

BS ISO 9162:2013



BSI Standards Publication

Petroleum products — Fuels (class F) — Liquefied petroleum gases — Specifications

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of ISO 9162:2013.

The UK participation in its preparation was entrusted to Technical Committee PTI/15, Natural Gas and Gas Analysis.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2013. Published by BSI Standards Limited 2013

ISBN 978 0 580 78540 5

ICS 75.160.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2013.

Amendments issued since publication

Date	Text affected
------	---------------

INTERNATIONAL
STANDARD

BS ISO 9162:2013

ISO
9162

Second edition
2013-07-15

**Petroleum products — Fuels (class
F) — Liquefied petroleum gases —
Specifications**

*Produits pétroliers — Combustibles (classe F) — Gaz de pétrole
liquéfiés — Spécifications*



Reference number
ISO 9162:2013(E)

© ISO 2013



COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Requirements	2
3.1 General	2
3.2 Water content	2
4 Precision and interpretation of test results	3
5 Documentation	3
6 Sampling	3
Annex A (informative) Evaporation residue of liquefied petroleum gases	4

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. www.iso.org/directives.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 4, *Classifications and specifications*, WG 5, *Gas turbine fuels*.

This second edition cancels and replaces the first edition (ISO 9162:1989), of which it constitutes a minor revision with the following changes:

- ISO 4260 (Wickbold sulphur determination method) has been replaced by ASTM D6667 (method for determination of total volatile sulphur);
- new methods for evaporation residue in liquefied petroleum gas (LPG) have been added: EN 15470, EN 15471, and EN 16423.

Petroleum products — Fuels (class F) — Liquefied petroleum gases — Specifications

HEALTH AND SAFETY — WARNING — The use of this International Standard involves potentially hazardous materials, operations, and equipment. This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user to consult the relevant safety and health regulations, determine the applicability of regulatory limitations, and establish appropriate safety and health practices prior to use.

1 Scope

This International Standard specifies required characteristics and additional information to be supplied to the purchaser by the vendor of those products commonly referred to as liquefied petroleum gases (see ISO 8216-3) and is intended to apply to international transfers of commercial propane and commercial butane. This International Standard is neither intended nor expected to replace or encroach upon national standards of any country, since each country is subject to different regulations, codes, industry practices and market utilization.

NOTE National standards and safety codes might be applicable when formulating any characteristics required for specific uses.

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.

ISO 3993, *Liquefied petroleum gas and light hydrocarbons — Determination of density or relative density — Pressure hydrometer method*

ISO 4256, *Liquefied petroleum gases — Determination of gauge vapour pressure — LPG method*

ISO 4257, *Liquefied petroleum gases — Method of sampling*

ISO 4259, *Petroleum products — Determination and application of precision data in relation to methods of test*

ISO 6251, *Liquefied petroleum gases — Corrosiveness to copper — Copper strip test*

ISO 7941, *Commercial propane and butane — Analysis by gas chromatography*

ISO 8216-3, *Petroleum products — Fuels (class F) — Classification — Part 3: Family L (Liquefied petroleum gases)*

ISO 8819, *Liquefied petroleum gases — Detection of hydrogen sulfide — Lead acetate method*

ISO 8973, *Liquefied petroleum gases — Calculation method for density and vapour pressure*

EN 15470, *Liquefied petroleum gases — Determination of dissolved residues — High temperature gas chromatographic method*

EN 15471, *Liquefied petroleum gases — Determination of dissolved residues — High temperature gravimetric method*

EN 16423, *Liquefied petroleum gases — Determination of dissolved residue — Gas chromatographic method using liquid, on-column injection*

ASTM D6667-04, *Standard test method for determination of total volatile sulphur in gaseous hydrocarbons and liquefied petroleum gases by ultraviolet fluorescence*

3 Requirements

3.1 General

When determined in accordance with the methods given in [Table 1](#), the properties of commercial butane and commercial propane shall be in accordance with the limiting requirements given in that table.

NOTE Individual contractual agreements, national standards, national safety codes, and/or requirements of distribution systems may prescribe other limits.

