



UL 749

STANDARD FOR SAFETY

Household Dishwashers

*UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL*



Documents

Document Sharing Hub

UL Standard for Safety for Household Dishwashers, UL 749

Ninth Edition, Dated March 20, 2013

Summary of Topics

This revision to ANSI/UL 749 is being issued to incorporate the effective dates for the following clauses originally published March 20, 2013 with effective dates to be determined:

Clauses 8.1.5, 8.1.6, 8.3.5, 9.2.6, 18.3.1, 18.7, and 22.11

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. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The following table lists the future effective dates with the corresponding item.

Future Effective Date	References
May 24, 2016	Clauses 8.1.5, 8.1.6, 8.3.5, 9.2.6, 18.3.1, 18.7, and 22.11.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated July 1, 2011 and November 30, 2012.

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.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

No Text on This Page

*UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL*



Documents

Document Sharing Hub



Canadian Standards Association
CSA-C22.2 No. 167-13
Sixth Edition



Underwriters Laboratories Inc.
UL 749
Ninth Edition

Household Dishwashers

March 20, 2013

(Title Page Reprinted: May 24, 2013)



ANSI/UL 749-2013

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at any time. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

ISBN 978-1-55491-650-4 © 2013 CSA Group

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

This Standard is subject to periodic review, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include “Proposal for change” in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

To purchase CSA Group Standards and related publications, visit CSA Group’s Online Store at shop.csa.ca or call toll-free 1-800-463-6727 or 416-747-4044.

Copyright © 2013 Underwriters Laboratories Inc.

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 <http://csds.ul.com>.

The most recent designation of ANSI/UL 749 as an American National Standard (ANSI) occurred on March 20, 2013. The ANSI approval for this standard does not include the cover page, transmittal pages, title page, superseded requirements, or the CRG.

This ANSI/UL Standard for Safety consists of the Ninth edition.

The U.S. Department of Defense (DoD) has adopted UL 749 on August 12, 1994. The publication of revisions or a new edition of this standard will not invalidate the DoD adoption.

To purchase UL Standards, visit www.comm-2000.com, or call them at 1-888-UL33503 or 1-888-853-3503.

CONTENTS

Preface	6
1 Scope	8
2 Reference publications	8
3 Definitions	17
4 General requirements	20
5 General conditions for the tests	20
5.1 Voltage and frequency	20
5.2 Cheesecloth for heating and abnormal tests	21
5.3 Test temperature	21
5.4 Thermocouples	21
5.5 Dishwashing detergent	21
5.6 Rinse agent	22
5.7 Place setting	22
5.8 High-sudsing detergent	22
5.9 Water temperature	22
6 Classification	22
7 Marking	22
7.1 General	22
7.2 Appliance markings	24
8 Instructions	26
8.1 General	26
8.2 Instructions pertaining to a risk of fire, electric shock, or injury to persons	28
8.3 Installation instructions	30
8.4 Operating instructions	31
8.5 User-maintenance instructions	31
9 Protection against accessibility to current-carrying parts	31
9.1 General	31
9.2 ENCLOSURES for other than BUILT-IN APPLIANCES	31
9.3 ENCLOSURES for BUILT-IN APPLIANCES	33
9.4 All dishwashers	33
10 Starting of motor-operated appliances	34
11 Power input and current	34
12 Heating	34
13 Leakage current	35
14 Insulation Resistance	36
15 Moisture resistance	36
15.1 General	36
15.2 Humidity conditioning	37
15.3 Liquid overflowing from an auxiliary reservoir	37
15.4 Oversudsing	38
15.5 Liquid spillage – all appliances	39
15.6 Liquid spillage – portable appliances	40
15.7 Wetting of electrical components	40
16 Electric strength	41
17 Abnormal operation	42
17.1 Burnout test on components	42
17.2 Stopped timer	43
17.3 Cord reels	44
18 Stability and mechanical hazards	44

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

18.1	General	44
18.2	Stability	44
18.3	Sharp edges	45
18.4	Automatic restarting of the motor	45
18.5	Moving parts	45
18.6	Guards, interlocks, and the like	46
18.7	Unintentional operation	47
19	Mechanical strength	47
19.1	General	47
19.2	Frame and ENCLOSURE	48
20	Construction	49
20.1	Current-carrying parts	49
20.2	Bottom openings	50
20.3	Electrical insulation	51
20.4	Thermal insulation	52
20.5	Plumbing requirements	52
21	Internal wiring	52
21.1	General	52
21.2	Splices and connections	54
21.3	Separation of circuits	55
21.4	BARRIERS	55
21.5	Endurance test	56
22	Components	56
22.1	General	56
22.2	Mechanical assembly	58
22.3	Capacitors	58
22.4	Field-attached or optional accessories	59
22.5	HEATING ELEMENTS	60
22.6	Lampholders	60
22.7	Motors	61
22.8	Receptacles	62
22.9	Seals and diaphragms	62
22.10	Switches	62
22.11	Controls	64
22.12	Connecting hoses	67
22.13	Transformers and Power Supplies	67
22.14	Overcurrent protection	68
22.15	Electrically operated valves	68
22.16	Terminals and connectors	68
22.17	Pumps	69
22.18	Insulating devices	69
22.19	Adhesives used to secure parts	69
23	Supply connection and external flexible cords	69
23.1	PERMANENTLY CONNECTED APPLIANCES	69
23.2	CORD-CONNECTED APPLIANCES	71
23.3	Push-back relief	73
23.4	Strain relief	73
23.5	Cord reels	74
23.6	Power-supply cord kits for use with undercounter or built-in dishwashers	74
23.7	Bushings	75
24	Terminals for external conductors	75
25	Provision for grounding	76
25.1	General	76

UL COPYRIGHTED MATERIAL –
 NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
 DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

