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Ships and marine technology — Ceramic weld backing for marine use

Navires et technologie maritime — Soutien de soudures en céramique

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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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

Ships and marine technology — Ceramic weld backing for marine use

1 Scope

This International Standard specifies the classification, dimension and appearance, performance, and test methods for ceramic weld backing. It also specifies marking, packaging, and storage.

This International Standard is applicable to designing, manufacturing, testing, and accepting ceramic weld backing that are to be used in the double side form with single side weld, such as arc welding, gas welding, vertical gas welding, and submerged arc welding, and the shaping structural steel welding end for carbon steel, stainless steel, aluminium alloy, copper alloy, and so on.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 528, *Refractory products — Determination of pyrometric cone equivalent (refractoriness)*

ISO 29862, *Self adhesive tapes — Determination of peel adhesion properties*

3 Terms and definitions

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

3.1
ceramic weld backing block
ceramic block with certain geometric shape manufactured by inorganic material

3.2
moisture absorption rate
W_a
ratio of the weight of water vapour absorbed on the surface of ceramic weld backing block to the weight of the dried sample, with certain temperature, humidity, and time

3.3
adhesive aluminium foil tape
strip of aluminium foil coated with pressure-sensitive adhesive and covered with release paper

3.4
metal case
case which is made of low carbon steel, and used for combining ceramic weld backing blocks

4 Classification

According to the fixed method, ceramic weld backing is classified as follows:

a) type I — ceramic weld backing with adhesive aluminium foil tape;

b) type II — ceramic weld backing with metal cases.

5 Dimensions and appearance

5.1 General

For inspection of its dimensions and appearance, six strips of ceramic weld backing shall be randomly selected. Each one of the samples shall meet the requirements in 5.2 and 5.3.

5.2 Dimensions

5.2.1 The tolerance of thickness for ceramic weld backing block shall be ±0,5 mm of its thickness.

5.2.2 The length tolerance for a strip of ceramic weld backing shall be −10 mm to +20 mm of its length.

5.2.3 The centreline tolerance for ceramic weld backing block with moulding groove shall be ±1,0 mm.

5.2.4 The angle tolerances of a triangular or trapezoidal ceramic weld backing block shall be ±2°.

5.3 Appearance

5.3.1 Defects, such as damage and rounded corners, are not allowed for the joints between ceramic weld backing blocks other than rounded corners made by the mould itself.

5.3.2 Within the area of the groove of the ceramic weld backing blocks and 2 mm on either side of them, mould sticking grain shall not be larger than 0,5 mm and the defect of the pit and damages shall not be more than 0,5 mm on the surface of the ceramic weld backing blocks.

6 Performance and test

6.1 Moisture absorption rate

6.1.1 The moisture absorption rate shall be measured as follows.

a) Randomly select three samples among the ceramic weld backing blocks. The dust on their surface shall be blown clear. Lay the samples on a tray, then put into an oven of constant temperature and humidity together.

b) Switch on the power of the oven and adjust the humidity to (95 ± 3) % and the temperature to (25 ± 2) °C.

c) Keep the samples and tray in the oven for 4 h, then take the samples out of the oven, weigh all samples, and record the weights as m_2 separately with an accuracy of 0,001 g.

d) Lay the samples on the tray, then place into the oven of constant temperature. Switch on the power of the oven, adjust the temperature to 200 °C, and keep for 2 h.

e) Take the samples out of the oven and keep it in the dryer until it cools down to the room temperature. Weigh all samples by an analytical balance, and record the weights as m_1 separately with an accuracy of 0,001 g.

f) The moisture absorption rate for each sample shall be calculated in accordance with Formula (1).

$$W_a = \frac{m_2 - m_1}{m_1} \times 100\,\% \quad (1)$$

where

W_a is the value of the moisture absorption rate (%);

m_1 is the weight of dried sample (g);

m_2 is the weight of sample which has absorbed water vapour sufficiently (g).

g) Calculate the average value of the three samples.

