

UL 749

Household Dishwashers



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333 Pfingsten Road
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UL Standard for Safety for Household Dishwashers, UL 749

Eighth Edition, Dated January 31, 2008

Summary of Topics

This new eighth edition was issued to:

- Add flammability requirements to align with changes in flammability requirements in the Standard for Polymeric Materials – Use In Electrical Equipment Evaluations, UL 746C;
- Add requirements to address thermistor-type devices used as temperature controls;
- Clarify requirements for seals and diaphragms;
- Clarify accessibility requirements; and
- Replace leakage current requirements with a reference to the Standard for Leakage Current for Appliances, UL 101.

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

Future Effective Date	References
July 31, 2010	Section 9, Clause 30.3, Table 1, and Figures 2 and 3.

The new and requirements are substantially in accordance with UL's Proposal(s) on this subject dated June 22, 2007 and September 21, 2007.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the approved text of this ANSI/UL Standard.

As indicated on the title page (page1), this UL Standard for Safety has been adopted by the Department of Defense.

The UL Foreword is no longer located within the UL Standard. For information concerning the use and application of the requirements contained in this Standard, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfo.net/ulforeword.html>.

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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that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognized and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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This Standard consists of pages dated as shown in the following checklist:

Page	Date
1-84	January 31, 2008
A1-A6	January 31, 2008
B1-B4	January 31, 2008
SR1-SR6	January 31, 2008

No Text on This Page





Canadian Standards Association
CSA-C22.2 No. 167-08
Fifth Edition



Underwriters Laboratories Inc.
UL 749
Eighth Edition

Household Dishwashers

January 31, 2008



ANSI/UL 749-2007

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ISBN 1-55436-194-X

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The most recent designation of ANSI/UL 749 as an American National Standard (ANSI) occurred on December 17, 2007. 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, which consists of the Eighth edition is under continuous maintenance, whereby each revision is ANSI approved upon publication.

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.

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Preface

This is the harmonized CSA and UL Standard for Household Dishwashers. It is the fifth edition of CAN/CSA-C22.2 No. 167, and the eighth edition of UL 749.

This harmonized Standard was prepared by Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL), and the appliance manufacturing industry. 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 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 Effective Date

The effective date for CSA International will be announced through *CSA Informs* or *CSA certification notice*.

UL Effective Date

As of January 31, 2008, all products Listed or Recognized by UL must comply with the requirements in this standard except for clauses in the following list which are effective July 31, 2010.

Section 9, Clause 30.3, Table 1, and Figures 2 and 3.

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, C22.2.1, 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 Products for this standard shall comply with the reference installation codes and standards as noted in Appendix A.

2.2 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 Standards

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

C22.1-06
Canadian Electrical Code, Part I

C22.2 No. 0.1-M1985 (R2003)
General Requirements for Double-Insulated Equipment

C22.2 No. 0.2-93 (R2004)
Insulation Coordination

C22.2 No. 0.3-01
Test Methods For Electrical Wires and Cables

C22.2 No. 0.15-01
Adhesive Labels

CAN/CSA-C22.2 No. 0.17-00 (R2004)
Evaluation of Properties of Polymeric Materials

C22.2 No. 24-93 (R2003)
Temperature-Indicating and -Regulating Equipment

C22.2 No. 42-99 (R2004)
General Use Receptacles, Attachment Plugs, and Similar Wiring Devices

C22.2 No. 43-04
Lampholders

C22.2 No. 55-M1986 (R2003)
Special Use Switches

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

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

C22.2 No. 77-95 (R2004)
Motors with Inherent Overheating Protection

C22.2 No. 111-M2000 (R2005)
General-Use Snap Switches

C22.2 No. 153-M1981 (R2003)
Quick Connect Terminals

C22.2 No. 168-M1981 (R2004)
Commercial Dishwashing Machines

C22.2 No. 188-04
Splicing Wire Connectors

C22.2 No. 190-M1985 (R2004)
Capacitors for Power Factor Correction

C22.2 No. 197-M1983 (R2003)
PVC Insulating Tape

C22.2 No. 198.1-99 (R2004)
Extruded Insulating Tubing

CAN/CSA-C22.2 No. 223-M91 (R2003)
Power Supplies with Extra-Low-Voltage Class 2 Outputs

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

UL Standards

UL 20
General-Use Snap Switches

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 310

Electrical Quick-Connect Terminals

UL 355

Cord Reels

UL 486A-486B

Wire Connectors

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 510

Polyvinyl Chloride, Polyethylene And Rubber Insulating Tape

UL 723

Tests for Surface Burning Characteristics of Building Materials

UL 746A

Polymeric Materials – Short 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 810

Capacitors

UL 840

Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment

UL 873

Temperature-Indicating and -Regulating Equipment

UL 921

Commercial Dishwashers

UL 969

Marking and Labeling Systems

UL 991

Tests for Safety-Related Controls Employing Solid-State Devices

UL 1054

Special-Use Switches

UL 1097

Double Insulation Systems for Use in Electrical Equipment

UL 1441

Coated Electrical Sleeving

UL 1434

Thermistor-Type 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 5085-3

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

AHAM¹ Standards

ANSI/AHAM DW-1-2005

Dishwashers

AHAM HLW-1-2006

Clothes Washers

ASSE² Standards

ASSE 1001-2002

Performance Requirements for Atmospheric Type Vacuum Breakers

ASSE 1006-1986
Plumbing Requirements for Residential Use Dishwashers

ASTM³ Standards

ASTM D 638-03
Standard Test Method for Tensile Properties of Plastics

ASTM D 1822-06
Standard Test Method for Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials

ASTM E 162-02a
Standard Tests Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

IEC⁴

IEC 60695-2-12:2000
Fire Hazard Testing – Part 2-12: Glowing/Hot-Wire Based Test Methods – Glow-Wire Flammability Test Method for Materials

IEC 60695-2-13:2000
Fire Hazard Testing – Part 2-13: Glowing/Hot-Wire Based Test Methods – Glow-Wire Ignitability Test Method for Materials

ISA⁵ Standards

ISA-MC 96.1-1982
Temperature Measurement Thermocouples

NFPA⁶ Standards

NFPA 70-2005
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.