25.2	Bonding for grounding	77
25.3	Continuity of grounding circuit	79
25.4	Grounding terminals and leads	79
25.5	Heater sheaths	80
26	Screws and connections	81
27	Creepage distances, clearances, and distances through insulation	81
28	Alternative spacings-clearances and creepage distances	82
29	Resistance to corrosion	83
29.1	General	83
29.2	Liquid containers	83
30	Resistance to heat, fire and cracking – polymeric materials	83
30.1	General	83
30.2	Horizontal burning rate	84
30.3	Flammability	84
30.4	ENCLOSURE flammability – large mass consideration	86
30.5	Impact test	86
30.6	Mould stress relief	86
30.7	Immersion	87
30.8	Thermal ageing	87
30.9	Long-term exposure	88
30.10	Endurance	89
30.11	Tensile strength	89
30.12	Tensile impact energy	89
31	Manufacturing and production tests	90
31.1	Grounding continuity test	90
31.2	Electric strength test	90

Annex A (informative) Translations

Note: Annex A replaces Annex B

A1	French Translations	1
----	---------------------	---

Preface

This is the harmonized CSA Group and UL Standard for Household Dishwashers. It is the sixth edition of CAN/CSA-C22.2 No. 167, and the ninth edition of UL 749. This edition of CSA C22.2 No. 167 supersedes the previous edition published in 2008.

This harmonized Standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL).

The efforts and support of the Canadian Appliance Manufacturers Association (CAMA) and the Association of Home Appliance Manufacturers (AHAM) are gratefully acknowledged.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was reviewed by the CSA Subcommittee on Household Dishwashers, under the jurisdiction of the Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Where reference is made to a specific number of samples to be tested, the specified number shall be considered a minimum quantity.

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.

Level of harmonization

This standard is published as an identical standard for CSA Group and UL.

An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. Presentation is word for word except for editorial changes.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

CSA Group Effective Date

The effective date for CSA Group will be announced through *CSA Informs* or *CSA Group Certification Notice*.

UL Effective Date

The effective date for UL is May 24, 2016 for the following clauses:

Clauses 8.1.5, 8.1.6, 8.3.5, 9.2.6, 18.3.1, 18.7, and 22.11.

A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

Household dishwashers

1 Scope

1.1 This Standard applies to electric household dishwashers intended to be used in nonhazardous locations in accordance with the Canadian Electrical Code (CEC), Part I, C22.1, General Requirements – Canadian Electrical Code (CEC), Part II, C22.2 No. 0-10, and the National Electrical Code (NEC), NFPA 70, on circuits having a nominal voltage not exceeding 250 V.

1.2 This Standard applies to both CORD-CONNECTED APPLIANCES and PERMANENTLY-CONNECTED APPLIANCES.

1.3 This Standard does not apply to commercial appliances. Commercial appliances are covered under the scope of the Standard for Commercial Dishwashing Machines, CSA C22.2 No. 168, or the Standard for Commercial Dishwashers, UL 921.

2 Reference publications

2.1 For undated references to standards, such reference shall be considered to refer to the latest edition and all revisions to that edition up to the time when this standard was approved. For dated references to standards, such reference shall be considered to refer to the dated edition and all revisions to that edition up to the time when this standard was approved.

CSA Group Standards

CSA-B64.1.1-01 (part of CAN/CSA-B64 Series-07, Backflow preventors and vacuum breakers)
Vacuum Breakers, Atmospheric Type (AVB)

C22.1-12
Canadian Electrical Code, Part I

C22.2 No. 0-10
General Requirements – Canadian Electrical Code (CEC), Part II

C22.2 No. 0.1-M1985 (R2008)
General Requirements for Double-Insulated Equipment

C22.2 No. 0.2-93 (R2008)
Insulation Coordination

C22.2 No. 0.3-09
Test Methods For Electrical Wires and Cables

C22.2 No. 0.8-09
Safety Functions Incorporating Electronic Technology

C22.2 No. 0.15-01 (R2006)
Adhesive Labels

CAN/CSA-C22.2 No. 0.17-00 (R2009)
Evaluation of Properties of Polymeric Materials

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  Documents
Document Sharing Hub

C22.2 No. 8-M1986 (R2008)
Electromagnetic Interference (EMI) Filters

C22.2 No. 12-1982 (R2008)
Portable Luminaires

C22.2 No. 14-10
Industrial Control Equipment

CAN/CSA-C22.2 No. 18.1-04 (R2009)
Metallic Outlet Boxes

C22.2 No. 18.2-06
Nonmetallic Outlet Boxes

CAN/CSA C22.2 No. 18.3-04 (R2009)
Conduit, Tubing, and Cable Fittings

CAN/CSA-C22.2 No. 18.5-02 (R2007)
Positioning Devices

C22.2 No. 21-95 (R2009)
Cord Sets and Power Supply Cords

C22.2 No. 24-93 (R2008)
Temperature-Indicating and -Regulating Equipment

C22.2 No. 38-10
Thermoset-Insulated Wires and Cables

C22.2 No. 39-M1987 (R2007)
Fuseholder Assemblies

C22.2 No. 42-10
General Use Receptacles, Attachment Plugs, and Similar Wiring Devices

CAN/CSA C22.2 No. 42.1-00 (R2009)
Cover Plates for Flush-Mounted Wiring Device

C22.2 No. 43-08
Lampholders

C22.2 No. 49-10
Flexible Cords and Cables

C22.2 No. 55-M1986 (R2008)
Special Use Switches

CAN/CSA-C22.2 No. 65-03 (R2008)
Wire Connectors

C22.2 No. 66.2-06
Low Voltage Transformers – Part 2: General Purpose Transformers

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
Document Sharing Hub

C22.2 No. 66.3-06
Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers

C22.2 No. 72-10
Heater Elements

CAN/CSA-C22.2 No. 74-96 (R2010)
Equipment for Use with Electric Discharge Lamps

C22.2 No. 75-08
Thermoplastic-Insulated Wires and Cables

C22.2 No. 77-95 (R2009)
Motors with Inherent Overheating Protection

C22.2 No. 100-04 (R2009)
Motors and Generators

CAN/CSA-C22.2 No. 108-01 (R2010)
Liquid Pumps

C22.2 No. 111-10
General-Use Snap Switches

C22.2 No. 127-09
Equipment and Lead Wires

C22.2 No. 139-10
Electrically Operated Valves

C22.2 No. 153-09
Electrical Quick Connect Terminals

C22.2 No. 156-M1987 (R2004)
Solid-State Speed Controls

C22.2 No. 158-10
Terminal Blocks

C22.2 No. 168-2005
Commercial Dishwashers

C22.2 No. 177-92 (R2007)
Clock-Operated Switches

C22.2 No. 182.3-M1987 (R2009)
Special Use Attachment Plugs, Receptacles, and Connectors

