IEC 60749-20-1

Edition 1.0 2009-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

withdrawn

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Semiconductor devices – Mechanical and climatic test methods – Part 20-1: Handling, packing, labelling and shipping of surface-mount devices sensitive to the combined effect of moisture and soldering heat

Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 20-1: Manipulation, emballage, étiquetage et transport des composants pour montage en surface sensibles à l'effet combiné de l'humidité et de la chaleur de brasage

IEC 60749-20-1:2009

THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.
If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.
Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

Withdrawn

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:
Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,…). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:
Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

IEC 60749-20-1

Edition 1.0 2009-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Withdrawn

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Semiconductor devices – Mechanical and climatic test methods – Part 20-1: Handling, packing, labelling and shipping of surface-mount devices sensitive to the combined effect of moisture and soldering heat

Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 20-1: Manipulation, emballage, étiquetage et transport des composants pour montage en surface sensibles à l'effet combiné de l'humidité et de la chaleur de brasage

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

ICS 31.080.01

ISBN 978-2-88910-285-3

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

CONTENTS

FOREWORD ... 4
INTRODUCTION ... 6
1 Scope ... 7
2 Normative references ... 7
3 Terms and definitions ... 7
4 General applicability and reliability considerations ... 9
4.1 Assembly processes ... 9
4.1.1 Mass reflow ... 9
4.1.2 Localized heating ... 9
4.1.3 Socketed components ... 9
4.1.4 Point-to-point soldering ... 9
4.2 Reliability ... 9
5 Dry packing ... 10
5.1 Requirements ... 10
5.2 Drying of SMDs and carrier materials before being sealed in MBBs ... 10
5.2.1 Drying requirements - level A2 ... 10
5.2.2 Drying requirements - levels B2a to B5a ... 10
5.2.3 Drying requirements - carrier materials ... 10
5.2.4 Drying requirements - other ... 11
5.2.5 Excess time between bake and bag ... 11
5.3 Dry pack ... 11
5.3.1 Description ... 11
5.3.2 Materials ... 11
5.3.3 Labels ... 13
5.3.4 Shelf life ... 14
6 Drying ... 14
6.1 Drying options ... 14
6.2 Post exposure to factory ambient ... 16
6.2.1 Floor life clock ... 16
6.2.2 Any duration exposure ... 16
6.2.3 Short duration exposure ... 16
6.3 General considerations for baking ... 17
6.3.1 High-temperature carriers ... 17
6.3.2 Low-temperature carriers ... 17
6.3.3 Paper and plastic container items ... 17
6.3.4 Bakeout times ... 17
6.3.5 ESD protection ... 17
6.3.6 Reuse of carriers ... 17
6.3.7 Solderability limitations ... 17
7 Use ... 18
7.1 Floor life clock start ... 18
7.2 Incoming bag inspection ... 18
7.2.1 Upon receipt ... 18
7.2.2 Component inspection ... 18
7.3 Floor life ... 18
7.4 Safe storage ... 19

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/9fb00db-6546-4719-ac0f-24407a1d04fc/iec-60749-20-1-2009

7.4.1 Safe storage categories 19
7.4.2 Dry pack 19
7.4.3 Dry atmosphere cabinet 19
7.5 Reflow 19
7.5.1 Reflow categories 19
7.5.2 Opened MBB 19
7.5.3 Reflow temperature extremes 19
7.5.4 Additional thermal profile parameters 20
7.5.5 Multiple reflow passes 20
7.5.6 Maximum reflow passes 20
7.6 Drying indicators 20
7.6.1 Drying requirements 20
7.6.2 Excess humidity in the dry pack 20
7.6.3 Floor life or ambient temperature/humidity exceeded 21
7.6.4 Level B6 SMDs 21
Annex A (normative) Symbol and labels for moisture-sensitive devices 22
Annex B (informative) Board rework 27
Annex C (informative) Derating due to factory environmental conditions 28
Bibliography 31

