ULC Standards
Normes ULC

JOINT CANADA-UNITED STATES
NATIONAL STANDARD

ANSI/CAN/UL/ULC 1389:2023

STANDARD FOR SAFETY

Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations

Approved American National Standard
ANSI
ANSI/UL 1389-2023

scc ccn

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 Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations, ANSI/CAN/UL/ULC 1389

First Edition, Dated November 25, 2019

Summary of Topics

This revision of ANSI/CAN/UL/ULC 1389 dated April 20, 2023 includes the following changes in requirements:

– Additional Standard Reference for Storage Cylinders for Transportation; 9.1.
– Corrected Standard References for Industrial Control Equipment and Insulation Coordination; 18.1, 18B.1, 18B.2, 18C.1 and 18D.1.
– Correcting Explosion-Proof Equipment Standard References for Canada; 19.1.2 and 50.1.2.2.
– Revisions to Table 27.1.
– Terminology Clarifications and Corrections; 1.1, 19.1.3, 19.2.1, 19.3.1, 19.3.2, 37.1, 38.1, 46.3, 47.5, 49.2.1, 49.2.2, 49.3.1, 49.3.2, 50.1.2.1, 50.1.3.1, 50.4.1, 52.2 and 53.4.
– Miscellaneous Editorial Corrections; 48.1, 48.2, 48.4, Section 49 (title only), Section 52 (Advisory Note only) and 54.1.
– Update Table A1.1 – Safety Markings Translations.
– Update Annex A from Informative to Normative.
– Formatting Clause 1.1 for Consistency.

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.

These new and revised are substantially in accordance with Proposal(s) on this subject dated November 4, 2022.

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

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

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

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

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

No Text on This Page

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

ANSI/UL 1389-2023

NOVEMBER 25, 2019
(Title Page Reprinted: April 20, 2023)

ANSI/CAN/UL/ULC 1389:2023

Standard for Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations

First Edition

November 25, 2019

This ANSI/CAN/UL/ULC Safety Standard consists of the First Edition including revisions through April 20, 2023.

The most recent designation of ANSI/UL 1389 as an American National Standard (ANSI) occurred on April 20, 2023. 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 April 20, 2023.

COPYRIGHT © 2023 ULSE INC.

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

INTRODUCTION

1 Scope 11
2 Units of Measurement 12
3 Undated References 12
3A Referenced Publications 12
4 Glossary 15
5 Components 15
6 Normative References 15
6A Schedule of Limitations on Components 15

PART I – PLANT OIL EXTRACTORS

CONSTRUCTION

7 General 16
8 Pressure Vessels 16
9 Storage Cylinders 17
10 Piping, Hose, Tubing and Fittings 17
11 Gauges 18
12 Power-Operated Pumps and Bypass Valves 18
13 Meters 19
14 Valves 19
14.1 General 19
14.2 Safety relief valves 20
14.3 Excess flow/backflow/check valves 20
14.4 Hydrostatic relief valves 21
14.5 Positive shutoff valves 21
14.6 Pressure-limiting device 22
15 Regulators 22
16 Tube Fittings 22
17 Wiring 22
18 Grounding and Bonding 22
18A Support and Securement of Live Parts 23
18B Spacings 23
18C Insulating Barriers 24
18D Insulating Materials 24
18E Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts 24
18F Guards 29
18G Protection Against Risk of Fire, Electric Shock, or Injury to Persons 29
18H Sharp Edges 30
19 Specific Risk of Ignition Requirements for Hazardous Locations Rated Equipment 30
19.1 General 30
19.2 Zone 1 or Class I, Division 1 32
19.3 Zone 2 or Class I, Division 2 32
20 Materials 33
21 Cooling Systems 35
21.1 Aqueous systems 35
21.2 Refrigerant base cooling systems 35

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

PERFORMANCE

22 Deformation Test 35
23 Leakage Test – Pneumatically-Powered Pump 36
24 Endurance Test 37
24.1 Mechanical and pneumatically-powered pumps 37
24.2 Pressure vessel body and cover locking mechanism 37
25 Leakage Test – System 37
26 Hydrostatic Strength Test – Vessel 37
27 Hydrostatic Strength Test – Piping and Operating Parts 38
28 Mechanical Strength Tests for Sight Glass 38
29 Overflow Test 39
30 Temperature Test 39
31 Dielectric Voltage-Withstand Test 41
32 Tests for Butane and Carbon Dioxide Hoses 41
32.1 General 41
32.2 Exposure test 41
32.3 Hydrostatic strength test 42
32.4 Thermal cycling test 42
32.5 Oil aging test 42
32.6 Vibration test 42
32.7 Pull test 42
32.8 Permeation tests 42
33 Tip Stability Test 44
34 Tests for Synthetic Rubber Parts 44
34.1 General 44
34.2 Volume change test 44
34.3 Weight loss test 45
35 Low Temperature Test 45
36 Accelerated Aging Test 46
37 Solvent Vapor Release Test – Vessel Disconnection 46
38 Solvent Vapor Release Test – Vessel Opening 46
39 Moist Ammonia Air Stress Cracking Test 47