CAN/CSA-C22.2 No. 188-04 (R2009)
Splicing Wire Connectors

C22.2 No. 190-M1985 (R2009)
Capacitors for Power Factor Correction

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
Document Sharing Hub

C22.2 No. 197-M1983 (R2008)
PVC Insulating Tape

CAN/CSA-C22.2 No. 198.1-06 (R2010)
Extruded Insulating Tubing

CAN/CSA C22.2 No. 198.3-05 (R2010)
Coated Electrical Sleeving

C22.2 No. 210-05 (R2010)
Appliance Wiring Material Products

CAN/CSA-C22.2 No. 223-M91 (R2008)
Power Supplies with Extra-Low-Voltage Class 2 Outputs

C22.2 No. 235-04 (R2009)
Supplementary Protectors

C22.2 No. 743-1953 (R2009)
Construction and Test of Electrically Equipped Machine Tools

C22.2 No. 248.1-11
Low-Voltage Fuses - Part 1: General Requirements

C22.2 No. 2459-08
Insulated Multi-pole Splicing Wire Connectors

CAN/CSA-C22.2 No. 4248.1-07
Fuseholders – Part 1: General Requirements

CAN/CSA-E730-2-6
Automatic Electrical Controls for Household and Similar Use – Part 2-6: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements

CAN/CSA-E730-2-7
Automatic Electrical Controls for Household and Similar Use – Part 2-7: Particular Requirements for Timers and Time Switches

CAN/CSA-E60384-14-09
Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains

CAN/CSA-E60730-1-02 (R2007)
Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements

CAN/CSA-E60730-2-8-01 (R2007)
Automatic Electrical Controls for Household and Similar Use - Part 2-8: Particular Requirements for Electrically Operated Water Valves, Including Mechanical Requirements

CAN/CSA-E60730-2-9-01
Automatic Electrical Controls for Household and Similar Use - Part 2-9: Particular Requirements for Temperature Sensing Controls

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
Document Sharing Hub

C22.2 No. 61058-1-09
Switches for Appliances – Part 1: General Requirements

UL Standards

UL 20
General-Use Snap Switches

UL 44
Thermoset-Insulated Wires and Cables

UL 62
Flexible Cords and Cables

UL 66
Fixture Wire

UL 83
Thermoplastic-Insulated Wires and Cables

UL 94
Test for Flammability of Plastic Materials for Parts in Devices and Appliances

UL 101
Leakage Current For Appliances

UL 157
Gaskets and Seals

UL 224
Extruded Insulating Tubing

UL 244A
Solid-State Controls for Appliances

UL 248-1
Low-Voltage Fuses - Part 1: General Requirements

UL 248-2
Low-Voltage Fuses - Part 2: Class C Fuses

UL 310
Electrical Quick-Connect Terminals

UL 355
Cord Reels

UL 429
Electrically Operated Valves

UL 486A-486B
Wire Connectors

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
Document Sharing Hub

UL 486C

Splicing Wire Connectors

UL 486E

Equipment Wiring Terminals For Use With Aluminum And/Or Copper Conductors

UL 496

Lampholders

UL 498

Attachment Plugs and Receptacles

UL 508

Industrial Control Equipment

UL 510

Polyvinyl Chloride, Polyethylene And Rubber Insulating Tape

UL 514A

Metallic Outlet Boxes

UL 514B

Conduit, Tubing, and Cable Fittings

UL 514C

Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 514D

Cover Plates for Flush-Mounted Wiring Devices

UL 635

Insulating Bushings

UL 723

Tests for Surface Burning Characteristics of Building Materials

UL 746A

Polymeric Materials – Short Term Property Evaluations

UL 746B

Polymeric Materials - Long Term Property Evaluations

UL 746C

Polymeric Materials – Use in Electrical Equipment Evaluations

UL 746E

Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fiber, and Materials Used in Printed Wiring Boards

UL 758

Appliance Wiring Material

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

UL 778
Motor-Operated Water Pumps

UL 810
Capacitors

UL 817
Cord Sets and Power-Supply Cords

UL 840
Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment

UL 873
Temperature-Indicating and -Regulating Equipment

UL 906
Outline for Solenoids

UL 917
Clock-Operated Switches

UL 921
Commercial Dishwashers

UL 935
Fluorescent-Lamp Ballasts

UL 969
Marking and Labeling Systems

UL 991
Tests for Safety-Related Controls Employing Solid-State Devices

UL 1004-1
Rotating Electrical Machines – General Requirements

UL 1004-2
Impedance Protected Motors

UL 1004-3
Thermally Protected Motors

UL 1004-7
Electronically Protected Motors

UL 1029
High-Intensity-Discharge Lamp Ballast

UL 1030
Sheathed Heating Elements

UL 1054
Special-Use Switches

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

UL 1059

Terminal Blocks

UL 1077

Supplementary Protectors for Use in Electrical Equipment

UL 1097

Double Insulation Systems for Use in Electrical Equipment

UL 1283

Electromagnetic Interference Filters

UL 1414

Capacitors and Suppressors for Radio- and Television-Type Appliances

UL 1434

Thermistor-Type Devices

UL 1439

Tests for Sharpness of Edges on Equipment

UL 1441

Coated Electrical Sleeving

UL 1565

Positioning Devices

UL 1581

Reference Standard For Electrical Wires, Cables And Flexible Cords

UL 1694

Tests For Flammability Of Small Polymeric Component Materials

UL 1977

Component Connectors For Use In Data, Signal, Control And Power Applications

UL 2111

Overheating Protectors for Motors

UL 1998

Software in Programmable Components

UL 2459

Insulated Multi-Pole Splicing Wire Connectors

UL 2557

Outline for Membrane Switches

UL 4248-1

Fuseholders - Part 1: General Requirements

UL 5085-2

Low Voltage Transformers, Part 2: General Purpose Transformers

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

UL 5085-3

Low Voltage Transformers, Part 3: Class 2 and Class 3 Transformers

UL 8750

Light Emitting Diode (LED) Equipment For Use In Lighting Products

UL 60384-14

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

UL 60691

Thermal-Links – Requirements and Application Guide

UL 60730-1

Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements

UL 60730-2-6

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements

UL 60730-2-7

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches

UL 60730-2-8

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electrically Operated Water Valves, Including Mechanical Requirements

