JOINT CANADA – UNITED STATES NATIONAL STANDARD

ANSI/CAN/UL 3300:2026

STANDARD FOR SAFETY

Service, Communication, Information, Education and Entertainment Robots – SCIEE Robots

ANSI/UL 3300-2026

SCC FOREWORD

National Standard of Canada

A National Standard of Canada is a standard developed by a Standards Council of Canada (SCC) accredited Standards Development Organization, in compliance with requirements and guidance set out by SCC. More information on National Standards of Canada can be found at www.scc.ca.

SCC is a Crown corporation within the portfolio of Innovation, Science and Economic Development (ISED) Canada. With the goal of enhancing Canada's economic competitiveness and social well-being, SCC leads and facilitates the development and use of national and international standards. SCC also coordinates Canadian participation in standards development, and identifies strategies to advance Canadian standardization efforts.

Accreditation services are provided by SCC to various customers, including product certifiers, testing laboratories, and standards development organizations. A list of SCC programs and accredited bodies is publicly available at www.scc.ca.

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

UL Standard for Safety for Service, Communication, Information, Education and Entertainment Robots – SCIEE Robots, ANSI/CAN/UL 3300

First Edition, Dated May 14, 2024

Summary of Topics

The revision of ANSI/CAN/UL 3300 dated August 14, 2026 includes the following changes in requirements:

– Clarification of ambient light conditions to use during testing; 7.2.2.1

– Modification to Robot stability test, 7.2.4, to permit alternatives to using a wet glass ramp; Annex G, Bibliography Section

– Modifications to Obstacle test, 7.2.5, to align with latest edition of ISO 18646-2; Table 2 (Deleted), Table 3 (Deleted), Figure 1 title, Figure 2 title

– Modifications to clarify definition of "wet locations" and applicability of Exposure to moisture test, 7.4.10, additional requirements for robots subjected to liquids via cleaning and wiping, and additional considerations for conditions that could cause sensor occlusion/blockage; 3.5.15, 5.2.3.2, 7.4.10, 8.4.5, 8.11.4, C.5.2.3.2

– Additional requirements to address operation of SCIEE robots using remote controllers and pendants; 5.1.6, 8.11.6, C.5.1.6

– Clarification of the material and shape of the thresholds used in 7.2.4.1, Elevation change test; 7.2.4.1, Figure 7.1, Section 2

– Additional manufacturer verification and validation test cases to account for variations in obstacle shapes and colors, traveling around humans, and robots employing AI in safety functions; 8.4.5, 8.15, Bibliography Section

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

The revised requirements are substantially in accordance with Proposal(s) on this subject dated March 6, 2026 and June 26, 2026.

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

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

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

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

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

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

ANSI/UL 3300-2026

MAY 14, 2024
(Title Page Reprinted: August 14, 2026)

ANSI/CAN/UL 3300:2026

Standard for Service, Communication, Information, Education and Entertainment Robots – SCIEE Robots

First Edition

May 14, 2024

This ANSI/CAN/UL Safety Standard consists of the First Edition including revisions through August 14, 2026.

The most recent designation of ANSI/UL 3300 as an American National Standard (ANSI) occurred on August 14, 2026. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword.

This Standard has been designated as a National Standard of Canada (NSC) on August 14, 2026.

© 2026 ULSE Inc. All rights reserved.

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

No Text on This Page

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

CONTENTS

Preface **7**

1 Scope 11
2 Normative References 12
3 Terms, Definitions and Abbreviated Terms 14
3.1 Abbreviations 14
3.2 Terms and definitions 14
3.3 Function terms 14
3.4 Hazard terms 15
3.5 General terms 17
4 General Requirements 19
5 Non-robotic Function 19
5.1 Requirements for components 20
5.2 Accessibility 20
5.3 Abuse tests 22
6 Mobility 22
6.1 Indicators 22
6.2 Robot stop control 22
6.3 Manipulators 22
7 Testing 23
7.1 Robot specifications 23
7.2 Tests for mobility safeguards 24
7.3 Safeguards provided for robot shape and size 37
7.4 Environmental stress tests 38
7.5 Tests for robots with manipulators 40
7.6 Additional evaluation of compliance 41
8 Safety-related Control Systems 41
8.1 Risk assessment 41
8.2 Safety functions 42
8.3 Hazard Classes for robotic mobility 42
8.4 Functional safety 43
8.5 Protective stop 46
8.6 Collision avoidance or limitation 46
8.7 Critical edge detection 46
8.8 Entrapment 46
8.9 Safety-limited speed 46
8.10 Manipulator movement 46
8.11 Other safety functions 47
8.12 Off-the-shelf (OTS) software 48
8.13 Cybersecurity 50
8.14 Remote software updates 50
8.15 Artificial intelligence and machine learning 51
8.16 Sensor configuration, calibration and servicing 52
9 Electric Power Sources 52
10 Indicators 53
10.1 General 53
10.2 Audible indicators 53
10.3 Visual indicators 53
11 Batteries 53
12 Markings and Instructions 54

