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Light gauge metal containers — Non-refillable LPG cartridges — General requirements

Récipients métalliques légers — Cartouches de GPL non rechargeables — Exigences générales

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 52, *Light gauge metal containers*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Light gauge metal containers — Non-refillable LPG cartridges — General requirements

1 Scope

This document specifies minimum requirements for the construction, design, material, performance, test methods and marking at manufacture of non-refillable liquefied petroleum gas (LPG) cartridges.

This document is applicable to non-refillable LPG cartridges which:

a) predominantly comprise butane fuel gas (iso/normal);

b) have a total nominal capacity of up to 250 g net;

c) are intended to deliver gas in the vapour state when either positioned upright or in a horizontal orientation;

d) are used with certain types of gas appliances, e.g. portable gas cookers;

e) are classified as UN 2037, RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device, non-refillable for the transport of dangerous goods.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 1431-1:2012, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 11949, *Cold-reduced tinmill products — Electrolytic tinplate*

ISO 11951, *Cold-reduced tinmill products — Blackplate*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
non-refillable liquefied petroleum gas cartridge
non-refillable LPG cartridge
cartridge only filled up once with LPG

3.2
flange
guide for setting the *non-refillable liquefied petroleum gas cartridges* (3.1) in the gas appliances in the appropriate direction

3.3
boss
protruding part at the centre of the *non-refillable liquefied petroleum gas cartridges* (3.1) that houses the *stem* (3.5) or another valve part

3.4
cartridge cap
cap for protecting the gas outlet of the *non-refillable liquefied petroleum gas cartridges* (3.1) for the gas appliances

3.5
stem
part for vapour withdrawal which is fitted to a gas appliance

3.6
burst prevention device
part of the *non-refillable liquefied petroleum gas cartridges* (3.1) which releases pressure or closes the gas flow inside the cartridges when the pressure or the temperature reaches a pre-set value

3.7
countersink release vent type
CRV type
burst prevention device (3.6) that, when the internal pressure of the cartridge rises and the cartridge is deformed, the explosion-proof part ruptures installed on the upper body in a state where the body and the upper body are not separated from each other to discharge the LPG and prevent the explosion

3.8
rim vent release type
RVR type
burst prevention device (3.6) that, when the internal pressure of the cartridge rises and the cartridge is deformed, the explosion-proof part ruptures installed on the rim in a state where the body and the upper body are not separated from each other to discharge the LPG and prevent the explosion

3.9
resealing valve type
burst prevention device (3.6) that, when the internal pressure of the cartridge rises, the resealing valve is opened to discharge the LPG and prevent the explosion, and after decreasing the internal pressure of the cartridge, the resealing valve is closed and used again

3.10
temperature sensing valve type
burst prevention device (3.6) that, when the internal heat of cartridge rises, while the surface of the pin inside the cartridge melts, the temperature sensing valve inside the cartridge closes the gas flow

4 Gas filled in cartridge

4.1 Composition

The composition of LPG, when tested by the method described in 8.3.10, shall conform to the requirements given in Table 1.

Table 1 — Composition

Composition	Distribution ratio
C_4H_{10}(butane)	≥ 95 % mass fraction
Other hydrocarbons	≤ 5 % mass fraction

4.2 Nominal LPG capacity

The nominal LPG capacity, when tested by the method described in 8.3.11, shall be up to 250 g.

4.3 Odour

The odour of LPG shall be detectable when LPG mixing ratio to air is 1/1 000 in volume.

5 Construction and design

5.1 Construction

When the test described in 8.3 is carried out for testing the construction of each composition of the cartridges, each composition shall be proven to have been manufactured with safety and durability considerations and shall be free from any leakage of LPG, burst or deformation that can be detrimental to use when used under normal service and transportation conditions.

The pressing jointed part shall be effective in pressing, and the edges likely to be touched by hands during use shall be smooth.

Exposure to such vibrations and impacts as can occur during transportation or service shall not reduce the gas tightness and pressure resistance of the cartridges.

The cartridges shall be constructed in such a way that allows the LPG to be discharged in a gaseous state when it is under normal service conditions.

NOTE Normal service conditions refers to conditions where the cartridge is installed in a gas appliance.

