

CAN/ULC-S635:2016

**STANDARD FOR LINING SYSTEMS FOR EXISTING MASONRY
OR FACTORY-BUILT CHIMNEYS AND VENTS**

Prepared and Published by:



Approved by:



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

STANDARD FOR LINING SYSTEMS FOR EXISTING MASONRY OR
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STANDARD FOR LINING SYSTEMS FOR EXISTING MASONRY OR FACTORY BUILT CHIMNEYS AND VENTS

PREFACE

This is the Third Edition of the Standard for Lining Systems for Existing Masonry or Factory Built Chimneys and Vents, CAN/ULC-S635.

This Edition of the Standard has been formally approved by the ULC Standards Committee on Factory-Built Fireplaces, Chimneys and Vents.

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.

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 Third Edition National Standard of Canada is based on, and now supersedes, the Second Edition of ULC-S635.

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.

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.

The review and action to revise or reaffirm this Standard will not exceed 5 years from the date of publication, unless the Standard is identified as fitting within a stabilized category, whereby the review will commence within the appropriate time frame set out by ULC Standards.

This Standard is intended to be used for conformity assessment.

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1 SCOPE

1.1 This Standard covers *lining systems* for existing *masonry chimneys*, which may or may not incorporate a *liner* of fire-clay tile, and existing factory built *chimneys* and vents.

1.2 *Lining systems* shall be classed as follows:

Class 1 – For the venting of gas-fired *appliances* where the temperature of the *flue-gas* products is 135 °C or above, but does not exceed 245 °C;

Class 2 – For the venting of oil and gas-fired *appliances* where the temperature of the *flue-gas* products does not normally exceed 300 °C; and

Class 3 – For the venting of oil-, gas- and solid-fuel fired *appliances* where the temperature of the *flue-gas* products does not normally exceed 650 °C.

1.3 *Lining systems* as covered by these requirements, are not intended for use with Type BH Gas Vents, or with *appliances* that create positive pressures within the *lining system*, or cause condensation of corrosive acids, unless specifically listed for such applications.

2 REFERENCE PUBLICATIONS

2.1 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 ULC Standard.

Documents Published by the American Society for Testing and Materials (ASTM International)
100 Barr Harbour Drive, PO Box C700, West Conshohocken, PA 19428-2959 U.S.A.
Telephone: (610) 832-9585
www.astm.org

- ANSI/ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process

Documents Published by ULC Standards (prior to May, 2010, identified as Underwriters Laboratories of Canada)
171 Nepean Street, Suite 400, Ottawa, ON K2P 0B4 Canada
Telephone: (416) 757-3611, ext. 61744; Fax (613) 231-5977, "ATTN: Publications"
E-mail: publications@ulc.ca
www.ulc.ca

- CAN/ULC-S114-05, Standard Method of Test for Determination of Non Combustibility in Building Materials

3 GLOSSARY

Note: Terms used in this Standard that are in *italic* print are defined as follows:

3.1 *APPLIANCE* – A device to convert the energy in fuel into heat, and includes all accessories, components, controls, wiring, piping or tubing required to be part of the device.

3.2 *BREECHING* – A *flue* pipe or chamber for receiving *flue gases* from one or more *flue* connections and for discharging these gases through a single *flue* connection.

3.3 **CHIMNEY** – A primarily vertical shaft enclosing at least one *flue* for conducting *flue gases* to the outdoor atmosphere.

3.4 **CHIMNEY CONNECTOR** – The *flue* pipe that connects a fuel burning *appliance* to a *lining system*.

3.5 **CHIMNEY, MASONRY OR CONCRETE** – A field constructed *chimney* of brick, stone, concrete or masonry units built in accordance with applicable building code requirements.

3.6 **CHIMNEY TOP FLASHING** – A flashing to close off the space between the *lining system* and the top of the existing *chimney*.

3.7 **FIRE STOP** – A draft tight barrier within or between construction assemblies that acts to retard the passage of smoke and flame.

3.8 **FLUE** – An enclosed passageway for conveying *flue gases*.

3.9 **FLUE COLLAR** – The portion of a fuel-fired *appliance* designed for the attachment of the *flue* pipe or *breeching*.

3.10 **FLUE GASES** – Combustion products and excess air.

3.11 **LINER** – The *flue* gas conveying section of a *chimney lining system*.

3.12 **LINING SYSTEM** – A system that is constructed from metallic or nonmetallic materials that are factory made or packaged by the manufacturer to be mixed in the field, and that is assembled in the field to form a complete, functional means for conveying products of combustion to the outside, within an existing *chimney*.

3.13 **NATURAL DRAFT** – The draft created by an *appliance* that operates at neutral or negative pressure, as measured at the outlet of the appliance.

3.14 **NON-COMBUSTIBLE** – Material conforming to CAN/ULC-S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

3.15 **QUALIFIED PERSON** – A person who has successfully completed a thorough training programme recognized by the *regulatory authority* and who is familiar with the use of the product and the risks associated with improper installation procedures.

