SLOVENSKI STANDARD
oSIST prEN ISO 8469:2020

01-april-2020

Mala plovila - Gorljive cevi za gorivo (ISO/DIS 8469:2020)

Small craft - Non-fire-resistant fuel hoses (ISO/DIS 8469:2020)

Kleine Wasserfahrzeuge - Nicht feuerwiderstandsfähige Kraftstoffschläuche (ISO/DIS 8469:2020)

Petits navires - Tuyaux souples pour carburant non résistants au feu (ISO/DIS 8469:2020)

Ta slovenski standard je istoveten z: **prEN ISO 8469**

ICS:

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
47.020.30	Sistemi cevi	Piping systems
47.080	Čolni	Small craft

oSIST prEN ISO 8469:2020 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 8469

ISO/TC **188**

Secretariat: **SIS**

Voting begins on:
2020-02-19

Voting terminates on:
2020-05-13

Small craft — Non-fire-resistant fuel hoses

Petits navires — Tuyaux souples pour carburant non résistants au feu

ICS: 47.080

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 8469:2020(E)

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Published in Switzerland

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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).

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 (see www.iso.org/patents).

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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 188, *Small craft*.

This fourth edition cancels and replaces the third edition (ISO 8469:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— requirements for low permeation fuel hoses have been added;

— clarifies the test fluids for petrol;

— test fixture Figure A.1 has been revised to remove the vented capillary tube.

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.

Small craft — Non-fire-resistant fuel hoses

1 Scope

This document specifies general requirements and physical tests for non-fire-resistant hoses for conveying petrol or petrol blended with ethanol, and diesel fuel or diesel fuel blended with FAME, designed for a working pressure not exceeding 0,34 MPa for hoses with inner diameter up to and including 10 mm and 0,25 MPa for hoses up to 63 mm inner diameter in craft of hull length up to 24 m.

It applies to hoses for small craft with permanently installed fuel systems.

Specifications for fire-resistant hoses are given in ISO 7840: 2004. Specifications for permanently installed fuel systems are given in ISO 10088:2009.

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 1307:2006, *Rubber and plastics hoses — Hose sizes, minimum and maximum inside diameters, and tolerances on cut-to-length hoses*

ISO 1402:2009, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1817:2015, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 7233:2016, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum*

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

EN 14214:2012+A2:2019, *Automotive fuels — Fatty acid methyl esters (FAME) for diesel engines — Requirements and test methods*

3 Terms and definitions

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

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

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

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

3.1
FAME
Fatty Acid Methyl Esters
esters of fatty acids. The physical characteristics of fatty acid esters are closer to those of fossil diesel fuels than pure vegetable oils, but properties depend on the type of vegetable oil

3.2
tube
interior liner of the fuel hose that is normally in contact with the fuel.

4 General requirements

Hoses complying with this International Standard shall present a smooth inner surface free from pores, other defects and chemical contaminants.

Hoses shall demonstrate suitability for marine use by complying with the requirements of the tests in Clause 6. Hoses intended to be used for both petrol and diesel fuels must be tested with both test fluids separately in sections requiring preconditioning. They shall be marked according to Clause 7.

5 Hose inner diameter

Table 1 gives some of the inner diameters based on series R 10 of ISO 3:1973. Tolerances shall conform to ISO 1307:2006.

Table 1 — Inner diameters and tolerances

Dimensions in millimetres

Inner diameter, *d*	Tolerance
3,2 4 5	± 0,5
6,3 7 8 9,5 10 12,5 16 19 20	± 0,75
25 31,5 38	± 1,25
40 50 63	± 1,5

6 Physical tests on finished hose

6.1 General

New samples shall be used for each of the tests below.

6.2 Test liquids

a) Petrol:

1) a mixture by volume of 90 % of liquid C specified in ISO 1817:2015, Table A.1 and 10 % by volume of ethanol. (CE10)

b) Diesel:

1) a mixture by volume of 90 % liquid F specified in ISO 1817:2015 and 10 % by volume of Fatty Acid Methyl Esters (FAME), specified in EN 14214:2012+A2:2019.

6.3 Bursting pressure

Fill three hoses or sample lengths from hoses with the applicable test liquids as specified in 6.2, and storethem for 40 days in air at a temperature of 40 °C ± 2 °C. For type 15 fuel hose (see 6.9) the 40 day test period may be reduced to 28 days.

Empty the liquid out and fill the hoses or sample lengths with cold water, subject them to hydrostatic pressure as specified in ISO 1402:2009.