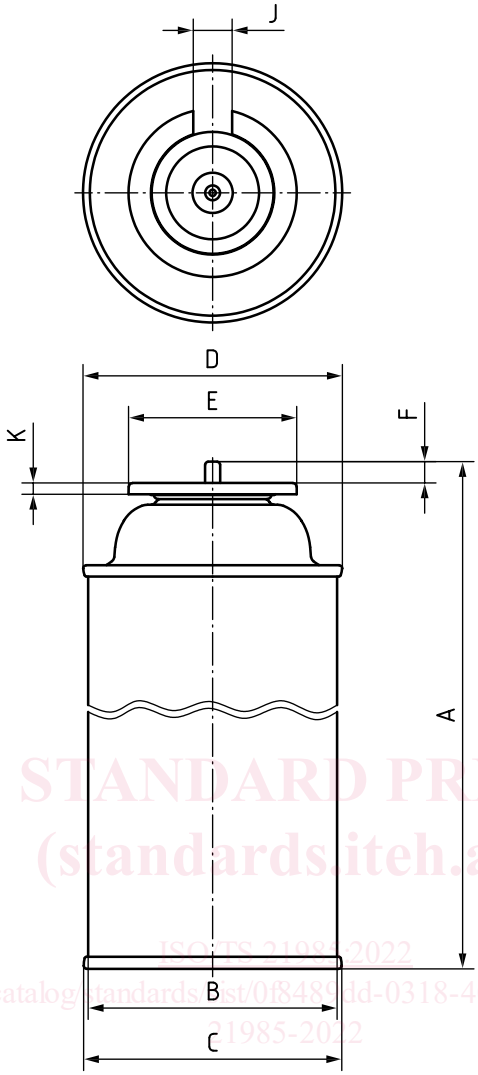
The cartridges shall be provided with a means to prevent LPG from being discharged when it is taken off from the gas appliances.

The cartridges shall be provided with a means to protect the protruding cartridge valve.

5.2 Design

5.2.1 Dimensions of cartridge and cartridge valve

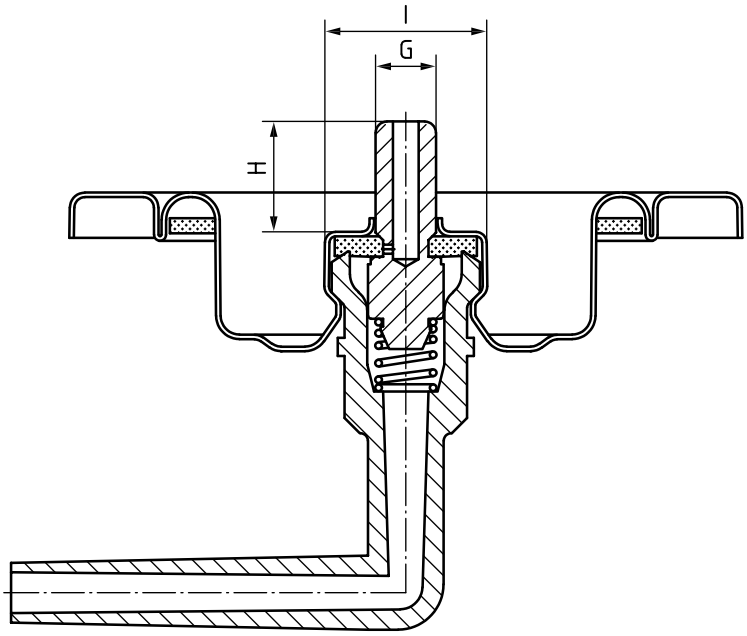
The dimensions of cartridge and cartridge valve, when tested by the method described in 8.3, shall conform to the requirements given in Table 2 corresponding to respective parts indicated in Figures 1 and 2.



Key

A	total height	E	flange diameter
B	outer diameter of can-shell	F	stem height
C	lower can diameter	J	flange cut-away width
D	upper can diameter	K	flange thickness

Figure 1 — Cartridge



Key

G stem diameter
H stem length
I boss diameter

Figure 2 — Cartridge valve

Table 2 — Dimensions of cartridge and cartridge valve

Key item	Name	Dimensions
A	Total height	(185,0 + 1,5) mm[b]
B	Outer diameter of can-shell	(65,7 ± 0,5) mm
C	Lower can diameter	(68,2 ± 0,4) mm
D	Upper can diameter	(68,5 ± 0,4) mm
E	Flange diameter	(44,5 ± 0,6) mm
F	Stem height	(5,6 ± 0,5) mm
G	Stem diameter	(4,0 + 0,05) mm
H	Stem length	(7,3 ± 0,5) mm
I	Boss diameter [a]	(10,65 ± 0,1) mm[b]
J	Flange cut-away width	(10,3 ± 0,3) mm
K	Flange thickness	(3,15 ± 0,25) mm

[a] Boss diameter shall be an outside diameter measured at a position 1,5 mm below the upper end of the boss.

