



NSAI
Standards

Irish Standard
I.S. EN 14140:2014&AC:2015

LPG equipment and accessories -
Transportable refillable welded steel
cylinders for LPG - Alternative design and
construction

I.S. EN 14140:2014&AC:2015

Incorporating amendments/corrigenda/National Annexes issued since publication:

EN 14140:2014/AC:2015

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

EN 14140:2014

Published:

2014-12-03

This document was published under the authority of the NSAI and comes into effect on:

2015-05-30

ICS number:

23.020.30

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD

EN 14140:2014/AC

NORME EUROPÉENNE

May 2015

EUROPÄISCHE NORM

Mai 2015

Mai 2015

ICS 23.020.30

English version
Version Française
Deutsche Fassung

LPG equipment and accessories - Transportable refillable welded steel
cylinders for LPG - Alternative design and construction

Équipements pour GPL et leurs
accessoires - Bouteilles en acier soudé
transportables et rechargeables pour gaz
de pétrole liquéfié (GPL) - Autres solutions
en matière de conception et construction

Flüssiggas-Geräte und Ausrüstungsteile -
Ortsbewegliche, wiederbefüllbare,
geschweißte Flaschen aus Stahl für
Flüssiggas (LPG) - Alternative Gestaltung
und Konstruktion

This corrigendum becomes effective on 13 May 2015 for incorporation in the three official language versions of the EN.

Ce corrigendum prendra effet le 13 mai 2015 pour incorporation dans les trois versions linguistiques officielles de la EN.

Die Berichtigung tritt am 13. Mai 2015 zur Einarbeitung in die drei offiziellen Sprachfassungen der EN in Kraft.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

EN 14140:2014/AC:2015 (E)

1 Modification to 5.3.1

Replace

"The shape of ends shall be such that the following conditions are fulfilled:

- for torispherical ends $R < D ; r > 0,1 D ; h > 4b$ (see Figure 1),
- for semi-ellipsoidal ends $H > 0,192 D ; h > 4b$ (see Figure 1)."

with the following:

"The shape of ends shall be such that the following conditions are fulfilled:

- for torispherical ends $R \leq D ; r \geq 0,1 D ; h \geq 4b$ (see Figure 1),
- for semi-ellipsoidal ends $H \geq 0,192 D ; h \geq 4b$ (see Figure 1)."

EUROPEAN STANDARD

EN 14140

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2014

ICS 23.020.30

Supersedes EN 14140:2003+A1:2006

English Version

**LPG equipment and accessories - Transportable refillable
welded steel cylinders for LPG - Alternative design and
construction**

Équipements pour GPL et leurs accessoires - Bouteilles en
acier soudé transportables et rechargeables pour gaz de
pétrole liquéfié (GPL) - Autres solutions en matière de
conception et construction

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche,
wiederbefüllbare, geschweißte Flaschen aus Stahl für
Flüssiggas (LPG) - Alternative Gestaltung und Konstruktion

This European Standard was approved by CEN on 9 August 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Contents	Page
Foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms, definitions and symbols.....	7
3.1 Terms and definitions	7
3.2 Symbols	9
4 Materials	9
5 Design	10
5.1 General requirements.....	10
5.2 Calculation of cylindrical shell wall thickness	11
5.3 Design of torispherical and semi-ellipsoidal ends concave to pressure.....	11
5.4 Ends of other shapes	15
5.5 Minimum wall thickness.....	15
5.6 Design of openings.....	15
5.7 Valve protection	16
5.8 Non-pressure containing attachments welded to the cylinder.....	16
5.9 Resistance against external corrosion.....	16
5.10 Over-moulded cylinders.....	16
5.11 Hot air balloon cylinders	17
6 Construction and workmanship.....	17
6.1 General.....	17
6.2 Environment.....	17
6.3 Welding qualification.....	17
6.4 Plates and pressed parts	18
6.5 Welded joints.....	18
6.6 Tolerances	19
6.6.1 Out-of-roundness.....	19
6.6.2 Straightness	19
6.6.3 Verticality	19
6.7 Closure of openings	20
6.8 Heat treatment.....	20
7 Tests and examinations	20
7.1 General.....	20
7.2 Types of test and evaluation of test results.....	21
7.3 Test specimens and related tests and examinations.....	22
7.3.1 All cylinders.....	22
7.3.2 Two-piece cylinders	22
7.3.3 Three-piece cylinders	23
7.3.4 Bung welds.....	24
7.3.5 Tensile test	24
7.3.6 Bend test.....	25
7.3.7 Resistance to external corrosion	28
7.4 NDT.....	31
7.4.1 Radiographic examination	31
7.4.2 Macro examination	33

