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LPG equipment and accessories — Inspection and maintenance of LPG cylinder valves at time of periodic inspection of cylinders

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Flüssiggas-Geräte und Ausrüstungsteile - Inspektion und Wartung von Ventilen für Flaschen für Flüssiggas (LPG) zum Zeitpunkt der wiederkehrenden Inspektion der Flaschen

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword 3

Introduction 4

1 Scope 5

2 Normative references 5

3 Terms and definitions 5

4 General requirements 6
4.1 General 6
4.2 Cleaning 6
4.3 Personnel 6
4.4 Safety concerns 7

5 Inspections 7
5.1 General 7
5.2 External inspection 7
5.3 Additional inspection criteria 8
5.4 Pressure relief valves 8
5.4.1 General requirement 8
5.4.2 Individual test 8
5.4.3 Batch sampling test 9
5.5 Acceptance criteria 9

6 Maintenance 9
6.1 Minor repair 9
6.2 Refurbishment 9
6.2.1 General 9
6.2.2 Valve inspection during refurbishment 9
6.2.3 Valve repair during refurbishment 10

7 Testing 10
7.1 Refurbished valves 10
7.2 All other valves 10

8 Marking 10

Bibliography 12

Foreword

This document (EN 14912:2015) has been prepared by Technical Committee CEN/TC 286 “LPG Equipment and Accessories”, the secretariat of which is held by NSAI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2015, and conflicting national standards shall be withdrawn at the latest by September 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document supersedes EN 14912:2005.

The main changes between this version of this standard and the previous version are:

— alignment with the requirement of paragraph 12 of Packing Instruction P200 of ADR;

— introduction of inspection and refurbishment requirements for pressure relief valves.

It is recommended that users develop an environmental management policy. For guidance, see EN ISO 14000 series, see [1], [2] and [3]. Users of this standard should consult FprCEN/TS 16765 [4] while implementing its requirements.

This European Standard has been submitted for reference into the technical annexes of the ADR [5].

NOTE These regulations take precedence over any clause of this European Standard. It is emphasized that ADR is regularly revised at intervals of two years, which may lead to temporary non-compliances with the clauses of this European Standard.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard has been prepared to reflect the current methods for periodically inspecting LPG cylinder valves, and is based upon the operating experience of millions of cylinder years of service over a period of more than 50 years.

The primary objective of the periodic inspection of transportable refillable LPG cylinder valves is that, at the completion of the tests, the cylinder valve can be re-introduced into service for a further period of time.

The valve inspection is an integral part of the periodic inspection of an LPG cylinder.

Periodic inspections/tests shall be carried out by a competent person under the authorization of an inspection body based on a written scheme of examination.

This European Standard calls for the use of substances and procedures that can be injurious to health if adequate precautions are not taken. It refers to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

It has been assumed in the drafting of this European Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

Where judgements are called for, it has been assumed that they are made by competent persons who have been trained specifically for the tasks.

1 Scope

This European Standard specifies the requirements for inspection and maintenance of LPG cylinder valves, either manually operated or self-closing, for reuse. It applies when the valve is either inspected or refurbished at the time of periodic inspection of the cylinder.

This European Standard may also be applied at any other time, for example, when maintenance of the valve is necessary.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13953, *LPG equipment and accessories — Pressure relief valves for transportable refillable cylinders for Liquefied Petroleum Gas (LPG)*

EN ISO 14245, *Gas cylinders — Specifications and testing of LPG cylinder valves — Self-closing (ISO 14245)*

EN ISO 15995, *Gas cylinders — Specifications and testing of LPG cylinder valves — Manually operated (ISO 15995)*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
liquefied petroleum gas
LPG
low pressure liquefied gas composed of one or more light hydrocarbons which are assigned to UN 1011, UN 1075, UN 1965, UN 1969 or UN 1978 only and which consists mainly of propane, propene, butane, butane isomers, butene with traces of other hydrocarbon gases

3.2
periodic inspection
activities carried out at defined intervals, such as examining, measuring, testing or gauging the characteristics of a pressure vessel and comparing these with specified requirements

3.3
dismantling
separation into component parts

3.4
minor repair
operations that include cleaning and replacement of components accessible without any dismantling of the valve (e.g. outlet seal, excess flow device)

3.5
refurbishment
operation that includes complete dismantling of the valve, evaluation and replacement of internal components, and reassembly

3.6
competent person
person which by combination of appropriate qualification, training, experience and resources, is able to make objective judgments on the subject

3.7
external leak tightness
resistance to leakage through the fitting to or from the atmosphere when the valve/fitting is open

3.8
internal leak tightness
resistance to leakage across the valve or fitting seat or other internal sealing components when the valve is closed

3.9
written scheme
document, prepared by an inspection body, containing inspection information

3.10
self-closing valve
normally closed valve that provides a leak tight seal, opens by the engagement of a special connector or by fluid passing through it and closes automatically upon removal of the connector or by stopping the fluid flow

3.11
working pressure
pressure under normal operating conditions

4 General requirements

4.1 General

The valve shall be cleaned externally to facilitate inspection.