Figure 1 – Typical dry pack configuration for moisture-sensitive SMDs in shipping tubes 11
Figure 2a – Example humidity indicator card for level A2 13
Figure 2b – Example humidity indicator card for levels B2a to B5a 13
Figure 2 – Example humidity indicator cards 13
Figure A.1 – Moisture-sensitive symbol (example) 22
Figure A.2 – MSID label (example) 22
Figure A.3 – Information label for level A1 or B1 (example) 23
Figure A.4 – Moisture-sensitive caution label for level A2 (example) 24
Figure A.5 – Moisture-sensitive caution label for levels B2-B5a (example) 25
Figure A.6 – Moisture-sensitive caution label for level B6 (example) 26

Table 1 – Dry packing requirements 10
Table 2 – Reference conditions for drying mounted or unmounted SMDs (user bake: floor life begins counting at time = 0 after bake) 14
Table 3 – Default baking times used prior to dry-pack that were exposed to conditions ≤60 % RH (supplier bake: MET = 24 h) 16
Table 4 – Moisture classification level and floor life 18
Table C.1 – Recommended equivalent total floor life (days) for level A2 at 20 °C, 25 °C, 30 °C and 35 °C for ICs with Novolac, biphenyl and multifunctional epoxies (reflow at same temperature at which component was classified) 28
Table C.2 – Recommended equivalent total floor life (days) for levels B2a to B5a at 20 °C, 25 °C, 30 °C and 35 °C for ICs with Novolac, biphenyl and multifunctional epoxies (reflow at same temperature at which component was classified) 29

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

**SEMICONDUCTOR DEVICES –
MECHANICAL AND CLIMATIC TEST METHODS –**

Part 20-1: Handling, packing, labelling and shipping of surface-mount devices sensitive to the combined effect of moisture and soldering heat

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
https://standards.iteh.ai/catalog/standards/sist/5f37b0db-6346-4719-ac0f-24467a1d64fe/iec-60749-20-1-2009

International Standard IEC 60749-20-1 has been prepared by IEC technical committee 47: Semiconductor devices.

This standard cancels and replaces IEC/PAS 62168 and IEC/PAS 62169 published in 2000. IEC/PAS 62169 was based on a Joint (IPC/JEDEC) Industry Standard. This first edition of IEC 60749-20-1 constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
47/2010/FDIS	47/2013/RVD

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

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

A list of all the parts in the IEC 60749 series, under the general title *Semiconductor devices – Mechanical and climatic test methods,* can be found on the IEC website.

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

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

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/5fd760db-6346-4719-ac0f-24467a1d64fe/iec-60749-20-1-2009

INTRODUCTION

The advent of surface-mount devices (SMDs) introduced a new class of quality and reliability concerns regarding package damage ''cracks and delamination'' from the solder reflow process. This document describes the standardized levels of floor life exposure for moisture/reflow-sensitive SMDs along with the handling, packing and shipping requirements necessary to avoid moisture/reflow-related failures. IEC 60749-20 defines the classification procedure and Annex A of this document defines the labelling requirements.

Moisture from atmospheric humidity enters permeable packaging materials by diffusion. Assembly processes used to solder SMDs to printed circuit boards (PCBs) expose the entire package body to temperatures higher than 200 °C. During solder reflow, the combination of rapid moisture expansion, materials mismatch, and material interface degradation can result in package cracking and/or delamination of critical interfaces within the package.

The solder reflow processes of concern are convection, convection/IR, infrared (IR), vapour phase (VPR) and hot air rework tools. The use of assembly processes that immerse the component body in molten solder are not recommended for most SMDs.

This first edition of IEC 60749-20-1 is based principally on IPC/JEDEC J-STD-033 [1] and the permission to use this standard is gratefully acknowledged. It is also based on contributing documents from various national committees.

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/5fd760db-6346-4719-ac0f-24467a1d64fe/iec-60749-20-1-2009

1 Refer to Bibliography.

SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 20-1: Handling, packing, labelling and shipping of surface-mount devices sensitive to the combined effect of moisture and soldering heat

1 Scope

This part of IEC 60749 applies to all non-hermetic SMD packages which are subjected to reflow solder processes and which are exposed to the ambient air.

