UL 921

STANDARD FOR SAFETY

Commercial Dishwashers

UL Standard for Safety for Commercial Dishwashers, UL 921

Eighth Edition, Dated January 30, 2020

Summary of Topics

This new edition of ANSI/UL 921 dated January 30, 2020 includes editorial cleanup and renumbering in addition to revisions to Commercial Dishwashers provided with a heat pump.

The requirements are substantially in accordance with Proposal(s) on this subject dated June 14, 2019 and September 13, 2019.

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CSA Group
CSA/ANSI Z83.21:20 • CSA C22.2 No. 168:20
Third Edition

Underwriters Laboratories Inc.
UL 921
Eighth Edition

Commercial Dishwashers

January 30, 2020

Approved American National Standard

ANSI/UL 921-2020
CSA/ANSI Z83.21:20

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 anytime. 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.

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This Standard is subject to review within five years from the date of publication, 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.

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This ANSI/UL Standard for Safety consists of the Eighth Edition. The most recent designation of ANSI/UL 921 as an American National Standard (ANSI) occurred on January 30, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

The Department of Defense (DoD) has adopted UL 921 on June 18, 1992. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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

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PREFACE

This is the harmonized CSA Group and UL standard for Commercial Dishwashers. It is the Third edition of CSA/ANSI Z83.21 • CSA C22.2 No. 168, and the Eighth edition of UL 921. This edition of CSA/ANSI Z83.21 • CSA C22.2 No. 168 supersedes the previous editions published in 2005 and 2016. This edition of UL 921 supersedes the previous edition published in 2016.

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

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

This standard was reviewed by the Joint Technical Subcommittee on Gas Food Service Equipment under the jurisdiction of the Z21/83 Technical Committee on Performance and Installation of Gas Burning Appliances and Related Accessories and the CSA Strategic Steering Committee on Fuels and Appliances. It has been formally approved by the Z21/83 Technical Committee and the Interprovincial Gas Advisory Council.

This standard was also reviewed by the CSA Subcommittee on Household and Commercial Dishwashers, under the jurisdiction of the CSA 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.

Application of Standard

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

Reasons for Differences From IEC

This standard provides requirements for commercial dishwashers for use in accordance with the electrical installation codes of Canada and the United States. This standard does not employ any IEC standard for base requirements.

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.

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Commercial Dishwashers

1 Scope

1.1 This Standard covers commercial, freestanding, under-counter, and counter-insert dishwashers, utensil-washers, and glass washers using water as the principal cleaning medium, hereafter referred to as dishwashers. These dishwashers utilize steam, gas, or electric heaters for heating the water. Heated water is provided to a dishwasher by means of steam, gas, or electric heating systems integral to the appliance, or by means not integral to the dishwasher that is provided at the installation site.

1.2 This Standard is not intended to be used to evaluate the gas-fired water heating portions of the system that incorporate water containment vessels operating above atmospheric pressure.

For dishwashers that incorporate a gas-fired water heater with a pressurized water containment vessel operating above atmospheric pressure, the water heater portion of the system is covered by the requirements of ANSI Z21.10.3/CSA 4.3.

1.3 This Standard covers:

a) electric dishwashers rated 600 V or less, installed in accordance with the Canadian Electrical Code (CEC), Part I , CSA C22.1, and the National Electrical Code (NEC), NFPA 70; and

b) the gas-handling, gas-burning, and gas-control features of gas-fired dishwashers having inputs of 420 MJ (400,000 Btu per hour or less, limited to 3.45 kPa (0.5 psig) inlet pressure, installed in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, the International Fuel Gas Code, ICC IFGC, or the Natural Gas and Propane Installation Code, CSA B149.1 for use with:

1) natural gas;

2) manufactured gas;

3) mixed gas;

4) propane gas;

5) liquefied petroleum gases; or

6) LP gas-air mixtures.

1.4 These requirements cover dishwashers intended for use in commercial establishments, such as kitchens of restaurants and hospitals, where they are not intended to be accessible to the public.

2 General

2.1 Components

2.1.1 Except as indicated in Clauses 2.1.2, 2.1.3, and 2.1.4, a component of a product covered by this standard shall:

a) comply with the requirements for that component as specified in this Standard;

b) be used in accordance with its rating(s) established for the intended conditions of use;

c) be used within its established use limitations or conditions of acceptability;

d) additionally comply with the applicable requirements of this end product standard; and

e) not contain mercury, except when contained in lamps.

Note: Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and can be used only under those specific conditions.

2.1.2 A component of a product covered by this standard is not required to comply with a specific component requirement that:

a) involves a feature or characteristic not required in the application of the component in the product;

b) is superseded by a requirement in this standard; or

c) is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.

