UL 746C

STANDARD FOR SAFETY

Polymeric Materials – Use in Electrical Equipment Evaluations

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER
REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

UL Standard for Safety for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C

Seventh Edition, Dated February 5, 2018

SUMMARY OF TOPICS

This revision of ANSI/UL 746C dated July 28, 2026 is issued for the clarification of Exposure and Evaluation Requirements for Polymeric Materials Exposed to UVC for UV Germicidal Irradiation (UVGI) Purposes provided in 25.1, 25.2, 25.3, 57.1.1, 57.2.2, 57.2.6, 57A.2.1, 57A.2.2, 57A.2.5, and 57A.2.6; Section 25A (deleted) and Table 4.1, Table 25.1 and Table 25.2.

Text that has been changed in any manner or impacted by ULSE'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 3, 2026 and June 19, 2026.

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 ULSE Inc. (ULSE).

ULSE 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 ULSE 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 ULSE or an authorized ULSE representative has been advised of the possibility of such damage. In no event shall ULSE'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 ULSE 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.

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

No Text on This Page

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

FEBRUARY 5, 2018
(Title Page Reprinted: July 28, 2026)

ANSI/UL 746C-2026

1

UL 746C

Standard for Polymeric Materials – Use in Electrical Equipment Evaluations

The first edition was titled Test for Polymeric Enclosures of Portable Electrical Appliances and numbered UL 746.51.

First Edition – June, 1973
Second Edition – March, 1978
Third Edition – May, 1989
Fourth Edition – December, 1995
Fifth Edition – November, 2001
Sixth Edition – September, 2004

Seventh Edition

February 5, 2018

This ANSI/UL Standard for Safety consists of the Seventh Edition including revisions through July 28, 2026.

The most recent designation of ANSI/UL 746C as an American National Standard (ANSI) occurred on July 28, 2026. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 746C on November 3, 1998. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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

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

© 2026 ULSE Inc. All rights reserved.

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

No Text on This Page

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

CONTENTS

INTRODUCTION

1 Scope 7
2 General 7
3 Glossary 8

ENCLOSURES

4 General 12
5 Portable Unattended Household Equipment – Alternate Path 14
5.1 General 14
5.2 Electrical connections 15
5.3 Materials adjacent to connections 15
5.4 Wire, tubing, sleeving and tape 15

ELECTRICAL INSULATION

6 Material Property Considerations 16
6.1 General 16
6.2 Evaluation of materials not meeting preselection test performance levels in Table 6.1 22
7 Internal Barriers 22

PERFORMANCE CRITERIA

8 General 23

ELECTRICAL

9 Comparative Tracking Index (CTI) 23
10 Dielectric Strength 24
11 High Current Arc Resistance to Ignition (HAI) 24
12 Hot-Wire Ignition (HWI) – Abnormal Overload Test or Glow-Wire End-Product Test 25
12.1 General 25
12.2 Abnormal overload test 25
12.3 Glow-wire end-product test (GWEPT) 26
13 Inclined Plane Tracking 26
14 Volume Resistivity 26

FLAMMABILITY

15 Flammability – 12 mm Flame 27
16 Flammability – 20 mm (3/4-Inch) Flame 27
17 Flammability – 127 mm (5 Inch) Flame 27
18 Enclosure Flammability – 746-5VS 27
18.1 Test criteria 27
19 Enclosure Flammability – Large Surface Area Considerations 28
20 Flame-Retardant Coatings 28
20.1 General 28
20.2 Test criteria 29

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

MECHANICAL

21 Crushing Resistance 29
22 Resistance to Impact 29

DIMENSIONAL CHANGE OF POLYMERIC PARTS

23 Creep 30

PERMANENCE

24 Permanence 31
24.1 General 31
24.2 Vicat softening point 31
24.3 Heat deflection temperature 31
24.4 Ball pressure temperature 31
25 Ultraviolet Radiation Exposure 31
25A Ultraviolet Light Germicidal Exposure (UV-C) 32
26 Water Exposure and Immersion 33
26.1 General 33
26.2 Dimensional change 33

SPECIAL END-USE CONSIDERATIONS

27 Abnormal Operation 33
28 Severe Conditions 33

THERMAL

29 Mold Stress-Relief Distortion 34
30 Input to Motor 34
31 Strain-Relief Test after Mold Stress-Relief Distortion 34
32 Temperature Considerations – General 34
33 Functional-Use Temperature Indices 35
34 Generic Thermal Indices 36
35 Relative Thermal Index 36
36 Relative Thermal Capability 37
37 Relative Thermal Capability (Alternate) 38
38 Temperature Excursions Beyond the Maximum Use Temperature 41