Annex A (normative) Textiles

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

Annex B (normative) Required Information for Robot Specification

B.1 General 56

Annex C (normative) Use of CSA C22.2 No. 60335-1/UL 60335-1, Alternative General Requirements

C.1 General 61
C.5 Non-robotic Function 61
C.5.1 Requirements for components 61
C.5.2 Accessibility 61
C.5.3 Abuse tests 62
C.5.4 Requirements for intentional heating and refrigeration 62
C.6 Mobility 62
C.6.2 Robot stop control 62
C.6.3 Manipulators 62
C.7 Testing 62
C.7.2 Tests for mobility safeguards 62
C.7.3 Safeguards provided for robot shape and size 63
C.7.3.2 Moving components 63
C.7.3.4 Drop test 63
C.9 Electric Power Sources 63
C.11 Batteries 64

Annex D (informative) Indicators

D.1 General 65
D.1.1 Considerations for supervising operators 65
D.1.2 Considerations for advance notice of indications 65
D.1.3 Considerations for other situations that can require indication 65
D.1.4 Guidance on audible indicators 65
D.1.5 Sound level recommendations 66
D.1.6 Frequency recommendations 66
D.1.7 Other considerations for audible indicators 66
D.1.8 Guidance on visual indicators 67
D.1.9 Brightness recommendations 67
D.1.10 Color code, pattern and other recommendations 67

Annex E (informative) Methods to Determine Maximum Capable Force

E.1 General 69
E.1.1 Method 1, calculation using force formula 69
E.1.2 Method 2, calculation using kinetic energy formula 69
E.1.3 Method 3a, test for robot/mobile platform 69
E.1.4 Method 3b, test for manipulators 70

Annex F (normative for Canada and informative for the US) Safety Marking Translations

F.1 General 71

Annex G(informative)Method to Determine Coefficient of Friction of the Ramp Test Surface

G.1 Test Apparatus 72
G.1.1 Test block 72
G.1.2 Test rubber 73

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

G.1.3 Force gauge 73
G.2 Test Procedure 73

Bibliography

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

No Text on This Page

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

Preface

This is the First Edition of ANSI/CAN/UL 3300, Standard for Service, Communication, Information, Education and Entertainment Robots – SCIEE Robots.

ULSE is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC) as a Standards Development Organization (SDO).

This Standard has been developed in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization.

This ANSI/CAN/UL 3300 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization. In the event that no revisions are issued for a period of four years from the date of publication, action to revise, reaffirm, or withdraw the standard shall be initiated.

Annex A, Annex B, and Annex C are identified as Normative, as such, form mandatory parts of this Standard.

Annex D, Annex E, and Annex G identified as Informative, are for information purposes only.

Annex F is identified as Normative for Canada and Informative for the US. Informative text is for informational purposes only, and Normative text is considered to be mandatory.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

This First Edition joint American National Standard and National Standard of Canada is based on, and now supersedes, the Third Issue of the Outline of Investigation of UL 3300.

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

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

This Edition of the Standard has been formally approved by the Technical Committee (TC) on Service, Communication, Information, Entertainment And Education Robots, General Requirements, TC 3300.

This list represents the TC 3300 membership when the final text in this Standard was balloted. Since that time, changes in the membership may have occurred.

