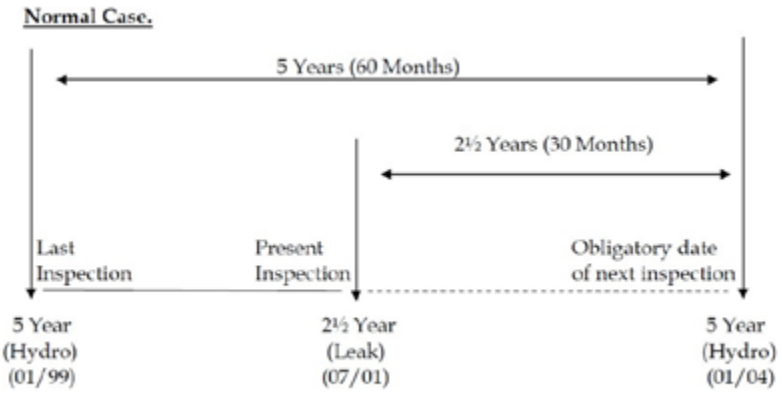
Tanks shall be inspected in accordance with the frequency below.

| Type of Equipment | Intermediate Inspection | Periodic Inspection |
|---|---|---|
| **CSC Containers includes Box, ISO, Reefer, Flatrack, Bulk & BK2** | - | 2.5 years |
| **Offshore Portable tank** | 1 year<br>(*6 months to certain regulations) for frame only. | 4 years for frame only |
| **Portable Tank** | 2.5 years<br>(*includes internal inspection unless dedicated service) | 5 years |
| **Bromine Portable Tanks** | 1-year check of Lead Lining (SP TP10)<br>2.5 years intermediate | 5 years |
| **MEGC** | 2.5 years (CSC frame) | Elements as per P200 (generally 10 years) |
| **Tank Containers** | 2.5 years | 5 years |
| **Tank Containers carrying UN 1008, UN 1017, UN1048, UN1050, UN1053, UN1079** | - | 2.5 years |
| **Cryogenic Tank Container** | 4 years, then after 8 years every 6 years for the vessel<br>2.5 years for the frame | 8 years then 12 years thereafter (if acceptable) for the vessel |
| **Road Tanker** | 3 years | 6 years |
| **Cryogenic Road Tanker** | 3 years, then after 6 years every 6 years | 6 years then 12 years thereafter (if acceptable) |
| **Petrol Tanker** | 3 years<br>(Industry practice to change to 2 years to coincide with PV Valve replacement) | 6 years |
| **Rail Tankers** | 4 years | 8 years |
| **Rail Tankers carrying UN 1008, UN 1017, UN1048, UN1050, UN1053 or UN1079** | - | 4 years |
| **Cryogenic Rail Tanker** | 4 years, then after 8 years every 6 years | 8 years then 12 years thereafter (if acceptable) |
| **Vacuum- operated waste tanks (VOWT)** | 3 years for fixed tanks or demountable tanks or 2.5 years for tank containers and tank swap bodies (internal examination required including inspections set out in 6.8.2.4.3) | 6 years for fixed tanks or demountable tanks or 5 years for tank containers and tank swap bodies. |

## 3. Normal case

The 'normal' date for the next regularity inspection is calculated using the following principles.

If the present visit is a periodic inspection, the date of the next inspection is equal to present date + 30 months (i.e. 2½ years)




If the present visit is an intermediate inspection the date of the next inspection is previous Hydraulic Test Date + 60 months (5 Years).

***Note:*** *If the tank is less than 5 years old the date of the initial inspection should be considered as the previous Hydraulic Test Date for Chapter 6.7 UN Portable Tanks, however for Chapter 6.8 tank containers the initial inspection date shall be the date of Leakproofness testing.*

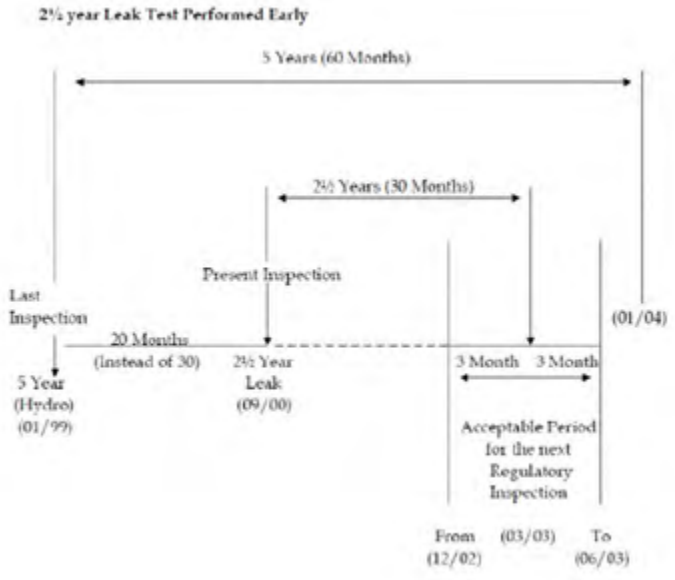
***Note:*** *If the tank container owner /operator exceeds the time limit set up for these inspections, they are fully responsible for the consequences (the tank can be stopped by the control authorities at any place).*

For up to 3 months past the due date, the operator can apply to LRQA for a letter of dispensation to get the tank back to a Home Depot for discharge and inspection. LRQA can forward the details to the Competent Authority for the letter of dispensation. NOTE: LRQA does not issue the letter of dispensation, this is under the authority of the competent authority.

## 4. Leak test performed early

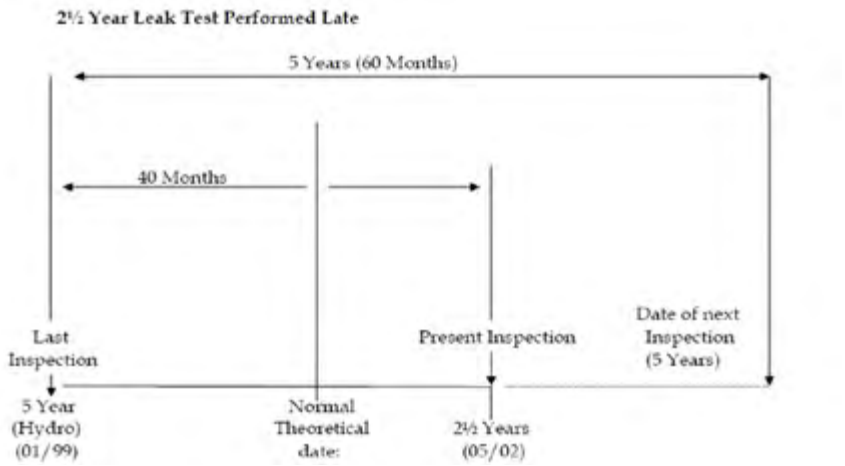
If the intermediate inspection is carried out early, i.e. less than 30 months, but within 3 months of the due date, after the previous test, then the next test date is 5 years after the last Hydraulic test date.

As always, the 3 months grace period can be used at the owner's discretion. Having carried out an intermediate inspection earlier, it is industry practice to make the next inspection a periodic inspection.



## 5. Leak test performed late

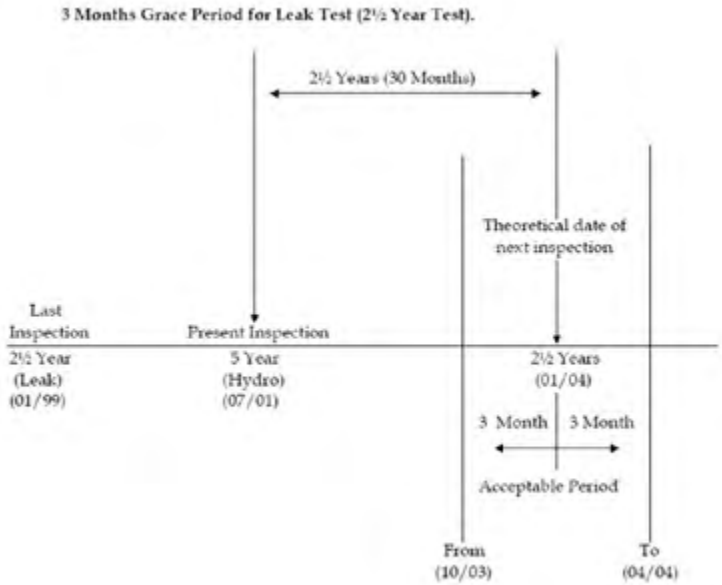
If the intermediate inspection is performed after its normal specified date (after 30 months) the following periodic inspection must be performed no later than 60 months after the previous periodic inspection.




## 6. Non-normal cases

The intermediate inspection may be carried out up to 3 months after the specified date.

