



BCGA CODE OF PRACTICE CP38

**Revalidation of Cryogenic
Tankers and Containers**

2010

British Compressed Gases Association

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PREFACE

The various publications issued by the British Compressed Gases Association have the objective of establishing consistency in design, construction practices and user operational and maintenance procedures, in order to establish high standards of reliability and safety in the interests of employers, employees and the general public.

The Association endeavours to compile these documents using the best sources of information known at the date of issue. The information is used in good faith and belief in its accuracy. The publications are intended for use by technically competent persons and their application does not, therefore, remove the need for technical and managerial judgement in practical situations and with due regard to local circumstances, nor do they confer any immunity or exemption from relevant legal requirements, including by-laws.

The onus of responsibility for their application lies with the user. The Association, its officers, its members and individual members of any Working Parties can accept no legal liability or responsibility whatsoever, howsoever arising, for the consequences of the use or misuse of the publications.

For the assistance of users, references are given, either in the text or Appendices, to publications such as British, European and International Standards and Codes of Practice, and current legislation that may be applicable. The intention of BCGA is that this document should be read and used in the context of these references where the subjects have a bearing on the local application of the processes or operations carried out by the user.

BCGA's publications are reviewed, and revised if necessary, at five-yearly intervals. Readers are advised to check the list of publications on the Association's website www.bcgga.co.uk to ensure that the copy in their possession is the current version.

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* Numerals in brackets in the text refer to Section 6: References.

TERMINOLOGY AND DEFINITIONS

- 1 Shall:** Indicates a mandatory requirement for compliance with this Code of Practice.
- 2 Should:** Indicates a preferred requirement but is not mandatory for compliance with this Code of Practice.
- 3 May:** Indicates an option available to the user of this Code of Practice.
- 4 Cryogenic Tanker and Container:** A cryogenic tanker (rigid or semi trailer) or container, complete with a piping system designed for the transportation of cryogenic liquids. These can be either vacuum or conventionally Insulated. In this document these are referred to as tankers.
- 5 Revalidation:** Indicates the endorsement of a tanker as fit for continued service based upon a review of documentation for design, operation and examinations.
- 6 Competent Person:** An individual or, more likely, a body corporate of several persons who collectively have the necessary theoretical knowledge, practical experience and training in design, operation and examination that is necessary to identify defects, to assess their importance and to ultimately endorse, or otherwise, a tanker as fit for continued service.
- 7 Cryogenic Liquid:** For the purposes of this document cryogenic liquid is liquid oxygen, nitrogen, argon, hydrogen and helium. Although carbon dioxide and nitrous oxide are not classed as cryogenic liquids they are included in the scope of this document.
- 8 Design Life** Calculated life expectancy of the tanker.
- 9 Old Tank** Means a cryogenic tanker or container constructed on or before 9th May 2004

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Revalidation of Cryogenic Tankers and Containers

1. INTRODUCTION

The UK Health and Safety Executive has published a document on the management of Ageing Equipment (6) , which supports the concept that it is the condition of the equipment rather than its age which must be taken into account during the revalidation process.

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (1) require tankers to be periodically examined in accordance with ADR or, in the case of an 'Old Tank' in accordance with schedule 2, a suitable written scheme of examination.

The purpose of this Code of Practice is to provide guidelines for the periodic revalidation of tankers which can be incorporated into either Written Schemes of Examination, or company maintenance and inspection programmes.

2. SCOPE

This Code of Practice covers the revalidation of the pressure containing element and supporting structure of tankers specifically designed for transporting cryogenic liquid gases.

The type of road tanker shall generally conform to one of the following design types as defined in ADR, although alternatives may be considered, subject to the approval of the Competent Person:

- (i) Fixed Tanks
- (ii) Demountable Tanks
- (iii) Tank containers

External piping, valves and fittings that do not directly affect the integrity of the inner containment are not included in the revalidation process. Such items are covered in appropriate ADR inspections.

The chassis and automotive inspection of this equipment is excluded from this scope as it is covered by ADR and appropriate national and international regulations.

3. REVALIDATION

3.1 General

The revalidation of a tanker as fit for continued service shall be based upon periodic reviews of documentation carried out by the Competent Person. The revalidation process shall comprise the following steps:

- (i) Design documentation review.
- (ii) Evaluation of fatigue design life
- (iii) Service history review.
- (iii) Examination record review.
- (iv) Repair and modification review
- (v) Review of experience of similar tankers.
- (v) Preparation of revalidation report.

Any deficiencies identified in the reviews of design, service history, examination and records shall be assessed by the Competent Person. The conclusion of the assessment shall be recorded in the revalidation report.

