



# UL 60384-14

## **STANDARD FOR SAFETY**

Fixed Capacitors for Use in Electronic Equipment  
– Part 14: Sectional Specification: Fixed  
Capacitors for Electromagnetic Interference  
Suppression and Connection to the Supply Mains



Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains, UL 60384-14

Second Edition, Dated July 11, 2014

### **Summary of Topics**

***The revisions to the Standard for Safety for Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains, UL 60384–14, are being issued to reflect the latest ANSI approval date, and to incorporate the following changes in requirements:***

- ***Removal of Figure 9DVD2 modification.***

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated April 28, 2017.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

No Text on This Page

**JULY 11, 2014**  
(Title Page Reprinted: June 1, 2017)



**ANSI/UL 60384-14-2017**

**1**

**UL 60384-14**

**Safety Requirements for Fixed Capacitors for Use in Electronic Equipment**

**– Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic**

**Interference Suppression and Connection to the Supply Mains**

First Edition – April, 2009

**Second Edition**

**July 11, 2014**

This ANSI/UL Standard for Safety consists of the Second Edition including revisions through June 1, 2017.

The most recent designation of ANSI/UL 60384-14 as an American National Standard (ANSI) occurred on June 1, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

**COPYRIGHT © 2017 UNDERWRITERS LABORATORIES INC.**

No Text on This Page

## CONTENTS

<b>Preface (UL)</b> .....	<b>6</b>
<b>NATIONAL DIFFERENCES</b> .....	<b>7</b>
<b>FOREWORD</b> .....	<b>8</b>
1 General .....	10
1.1 Scope .....	10
1.2 Object .....	10
1.3 Normative references .....	10
1.4 Information to be given in a detail specification .....	11
1.5 Terms and definitions .....	13
1.6 Marking .....	21
1.7 Classification of Class X and Class Y capacitors .....	22
2 Preferred ratings and characteristics .....	26
2.1 Preferred characteristics .....	26
2.2 Preferred values of ratings .....	26
2.3 Requirements for sleeving, tape, tubing and wire insulation .....	28
3 Assessment procedures .....	28
3.1 Primary stage of manufacture .....	28
3.2 Structurally similar components .....	28
3.3 Certified records of released lots .....	28
3.4 Approval testing .....	28
3.5 Quality conformance inspection .....	39
4 Test and measurement procedures .....	42
4.1 Visual examination and check of dimensions .....	43
4.2 Electrical tests .....	44
4.3 Robustness of terminations .....	48
4.4 Resistance to soldering heat .....	49
4.5 Solderability .....	49
4.6 Rapid change of temperature .....	50
4.7 Vibration .....	50
4.8 Bump .....	51
4.9 Shock .....	52
4.10 Container sealing .....	53
4.11 Climatic sequence .....	53
4.12 Damp heat, steady state .....	55
4.13 IMPULSE VOLTAGE .....	56
4.14 Endurance .....	58
4.15 Charge and discharge .....	61
4.16 Radiofrequency characteristics .....	63
4.17 PASSIVE FLAMMABILITY test .....	63
4.18 ACTIVE FLAMMABILITY test .....	64
4.19 Component solvent resistance (if applicable) .....	67
4.20 Solvent resistance of the marking .....	67

**Annex A (normative) Circuit for the IMPULSE VOLTAGE test****Annex B (normative) Circuit for the endurance test****Annex C (normative) Circuit for the charge and discharge test****Annex D (normative) Declaration of design (confidential to the manufacturer and the certification body)****Annex E (informative) Pulse test circuits****Annex F (normative) Particular requirements for safety test of surface mounting capacitors**

F.1 General .....	76
F.2 Test and measurement procedures .....	76

**Annex G (informative) Capacitance ageing of fixed capacitors of ceramic dielectric, Class 2**

G.1 Overview .....	79
G.2 Law of capacitance ageing .....	79
G.3 Capacitance measurements and capacitance tolerance .....	80
G.4 Special preconditioning .....	81

**Annex H (normative) Use of safety approved a.c. rated capacitors in d.c. applications**

H.1 Overview .....	82
H.2 Background .....	82
H.3 Terms and definitions .....	82
H.4 Additional requirement for use of X- and Y-capacitors in d.c. applications .....	82

**Annex I (normative) Humidity robustness grades for applications, where high stability under high humidity operating conditions is required**

I.1 Overview .....	84
I.2.1 Grade (I) robustness under humidity .....	84
I.2.2 Grade (II) robustness under high humidity .....	84
I.2.3 Grade (III) high robustness under high humidity .....	85
I.3 Indication of humidity robustness grades .....	85



No Text on This Page

## Preface (UL)

This UL Standard is based on IEC Publication 60384-14: Fourth Edition, Safety Requirements for Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains. IEC publication 60384-14 is copyrighted by the IEC.

This is the UL Standard for Safety for Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains.

The text, figures and tables of IEC publication 60384-14, Safety Requirements for Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains copyright June, 2013 are used in this Standard with the consent of the IEC and the American National Standards Institute (ANSI). The IEC copyrighted material has been reproduced with permission from ANSI. ANSI should be contacted regarding the reproduction of any portion of the IEC material. The IEC Foreword and Introduction are not a part of the requirements of this Standard but are included for information purposes only. Copies of IEC Publication 60384-14 may be purchased from ANSI, 11 West 42<sup>nd</sup> Street, New York, New York, 10036, (212) 642-4900.

**Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.**

These materials are subject to copyright claims of IEC, ANSI, and UL. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of UL. All such requests pertaining to the ANSI/UL 60384-14 Standard should be submitted to UL.

The previous version of UL 60384-14 included national differences to the following IEC requirements: Clauses 2.26, 2.3, 4.14.1, 4.17 and Figure 9. These national differences were deleted in this version of UL 60384-14.