UL 60730-2-9

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls

UL 60730-2-16A

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Water Level Controls of the Float Type for Household and Similar Applications

UL 60730-2-18

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Water and Air Flow Sensing Controls, Including Mechanical Requirements

UL 61058-1

Switches for Appliances - Part 1: General Requirements

AHAM¹ Standards

ANSI/AHAM DW-1

Dishwashers

ASSE² Standards

ASSE 1001

Performance Requirements for Atmospheric Type Vacuum Breakers

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
Document Sharing Hub

ASSE 1006
Plumbing Requirements for Residential Use Dishwashers

ASSE 1006/AHAM DW-2PR
Plumbing Requirements for Household Dishwashers

ASTM³ Standards

ASTM D 638
Standard Test Method for Tensile Properties of Plastics

ASTM D 1822
Standard Test Method for Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials

ASTM E 162
Standard Tests Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

ASTM E230/E230M
Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples

IEC⁴

IEC 60695-2-11
Fire Hazard Testing – Part 2-11: Glowing/Hot-Wire Based Test Methods – Glow-Wire Flammability Test Method for End-Products

IEC 60695-2-12
Fire Hazard Testing – Part 2-12: Glowing/Hot-Wire Based Test Methods – Glow-Wire Flammability Test Method for Materials

IEC 60695-2-13
Fire Hazard Testing – Part 2-13: Glowing/Hot-Wire Based Test Methods – Glow-Wire Ignitability Test Method for Materials

NFPA⁶ Standards

NFPA 70-2011
National Electrical Code

- ¹ Association of Home Appliance Manufacturers
- ² American Society of Sanitary Engineering
- ³ American Society for Testing and Materials
- ⁴ International Electrotechnical Commission
- ⁵ Instrumentation, Systems, and Automation Society
- ⁶ National Fire Protection Association

3 Definitions

3.1 For the purposes of this standard, where practical, the term “appliance” has been used instead of “dishwasher” or “machine.”

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM**

Documents
Document Sharing Hub

3.2 The definitions in Clauses 3.3 – 3.24 apply in this standard. Terms used throughout this standard which have been defined in Clause 3 are in SMALL ROMAN CAPITAL type font.

3.3 APPLIANCE, AUTOMATIC – An appliance equipped with a timer switch or an equivalent control that, after the appliance has been energized, governs the sequence and duration of the various portions of the operating cycle, including its termination.

3.4 APPLIANCE, BUILT-IN – An appliance that is constructed to be permanently installed in a cabinet or wall.

3.5 APPLIANCE, CORD-CONNECTED – An appliance that is connected to the electrical supply by a power-supply cord terminating in an attachment plug of configuration 5-15P or 5-20P.

3.6 APPLIANCE, PERMANENTLY CONNECTED – An appliance that is connected to the electrical supply by means other than a supply cord and an attachment plug.

3.7 BARRIER – A partition for the insulation or isolation of electric circuits, for the isolation of electric arcs, or for the isolation of moving parts or hot surfaces. In this respect, a BARRIER may serve as a portion of an ENCLOSURE and as a FUNCTIONAL PART.

3.8 CIRCUIT, LINE VOLTAGE – A circuit having characteristics in excess of those of a LOW-VOLTAGE CIRCUIT.

3.9 CIRCUIT, LOW VOLTAGE – A circuit having limited voltage and energy capacity supplied by :

- a) a primary battery having an output voltage of 30 V or less,
- b) a Class 2 transformer, or
- c) a Class 2 power supply.

Note: A circuit that is derived from a circuit that exceeds 30 V by connecting resistance or impedance, or both, in series with the supply circuit to limit the voltage and current is not considered to be a LOW-VOLTAGE CIRCUIT.

3.10 CONTROL, OPERATING – Control, the operation of which starts or regulates the appliance during normal operation.

3.11 CONTROL, PROTECTIVE – Control, the operation of which is intended to prevent the risk of electric shock, fire, or injury to persons during abnormal operation of the appliance.

Note: During the evaluation of the PROTECTIVE CONTROL, the protective functions are verified under normal and single-fault conditions of the control.

3.12 CURRENT-CARRYING PARTS – Parts carrying current during normal or abnormal operation in LINE-VOLTAGE CIRCUITS.

Note: With respect to Separation of Circuits, Clause 21.3, this term refers to parts in both LOW-VOLTAGE and LINE-VOLTAGE CIRCUITS.

3.13 ENCLOSURE – A material used to:

- a) limit accessibility of all or any parts of the product that may otherwise present a risk of electric shock or injury to persons, and

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

b) retard propagation of flame initiated by electrical disturbances that may occur within the product.

3.14 **FIELD WIRING TERMINAL** – A terminal to which a wire may be connected in the field. A wire that is provided as part of the appliance and is provided with a means of making the connection that is factory-assembled to the wire is not considered a **FIELD WIRING TERMINAL**. The following are examples of means of making wiring connections:

- a) a pressure wire connector,
- b) soldering lugs,
- c) a soldered loop, or
- d) a crimped eyelet.

3.15 **HEATER ASSEMBLY** – An assembly of:

- a) a **HEATING ELEMENT**,
- b) electrical insulation (e.g., refractory, mica, magnesium oxide), and
- c) a frame or housing (e.g., a metal sheath or the like) that holds the assembly together.

3.16 **HEATING ELEMENT** – The actual electrical conducting medium that is intended to be heated by an electric current.

3.17 **MEMBRANE SWITCH** – A momentary switching device in which at least one contact is on, or made of, a flexible substrate.

3.18 **NORMAL CYCLE** – The cycle type recommended by the manufacturer for completely washing a full load of normally soiled dishes, including the **POWER-DRY FEATURE**.

