BRITISH STANDARD

BS EN ISO 16147:2002 +A1:2013

Small craft — Inboard diesel engines — Engine-mounted fuel and electrical components

ICS 47.080

BSI British Standards

National foreword

This British Standard is the UK implementation of EN ISO 16147:2002+A1:2013. It is identical to ISO 16147:2002, incorporating amendment 1. It supersedes BS EN ISO 16147:2002, which will be withdrawn on 1 January 2015.

The UK participation in its preparation was entrusted to Technical Committee GME/33, Small craft.

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

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

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

This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 17 December 2002

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Amendments/corrigenda issued since publication

Date	Comments
30 April 2013	Implementation of ISO amendment 1:2013 with CEN endorsement A1:2013: New Clause 7 added and Annex ZA updated

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 16147:2002+A1

February 2013

ICS 47.080

English version

Small craft - Inboard diesel engines - Engine-mounted fuel and electrical components (ISO 16147:2002)

Petits navires - Moteurs intérieurs diesels - Eléments des circuits d'alimentation et des systèmes électriques fixés sur le moteur (ISO 16147:2002)

Kleine Wasserfahrzeuge - Eingebaute Dieselmotoren - Am Motor befestigte Kraftstoff- und Elektrikbauteile (ISO 16147:2002)

This European Standard was approved by CEN on 9 October 2002.

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

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Foreword

This document (ISO 16147:2002) has been prepared by Technical Committee ISO/TC 188 "Small craft" in collaboration with CMC.

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of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZB, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of ISO 16147:2002 has been approved by CEN as EN ISO 16147:2002 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

Foreword to amendment A1

This document (EN ISO 16147:2002/A1:2013) has been prepared by Technical Committee ISO/TC 188 "Small craft".

This Amendment to the European Standard EN ISO 16147:2002 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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.

Endorsement notice

The text of ISO 16147:2002/Amd 1:2013 has been approved by CEN as EN ISO 16147:2002/A1:2013 without any modification.

INTERNATIONAL STANDARD

ISO 16147

First edition
2002-10-15

Small craft — Inboard diesel engines — Engine-mounted fuel and electrical components

Petits navires — Moteurs intérieurs diesels — Éléments des circuits d'alimentation et des systèmes électriques fixés sur le moteur

Reference number
ISO 16147:2002(E)

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16147 was prepared by Technical Committee ISO/TC 188, *Small craft*.

Small craft — Inboard diesel engines — Engine-mounted fuel and electrical components

1 Scope

This International Standard establishes requirements for the design and installation of engine-mounted fuel and electrical components on diesel inboard-mounted engines for minimizing fuel leakage and the risk of and/or the spread of fire on small craft of hull length up to 24 m.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7840:1994, *Small craft — Fire-resistant fuel hoses*

ISO 10088:2001, *Small craft — Permanently installed fuel systems and fixed fuel tanks*

ISO 10133:2000, *Small craft — Electrical systems — Extra-low-voltage d.c. installations*

3 Terms and definitions

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

3.1
engine-mounted
component fixed to the marine inboard engine and which will be in place while the engine is in operation

3.2
diesel fuel
hydrocarbon fuel or blends of hydrocarbon fuels which are liquids at atmospheric pressure and are used in compression-ignition engines

3.3
diesel engine
compression-ignition engine in which ignition is obtained by means of compressing the diesel fuel/air mixture

3.4
accessible
capable of being reached for inspection, removal or maintenance without removal of the permanent boat structure

NOTE Hatches are not regarded as permanent boat structures in this sense, even if tools are needed to open them.

3.5
low-pressure fuel line
hose or pipe for fuel supply to high-pressure pumps or injection pumps including leak-off and return pipes from high-pressure pumps, injection pumps, injectors, etc.

3.6
high-pressure fuel pipe
fuel pipes from high-pressure pumps or injection pumps including high-pressure accumulators (rails)

4 General

All material and components shall be suitable for use in a marine atmosphere and capable of operation within an ambient temperature range of − 10 °C to + 80 °C without failure or leakage, and be capable of being stored without operation within an ambient temperature range of − 30 °C to + 80 °C without failure or leakage.

5 Engine fuel system and components

5.1 General

5.1.1 Engine-mounted fuel and lubricating systems shall be leak free, such that there is no dripping or wetting of surface areas at the interface of connecting components and pipe joints due to misting atomization, or liquid from fuel or lubrication under normal operation.

5.1.2 All materials used in fuel systems shall be resistant to deterioration by the fuel and to other liquids or compounds with which they may come into contact under normal operating conditions, e.g. grease, lubricating oil, bilge solvents and sea water.