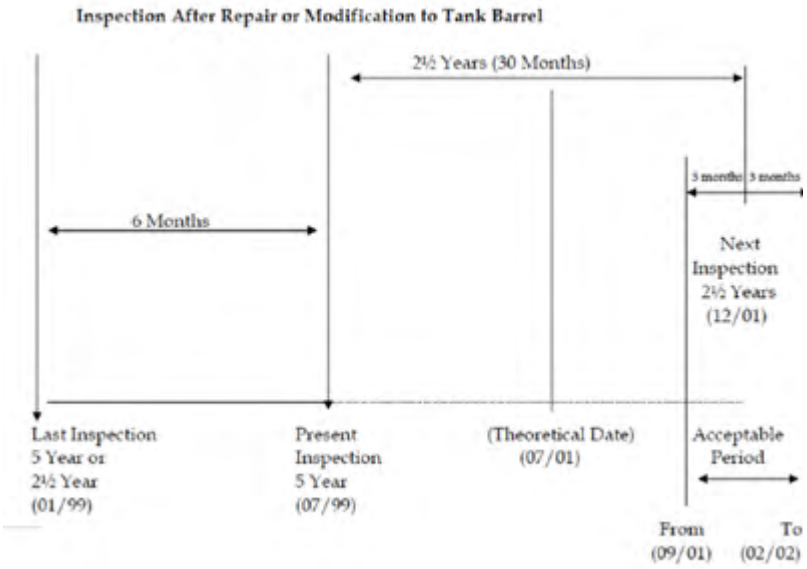
Generally, If the intermediate inspection is performed after 3 month's grace period (30 months + 3 months) a periodic inspection shall be performed prior to the tank going back into service. This allows operational requirements to be considered at the owner's discretion.




## 7.0 Inspection after exceptional inspections

In the event of any repair/ modification work undertaken on the tank, a hydraulic pressure test is required in accordance with section 1.3 above. At this point a periodic inspection should be performed.

The date of the next intermediate inspection is calculated from this periodic inspection by adding 30 months to the current test date.



## 8.0 Inspection of IMO portable tanks under IMO CCC.1/ Circ.3

IMO CSC.1/Circ.3 dated 30 October 2015 (replacing CSC.Circ.12, dated 11 November 2003), titled "Revision Guidance on the continued use of existing IMO type portable tanks and road tank vehicles for the transport of dangerous goods" allows the continued use of 1st generation portable tanks (i.e. IMO 1 portable tanks) until the end of their life if they are inspected in accordance with Chapter

6.7 of the IMDG code. The transport of dangerous goods in IMO type portable tanks shall be in accordance with the T-code requirements and special provisions listed in IMDG.

Reference shall be made to the portable tank T-code list in ADR (4.2.5.2.6) with regards to the test pressure, safety valve arrangement and the location of openings and their number in-series for the allocation of an "equivalent T-code for carriage".

Although it is not a legal requirement to recertify IMO Portable Tanks as UN Portable Tanks, many operators find this useful. Certification for IMO Portable Tanks shall be clear that they are not UN Portable Tanks.

## 9.0 DOT Specification 51

When inspecting tanks according DOT specification 51, IM 101 or IM 102 portable tanks these may not be manufactured after 1 January 2003, however, such tanks may continue to be used for transportation of a hazardous material provided they meet the requirements of the relevant parts of USDOT CFR 49. Specification 51 portable tanks must be given a periodic inspection and test at least once every five years (CFR49, paragraph 180.605 (c)(2)).

## 10.0 Inspection requirements

The numbering system employed in this document follow the convention from EN 12972. The inspection shall cover the following: -

- Internal & External surfaces
- Service equipment
- Chassis / frame
- Overall general condition

### 10.1 Examination of document

The LRQA surveyor must request a copy of the initial certificate to check that the latest inspection certificate for the tank still complies with the initial approval for the tank.

There may be rare occasions where the paperwork is not available at the depot or site and it is acceptable for the documents to be reviewed before or after attending site, but the inspection certificate shall not be issued until this check is completed. Where the previous certificate is not available, or if working under LRQA Netherland B.V approval for 6.7 tanks the nameplate cannot be verified then the following requirements will be performed:

- A (full) periodic inspection shall be undertaken by the LRQA surveyor. A copy of the vessel nameplate shall be taken to be affixed to the LRQA surveyor's report. If there is no vessel nameplate, or if the nameplate is unreadable the tank shall be rejected at this stage, and additional checks on welding and materials will be undertaken. In these instances, the review shall be undertaken on a case-by-case basis.
- A full ultrasonic survey of the tank shall be undertaken, and a copy of the report shall be forwarded with the LRQA surveyor's report for review.
- A thorough inspection of welds shall be undertaken – lagging/cladding will be required to be removed to facilitate this inspection. Additional NDT shall be undertaken at the discretion of the LRQA surveyor.
- The material used for the vessel shall be established, either from the nameplate or by PMI or other methods and shall be noted in the LRQA surveyor's report.
- Details of the safety valves /burst discs shall be noted, specifically the manufacturer, model, set pressure and flow rate. This shall be noted in the LRQA surveyor's report.
- Pictures of the tank shall be taken from various viewpoints and added to the surveyor's report which will enable the LRQA design appraisal surveyor to verify the tank is acceptable as a T-coded portable tank.
- A review of the information submitted above by a design appraisal surveyor shall be undertaken, and conclusions made concerning the tanks suitability, by way of an attestation which shall include the details that would be expected on an initial unit certificate.

If there is no CSC plate and there are concerns regarding the frame, the LRQA surveyor shall specify frame tests to be undertaken at their discretion.

On completion of the periodic inspection and satisfactory issuance of the DAD, the in-service certificates shall be issued to the client.

Additionally, for Road Tankers the maintenance log should be consulted to see if there have been any modifications made to the tank. The LRQA surveyor shall check to see whether the gaskets and seals have been changed to those that were originally supplied, and if any other modifications could affect the tanks safety.

If an exceptional check is required, the type approval certificate and supporting documentation shall comply to the same requirements as for a new construction tank, which are specified in Part A of this document.

### 10.2 Check of the design characteristics

A check of design characteristics is only required for exceptional checks. The exceptional checks shall be specified on the DAD covering the repair and/or modification. The following text is only valid for the exceptional check and is not required for 'routine' periodic and intermediate inspections.

As part of the inspection, the LRQA surveyor shall verify that the tank thickness is not less than the required thickness from the drawing and that of the regulations. Where thickness checks cannot be undertaken the thickness specified on the dished end / shell thickness check reports shall be used for actual thickness entry on certification. Thickness measurements are to be made in the presence of the LRQA surveyor. The measuring instrument must be calibrated, and its calibration certificate available to the surveyor for consultation. The results of these thickness measurements are to be entered on a suitable report, verified, and signed by the LRQA surveyor.

Where NDT is required for an exceptional inspection, the NDT shall be undertaken as per the requirements of the technical code used, refer section 7 of Part A. Depending on the type of equipment, EN 12972 does not override the design code requirement for portable tanks but it is compulsory for chapter 6.8 tank containers. All design requirements shall

be checked against the regulations in the first instance. Radiographs shall be reviewed by the LRQA surveyor. Other NDT shall be reviewed or witnessed at the LRQA surveyor's discretion. The same applies for mechanical testing of production control plates as applicable.

### 10.3 Internal visual examination

The LRQA surveyor shall ensure that they adhere to safety requirements concerning personal protective equipment and any site rules applicable. Each tank should be presented, clean, dry, gas free, and adequate lighting and access equipment is made available. Suitable lighting is required to perform the inspection adequately (approx. 500 LUX).

During the internal inspection of the tank the LRQA surveyor shall verify that it is free from the following defects that might render the tank unsafe for carriage:

- Leaks
- Laminations,
- Corrosion which reduces the shell thickness below the required minimum or creates contamination traps,
- Stress corrosion
- Pitting,
- Cuts & Cracks or sharp indentations, creases or dents causing the elastic limit of the material to be exceeded resulting in permanent deformation.
- Deformations and dents, use technical code for guidance, but dents greater than 6 mm (0.25 inch) to the top third of the tank shell or dents greater than 10 mm (0.4 inch) to the bottom two thirds of the tank shell shall not be accepted
- Grinding operations which reduce the shell thickness to less than the minimum.
- Scratches deeper than 0.1mm and gouges. Check with Mark Hale and Gary Taylor
- Previous cargo, contamination or odour and discolouration or transferable stain which can be removed by the manual application of a plastic abrasive pad and/or solvent.
- Improper repairs.
- Weld defects.

When Transport Canada CSA B625 is applicable, the following rejection criteria shall be adhered to:

- Less than the minimum thickness remaining under a cut, dig, or gouge;
- Any dent with a depth of more than 12.7 mm (0.5 in) where it includes a weld;
- Any dent with a depth of greater than 10% of the length of the dent;
- Any weld defect, including a crack, pinhole, or incomplete fusion of the weld; or
- Any source of leakage.

Any corrosion, erosion, mechanical and/or incident damage, or any other condition that may affect the safe operation of the tanker shall be recorded on the LRQA surveyor's report.