[b] In China and Japan, the dimensions of cartridge and cartridge valve for total height and boss diameter shall conform to the requirements specified in A.2.

5.2.2 Compressive (stroke) dimension and initial injection stroke of cartridge valve

The compressive (stroke) dimension and the initial injection stroke of cartridge valve, when tested by the methods described in 8.3.12, shall conform to the requirements given in Table 3.

Table 3 — Stroke dimensions of cartridge valve

Item	Dimension mm
Cartridge valve compressive (stroke) dimension	1,7 to 2,8
Initial injection stroke dimension	0,2 to 0,9

6 Material

6.1 Material of cartridge body

The material used for cartridge body shall be as follows:

a) The material shall be that specified in ISO 11949 or ISO 11951.

b) If the material used is a steel or lightweight metal other than specified in ISO 11949 or ISO 11951, it shall be subjected to the corrosion resistance test specified in ISO 9227.

6.2 Material of cartridge stem

The material used for the cartridge stem shall be as follows:

a) The material shall have a melting point above 500 °C.

b) It shall be made of corrosion-resistant metal or the surfaces shall be treated for corrosion resistance.

In the Republic of Korea, the melting point of the material used for the cartridge stem shall conform to the requirements specified in A.3.1.

In Japan, the material of the cartridge stem shall conform to the requirements specified in A.3.2.

7 Performance

The performance of non-refillable LPG cartridges, when tested by the methods described in 8.3, shall conform to the requirements given Table 4.

Table 4 — Performance

Item		Performance	Applicable test subclause
Gas resistance	Packings for cartridge valve	The mass change rate shall not exceed 20 %. There shall be no deformation or change that can be detrimental to use.	8.3.4
Ozone resistance		There shall be no cracks.	8.3.5
Gas tightness		There shall be no LPG leakage.	8.3.6
Pressure resistance	Deformation	There shall be no leakage and deformation.	8.3.7
	Burst	The cartridge shall not burst.	
Stem functioning load		12 N to 19 N	8.3.8
Repeated use		The requirements for gas tightness shall be met.	8.3.9
Accuracy of filled LPG mass to the nominal mass		It shall have a tolerance between +1 % and −2 %.	8.3.11
Initial partial air pressure		It shall not exceed 50 kPa at a temperature of 25 °C.	8.3.13

Table 4 *(continued)*

Item	Performance	Applicable test subclause
Valve flow rate	The flow rate shall be 8 l/min or more at the valve-inlet pressure of 0,2 MPa.	8.3.14
Flange strength	The maximum load before deformation of the edge of the flange notch shall be 100 N or greater.	8.3.15

8 Test methods

8.1 Test condition

Unless otherwise stated, the test conditions shall be as follows:

a) ambient temperature: (20 ± 15) °C;

b) humidity: (65 ± 20) %;

c) temperature variation during test: ±5 °C.

8.2 Test instruments and apparatus

Test instruments and apparatus shall be as given in Figures 3, 4 and 5.

8.3 Tests for construction, design, material and performance

8.3.1 General

Unless otherwise specified in the test subclause, the evaluation of test results shall be performed by visual observation. For the dimensional evaluation in 5.2, the dimension of each part shall be measured using a suitable measuring instrument.

8.3.2 Vibration test

With the specimen, which has been packed for transportation, fixed horizontally on a vibration tester, apply first vertical vibrations and then lateral vibrations of 5 mm full amplitude at a rate of 600 cycles per minute (cpm) for 30 min. Test for gas tightness according to the method described in 8.3.6 and for pressure resistance according to the method described in 8.3.7.

8.3.3 Drop test

The drop test shall be as follows:

a) Drop a cartridge, which has been packed for transportation, from a 1 m height with its top surface facing up onto a concrete floor. Test for gas tightness according to the method described in 8.3.6 and for pressure resistance according to the method described in 8.3.7. Also, examine for deformations detrimental to use.

b) Drop a cartridge body with its cartridge cap on from a 30 cm height onto a wooden floor, directing the cartridge valve, three times each way: upward, downward and then in the horizontal position, for a total of nine times. After each drop, test for gas tightness according to the method described in 8.3.6 and for pressure resistance according to the method described in 8.3.7. Also, examine for deformations detrimental to use.

c) Drop a cartridge with its cartridge cap removed from a 30 cm height onto a wooden floor directing its valve upward. Test for gas tightness according to the method described in 8.3.6 and for pressure