CAN/ULC 774:2026

Standard Test Method for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam

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Standard Test Method for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam, CAN/ULC 774

Fourth Edition, Dated June 23, 2026

Summary of Topics

This new Fourth Edition of CAN/ULC 774 dated June 23, 2026 incorporates editorial changes including renumbering and reformatting to align with current style.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated March 2, 2026.

PLEASE NOTE THAT CERTAIN CODES MAY REFER TO A SUPERSEDED VERSION OF THIS STANDARD. IN THOSE INSTANCES, THE RELEVANT VERSIONS ARE AVAILABLE FOR PURCHASE.

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PREFACE

This is the Fourth Edition of the Standard Test Method for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam, CAN/ULC 774.

This Edition of the Standard has been formally approved by the ULC Standards Committee on Thermal Performance and Energy Use in the Built Environment.

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

Only metric SI units of measurement are used in this Standard. If a value for measurement is followed by a value in other units in parentheses, the second value may be approximate. The first stated value is the requirement.

Annex A, identified as informative, is for informational purposes only.

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 Fourth Edition National Standard of Canada is based on, and now supersedes the Third Edition.

Attention is drawn to the possibility that some of the elements of this Canadian standard may be the subject of patent rights. ULC Standards shall not be held responsible for identifying any or all such patent rights.

This CAN/ULC 774 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of 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.

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.

This Standard is intended to be used for conformity assessment.

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INTRODUCTION

1 Scope

1.1 This Standard has been developed for the assessment of volatile organic compound emissions from polyurethane foam materials used in residential and nonresidential occupancies. It outlines a test procedure for the determination of volatile organic compounds from the specimen and explains why certain test conditions have been selected.

1.2 This laboratory test method is based on ASTM D5116 and ASTM D8142, which describes a procedure using small-scale environmental chambers to determine volatile organic compound emissions from a variety of materials including Spray Polyurethane Foam (SPF) Insulation.

1.3 The chamber methodology only presents a simple picture of the complex nature and interactions of emissions that may exist in home and work environments. However, data from the chamber procedure is useful for identifying potential sources of chemicals that may adversely affect the health of the occupants. Therefore, the results from these tests cannot fully represent "real life" conditions and they will err on the side of conservatism.

1.4 The test method specifies recommended procedures for the use of test chambers to evaluate emissions from the material at a point in time following its installation. The test method contains the following:

a) A dynamic chamber procedure for characterizing the rate of volatile organic compound emissions from the material; and

b) A methodology for calculating the estimated indoor air concentrations of volatile organic compounds based on the results of dynamic chamber testing.

1.5 The dynamic chamber procedure measures the typical VOC emission profile of the material commencing 24 hours after installation and continuing for 30 days thereafter.

1.6 The results of the dynamic chamber procedure are used to calculate indoor air VOC concentration profiles and to determine the acceptability of the material for retrofit use.

1.7 The dynamic chamber procedure is a more complex evaluation of the material when the normal 30 day minimum time to occupancy associated with new construction is not provided (e.g. occupied buildings).

1.8 In these special cases (e.g. occupied buildings), the application and installation standard will provide the requirements for isolation and ventilation, if necessary. The test results of the dynamic chamber procedure will determine the length of time that these requirements are necessary.

1.9 The methodology for assessing the acceptability of the material utilizes comparison of the estimated indoor air concentration of volatile organic compounds (VOCs) with permissible concentrations published by the American Conference of Governmental Industrial Hygienists, Health Canada and/or a Human Health Risk Assessment Report (HHRA) by a licensed Toxicologist.

1.10 This test method can also be used to measure the emissions from SPF insulation samples that are collected from building sites where the insulation has already been applied. Potential uses of such measurements include investigations of odor complaints after product application. However, the specific details of odor investigations and other indoor air quality (IAQ) investigations are outside of the scope of this test method.

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2 Referenced Publications

2.1 Any undated reference to a code or standard appearing in the requirements of this Standard shall be interpreted as referring to the latest edition of that code or standard.

