INTERNATIONAL STANDARD

ISO 14409

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Ships and marine technology — Ship launching air bags

Navires et technologie maritime — Boudins pneumatiques pour le lancement des navires

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14409 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 8, *Ship design*.

Ships and marine technology — Ship launching air bags

1 Scope

This International Standard specifies the terms and definitions, classification, materials and dimensions, test items and methods for air bags to be used for launching a vessel. It also specifies issues such as marking, documentation, packaging, transport, storage and so on.

This International Standard is intended for designing, manufacturing, testing and accepting air bags that are made of synthetic-tyre-cord reinforcement layers.

2 Normative references

The following referenced documents are indispensable for the application 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 34-1, *Rubber, vulcanized or thermoplastic — Determination of tear strength — Part 1: Trouser, angle and crescent test pieces*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 815-1, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 1431-1, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

3 Terms and definitions

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

3.1
bearing capacity of air bag
maximum load carrying capacity of the air bag, while it suffers no permanent deformation or damage

3.2
body of air bag
cylindrical part of the air bag after being fully inflated with compressed air

NOTE See item 3 of Figure 2.

3.3
burst pressure
internal pressure at which the air bag bursts

3.4
diameter of air bag
diameter of the air bag body

NOTE See D in Figure 2.

3.5
head of air bag
conical parts connecting the body and the mouths of the air bag

NOTE See item 2 of Figure 2.

3.6
initial internal pressure
air pressure that fully inflates the air bag, before compression

NOTE See Figure A.1.

3.7
length of air bag
length of the air bag body

NOTE Shown as L in Figure 2.

3.8
mouth of air bag
metal valves mounted on both ends of the air bag for charging air

NOTE Shown in item 1 of Figure 2.

3.9
percentage deformation
ratio of the deformed height to the original diameter of the air bag while the air bag is being compressed

NOTE Shown in Figure 1 and Equation (1).

$$P = (D - H)/D \quad (1)$$

where

P is the percentage deformation (%);

D is the original diameter of the air bag (m);

H is the height of the compressed air bag (m).

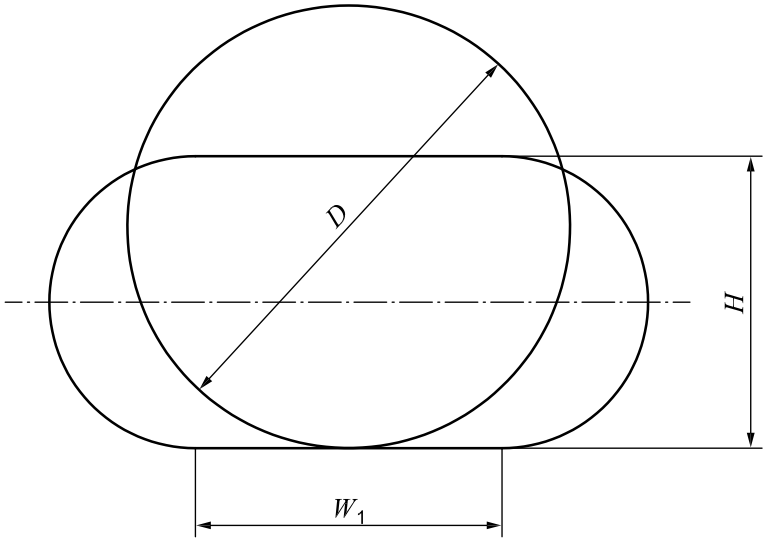


Figure 1 — An air bag being compressed

3.10
rated working pressure
maximum allowable internal pressure of the air bag while supporting a weight or load equal to the rated bearing capacity of the air bag

3.11
synthetic-tyre-cord layer
reinforcement layer of the air bag which is made of rubber coated synthetic-tyre-cord fabrics

3.12
total length of air bag
overall length of the air bag

NOTE Shown as L_{OA} in Figure 2.

4 Classification

4.1 Type and model

4.1.1 Air bags are categorized by the following two types according to the bearing capacity, per metre in length:

a) QP — ordinary air bag;

b) QG — high-bearing capacity air bag.

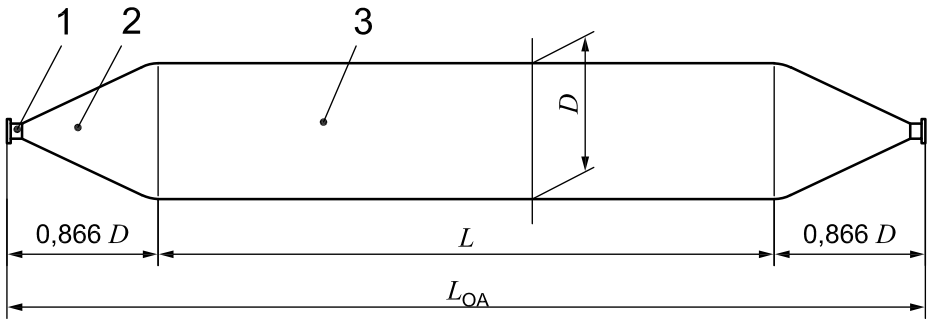
4.1.2 The types and models of air bags are specified in Table 1.