3.19 **PART, DECORATIVE** – A part used for no other function except appearance. A polymeric control knob or lever may be considered a **DECORATIVE PART**.

3.20 **PART, FUNCTIONAL** – A part used in such a way that deterioration or breakage of the part would result in a risk of fire, electric shock, or injury to persons.

3.21 **POWER-DRY FEATURE** – That function in a cycle in which electrically generated heat is introduced into the washing compartment for the purpose of improving the drying performance of the appliance.

3.22 **COMBINED TEMPERATURE-REGULATING AND -LIMITING DEVICE** – A device that functions to:

- a) regulate the temperature under normal conditions of use, and
- b) limit abnormal temperatures that might result from conditions of abnormal operation of the appliance.

3.23 **TEMPERATURE-LIMITING DEVICE** – A device that functions:

- a) only under conditions that produce abnormal temperatures, and

b) that is not intended to function during normal operation of the appliance.

3.24 TEMPERATURE-REGULATING DEVICE – A device that:

- a) regulates temperature, and
- b) functions during normal operation of the appliance.

4 General requirements

4.1 The values given in SI (metric) units shall be normative. Any other values given shall be for information purposes only.

5 General conditions for the tests

5.1 Voltage and frequency

5.1.1 Unless otherwise specified in the requirements, all tests shall be conducted with the appliance connected to a supply circuit with a rated frequency and a voltage (V_s) of:

- a) 120 V for an appliance rated from 110 to 120 V,
- b) 240 V for an appliance rated from 220 to 240 V, or
- c) the maximum rated voltage of the appliance for an appliance rated other than as specified in (a) or (b).

5.1.2 The test voltage (V_t) used during the heating tests of Clause 12 and the abnormal operation tests of Clause 17 shall be adjusted so that the calculated (see formula below) heating circuit input (W_t) is achieved during the heated wash cycle of the appliance. This compensates for HEATING ELEMENTS with inputs at V_s (see Clause 5.1.1) that are different than their rated (marked) inputs.

$$W_t = W_m(V_s/V_m)^2$$

where

W_t = the calculated heating circuit input, W

W_m = the HEATING ELEMENT rated (marked) input, W

V_s = the supply circuit voltage specified in Clause 5.1.1

V_m = the HEATING ELEMENT rated (marked) input, V

5.1.3 If it is necessary to increase the heater test voltage as specified in Clause 5.1.2 through a separate circuit, the rest of the appliance shall be supplied at the voltage specified in Clause 5.1.1.

5.1.4 If an appliance is rated for more than one frequency, testing shall be conducted at the frequency that would result in the highest temperature condition.

5.2 Cheesecloth for heating and abnormal tests

5.2.1 Whenever cheesecloth is required for a test in this standard, the cloth shall be bleached cheesecloth measuring approximately 34 g/m² (lbs-/ft²) with a thread count in the range of 10 – 13 × 9 – 12 threads/cm.

5.3 Test temperature

5.3.1 The tests shall be conducted in a draft-free location and, unless otherwise specified, at an ambient temperature in the range of 10 – 40°C (50 – 104°F).

5.4 Thermocouples

5.4.1 Thermocouples shall consist of wires not larger than 24 AWG (0.21 mm²). The thermocouple wire shall conform with the requirements for special thermocouples as specified in the Initial Calibration Tolerances for Thermocouples table in the Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples, ASTM E230/E230M.

5.4.2 When thermocouples are used in the determination of temperatures in connection with the heating of electrical devices, it is common practice to employ thermocouples consisting of 30 AWG (0.05 mm²) iron and constantan wires and a potentiometer-type indicating instrument. Such equipment shall be used whenever reference temperature measurements by thermocouples are necessary.

5.5 Dishwashing detergent

5.5.1 If a dishwashing detergent is required for a test in this standard, it shall:

a) have the following formula by mass:

Sodium carbonate	40%
Sodium tripolyphosphate	25%
Sodium sulfate	15%
Water	10%
Sodium silicate solids	8%
Nonionic surfactant (low-foaming alcohol alkoxylate)	1%
Sodium dichloroisocyanurate	1%

or

b) be a powdered dishwashing detergent as specified in Dishwashers, AHAM DW-1, or any other powdered dishwashing detergent having similar properties.

5.6 Rinse agent

5.6.1 If a rinse agent is required for a test in this standard, it shall be a rinse agent recommended by the manufacturer.

5.7 Place setting

5.7.1 If a test load or a place setting is required for a test in this standard, the place setting shall consist of dishes and cutlery as specified in Dishwashers, AHAM DW-1.

5.8 High-sudsing detergent

5.8.1 If a high-sudsing detergent is required for a test in this standard, it shall be any commercially available liquid handwashing dish soap.

5.9 Water temperature

5.9.1 If a test in this standard requires that an appliance be connected to a water supply, an appliance shall be connected to a hot water supply with a nominal water temperature of $60 \pm 2^\circ\text{C}$ ($140 \pm 3.6^\circ\text{F}$).

5.9.2 For an appliance with a water-heating feature intended to be connected to a cold-water supply in accordance with the installation instructions of Clause 8.3.5, testing shall be repeated with the appliance connected to a cold water supply with a nominal temperature of $15 \pm 5^\circ\text{C}$ ($59 \pm 9^\circ\text{F}$), unless the water temperature does not affect the test results.

5.9.3 For an appliance with a water-heating feature intended to be connected to a hot-water supply in accordance with the installation instructions of Clause 8.3.5, testing shall be repeated with the appliance connected to a hot water supply with a nominal temperature of $50 \pm 2^\circ\text{C}$ ($122 \pm 3.6^\circ\text{F}$), unless the water temperature does not affect the test results.

6 Classification

6.1 Appliances shall be grounded or double-insulated with respect to electric shock.

6.2 Appliances shall have the appropriate degree of protection against ingress of water that may introduce a risk of fire or electric shock (see Clause 15.5).

