

SLOVENSKI STANDARD oSIST prEN IEC 60068-2-88:2024

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Okoljsko preskušanje - 2-88. del: Preskusi - Preskus xd: Odpornost komponent in sestavov na tekoče čistilno sredstvo

Environmental testing - Part 2-88: Tests - Test xd: Resistance of components and assemblies to liquid cleaning media

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elementiElectronic component
assemblies

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TITLE:

ENVIRONMENTAL TESTING - Part 2-88: Tests – Test XD: Resistance of components and assemblies to liquid cleaning media

PROPOSED STABILITY DATE: 2030

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3 4 5			ENVIRONMI	ENTAL TESTING	
6 7 8 9	F	Part 2-88: Tests –	Test XD: Resista liquid cle	ance of components eaning media	and assemblies to
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46 47	IEC 60068-2-88 has been prepared by IEC technical committee 91: Assembly Technology. It is an International Standard.				
48	T٢	e text of this Internat	ional Standard is bas	ed on the following docum	nents:
			Draft	Report on voting]
			XX/XX/FDIS	XX/XX/RVD]

49

50 Full information on the voting for its approval can be found in the report on voting indicated in 51 the above table.

52 The language used for the development of this International Standard is English.

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This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

57 The committee has decided that the contents of this document will remain unchanged until the 58 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to 59 the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.
- 64

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INTRODUCTION

66 Background

⁶⁷ "Surface mount technology development and innovation continues in response to market ⁶⁸ pressures for higher functionality, cost reduction, cycle time reduction, and improved quality. ⁶⁹ To achieve increased functionality, today's circuit assemblies pack more performance into ⁷⁰ smaller board designs. Advanced package designs require an increasing number of ⁷¹ interconnects to support power requirements and bandwidth. With active and passive ⁷² component size reduction as well as many area array pitches and standoff heights also ⁷³ reducing, this increases the risk of dendrite formation and electrochemical migration."¹

Current manufacturing processes preferably to not use cleaning steps for the sake of cost 74 saving, environmental impacts, and potentially detrimental effects to quality and reliability of 75 76 the equipment. But there are situations, where cleaning of components or assemblies becomes unavoidable, e.g. in case protective coatings are to be applied, or cleaning is 77 required by specific regulations concerning the end use of the equipment. It is the challenge 78 for process engineers to select effective cleaning media and processes at one side, and on 79 the other side to evaluate whether the components and circuit boards exposed to those 80 processes can withstand it without being damaged or its performance being deteriorated. 81

82 Current industry standard test methods

Current standards, like IEC 60068-2-45 and some other component standards describe resistance to solvents test, but the test liquids used for testing (e.g. alcohols) are not commonly used in real industrial cleaning processes. In addition, the current resistance to solvent test methods are immersion tests without any mechanical load to the components or ultrasonic agitation. The current focus of these tests is put mainly on the legibility of marking, etc.

Other standards, like MIL-STD-202, Method 215K, describe very specific qualification processes and solvents, which again are not common in today's manufacturing processes of electronic equipment.

92 To close the gap

<u>SIST prEN IEC 60068-2-88:2024</u>

It is the intention of this document to close the above-described gap between industrial practice and existing test methods. The approach used is a combination of basic qualification tests to be performed on component and upopulated circuit board level, and a validation test to be performed on assembly level, using the real manufacturing processes conditions and media. By this two-step approach, a pre-selection of components suitable for the intended assembly and cleaning processes, the evaluation of its resistance against the selected processes, and detection of material incompatibilities is enabled.

100 The test liquids specified in this document are representative for solvent families used in 101 cleaning processes of electronics industry.

