BS ISO 15540:2016

BSI Standards Publication

Ships and marine technology — Fire resistance of non-metallic hose assemblies and non-metallic compensators — Test methods

bsi.

National foreword

This British Standard is the UK implementation of ISO 15540:2016. It supersedes BS EN ISO 15540:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SME/32, Ships and marine technology - Steering committee.

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.

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ISO 15540

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Ships and marine technology — Fire resistance of non-metallic hose assemblies and non-metallic compensators — Test methods

Navires et technologie maritime — Résistance au feu des flexibles et des compensateurs non métalliques — Méthodes d'essais

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Foreword

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

This second edition cancels and replaces the first edition (ISO 15540:1999), which has been technically revised. It also incorporates the Technical Corrigendum ISO 15540:1999/Cor 1:1999.

The most significant change in this second edition is the inclusion of non-metallic compensators to the fire test procedures outlined in this document. The first edition of this document applied primarily to non-metallic hose assemblies. Because the compensators are used in common piping systems and may have similar materials to hose assemblies, the applicability of the test procedures was expanded to include compensators.

Introduction

The main objective of the test using the test bench described in this document is to determine whether and for a safety period a non-metallic hose (made of rubber) assembly or non-metallic compensator (bellow made of rubber) can be exposed to fire without becoming inoperable when subjected to the design working pressure. Although the attacking fire is simulated such that it corresponds to a fire occurring in practice, it cannot be assumed that the duration of fire resistance as recorded during that test will also occur in the event of an actual fire, as the installation conditions, which greatly affect to the duration of fire resistance, may vary from case to case.

When carried out using the test bench specified in ISO 15541, the test procedure according to this document is intended to lead to results capable of being reproduced by testing the same size and type.

A specimen test certificate is specified in Annex A.

INTERNATIONAL STANDARD ISO 15540:2016(E)

Ships and marine technology — Fire resistance of non-metallic hose assemblies and non-metallic compensators — Test methods

1 Scope

This document specifies a test procedure for determining the fire resistance of non-metallic hose assemblies and non-metallic compensators with nominal diameter of up to 150 mm. It may be used for larger sizes provided proper test bench conditions are obtained.

It serves for proving whether, after the period of fire effect on the test bench specified in ISO 15541, hose assemblies and non-metallic compensators continue to be tight, even when subjected to proof pressure.

Only water is permitted as a test medium. With a view to ensuring maximum safety for both the operating personnel and the test bench in the event of damage to the hose or non-metallic compensator during the test, the use of combustible test media is excluded.

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 15541:2016, *Ships and marine technology — Fire resistance of non-metallic hose assemblies and non-metallic compensators — Requirements for the test bench*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Designation

The designation of the test for determining the fire resistance is composed of the elements quoted in the example below:

Test ISO 15540-30-0-5-400-F

In this designation the elements have the following meaning:

Test: designation

ISO 15540: number of this document

30: test duration in minutes

5: working pressure during flame application, in bar

400: proof pressure following flame application, in bar

F: test specimen with fire sleeve

5 Test specimen and specimen preparation

Non-metallic hose assemblies with a hose length of a least 500 mm shall be used as test specimen.

Each series of non-metallic compensators which have the same shape and identical construction shall be tested in their standard configuration.

The purchaser and operator of the test bench shall agree which fitting types shall be used for the test.

The test specimen may be tested either with or without fire sleeves subject to agreement; identification letter B for test without fire sleeves, identification letter F for tests with fire sleeves. If fire sleeves are used, then all specimens qualifying a series of non-metallic hose or non-metallic compensator shall be tested with fire sleeves.

Prior to the test, the test specimen shall be stored at ambient temperature for 24 h.

6 Number of test specimen

The type tests shall be carried out on a minimum of three non-metallic hose assemblies or non-metallic compensators with different nominal diameters of up to 150 mm but of identical hose or compensator construction. The smallest, the middle and the largest nominal diameter of each series shall be tested.

For an approval of non-metallic compensators with size range above 150 mm one additional test with half of the biggest size shall be tested.

7 Test bench

The test shall be carried out on a test bench according to ISO 15541.