7.4.3	Visual examination of the surface of the weld	33
7.5	Prototype and production batch testing	33
7.5.1	Burst test under pressure.....	33
7.5.2	Fatigue test	34
7.5.3	Cylinder body integrity impact tests (not required for hot air balloon cylinders).....	35
7.5.4	Drop tests (all cylinders except hot air balloon cylinders)	39
7.5.5	Drop tests (hot air balloon cylinders only)	40
8	Technical requirements for type approval.....	41
8.1	General	41
8.2	Extent of testing	41
8.3	Design type variations	42
8.3.1	General	42
8.3.2	Two piece cylinders	42
8.3.3	Three piece cylinders.....	42
9	Initial inspection and tests	43
9.1	Tests and examinations applicable to all cylinders.....	43
9.2	Radiographic examination.....	43
9.3	Macro examination	44
9.4	Examination of bung welding	44
9.5	Examination of welding of non-pressure containing attachments	44
9.5.1	Macro examinations	44
9.5.2	Weld penetration requirement	44
9.6	Unacceptable imperfections in radiographic or macro examination.....	44
9.7	Production pressure test.....	44
9.7.1	Procedure.....	44
9.7.2	Requirements.....	45
9.8	Production batch testing (Mechanical / Burst tests)	45
9.8.1	Production batch	45
9.8.2	Inspection lots	45
9.8.3	Rate of sampling.....	45
9.8.4	Verification of conformance with type approval	47
9.9	Failure to meet mechanical and burst test requirements	48
9.9.1	General	48
9.9.2	Mechanical	48
9.9.3	Burst	48
9.9.4	Production batch retest	48
9.9.5	Resubmission of production batch	48
9.9.6	Additional checks.....	49
9.10	Production adhesion test for over-moulded cylinders.....	49
9.11	Production water absorption test for over-moulded cylinders	49
10	Marking.....	50
11	Documentation	51
12	Certification.....	51
Annex A (normative)	Additional manufacturers markings	52
Annex B (informative)	Over-moulded cylinder.....	53
Annex C (informative)	Hot Air Balloon Cylinders	55
C.1	Description.....	55
Annex D (informative)	Environmental checklist.....	57
Bibliography.....		59

EN 14140:2014 (E)

Foreword

This document (EN 14140:2014) has been prepared by Technical Committee CEN/TC 286 "Liquefied petroleum gas 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 June 2015 and conflicting national standards shall be withdrawn at the latest by June 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 supersedes EN 14140:2003+A1:2006.

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

This European Standard has been submitted for reference into:

- the RID [11]; and
- the technical annexes of the ADR [12].

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

The major changes to this revision include:

- restructure of standard;
- the addition of requirements for hot air balloon cylinders;
- an update on the terminology;
- the addition of requirements for over-moulded cylinders;
- the addition of the environmental checklist, Annex D.

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 calls for the use of substances and procedures that may be injurious to health and/or the environment if adequate precautions are not taken. It refers only to technical suitability: it does not absolve the user from their legal obligations 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.

This European Standard permits the use of new and higher strength steels and has the potential for cylinders to have a wall thickness thinner than the minimum wall thickness related to diameter, when compared with cylinders in accordance with EN 1442. These changes in technology are justified by requiring a series of performance tests, including impact testing, to demonstrate the adequacy of the calculated pressure thickness for service and transport considerations

Reference should also be made to EN 1439 and EN 1440, which requires the cylinder manufacturer to perform additional tests to determine the rejection limits for in-service damage and to include these limits in the documentation for the cylinder.

Protection of the environment is a key political issue in Europe and elsewhere around the world. Protection of the environment in this document is understood in a very broad sense. The phrase is used, for example, in relation to the total life-cycle aspects of a product on the environment, including expenditure of energy, and during all phases of its existence, from mining of raw materials, to fabrication, packaging, distribution, use, scrapping, recycling of materials, etc. Annex D comprises an environmental checklist which highlights the clauses of this European Standard that address environmental aspects.

It is recommended that manufacturers develop an environmental management policy. For guidance see EN ISO 14000 series, [6], [7] and [8].

Provisions need to be restricted to a general guidance. Limit values are specified in national laws.

All pressures are gauged unless otherwise stated.

NOTE This European Standard requires measurement of material properties, dimensions and pressures. All such measurements are subject to a degree of uncertainty due to tolerances in measuring equipment etc. It may be beneficial to refer to the leaflet "measurement uncertainty leaflet" SP INFO 2000 27 [14].

EN 14140:2014 (E)

1 Scope

This European Standard specifies the minimum requirements for the design, construction and testing during manufacture of transportable refillable welded steel Liquefied Petroleum Gas (LPG) cylinders, of water capacity from 0,5 l up to and including 150 l, exposed to temperatures of -20 °C to +65 °C. It allows alternative design and construction methods to those required in EN 1442, including coated cylinders, over-moulded cylinders and cylinders for hot air balloons.

This European Standard applies only to pressure receptacles with a circular cross-section.

This European Standard does not include the equipping of the cylinders with valves and other service equipment.

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 1439, *LPG equipment and accessories - Procedure for checking LPG cylinders before, during and after filling*

EN 10028-7, *Flat products made of steels for pressure purposes - Part 7: Stainless steels*

EN 10120, *Steel sheet and strip for welded gas cylinders*

EN 10204:2004, *Metallic products - Types of inspection documents*

EN 10272, *Stainless steel bars for pressure purposes*

EN 14717, *Welding and allied processes - Environmental check list*

EN 14894, *LPG equipment and accessories - Cylinder and drum marking*

EN ISO 643, *Steels - Micrographic determination of the apparent grain size (ISO 643)*

EN ISO 2409:2013, *Paints and varnishes - Cross-cut test (ISO 2409:2013)*

EN ISO 2812-2, *Paints and varnishes - Determination of resistance to liquids - Part 2: Water immersion method (ISO 2812-2)*

EN ISO 3231:1997, *Paints and varnishes - Determination of resistance to humid atmospheres containing sulfur dioxide (ISO 3231:1993)*

EN ISO 4136, *Destructive tests on welds in metallic materials - Transverse tensile test (ISO 4136)*

EN ISO 4624, *Paints and varnishes - Pull-off test for adhesion (ISO 4624)*

EN ISO 5173, *Destructive tests on welds in metallic materials - Bend tests (ISO 5173)*

EN ISO 6520-1, *Welding and allied processes - Classification of geometric imperfections in metallic materials - Part 1: Fusion welding (ISO 6520-1)*

EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*

EN ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227)*

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-