INTERNATIONAL STANDARD

ISO 15584

First edition
2001-03-15

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

Petits navires — Moteurs intérieurs à essence — Éléments des circuits d'alimentation et des systèmes électriques

Reference number
ISO 15584:2001(E)

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.ch
Web www.iso.ch

Printed in Switzerland

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.

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.

International Standard ISO 15584 was prepared by Technical Committee ISO/TC 188, *Small craft*.

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

1 Scope

This International Standard specifies requirements for the design and installation of engine-mounted fuel and electrical system components on inboard petrol engines for minimizing fuel leakage and protecting against ignition of surrounding flammable gases on small craft of hull length up to 24 m.

The following types of engines are exempt from the application of this International Standard:

— engines in personal watercraft as defined by ISO 13590 (see the bibliography);

— outboard engines.

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 ISO and IEC maintain registers of currently valid International Standards.

ISO 1817:1999, *Rubber, vulcanized — Determination of the effect of liquids.*

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

ISO 8846:1990, *Small craft — Electrical devices — Protection against ignition of surrounding flammable gases.*

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests.*

ISO 10088:—[1)], *Small craft — Permanently installed fuel systems and fixed fuel tanks.*

ISO 13592:1998, *Small craft — Backfire flame control for petrol engines.*

3 Terms and definitions

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

3.1
engine-mounted
component securely fixed by the engine manufacturer to the marine inboard engine and which will remain in place while the engine is in operation

1) To be published. (Revision of ISO 10088:1992)

3.2
electrical component
component which is operated by electrical current or generates an electrical current through mechanical operation

3.3
petrol
hydrocarbon fuel or blends of hydrocarbon fuels which are liquids at atmospheric pressure and are used in spark-ignition engines

3.4
spark-ignition engine
engine in which ignition is obtained by means of an electric spark

3.5
accessible
capable of being reached for inspection, removal or maintenance without removal of the permanent boat structure

4 General

4.1 Engine-mounted fuel-system components, such as carburettors, filters, fuel pumps, fuel piping and hoses shall, when installed in accordance with the manufacturer's instructions, minimize the risk of fuel leakage into the engine compartment and shall meet the requirements of clause 5.

4.2 Engine-mounted electrical components which can create an electric spark, externally or internally, capable of igniting a petrol and air mixture, such as circuit breakers, switches, solenoids, alternators, generators, voltage regulators and electric motors, shall be ignition protected in accordance with ISO 8846 and the requirements of clause 6.

4.3 Installation instructions shall be provided by the manufacturer.

5 Engine fuel-system components

5.1 General requirements – Piping, hoses, pumps, filters and their connections

5.1.1 The fuel connection between the fuel pump and carburettor or throttle-body injection device shall be

— a metallic piping, such as copper or copper alloy, stainless steel, steel with corrosion-resistant coating, or

— a fuel hose meeting the requirements of ISO 7840 equipped with permanently installed end fittings, such as a swaged sleeve or sleeve and threaded insert.

5.1.2 Engine-mounted fuel-system components shall be capable of withstanding a 2,5 min exposure to free burning fuel when tested in accordance with the fire test procedure described in ISO 10088.

Carburettors are excluded from this requirement.

5.1.3 Each component of the fuel system and the system as a whole shall be 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.

5.1.4 Venting of all engine-mounted fuel-system components shall be accomplished internally within the air induction system, except those that have a flame arresting capability in accordance with the requirements of ISO 13592 and are in compliance with all the other requirements of this International Standard.

5.1.5 Any fuel-pump diaphragm failure, or operation of pressure relief valve shall not discharge fuel into the engine compartment.

5.1.6 The fuel-pump operating pressure on engines using carubrettors shall not exceed 70 kPa.

5.1.7 Fuel filters shall be secured on the engine, and not suspended from fuel piping or hoses.

5.1.8 If drains are installed on fuel filters, only straight-threaded drain plugs with O-rings or gaskets, or taper-threaded drain plugs are permitted.

5.1.9 All engine-fuel system connections shall be accessible.

5.2 Carburettors and/or throttle bodies

Carburettors and fuel-injection throttle bodies shall

— be equipped with a backfire flame arrester meeting the requirements of ISO 13592, except those installed on two-stroke engines fitted with a reed valve or other induction system meeting the requirements of ISO 13592 to prevent propagation of backfire flame through the intake system;

— have all vents and air bleeds on carburettors or fuel-injection throttle bodies contained within the the air induction system, except those that have a flame-arresting capability in accordance with the requirements of ISO 13592 and are in compliance with all the other requirements of this International Standard;

— prevent fuel from being carried out by the pressure wave of a backfire or by reverse air flow, and to return collected fuel to the engine induction system after the engine starts;

— use sealing material of the non-wicking type, i.e. non-fuel absorbent, in gaskets, O-rings, joint rings, etc., communicating to the outside of the carburettor or throttle body;

— operate under conditions of continuous 12° inclination from the design position in any direction and not exceed the leakage limitations according to the requirements of 5.3.

5.2.2 Carburettors shall withstand a supply pressure of 80 kPa without unseating the float mechanism.

5.2.3 Fuel-injection throttle bodies shall withstand a supply pressure of 350 kPa without leakage from the injector and regulator assemblies.

5.3 Conditioning procedure

Carburettors and fuel-injection throttle bodies shall meet the leakage test requirements of 5.4 after the following conditioning procedure has been carried out.