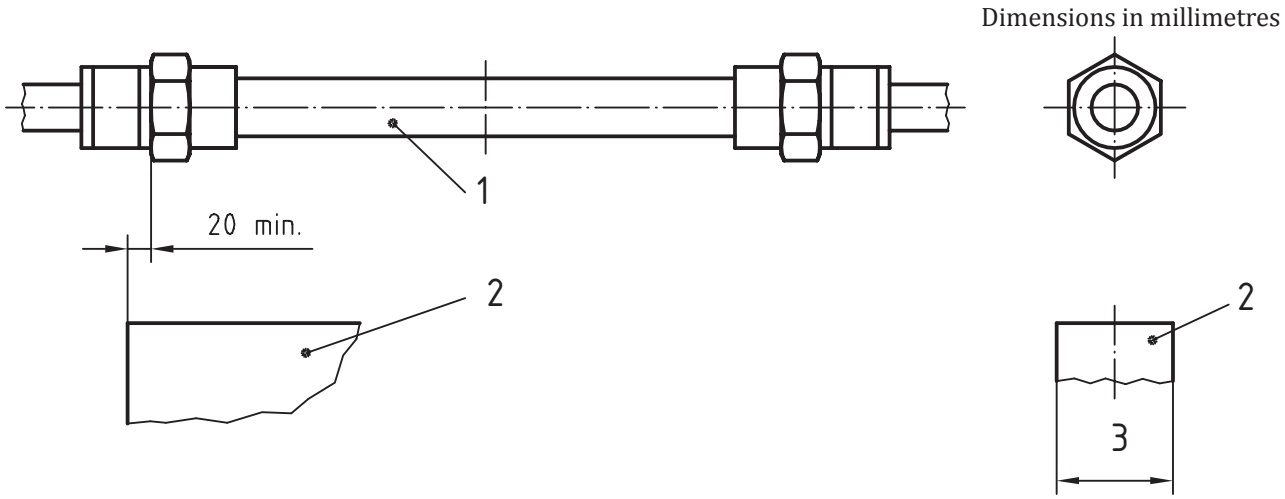
8 Test performance

8.1 Installation of test specimen

The test specimen shall be installed on the test bench such that the burner end extends beyond one hose end fitting by at least 20 mm such that the fitting and hose is completely enclosed by the flames (see Figure 1).

In case of non-metallic compensators, the specimen shall be arranged such that the bellow (or other compensator design shape) and both end fittings or flanges are parallel to the surface of the burner and are completely enclosed by the flames.

The test specimen shall be centred above the burner surface (see Figure 1) in order to provide a flame appearance according to ISO 15541:2016, Annex A, Figures A.1 and A.2.



Key

1 test specimen
2 burner
3 burner width

Figure 1 — Test specimen arrangement (hose assembly)

8.2 Burner width

In order to ensure that the flames reliably enclose the test specimen, the minimum burner widths shown in Table 1 shall be observed.

Table 1 — Burner width

Dimensions in millimetres

Minimum width of burner	**Outside diameter of test specimens**	
50	up to 25	up to 100[a]
100	over 25 up to 75	
150	over 75 up to 125	
200	over 125 up to 150[a]	
250	over 150 up to 200	
[a] Up to 150 the flames shall fully enclose the test specimen.		

8.3 Preparation

Following installation, the test specimen shall be rinsed with the test medium water for at least 1 min in order to evacuate as far as possible the air contained in the test specimen.

8.4 Measured values and measuring points

The following measured values shall be determined at the measuring points indicated in Figure 2:

— water temperature at measuring points 1 and 2;

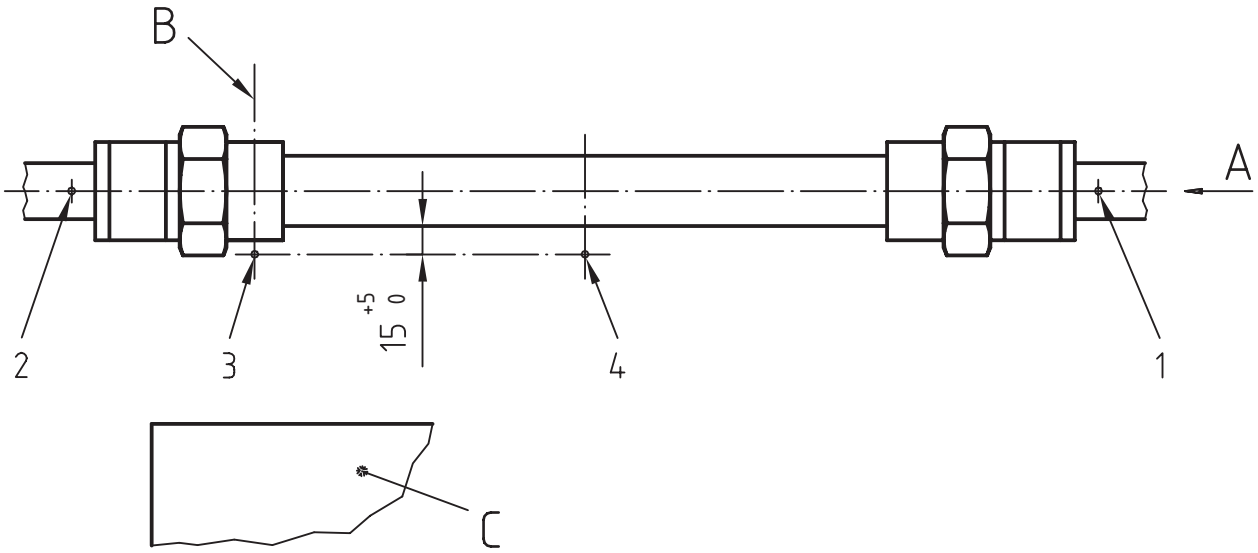
— flame temperature at measuring points 3 and 4;