2.1.3 A component complying with a CSA or UL component standard other than those specified in this Standard is acceptable if:

a) the component also complies with the applicable component standard specified in this Standard; or

b) the component standard:

1) is compatible with the ampacity and overcurrent protection requirements in the Canadian Electrical Code (CEC), Part I and National Electrical Code, where appropriate;

2) considers long-term thermal properties of polymeric insulating materials in accordance with the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B; and

3) any use limitations of the other component standard are identified and appropriately accommodated in the end use application.

2.1.4 Components located in an EXTRA-LOW VOLTAGE CIRCUIT that are not relied upon to reduce the risk of electric shock, fire, or injury shall not require additional investigation.

2.1.5 A component that is also intended to perform other functions, such as over current protection, ground-fault circuit-interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements of the applicable CSA and UL standard(s) that cover devices that provide those functions, unless those other functions are:

a) not required for the application; and

b) not identified as part of markings, instructions, or packaging for the appliance.

2.1.6 A component not anticipated by the requirements of this end product standard, not specifically covered by the component standards specified in this Standard, and that involves a risk of fire, electric shock, or injury to persons shall be additionally investigated in accordance with the applicable CSA and UL standards, and shall comply with Clause 2.1.1 (b) – (e).

2.1.7 With respect to Clause 2.1.6, reference to construction and performance requirements in another CSA and UL end product standard is suitable where that standard anticipates normal and abnormal use conditions consistent with the application of commercial dishwashers.

2.2 Units of measurement

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

2.3 Reference publications

2.3.1 Products covered by this standard shall comply with the reference installation codes and standards noted in this clause. 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 published to that edition up to the time the standard was approved.

CSA Group Standards

CSA Component Acceptance Notice No. 5A

B149.1-15
Natural Gas and Propane Installation Code

C22.1-18
Canadian Electrical Code (CEC), Part I

CAN/CSA-C22.2 No. 0-10 (R2105)
General requirements – Canadian Electrical Code (CEC), Part II

C22.2 No. 0.2-16
Insulation coordination

C22.2 No. 0.8-12 (R2016)
Safety functions incorporating electronic technology

C22.2 No. 0.15-15
Adhesive Labels

CAN/CSA-C22.2 No. 0.17-00 (R2018)
Evaluation of properties of polymeric materials

C22.2 No. 5-16
Molded-case circuit breakers, molded-case switches and circuit-breaker enclosures

C22.2 No. 8-13
Electromagnetic interface (EMI) filters

C22.2 No. 14-18
Industrial Control Equipment

C22.2 No. 21-14
Cord sets and power-supply cords

CSA C22.2 No. 24-15
Temperature-indicating and regulating equipment

C22.2 No. 38-18
Thermoset-insulated wires and cables

C22.2 No. 39-13 (R2017)
Fuseholder assemblies

C22.2 No. 42-10 (R2015)
General use receptacles, attachment plugs, and similar wiring devices

C22.2 No. 43-17
Lampholders

C22.2 No. 49-14
Flexible cords and cables

C22.2 No. 55-15
Special use switches

C22.2 No. 65-18
Wire connectors

C22.2 No. 66-1(R2015)
Low voltage transformers - Part 1: General requirements

C22.2 No. 66-2 (R2015)
Low voltage transformers – Part 2: General purpose transformers

C22.2 No. 66-3 (R2015)
Low voltage transformers – Part 3: Class 2 and Class 3 transformers

C22.2 No. 74-16
Equipment for use with electric discharge lamps

C22.2 No. 75-17
Thermoplastic-insulated wires and cables

C22.2 No. 77-14
Motors with inherent overheating protection

C22.2 No. 100-14
Motors and generators

C22.2 No. 127-18
Equipment and lead wires

C22.2 No. 144.1-16
Ground-fault circuit-interrupters

C22.2 No. 153-14
Electrical quick-connect terminals

C22.2 No. 156-M1987 (R2013)
Solid-state speed controls

C22.2 No. 158-10 (R2014)
Terminal blocks

C22.2 No. 182.3-16
Special use attachment plugs, receptacles, and connectors

C22.2 No. 188-18
Splicing wire connectors

C22.2 No. 209-M1985 (R2013)
Thermal cut-offs

C22.2 No. 210-15
Appliance wiring material products

C22.2 No. 235-04 (R2017)
Supplementary protectors

C22.2 No. 236-15
Heating and cooling equipment

C22.2 No. 248.1-11 (R2016)
Standard for low-voltage fuses – Part 1: General requirements

CAN/CSA C22.2 No. 248.14-00 (R2015)
Standard for low-voltage fuses – Part 14: Supplemental fuses

