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STANDARD FOR HEAT SHIELDS

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REFERENCE PUBLICATIONS

The document shown below is 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.

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- CAN4-S114-M80 (R 1997), Standard Method of Test for Determination of Non-Combustibility in Building Materials

STANDARD FOR HEAT SHIELDS

PREFACE

This is the Second Edition of the Standard for Heat Shields, ULC-S632.

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 Second Edition ULC Standard was based on the First Edition, and has been reaffirmed.

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.

1. SCOPE

1.1 These requirements cover the construction and performance of *heat shield*s for vertical installation between heat producing appliances, chimney connectors and *combustible* construction.

1.2 *Heat shields* are intended for attachment to *combustible* construction for the reduction of specified minimum clearances for heat producing appliances.

1.3 *Heat shields* are rated on a percentage basis, i.e. a 50% rated *heat shield* is considered suitable for the reduction of required clearances by 50%.

2. GLOSSARY

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

COMBUSTIBLE - (As applying to an elementary building material) means that such material fails to conform to the Standard Method of Test for Determination of Non-Combustibility in Building Materials, CAN4-S114.

HEAT SHIELD - A device for the purpose of reducing the clearance between heat producing appliances, including chimney connectors and *combustible* construction.

NON-COMBUSTIBLE - (As applying to an elementary building material) means that such material conforms to the Standard Method of Test for Determination of Non-Combustibility in Building Materials, CAN4-S114.

3. CONSTRUCTION

3.1 *Heat shield*s, mounting hardware, and spacers shall be constructed of *non-combustible* materials or shall meet the requirements of the Burning Brand Test, Subsection 5.4, and withstand without damage the High Temperature Test, Subsection 5.8.

3.2 *Heat shield*s shall be sufficiently rigid to be self supporting when mounted as described in the manufacturer's instructions.

3.3 *Heat shield*s shall incorporate all materials necessary for their proper mounting and intended function. Essential components necessary for the proper mounting of *heat shield*s, except for readily available materials such as screws and nails, shall be provided by the manufacturer.

3.4 *Heat shield*s shall be corrosion resistant as afforded by being fabricated from inherently corrosion resistant materials or from materials protected by corrosion resistant plating or heat resistant paint.

3.5 *Heat shield*s intended for outside use shall meet the requirements of the Ultraviolet Light and Water Test, Subsection 5.2, and the Freeze and Thaw Test, Subsection 5.3.

3.6 *Heat shield*s shall be impact resistant as described in the Impact Test, Subsection 5.5.

3.7 If shipped disassembled, *heat shield*s shall be capable of assembly without the use of special tools.

3.8 When installed, corners and edges of *heat shield*s shall not present a cut or puncture hazard.

4. INSTRUCTIONS

4.1 Full instructions in English and French on the use and placement of the *heat shield*s shall be provided by the manufacturer, and shall include particular details concerning:

A The required extension of the *heat shield*s with respect to the projected outlines of the appliance and/or chimney connector;

B Warnings against the application of *combustible* materials to the surfaces of *heat shields*;

C Where air openings or spaces are necessary for the proper functioning of the *heat shield*, a warning against the closing or blockage of such openings or spaces;

D A warning to the effect that *combustible* material may need to be shielded from the effects of the chimney connector as a result of reducing the appliance clearance;

E The following statement accompanied by an illustration: "This heat shield permits a reduction of required clearances between heat producing appliances and vertical *combustible* construction by up to *%, except where clearances include provision for access or ventilation. (See Figure 1.) A minimum clearance of 50 mm is required between the chimney connector and the heat shield."

* Insert percentage reduction.

NOTE: This applies to two walls only.

F Manufacturer's name and address;

G Model or type number; and

H The correct mounting orientation of the *heat shield*.

5. PERFORMANCE

5.1 GENERAL

5.1.1 When a *heat shield* is tested in accordance with these requirements, safe temperatures shall be maintained for *combustible* construction. No part shall attain a temperature sufficient to damage required corrosion protection or to cause creeping, distortion, sagging or similar damage; resistance to damage by handling, weather, heat and flame shall be demonstrated. Results indicating conformance with this clause shall include the following:

A No part has become damaged or permanently distorted to such an extent that it will not continue to function as intended;

B The effectiveness of any required protective coating or finish on metal parts has not been impaired;

C A ceramic material does not show evidence of cracking, disintegration or spalling to an extent that impairs the serviceability of the part or the assembly; and

D Cracks are not visually observable in porcelain enamel used as a required protective coating.

NOTE: Tests shall be conducted in the sequence given, in order that any deficiencies resulting from the tests in Subsections 5.1 through 5.6 may be evaluated by the Clearance Reduction Test of Subsection 5.7.

5.2 ULTRAVIOLET LIGHT AND WATER TEST (OUTDOOR HEAT SHIELDS ONLY)

5.2.1 There shall be no corrosion of metal parts or loss of physical strength (compressive or tensile) of other material in excess of 25% following exposure of representative samples to ultraviolet light and water for a total period of 720 h.

5.2.2 The ultraviolet light is to be obtained from two stationary enclosed carbon-arc lamps. The arc of each lamp is to be formed between two vertical carbon electrodes, 12.7 mm in diameter, located at the centre of a revolvable vertical metal cylinder, 787 mm in diameter and 450 mm in height. Each arc is to be enclosed with a type PX Pyrex-glass globe. The specimens are to be mounted vertically on the inside of the revolvable cylinder, facing the lamps, and the cylinder continuously revolved around the stationary lamps at l rpm. A system of nozzles is to be provided so that each specimen, in turn, is sprayed with water as the cylinder revolves. During each operating cycle, a total of 20 min, each specimen is to be exposed to the light and water spray for 3 min and to the light only for 17 min. The air temperature within the revolving cylinder of the apparatus[1] during operation is to be 63 $\pm$ 5°C.