Pitting is the most common type of defect in-service, in particular 'around' the wash line. All pitting must be reported and investigated to ensure that cavity pitting is not present and that the pitting is not masking stress corrosion. The investigation will involve localised polishing of the surface followed by visual examination with the aid of a magnifying glass and dye penetrant.

The thickness of the tank walls is to be measured in the following cases:

- Ground areas visible inside the tank.
- Corrosion pitting which requires grinding/polishing.
- When the surveyor is doubtful about the actual thickness of the walls.

Thickness measurements are to be performed in the presence of the LRQA surveyor. The measuring instrument must be calibrated, and its calibration certificate available to the surveyor for consultation.

The results of the thickness measurements shall be reported by the LRQA surveyor who shall interpret thickness measurement results with reference to the thickness stated on the data plate and the relevant technical codes and regulations.

The internal inspection shall also include an Inspection of protective lining or coating. The condition of the protective lining or coating shall be inspected by appropriate methods, e.g., spark test in accordance with the manufacturer's specification and the manufacturer's recommendations. Bonding defects, of the protective lining, shall be identified and recorded.

### 10.4 External visual examination

To undertake the external inspection, it is recommended that the inspection location has a gantry system.

Sheathing and lagging shall be sufficiently removed to allow inspection where the LRQA surveyor suspects there to be corrosion. Suitable lighting is required to perform the inspection adequately (approx. 500 LUX).

During the external inspection the LRQA Surveyor shall check for the following:

- Leaks.
- Laminations.
- Corrosion which reduces the shell thickness below the required minimum set out in the regulation / technical code or creates contamination traps.
- Stress corrosion.
- Pitting.
- Cuts, cracks or sharp indentations, creases or dents causing the elastic limit of the material to be exceeded resulting in permanent deformation.
- Deformations and dents greater than 6 mm (0.25 inch) located on the top third of the tank shell or dents greater than 10 mm (0.4 inch) located on the bottom two thirds of the tank shell shall not be accepted.
- Grinding operations which reduce the shell thickness to less than the minimum.
- Scratches deeper than 0.1mm and gouges.
- Improper repairs or non-standard fittings.
- Previous cargo, contamination or odour, Oil or grease deposits, cargo residues, dirt, sundry waste.
- Road dirt reducing legibility of tank markings.
- Vacuum ring distortions greater than 15 mm or 50% of the thickness, whichever is smaller.
- Non-operational, damaged, twisted or bent beyond the limits of the ISO corner fittings compartments and compartment lids.
- Damaged, missing, or painted earthing (ground) Lug.
- Paint removed by spillage of cargo or removed by improper handling.
- Insulation, which is missing or saturated by water / cargo. Incorrectly repaired or deteriorated by heat (burnt or baked).
- Cladding which has cuts, holes, cracks, gaps, patch joints or splits penetrating the cladding thickness and allowing moisture ingress, dents greater than 25mm (1 inch), or has been deteriorated by heat (burnt or baked).
- Insecure cladding, retaining straps or distorted outwards beyond the limits of the ISO corner fittings.

When Transport Canada CSA B625 is applicable, the following rejection criteria shall be adhered to:

- Less than the minimum thickness remaining under a cut, dig, or gouge;
- Any dent with a depth of more than 12.7 mm (0.5 in) where it includes a weld;
- Any dent with a depth of greater than 10% of the length of the dent;
- Any weld defect, including a crack, pinhole, or incomplete fusion of the weld; or
- Any source of leakage.

When corrosion pitting or cracks are suspected by the LRQA surveyor, they may be examined using a magnifying glass or dye-penetrant test. If grinding has been conducted, the remaining thickness of the tank wall is to be checked on the suspect area.

The LRQA surveyor shall confirm that required markings on the tank are legible and in accordance with the applicable requirements set out in regulations and technical code.

Electrical Continuity check, if required, shall be undertaken in accordance with the instructions in section 10.9.15 of this document.

## 10.5 Hydraulic test

The pressure test shall include each compartment (with adjacent compartment empty and un-pressurised, for subdivided tanks), and the whole tank.

The fluid normally used for hydraulic pressure testing is water.

The hydraulic test shall typically follow the standard procedure, namely fill the compartment(s) with a test liquid to approximately 99% of full capacity and subsequently pressurise above the test liquid up to the test pressure described below. The hydraulic test pressure for tanks shall be governed by regulations / technical code the more stringent pressure shall be applied.

A safety device shall be used in the pressurising system to prevent over-pressurisation during pressure testing.

The device shall ensure that the pressure in the shell does not exceed 105% of the required test pressure. The tank shall be held at test pressure for a minimum of 30 minutes.

For vacuum insulated tanks, the inspection of the shell interior and the hydraulic pressure test are not required provided that a satisfactory vacuum in accordance with the manufacturer's specification is confirmed by measurement and simultaneously a leakproofness test is carried out. Please refer to section 10.6 and 10.7 of this document.

A pressure test shall be deemed to have failed if there is:

4. **An unaccountable fall in pressure during the test period**
5. **Visible permanent deformation**
6. **A leak was detected.**

| Portable tank intended for | Test pressure |
|---|---|
| Dangerous goods of Class 1 or Classes 3 to 9 | 1.5 x MAWP |
| Non-refrigerated liquefied gases of Class 2 | 1.3 x MAWP |
| Refrigerated liquefied gases of Class 2;<br>shell without<br>vacuum insulation | The greater of:<br>1.3 x MAWP; or<br>300 kPa |
| Refrigerated liquefied gases of Class 2;<br>vacuum-insulated<br>shell | The greater of:<br>1.3 x (MAWP + 100 kPa); or<br>300 kPa |

The correlation between calculation pressure and test pressure is specified in ADR/RID 6.8.2.4.1.

Where a 'G' code is specified, the test shall be undertaken at a pressure of 1.3 times the static pressure but not less than 0.2 barg.

| Calculation Pressure (Bar) | Test pressure (Bar) |
|---|---|
| G | G (≥ 0.2 bar) |
| 1.5 | 1.5 |
| 2.65 | 2.65 |
| 4 | 4 |
| 10 | 4 |
| 15 | 4 |
| 21 | 4 |
| | 10 (*1) |

Heating equipment shall be tested at a pressure in accordance with the below.

| Type of heating equipment | Test pressure |
|---|---|
| Internal and external heating pipe (not connected with the tank shell) | 1,5 × working pressure of heating equipment |
| External heating channel and heating tub (connected with the tank shell) | 1,3 × working pressure of heating equipment |

The pressure gauge used shall be in calibration and traceable back to National Standards and traceable to a pressure gauge tested by an independent test laboratory accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full-scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of accuracy shall be demonstrated. For

selection and installation of mechanical pressure gauges EN 837-2 shall be used. Electronic pressure gauges may be used in the range attested by the gauge manufacturer. Reference must be made for specific gauge requirements against the applicable manufacturing standards.

The ambient temperature and the weather condition shall be considered by the LRQA surveyor before the test commences. If the ambient temperature is below 0°C, then testing can only proceed once it is established that the liquid test medium will not freeze. For carbon steel tanks the LRQA surveyor shall consider the risk of brittle fracture for temperature less than 7°C, where materials used are at risk of brittle fracture. Additionally, if there are small bore nozzles then precautions to be undertaken to avoid water freezing inside the nozzles. Stress corrosion cracking can be caused by increased levels of chlorine in the test water, therefore it is recommended that the water source is tested prior to eliminate any unnecessary risk.

## 10.6 Vacuum test

Where the regulation / technical code specifies a vacuum test to be undertaken in-service, the following formula may be used, up to a maximum of -1 Barg (Note –it is noted that -1 Barg may not be achievable, and that -0.9 Barg is thus satisfactory if testing from the equipment pump for certain equipment – refer to EN 12972). For practical reasons, it is sufficient for vacuum-operated waste tankers to apply a negative internal pressure of 0.9 bar.

***Note:*** *The technical code requirements are that the tank shall start the test empty and at atmospheric pressure. All openings of the tank shall be closed except the discharge openings. A pressure of 1.5 times more severe than the external pressure shall be created inside the tank held for 5 minutes minimum. The vacuum test is a prototype test used to validate the design of tank where there is unusual design condition, typically for a large diameter tank in an ISO frame where part of the stiffener is removed to maximise the diameter within the frame.*

For vacuum insulated tanks, the inspection of the shell interior and the hydraulic pressure test are not required provided that a satisfactory vacuum in accordance with the manufacturer's specification is confirmed by measurement and simultaneously a leakproofness test is carried out.