SPECIALIZED APPLICATIONS

39 General – Adhesives 42
40 Function Analysis 42
41 Program of Investigation 43
41.1 End-product evaluation 43
41.2 Effect of environmental conditions 43
41.3 Test criteria 43
42 Coil Forms 43
43 Conformal Coatings 43

METALLIZED PARTS

44 General 44

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

45 Ductile Coatings....44
46 Brittle Coatings....44

TEST PERFORMANCE

47 General....45
47.1 Details....45
47.2 Voltmeters....45
47.3 Cheesecloth indicators....45
47.4 Supply-circuit voltage and frequency....45
48 End-Product Arc Resistance Test....46
49 Abnormal Overload Test....46
50 Flammability – 12 mm Flame Test....48
51 Flammability – 20 mm (3/4 Inch) Flame Test....49
52 Flammability – 127 mm (5 inch) Flame Test....51
53 Enclosure Flammability – 746-5VS Test....52
53.1 Apparatus....52
53.2 Plaque conditioning....52
54 Flame-Retardant Coatings Test....54
54.1 Specimen conditioning....54
54.2 Test methods....55
54.3 Other considerations....55
55 Crushing Resistance Test....56
56 Resistance to Impact Test....56
57 Ultraviolet (UVA/UVB) Radiation Exposure Test (280 – 400 nm)....59
57.1 Apparatus....59
57.2 Method....59
57A Ultraviolet (UVC) Radiation Exposure Test (100 – 280 nm)....64
57A.1 Apparatus....64
57A.2 Method....64
58 Water Exposure and Immersion Test....65
59 Abnormal Operation Test....66
60 Severe Conditions Test....66
61 Mold Stress-Relief Distortion Test....67
62 Ball Pressure Test on End-Product....67
63 Input to Motors Test....68
64 Relative Thermal Capability....68
65 Relative Thermal Capability (Alternate)....69
66 Temperature Excursions Beyond the Maximum Use Temperature....69
67 Temperature Considerations – Illustrative Example....71
68 Temperature Considerations – Illustrative Example (Alternate RTC)....73
69 Adhesives – Specialized Applications....75
69.1 General....75
69.2 As-received test....75
69.3 Effect of temperature....76
69.4 Effect of humidity....80
69.5 Effect of cold....80
69.6 Effect of environmental cycling....80
69.7 Other test considerations....81

COIL FORMS

70 Conformal Coating Test....82
71 Tape Adhesion Test....82
71.1 General....82

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

71.2 Samples 82
71.3 Coating thickness measurement 82
71.4 Sample preparation 83
71.5 Conditioning 83
71.6 Results 83
72 Leakage Current Test 84
73 Glow-Wire End-Product Test 86
73.1 General 86
73.2 Significance 86

MARKING

74 General 86

APPENDIX A Guidelines for Evaluation of Substitute Polymeric Materials

A1 Alternate Enclosure Material Considerations 87

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

INTRODUCTION

1 Scope

1.1 These requirements cover parts made of polymeric materials that are used in electrical equipment and describe the various test procedures and their use in the testing of such parts and equipment.

1.2 These requirements do not cover the specific insulating systems that are covered by the requirements contained in the Standard for Systems of Insulating Materials – General, UL 1446.

1.3 Test procedures are provided herein for the evaluation of polymeric materials in specific applications. These test procedures include references to data obtained from small-scale property tests conducted under standard conditions as well as other practical means of evaluation.

1.4 Unless otherwise indicated, parts made by Additive-Manufacturing (AM) Technology shall be evaluated by subjecting the end-product part or test specimens cut from the end-product part to the specified test. For preselection purposes, test specimens printed in the specified dimensions or cut to the specified dimensions from a printed part may represent the end product when the same production conditions are used.

2 General

2.1 If a value for measurement is followed by a value in other units, the use of either value can be expected to provide equivalent results in the application of such requirements. Each of the requirements is stated in SI units as well as in U.S. customary units. Equivalent, although not necessarily exactly identical results, are to be expected from applying a requirement in SI units or U.S. customary units. Equipment calibrated in metric units is to be used when a requirement is applied in metric terms.

2.2 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

2.3 For reference purposes, Figure 2.1 describes the procedure to be followed in the evaluation of parts made of polymeric materials and covered by the requirements in this standard.

ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.