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

TC 3300 Membership

Name	Representing	Interest Category	Region
Aliasghar Arab	General Autonomy Inc.	General Interest	USA
Haley L. Callahan	UL Standards & Engagement	TC Chair – Non-voting Member	USA
Vineed Dayal	U.S. Consumer Product Safety Commission (CPSC)	Non-Voting	USA
J. Bern Jordan	University of Maryland	Consumer	USA
Sudesh Kamble	Intertek Testing Services	Testing & Standards Org.	USA
Joungwoo Kang	Samsung Electronics CO LTD	Producer	Korea, Republic of
Joon Young Kim	Sungshin Women's University	General Interest	Korea, Republic of
Seongmin Kim	LG Electronics, Korea	Producer	Korea, Republic of
Takahiro Komazaki	Sony Group Corporation	Producer	Japan
Yu-Chieh Lee	Tairoa	General Interest	Chinese Taipei
Sailing Li	TUV Rheinland	Testing & Standards Org.	China
Sean McAlister	UL Standards & Engagement	Project Manager	USA
William Melek	University Of Waterloo	General Interest	Canada
Krupal Patel	Standards Individuals	General Interest	USA
Aaron Prather	ASTM International	Testing & Standards Org.	USA
Maren Roush	Association for Advancing Automation	Producer	USA
Roberta Nelson Shea	Teradyne Robotics	Producer	USA
Soomin (Simon) Shim	Hyundai Motor Company	Producer	Korea, Republic of
Rahul Singh	GreyOrange	General Interest	India
Travis Sjostrom	Best Buy Co Inc	Supply Chain	USA
Jason R. Smith	UL Solutions	Testing & Standards Org.	USA
Kazumi Sugioka	SEIKO EPSON CORPORATION	General Interest	Japan
Takashi Sugiyama	Groove X INC	Producer	Japan
David Sun	SGS	Testing & Standards Org.	China
Paul Turner	CSA Group	Testing & Standards Org.	Canada
Terry Wei	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch	Testing & Standards Org.	China
Lin Xing	Shanghai Electrical Apparatus Research Institute (SEARI)	Testing & Standards Org.	China
Shuping Yang	Beijing Research Institute of Automation for Machinery Industry Co. Ltd (BRIA)	Testing & Standards Org.	China
Jie Yuan	Intellifusion	Supply Chain	China
Wangtan Yuan	Segway Ninebot	Producer	China
Xin Zhao	Hesai Technology	Supply Chain	China

International Classification for Standards (ICS): 97.200.99

For information on ULSE Standards, visit https://www.shopulstandards.com, call toll free 1-888-853-3503 or email us at ClientService@shopULStandards.com.

This Standard is intended to be used for conformity assessment.

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

The intended primary application of this Standard is stated in its scope. It is important to note that it remains the responsibility of the user of the standard to judge its suitability for this particular application.

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE

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

No Text on This Page

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

1 Scope

This document establishes the safety requirements for Service, Communication, Information, Education and Entertainment (SCIEE) robots.

These requirements supplement the safety requirements for the intended, non-robotic function as described in the relevant identified standards CSA C22.2 No. 62368-1/UL 62368-1, Audio/Video, Information and Communication Technology Equipment; or CSA C22.2 No. 60335-1/UL 60335-1, Household and Similar Electrical Appliances, including the applicable Part 2. Mobility and/or uncontained manipulation introduce potential for hazard due to the speed and mass of the robot, use environment and other considerations described herein. Where applicable, these requirements cover robotics intended for use in indoor and outdoor locations.

The scope includes SCIEE robots intended for use by, or in close proximity to, the general consumer.

These requirements do not apply to:

– On- or off-road transport of persons;

– Use in industrial environments, including training simulators for industrial applications;

– Use in hazardous locations;

– Use as personnel protective equipment;

– Agricultural use;

– Use in food preparation;

– Use to treat, alleviate instability, or move individuals in hospitals, care facilities or in the home;

– Use as medical devices or in medical environments;

– Robotic functions that have no safety dependencies (i.e., non-safety-related functions, e.g., accuracy of AI query responses, efficacy of a security alarm); or

– Robotic functions described in the relevant end-product safety standard.

Examples of such standards include:

– Commercial floor cleaning machines covered by CSA C22.2 No. 336, Particular requirements for rechargeable battery-operated commercial robotic floor treatment machines with traction drives;

– Portable battery-operated automatic vacuums covered by UL 1017, Standard for Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines;

– Outdoor commercial drones – UL 3030, Standard for Unmanned Aerial Vehicles; and

– Robots identified as a toy by the manufacturer and intended for play only by children covered by the Standard for Electric Toys, UL 696 and/or ASTM F963, Standard Consumer Safety Specification for Toy Safety.