2.2 The following publications are referenced in this Standard:

BIFMA M7.1, *Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components, and Seating*

ASTM D4840, *Standard Guide for Sample Chain-of-Custody Procedures*

ASTM D5116, *Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products*

ASTM D5197, *Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)*

ASTM D6196, *Standard Practice for Choosing Sorbents, Sampling Parameters and Thermal Desorption Analytical Conditions for Monitoring Volatile Organic Chemicals in Air*

ASTM D6670, *Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products*

ASTM D7706, *Standard Practice for Rapid Screening of VOC Emissions from Products Using Micro-Scale Chambers*

ASTM D8141, *Standard Guide for Selecting Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) Emission Testing Methods to Determine Emission Parameters for Modeling of Indoor Environments*

ASTM D8142, *Standard Test Method for Determining Chemical Emissions from Spray Polyurethane Foam (SPF) Insulation using Micro-Scale Environmental Test Chambers*

ASTM E741, *Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution*

CDPH/EHLB/Standard Method V1.2, *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers*

EN 16516, *Construction products – Assessment of release of dangerous substances – Determination of emissions into indoor air*

Exposure Guidelines for Residential Indoor Air Quality (http://publications.gc.ca/collections/Collection/H46-2-90-156E.pdf)

ISO 9001, *Quality Management System – Requirements*

ISO 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 16000-3, *Indoor Air – Part 3: Determination of Formaldehyde and Other Carbonyl Compounds in Indoor and Test Chamber Air – Active Sampling Method*

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ISO 16000-6, *Indoor Air – Part 6: Determination of volatile organic compounds (VVOC, VOC, SVOC) in indoor and test chamber air by active sampling on sorbent tubes, thermal desorption and gas chromatography using MS or MS FID*

Method 325B – Volatile Organic Compounds from Fugitive and Area Sources: Sampler Preparation and Analysis (https://www.epa.gov/sites/production/files/2017-08/documents/method_325b.pdf)

TLV®s and BEI®s, published annually (formerly Threshold Limit Values for Chemical Substances and Physical Agents)

ULC-S710.1, *Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification*

ULC-S711.1, *Bead-Applied Two Component Polyurethane Air Sealant Foam, Part 1: Material Specification*

ULC-S718, *Site Quality Assurance Program for Spray Applied Polyurethane Foam*

ULC-S773, *Thermal Insulation Terminology*

U.S. EPA Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS) (https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-15r.pdf)

U.S. EPA Compendium Method TO-17: Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes (https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-17r.pdf)

3 Glossary

3.1 Definitions common to ULC Thermal Insulation Standards are given in ULC-S773, and some of these have been listed below with a (ULC-S773) identifier. Additional definitions not listed in ULC-S773 but required for this Standard have also been listed below.

3.2 AIR CHANGE RATE – The flow rate of clean, conditioned air brought into the chamber in one hour divided by the net chamber volume measured in identical volume units, normally expressed in air changes per hour (ACH).

3.3 ALDEHYDES – Formaldehyde, acetaldehyde and other low molecular aldehydes detectable by derivatization with DNPH and analysis by HPLC.

3.4 CHAIN-OF-CUSTODY – Document providing written evidence of transfer of a product sample, air sample, or another document from one organization to another organization or from one individual to another individual within the same organization. Document is signed and dated by each party involved in the transfer.

3.5 CLEAN AIR – Air that does not contain any volatile organic compounds at a concentration in excess of the allowable background level.

3.6 DYNAMIC CHAMBER – A chamber where a polyurethane foam specimen can be placed and tested to determine the volatile organic compound emission rate under controlled environmental conditions.

3.7 HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) – Is a form of column chromatography that pumps a sample mixture or analyte in a solvent (known as the mobile phase) at high pressure through a column with chromatographic packing material (stationary phase). HPLC has the

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ability to separate, and identify compounds that are present in any sample that can be dissolved in a liquid in trace concentrations as low as parts per trillion.

3.8 LOADING RATIO – The total exposed surface area of each specimen (or insulation in a building) divided by the test chamber (or building) volume. Since the material is installed in large continuous areas, only one face of the material is exposed in the test procedure (see 7.3, Specimen preparation).

3.9 NOEL / NOAEL – No Observed Effect Level / No Observed Adverse Effect Level.

3.10 NONCANCER CHRONIC REFERENCE EXPOSURE LEVEL (CREL) – Developed by Cal/EPA OEHHA. These are inhalation concentrations to which the general population, including sensitive individuals, may be exposed for long periods (10 years or more) without the likelihood of serious adverse systemic effects other than cancer.

3.11 PERMISSIBLE INDOOR AIR CONCENTRATION – The maximum allowable indoor air concentration of a volatile organic compound.