The purpose of this document is to provide SMD manufacturers and users with standardized methods for handling, packing, shipping, and use of moisture/reflow sensitive SMDs which have been classified to the levels defined in IEC 60749-20. These methods are provided to avoid damage from moisture absorption and exposure to solder reflow temperatures that can result in yield and reliability degradation. By using these procedures, safe and damage-free reflow can be achieved, with the dry packing process, providing a minimum shelf life capability in sealed dry-bags from the seal date.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Withdrawn

Two test conditions, method A and method B, are specified in the soldering heat test of IEC 60749-20. For method A, moisture soak conditions are specified on the assumption that moisture content inside the moisture barrier bag is less than 30 % RH. For method B, moisture soaking conditions are specified on the assumption that manufacturer’s exposure time (MET) does not exceed 24 h and the moisture content inside the moisture barrier bag is less than 10 % RH. In an actual handling environment, SMDs tested by method A are permitted to absorb moisture up to 30 % RH, and SMDs tested by method B are permitted to absorb moisture up to 10 % RH. This standard specifies the handling conditions for SMDs subjected to the above test conditions.

NOTE Hermetic SMD packages are not moisture sensitive and do not require moisture precautionary handling.

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.

IEC 60749-20, *Semiconductor devices – Mechanical and climatic test methods – Part 20: Resistance of plastic-encapsulated SMDs to the combined effect of moisture and soldering heat*

IEC 60749-30, *Semiconductor devices – Mechanical and climatic test methods – Part 30: Preconditioning of non-hermetic surface mount devices prior to reliability testing*

3 Terms and definitions

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

3.1
active desiccant
desiccant that is either fresh (new) or has been baked according to the manufacturer’s recommendations to renew it to original specifications

3.2
bar code label
a label that gives information in a code consisting of parallel bars and spaces, each of various specific widths

NOTE For the purposes of this standard, the bar code label is on the lowest level shipping container and includes information that describes the product, e.g., part number, quantity, lot information, supplier identification, and moisture-sensitivity level etc.

3.3
mass reflow
reflow of a number of components with simultaneous attachment by an infrared (IR), convection/IR, convection, or vapour phase reflow (VPR) process

3.4
carrier
container that directly holds components such as a tray, tube, or tape and reel

3.5
desiccant
absorbent material used to maintain a low relative humidity

3.6
floor life
allowable time period for a moisture-sensitive device, after removal from a moisture barrier bag, dry storage or dry bake and before the solder reflow process

3.7
humidity indicator card
HIC
card on which a moisture-sensitive chemical is applied in such a way that it will make a significant, perceptible change in colour (hue), typically from blue (dry) to pink (wet) when the indicated relative humidity is exceeded

NOTE The HIC is packed inside the moisture-barrier bag, along with a desiccant, to aid in determining the level of moisture to which the moisture-sensitive devices have been subjected.

3.8
manufacturer's exposure time
MET
maximum time after bake that the component manufacturer requires to process components prior to bag seal; it also includes the maximum time allowed at the distributor for having the bag open to split out smaller shipments

3.9
moisture barrier bag
MBB
bag designed to restrict the transmission of water vapour and used to pack moisture-sensitive devices

3.10
rework
the removal of a component for scrap, reuse, or failure analysis; the replacement of an attached component; or the heating and repositioning of a previously attached component

3.11
shelf-life
maximum storage period for a dry-packed moisture-sensitive device in an unopened moisture barrier bag (MBB) to avoid exceeding the specified interior bag ambient humidity

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009

3.12
surface-mount device
SMD
plastic-encapsulated surface-mount devices made with moisture-permeable materials

NOTE For the purposes of this standard, the term SMD is limited as indicated in the definition.

3.13
solder reflow
a solder attachment process in which previously applied solder or solder paste is melted to attach a component to the printed circuit board

3.14
water vapour transmission rate
WVTR
measure of the permeability of plastic film or metallized plastic film material to moisture

4 General applicability and reliability considerations

4.1 Assembly processes

4.1.1 Mass reflow

This standard applies to mass solder reflow assembly by convection, convection/IR, infrared (IR), and vapour phase (VPR), processes. It does not apply to mass solder reflow processes that immerse the component bodies in molten solder (e.g., wave soldering bottom mounted components). Such processes are not allowed for many SMDs and are not covered by the component qualifications standards used as a basis for this document.