[1] A device known as an “Atlas Weather-Ometer”, Model DMC-W, manufactured by Atlas Electric Devices Co., Chicago, Illinois 60613, U.S.A., has been found suitable for this purpose.

5.3 FREEZE AND THAW TEST (OUTDOOR HEAT SHIELDS ONLY)

5.3.1 Parts which are made of materials that absorb water are to be subjected to the tests described in Clauses 5.3.2 through 5.3.5.

5.3.2 A specimen of each material is to be tested for water absorption. The specimens are to be free of observable cracks and are to contain laminations and fissures only to the extent that they are representative of the material from which the specimens were taken.

5.3.3 The specimens are to be dried to constant mass in a ventilated oven at a temperature of 107 ± 3°C. The specimens are then to be submerged for 24 h in water at a temperature of 21 ± 3°C. The water is then to be raised to and maintained at boiling temperature for 5 h and then allowed to cool to a temperature of 2l ± 3°C. Each specimen is then to be removed from the water, wiped with cloth, weighed immediately, and the average water absorption by mass recorded.

5.3.4 Representative samples of complete parts are then to be selected. They are to be free of observable cracks or shattered edges and shall contain laminations and fissures only to the extent that they are representative of the material. The samples are to be dried to constant mass in a ventilated oven at a temperature of 107 ± 3°C and the masses recorded. The samples are to be immersed for 72 h in water at a temperature of 21 ± 3°C and then removed from the water and allowed to drain for not more than 1 min. The superficial moisture is to be removed by a towel or blotting paper and the samples immediately placed in a freezer. The samples are to be given a daily cycle of freezing at -18°C for 16 h, drying at 110°C for 7 h, and immersed in water for l h. The tests are to be continued for 10 d, except that over one weekend the samples are to remain in the freezer for 64 h. At the end of the test period, the samples are to be again dried to constant mass and the masses recorded.

5.3.5 After the freezing and thawing treatment, the samples shall not show disintegration or spalling, or loss of mass of more than 5% of the initial dry mass.

5.4 BURNING BRAND TEST

5.4.1 A *heat shield* assembly consisting of components other than components satisfying the requirements of the Standard Method of Test for Determination of Non-Combustibility in Building Materials, CAN4-S114, shall be subjected to the Burning Brand Test as described in Clauses 5.4.2. through 5.4.9. This test is to be conducted prior to the Impact and Clearance Reduction Tests.

5.4.2 The sample *heat shield* assembly shall be mounted horizontally in accordance with the manufacturer's instructions for wall mounting and subjected to a burning brand.

5.4.3 The brand to be used in this test shall be constructed as described in Clauses 5.4.4 and 5.4.5 and conditioned in an oven at 41 to 49°C for at least 24 h. The dry mass of the finished brand shall be 500 ± 50 g at the time of ignition.

5.4.4 The brand shall consist of a grid 152 by 152 mm and approximately 57 mm thick, made of kiln-dried Douglas fir lumber, free from knots and pitch pockets. It shall be made of

eighteen 19 by 19 by 152 mm strips and placed in three layers of six strips each, with strips spaced 7.6 mm apart. The strips shall be placed at right angles to those in adjoining layers and shall be nailed at each end of each strip on one face, and in a diagonal pattern on the other face. (See Figure 2.)

5.4.5 Nails used in the construction of the brand shall be 1.59 mm (No.16), 38 mm long, bright, flat head, diamond point wire nails. Thirty-two nails weighing approximately 21 g shall be used.

5.4.6 Before application to the test sample, the brand shall be ignited so as to burn freely in still air. It shall be considered to be so burning after it has been subjected, for the following required periods of time, to the flame of a gas burner of such size that, during the process of ignition, the brand is nearly enveloped in the burner flame. The flame temperature of the igniting flame shall be 888 $\pm$ 28°C, measured 59 mm above the top of the burner, which shall be shielded from drafts. The flame temperature shall be measured with a maximum 1.6 mm thick chromel alumel thermocouple attached to a potentiometric device. The thermocouple shall be centred in the flame.

5.4.7 The brand shall be exposed to the flame for 240 s, during which time it shall be rotated so as to present each surface to the flame in the following manner and sequence:

Each 152 by 152 mm face for 30 s.
Each 57 by 152 mm face for 30 s.
Each 152 by 152 mm face again for 30 s.

5.4.8 The brand shall be placed centrally on the surface of the test sample and the test continued until the brand is consumed and until all evidence of flame, glow and smoke have disappeared.

5.4.9 The sample shall not be damaged or permanently distorted to such an extent that it will not continue to function as intended and shall not ignite or show a loss of mass.

5.5 IMPACT TEST

5.5.1 A *heat shield* assembly, mounted horizontally in accordance with the manufacturer's instructions for wall mounting, shall withstand, without impairment of function, two impacts as described in Clauses 5.5.2 and 5.5.3. This test shall be conducted prior to the Clearance Reduction Test.

5.5.2 An impact shall be applied at a location on the *heat shield* corresponding to position 'A' in Figure 3 by means of a 535 g, 50 mm diameter steel sphere dropped from a height of 400 mm.

5.5.3 A second similar impact shall be applied at a location 250 mm from the first impact and at least 150 mm from any edge of the *heat shield*.