3.12 SEMI-VOLATILE ORGANIC COMPOUND (SVOC) – Organic compound whose boiling point is in the range from (240 °C – 260 °C) to (380 °C – 400 °C).

3.13 SORBENT TUBE – Solid phase sampling device through which a sample of chamber exhaust air at controlled flow rate is passed to capture VOCs. Device typically contains Tenax-TA, or equivalent, as primary sorbent material backed up by higher surface area sorbent material to quantitatively capture the most volatile VOCs.

3.14 SPRAY-APPLIED POLYURETHANE FOAM (SPF) – Cellular plastic material that is formed in place by the catalyzed reaction of polymeric isocyanate and resin (which includes polyhydroxyl compounds, and blowing agents, etc.).

3.15 SPRAY APPLIED POLYURETHANE FOAM INSTALLER (INSTALLER) – Individual (worker) responsible for the actual installation and site requirements of spray polyurethane foam, and authorized to supervise an apprentice.

3.16 SPRAY APPLIED POLYURETHANE FOAM SYSTEM SUPPLIER (SUPPLIER) – A manufacturer or distributor responsible for the liquid chemical system (resin and polymeric isocyanate) which is designed to be mixed and sprayed to form spray polyurethane foam material in-situ.

3.17 TD-GC/MS-SCAN – A thermal desorption gas chromatograph equipped with a mass spectrometer operated in scan mode.

3.18 TESTING LABORATORY (LABORATORY) – Organization accredited to ISO/IEC 17025 by a member of IAF/ILAC Multilateral Agreement, possessing the necessary competence to test material to the appropriate ULC 774 Standard listed in the Laboratory's current scope of accreditation.

3.19 THRESHOLD LIMIT VALUE (TLV®) – The level of exposure to a chemical substance to which it is believed a worker can be subjected day after day for a working lifetime without adverse health effects.

Source: American Conference of Governmental Industrial Hygienists (ACGIH).

3.20 TIME TO OCCUPANCY – Period of time required after installation of the material where that portion of the building is isolated, ventilated and unoccupied.

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3.21 TOTAL VOLATILE ORGANIC COMPOUND (TVOC) – Sum of the concentrations of all identified and unidentified VOCs between and including n-pentane through n-heptadecane (i.e., C5 – C17) as measured by the GC/MS TIC (total-ion-current) method and expressed as a toluene equivalent value.

3.22 TRACER GAS – A gaseous chemical (e.g. SF6 and N2O) used to study the mixing characteristics of the dynamic chamber and to provide a crosscheck of the air exchange rate measurements.

3.23 VERY VOLATILE ORGANIC COMPOUND (VVOC) – Organic compound whose boiling point is in the range from < 0 °C – (50 °C – 100 °C).

3.24 VOLATILE ORGANIC COMPOUND (VOC) – An organic compound (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates and ammonium carbonate) with a saturation vapour pressure at room temperature and/or with a boiling point less than 260 °C. Including VVOCs such as formaldehyde and acetaldehyde.

TEST METHODS

4 Introduction

4.1 Dynamic chamber tests

4.1.1 Dynamic chamber tests are useful for evaluating volatile organic compound emissions from materials. The volatile organic compounds emitted are studied to determine the "Time to Occupancy" for a typical residential and nonresidential building. It is essential that the use of these chambers and test protocols closely model the actual field conditions. Important parameters that must be considered include size and installation effects, air exchange rate, temperature and humidity, time from installation to occupancy and other site-specific factors.

4.1.2 The conditions selected for the procedures herein represent those encountered by the materials, when they are installed in typical residential buildings. Although materials installed in walls and ceilings will normally be covered with an interior finish, the gas transport properties of the finishes cannot be controlled.

4.1.3 In general, the closer the dynamic chamber conditions (temperature, humidity, air exchange rate, loading ratio and time) match the actual environmental conditions of the installation, the more accurate the data is.

4.2 Time frames used

4.2.1 For retrofit applications, a time emission profile is used to assess the nature of the VOC emissions. In this case, the specimens are tested at intermittent times up to 30 days to assess the decay pattern of the VOCs.

5 Test Apparatus and Equipment Requirements

5.1 General equipment requirements

5.1.1 All equipment and apparatus in contact with the specimen or the associated air stream including the air exchange system, chambers, sample holder, and air sampling system shall be of glass, stainless steel, or other inert material. Special care shall be taken to ensure that gaskets, seals, sealants, valve and pump components and other associated items are chemically inert.

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