4.1.2 Localized heating

This standard also applies to moisture sensitive SMDs that are removed or attached singly by local ambient heating, i.e., ''hot air rework.'' See Annex B.

4.1.3 Socketed components

This standard does not apply to SMDs that are socketed and not exposed to solder reflow temperatures. Such SMDs are not at risk and do not require moisture precautionary handling.

4.1.4 Point-to-point soldering

This standard does not apply to SMDs in which only the leads are heated to reflow the solder, e.g., hand-soldering, hot bar attach of gull wing leads, and through hole by wave soldering. The heat absorbed by the SMD body from such operations is typically much lower than for mass surface mount reflow or hot air rework, and moisture precautionary measures are typically not needed.

4.2 Reliability

The methods set forth in this specification ensure that an adequate SMD reliability can be achieved during and after the PCB assembly operation, when the SMDs are evaluated and verified by IEC 60749-20 and/or by IEC 60749-30, together with environmental reliability testing.

This specification does not address or ensure solder joint reliability of attached components.

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/f1b0db-6346-4719-ac0f-24467a1d64fe/iec-60749-20-1-2009

5 Dry packing

5.1 Requirements

Dry packing requirements for the various moisture sensitivity levels are shown in Table 1. The levels are determined in accordance with IEC 60749-20 and/or IEC 60749-30, together with reliability testing. As a minimum all materials used in dry packing should conform to relevant national packaging material standards for ESD-sensitive items.

Table 1 – Dry packing requirements

Level	Dry before bag	MBB	Desiccant	MSID[a] label	Caution label
A1 or B1	Optional	Optional	Optional	Not required	Not required if classified at 220 °C to 225 °C
					Required[b] if classified at other than 220 °C to 225 °C
A2 or B2	Optional	Required	Required	Required	Required
B2a-B5a	Required	Required	Required	Required	Required
B6	Optional	Optional	Optional	Required	Required

[a] MSID = Moisture-sensitive identification label.

[b] A ''Caution'' label is not required if level and reflow temperature are given, in human readable form, on the barcode label attached to the lowest level shipping container.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/5fd760db-6346-4719-ac0f-24467a1d64fe/iec-
Withdrawn

5.2 Drying of SMDs and carrier materials before being sealed in MBBs

5.2.1 Drying requirements - level A2

Packing of the SMDs classified as Level A2 into MBBs shall be carried out within one week under the environmental condition below 30 °C/60 % RH after molding, burn-in, or bake.

MET is not specified for Level A2 SMDs.

MBBs may be opened for a short period of time (less than 1 h) and re-closed provided that the HIC indicates a humidity of less than 30 % RH and provided that the desiccant is replaced with fresh desiccant. When the MBB is next opened, as long as the HIC indicates below 30 % RH, the duration time of the previous MBB's opening may be disregarded. Thus, if the HIC indicates below 30 % RH when MBB is opened, the floor life is not dependent on the duration time of MBBs opening, and is 168 h at 30 °C/70 % RH.

5.2.2 Drying requirements - levels B2a to B5a

SMDs classified from Levels B2a through to B5a shall be dried (see Clause 6) prior to being sealed in MBBs. The period between drying and sealing shall not exceed the MET less the time allowed for distributors to open the bags and repack parts. If the supplier's actual MET is more than the default 24 h, then the actual time shall be used. If the distributor practice is to repack the MBBs with active desiccant, then this time does not need to be subtracted from the MET.

5.2.3 Drying requirements - carrier materials

The materials from which carriers (such as trays, tubes, reels, etc.) are made can affect the moisture level when placed in the MBB. Therefore, the effect of these materials shall be compensated for by baking or, if required, adding additional desiccant in the MBB to ensure the shelf life of the SMDs (see 6.3).

5.2.4 Drying requirements - other

Suppliers may use the drying effect of normal in-line processes such as post mould cure, marking cure, and burn-in to reduce the bake time. An equivalency evaluation is recommended to ensure that high-temperature processing maintains moisture weight gain to an acceptable level. The total weight gain for the SMD at the time it is sealed in the MBB shall not exceed the moisture gain of that SMD starting dry and then being exposed to 30 °C/60 % RH for MET h (less the time for distributors).

