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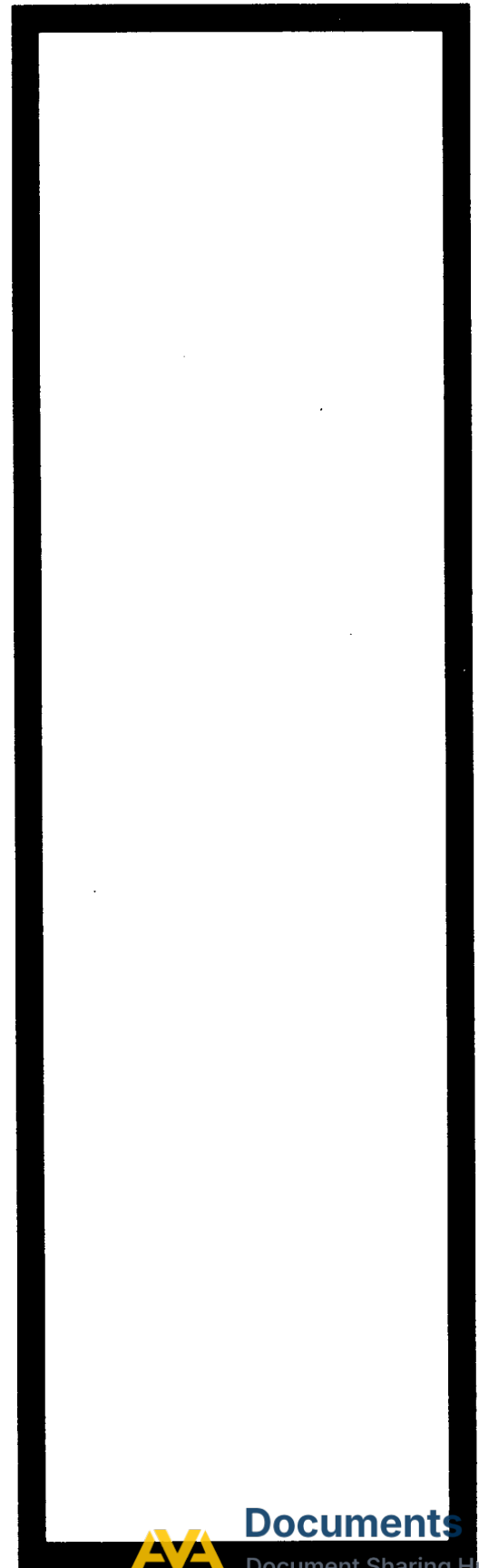
540°C AND 760°C INDUSTRIAL CHIMNEYS



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540°C AND 760°C
INDUSTRIAL CHIMNEYS

Prepared and Published by
UNDERWRITERS' LABORATORIES OF CANADA



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FOREWORD

Certification organizations are periodically called upon to respond promptly to a need to provide a certification service for devices, constructions, materials and systems for which no recognized standards of acceptance are available. Accordingly, the certification agency draws upon its experience, existing specifications and requirements in related areas, together with assistance from its advisory councils to develop and prepare an "Other Recognized Document" (ORD) for use in conducting the necessary tests and evaluation investigation.

Underwriters' Laboratories of Canada has over the years prepared many ORD's in response to requests from, and in conjunction with, industry, code writing bodies, regulatory agencies and others prior to inaugurating a certification programme. In many instances such documents have become published ULC Standards and subsequently National Standards of Canada. It is the intention of Underwriters' Laboratories of Canada to continue this practice, as appropriate.

Comments on the content of this ORD should be directed to the Head Office of Underwriters' Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, CANADA, M1R 3A9.

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ULC/ORD-C959-1993

540°C AND 760°C

INDUSTRIAL CHIMNEYS

PREFACE

This is the First Edition of ULC/ORD-C959, entitled "540°C and 760°C Industrial Chimneys".

A product which complies with these requirements will not necessarily be acceptable if, when examined and tested, it is found to have features not covered by this document which may impair the result contemplated by these requirements.

A product employing materials or having forms of construction differing from those detailed in these requirements may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be given recognition.

Units of measurement used in this document are Metric SI.

1. SCOPE

1.1 These are factory-built industrial chimneys intended for use with certain process equipment and large oil or gas burning building heating appliances normally producing flue gas temperatures of 540°C or 760°C, or less as applicable.

1.2 A complete assembly consists of a support assembly, a clean-out tee or drain section, a number of chimney sections, intermediate supports, a roof flashing, a storm collar and a termination fitting such as a raincap or finishing cone. Elbows may be included.

1.3 540°C and 760° chimneys shall be capable of installation in accordance with the manufacturer's installation instructions as specified in Section 6.

1.4 540°C and 760°C Chimneys are intended to be installed unenclosed, or where penetration of a fire separation is required, to be enclosed in a non-combustible enclosure of equivalent fire rating.

2. GLOSSARY

2.1 APPLIANCE - A piece of utilization equipment, normally built in standardized sizes or types, that is installed or connected as a unit to perform one or more functions such as clothes washing, air conditioning, food mixing, cooking, heating, refrigeration, etc.