Table 1 — Specifications for liquefied petroleum gases

Character	Unit	Limit	Commercial propane ISO-F-LP	Commercial butane ISO-F-LB	Test method reference
Density at 15 °C	kg/m ³		Report	Report	ISO 3993 or ISO 8973
Gauge vapour pressure at 40 °C	kPa	max	1550 ^a	520 ^a	ISO 4256 ^b or ISO 8973
Volatility					ISO 7941
C ₂ hydrocarbons	% (molar)		Report ^c	-	
C ₄ hydrocarbons	% (molar)	max	7,5 ^a	-	
C ₅ hydrocarbons	% (molar)	max	0,2 ^e	2,5 ^e	
Unsaturated hydrocarbons	% (molar)		Report ^d	Report ^d	ISO 7941
Dienes	% (molar)	max	0,5 ^e	0,5 ^e	ISO 7941
Evaporation residue	mg/kg	max	60	60	EN 15470 ^g or EN 15471 ^g or EN 16423
Corrosiveness to copper		max	1	1	ISO 6251
Sulphur	mg/kg	max	50 ^e	50 ^e	ASTM D6667
Hydrogen sulphide			Pass	Pass	ISO 8819
Free water content			None ^f	None ^f	

^a Certain national standards and/or regulations may describe other limits.

^b In case of dispute about the vapour pressure, ISO 4256 shall prevail.

^c Physical limitations of transport and storage facilities shall be considered for refrigerated transport; a common limit is 2 % (molar) maximum.

^d Certain national standards may prescribe a limitation on saturated hydrocarbons.

^e Certain national standards may prescribe other limits.

^f The presence of water shall be determined by visual inspection. For shipments of refrigerated liquefied petroleum gases at their atmospheric boiling point, it is essential that the water content is below the saturation level at this temperature as determined by a method agreed between the buyer and the seller.

^g In case of dispute about the evaporation residue, EN 15470 and EN 15471 shall prevail.

3.2 Water content

Commercial butane and commercial propane shall not contain free or suspended water detectable by visual inspection.

4 Precision and interpretation of test results

Most of the methods of test given in [Table 1](#) contain a statement of the precision, i.e. the repeatability and reproducibility, to be expected from them but, in cases of dispute, the procedure described in ISO 4259, which uses precision data in the interpretation of test results, shall be used.

5 Documentation

The documentation supplied to the purchaser by the vendor shall include at least the following:

- a) a reference to this International Standard;
- b) the type of liquefied petroleum gas supplied, i.e. commercial propane or commercial butane;
- c) the brand name of the product;
- d) the ISO designation code, i.e. ISO-F-LP or ISO-F-LB (see ISO 8216-3);
- e) the supplier's production code and the date of production;
- f) precautionary and safety advice.

If a transportable container is supplied with the liquefied petroleum gas, it shall also be clearly marked with this information.

6 Sampling

A representative sample of non-refrigerated commercial butane or commercial propane shall be taken in accordance with the procedure given in ISO 4257.

For refrigerated liquefied petroleum gases, a sampling procedure shall be agreed between the parties concerned.

NOTE Proper sampling of the liquefied petroleum gases is extremely important if the test results are to be significant.

Annex A **(informative)**

Evaporation residue of liquefied petroleum gases

Liquefied petroleum gases may contain trace amounts of non-volatile residues. These contaminants can include a variety of hydrocarbons derived from the distillation process, compressor lubricating oils, valve greases, and rubber and elastomer extenders from hoses.

In the majority of applications, the liquid is evaporated and the fuel is fed to the appliance in the gaseous phase.

In those cases where the natural evaporation capacity of the storage tank is not sufficient to provide the required quantity of gas, vaporizers are widely used. In this case, excessive non-volatile residues can be very detrimental.

A distinction can be made between industrial and automotive vaporizers and a variety of energy sources may be applied.

Automotive vaporizers use, in the majority of installations, the engine coolant as a heat source. With the engine fully warmed up, the coolant will have a temperature of about 80 °C to 100 °C. Taking this temperature into account as well as the more complicated construction of the automotive vaporizer/pressure regulator relative to the industrial installation, it can be concluded that the automotive equipment is the most sensitive with respect to the content of residual matter.

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. Details and advice can be obtained from the Copyright & Licensing Department.

Useful Contacts:

Customer Services

Tel: +44 845 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 845 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com



...making excellence a habit.™