7 Marking

Advisory Note: *In Canada, there are two official languages, English and French. Annex A provides French translations of the markings specified in this standard. Markings required by this standard may have to be provided in other languages to conform with the language requirements of the country where the product is to be used.*

7.1 General

7.1.1 A marking that is required to be permanent shall be moulded, die-stamped, paint-stencilled, stamped, or etched metal that is permanently secured or indelibly stamped on a pressure-sensitive label secured by adhesive. Adhesive labels shall comply with Adhesive Labels, CSA C22.2 No. 0.15, and Marking and Labeling Systems, UL 969. If adhesive labels will be exposed to detergents or rinse agents, they shall also comply with Clauses 7.1.2 and 7.1.3.

7.1.2 After being conditioned as described in Clause 7.1.3, an adhesive label, immediately following removal from each test medium, and after being exposed to room temperature for 24 h following removal from each medium, shall:

- a) demonstrate good adhesion and not have curled edges,
- b) resist defacement or removal, as demonstrated by scraping across the test panel with a flat metal blade 0.81 mm (0.03 in) thick held at right angles to the test panel, and
- c) be legible and resist defacement when rubbed with thumb or finger pressure.

7.1.3 Three samples of the label specified in Clause 7.1.2 shall be applied to test surfaces as intended in the application and shall be conditioned for 24 h in a controlled atmosphere maintained at $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$) with a 50 ± 5 percent relative humidity. The samples shall then be immersed for 48 h in a solution representative of the solution used during a NORMAL CYCLE, maintained at the temperature the solution would attain during a NORMAL CYCLE, but not less than $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$).

7.1.4 A marking on a readily removable part shall not be acceptable.

7.1.5 A cautionary marking that is required to be permanent shall be located on a part that:

- a) requires the use of a tool for removal,
- b) cannot be removed without impairing the operation of the appliance, or
- c) is not removed during routine servicing of the appliance.

7.1.6 A cautionary marking may be located on a front panel that is removed for routine servicing, if a tool is required to remove the panel.

7.1.7 A cautionary marking intended to instruct the operator shall be legible and visible by the operator during the normal operation of the appliance. A marking giving servicing instructions shall be legible and visible when such servicing is being performed.

7.1.8 A cautionary marking shall be prefixed by the word "CAUTION", "WARNING", or "DANGER" in letters not less than 3.2 mm (0.13 in) high. The remaining letters of such a marking shall not be less than 1.6 mm (0.06 in) high.

7.2 Appliance markings

7.2.1 An appliance shall be rated in V and Hz.

7.2.2 A PERMANENTLY CONNECTED APPLIANCE or a cord-connected undercounter appliance having a motor load:

a) of 93 W (output) or less shall have a single current rating in A. For an appliance with a full-load power factor of 0.80 or more, the rating may be in W or kW, or

b) of more than 93 W shall have the following ratings clearly identified:

1) the current rating of the motor in A, and

2) the rating of the total load other than the motor load (heater load, lighting load, and the like) in A, or in W or kW.

7.2.3 If an appliance is required to have a dual rating in accordance with Clause 7.2.2(b), and if the appliance is controlled so that the motor load and the load other than the motor load are never connected simultaneously, the appliance may also be marked to indicate the maximum load that will be connected at one time.

7.2.4 A portable appliance shall be rated in A. For an appliance with a full-load power factor of 0.80 or more, the rating may be in W or kW.

7.2.5 Appliances having FIELD WIRING TERMINALS shall be marked with one of the following:

a) "Use copper conductors only", if the terminal is acceptable only for connection to copper wire,

b) "Use aluminum conductors only", if the terminal is acceptable only for connection to aluminum wire,

c) "Use copper or aluminum conductors" or "Use copper, copper-clad aluminum, or aluminum conductors", if the terminal is acceptable only for connection to either copper or aluminum wire, or

d) "Use copper or copper-clad aluminum conductors", if the terminal is acceptable only for connection to either copper or copper-clad aluminum wire.

7.2.6 An appliance requiring the use of supply conductors rated above 60°C (140°F) shall be marked with the following statement, or the equivalent, at or near the point where the supply connections are to be made and located so that it will be readily visible during and after installation:

"USE SUPPLY CONDUCTORS RATED FOR AT LEAST ____ °C (____ °F)."

7.2.7 The marking specified in Clause 7.2.6 shall include both °C and °F. The temperature rating of the conductors required by the heating test (see Clause 12) shall be placed in the marking.

7.2.8 An appliance that will not start and operate normally when connected to a circuit protected by a 15 A fuse of other than the time-delay type, but that will start and operate normally when connected to a circuit protected by a time-delay fuse (see Clause 10.2), shall be plainly and permanently marked, in a location that is visible during installation and inspection, with the following or the equivalent:

“If connected to a circuit protected by fuses, use time-delay fuses with this appliance.”

Note: A portable appliance is limited to 1500 W and a 15 A circuit. See Clause 11.4.

7.2.9 A HEATING ELEMENT rated more than 1 A and intended to be replaceable in the field shall be marked with:

- a) its rating in V and A or in V and W,
- b) the manufacturer's part number, or
- c) an equivalent means of identification.

7.2.10 The marking specified in Clause 7.2.9 shall withstand the environmental conditions to which the HEATING ELEMENT is subjected.

7.2.11 If an appliance employs a non-current-carrying metal part that is not grounded as specified in Clauses 25.1.5 and 25.5, the appliance shall be permanently marked with the following or equivalent:

“WARNING: Certain internal parts are intentionally not grounded and may present a risk of electric shock only during servicing. Service Personnel – Do not contact the following parts while the appliance is energized: (list of ungrounded parts).”

7.2.12 The marking specified in Clause 7.2.11 shall be located close to each ungrounded part and it shall be readily visible before or when the part becomes accessible for servicing.

7.2.13 If all approaches to ungrounded parts can be adequately covered by one marking, then only one marking as specified in Clause 7.2.11, at the approach to the ungrounded parts, shall be required.

7.2.14 If the marking specified in Clause 7.2.11 is located on the ungrounded part, only one marking shall be required.

7.2.15 If a manufacturer produces or assembles appliances at more than one factory, each finished appliance shall have a distinctive marking, which may be in code, by which it may be identified as the product of a particular factory.