C22.2 No. 250.4-14
Portable luminaires

C22.2 No. 2459-08 (R2017)
Insulated multi-pole splicing wire connectors

C22.2 No. 4248.1-17
Fuseholders

CAN/CSA-C22.2 No. 60335-2-34:17
Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors

CAN/CSA-C22.2 No. 61058-1:17
Switches for appliances – Part 1: General requirements

CAN/CSA-E60730-1
Automatic electrical controls for household and similar use – Part 1: General requirements

CAN/CSA-E60730-2 Series of Standards
Automatic electrical controls for household and similar use – Part 2: Particular requirements

CAN/CSA-E60730-2-9:15
Automatic electrical controls for household and similar use – Part 2-9: Particular requirements for temperature sensing controls

CAN/CSA-C22.2 No. 60950-1-07 (R2016)
Electromagnetic interface (EMI) filters

ANSI Z21.20-2014/CAN/CSA 60730-2-5-14
Automatic electrical controls for household and similar use – Part 2: Particular requirements for automatic electrical burner control systems

CSA/AM ANSI Z21.15-2009/CSA 9.1-2009 (R2014)
Manually-Operated Gas Valves for Appliances Appliance Connector Valves, and Hose End Valves

CSA/AM ANSI Z21.18-2007/CSA 6.3-2007 (R2017)
Gas Appliance Pressure Regulators

CSA/AM ANSI Z21.20-2014/CAN/CSA-C22.2 No. 60730-2-5-14
Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Automatic Burner Ignition Systems and Components

CSA/AM ANSI Z21.21-2015/CSA 6.5-2015
Automatic Valves for Gas Appliances

CSA/AM ANSI Z21.35-2005/CSA 6.8-2005 (R2015)
Pilot Gas Filters

ANSI Z21.78-2010/CSA 6.20-2010 (R2015)
Combination gas controls for gas appliances

UL[1] Standards

UL 44
Standard for Thermoset-Insulated Wires and Cables

UL 62
Standard for Flexible Cords and Cables

UL 66
Standard for Fixture Wire

UL 83
Standard for Wires and Cables, Thermoplastic-Insulated

UL 244A
Standard for Solid-State Controls for Appliances

UL 248-1
Standard for Low-Voltage Fuses – Part 1: General Requirements

UL 248-14
Standard for Low-Voltage Fuses - Part 14: Supplemental Fuses

UL 310
Standard for Electrical Quick-Connect Terminals

UL 353
Standard for Limit Controls

UL 372
Standard for Automatic Electrical Controls for Household and Similar Use – Part 2: Particular Requirements for Burner Ignition Systems and Components

UL 429
Standard for Electrically Operated Valves

UL 486A-486B
Standard for Wire Connectors

UL 486C
Standard for Splicing Wire Connectors

UL 486E
Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

UL 489
Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures

UL 489A
Standard for Circuit Breakers for Use in Communications Equipment

UL 496
Standard for Lampholders

UL 498
Standard for Attachment Plugs and Receptacles

UL 508
Standard for Industrial Control Equipment

UL 723
Standard for Test for Surface Burning Characteristics of Building Materials

UL 746A
Standard for Polymeric Materials – Short Term Property Evaluations

UL 746B
Standard for Polymeric Materials – Long Term Property Evaluations

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

UL 746E
Standard for Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used In Printed Wiring Boards

UL 758
Standard for Appliance Wiring Material

UL 795
Standard for Commercial-Industrial Gas Heating Equipment

UL 796
Standard for Printed-Wiring Boards

UL 817
Standard for Cord Sets and Power-Supply Cords

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

UL 873
Standard for Temperature-Indicating and -Regulating Equipment

UL 935
Standard for Fluorescent-Lamp Ballasts

UL 943
Standard for Ground-Fault Circuit-Interrupters

UL 969
Standard for Marking and Labeling Systems

UL 1004-1
Standard for Rotating Electrical Machines – General Requirements

UL 1004-2
Standard for Impedance Protected Motors

UL 1004-3
Standard for Thermally Protected Motors

UL 1029
Standard for High-Intensity-Discharge Lamp Ballast

UL 1059
Standard for Terminal Blocks

UL 1077
Standard for Supplementary Protectors for Use in Electrical Equipment

UL 1411
Standard for Transformer and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliances

UL 1434
Standard for Thermistor-Type Devices

UL 1446
Standard for Systems of Insulating Materials – General

UL 1557
Standard for Electrically Isolated Semiconductor Devices

UL 1577
Standard for Optical Isolators

UL 1977
Standard for Component Connectors for Use in Data, Signal, Control and Power Applications

