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TECHNICAL REPORT

colour inside

Damp heat, steady state (unsaturated pressurized vapour with air)

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC TR 63141, which is a Technical Report, has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
104/834/DTR	104/853A/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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- withdrawn,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

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INTRODUCTION

Highly accelerated stress test (HAST), is a high temperature (100 °C or more), high humidity steady test of unsaturated pressurized steam of 85 % RH, and is the original test method that was developed for the evaluation of corrosion of packaged semiconductor wiring. This test method, often referred to as HAST, is applied to primarily non-hermetically sealed small electronic components, and has been standardized as a standard test method for evaluating, in an accelerated manner, the resistance to the deteriorative effect of high temperature and high humidity (IEC 60068-2-66). The equipment used for this test method is a chamber, filled with unsaturated water vapour, called a HAST chamber.

However, in life evaluation test conditions, acceleration cannot be obtained without air from the environment being incorporated into the HAST chamber. This test method is referred to as air-HAST.

Examples of the application of air-HAST are whiskers evaluation of lead-free solder, deterioration life evaluation of conductive paste, and deterioration life evaluation of solar cells and are given in this document in order to provide an understanding of air-HAST with the aim, in future, to standardize air-HAST.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning whisker evaluation given in Clause5.

IEC takes no position concerning the evidence, validity and scope of this patent right.

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DAMP HEAT, STEADY STATE (UNSATURATED PRESSURIZED VAPOUR WITH AIR)

1 Scope

This document describes a new test method to control the volume of air injected into a conventional HAST chamber filled with water vapour. This document provides an overview of the conventional HAST chamber, an overview of the air-HAST equipment where air is incorporated into the HAST chamber, an example of an air-HAST test apparatus, and application examples of air-HAST.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
galvanic corrosion
corrosion damage induced when two dissimilar materials are coupled in a corrosive electrolyte

3.2
Kirkendall effect
motion of the boundary layer between two metals that occurs as a consequence of the difference in diffusion rates of the metal atoms

3.3
whisker
metallic protrusion which grows up naturally during storage or in use

3.4
HAST
highly accelerated stress test
original test method developed to evaluate the corrosion of the semiconductor wiring at a high temperature of 100 °C or more

3.5
air-HAST
HAST test method with the addition of further air partial pressure in a HAST chamber