3.2 The definitions in Clauses 3.3 – 3.20 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, EXTRA LOW-VOLTAGE – A circuit having characteristics in excess of those of a LOW-VOLTAGE CIRCUIT.

3.9 CIRCUIT, LOW VOLTAGE – A circuit that:

- a) has an ac potential of not more than 30 V (42.4 V peak) and power of 100 VA or less,
- b) has 30 V dc supplied by a primary battery,
- c) is supplied by a Class 2 transformer, or
- d) is supplied by a combination of a transformer and fixed impedance that, as a unit, complies with all the performance requirements for a Class 2 transformer.

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. Class 2 transformers are specified in Low Voltage Transformers, Part 3: Class 2 and Class 3 Transformers, CSA C22.2 No. 66.3, and Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, UL 5085-3.

3.10 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
- b) retard propagation of flame initiated by electrical disturbances that may occur within the product.

3.11 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.

3.12 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.

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

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

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

3.16 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.

3.17 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.

3.18 THERMOSTAT, COMBINED TEMPERATURE-REGULATING – 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.

3.19 THERMOSTAT, TEMPERATURE-LIMITING – 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.

3.20 THERMOSTAT, TEMPERATURE-REGULATING – A device that:

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

4 General requirements

4.1 Except as indicated in Clause 4.2, a component of a product covered by this standard shall comply with all the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard. A component shall comply with the CSA and UL Standards.

4.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

4.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.4 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 in general 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 Temperature Measurement Thermocouples, ISA/MC 96.1.

Note: 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 is to 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 Household Electric 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 powdered laundry detergent as specified in the Performance Evaluation Procedure for Household Washers, AHAM HLW-1, or any other powdered laundry detergent having similar properties.

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 without a water-heating feature shall be connected to a hot water supply with a nominal water temperature of $60 \pm 2^\circ\text{C}$ ($140 \pm 3.6^\circ\text{F}$). An appliance with a water-heating feature may be connected to a cold-water supply with a nominal temperature of $15 \pm 5^\circ\text{C}$ ($59 \pm 41^\circ\text{F}$) or a hot-water supply rated less than $60 \pm 2^\circ\text{C}$ ($140 \pm 3.6^\circ\text{F}$).

5.9.2 With reference to Clause 5.9.1, an appliance with a water-heating feature shall be identified as such by a marking on the appliance or indicated in the operating instructions provided by the manufacturer.

5.9.3 With reference to Clause 5.9.1, if an appliance with a water-heating feature is connected to a cold-water supply for the heating test in Clause 12, the heating test shall be repeated. If an appliance with a water-heating feature is connected to a hot-water supply for the heating test, the heating test shall be repeated at 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 cycle time.

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 14.5).

7 Marking

Advisory Note: *In Canada, there are two official languages, English and French. Annex B 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

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,
- b) installation,
- c) operation, and
- d) if applicable, user maintenance.

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 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.

8.1.6 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".

8.1.7 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 8.1.5).

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 8.1.5).

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.

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 8.1.5).

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.

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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.

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.”

8.4 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 effective July 31, 2010

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 9.2.8.

9.2.2 ENCLOSURES shall prevent a probe as shown in:

- a) Figure 2 from touching uninsulated current-carrying parts that may present a risk of electric shock,
- b) Figure 3 from touching insulated internal wiring, other than as specified in Clause 9.4.5, or film-coated wire, and
- c) 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.

9.2.3 The ENCLOSURE openings located in the top, back, sides, and front of the appliance and the interior surfaces of the washing compartment, including the door, that are accessible when the loading door is open shall comply with the requirements of Clause 9.2.2.

9.2.4 During the examination of the dishwasher interior surfaces, the dish racks shall be moved to any normal position giving the greatest accessibility to the probe, but shall not be removed from the appliance.

9.2.5 During the use of the probe on appliances weighing 22 kg (48.5 lb) or less when empty, there shall be sufficient clearance from supporting and other adjacent surfaces for unrestricted use of the probe (e.g., the appliance can be tipped over).

9.2.6 Where an opening in an ENCLOSURE has a minor dimension (see Clause 9.2.8):

- a) less than 25.4 mm (1 in), an uninsulated current-carrying part or film-coated wire shall not be contacted by the probe illustrated in Figure 2, or
- b) of 25.4 mm (1 in) or more, an uninsulated current-carrying part or film-coated wire shall be positioned from the opening as specified in Table 1, to reduce the likelihood of electric shock resulting from unintentional contact with such a part or wire.

9.2.7 A motor with an integral ENCLOSURE that has an opening with a minor dimension (see Clause 9.2.8):

- a) of less than 19.1 mm (0.75 in) is acceptable, if film-coated wire cannot be contacted by the probe illustrated in Figure 3, or
- b) of 19.1 mm (0.75 in) or more is acceptable, if a part or wire is spaced from the opening as specified in Table 1.