NOTE The requirements of UL 3300 can be applied to robots with multiple use cases, some of which are not specifically covered.

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

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AATCC 20, *Test Methods for Fiber Analysis: Qualitative*

AATCC 20A, *Test Methods for Fiber Analysis: Quantitative*

Accessible Canada Act (ACA)

Americans with Disabilities Act (ADA) Standards for Accessible Design

ASTM F963, *Standard Consumer Safety Specification for Toy Safety*

Code of Federal Regulations, 16 CFR Part 24, *Guides for Select Leather and Imitation Leather Products*

Code of Federal Regulations, 16 CFR Part 303.15, *Required label and method of affixing*

Code of Federal Regulations, 16 CFR Part 303.4, *English language requirements*

Code of Federal Regulations, 16 CFR Part 303.43, *Fiber Content tolerances*

Code of Federal Regulations, 16 CFR Part 423, *Care Labelling of Textile Wearing Apparel and Certain Piece Goods*

Code of Federal Regulations, 16 CFR Part 1500.49, *Technical requirements for determining a sharp metal or glass edge in toys and other articles intended for use by children under 8 years of age*

Code of Federal Regulations, 16 CFR Part 1610, *Standard for the Flammability of Clothing Textiles*

Code of Federal Regulations, 167 CFR Part 205.100, *National Organic Program*

CSA C22.2 No. 94.2:20, *Enclosures for electrical equipment, environmental considerations*

CSA C22.2 No. 62368-1, *Audio/Video, information and communication technology equipment – Part 1: Safety requirements*

CSA C22.2 No. 60335-1, *Safety of household and similar appliances – Part 1: General requirements*

CSA C22.2 No. 60335-2-29, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers*

IEC 60068-2-6, *Environmental Testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14, *Environmental Testing – Part 2-14: Tests – Test N: Change of Temperature*

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

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

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 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 61508, *Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems (all parts)*

IEC 62061, *Safety of Machinery – Functional Safety Of Safety-Related Control Systems*

IEC/TS 62998-1, *Safety of Machinery – Safety-Related Sensors Used For The Protection Of Persons*

ISO 12405-4, *Electrically propelled road vehicles – Test specification for lithium-ion traction battery packs and systems – Part 4: Performance testing*

ISO 13849, *Safety of machinery – Safety-related parts of control systems (all parts)*

ISO 13850, *Safety of machinery – Emergency stop function – Principles for design*

ISO TS 15066, *Robots and Robotic devices, Collaborative Robots*

UL 50E, *Enclosures for Electrical Equipment, Environmental Considerations*

UL 62, *Flexible Cords and Cables*

UL/ULC 2271, *Batteries for Use in Light Electric Vehicle (LEV) Applications*

UL/ULC 2580, *Batteries for Use in Electric Vehicles*

UL 2595, *General Requirements for Battery-Powered Appliances*

UL 3115, *Outline of Investigation for Safety of AI-Based Products*

UL 5500, *Remote Software Updates*

UL 60335-1, *Household and Similar Electrical Appliances, Part 1: General Requirements*

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

UL 60335-2-29, *Household and Similar Electrical Appliances – Safety – Part 2-29: Particular Requirements For Battery Chargers*

UL 60730-1, *Automatic Electrical Controls – Part 1: General Requirements*

UL 62368-1, *Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements*

15 USC 45, *Unfair methods of competition unlawful; prevention by Commission*

3 Terms, Definitions and Abbreviated Terms

3.1 Abbreviations

Abbreviations are summarized alphabetically in Table 1.

Table 1
Abbreviations

ODD	Operational Design Domain
OTS	Off the Shelf
PL	Performance Level
SCIEE robot	Service, Communication, Information, Education and Entertainment Robot
SIL	Safety Integrity Level

3.2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.3 Function terms

3.3.1
collision avoidance
safety function involving non-contact sensing (e.g., lidar) plus a predetermined action (e.g., stopping, braking, decelerating) to avoid impact with a person.

3.3.2
emergency stop
safety function which is intended to avert arising or reduce existing hazards to persons, damage to machinery or to work in progress, and be initiated by a single human action.

[SOURCE: ISO 12100]

3.3.3
fail-safe routine

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