3.16 **RAIN CAP** – A cover to prevent the entrance of debris or rain into the *liner*.

3.17 **REGULATORY AUTHORITY** – A Federal, Provincial or Municipal Ministry, Department, Board, Agency, or Commission that has responsibility for regulating by statute the use of products, materials, or services.

3.18 **SMOKE CHAMBER** – The part of the system which connects the fireplace to the *chimney* and allows a channelling of the *flue gases* to occur.

3.19 **SPARK ARRESTOR** – A device to prevent sparks, embers or other ignited material, above a given size, from being expelled to the atmosphere.

3.20 **SPARK SCREEN** – A device to prevent sparks, embers or other ignited material, above a given size, from being expelled onto the roof.

3.21 **WALL PENETRATION ASSEMBLY** – A means for routing a *chimney connector* through a combustible wall to a masonry *chimney*.

4 COMPLIANCE

4.1 *Lining systems* as covered by this Standard, shall be capable of installation in existing masonry or factory-built *chimneys* and vents in accordance with the manufacturer's installation instructions as required herein.

4.2 Class 1 *lining systems* intended for venting gas-fired *appliances* shall meet the requirements of Parts A and B of this Standard.

4.3 Class 2 *lining systems* intended for venting oil and gas-fired *appliances* shall meet the requirements of Parts A and C of this Standard.

4.4 Class 3 *lining systems* intended for venting oil-, gas- and solid-fuel fired *appliances* shall meet the requirements of Parts A and D of this Standard.

PART A

5 MATERIALS

5.1 Materials employed for the conduit of *lining systems* shall be *non-combustible* and capable of meeting the test requirements described herein for the appropriate class of *lining system*. Materials shall not be used in combinations at any location within the *lining system* that may cause detrimental galvanic action.

5.2 Materials shall be as specified in Parts B, C and D, as applicable.

5.3 Thermal insulation, if used, shall comply with the following conditions when the *lining system* is tested in accordance with these requirements:

- A Shall be *non-combustible*;
- B Shall be compressible;
- C The K factor shall not change by more than 20 %;
- D Shall not cause deterioration of the *lining system*; and
- E Shall not soften or melt.

6 ASSEMBLY

6.1 GENERAL

6.1.1 A *chimney lining system* shall consist of all the parts and materials necessary for its intended assembly of a complete *chimney lining system*. Each part of the system shall be constructed for ready attachment of one to the other without requiring alteration by the installer, such as by cutting, threading, drilling, welding, or similar tasks.

Exception No. 1: An assembly or component part intended to be cut to length or to be fitted by the installer may be provided if means are furnished for joining any altered part to a companion part or assembly. All fasteners required to complete the assembly shall be provided with the product by the manufacturer.

Exception No. 2: Drilling is acceptable if (1) the drilling operation does not weaken the assembly and (2) the size of the required drill bit is specified and the instructions clearly describe the location(s) to be drilled such as by the use of drawings, descriptions, templates, or the like.

6.1.2 Two or more parts or subassemblies that bear a definite relationship to each other in the intended application shall:

- A Be arranged and constructed to permit them to be incorporated into the complete assembly without need for alteration or alignment and only in the correct relationship with each other; or
- B Be assembled and shipped from the factory as one unit.

6.1.3 Each part, such as a *liner* section, tee section, clean-out door assembly, and *rain cap* shall be completely assembled by the manufacturer at the factory.

Exception: A cementitious lining system, or one incorporating other material requiring field mixing, need not be completely assembled by the manufacturer at the factory.

6.1.4 A *liner* shall be sized in consideration of standard sized *chimney* brushes.

Exception: Nonstandard sizes and shapes of liners are acceptable provided the manufacturer supplies a brush sized to clean the lining system, or the specific size is readily available, and the maintenance instructions specify the method of ordering the brush.

6.1.5 A *lining system* shall not incorporate loose-fill type insulation between the *masonry chimney* and *liner* material unless the insulation binder keeps the fibres or particles together within the assembly.

6.1.6 If a *lining system* is intended for installation in an offset *chimney*, parts necessary for maintaining the clearance between the *liner* and the *masonry chimney* wall shall be provided by the manufacturer, as well as the parts needed to install the *lining system* in the offset *chimney*.

6.1.7 A rigid metallic *lining system* shall incorporate means to provide for expansion of the parts in the system so as not to create stress on parts within the assembly. Means shall be provided to prevent *liner* sections from telescoping into one another.

6.2 INSULATION

6.2.1 Thermal insulation shall not come into contact with the products of combustion.

6.2.2 When the lining system is installed in accordance with the manufacturer's installation instructions, thermal insulation located within the living space shall not be exposed.

6.2.3 Thermal insulation that is not self-supporting shall be applied to solid surfaces so that the insulation does not sag. An adhesive or cement that is depended upon to adhere insulation to *chimney lining system* parts shall retain its adhesive qualities at any temperature the adhesive may attain when tested in accordance with these requirements and at -18 °C.

6.2.4 A water-absorbing insulating material shall not be subject to wetting by condensation or rain when installed as intended.