Subject the carburettor or throttle body to a storage temperature of – 30 °C for 48 h and return it to room temperature. Then

— subject it, in its normal operating position, to 1 000 cycles of 13g to 17g[2)] peak vertical accelerations at a rate of 80 cycles or less per minute with the duration of minimum 6 ms at the base of the half-sine shock pulse. After the shock test, the steady rate of fuel delivery shall not vary by more than ± 5 %. There shall be no structural or mechanical failure of components;

— mount it on an intake manifold or a sealed flange, with its flame arrester in accordance with ISO 13592, fuel and vacuum lines attached, or such line openings closed, and subject it to a 96 h salt spray test (NSS) at 35 °C in accordance with ISO 9227:1990, 5.1, using a 5 % salt solution. Linkages shall be operated through their full range once every 24 h during the salt spray test. All moving parts shall operate without loss of function after this test.

2) g = 9,806 65 m/s^2

5.4 Fuel leakage test

There shall be no more than 5 cm^3 of external fuel leakage from the carburettor or throttle body and its air-induction system in 30 s when the following conditions occur.

— The carburettor fuel-inlet shut-off valve is fixed in its full-open flow condition or the throttle body injectors are set to flow continuous fuel.

— The throttle plates are set at mid-position between closed and full-open. For multiple-throat carburettors or throttle bodies having secondary throttle plates opened by movement of the primary throttle plates, the primary plates may be positioned to allow the secondary plates to open by no more than 50 % to prevent fuel accumulation.

— The engine is cranked at normal cranking speed without starting for 30 s.

6 Engine electrical systems and components

6.1 General requirements

6.1.1 The d.c. negative ground/earth for electrical systems shall be of two types:

— either fully insulated earth return, or

— ground earth return.

6.1.2 All electrical system components shall be mounted as high as practical on the engine excluding the engine-cranking motor and ignition distributor position which shall be according to the basic engine manufacturer's design.

6.1.3 Ignition coils and magnetos shall be mounted or protected so that water will not accumulate around the high-voltage cap.

6.1.4 If an electrical component is required to be ignition protected (ISO 8846) and covers form part of the ignition-protection enclosure, a permanent warning tag shall be affixed to the component, or the component shall be permanently and visibly marked with appropriate language or symbols, indicating that the cover must be in place when the engine is ready for use

6.2 Ignition distributors

6.2.1 The distributor, when in operation, shall meet the ignition-protection requirements of ISO 8846. Means used to secure distributor caps shall prevent the cap lifting off the sealing surface during an internal explosion of a fuel and air vapour mixture. During the test, high-tension (secondary) ignition wiring shall be in place on all distributor cap towers with terminal covering boots as installed during engine operation.

6.2.2 All vent or drain openings shall be protected by effective flame-arrester screens or shall be of a size and length providing an equivalent ignition protection.

6.2.3 High-tension (secondary) wiring connections to the distributor-cap towers shall meet a minimum of 27 N pull-off force along the tower axis when installed without the covering boots in place.

6.2.4 Terminal covering boots shall be close fitting to effect a watertight seal on the outside of high-tension wire insulation and on the outside of the distributor-cap tower when in place and meeting the dielectric leakage test requirements of 6.3.1. Sealing against the outside of the distributor cap tower shall be effected before the boot is in contact with the cap surface at the bottom of the tower.

6.3 High-tension (secondary) ignition-cable assemblies – Dielectric leakage test

6.3.1 The high-tension ignition-cable assemblies shall have a watertight seal with the outside of the high-tension wire insulation, the outside of the distributor-cap terminal towers and the outside of the spark-plug ceramic insulator, such that leakage of electric current will not occur when the connection is submerged for 2 h at 30 mm to 50 mm below the surface of a grounded salt and water solution of mass fraction 3 %, with a voltage of 20 kV peak (14 kV r.m.s) at 50 Hz to 60 Hz applied to the conductor. The voltage shall be applied at a rate of 500 V peak (355 V r.m.s) per second between the free end of the high-tension lead and the grounded salt water solution.

6.3.2 The test shall be conducted under the conditions described in 6.3.2.1 to 6.3.2.3.

6.3.2.1 The watertight seal installed on high-tension ignition cables shall meet the dielectric leakage test requirements of 6.3.1 after conditioning at 125 °C ± 2 °C for 40 h and subsequent flexing by installation and removal, at room temperature, 10 times on the spark plug and distributor-cap tower.

6.3.2.2 The watertight seal installed on high-tension ignition cables shall meet the dielectric leakage test requirements of 6.3.1 after conditioning for 30 h in a sealed glass container at room temperature when suspended 25 mm ± 5 mm above test liquid C in accordance with ISO 1817, and subsequent flexing by installation and removal 10 times from the spark plug and distributor-cap tower.

6.3.2.3 The watertight seal installed on high-tension ignition cables shall meet the dielectric leakage test requirements of 6.3.1 after conditioning for 40 h in test oil No. 3 in accordance with ISO 1817 maintained at 125 °C ± 2 °C. Remove from the oil; cool to room temperature; remove excess oil. Flex the boots and nipples by installing and removing them 10 times from the spark plug and distributor-cap tower.

Tests as described in 6.3.2.1, 6.3.2.2 and 6.3.2.3 shall be conducted on separate groups of high-tension ignition cable assemblies.