2.2 APPLIANCE, BUILDING HEATING - Fuel-burning boiler, operating at not over 345 kPa pressure, central furnaces, and heaters intended primarily for heating spaces having volumes exceeding 700 m³.

2.3 APPLIANCE, LOW-HEAT, INDUSTRIAL - An industrial appliance in which materials or products are dried, cured, cooked, heated or melted at temperatures (excluding flue-gas temperatures) not exceeding 316°C.

2.4 APPLIANCE, RESIDENTIAL-TYPE, HEATING - Fuel-burning appliances, except high-pressure steam boilers, for heating building spaces having a volume of not more than 708 m³ and other heat-producing appliances of the type mainly used in residences, but which may be used in other buildings.

2.5 CHIMNEY - A passageway, essentially vertical, for conveying flue gases to the outside atmosphere.

2.6 CHIMNEY, FACTORY-BUILT - A chimney composed of factory-built components assembled in accordance with its manufacturer's Installation Instructions to form a complete chimney.

2.7 CHIMNEY CAP - A protective covering or housing for the top of a chimney intended to prevent the entry of rain, snow, animals, birds, etc. and to prevent downdrafts.

2.8 CLEANOUT OPENING - An opening in a chimney, usually located near its base, designed to allow access to the flue for purposes of removing ash, creosote, soot and other extraneous matter.

2.9 CLEARANCE - The distance between a heat-producing appliance, chimney, chimney connector, vent, vent connector, or plenum, and other surfaces.

2.10 Combustible Material - Material that fails to meet the acceptance criteria of CAN4-S114 "Standard Method of Test for Determination of Non-combustibility in Building Materials.

2.11 COMBUSTION - As used herein, refers to the rapid oxidation of fuel accompanied by the production of heat.

3. CONSTRUCTION

3.1 MATERIALS

3.1.1 A chimney assembly part shall be made of noncombustible corrosion-resistant materials. Materials employed in the construction shall be of such quality and shall possess properties and characteristics which may be expected to provide the almost unlimited service life expected of a permanent portion of a building. Metals shall not be used in combinations such as to cause detrimental galvanic action which will adversely affect any part of the assembly.

3.1.2 The thickness of sheet metal employed for a component or sub-assembly shall be not less than that indicated in Table 1; except that sheet metal of lesser thickness may be employed if, upon investigation (consideration being given to the shape, size, and function of the component or sub-assembly), it is found to have adequate mechanical strength and to be otherwise suitable for the purpose; but in no case shall the thickness of a component or sub-assembly for any size of chimney be less than that shown in Table 1 for chimney sizes of 305 mm and less.

3.1.3 Aluminum alloys containing more than 1.0% magnesium are not to be used if the reflectivity of the material is utilized to reduce fire hazard.

3.1.4 The lining of the chimney, the clean-out tee and other parts of a chimney assembly in contact with flue gases or subject to condensation shall be of material having durability and resistance to corrosion, fire, and heat equivalent to fire-clay tile, cast iron, or suitable stainless steel.

3.1.5 Ceramic materials and porcelain-enamelled steel shall conform to the requirements of the applicable tests described for the material.

T A B L E 1
THICKNESS OF SHEET METAL

Chimney Size (Liner Diameter)	Minimum Thickness of Sheet Metal (mm)				
	Aluminum Alloys (1100, 3003)	Steel			
		Uncoated	Zinc Uncoated	Aluminum ^a Coated	Stainless Steel
305 mm and less	0.40	1.00	0.49	0.46	0.30
306 mm and above	0.80	1.00	0.59	0.50	0.41
^a Having a coating of aluminum of 122.6 g/m ²					
NOTE: The thicknesses given in Table 1 are minimums, and greater thicknesses may be required depending upon the particular design.					

3.1.6 All portions of a chimney shall be fabricated from materials resistant to the corrosive effects of combustion products. An outer casing of the chimney shall be made of material having durability and resistance to physical damage, corrosion and fire.

3.1.7 Structural parts, other than those noted in Clauses 3.1.4 and 3.1.6, whose failure would cause the chimney assembly in collapse or fail, shall be made of material having durability and resistance to physical damage, corrosion and fire. Plain galvanized steel having a coating of zinc conforming to ASTM A525M, General Requirements for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, coating designation Z275, published by the American Society for Testing and Materials, ordinarily meets the requirements of the foregoing.

3.1.8 A painted part made of steel not less than 1.40 mm thick, or of cast iron not less than 3 mm thick, and for use only in the interior of buildings, is considered as having corrosion resistance equivalent to that required by Clause 3.1.7.

3.1.9 Paint coatings on outer casings shall not ignite below the maximum temperature obtained on the outer case of the chimney assembly during temperature tests.

3.1.10 Thermal insulation material shall be of a metal or mineral base.

3.1.11 Thermal insulation, as employed, shall comply with the following conditions when the chimney assembly is tested in accordance with these requirements:

- A The products resulting from the combustion or volatilization of any combustible binder shall be discharged to the chimney terminus outside of the building;
- B The insulating material shall retain sufficient physical strength to remain in its intended position; and
- C The thermal insulation shall not show evidence of softening, melting, change in physical structure, or other evidence of failure.