The inspection shall determine if:

— the valve is suitable for service;

— maintenance is required; or

— the valve shall be scrapped.

4.2 Cleaning

Contaminants, foreign matter and corrosion products shall be removed from the valve to facilitate inspection, taking care not to damage any sealing surfaces. If any cleaning materials are used, they shall be:

— completely removed after use; or

— suitable for and compatible with LPG and the materials of construction of the valve, the LPG cylinder and the associated downstream equipment.

4.3 Personnel

Valves shall be inspected and maintained by a competent person. Where valve removal is required, it shall only be removed from LPG cylinders by competent personnel, or under the responsibility of a competent person.

4.4 Safety concerns

Prior to manually removing a valve, it shall be verified that the cylinder does not contain liquid and is not under pressure. An additional check shall be made to ensure that the valve is not obstructed or blocked. Cylinders that contained liquid shall be emptied and depressurized in a safe and controlled manner. Cylinders with inoperative or blocked valves shall be set aside for safe valve removal.

To confirm if an LPG cylinder contains residual liquid LPG, when its valve is suspected to be inoperative or blocked, it can be weighed and this weight compared to the tare mass.

Valves shall only be removed from and refitted safely to a pressurized LPG cylinder provided the facility includes suitable equipment.

External inspection and minor repairs may be carried out on valves while they are connected to a pressurized LPG cylinder, e.g. at time of filing, but this may require special procedures and equipment.

Refurbishment shall only be performed on valves that have been removed.

5 Inspections

5.1 General

All valves shall be inspected in accordance with 5.2.

If the valves have been removed from the cylinders, additional inspections shall be performed in accordance with 5.3.

Valves fitted with dip-tubes, eduction tubes, sediment tubes, inlet filters, level indicating devices or overfill protection devices shall be removed from the cylinders.

Valves with excess flow devices fitted onto the stems of manually operated valves shall also be removed from the cylinders unless the correct operation of the flow devices is checked after each filling.

Valves fitted with pressure relief valves shall also be tested in accordance with 5.4.

5.2 External inspection

All valves shall be externally inspected for:

a) spindles that do not move smoothly, are difficult to turn or are seized;

b) bent, deformed, corroded, scored or cracked bodies;

c) bent or damaged spindles;

d) cross-threaded, damaged or stripped valve outlet connections;

e) damaged outlet sealing surfaces and/or any non-metallic sealing elements;

f) indications of having been subjected to excessive heat or having been in a fire;

g) foreign matter in visible internal passageways;

h) evidence of abuse or tampering;

i) evidence of damaged gauges or indicators;

j) damage to hand wheels;

k) damage to pressure relief valves; and

l) missing parts.

For acceptance criteria, see 5.5.

5.3 Additional inspection criteria

Valves removed from cylinders shall be inspected for:

a) contaminants, foreign matter and corrosion products;

b) cross-threaded, damaged or stripped valve stem threads;

c) damaged dip tubes, eduction tubes, sediment tubes and their retaining threads;

d) damaged inlet filters;

e) damaged liquid level and pressure indicating devices;

f) damaged overfill protection devices;

g) damaged excess flow devices; and

h) missing parts.

For acceptance criteria, see 5.5.

5.4 Pressure relief valves

5.4.1 General requirement

A pressure relief valve shall be tested according to 5.4.2.

If the periodic inspection interval of the cylinder is less than 15 years, then the pressure relief valve may be tested using the batch test described in 5.4.3. This batch testing is only allowed for valve batches that are less than 15 years old otherwise, the method described in 5.4.2 shall be used.

5.4.2 Individual test

The start to discharge pressure shall be determined from the following procedure:

— apply a pneumatic pressure to lift the pressure relief valve sealing element off the seat to ensure that it is not sticking;

— depressurize to allow the pressure relief valve to close;

— apply a pneumatic pressure to lift the pressure relief valve sealing element to determine the start to discharge pressure;

The start to discharge pressure shall be checked and shall be within ± 15 % of the nominal set pressure. The reseat pressure shall not be less than 70 % of the nominal set pressure, or the maximum working pressure of the cylinder, whichever is the greater. Valves failing the test shall be scrapped.