PERFORMANCE TESTS FOR HYDRAULIC PUMPS

40 Directional Valve Endurance Test 47
41 Pressure Relief and Automatic Limiting Device Endurance Test 47
42 Hydraulic Pump Endurance Tests 48
42.1 Hydraulic pump endurance test No. 1 48
42.2 Hydraulic pump endurance test No. 2 48
43 Fitting Pull Test 48
44 Hydrostatic Strength Test 48

MANUFACTURING AND PRODUCTION TESTS

45 General 48

MARKINGS

46 Details 48

INSTRUCTIONS

47 Manual 52

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

PART II – PLANT OIL EXTRACTION BOOTHS

CONSTRUCTION

48 General 55
49 Area Classification Due to Internal Sources of Release 56
49.1 General 56
49.2 Zone 1 or Class I, Division 1 within booth 56
49.3 Zone 2 or Class I, Division 2 within booth 57
50 Key Factors Investigated 58
50.1 Electrical equipment and associated factory-provided interconnections 58
50.2 Fire suppression system 60
50.3 Ventilation 60
50.4 Vapor detection 61
50.5 Smoke detection 61
50.6 Working spaces 61
51 Field Assembly, Installation and Use 62

MARKINGS

52 Details 62

INSTRUCTIONS

53 Manual 63

PART III – PLANT OIL EXTRACTION PREPARATORY AND POST-PROCESSING EQUIPMENT

54 General 65

ANNEX A – (NORMATIVE) – Safety Marking Translations

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 the ANSI/CAN/UL/ULC 1389, Standard for Safety for Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations.

ULSE is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC) as a Standards Development Organization (SDO). ULC Standards is accredited by 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/ULC 1389 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, identified as normative, forms a mandatory part of this Standard.

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 First Issue of UL 1389 Outline of Investigation and the First Edition of ULC/ORD-C1389-19.

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

Requests for interpretation of this Standard should be sent to ULC Standards. The requests should be worded in such a manner as to permit a "yes" or "no" answer based on the literal text of the requirement concerned.

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 Plant Oil Extraction Equipment, TC 1389.

This list represents the TC 1389 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 1389 Membership

Name	Representing	Interest Category	Region
Casals, Tomas	Viridios Systems	Producer	USA
Chisholm, Jim	Toronto Fire Services	AHJ	Toronto
Cole, Marty	Hubbell Canada Inc.	Supply Chain	Ontario
Drage, Tyler	Front Range Fire Rescue	AHJ	USA
Haferkorn, James	Rockwell Automation	Supply Chain	USA
Havelick, Linn	HAL Extraction Technology Ltd.	Producer	USA
Kaiman, Sarah	Green Hygiene Consulting	Commercial / Industrial User	USA
Kwong, Philip	3 Carbon	General Interest	British Colombia
Laberge, Todd	TLB Fire Protection Engineering Inc.	General Interest	USA
Laidlaw, Edward	Arcata Fire Protection District	AHJ	USA
Laks, David	Hub International	General Interest	Ontario
Lohf, Lloyd	Spokane Industries	Producer	USA
Lowrey, David	Boulder Fire Rescue	AHJ	USA
Martin, John	Technical Safety BC	AHJ	British Columbia
Mega, Dan	Emerson Fluid & Motion Control	Supply Chain	USA
Monsour, John	Precision Extraction Solutions	Producer	USA
Naito, Jack	Luna Technologies	Producer	USA
Nicoletti, Megan	Codenext Inc.	Supply Chain	Ontario
Olmstead, David	YA Engineering Services LLC	General Interest	USA
Ricks, Luke	Exveritas North America LLC	Testing & Standards Org.	USA
Sasso, Nick	Clark County, Nevada	AHJ	USA
Sexton, Jeremy	Apeks Supercritical	Producer	USA
Watt, Stephen	Emergency Management BC	Government	British Columbia
Williams, Jason	Office of the Fire Marshal	Government	Ontario
Witherell, Christopher	Pressure Safety Inspectors LLC	General Interest	USA
Wolf, Kevin	Intertek	Testing & Standards Org.	USA
Wolff-Klammer, Edgar	UL Solutions	Testing & Standards Org.	USA
Wintonic, Gillian	ULC Standards	TC Chair (Non-Voting)	Canada
Werner, Laura	ULC Standards	TC Project Manager (Non-Voting)	Canada

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

International Classification for Standards (ICS): 29.260.20

For information on ULSE Standards, visit http://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.

