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Fire hazard testing—Part 5 : Assessment of potential corrosion damage by fire effluent— Section 2 : Guidance on the selection and use of test methods

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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In the event of any doubts arising as to the contents, the original JIS is to be the final authority.

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Fire hazard testing—Part 5 : Assessment of potential corrosion damage by fire effluent—Section 2 : Guidance on the selection and use of test methods

Introduction This Japanese Industrial Standard has been prepared based on **IEC 60695-5-2**, *Fire hazard testing — Part 5: Assessment of potential corrosion damage by fire effluents — Section 2: Guidance on the selection and use of test methods* published in 1994 as the first edition, without modifying its technical contents.

The portions with dotted underlines show the matters not included in the original International Standard.

The **IEC** Standard number is based on the new numbering system of **IEC** Standards put in force on January 1st, 1997, and the Standard published before the said date is numbered by adding 60000 to the former number. This is only the change in the numbering system and the contents remain unchanged.

1 Scope This technical report gives a summary of the test methods that are used in the assessment of hazard of corrosion damage caused by fire effluents. It presents the state of the art of these test methods and it includes special observations on their relevance and use.

Evaluation of potential corrosion damage is particularly important or high values and safety-related electrotechnical products and installations.

Remarks: The International Standard corresponding to this Standard is given below.

IEC 60695-5-2 *Fire hazard testing — Part 5: Assessment of potential corrosion damage by fire effluents — Section 2: Guidance on the selection and use of test methods*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect apply limiting only to the most recent edition (including the amendment).

JIS C 0063 : 1993 *Fire hazard testing Part 1: Guidance for the preparation of requirements and test specifications for assessing fire hazard of electrotechnical products. General guidance*

Remarks: The above is identical with **IEC 60695-1-1**: 1982, *Fire hazard testing — Part 1: Guidance for the preparation of requirements and test specifications for assessing fire hazard of electrotechnical products — General guidance.*

JIS C 0070: 1996 *Fire hazard testing Part 5: Assessment of potential corrosion damage by fire effluent — Section 1: General guidance*

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Remarks: The above is identical with **IEC 60695-5-1** : 1993, *Fire hazard testing — Part 5: Assessment of potential corrosion damage by fire effluent — Section 1: General guidance.*

3 Definitions For the purposes of this Standard, the following definitions apply. Definitions are taken from **IEC 60695-4**.

3.1 corrosion damage The physical and/or chemical damage or impaired function caused by the effluent especially by chemical action.

3.2 corrosion target The sensor — product, component, or a reference material simulating them — used to determine the degree of corrosion damage, under specified test conditions.

3.3 fire

a) A process of combustion characterized by the emission of heat and effluent accompanied by smoke, and/or flame, and/or glowing:

b) Rapid combustion spreading uncontrolled in time and space.

3.4 fire effluent The total gaseous, particulate or aerosol effluent from combustion or pyrolysis.

3.5 fire effluent decay characteristics The physical and/or chemical changes in fire effluent due to time and transport.

3.6 fire effluent transport The movement of fire effluent away from the location of the fire.

3.7 fire scenario A detailed description of conditions, including environmental, of one or more of the stages from before ignition to the completion of combustion in an actual fire at a specific location, or in a full-scale simulation.

3.8 ignition source A source of energy that initiates combustion.

3.9 smoke A visible suspension of solid and/or liquid particles in gases resulting from combustion or pyrolysis.

4 Classification of test method It is desirable that the test procedure is designed in such a manner that the results are valid for assessment of potential corrosion damage, and are also applicable to an analysis of total fire hazard.

Informative reference: Work on the design of fire tests to ensure that results are valid in assessment of total fire hazard is in its early stages (see **JIS C 0063**). This technical report therefore may be amended as work progresses.

The category of test method is defined by the type of corrosion target selected. Where no corrosion target is used, the test method is classified as an indirect assessment.

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4.1 Product testing The corrosion target shall be a manufactured product.

Examples are: printed wiring boards, switchboards, washing machines, computers, etc.

The effects of fire effluent on the product can be assessed by degradation of function as determined by inspection or measurement.

4.2 Simulated product testing The corrosion target shall be a representative material simulating a product.

The effects of fire effluent on the conventional material can be assessed by changes in appearance, weight or measurements of mechanical, physical or electrical characteristics.

4.3 Indirect assessment An indirect method of assessment is one that uses no corrosion target but measures a characteristic of the gases and vapours evolved, for example the pH and/or the conductivity of a solution in which the gases and vapours evolved by combustion have been dissolved.

5 Summary of published test methods This summary cannot be used in place of full published standards which are the only reference documents.

5.1 Determination of the acidity and conductivity of combustion gases after bubbling in an aqueous solution One international and many national standards are based on the method described here.

Annex B gives the differences among four of these methods.

5.1.1 Purpose and principle This technique is used to measure the pH and conductivity of the solution of fire gases, after bubbling, evolved by the pyrolysis or combustion of test specimens.

Assessment is made by measuring the pH or pH and conductivity, of aqueous solutions obtained after bubbling these gases in distilled or demineralized water.

5.1.2 Test specimen The test specimen typically has a mass of 0.5 g or 1.0 g.

5.1.3 Method An annular furnace is set to a temperature specified in the relevant standard of between 750 ℃ and 950 ℃. It is placed over a test specimen located in a porcelain boat inside a quartz glass combustion tube. Air is injected upstream of combustion and the combustion gases are directed into wash bottles containing distilled or demineralized water by suction or blowing.

5.1.4 Repeatability and reproducibility Repeatability and reproducibility have been determined during round robin tests used to develop the French standard.

Repeatability: 4 % to 7 %

Reproducibility: 9 % to 11 %

The values depend on test conditions and materials (see Annex C).

5.1.5 Relevance of test data to corrosion hazard assessment For strong acids and bases, it is known by experience that within a generically similar family of polymeric

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