7.2.16 An appliance shall have a permanent, legible marking that will be readily visible after the appliance has been installed as intended without the necessity of moving the appliance. The markings shall include the:

- a) manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified – hereinafter referred to as the manufacturer's name,
- b) catalogue or model number, type, or the equivalent,
- c) electrical rating, and

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  Documents
Document Sharing Hub

d) date of manufacture by week, month or quarter, and year, which may be abbreviated or in an established or otherwise acceptable code.

7.2.17 An appliance that is shipped from the factory with its side panels or back omitted shall be plainly and permanently marked, at such a location that the marking will be visible when connections to the power-supply circuit are made, with the following or equivalent:

“WARNING: To reduce the risk of electric shock, fire, or injury to persons, the installer must ensure that the dishwasher is completely enclosed at the time of installation.”

7.2.18 An appliance provided with double insulation shall be permanently marked with the words:

“DOUBLE INSULATION – When servicing, use only identical replacement parts.”

The words

“DOUBLE INSULATED”

may be used instead of

“DOUBLE INSULATION”

7.2.19 An appliance shall not be marked with a double-insulation symbol (a square within a square), the words “DOUBLE INSULATION”, or the equivalent unless it complies with the requirements for double-insulated appliances in accordance with General Requirements for Double-Insulated Equipment, CSA C22.2 No. 0.1, and Double Insulation Systems for Use in Electrical Equipment, UL 1097.

7.2.20 If an appliance can be readily adapted upon installation for connection to a supply circuit of either of two voltages, complete instructions, including identification of terminals, for making the connections for the different voltages shall be included in the permanent marking of the appliance. If the appliance employs an attachment plug, instructions shall be provided to indicate the type of plug that should be used if the appliance is reconnected for the alternative voltage. The information required by this clause may be shown on a circuit diagram.

7.2.21 An appliance that has plug-in provisions for the installation of an electrical accessory shall be plainly and permanently marked with the name and model number of the accessory. Instructions for the installation of the accessory shall be marked on the accessory or shall be included in literature supplied with the accessory.

7.2.22 With reference to Clause 25.4.3, a pressure terminal connector intended for connection of an equipment-bonding conductor shall be identified by being marked “G,” “GR,” “GND,” “Ground,” “Grounding,” with the grounding symbol illustrated in Figure 1, or a similar marking, or by a marking on the wiring diagram provided on the appliance.

8 Instructions

8.1 General

8.1.1 Instructions providing information equivalent to the marking required by Clause 7.2.17 shall be packed with an appliance that is shipped from the factory with its side panels or back omitted.

8.1.2 An appliance that may be converted from cord-connected to permanently connected shall be provided with instructions for such conversion. These instructions may be packed inside the appliance.

8.1.3 An appliance shall be provided with legible instructions pertaining to:

- a) a risk of fire, electric shock, or injury to persons associated with use of the appliance as specified in Clause 8.2,
- b) installation as specified in Clause 8.3,
- c) operation as specified in Clause 8.4, and
- d) if applicable, user maintenance as specified in Clause 8.5.

8.1.4 The instructions required by Clause 8.1.3 shall be:

- a) in separate manuals, or
- b) combined in one or more manuals, if the instructions pertaining to a risk of fire, electric shock, or injury to persons are emphasized and in a separate format to distinguish them from the rest of the text.

8.1.5 The instructions and warning statements required by Clauses 8.1.1 through 8.1.3 shall be provided as printed material. If any electronic media instructions are provided, the instructions and warning statements required by Clause 8.1.1 through 8.1.3 shall also be included within the electronic media instructions. All other instructions may be provided in electronic read-only media format only, such as CD-ROM.

Added 8.1.5 effective May 24, 2016

8.1.6 The printed instruction material referenced in Clause 8.1.5 shall contain detailed instructions of how to obtain a printed copy of the material contained in electronic format.

Added 8.1.6 effective May 24, 2016

8.1.7 The headings and statements required by Clauses 8.2.2, 8.2.3, 8.3.1, 8.4.2, and 8.5.2 and cautionary prefixes, such as "WARNING" and "DANGER", required by Clauses 8.2.3 and 8.2.4 shall be entirely in upper-case letters or otherwise emphasized to distinguish them from the rest of the text.

8.1.8 The text of all required instructions shall be in the words specified or words that are equivalent, clear, and understandable. However, there shall be no substitutes for the words "WARNING" or "DANGER".

8.1.9 An illustration may be used with a required instruction to clarify the intent, but it shall not replace the written instruction.

8.2 Instructions pertaining to a risk of fire, electric shock, or injury to persons

8.2.1 The instructions pertaining to a risk of fire, electric shock, or injury to persons shall warn the user of the potential risks and state the precautions that should be taken to reduce such risks.

8.2.2 The heading "IMPORTANT SAFETY INSTRUCTIONS" or the equivalent shall precede the list of instructions required by Clause 8.2.3, and the statement "SAVE THESE INSTRUCTIONS" or the equivalent shall either precede or follow the list (see Clause 8.1.7).

8.2.3 The instructions required by Clause 8.2.1 shall include the items in the following list, as applicable, and any other instructions the manufacturer considers to be necessary for the appliance (see Clause 8.1.7).

IMPORTANT SAFETY INSTRUCTIONS

WARNING – When using your dishwasher, follow basic precautions, including the following:

- a) Read all instructions before using the dishwasher.
- b) Use the dishwasher only for its intended function.
- c) Use only detergents or wetting agents recommended for use in a dishwasher and keep them out of the reach of children.
- d) When loading items to be washed:
 - 1) locate sharp items so that they are not likely to damage the door seal, and
 - 2) load sharp knives with the handles up to reduce the risk of cut-type injuries.
- e) Do not wash plastic items unless they are marked "dishwasher safe" or the equivalent. For plastic items not so marked, check the manufacturer's recommendations.