The pressure gauge used shall be in calibration and traceable back to National Standards and traceable to a pressure gauge tested by an independent test facility accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of the accuracy shall be given. For

selection and installation of mechanical pressure gauges EN 837-2 shall be used. Electronic pressure gauges may be used in the range attested by the gauge manufacturer.

| | | |
|---|---|---|
| $P_{vac}$ | Vacuum Test Pressure | $P_{vac} := 1.5.P_{ext} . \frac{t}{t_c}$ |
| $P_{ext}$ | External Pressure condition of the tank | |
| t | Thickness of tank | |
| $t_c$ | Thickness of corroded tank | |

***Note:*** *It is recommended in addition to the formula to multiply the value by the ratio of Young's Modulus.*

## 10.6 Vacuum test

The leakproofness test shall include each compartment (with adjacent compartment empty and unpressurised, for subdivided tanks), and the whole tank. The tank shall include all fittings, including piping and service equipment, unless those rated below 0.2 Bar in accordance with the below e.g. for gravity discharge tanks. The tank shall be dry and clean externally before the test commences to enable the LRQA surveyor to observe any leakage.

The leakproofness test shall be held for 5 minutes minimum but shall be long enough for the LRQA Surveyor to assess the whole assembly for leak tightness. Acceptance criteria shall be in line with the applicable application standard and regulations.

The pressure gauge used shall be in calibration and traceable back to national standards and traceable to a pressure gauge tested by an independent test facility accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full-scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of accuracy shall be demonstrated. For selection and installation of mechanical pressure gauges EN 837-2 shall be used. Electronic pressure gauges may be used in the range attested by the gauge manufacturer.

A safety device shall be in the pressurising system to prevent over-pressurisation during pressure testing. The device shall ensure that the pressure in the shell does

ensure that the pressure in the shell does not exceed 105% of the required test pressure. Pressurising with gas is covered in LRQA Safety Guidelines, which must be followed. The following notes are taken from EN 12972.

- The test area shall be sufficiently quiet enough to hear the noise of a gas escape from a leakage.
- A written permit to work shall be given to any personnel necessary to be present in the vicinity of the tank regarding the risk of a leakproof test with gas and the precautions necessary for safety at work.
- During the test duration no work shall be carried out on the tank.

**The below table shall be used for leak test pressures where the regulation does not specifically restrict the pressure or medium (e.g. for portable tanks):**

## 10.7 Leakproofness test

The leakproofness test shall include each compartment (with adjacent compartment empty and unpressurised, for subdivided tanks), and the whole tank.

The tank shall include all fittings, including piping and service equipment, unless those rated below 0.2 Bar in accordance with the below e.g. for gravity discharge tanks. The tank shall be dry and clean externally before the test commences to enable the LRQA surveyor to observe any leakage.

The leakproofness test shall be held for 5 minutes minimum but shall be long enough for the LRQA Surveyor to assess the whole assembly for leak tightness. Acceptance criteria shall be in line with the applicable application standard and regulations.

The pressure gauge used shall be in calibration and traceable back to national standards and traceable to a pressure gauge tested by an independent test facility accredited to ISO 17025. The accuracy of the measuring equipment shall be equal to or less than 1 % of full-scale deflection (accuracy classes 0,1 to 1 according to EN 837-1 or EN 837-3). Proof of accuracy shall be demonstrated. For selection and installation of mechanical pressure gauges EN 837-2 shall be used.

Electronic pressure gauges may be used in the range attested by the gauge manufacturer.

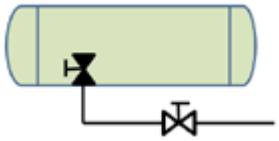
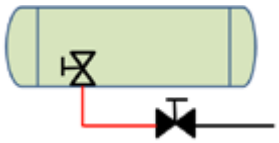
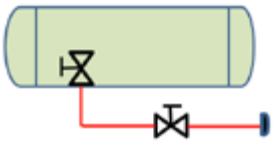
A safety device shall be in the pressurising system to prevent over-pressurisation during pressure testing. The device shall ensure that the pressure in the shell does not exceed 105% of the required test pressure. Pressurising with gas is covered in LRQA Safety Guidelines, which must be followed. The following notes are taken from EN 12972.

- The test area shall be sufficiently quiet enough to hear the noise of a gas escape from a leakage.
- A written permit to work shall be given to any personnel necessary to be present in the vicinity of the tank regarding the risk of a leakproof test with gas and the precautions necessary for safety at work.
- During the test duration no work shall be carried out on the tank.

| Substance | Test fluid | Test pressure (applied at the highest point of the tank) |
|---|---|---|
| Liquids, solids in granular or powder form (see below for gravity discharge tanks) | Liquid (not allowed for UN Portable tanks) | For pressure tanks at least equal to the maximum (allowable) working pressure with a minimum of 0,2 bar. |
| Liquids, solids in granular or powder form | Gas | At least equal to 25 % of the maximum working pressure with a minimum of 0,2 bar |
| Compressed or liquefied gases | Liquid (not allowed for UN Portable Tanks) | Not at less than 20% of the test pressure |
| Compressed, liquefied, or dissolved gases | Gas | At least equal to 25 % of the maximum allowable working pressure |
| Refrigerated liquefied gases | Gas or Liquid (Not for UN Portable Tank) | Not less than 90 % of the maximum (allowable) working pressure |
| Gravity discharge tanks (e.g. petrol tanks) | Gas or Liquid | At least equal to the static pressure of the densest substance to be carried, the static pressure of water or 0,2 bar whichever is the highest.<br><br>Pressure vacuum vent valves (breather valves) which shall be removed for the leakproofness test, then subsequently replaced, and tested at a pressure of 90% of the minimum operating pressure of such service equipment. |

***Note:*** *UN Portable Tanks, in accordance with ADR (6.7.2.1, 6.7.3.1 and 6.7.4.1) must be tested with a gas. For 6.8 tanks it is also recommended that a gas (e.g. air) is used as the test medium, however in accordance with EN 12972 water is permitted as the test medium where the test temperature is > 0°C and the contents of the tank, of the measuring equipment and of the piping system cannot freeze. subject to the acceptance of the LRQA surveyor that the testing with water is acceptable. The leak test shall verify that where valves in series are used, both are leak tight. The following diagram indicates the sequence on how this is to be completed.*

The leakproofness test shall include the pipework and valves in series, all of which shall be tested in sequence. The diagram below gives guidance on how to perform these activities:

| Test No. | Purpose | Pressure | Valve 1 | Valve 2 | Valve 3 | Diagram |
|---|---|---|---|---|---|---|
| 1 | Check the leakproof of valve 1 | As per table above | Closed | Open | Open |  |
| 2 | Check the leakproof of valve 2 | As per table above | Open | Closed | Open |  |
| 3 | Check valve 3 is liquid tight | Static Head (*1) | Open | Open | Closed |  |

### 10.8 Determination of water capacity

The water capacity shall be measured by the manufacturer using appropriate calculation such as volumetric or gravimetric methods, for filling the tank prior to the hydraulic test for a tank at 20 °C. Where a calculation method is proposed the request shall be forwarded to the LRQA design surveyor for review.

Variations in capacity (and tare) of 1% are permitted to a maximum of 250 Litres (or kg) without additional design consideration if the maximum gross weight / rating is not itself increased.

The volumetric or gravimetric determination of water capacity of the tank and, where appropriate, each compartment shall be carried out by completely filling the tank or compartment with water. When it is not possible to completely fill the shell or the shell compartment because of its shape or construction, this reduced capacity shall be used for the determination of the degree of filling and for the marking of the tank.

Note: An appropriate method of determination of water capacity can be found in the International Organisation of Legal Metrology's Recommendation OIML R 80 [12].

### 10.9 Inspection of service equipment

The inspection of the piping, service equipment, heating/cooling system, gaskets and safety devices shall check for corrosion, signs of leakage or defects in welds that might render the tank unsafe for filling, discharge, or carriage.

An essential part of the inspection of the service equipment is to review the maintenance of the equipment and to check that equipment subject to ATEX (e.g. PTO) has maintained its compliance.

All safety valves shall be bench tested and witnessed by the attending LRQA surveyor to make sure they open / close with their tolerances set out by the manufacturing standard and regulation. This activity can be waived if it has been determined that the safety valve has already been tested and witnessed by an ISO 17020 inspection body. All burst disc's shall be visually inspected.

For manlids where bolts are used in replacement of studs and nuts to secure the bolted manway lid, care shall be taken at the time of manufacture, maintenance, and periodic testing to ensure that the bolts used are of the correct length, so that they can be fully tightened and torqued to the recommended value.

### 10.9.1 Safety valve / pressure relief valve

All safety valves shall be bench tested and witnessed by the attending LRQA surveyor, unless they are new valves and it can be proven that the safety valve has already been witness tested by an ISO 17020 inspection body, or under its authority, approved for such activities. The LRQA Surveyor should perform some level of scrutiny to ensure safety valve functionality.

- Safety valve(s) should be recorded and stamping indicating that they have been tested.
- Safety valve(s) shall be lift tested either in situ or off the vessel.
- The LRQA surveyor shall check that the siting of the pressure relief valves is in the top space of the shell as close to the longitudinal and lateral centre so that they always remain in contact with the gas or vapour even during severe weather.