— flow rate of water;

— pressure inside test specimen during the flame application.

The positioning of the measuring points for compensators shall be analogue to Figure 2.

Dimensions in millimetres



Key

A flow direction
B centre of socket
C burner

Figure 2 — Temperature measuring points

8.5 Temperature during flame application

The temperatures according to Table 2 shall be observed. In order to ensure the water temperatures indicated, the velocity of flow shall be controlled accordingly.

Table 2 — Temperatures

Temperature of flowing water at	temperature measuring point 1	(80 ± 2) °C
	temperature measuring point 2	Max. 85 °C
Temperature of flame at temperature measuring points 3 and 4 during test		(800 ± 50) °C
NOTE For temperature measuring points, see Figure 2.		

8.6 Pressure during flame application

The test specimen shall be subjected to a working pressure of at least (5 ± 0,2) bar or the maximum allowable working pressure (M.A.W.P.) as identified on the product.

Any deviating working pressure shall be agreed on.

8.7 Duration of test

The duration of the test is 30 min. The duration starts at the moment the test specimen is exposed to the minimum test temperature (flame temperature), which shall have been reached at both measuring points.

In case of non-metallic compensators, a leakage of the flange connection during or at the end of the flame application may be one-time corrected by retightening the flange screws. The flame impingement duration is to be extended accordingly. The nominal length of the compensator has to be fixed during the test to avoid additional stress on the bellow due to uncontrolled elongation.

Any deviating durations of test shall be agreed on.

8.8 Proof pressure application

Following flame application, the test specimen shall be subjected at ambient temperature to proof pressure for 2 min duration as follows:

a) hose assemblies: proof pressure according to applicable hose standard, normally two times the M.A.W.P.

b) compensators: proof pressure is 1,5 times the M.A.W.P. The proof pressure application can be omitted in case the test specimens have been subjected to the M.A.W.P. during flame application.

9 Assessment

The test is considered as passed when the test specimen remains tight when subjected to proof pressure after flame application.

In the event of a test specimen failing, the test shall be repeated on two specimens of the nominal diameter having failed. If one specimen fails during the repeat test, the hose assembly of the design presented for testing will be regarded as having failed.

If the test specimens pass the test successfully, the hose assembly and compensator of the design presented for testing will be approved, i.e. from the smallest up to the largest nominal diameter of the series.

10 Type test certificate

The test results shall be certified in a test certificate as shown in the specimen in Annex A.

Annex A
(normative)

Type test certificate

This form may be duplicated.

For non-metallic compensators, replace the word hose/-assemblies with the word “compensators” throughout the certificate.

Type Test Certificate **Fire resistance of non-metallic hose assemblies** **Testing subject to ISO 15540**
Details on test specimen Hose: Type: ..... according to specification: ..... Nominal diameter: Allowable working pressure: ..... [bar] Proof pressure: ..... [bar] Hose manufacturer: Name: ..... Fitting: Type: ..... according to specification: ..... Allowable working pressure: ..... [bar] Proof pressure: ..... [bar] Fitting manufacturer: Name: ..... Hose assembly: Designation: ..... Hose assembly manufacturer: Name: ..... Address: Flame protection: .....
Test conditions Working pressure during the test: ..... [bar] Static test pressure following flame application:..... [bar] Duration of flame application: .....[min] Duration of static pressure load following flame application: .....[min]
Test results Temperature: of test medium in front of test specimen: ..... [°C] of test medium behind test specimen: ..... [°C] Flame temperature; below centre of test specimen: ..... [°C] under fitting: ..... [°C] Actual test duration: min (if deviating from the duration of flame application as stipulated under test condition) Tight at test pressure after flame application yes no Measurement records (see Annex) No.: .....
Description of failure
Remarks (e.g. on behaviour in fire)
Assessment: Test passed: yes no
The test was carried out on at: Name: Address: **Inspector**: Date:

ICS 83.140.40; 47.020.30

Price based on 6 pages

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