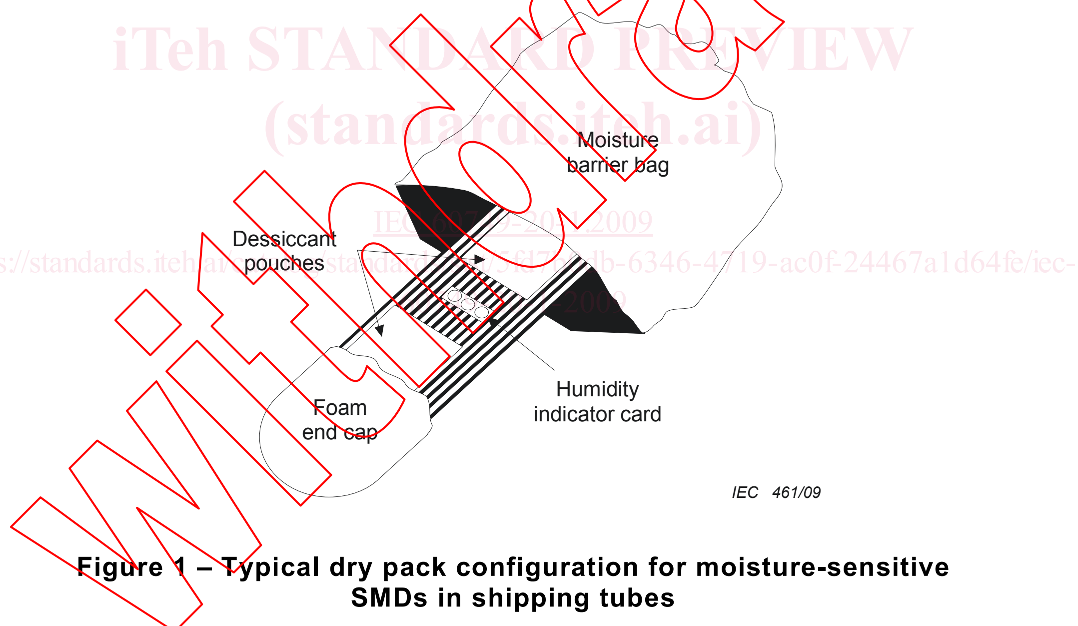
5.2.5 Excess time between bake and bag

If the allowable time between bake and bag is exceeded, the SMDs shall be redried in accordance with Clause 6.

5.3 Dry pack

5.3.1 Description

Dry pack consists of desiccant material and a humidity indicator card (HIC) sealed with the SMDs and their carriers inside a moisture barrier bag (MBB). A representative dry pack configuration is shown in Figure 1.



Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)

Figure 1 – Typical dry pack configuration for moisture-sensitive SMDs in shipping tubes

5.3.2 Materials

5.3.2.1 Moisture barrier bag (MBB)

The moisture barrier bag shall meet relevant national standard requirements for flexibility, ESD protection, mechanical strength, and puncture resistance. The bags shall be heat sealable. The water vapour transmission rate (WVTR) shall be ≤0,03 g/m^2 in 24 h at 40 °C after flex testing in accordance with relevant national standards governing flex durability of flexible barrier materials. The WVTR is measured using relevant national standards governing water vapour transmission rate through plastic film and sheeting using a modulated infrared sensor.

5.3.2.2 Desiccant

The desiccant material shall comply with relevant national standards governing activated desiccants used for the static dehumidification of packaging bags. Desiccant shall be dustless, non-corrosive, and absorbent to amounts specified in the standard. The desiccant shall be

packaged in moisture permeable bags. The amount of desiccant used, per moisture barrier bag, shall be based on the bag surface area and WVTR in order to maintain an interior relative humidity in the MBB of less than 30 % at 25 °C for SMD classification A2 and less than 10 % at 25 °C for SMDs classified from Levels B2a through to B5a.