The pressure relief valve is normally protected within a spill box, clustered with airlines, and the LRQA surveyor shall check that the spill box, if fitted with a lid does not restrict the flow of air in such a way that will render the siting of the pressure relief valve unsafe. It shall be verified that safety valves are vented safely away from the operator of the tank.

The LRQA surveyor shall check the following: -

- Contamination or corrosion.
- Missing parts.
- Distortion, damaged or worn threads affecting correct operation or security.
- Leaks or incorrect pressure settings.
- Missing or defective Customs sealing ring.
- Improper repairs, seals, or gaskets.

***Note:*** *Where the tank is designed for an external pressure of 0.21 Barg it shall be confirmed that an anti-vac valve (set at -0.21 Barg) has been fitted. If the tank has a burst disc fitted it shall be confirmed that the burst disc is parallel to the anti-vac valve and not in series.*

### 10.9.2 Burst disc

When burst discs are required and fitted, they shall be checked for correct installation and rating. The burst discs shall be visually inspected by the LRQA surveyor and if satisfactory they do not need to be replaced. It's not unusual for tanks to have burst disc flange assemblies fitted in series with the relief valve. The LRQA surveyor shall confirm that the burst disc is set at the correct pressure rating and shall check the following:

- Leaks.
- Contamination or corrosion.
- Broken disc.
- Improper parts.
- Damaged pressure gauge affecting correct operation.
- Missing tell tale/pressure gauge.

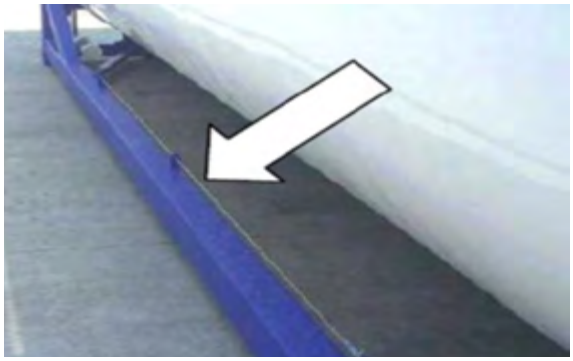
### 10.9.3 Flame Arrestor Gauze

When flame arrestors are required, the LRQA surveyor shall check the following: -

- Missing or damaged such that it affects the correct operation.
- Contaminated.

### 10.9.4 System Emergency Stop / Remote Closure

Provision to stop the service delivery/ discharge function at service areas should be provided. The LRQA surveyor shall confirm the service load/discharge emergency stop function. Service load/discharge stop actuators shall be evaluated, when actuated the foot valve should automatically close in 15 seconds or less.



When three shut of devices are required the first (foot valve) must be fitted with a remote operating device. This device consists of steel cable, often plastic-coated stainless steel, or a rod which leads from the foot valve along one side of the tank. Should there be an incident where the loading / discharge process should be halted, then the steel wire is activated. The action of pulling the wire, or rod, will lift the foot valve operating handle over the cam position closing the valve.

The LRQA surveyor shall check that the remote closure is secure and check the following:

- Damage rendering remote closure inoperable.
- Seized.
- Broken thermal closure (when fitted).

### 10.9.5 Safety Interlocks

The safety interlock(s) shall be evaluated by the LRQA surveyor for correct functionality:

- First ensure the braking system is functioning normally and the tanker is free to drive/roll.
- Whilst the tanker is stationary activate the safety interlock. The tanker should remain stationary when braking system is applied and the tanker should not be drivable. Cab control unit should indicate a re-set is required (visual and/or alarm).
- Whilst the tanker is stationary deactivate the safety interlock without a safety interlock re-set. The tanker should remain stationary, and the tanker should not be drivable until a safety interlock re-set is performed.
- Re-set the safety interlock, check the tanker is drivable.

All safety interlocks shall be checked and evaluated independently by the LRQA surveyor to ensure correct operation.

Where fitted, the following interlocks shall be assessed:

- Guard rail safety interlock.
- Vapour transfer adaptor safety interlock.
- HLCO safety interlock.
- Handrail interlock.

The LRQA surveyor shall examine the condition and function of the guard rail. The functionality of the associated interlocks shall be tested as described later in this document. A securing device/ system shall be employed to prevent unauthorised operation.

### 10.9.6 Pressure Gauge, Foot Valve, Bottom Outlet Valve, Outlet Blank, Airline Valves, Vent Valve & Top Outlet

Manually operated foot valves shall be clearly marked to indicate open/close position. Pneumatically operated foot valves where indicators are fitted shall be checked for correct and effective operation by the LRQA surveyor. All foot valves shall be checked that they are secure, sealing correctly, and have functionality. Markings shall be checked to ensure the part are suitably rated for intended service (pressure, temperature and has been correctly evaluated).
The LRQA surveyor shall check for the following:

- Leaks.
- Contamination or corrosion.
- Damage or distortion affecting correct operation or sealing.
- Improper repairs, seals, or gaskets.
- Customs sealing ring missing.
- Incompatible material.
- Foot valve to tank flange gaskets.
- Missing Customs sealing ring.
- Defective pressure gauge where fitted.

For flammable gases, all fittings and discharge connections shall be provided with back-pressure check valves or quick-closing valves mounted internally to prevent excessive escape of the flammable gas in the event of damage to the connections. All these types of valves shall be checked by LRQA surveyor for leakage and for correct operation at intervals not exceeding one year.

### 10.9.7 Screwed Outlet Cap

The LRQA surveyor shall check the following:

- Contamination or corrosion.
- Leaks.
- Missing parts.
- Non-metallic, or a material that is not corrosion resistant.
- Damaged or improper screw threads.
- Broken or missing retaining wire or chain.
- Damage affecting operation.

### 10.9.8 Thermometer

Thermometers should be assessed or changed at intervals not exceeding one year. The LRQA surveyor shall check the following:

- Functionality.
- Broken fascia or dial.
- Missing or insecure.
- Improperly fitted

### 10.9.9 Dipstick/dip tube and calibration chart

Dipsticks may or may not be standard. When in doubt refer to the owner. The LRQA surveyor shall check the following:

- Defects, including punctures of the gauze.
- Distortion or damage to the dipstick assembly preventing operation.
- That they a properly located and secure.
- Does not show evidence of being changed from the initial fitment.
- Contamination or corrosion.

### 10.9.10 Slip Tubes, syphon tubes and fixed level gauges

Rotary slip-tube and fixed liquid level gauges shall be evaluated at intervals not exceeding one year for efficiency of operation and at intervals not exceeding 5 years they shall also be checked to ensure that they are in good order. The LRQA surveyor shall check for the following:

- Contamination or corrosion.
- Incompatible Material.
- Damage or distortion affecting correct operation or sealing.
- Blocked, damaged, missing drain tubes.

### 10.9.11 Steam Tube and Cap

In all cases of damage, the steam tubes must be pressure tested. Defective steam traps should be removed, replacement is not required. The LRQA surveyor shall check for the following: -

- Leaks.
- Damaged screwed fittings.
- Missing dust caps.
- Missing chain or cable.
- Distortions greater than 50% of the steam tube depth.

### 10.9.12 Cargo Pump

Where a cargo pump and metering system is fitted it shall be visually examined for any signs of leakage by the LRQA surveyor. If a leakage or defective part is suspected, the system may be externally cleaned, and product pumped through the system. The cargo pump should be securely mounted. Mounting points shall be checked for any damage and/or defects.

The LRQA surveyor shall visually examine the pump delivery manifold and associated pipework, couplings, and seals.

### 10.9.13 Expansion Joints and Hoses

Where a delivery hose reel is fitted it shall be visually examined for any signs of leakage by the LRQA surveyor, if a leakage or defective part is suspected, the system may be externally cleaned, and product pumped through the system. The hose reel shall be securely mounted. Mounting points shall be checked for any damage and/or defects. All hoses, hose fitting and non-metallic flexible connections should be inspected frequently for damage. They shall be hydraulically pressure tested to the working pressure prior to placing them in service and again at intervals of not more than one year.

A record of the hydraulic testing shall be stamped on a fitting of the hose, flexible connection or on a metal tag securely attached to it. The LRQA surveyor shall check the hoses and expandable joints to ensure that the couplings are in good condition, the hoses are free of kinks, deformations and that the hoses / flexible joints do not show any sign of hardening or damage.

### 10.9.14 Manlids & Gaskets

For manlids where bolts are used in replacement of studs and nuts to secure the bolted manway lid, care shall be taken at the time of manufacture, maintenance, and periodic testing to ensure that the bolts used are of the correct length, so that they can be fully tightened and torqued to the recommended value.

The LRQA surveyor shall check the following:

- Manhole covers and gaskets to determine that there is no evidence of leakage.
- The condition of the bolts or nuts on any flanged connection or blank flange to ensure that they will not show signs of leakage.
- No missing, insecure, seized, or non-operational parts.
- No dents or distortion greater than 6mm (0.25 inch) or affecting proper sealing of the manlid.
- No cuts, cracks or distortion affecting sealing.
- No missing customs sealing ring.
- No Pitting, corrosion, or contamination.
- No Improper repairs.
- Other conditions that might render the tank unsafe for loading, unloading, or transport of dangerous goods.