3.1.12 Thermal insulation shall be adequately protected against contact with the products of combustion.

3.1.13 Thermal insulation, which is not adequately self-supporting, shall be securely applied to solid surfaces in a manner to prevent sagging. An adhesive or cement for attaching such material shall retain its adhesive qualities at any temperature the adhesive may attain when tested in accordance with these requirements and at -40°C.

3.1.14 A water-absorbing insulating material shall not become wetted by condensation or rain when installed as intended if such wetting will reduce its durability or insulating value.

3.1.15 Non-metallic structural components of a chimney assembly shall be subject to special investigation with respect to their application and possible deterioration under expected conditions of use.

3.2 ASSEMBLY

3.2.1 A chimney assembly shall consist of all the essential parts necessary for the proper installation of a complete chimney assembly. Each part or assembly shall be designed for ready attachment of one to the other without requiring alteration, cutting, threading, drilling, or similar task by the installer; except that a flashing assembly designed to be cut to fit by the installer may be provided if adequate instructions are furnished by the manufacturer.

3.2.2 Two or more parts or sub-assemblies, which must bear a definite relationship to each other for proper and safe use, shall be arranged and constructed to permit them to be incorporated into the complete assembly, without need for alteration or alignment, only in the correct relationship with each other; or such parts or sub-assemblies shall be assembled and shipped from the factory as one element.

3.2.3 Each part (such as chimney section or length, a cap, firestop-spacer, or support element, etc.) shall be completely assembled by the manufacturer at the factory.

3.2.4 To be in conformance with the requirements of Clause 3.2.3, a chimney section comprised of a chimney liner, formed insulation or other intermediate assembly, and an outer jacket, which are separable, is to be pre-assembled and packaged as one unit. A firestop-spacer assembly may be constructed in two halves, but is to be pre-assembled and packaged as one unit. In such cases, each separable part is to be completely formed, including the joining of all seams.

3.2.5 A chimney assembly, when installed in accordance with the manufacturer's instructions, shall be positioned securely and resistant to wind damage.

3.2.6 A clean-out tee shall be available for each assembly intended for interior installation, and shall be so designed as to provide for the clearance to combustible construction of the chimney connector in accordance with the National Building Code of Canada when the tee is attached directly to the chimney flue connection of the chimney.

3.2.7 Access shall be provided for inspection and cleaning of all portions of the chimney.

3.2.8 The design of a chimney assembly shall not void the firestopping required between spaces of a building when the chimney assembly is installed in accordance with the instructions furnished by the manufacturer.

3.3 JOINTS

3.3.1 Parts of chimney assemblies shall be joined in a manner to prevent disengagement when tested in accordance with these requirements.

3.3.2 If screws are employed to field-join assemblies, the assemblies to be joined shall readily receive screws without being field-punched or field-drilled. 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.

3.3.3 Joints in the flue gas passageway, when assembled in accordance with the manufacturer's instructions, shall be reasonably gastight.

3.3.4 A joint shall not materially reduce the capacity of the chimney.

3.3.5 A joint shall not retain condensation nor permit condensation to flow from the interior to the exterior of the chimney.

3.3.6 The joints of chimney assemblies shall be designed to be resistant to the entry of rain.

3.4 FIRESTOP-SPACERS

3.4.1 A chimney assembly intended to pass through a floor or ceiling of a building shall be provided with assemblies designed to provide firestopping at the opening and to establish and maintain required minimum clearances between chimney sections and combustible construction in this area. Spacers shall have sufficient strength and bearing surface to maintain the required clearance from chimney sections to the inner surfaces of the ceiling or floor material.

3.5 SUPPORTS

3.5.1 A support assembly (such as a floor or ceiling support) shall be designed to conform to the requirements for firestop-spacers and shall locate, at a safe distance, the point at which a flue pipe may be connected as determined by test in accordance with these requirements.

3.5.2 Chimney assemblies designed for exterior installation shall be provided with both vertical and lateral support assemblies.

3.5.3 A support assembly shall be designed to sustain, without failure, a load equivalent to four times the force imposed upon it by all chimney assembly parts it is intended to support.

3.5.4 A support assembly intended to be secured by nails or screws shall be arranged so that such holding means will be primarily in shear.

3.5.5 A lateral support assembly shall be designed so that a supported chimney assembly is able to resist a horizontal force of 1.44 kN/m^2 of projected area applied in any direction, without separation, sagging or other displacement or damage, and without distortion or dislodgement of the supports.

3.5.6 Exterior vertical and lateral support assemblies shall be designed to maintain specified clearances to adjacent combustible construction.

3.6 RADIATION SHIELDS

3.6.1 A radiation shield, if required to obtain safe temperatures on adjacent structures, shall be supplied by the chimney manufacturer and be referenced in the Manufacturer's Installation Instructions.

3.6.2 Parts of a firestop-spacer or support assembly which provide incidental shielding from radiation to combustible construction are not considered to be radiation shields.