UL 1995
Standard for Heating and Cooling Equipment

UL 2353
Standard for Single- and Multi-Layer Insulated Winding Wire

UL 2459
Standard for Insulated Multi-Pole Splicing Wire Connectors

UL 4248-1
Standard for Fuseholders – Part 1: General Requirements

UL 5085-1
Standard for Low Voltage Transformers – Part 1: General Requirements

UL 5085-2
Standard for Low Voltage Transformers – Part 2: General Purpose Transformers

UL 5085-3
Standard for Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers

UL 8750
Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products

UL 60065
Standard for Audio, Video and Similar Electronic Apparatus – Safety Requirements

UL 60335-1
Standard for Safety of Household and Similar Electrical Appliances, Part 1: General Requirements

UL 60335-2-34 (4th, 5th, and 6th Editions)
Standard for Household and Similar Electrical Appliances, Part 2: Particular Requirements for Motor-Compressors

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

UL 60691
Standard for Thermal-Links – Requirements and Application Guide

UL 60730-1
Standard for Automatic Electrical Controls – Part 1: General Requirements

UL 60730-2-5
Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Burner Control Systems

UL 60730-2-9
Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls

UL 61058-1
Standard for Switches for Appliances – Part 1: General Requirements

IEC Standards

IEC 60127-1
Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links

IEC 61000-4-2
Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test

IEC 61000-4-3
Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test

IEC 61000-4-4
Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test

IEC 61000-4-5
Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test

IEC 61000-4-6
Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields

IEC 61000-4-11
Electromagnetic Compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests

IEC 61000-4-13
Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests

ULC[2] Standards

CAN/ULC S102-2010
Standard for Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies

ANSI[3] Standards

ANSI/ASTM E230/E230M
Standardized Thermocouples

ANSI Z21.23-2010 (R2015)
Standard for Gas Appliance Thermostats

ASME[4] Standards

ANSI/ASME B1.20.1-2013
Standard for Pipe Threads, General Purpose (Inch)

ANSI/ASME B36.10M-2015
Welded and Seamless Wrought Steel Pipe

ASTM[5] Standards

F1696-14
Standard Test Method for Energy Performance of Single-Rack, Door-Type Commercial Dishwashing Machines

F1704-12 (R2017)
Standard Test Method for Capture and Containment Performance of Commercial Kitchen Exhaust Ventilation Systems

F1920-15
Standard Test Method for Performance of Rack Conveyor, Commercial Dishwashing Machines

F2474-14
Standard Test Method for Heat Gain to Space Performance of Commercial Kitchen Ventilation/Appliance Systems

ICC[6] Standards

ICC IFGC-2018
International Fuel Gas Code

NFPA[7] Standards

ANSI Z223.1/NFPA 54-2015
National Fuel Gas Code

NFPA 70-2017
National Electrical Code (NEC)

ANSI/NFPA 96-2017
Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

ANSI/NFPA 211-2016
Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances

[1] Underwriters Laboratories Inc.
[2] Underwriters Laboratories of Canada
[3] American National Standards Institute
[4] American Society of Mechanical Engineers
[5] American Society for Testing and Materials
[6] International Code Council
[7] National Fire Protection Association

2.4 General requirements

In Canada, general requirements as indicated in the Canadian Electrical Code, Part II, General Requirements, CSA C22.2 No. 0, are applicable.

3 Definitions

3.1 For the purpose of these requirements the following definitions apply.

3.2 **Automatic gas ignition system** – A system intended to ignite and reignite an appliance burner(s). Such systems are intended to:

a) automatically ignite gas at the main burner, or gas at the pilot burner so that the pilot ignites the main burner;

b) prove the presence of either the ignition source, the main burner flame, or both; and

c) automatically act to shut off the gas supply to the main burner or pilot burner and the main burner, when the supervised flame or ignition source is not proved.

3.3 **Automatically controlled dishwasher** – A dishwasher or a unit of a system for which energization of a motor, a solenoid, a magnet, or similar component occurs without manual intervention. Automatic control also occurs during any single predetermined cycle of operation, when automatic changing of the mechanical load reduces the speed of a motor so that starting-winding connections to the branch circuit are reestablished.

3.4 **Auxiliary control** – A control intended primarily for the regulation of time, temperature, pressure, or operations under conditions of normal operation, and that is not intended to address abnormal conditions such as overload or above maximum normal operating temperatures resulting from abnormal operation.

3.5 **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 can serve as a portion of an enclosure and as a functional part.

3.6 **Continuous-duty motor** – A motor that, under any intended condition of use, is intended to operate unattended and under load for 3 hours or more.

3.7 **Control, operating** – Control, the operation of which starts or regulates the appliance during normal operation.

3.8 **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.