6.1.2 The average value of the moisture absorption rate shall be less than 0,35 %.

6.2 Refractoriness

6.2.1 The refractoriness should be determined according to the welding method and melting point for the metal to be welded.

6.2.2 Randomly select one ceramic weld backing block. The test of the refractoriness shall be conducted according to ISO 528.

6.3 Chemical composition

6.3.1 The content of sulfur and phosphorus in the ceramic weld backing shall be analysed by an appropriate method and shall be less than 0,1 %.

6.3.2 The content of boron in the ceramic weld backing shall be analysed by an appropriate method and shall be less than 0,01 %.

6.3.3 Any analytical technique can be used, but in case of dispute, reference shall be made to established, published methods.

6.4 Adhesive aluminium foil tape

6.4.1 Randomly select one strip of type I ceramic weld backing for the adhesive aluminium foil tape test.

6.4.2 The peeling strength of adhesive aluminium foil tape shall be determined in accordance with ISO 29862 and shall be more than 12 N/25 mm.

6.5 Metal cases

6.5.1 Randomly select one strip of type II ceramic weld backing for the metal cases test.

6.5.2 Erect the strip of ceramic weld backing, and there is no loose between the ceramic weld backing and metal cases.

7 Type approval test

7.1 General

The type approval test shall be carried out under one of the following situations:

a) initial production;

b) upon reproduction or re-manufacturing, after being suspended from production for half a year or more, or production for 4 y continuously;

c) whenever the manufacturing technique which could affect the performance or quality of the products, or its ingredient and raw material, is changed significantly.

7.2 Test items

The following tests for type approval shall be carried out, in addition to the items required in 5.2 and 5.3:

a) moisture absorption rate (see 6.1);

b) refractoriness (see 6.2);

c) chemical composition (see 6.3);

d) adhesive aluminium foil tape (for type I) (see 6.4);

e) metal cases (for type II) (see 6.5).

7.3 Acceptance criteria

If the samples meet all test requirements, the batch of ceramic weld backing will be deemed to have passed the type test. However, if the samples fail to meet any of the test requirements, additional double of samples shall be tested. If the additional samples pass all test requirements, the batch of ceramic weld backing will be deemed to have passed the type test. Otherwise, the batch of ceramic weld backing will be deemed to have failed the type test.

8 Acceptance test

8.1 Test items

Prior to delivery of the batch of ceramic weld backing blocks, the manufacturer shall test every batch of ceramic weld backing block for the following items:

a) dimensions and tolerances (see 5.2);

b) appearance (see 5.3);

c) moisture absorption rate (see 6.1);

d) chemical composition (see 6.3).

8.2 Acceptance criteria

With the same lot of raw materials, ingredients, and manufacturing technique, the ceramic weld backing can be inspected as one batch which should not be more than 500 000 m. If less than 500 000 m, the products should be treated as a batch.

If the batch of ceramic weld backing meets the requirements specified in 8.1, the batch of the products will be deemed to have passed the acceptance test. However, if some samples fail to meet any of the test requirements, additional double of samples can be allowed only one time for re-test. If the additional samples pass the test requirements in 8.1, the batch of the products will be deemed to have passed the acceptance test. Otherwise, the batch of the products will be deemed to have failed the acceptance test.

9 Marking, packaging, and storage

9.1 Marking

9.1.1 The type of an accepted ceramic weld backing is to be marked after the number of this International Standard (i.e. ISO 17683). For example, a ceramic weld backing of type I is to be marked as follows:

Ceramic weld backing ISO 17683-I

9.1.2 Markings on the package shall have the following information:

a) the number of this International Standard (i.e. ISO 17683:2014);

b) the name of the manufacturer or supplier;

c) the trade name, lot number, and number of pieces;

d) health and safety warnings as required;

e) the country of origin.

9.2 Packaging

Ceramic weld backing shall be suitably packaged to ensure against damage during shipment and storage under normal conditions.

9.3 Storage

The ceramic weld backing should be maintained in a dry, ventilated room.