Where the tanker construction dossier or service/examination records are incomplete the Competent Person shall decide on the appropriate action required to revalidate the tanker. The construction drawings in conjunction with information from the tanker nameplate may be sufficient.

Note in exceptional cases an internal examination of the tanker, or of a similar tanker, may be required to establish base line data for this and future revalidations.

3.2 Frequency of Revalidation.

The frequency of the revalidation shall be aligned with the ADR periodic inspection i.e. firstly after six years and thereafter every 12 years or as otherwise specified by the competent person.

In the event of a significant change of service conditions the fatigue design life shall be re-evaluated by the competent person.

An assessment of fitness for continued service shall be undertaken by the Competent Person following an operating incident outside the design limits that could affect the tanker's operational safety.

3.3 Revalidation Processes

3.3.1 Design Documentation Review

A review based upon the available design information (preferably the tanker construction dossier but as a minimum the construction drawings plus nameplate data) shall:

- (i) Establish that the essential design information is complete to the satisfaction of the Competent Person.
- (ii) Establish that the design and construction was approved and witnessed by a Competent Person.
- (iv) Assess the impact of any changes in the design codes or standards that may affect the continued safe use of the tanker.
- (vi) Assess the consequences of operational excursions outside the design limits identified in the service history review.

3.3.2 Evaluation of fatigue design life

The Competent Person shall evaluate the fatigue design life based on the actual service conditions. This should include both cyclic pressure loading and externally applied structural loads for example those at inner vessel supports. Where the evaluation indicates the life is shorter than the next scheduled revalidation, the Competent person shall state on the report the date of the next revalidation.

3.3.3 Service History Review

Where available the following information shall be reviewed:

- (i) Previous and current operating conditions.
- (ii) Changes of service.
- (iv) Reports of operational problems e.g.
 - Reports of ice build up and analysis of cause.
 - Records of under or over pressure excursions and corrective actions.
- (vii) Periods and condition when out of service.
- (viii) Maintenance history

Note: When a major overhaul or pressure test has been undertaken the Competent Person may decide to incorporate this as part of the revalidation process.

3.3.4 Examination Records

Previous examination reports shall be reviewed.

The records reviewed shall cover:

- (i) Nameplate details or unique identification number.
- (iii) General external condition.
- (iv) Mechanical damage or corrosion to outer jacket supports and attachments.
- (v) Review details of any Road Traffic accidents, including assessment of excess G loadings
- (viii) Relief device reports.

Where appropriate records do not exist the competent person shall establish the extent of any examinations required.

3.3.5 Repair and modifications review

Check any defect and rectification reports, and ensure that any repairs or modifications have not affected the design life of the tanker.

3.3.6 Review of experience of similar tankers

Check that any recorded problems with tankers of similar design have been addressed

3.3.7 Preparation of Revalidation Report

The revalidation report shall confirm the period of revalidation together with any conditions or corrective actions the Competent Person considers appropriate. The revalidation report shall be signed and dated by the Competent Person. A suggested format is given in Appendix 1.

Note: Internal examination reports if available should be referenced on the revalidation report.

4.0 Tanker Inspection / Retirement

The inspection/retirement period shall be based upon a percentage of design life specified by the competent person. The retirement should not exceed the fatigue design life, unless a full fitness for use assessment is carried out, the scope of this is determined by the competent person.

When a tanker is retired from service the opportunity for a thorough internal examination should be taken in order to confirm the industry view that periodic internal examination is not necessary for vacuum insulated tankers.

5. References

- | | | |
|-----|---------------|---|
| (1) | SI 2009: 1348 | Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations |
| (2) | BS EN 13530 | Cryogenic Vessels – Large transportable vacuum insulated vessels. |
| (3) | BS EN 14398 | Cryogenic Vessels – Large transportable non-vacuum insulated vessels. |
| (4) | BCGA CP25 | Revalidation of Cryogenic Static Storage Tanks |
| (5) | BS EN 14398 | Cryogenic Vessels – Large transportable non-vacuum insulated vessels. |
| (6) | RR 509 | Plant Ageing Management of Equipment containing hazardous fluid or Pressure |

A TYPICAL REVALIDATION REPORT

Tanker Type No:

Tanker Serial No:

Date of Manufacture:

Manufacturer:

Design Code:

Design Pressure:

Capacity (Litres)

Type Examination Report No:

COMPETENT PERSON STATEMENTS

Design and Document Review:

Service History Review:

External Examination:

Revalidation Statement:

Evaluate of Fatigue Design Life:

Revalidation Period: years from (Date)

Next Revalidation: (Date)

Competent Person: (Signed)

Date of Issue:

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