5.4.3 Batch sampling test

The sample size shall be assessed using ISO 2859-1 with a general inspection level II in combination with a single sampling plan for normal inspection. The acceptance quality limit (AQL) shall be 4 or less. The acceptance and rejection numbers are set in Table 2-A of ISO 2859-1.

NOTE For the purposes of this standard, a valve batch is defined as a monthly production of valves done by a single manufacturer with a same valve design.

The test procedure shall be the same as defined in 5.4.2.

If the rejection number is reached, then all the pressure relief valves of the batch shall be individually tested according to 5.4.2.

5.5 Acceptance criteria

Valves inspected in accordance with 5.2 and 5.3 and showing none of the defects shall be tested in accordance with 7.2.

Valves with any of the defects listed in 5.2 and 5.3 shall either be maintained in accordance with Clause 6 or be scrapped.

Valves passing the tests described in 5.4 shall then be tested in accordance with 7.2. Valves failing the tests described in 5.4 shall be scrapped.

6 Maintenance

6.1 Minor repair

Minor repair shall be considered as part of the inspection.

Damaged outlet non-metallic sealing elements and excess flow prevention devices shall be replaced.

Gland nuts shall be tightened, only where a manufacturer’s specification for this operation exists.

Missing parts shall be replaced.

After minor repairs, valves shall be tested in accordance with 7.2.

6.2 Refurbishment

6.2.1 General

Refurbishment shall only be performed in accordance with manufacturer’s instructions (e.g. tools, procedure, components, etc.). Valves without manufacturers' instructions shall not be refurbished.

NOTE Valves can only be refurbished if they are designed to be completely dismantled.

6.2.2 Valve inspection during refurbishment

The threads of the valve body shall be visually inspected to assess whether they have been subjected to excessive damage, deformation or wear.

A gauge shall be used to check threads for excessive wear.

Internal passageways shall be inspected to ensure that they are free of foreign matter.

All component parts of the valve shall be visually inspected to assess suitability for re-use, e.g. absence of excessive wear, damage or contamination.

6.2.3 Valve repair during refurbishment

Valves shall be dismantled in accordance with the manufacturer's instructions, using appropriate tools and in a clean work area.

Replacement parts used shall be in accordance with the manufacturer's specifications applicable to the specific type and batch of the valve.

Any non-metallic seal within the sealing mechanism shall be replaced by a new one in accordance with the manufacturer's specification.

All defects may be corrected, provided the dimensions and expected performance remain within the design specification. Otherwise, the valve shall be scrapped.

All non-metallic components and springs shall be replaced with new parts.

Parts that are unsuitable for further service shall be scrapped.

All re-used parts of the valve shall be cleaned in accordance with the manufacturer's specification.

Valves shall be reassembled using appropriate tools and using torques and assembly procedures in accordance with the manufacturer's specification.

After repair, the valve shall be tested in accordance with 7.1.

7 Testing

7.1 Refurbished valves

7.1.1 Valves shall be operated "open to closed" to ensure that the operating mechanism is smooth and satisfactory and in accordance with the manufacturer's specification, see EN ISO 14245 and EN ISO 15995.

7.1.2 Valves shall pass a production test in accordance with EN ISO 14245 and EN ISO 15995 as appropriate.

7.1.3 Pressure relief valves shall pass a production test in accordance with EN 13953.

7.2 All other valves

All other valves shall pass internal and external leak tightness tests.

NOTE Where the periodic inspection and first fill take place at the same location, the internal and external leak tightness tests can be carried out during the first filling after the valve has been refitted to the cylinder.

If the above requirements cannot be met, then the valve shall be either completely refurbished or scrapped.

8 Marking

All refurbished valves that have undergone refurbishment according to Clause 6 shall be durably marked with at least the last two digits of the year of refurbishment and an identification mark traceable to the facility which carried out the work.

In case of inspection, the owner of the cylinders shall be able to ensure that the valves that are to be re-used were inspected before re-fitting. This proof of the inspection can be provided by way of a quality system traceable to the facility which carried out the work or by means of a durable marking.

All markings shall not adversely affect the valve.

Bibliography

[1] EN ISO 14021, *Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling) (ISO 14021)*

[2] EN ISO 14024, *Environmental labels and declarations — Type I environmental labelling — Principles and procedures (ISO 14024)*

[3] EN ISO 14025, *Environmental labels and declarations — Type III environmental declarations — Principles and procedures (ISO 14025)*

[4] FprCEN/TS 16765, *LPG equipment and accessories — Environmental considerations for CEN/TC 286 standards*

[5] European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Geneva, 30 September 1957, as amended

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BSI Group Headquarters

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