The bursting pressure shall be at least 1,4 MPa for hoses with an inner diameter of 10 mm or less and 1,00 MPa for hoses with an inner diameter of more than 10 mm.

6.4 Vacuum collapse test

Carry out the test in accordance with ISO 7233:2016, method A, using the test conditions specified in Table 2.

Table 2 — Pressure conditions for the vacuum collapse test

Inner diameter, d	**Vacuum**
mm	kPa
$d \leq 10$	80
$10 < d \leq 25$	35
$d > 25$	No test required

The test duration shall be 60 s and the diameter of the sphere 0,8 d (inner diameter of the hose). The sphere shall pass freely through the hose while under vacuum.

6.5 Volume change in test liquids

Determine the change of volume of the hose test sample (tube and cover) by the procedure specified in ISO 1817:2015. Completely submerge the test pieces in test liquids as specified in 6.2 at a temperature of 40 °C ± 2 °C for 40 days.

If the hose is made of a homogeneous compound (with or without reinforcement), the swelling shall not exceed 35 % by volume as measured by displacement in water. For hose with an inner layer of fuel-resistant material and a cover of another material mainly intended for weather and ozone resistance, the increase in volume shall not exceed 35 % for the tube and 120 % for the cover.

6.6 Mass reduction of test hose

Determine the reduction in mass of the hose by the procedure specified in ISO 1817:2015. Fill three hoses or sample lengths from the hoses with test liquids, as specified in 6.2, and store them for 40 days in air at a temperature of 40 °C ± 2 °C. For type 15 fuel hose (see 6.9) the 40 day test period may be reduced to 28 days.

The reduction in mass of the inner layer shall not exceed 8 % of the initial mass of the test pieces.

NOTE A reduction in mass of 8 % corresponds to a decrease in volume of approximately 10 %.

6.7 Effect of ozone

The hose shall be tested in accordance with ISO 7326:2016, method 1. The sample shall show no visible cracks at 7X magnification.

6.8 Fuel permeation

The permeation rate for the hoses shall be determined according to the method specified in Annex A or an equivalent test method. The hoses shall be classified in the following way and marked in accordance with Clause 7:

— Type 1: hoses with a permeation rate greater than 15 but less than 100 g/m^2 per 24 h;

— Type 2: hoses with a permeation rate of over 100 g/m^2 per 24 h, up to and including 300 g/m^2 per 24 h.

— Type 15: hoses with a permeation rate of 15 g/m^2 or less per 24 h

6.9 Cold flex test

For straight hoses of 19 mm inner diameter and smaller, condition three hose samples for 5 h at an ambient temperature of –20 °C ± 2 °C. Flex the hose in the cold chamber through 180° from the centreline to a diameter of 10 times the maximum outside diameter of the hose. The flexing shall take place within 4 s and the hose shall not fracture or show any cracks, checks or breaks in the tube or cover.

For straight hoses larger than 19 mm inner diameter and all pre-formed hoses, prepare three samples (100 ± 5) mm × (6 ± 1) mm from the whole hose wall and condition them for 5 h at a temperature of –20 °C ± 2 °C in an unrestrained loop, position between two jaws 50 mm wide and 64 mm apart. While in the cold chamber, bring the jaws together rapidly until they are 25 mm apart. The samples shall not fracture or show any cracks, checks or breaks.

6.10 Abrasion test —

Hose samples of 38 mm inner diameter and larger with embedded wire reinforcement shall be selected for the test. Larger inner diameter hose sizes to be qualified by the test shall not have a cover thickness or construction less than those of the test samples.

Three identical 38 mm inner diameter hose samples shall be tested. Condition hose samples for at least 24 h at a temperature of 23 °C ± 2 °C and relative humidity of 50 % ± 5 %. The test hose shall be mandrel-(core-) supported and rotate at a constant speed of 80 rev/min ± 2 rev/min. Subject the hose to a laterally moving abrasive surface, i.e. 80 grit aluminium oxide (Al_2O_3) emery cloth, parallel to the longitudinal axis of the hose. The abrasive surface shall be (25 ± 5) mm × (75 ± 5) mm affixed to a hard surface which will cycle back and forth 75 mm ± 5 mm in each direction while loaded with a constant normal force of 45 N ± 5 N. One test cycle shall equal one 360° rotation of the outside diameter of the hose and one back and forth movement of the abrasive surface. After 1 000 cycles, the three test samples shall have no helical wire reinforcement exposed at the point of contact with the abrasive surface.