Table 1 — Type and model of air bags

Type	Type No.	Model
QP	QP3	ordinary air bag with 3 layers of cord fabric
	QP4	ordinary air bag with 4 layers of cord fabric
	QP5	ordinary air bag with 5 layers of cord fabric
QG	QG6	high-bearing capacity air bag with 6 layers of cord fabric

4.2 Structure

As shown in Figure 2, an air bag has a cylindrical body and two conical heads, one at each end.



Key

1 mouth
2 head
3 body

Figure 2 — Structure of a typical air bag

4.3 Size

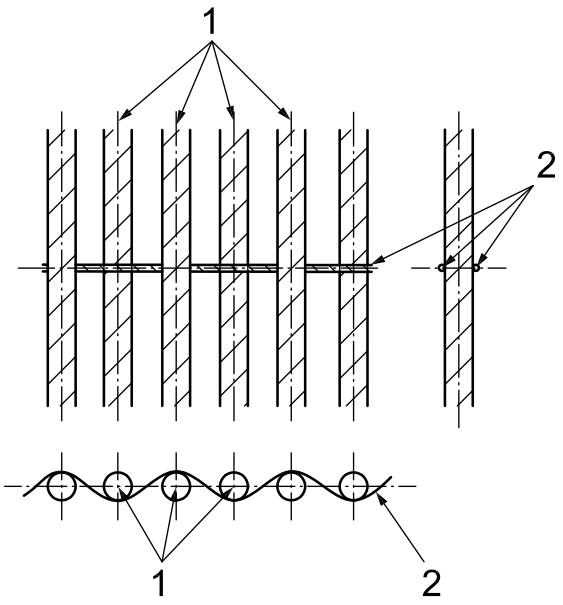
4.3.1 Diameter of air bag (D) varies such as 0,8 m, 1,0 m, 1,2 m, 1,5 m, 1,8 m, etc.

4.3.2 Length of air bag (L) is to be specified by the user.

5 Materials and dimensions

5.1 Materials

5.1.1 An air bag is to be constructed of an outer rubber layer, one or more synthetic-tyre-cord layers, and an inner rubber layer. The arrangement of synthetic-tyre-cord reinforcement layers is shown in Figure 3. All materials shall be vulcanized firmly.



Key

1 warp
2 weft

Figure 3 — Tyre cord

5.1.2 Prior to the air bag production, the outer and inner rubber layers shall be tested to meet the criteria in Table 2 in accordance with the test methods given in the International Standards listed in Table 2. While only one satisfactory sample per batch is required for test numbers 1 through 3, all others must be tested for test numbers 4 through 9 annually. If the first sample fails, two additional samples shall be tested. If the additional samples pass the test requirements, the materials will be deemed to have passed the test. Otherwise, the materials will be deemed to have failed the test and another batch of materials shall be selected.

Table 2 — Rubber material requirements

No.	Test item		Required value	Test method
1	Tensile strength, MPa		≥ 18	ISO 37
2	Elongation at break, %		≥ 400	ISO 37
3	Hardness, ° (Shore A)		60 ± 10	ISO 7619-1
4	Tear strength, N/cm		≥ 400	ISO 34-1
5	Compression set, % (70 °C ± 1 °C, 22 h)		≤ 30	ISO 815-1
6	After thermal ageing at 70 °C ± 1 °C, 96 h	Holding of pull lengthening, %	≥ 80	ISO 188
7		Holding of elongation at break, %	≥ 80	ISO 188
8		Change of hardness, ° (Shore A)	≤ 8	ISO 7619-1
9	Static ozone ageing at 40 °C × 96 h [ozone concentration (50 ± 5) × 10^{-8}], extension 20 %		No crack	ISO 1431-1

5.1.3 As a reinforcing material, the warp should be (90 ± 5) cords per 100 mm in width, and the breaking strength shall be more than 205 N per cord.

5.2 Appearance

The appearance of an air bag shall be smooth, glossy and without blemish such as crack, blister, delamination, pits or impurities.

5.3 Dimensional tolerances

The length and diameter of an air bag shall be measured with the rated working pressure and be within ± 3 %.

6 Test

6.1 General

All products must meet the following test criteria.

6.2 Test condition

6.2.1 Unless otherwise specified, tests shall be performed under the following conditions:

a) ambient temperature: 10 °C ~ 35 °C;

b) media: (1) dry clean compressed air, and (2) clean fresh water for bursting test.

6.2.2 Testing instruments, including pressure gauges and testing machine, shall be calibrated.