### 10.9.15 Electrical Continuity

Shells which are required to be fitted with at least one earth connection shall be clearly marked with the symbol adjacent to the point capable of being electrically connected.

Where required it shall be confirmed that electrical continuity meets the requirements of the regulation / technical code, however if no value specified it should be in accordance with the manufacturer's technical specification. The LRQA surveyor shall check the electrical continuity on the following:

- The tank shell.
- All service equipment.
- The wheels of rear axles.
- The hose reel (where fitted).
- The hose reel to connection nozzle (where fitted).

It shall be confirmed that the electrical continuity between the earth pin(s) and the hose reel swivel joint (where fitted) meets the requirements of the regulation / technical code, however if no value is specified it should be in accordance with the manufacturer's technical specification and it is suggested that the criteria is not more than value of 10 ohms between the earth pin(s) This shall be confirmed by the LRQA surveyor.

Shells which are required to be fitted with at least one earth connection shall be clearly marked with the earth symbol adjacent to the point capable of being electrically connected.

***Note:*** *The correct earth symbol is shown above- Any other earth symbol shall not be accepted, and the tank will be rejected. Non-Acceptance note shall be issued.*

### 10.9.16 Frame / Structural Inspection

The chassis, frame and/or other structural equipment shall be examined to confirm they are in good condition.

The examination shall include a visual examination of the welded joints and the surfaces of structural parts.

### 10.9.17 Tank Containers / Portable Tanks

The LRQA surveyor shall check that there have been no unauthorised frame / shell repairs undertaken on the unit, and the condition of the container frame to the requirements specified in Table 1 and Table 2 below.

Particular attention shall be made to structurally sensitive components as defined in CSC 2014, and below. The frame shall comply with the requirements of CSC, specifically for the following structurally sensitive components a container should be examined for serious deficiencies.

It is the Owner's responsibility to examine the container, or have it examined by a competent person, to maintain Convention Safe Container [CSC] approval. Transport of Dangerous Goods regulations are different from CSC regulations, and the frame is classified as part of the portable tank or tank container and is required to be inspected by LRQA. It therefore follows that all repairs to frames require an exceptional inspection in accordance with section 1.3 of this document and approval by LRQA. The time between date of construction and date of first inspection must not exceed five [5] years, and re-inspections thereafter at intervals of not more than 30 months.

It is the Owners responsibility to define and implement or have implemented the inspection guidelines and acceptable repair criteria that will allow safe operation of the equipment, for which LRQA's guidance would be to use the IICL repair manual and CIC-2 (Table 1 below) criteria as pass/fail for periodic inspection, not the maximum criteria specified in CSC (Table 2 below).

The dimensions of the container corner fittings dealt with in these requirements must comply with the latest edition of the International Standard ISO 1161.

In all cases of damage to a tank bearer support the tank shell must also be inspected for damage. In all cases of corrosion to the tank bearer supports the section of the bearer attached to the shell below the insulation must be checked for structural integrity. This will require local removal of insulation. The attachment of the shell to the container frame should also be examined for any readily visible serious structural deficiency comparable to that specified in the tables below.

The effect of two or more items of damage in the same structurally sensitive component, even though each is less than that specified in the below table, could be equal to, or greater than, the effect of a single item of damage listed in the table. In this case the damage should be reported to LRQA and be repaired under the supervision of the LRQA surveyor where the scope of the exceptional inspection is agreed.

When using the acceptance criteria in the tables below, the overall deformation is the total deformation (single or multiple defects) combined on the same member, where such defects are located in close proximity, which is specified as being within 300 mm of each other:

E.g., a component has 3 defects at 20mm long x 5mm deep, which are at locations 1000mm, 1200mm and 1450mm from the datum – as these defects are within 300mm of each other they shall be added together (20mm+ 20mm+ 20mm = 60mm) - totalling 60mm long x 5mm deep or 1 defect at 60mm long x 5mm deep which requires a repair.

The below tables show the maximum acceptable deformations during inspection.

The below tables show the maximum acceptable deformations during inspection. Table 1 is the CIC-2 inspection criteria and should be used during inspections. Table 2 is the CSC inspection criteria and if any deformation reaches these limits the container should be removed from service and repaired immediately. Clients should have some margin before the limits of Table 2 are met, which it is recommended that they are in accordance with the table 1 limits. In this case the damage should be reported to LRQA and be repaired under the supervision of the LRQA surveyor where the scope of the exceptional inspection is agreed.

If the defect/deformation in the frame exceeds the value in Table 1, it shall be noted in the remark section of the ITP (and LRQA certificate), but the item shall not be rejected, however a repair at this point would be recommended.

If the defect/deformation in the frame exceeds the value in Table 2, it shall be rejected, and a NAN issued (and VCA Certificate of Refusal if using the UK authorisation).

**Table 2- CIC-2 Inspection criteria -** Information as used in table 2 below is used in courtesy of Container Owners Association

| Component | Condition | Maximum acceptable deformation |
|---|---|---|
| All rails, including side rails, headers and sills and welds to corner fittings | Holed, cut, torn or cracked; broken component and/or weld<br>Missing or loose parts or fasteners | REPAIR |
| Top side rail | Any deformation such as bend, bow, dent, etc. | If more than 30 mm (1-3/16 in) deep - REPAIR |
| Front headers & Rear headers | Any deformation such as bend, bow, dent, etc. EXCEPT on a header extension plate or corner protection plate | if more than 35 mm (1-3/8 in) deep - REPAIR |
| Bottom side rails, front and door sills | Any deformation such as bend, bow, dent, etc.<br><br>Any deformation such as bend, bow, dent, etc. ON A FLANGE | if more than 50 mm (2 in) deep – REPAIR<br><br>If torn, cracked, or cut - REPAIR |
| Door headers, rain gutter or sills | Interference with door closure, securement and/or weather tightness | REPAIR |
| All corner posts, including J-bars | Holed, cut, torn or cracked broken component and/or weld.<br><br>Any deformation, such as bend, bow, dent, etc.<br><br>Outward deformation | REPAIR<br><br>If more than 20mm (13/16”) regardless of length or location - REPAIR<br><br>If more than 5mm (3/16”) beyond. The plane of end surfaces or 10mm (3/8”) beyond plane of side surfaces of corner fittings REPAIR |
| Rear corner posts | Any deformation causing interference with door operation, securement or weather tightness | REPAIR |
| J-bars | Any deformation such as bend, bow, dent, etc. Door | Door must be able to open fully (270°). If door operation is impaired – REPAIR |
| All side/front panels | Holed, cut, torn or cracked; broken component. and/or weld<br><br>Missing or loose parts or fasteners<br><br>Inward deformation, such as bend, bow, dent, etc. | REPAIR<br><br>REPAIR<br><br>If more than 35mm (1-3/8”) measured on an exterior recessed corrugation - REPAIR |
| Side Panels | Outward deformation, such as bend, bow, dent, etc. | If more than 30mm (1-3/16”) measured on an interior recessed corrugation - REPAIR |
| Front Panels | Outward deformation, such as bend, bow, dent, etc. | If more than 15mm (1-3/16”) measured on an inside recessed corrugation - REPAIR |
| Lashing fittings | Broken parts and/or welds; missing or loose parts or fasteners | REPAIR |
| Ventilator covers | Broken, missing, etc. | If cracked or broken in the enclosed baffled area of ventilator REPAIR |
| Door assembly, including hardware | Holed, cut, torn or cracked; broken component and/or weld<br><br>Missing or loose parts or fasteners<br><br>Any deformation, such as bend, bow, dent, etc.<br><br>Seized, frozen or stiff<br><br>Not light-tight | REPAIR<br><br>REPAIR<br><br>If door operation or securement is impaired, REPAIR<br><br>If door operation or securement is impaired, REPAIR<br><br>REPAIR |
| Door panels | Any deformation such as bend, bow, dent, etc. | If internal cube intrusion is greater than 35 mm (1-3/8 in), - REPAIR |