Note: This statement may be omitted for an appliance that employs a HEATING ELEMENT that is located or guarded such that melted plastic items are not likely to contact it.
- f) Do not touch the HEATING ELEMENT during or immediately after use.
- g) Do not operate your dishwasher unless all ENCLOSURE panels are properly in place.
- h) Do not tamper with controls.
- i) Do not abuse, sit on, or stand on the door or dish rack of the dishwasher.
- j) To reduce the risk of injury, do not allow children to play in or on a dishwasher.
- k) Under certain conditions, hydrogen gas may be produced in a hot-water system that has not been used for two weeks or more. HYDROGEN GAS IS EXPLOSIVE. If the hot-water system has not been used for such a period, before using the dishwasher turn on all hot-water faucets and let the water flow from each for several minutes. This will release any accumulated hydrogen gas. As the gas is flammable, do not smoke or use an open flame during this time.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

- l) Remove the door to the washing compartment when removing an old dishwasher from service or discarding it.

SAVE THESE INSTRUCTIONS

8.2.4 The instructions pertaining to a risk of fire, electric shock, or injury to persons shall include (a), (b), or (c) below, as applicable. As an alternative, (a) or (b) may be included in the installation instructions, and (c) may be included in the user-maintenance instructions. If the instructions in (a) or (b) are included in the installation instructions, and if (c) is included in the user-maintenance instructions, a reference to these instructions shall be included as a separate item in the list required by Clause 8.2.3 (see Clause 8.1.7).

- a) For a grounded, CORD-CONNECTED APPLIANCE:

GROUNDING INSTRUCTIONS

This appliance must be grounded. In the event of a malfunction or breakdown, grounding will reduce the risk of electric shock by providing a path of least resistance for electric current. This appliance is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is installed and grounded in accordance with all local codes and ordinances.

WARNING – Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or service representative if you are in doubt whether the appliance is properly grounded. Do not modify the plug provided with the appliance, if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

- b) For a PERMANENTLY CONNECTED APPLIANCE:

GROUNDING INSTRUCTIONS

This appliance must be connected to a grounded metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment-grounding terminal or lead on the appliance.

- c) For a double-insulated, CORD-CONNECTED APPLIANCE:

SERVICING A DOUBLE-INSULATED APPLIANCE

In a double-insulated appliance, two systems of insulation are provided instead of grounding. No grounding means is provided on a double-insulated appliance, nor should a means for grounding be added to the appliance. Servicing of a double-insulated appliance requires extreme care and knowledge of the system and should be done only by qualified service personnel. Replacement parts must be identical to those parts being replaced. A double-insulated appliance is marked with the words "DOUBLE INSULATION" or "DOUBLE-INSULATED." The double-insulation symbol (a square within a square) may also be marked on the appliance.

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

8.3 Installation instructions

8.3.1 The installation instructions shall include all the information needed to install the appliance for use as intended and shall be preceded by the heading "INSTALLATION INSTRUCTIONS" or the equivalent.

8.3.2 Where the installation instructions for a built-in dishwasher specifies that the appliance is able to be connected by means of a power-supply cord not already attached to the appliance by the manufacturer, the instructions shall specify that a power-supply cord kit marked for use with dishwashers shall be used. The cord kit shall comply with Clause 23.6. The part or model number of the power-supply cord kit shall be included in the appliance installation instructions.

8.3.3 The installation instructions provided with a cord-connected undercounter appliance shall include the following instructions or equivalent information:

- a) the power-supply receptacle for the appliance shall be installed in a cabinet or on a wall adjacent to the undercounter space in which the appliance is to be installed,
- b) there shall be an opening through the partition between the compartments specified in (a) that is large enough for the attachment plug to pass through. The longest dimension of the opening shall not be more than 38 mm (1.5 in),
- c) the edges of the opening specified in (b) shall, if the partition is wood, be smooth and rounded, or, if the partition is metal, be covered with an edge protector provided for this purpose by the manufacturer, and
- d) care shall be exercised, when the appliance is installed or removed, to reduce the likelihood of damage to the power-supply cord.

8.3.4 The installation instructions provided with an appliance having a water-supply hose that is intended to be connected to the sink faucet shall include the following or the equivalent:

"A hose that attaches to a sink spray can burst if it is installed on the same water line as the dishwasher. If your sink has one, it is recommended that the hose be disconnected and the hole plugged."

8.3.5 With reference to Clauses 5.9.2 and 5.9.3, an appliance with a water-heating feature shall be identified as such by a marking on the appliance or indicated in the installation instructions provided by the manufacturer. In addition, the installation instructions shall identify whether the appliance is intended for connection to a cold- or hot-water supply.

Added 8.3.5 effective May 24, 2016

8.4 Operating instructions

8.4.1 The operating instructions shall include all information needed to operate the appliance as intended. Instructions and warnings provided in accordance with the requirements of Clause 8.2 may be omitted from the operating instructions if there is a reference to the applicable instructions and warnings in the operating instructions.

8.4.2 The heading "OPERATING INSTRUCTIONS" or the equivalent shall precede the instructions required by Clause 8.4.1.

8.4.3 For a front-opening countertop appliance with a capacity of no more than six place settings, the maximum number of place settings shall be specified in the operating instructions provided with the appliance.

8.5 User-maintenance instructions

8.5.1 User-maintenance instructions shall include all information needed for cleaning and servicing operations, such as removing deposits from the HEATING ELEMENT, lubrication, and adjustments, that are intended to be performed by the user.

8.5.2 The heading "USER-MAINTENANCE INSTRUCTIONS" or the equivalent shall precede the instructions required by Clause 8.5.1.

9 Protection against accessibility to current-carrying parts

9.1 General

9.1.1 An appliance shall be provided with an ENCLOSURE of suitable material to isolate all parts that may present a risk of fire, electric shock, or injury to persons under any condition of normal use.

9.2 ENCLOSURES for other than BUILT-IN APPLIANCES

9.2.1 ENCLOSURES of appliances other than BUILT-IN APPLIANCES shall prevent access to internal current-carrying parts as specified in Clauses 9.2.2 to 9.2.10.

9.2.2 ENCLOSURES shall prevent a probe as shown in:

- a) Figure 3 from touching insulated internal wiring, other than as specified in Clause 9.4.5, and
- b) Figure 4 from:
 - 1) touching an uninsulated CURRENT-CARRYING PART or film-coated wire, and
 - 2) relocating any non-current-carrying metal parts such that:
 - i) the parts touch an uninsulated CURRENT-CARRYING PART or film-coated wire, or
 - ii) electrical spacings are reduced below the minimum values specified in Clauses 27 and 28.