6.2.5 Thermal insulation shall incorporate a binder, or be constructed of material that is woven or otherwise formed to retain its shape upon removal of a portion of the *lining system*.

6.3 CHIMNEY TERMINATION ASSEMBLIES

6.3.1 General

6.3.1.1 A *chimney* termination assembly shall resist the entrance of debris and rain into the *lining system* and surrounding *chimney* cavity. See Test No. 8, Rain.

6.3.2 Rain Caps

6.3.2.1 A cap shall be provided to prevent the entrance of debris, rain, birds, and small animals into the *liner*.

6.3.2.2 A cap shall be designed so that leaves and debris falling or blown onto it are not likely to be retained so as to obstruct *flue-gas* or cooling-air passages. A cap shall be designed to avoid accumulation of soot likely to obstruct *flue-gas* or cooling-air passages.

6.3.2.3 A cap shall be removable and replaceable by the use of simple hand tools (screwdriver, wrench, pliers, or the like) to allow for *chimney* cleaning in accordance with the installation and maintenance instructions without bending or deforming the *liner*, or parts thereof.

6.3.3 Chimney Top Flashing

6.3.3.1 A *chimney top flashing* shall be provided by the manufacturer.

Exception: A field constructed assembly may be used if the installation instructions or training manual clearly specify the materials to be used and methods of fabrication and installation of the assembly.

6.4 JOINTS

6.4.1 Parts of a *lining system* shall be joined and secured so that they do not disengage when tested in accordance with these requirements.

6.4.2 Screws, rivets, or similar fasteners used to join *lining system* parts together shall be used in such a manner as to not impose unacceptable stresses on the assembly, when tested in accordance with these requirements (see Clause 8.1.1). Screws shall not be used to secure *liner* sections together. The following considerations apply when rivets are used to secure *liner* sections together:

- A At least three rivets shall be employed at each joint between *liner* sections;
- B The rivets shall have corrosion resistance at least equivalent to that of the *liner* material;
- C The proper type and number of rivets shall be supplied with each *lining system*;
- D Holes for the rivets shall be prepunched or predrilled in at least the outer portion of each *liner* section. Holes in *liner* sections that are predrilled or prepunched at the factory to accept rivets in field installation shall be sized to accept the specified rivet size (allowing standard rivet hole tolerances). *Liner* sections that are predrilled or prepunched in both inner and outer sections shall be aligned at the factory to provide for correct field installation;
- E The *liner* sections shall have inherent means to prevent telescoping that rely on other than the fastening means; and
- F The *lining system* shall incorporate means to permit expansion (pipe length growth).

6.4.3 If screws are employed to join assemblies during installation, the assemblies to be joined shall provide for use of screws without being punched or drilled, except as permitted in the exception to Clause 6.1.1. If cement is employed for this purpose, the cement shall be a quick-setting type. Cement, screws, and instructions shall be furnished. A screw shall not extend into a *flue-gas* passage.

6.4.4 A joint shall not retain condensation nor permit condensation to flow from the interior to the exterior of the *liner*.

6.4.5 A joint between sections of *liner*, fabricated in accordance with the manufacturer's instructions, shall not permit passage of a 0.81 mm diameter rod.

6.4.6 A joint or section of a *lining system* shall not reduce the capacity of the *liner* to the extent that it interferes with venting.

6.5 TEE SECTIONS AND SUPPORT ASSEMBLIES FOR METALLIC LINING SYSTEMS

6.5.1 A tee section or support assembly shall be constructed to have the strength, rigidity and durability necessary to resist damage during installation and use. See Test No. 2, Support.

7 INSTALLATION AND MAINTENANCE INSTRUCTIONS

7.1 Installation and maintenance instructions shall be provided, either combined in a single manual or as separate manuals, and shall be packed in the package containing an essential part of the *lining system*. Reference shall be made on each *lining system* part or material package specifying the location of the instructions.

Exception: Installation instructions need not be provided if:

- A The lining system requires that installation be accomplished by a qualified person only;*
- B The lining system requires specialized equipment for installation; and*
- C A training manual is provided to the installer by the manufacturer.*

7.2 The installation and maintenance instructions shall be illustrated and include directions and information necessary to complete the intended installation and maintenance of the *lining system*.

NOTE: The instructions should include a copy of the certification label.

7.3 The instructions or training manual shall include particular details concerning:

- A The kind of fuels which may be used and appliances which may be connected to the lining system. Details are to be provided on the method of connection to appliances;*
- B Limitations with respect to installation, such as minimum air space clearances to be maintained between the inside of the masonry chimney (or flue tile lining) and the metal liner, maximum height, minimum thicknesses of nonmetallic liner material, joining of two or more parts to constitute the intended assembly, and the like;*
- C The termination of the lining system, its extension and proximity to adjacent walls or buildings;*
- D The maximum height of the lining system above the existing chimney or vent including a cautionary statement that use of a single wall liner above a chimney will cause the rapid accumulation of creosote;*