| | | |
|---|---|---|
| Door gaskets | Loose or missing<br>Cut, torn, cracked, or burned | If not light-tight or if the outer lips of the top horizontal gaskets are not fully in place and seated against the header - REPAIR |
| Roof panels, header extension plates and corner protection plates | Holed, cut, torn, or cracked; broken component and/or weld | REPAIR |
| Corner protection plates and header extension plates | Any deformation, such as bend, bow, dent, etc. | If more than 40 mm (1-9/16”) below the top surfaces of top side rails - REPAIR |
| All roof panels | Downward deformation such as bend, dent etc.<br><br>Upward deformation such as bend, dent etc. | If more than 40 mm (1-9/16”) below top surfaces of top side rails - REPAIR<br><br>If more than 40 mm (1-9/16”) above top surfaces of top side rails - REPAIR |
| Floor and centre rail | Holed | REPAIR<br>If light leaks, regardless of diameter of hole |
| Wooden flooring | Delamination or splinters<br><br>Downward deformation such as a bend or bow<br><br>Gouges (regardless of length) | REPAIR<br><br>If more than 15 mm (9/16 in) measured transversely at the floor screw centre line – REPAIR<br><br>REPAIR If more than 15 mm (9/16 in) deep OR if more than 5 mm (3/16 in) deep and width of more than 150 mm (6 in) of the gouge, REPAIR |
| Plank flooring | Cracked or Split | If light leaks, - REPAIR |
| Threshold Plate | Bent Upwards | If more than 5 mm (3/16 in), - REPAIR |
| Wooden flooring | Delamination or splinters<br><br>Downward deformation such as a bend or bow<br><br>Gouges (regardless of length) | REPAIR<br><br>If more than 15 mm (9/16 in) measured transversely at the floor screw centre line – REPAIR<br><br>REPAIR If more than 15 mm (9/16 in) deep OR if more than 5 mm (3/16 in) deep and width of more than 150 mm (6 in) of the gouge, REPAIR |
| Crossmembers,<br>Forklift pocket components (including straps), Outriggers<br>Gooseneck tunnel components | Holed, cut, torn, or cracked; broken component and/or weld<br><br>Missing or loose parts or fasteners<br><br>Downward deformation, such as bend, bow, dent, etc.<br><br>Any deformation such as bend, bow, dent, etc. ON A WEB<br><br>Any deformation such as bend, bow, dent, etc. ON A BOTTOM FLANGE<br><br>Any deformation such as bend, bow, dent, etc. ON A TOP FLANGE<br><br>TOP FLANGE separated from bottom of wood or steel flooring | REPAIR<br><br>REPAIR<br><br>If more than 15 mm (9/16 in) from its original position or below the plane of the lower surfaces of the bottom corner fittings - REPAIR<br><br>If more than 50 mm (2 in) in any direction, REPAIR<br><br>If torn, cracked, or cut - REPAIR<br><br>If intrusion into container is more than 50 mm REPAIR<br><br>If separation at point of attachment to floor, measured at the formed edge of the top flange, is more than 10mm (3/8 in), REPAIR |

| | | |
|---|---|---|
| Gooseneck tunnel assembly and forklift pocket top plate | Any deformation such as bend, bow, dent, etc. | If more than 50 mm (2 in) REPAIR |
| Markings required by regulations / standards | Missing, loose or defaced | REPAIR |
| Markings required by owner | Missing, loose or defaced | Consult with owner |
| Marking plates | loose, broken, missing plate or fasteners; illegible data | REPAIR |
| CSC Safety approval plate | Periodic examination mark | Examination according to owners approved procedure |
| Corner fittings and their weld attachments | Cracked, loose, broken; apertures outside ISO | REPAIR |
| Entire Container | Any deformation such as bend, bow, dent, etc. that affects ISO required diagonal dimensions between comer fitting apertures | If deformation exceeds ISO tolerances, REPAIR |
| End frame components (corner posts, doors, headers, sills, corner fittings) | Any deformation such as bend, bow, dent, etc. that affects other ISO required dimensions | If deformation exceeds ISO tolerances plus 5 mm (3/16”) on end faces or plus 10 mm (3/8”) on side faces, REPAIR |
| Corrosion | Structurally unsafe<br><br>Holed | REPAIR Note: only use an approved inspection hammer to investigate corrosion.<br>Repair |
| Improper repairs | Structurally safe<br><br>Structurally unsafe | No Action<br><br>REPAIR |
| Cleaning | Dangerous goods residue<br><br>Pest infestation<br><br>Contamination or odour that can be transferred.<br><br>Foreign material, lashings or dunnage impeding loading of cargo | REMOVE in compliance with health & safety procedures.<br><br>REMOVE in compliance with health & safety procedures.<br><br>REMOVE<br><br>REMOVE |
| Surfaces | Glue or tape (Sticky)<br><br>Offensive graffiti or misleading foreign marks<br><br>Hazard placards / labels | REMOVE<br><br>REMOVE<br><br>REMOVE |
| Ventilators | Blocked, loose, damaged and not weathertight, missing | REPAIR |
| Front and door headers Door assembly | | OUTWARDS: Maximum 5 mm (3/16”) beyond plane of end surfaces of corner fittings<br>UPWARDS (headers): Maximum 4 mm (5/32”) above plane of upper surfaces of top corner fittings |
| Front and door sills | | OUTWARDS: Maximum 5 mm (3/16”) beyond plane of end surfaces of corner fittings DOWNWARDS: Not below the plane of the lower surfaces of the bottom corner fittings |
| Fork-lift pocket strap | | DOWNWARDS: Minimum 10 mm (3/8”) above plane of the lower surfaces of the bottom corner fittings<br>UPWARDS: See “Fork-lift pocket opening HEIGHT” below |

| | | |
|---|---|---|
| Fork-lift pocket opening | | WIDTH: “LOADED” pockets: Minimum 345 mm (13 5/8”)<br>EMPTY pockets: Minimum 295 mm (11 5/8 in)<br>HEIGHT: “LOADED” pockets: Minimum 105 mm (4 1/8”)<br>EMPTY pockets: Minimum 92 mm (3 5/8 in) |
| Gooseneck tunnel | | LENGTH: Minimum 3140 mm (123-7/8”); Maximum 3510 mm (138-1/4”)<br>WIDTH of tunnel opening X: Minimum 1019 mm (40-1/8”); Maximum 1042 mm (41”)<br>HEIGHT of tunnel opening B: Minimum 107 mm (4-1/4”); Maximum 130 mm (5-1/8”) |
| Door opening | | WIDTH: Minimum 2281 mm (89-13/16’)<br>HEIGHT: 8’ high container: Minimum 2129 mm (83-13/16”)<br>8’6” high container: Minimum 2256 mm (88-13/16”)<br>9’6” high container: Minimum 2560 mm (98-13/16”) |

**Table 2 - CSC Structurally Sensitive Components and Definition of Serious Structural Deficiencies for Consideration**
Information as used in table 3 below is used in courtesy of CSC.1/Circ.138/Rev.1

| i | ii | iii | iv | v | vi | vii |
|---|---|---|---|---|---|---|
| **Structurally sensitive components** | **Serious deficiency requiring immediate out of service determination** *(see also section 10.5)* | **Deficiency requiring advice to owner and restrictions for transport** | **Restrictions to be applied in case of deficiencies according to column (iii)** | | | |
| | | | **Empty container** | | **Loaded container** | |
| | | | **See transport** | **Other modes** | **See transport** | **Other modes** |
| **Top rail** | Local deformation to the rail more than 60 mm or cracks or tears more than 45 mm in length. (see Note 1) | Local deformation to the rail more than 40 mm or separation or cracks or tears more than 10 mm in length. (see Note 1) | No restriction | No restriction | Bottom Lifting not allowed. Top lifting allowed only by use of spreaders without chains. | Bottom Lifting not allowed. Top lifting allowed only by use of spreaders without chains. |
| | **Note 1:** On some design of tank containers the top is not a structurally significant component. | | | | | |
| **Bottom rail** | Local deformation perpendicular to the rail more than 100 mm or separation cracks or tears in the rail's material more than 75 mm in length (see note 2) | Local deformation perpendicular to the rail more than 60 mm or separation cracks or tears in the rail's material of the upper flange more than 25 mm in length: or of web in any length (see note 2) | No restriction | No restriction | Lifting at (any) corner fitting not allowed | Lifting at (any) corner fitting not allowed |
| | **Note 2:** The rails material does not include the rails' bottom flange. | | | | | |
| **Header** | Load deformation to the header more than 80 mm or cracks or tears more than 80 mm in length | Load deformation to the header more than 50 mm or cracks or tears more than 10 mm in length | Container shall not be over stowed | No restriction | Container shall not be over stowed | No restriction |