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.

INTRODUCTION

1 Scope

1.1 This Standard covers commercial and industrial plant oil extraction equipment for installation and use indoors in ordinary (unclassified) locations and hazardous (classified) locations. Hazardous locations are also referred to as explosive atmospheres. Based on the application, installation is in accordance with the manufacturer's installation instructions, together with the following, as applicable:

a) In Canada:

1) CSA C22.1, Canadian Electrical Code, Part 1 (CE Code);

2) ULC-S4400, Premises, Buildings and Equipment Utilized for the Cultivation, Processing and Production of Cannabis;

3) National Fire Code of Canada (NFC);

4) CSA B149.1, Natural Gas and Propane Installation Code.

b) In the United States:

1) NFPA 70, National Electrical Code (NEC);

2) International Fire Code (IFC);

3) NFPA 1, Fire Code;

4) NFPA 55, Compressed Gases and Cryogenic Fluids Code;

5) NFPA 58, Liquefied Petroleum Gas Code.

NOTE 1: For the purposes of this standard the terms “LP-Gas” and “Propane” are interchangeable.

NOTE 2: The term “Class I” was originally included as a prefix to Zone 0, Zone 1 and Zone 2 locations. Since both the term “Class I” and the terms “Zone 0, Zone 1 and Zone 2” only apply to flammable gases, vapors, or liquids, the “Class I” prefix was redundant and has been deleted in the CE Code and NEC. However, marking of “Class I” is left as an option for Zone 0, Zone 1 and Zone 2 locations within the NEC.

1.2 Plant oil extraction equipment includes:

a) Preparatory equipment, for preparing the plant material for extraction of the oil, such as trimming, deseeding, and drying/curing;

b) Extractors, for removing the oil from the plant material by the use of butane, ethanol, n-hexane, liquefied petroleum gas (LPG), pentane or propane (flammable solvents) and Carbon Dioxide (CO_2) (non-flammable solvent);

c) Extraction booths or pods, for enclosing/protecting plant oil extraction equipment; and

d) Post-processing equipment, for finalizing the plant oil extraction process such as vacuum ovens, rotary evaporators, and solvent recovery pumps.

1.3 This equipment, along with systems involving any combination of this equipment, is used for extracting oils from plants as instructed by the manufacturer.

1.4 The requirements in this standard do not cover the physiological or other attributes or effects that may result from the use of this equipment.

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

1.5 This standard does not apply to equipment involving the following risks of ignition:

a) Exothermic reactions, including self-ignition of dusts.

b) Mechanically generated sparks (generated intentionally).

c) Flames and hot gases (including hot particles).

1.6 This standard does not apply to mechanical means of extraction of plant oils that do not use solvents.

1.7 This standard does cover the connection to external solvent containers or external solvent sources to the plant oil extraction equipment.

Note: Equipment is a general term including apparatus, fittings, devices, components, and the like used as a part of, or in connection with, an installation.

1.8 This standard does not cover the extraction or processing of cannabis oil in dwelling units or in basements.

2 Units of Measurement

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

3 Undated References

3.1 *Deleted*

3A Referenced Publications

3A.1 The documents shown below are referenced in the text of this Standard. Unless otherwise stated elsewhere in this Standard, such reference shall be considered to indicate the edition and/or revisions of the document available at the date on which the Committee approved this Standard.

UL Standards

UL 21 *LP-Gas Hose*
UL 25 *Meters for Flammable and Combustible Liquids and LP-Gas*
UL 51 *Power-Operated Pumps and Bypass Valves for Anhydrous Ammonia, LP-Gas, and Propylene*
UL 109 *Tube Fittings for Flammable and Combustible Fluids, Refrigeration Service, and Marine Use*
ANSI/CAN/UL/ULC 125 *Flow Control Valves for Anhydrous Ammonia*
UL 132 *Safety Relief Valves for Anhydrous Ammonia*
UL 252 *Compressed Gas Regulators*
UL 252A *Compressed Gas Regulator Accessories*
UL 305 *Panic Hardware*
UL 330A *Hose and Hose Assemblies for Use With Dispensing Devices Dispensing Gasoline and Gasoline/Ethanol Blends With Nominal Ethanol Concentrations Up To 85 Percent (E0 – E85)*
UL 404 *Gauges, Indicating Pressure, for Compressed Gas Service*
UL 429 *Electrically Operated Valves*
UL 508 *Industrial Control Equipment*
UL 508A *Industrial Control Panels*
UL 536 *Flexible Metallic Hose*
UL 569 *Pigtails and Flexible Hose Connectors for LP-Gas*
UL 674 *Electric Motors and Generators for Use in Hazardous (Classified) Locations*
UL 698A *Industrial Control Panels Relating to Hazardous (Classified) Locations*

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