5.1.3 All sealing material, such as gaskets, o-rings, joint-rings, etc. shall be of the non-wicking, i.e non-fuel-absorbent type.

5.1.4 Fuel filters and flexible hoses shall, individually or as installed, withstand a 2,5 min fire test as described in ISO 10088:2001, annex B or ISO 7840:1994, annex A.

5.2 High-pressure pipes

5.2.1 High-pressure pipes shall be suitable for the pressure and pressure impulses in the sytem and shall be made of, for example, welded or solid drawn-steel pipes.

5.2.2 High-pressure pipes shall be secured to prevent vibrations leading to pipe fracture at all operating engine speeds.

5.3 Low-pressure fuel lines

5.3.1 Low-pressure fuel lines shall be made of

— seamless copper or copper alloys, stainless steel, or corrosion-resistant coated mild steel pipe with a high temperature (450 °C or above) soldered or brazed end forms, or male/female straight-in pipes with compression-ring sealings and screwed compression connections, or

— flexible hose meeting the requirements of ISO 7840 secured by a metal hose clamp or permanently installed end fittings, such as a swaged sleeve, threaded insert or connections with compression ring sealings.

5.3.2 Hose connections having a nominal diameter of more than 25 mm shall have two hose clamps. The spud shall be at least 35 mm long, to provide space for the clamps.

5.3.3 All low-pressure pipes shall be secured into position so as to prevent damage due to excessive vibration leading to pipe fracture. All flexible hoses shall be located away from non-insulated components with a surface temperature above 200 ^{o}C, but remain accessible for inspection and maintenance.

5.4 Fuel filters

Fuel filters shall

— be independantly supported to avoid stress on pipe connections,

— be readily accessible, and

— not be mounted above turbochargers or uncooled exhaust gas manifolds.

6 Electrical systems and components of engines

6.1 D.C. installations

The d.c. negative ground/earth for electrical systems shall be

— a fully insulated earth return, or

— a ground earth return.

6.2 Cranking motors

Earth-return cranking motors shall be earthed (d.c. negative ground/earth) to the earth return system of the engine.

6.3 Wiring and connections

6.3.1 Cables and wiring shall be sized in accordance with ISO 10133.

6.3.2 Cables, wires and looms shall be

— of adequate length to prevent stressing of the cable and connections and chafing of the insulation,

— kept and secured well clear of rotating-shaft couplings, belts, etc., and

— supported to minimize the effects of vibration and chafing.

6.3.3 Wiring connections shall have the following protection:

— IP 67 as a minimum, if exposed to short-term immersion;

— IP 55 as a minimum, if exposed to splashing water;

— IP 20 as a minimum, if located in protected locations inside the craft.

6.4 Relays, fuse boxes and electronic control modules (ECMs)

Relays, fuses and ECMs shall have the following protection or be enclosed in boxes having the same protection level:

— IP 67 as a minimum, if exposed to short-term immersion;

— IP 55 as a minimum, if exposed to splashing water;

— IP 20 as a minimum, if located in protected locations inside the craft.

7 Installation manual

The highest return fuel temperature/flow/energy that can be reached shall be clearly stated in the installation manual. The engine manufacturer shall provide necessary information if a cooler is required in the fuel return line and how it is to be installed.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 94/25/EC as amended by 2003/44/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission to provide one means of conforming to Essential Requirements of the New Approach Directive 94/25/EC as amended by 2003/44/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 94/25/EC as amended by 2003/44/EC

Clause(s)/sub-clause(s) of this European Standard	Essential requirements (ERs) of EU Directive 94/25/EC as amended by 2003/44/EC	Qualifying remarks/Notes
All clauses	Annex 1A5, Clause 5.1.1 Inboard engines.	In respect of engine mounted fuel and electrical equipment.
5	Annex 1A5, Clause 5.2.1 Fuel systems.	In respect of engine mounted fuel equipment.
6	Annex 1A5, Clause 5.3 Electrical systems.	In respect of engine mounted electrical equipment.

Annex ZB
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 94/25/EC.

WARNING: Other requirements and other EU Directive may be applicable to the product(s) falling within the scope of this standard.

The following clauses of this standard, as detailed in Table ZB.1, are likely to support requirements of Directive 94/25/EC.

Compliance with the clauses of this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Table ZB.1: Correspondence between this European Standard and EU Directives

Clauses/sub-clauses of this European Standard	**Corresponding annexes/ paragraphs of Directive 94/25/EC**	**Comments**
All clauses	Annex 1, Clause 5.1.1, Inboard engines	
5	Annex 1, Clause 5.2.1, Fuel system	
6	Annex 1, Clause 5.3, Electrical system	

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