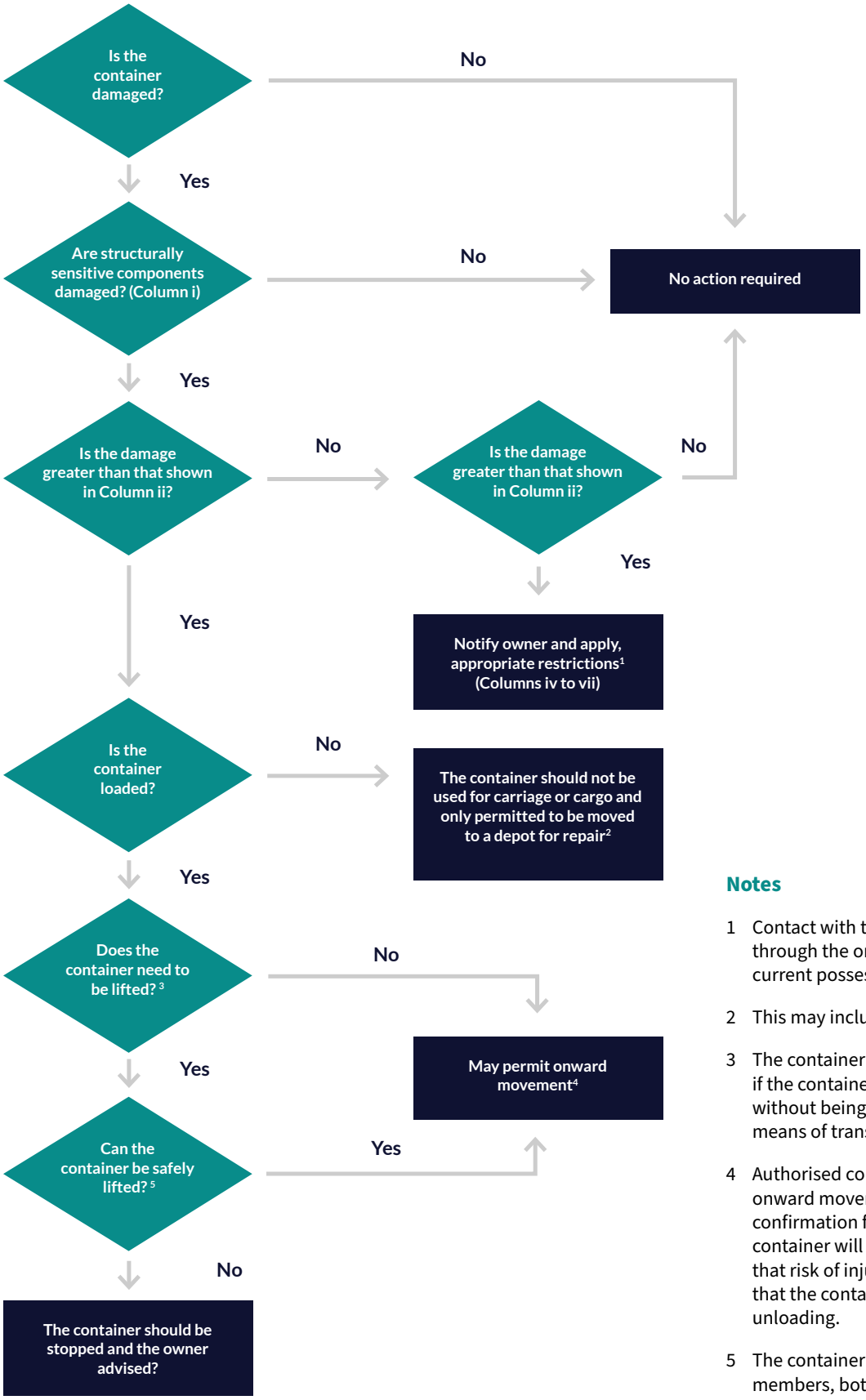
| i | ii | iii | iv | v | vi | vii |
|---|---|---|---|---|---|---|
| **Structurally sensitive components** | **Serious deficiency requiring immediate out of service determination** *(see also section 10.5)* | **Deficiency requiring advice to owner and restrictions for transport** | **Restrictions to be applied in case of deficiencies according to column (iii)** | | | |
| | | | **Empty container** | | **Loaded container** | |
| | | | **See transport** | **Other modes** | **See transport** | **Other modes** |
| **Sill** | Local deformation to the post more than 100 mm or cracks or tears in excess of 100 mm in length | Local deformation to the post more than 60 mm or cracks or tears in excess of 10 mm in length | Container shall not be over stowed | No restriction | Container shall not be over stowed | No restriction |
| **Corner posts** | Local deformation to the post more than 50 mm or cracks or tears in excess of 50 mm in length | Local deformation to the post more than 30 mm or cracks or tears of any length. Weld separation of adjoining components of 50 mm or less. | Container shall not be over stowed | No restriction | Container shall not be over stowed | No restriction |
| **Corner and intermediate fittings** Front and door headers Door assembly | Missing corner fittings, any through cracks or tears in the fitting, any deformation of the fitting that precludes full engagement of the securing or lifting fittings (see Note 3) or any weld separation or adjoining components in excess of 50 mm in length | | Container shall not be lifted on board a ship if the damaged fittings prevent safe lifting or securing | No restriction<br><br>Container shall be lifted and handled with special care | Container shall not be lifted on board a ship | Container shall be lifted and handled with special care |
| | | Any reduction in the thickness of the plate containing the top aperture that makes it less than 25 mm thick. | Container shall be lifted and handled with special care. Container shall not be over stowed when twist locks have to be used. | Container shall be lifted and handled with special care | Containers shall not be lifted by the top corner fittings | Container shall be lifted and handled with special care |
| | | Any reduction in the thickness of the plate containing the top aperture that makes it less than 26 mm thick. | Containers shall not be over stowed when fully automatic twist locks are to be used. | Container shall be lifted and handled with special care. | Containers shall not be used with fully automatic twist locks. | Container shall be lifted and handled with special care |

**Note 3:** The full engagement of securing or lifting is precluded if there is any deformation of the fitting beyond 5 mm from its original plane, any aperture width greater than 66 mm, any aperture length greater than 127 mm or any reduction in thickness of the plate containing the top aperture that makes it less than 23 mm thick

| i | ii | iii | iv | v | vi | vii |
|---|---|---|---|---|---|---|
| **Structurally sensitive components** | **Serious deficiency requiring immediate out of service determination** *(see also section 10.5)* | **Deficiency requiring advice to owner and restrictions for transport** | **Restrictions to be applied in case of deficiencies according to column (iii)** | | | |
| | | | **Empty container** | | **Loaded container** | |
| | | | **See transport** | **Other modes** | **See transport** | **Other modes** |
| **Understructure** | Two or more adjacent cross members missing or detached from the bottom rails. 20% or more of the total number of cross members missing or detached. (see note 4). | One or two cross members missing or detached (see Note 4) | No restriction | No restriction | No restriction | No restriction |
| | | More than two cross members missing or detached (see Notes 4 & 5) | No restriction | No restriction | Maximum payload shall be restricted to 0.5 x P | Maximum payload shall be restricted to 0.5 x P |
| | **Note 4:** If onward transport is permitted according to sections 10.5, it is essential that detached cross members are precluded from falling free.<br>**Note 5:** Careful cargo discharge is required as forklift capability of the understructure might be limited. | | | | | |

**Guidance on how to approach damaged containers below**

Information as used in below is used in courtesy of CSC.1/Circ.138/Rev.1 figure 5




## Notes

1 Contact with the owner may be made through the organisation that has current possession of the container

2 This may include an overseas depot.

3 The container does not need to be lifted if the container can reach its destination without being moved from its current means of transport.

4 Authorised control officers may permit onward movement following confirmation from the owner that the container will be handled in such a wau that risk of injury is minimised and that the container will be repaired after unloading.

5 The container that has damage to cross members, bottom rails or corner fittings should not be lifted.

## 11. Marking and stamping

### Fixed Tanks (Road Tankers)

The tank shell mounting supports and attachments shall be examined visually by the LRQA surveyor to determine the following:

- There are no signs of defects such as cracks, erosion and/or corrosion liable to weaken the integrity of support.
- Mounting springs are in good condition and secure.
- Mounting bolts and fixings are secure and show no sign of deformation.
- Chassis out rigger brackets are secure and show no signs of defects such as cracks, erosion and/or corrosion liable to weaken the integrity of support.

### Semi-Trailers

Additional to the above, for Semi-Trailers the fifth wheel shall also be inspected by the LRQA surveyor for the following:

- Visually inspect that the Trailer Upper coupler plate is free of strakes and gouges, which could damage the 5th Wheel.
- The Trailer Upper Coupler's Leading Edge Skid plate shall be free of any square or sharp edges.

The LRQA surveyor shall confirm that the kingpin is not damaged, bent or cracked. The LRQA surveyor shall check for wear, preferably with a kingpin gauge in line with manufacturer's recommendations. The kingpin shall be correctly lubricated, and the upper coupler plate is free of rust and debris. The LRQA surveyor shall ensure the kingpin is not obstructed and that there is sufficient clearance to the landing legs when the Semi-Trailer is connected, and that the release handle is fully retracted and that the lock notch is secured in the lock position.

The lock and jaw shall be checked to ensure they are completely engaged, and that the 5th wheel is properly locked and that there is no gap between the 5th wheel top plate and the trailers upper coupler plate. The trailer shall be securely mounted to the platform and that all bolts and pins securely in place. The trailer apron shall not be bent, cracked, or broken and should be lying flat and with sufficient lubrication.

The LRQA surveyor shall confirm that the release arm is correctly engaged and in position. The safety latch shall be correctly in place, the platform structure shall shows no cracks, and all bolts are tight and correctly torqued in line with the manufacturers recommendations.


## Get in touch

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