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Non-destructive testing — Penetrant testing —

Part 5: Penetrant testing at temperatures higher than 50 °C

Essais non destructifs — Examen par ressuage —

Partie 5: Examen par ressuage à des températures supérieures à 50 °C

Standard
Full standard
https://standards.iteh.ai/catalog/standards/iso/192-aacab/6e6b-4cdc-86a4-4ae07f7aedab/iso-3452-5-2008

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This final draft International Standard is a draft standard developed within the European Committee for Standardization (CEN) and processed under the CEN-lead mode of collaboration as defined in the Vienna Agreement. Following parallel ISO member body voting and CEN enquiry on the DIS, this final draft, established on the basis of comments received, has been transmitted by CEN to ISO for preparation and circulation for a parallel two-month FDIS vote in ISO and formal vote in CEN.

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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.

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ISO 3452-5 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 138, *Non-destructive testing*, in collaboration with ISO Technical Committee TC 135, *Non-destructive testing*, Subcommittee SC 2, *Surface methods*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 3452 consists of the following parts, under the general title *Non-destructive testing — Penetrant testing*:

- *Part 1: General principles*
- *Part 2: Testing of penetrant materials*
- *Part 3: Reference test blocks*
- *Part 4: Equipment*
- *Part 5: Penetrant testing at temperatures higher than 50 °C*
- *Part 6: Penetrant testing at temperatures lower than 10 °C*

Introduction

Temperatures higher than 50 °C can affect the properties of penetrant test materials. The use of penetrant materials and the testing of penetrant materials within the temperature range 10 °C to 50 °C are the subject of EN 571-1 and ISO 3452-2. This part of ISO 3452 addresses materials and their use at higher temperatures.

This part of ISO 3452 introduces the concept of process times being linked to working temperatures and accordingly users are recommended to ensure that testing products are correctly associated with process parameters in written instructions (procedures).

Testing products may be specifically developed and qualified for high temperature use but testing products qualified for use at normal temperatures, in some cases, may also be suitable for higher temperature use.

This part of ISO 3452 was prepared with the assistance of ISPESL (Italy), whose laboratory performed research activity to verify the possibility of use penetrant at temperatures higher than 50 °C, up to 200 °C.

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Non-destructive testing — Penetrant testing —

Part 5: Penetrant testing at temperatures higher than 50 °C

1 Scope

This part of ISO 3452 specifies the testing requirements particular to applications at higher temperatures (over 50 °C) and also the method for qualification of suitable testing products. It applies only to materials qualified for the relevant temperature range used in accordance with the manufacturer's instructions.

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 3059, *Non-destructive testing — Penetrant testing and magnetic particle testing — Viewing conditions*

ISO 3452-2, *Non-destructive testing — Penetrant testing — Part 2: Testing of penetrant materials*

ISO 3452-3, *Non-destructive testing — Penetrant testing — Part 3: Reference test blocks*

ISO 12706, *Non-destructive testing — Terminology — Terms used in penetrant testing*

EN 571-1, *Non destructive testing — Penetrant testing — Part 1: General principles*

EN 1330-1, *Non destructive testing — Terminology — Part 1: List of general terms*

EN 1330-2, *Non destructive testing — Terminology — Part 2: Terms common to the non-destructive testing methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-1, EN 1330-2 and ISO 12706 apply.

4 High temperature penetrant testing requirements

Penetrant materials shall be qualified, type tested for the temperature range within which the test temperature is included.

The general principles as defined in EN 571-1 shall apply unless otherwise stated in this part of ISO 3452 or in the manufacturer's instructions.

The manufacturer's instructions shall be followed.

5 Safety precautions

Equipment and testing products shall be handled, stored and used in a safe manner and always in accordance with the manufacturer's instructions.

The viewing conditions required in this part of ISO 3452 are the same as those for the 10 °C up to 50 °C temperature range and the same safety precautions should be observed.

In addition to the safety considerations associated with 10 °C up to 50 °C temperature range, due consideration shall be given to the risks associated with use at higher temperatures. Skin-burning, flammability and volatility are examples of potential hazards which vary with temperature. The work area shall always be adequately ventilated and personnel exposure levels should be carefully assessed.

All relevant European, national and local regulations pertaining to health and safety, environmental requirements etc. shall be observed.

6 Personnel qualification

Personnel carrying out testing in accordance with this part of ISO 3452 shall be suitably certified (e.g. ISO 9712, EN 473). They shall also be knowledgeable of the special considerations for testing at higher temperatures (e.g. time limitations for inspection, special considerations of materials).

7 Classification of testing products

Testing products shall be classified by type, method and form as given in ISO 3452-2:2006, Table 1, but high temperature sensitivity shall be as described herein.

Products also classified and qualified for 10 °C up to 50 °C temperature range may be designated with a suffix to show suitability for use at temperatures above 50 °C, e.g. Type I, Method C, Form a, Level 2, Temperature M, (ICa-2/M).

8 General characteristics of the products

The reference products as stated in 14.2 are penetrant materials used in the range 10 °C to 50 °C for comparison purposes (see 14.3) and they shall conform with the requirements of ISO 3452-2.

Thermal stability shall be stated by the manufacturer and the test shall be carried out at least at 20 °C above the maximum rated working temperature for the candidate testing material.

Testing products shall be selected according to application with appropriate reference to the manufacturer's recommendations for process parameters.

9 Reference blocks

Temperature designation shall be performed with defined reference blocks (see e.g. Annex A of this part of ISO 3452 or ISO 3452-3, Type 1).

Before use, reference blocks shall be cleaned using suitable means and tested for absence of indications with a suitable non-aqueous wet developer. Absence of indications confirms that the panel is suitable for use. The developer shall be removed and the panel shall not be touched by bare hands throughout the process (to avoid contamination). Clean, white cotton, or other materials meant for temperature-rating gloves, may be used to assist with handling.

Annex A comparators shall be used only once and in matched pairs. One of them shall be tested at the temperature given in Clause 12 and the other one shall be tested at ambient temperature using penetrant materials suitable for use at 10 °C to 50 °C, (see Clause 8).

NOTE High temperature process of Type 1 panels could lead to some residues being difficult to remove from the cracks. Specific care needs to be taken to maintain the usability of the panels.

10 Equipment

Testing at higher temperatures requires additional equipment to that detailed in ISO 3452-2, specifically,

- a) a thermostatic cell: capable of achieving a stable temperature at least 50 °C above the maximum testing temperature,
- b) gloves suitable for that temperature,
- c) a brush suitable for that temperature, and
- d) a surface thermometer (contact type): ± 5 °C error of indication of a measuring instrument.

11 Viewing conditions

Viewing conditions shall comply with the requirements of ISO 3059.

12 Test temperature

Temperature ratings and test points are shown in Table 1. For materials with a working temperature range of more than 50 °C, testing shall be carried out at maximum intervals of 50 °C. Testing shall be carried out at the temperatures shown in Table 1.

Table 1 — Test temperatures

Temperature rating	Permitted range	Test point temperature	Tolerance
M: Medium temperature	50 °C to 100 °C	50 °C and 100 °C	± 5 °C
H: High temperature	100 °C to 200 °C	100 °C, 150 °C and 200 °C	± 5 °C
A, B: Range as specified by manufacturer	A °C to B °C	A °C; B °C and 50 °C intervals	± 5 °C