102

¹ Source: IPC 9505

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103	ENVIRONMENTAL TESTING				
104 105 106 107 108	Part 2-88: Tests – Test XD: Resistance of components and assemblies to liquid cleaning media				
109	1 Scope				
110 111 112 113 114	This part of IEC 60068-2 establishes test methods for the resistance of electronic and electromechanical components, unpopulated circuit boards and assemblies to liquid cleaning media and cleaning processes, which are agreed between user and supplier for applications, where cleaning is required. These tests are not applicable to components, unpopulated circuit boards and assemblies, which are not intended to be subjected to cleaning processes.				
115 116 117 118	Tests XD_1 and XD_2 primarily are intended for qualification testing of components and unpopulated circuit boards suitable for cleaning processes, but can be adopted as well to testing of material compatibility and specific cleaning media used in manufacturing processes of components and unpopulated circuit boards.				
119 120 121	Test XD_3 is intended to determine the resistance of electronic assemblies suitable for cleaning processes to the various cleaning processes to which they are exposed during manufacturing, including the effects of assembly and soldering processes.				
122	2 Normative references iTeh Standards				
123	There are no normative references in this document.				
124	3 Terms and definitions				
125	For the purposes of this document, the following terms and definitions apply.				
126 127	ISO and IEC maintain terminological databases for use in standardization at the following addresses: catalog/standards/sist/a2ebb1b2-062f-4fab-a48f-e3cc8e90ac76/osist-pren-iec-60068-2				
128	IEC Electropedia: available at https://www.electropedia.org/				
129	ISO Online browsing platform: available at https://www.iso.org/obp				
130 131 132	3.1 compatibility interaction between material sets which do not negatively impact the end use product				
133 134	Example: removal of flux while not interacting with the markings required for product use. [SOURCE: IPC 9505]				
135 136 137	3.2 incompatibility interaction between material sets which do negatively impact the end use product				
138 139	Example: removal of protective coatings and critical type markings. [SOURCE: IPC 9505]				
140 141 142	3.3 qualification process process to demonstrate the ability to fulfil specified requirements				
143	[SOURCE: ISO 9000:2015, 3.8.6]				

- 144 **3.4**
- 145 validation
- confirmation, through the provision of objective evidence, that the requirements for a specific
 intended use or application have been fulfilled
- 148 [SOURCE: ISO 9000:2015, 3.8.5]

149 **4 Objective and general aspects**

150 **4.1 Objective**

To establish methods to assess the effects of short-term exposure of components and unpopulated circuit boards to prescribed liquid cleaning media as they as used typically in cleaning processes of electronic assemblies. It provides a qualification process and the validation of cleaning processes as they are used during manufacturing of electronic assemblies.

Plastic materials show a different behaviour against liquid cleaning media, even when the liquid cleaning media are from the same family with similar contents. A component or circuit board can therefore not generally be regarded as resistant against liquid cleaning media. It can only be stated as resistant to such liquid cleaning media that it has been tested against.

160 **4.2 General**

Testing is performed to ensure resistance of a test specimen to liquids to which it could be exposed during manufacturing or assembly and is carried out by immersing the test specimen in a specified test liquid, or group of liquids, for a specified period at a specified temperature. Separate test specimen shall be used for each test liquid and test condition. Properties are measured prior to and after exposure to the liquid.

166 Components and unpopulated circuit boards should be tested under the same conditions and 167 severities as described in test XD_1 and XD_2 , assuming that at a later stage both will be 168 stressed in the same way during the assembly processes.

169 Components and unpopulated circuit boards shall be tested in as received conditions without 170 cleaning. The tests described do not differ between components or unpopulated circuit boards, 171 which may contain flux residues coming from their manufacturing process (e.g. certain 2-88-2024 172 inductors or boards using hot air leveling finishes) and those without flux residues,

173 **WARNING** – Intended users of this procedure are cautioned that tests of this nature may 174 involve the use of certain hazardous material, operations and equipment. In particular, some 175 of the fluids that may be used are flammable or may constitute health hazards, or both. Test 176 temperatures should be at least 10°C below the flashpoint of any fluid being used. Open 177 flame heat sources should not be used with any organic solvents. Test personnel should 178 consult the relevant material's safety data sheets when necessary.

179 **4.3 Qualification and validation process**

- Details of the qualification and validation process are described in Annex A. For qualification of components and unpopulated circuit boards (tests XD₁ and XD₂) it is important,
- to test components and unpopulated circuit boards individually to enable inspection from
 all sides for any detrimental effects. In assembled stage this would be not possible
 anymore, e.g., underneath components,
- to select appropriate test liquids and conditions under consideration of worst-case
 conditions, to which the components and circuit boards later can be exposed in
 manufacturing processes of electronic assemblies.
- 188 For validation (test XD₃) it is important,
- 189 to use the cleaning media and cleaning equipment as used in the manufacturing process,
- 190 to set cleaning process parameters under consideration of worst-case conditions,
- 191 to include all cleaning steps into the test sequence.