For comparison between various desiccant types, certain specifications adopted the ''UNIT'' as the basic unit of measure of quantity for desiccant material. A UNIT of desiccant is defined as the amount that will absorb a minimum of 2,85 g of water vapour at 20 % RH and 25 °C. To meet the dry pack requirements of this standard the amount of water vapour that a UNIT of desiccant can absorb at 10 % RH and 25 °C must be known.

When the desiccant capacity at 10 % RH and 25 °C is known, the following equation should be used.

$$U = (0{,}003 \times M \times WVTR \times A)/D \quad (1)$$

where

U = amount of desiccant in UNITS;

M = shelf life desired in months;

$WVTR$ = water vapour transmission rate in g/m^2 in 24 h;

A = total surface area of the MBB in m^2;

D = amount of water in grams, that a UNIT of desiccant will absorb at 10 % RH and 25 °C.

When the desiccant capacity at 10 % RH and 25 °C is not known, the quantity needed can be estimated using the following simplified equation.

$$U = 8 \times A \quad (2)$$

where

U = amount of desiccant in UNITS;

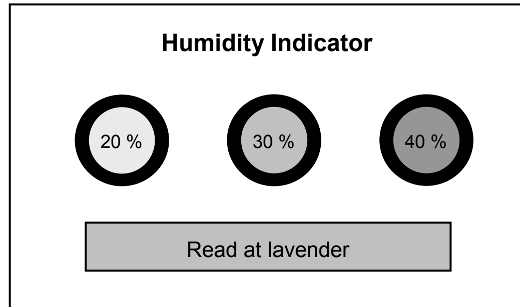
A = total surface area of the MBB in m^2.

NOTE If trays, tubes, reels, foam end caps, etc., are placed in the bag without baking, additional desiccant will be required to absorb the moisture contained in these materials.

5.3.2.3 Humidity indicator card (HIC)

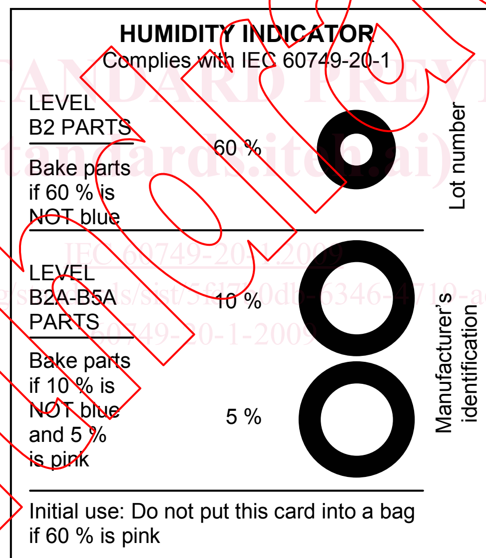
The HIC shall comply with relevant national standards governing chemically impregnated humidity indicator cards. For level A2 the HIC shall have a sensitivity value of 30 % RH which may be indicated by colour dots with sensitivity values of 20 % RH, 30 % RH, 40 % RH. For SMDs classified from Levels B2a through to B5a, as a minimum, the HIC shall have 3 colour dots with sensitivity values of 5 % RH, 10 % RH, 60 % RH. Example HIC are shown in Figure 2a and Figure 2b.

Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/5fd760db-6346-4719-ac0f-24467a1d64fe/iec-60749-20-1-2009



Below 30% RH can be confirmed by comparison of a color (lavender).

Figure 2a – Example humidity indicator card for level A2



Withdrawn
iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 60749-20-1:2009
https://standards.iteh.ai/catalog/standards/sist/5f4f70db-6346-4f19-ac0f-24467a1d64fe/iec-60749-20-1-2009

Figure 2b – Example humidity indicator card for levels B2a to B5a

Figure 2 – Example humidity indicator cards

5.3.3 Labels

5.3.3.1 Labels - Moisture sensitive identification

Labels relevant to the dry pack process are the moisture-sensitive identification (MSID) label and the caution label as specified in Annex A (see Figures A.2 to A.5). The MSID label shall be affixed to the lowest-level shipping container that contains the MBB. The Caution label shall be affixed to the outside surface of the MBB.

5.3.3.2 Labels - Level B6 requirements

Level B6 parts not shipped in MBBs shall have both an MSID label and the appropriate caution label affixed to the lowest level shipping container.