UL 2395

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Adhesives for Use in Heating and Cooling Appliances to Secure Thermal Insulation Materials

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UL Standard for Safety for Adhesives for Use in Heating and Cooling Appliances to Secure Thermal Insulation Materials, UL 2395

First Edition, Dated December 27, 2002

SUMMARY OF TOPICS

This is the first edition of the Standard for Adhesives for Use in Heating and Cooling Appliances to Secure Thermal Insulation Materials, UL 2395.

The new requirements are substantially in accordance with UL's Bulletin(s) on this subject dated May 30, 2002. The bulletin(s) is now obsolete and may be discarded.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a ″SUPERSEDED REQUIREMENTS″ notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Classification and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

This Standard consists of pages dated as shown in the following checklist:

Page	Date
1-12	December 27, 2002

December 27, 2002

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An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 These requirements describe the test methods used to determine the adhesion qualities of, and the risk of fire associated with, adhesives used in heating and cooling appliances to secure insulation.

1.2 Requirements for insulation adhesive testing procedures are included in the Standard for Test for Surface Burning Characteristics of Building Materials, UL 723. Requirements for insulation adhesive sample preparation are included in the Test Method for Peel or Stripping Strength of Adhesive Bonds, ASTM D903.

2 Glossary

2.1 For the purpose of this standard, the following definitions apply.

2.2 ADHESIVE – A substance used to bond two or more solids so that they act or can be used as a single piece; examples are: resins, formaldehydes, glue, paste, cement, putty, and polyvinyl resin emulsions.

2.3 INSULATION – Material used in walls, ceilings, and floors to retard the passage of heat and sound.

3 Units of Measurement

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

4 Undated References

4.1 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.

PERFORMANCE

5 General

5.1 Adhesives used in heating and cooling appliances to secure insulation shall comply with the applicable test requirements in Sections 6 – 11.

6 Sample Requirements for Peel Test

6.1 Each sample is to be prepared in accordance with 6.2 – 6.4. The specimens supplied for testing are to be representative samples of the various thermal insulation materials and metallic substrates.

6.2 Each test specimen shall be as described in the Test Method for Peel or Stripping Strength of Adhesive Bonds, ASTM D903.

6.3 Each test specimen is to be of one piece of thermal insulation having a 16 kg/m^3 – 24 kg/m^3 (1 – 1-1/2 pound/feet^3) density and a thickness of 25 mm (1 inch), measuring 25 mm (1 inch) by 305 mm (12 inches). Forty test specimens shall be prepared for each substrate in 6.4 (a) – (d).

6.4 Each specimen shall be bonded at the adhesive manufacturer's maximum recommended coverage rate (minimum thickness) for 152 mm (6 inches) at one end, to a 25 mm (1 inch) by 203 mm (8 inch) by no less than 0.79 mm (1/32 inch) piece of each of the following:

a) Steel painted with acrylic paint;

b) Steel painted with alkyd paint;

c) Cold-rolled steel; and

d) Galvanized steel.

7 Conditioning Requirements for Peel Test

7.1 Five test samples from each metallic substrate in Section 6, Sample Requirements for Peel Test, are to be subjected to tests described in Section 8, Peel Test, without undergoing conditioning.

7.2 Five test samples from each metallic substrate described in Section 6 are to be conditioned as specified in 7.4 – 7.8.

7.3 Two separate batches of five samples are required where concurrent conditioning durations of 30 and 60 days are specified.

7.4 The samples are to undergo a 24 hour low temperature conditioning at -20°F (-29°C).

7.5 The samples are to undergo a 30 and 60 day conditioning period at an elevated temperature of 50°C (90°F) above the maximum normal use temperature, as specified by the manufacturer, of the adhesives.

7.6 The samples are to undergo a 30 and 60 day conditioning period at 140°F (60°C) and 97 ±3 percent relative humidity.

7.7 The samples are to undergo a 7 hour conditioning period at the maximum abnormal temperature, as specified by the manufacturer, of the adhesive.

7.8 The samples are to be cycled 5 times in accordance with the following:

a) 24 hours at the maximum operating temperature, as designated by the manufacturer, of the adhesive;

b) 1 hour at 73°F (23°C) and 50 percent relative humidity; and

c) 24 hours at 140°F (60°C) and 97 ±3 percent relative humidity.

8 Peel Test

8.1 Each metallic substrate is to be held stationary while the unbonded end of the thermal insulation specimen is slowly pulled at an angle of 180 degrees to the metal strip.

8.2 After peeling the thermal insulation from the metal strip, each specimen is to be examined to determine if separation of the adhesive bond and thermal insulation occurs.

8.3 The strength of the adhesive bond shall be stronger than the physical or mechanical strength of the insulation for each specimen.

9 Identification Tests

9.1 General

9.1.1 Identification tests are to include the following:

a) Method of determination of ash content in solid samples, 9.2, or Method for determination of ash content in liquid samples, 9.3;

b) Method for determination of solid content, 9.4;

c) Determination of weight per gallon, 9.5, and;

d) The qualitative infrared analysis, 9.6.

9.1.2 A portion of a pint sample of the adhesive is to be used for each of the identification tests in 9.2 – 9.6.

9.1.3 A Material Safety Data Sheet (MSDS) is to be provided with the adhesive.

9.2 Method for determination of ash content in solid samples

9.2.1 The method for determination of ash content in solid samples is an analytical test to determine the total amount of inorganic substance in a product. The method is also capable of being used to determine the noncombustible content of a material or to measure the fire resistance of the material.

9.2.2 A portion of a one pint sample of the adhesive is to be used for this identification test.

9.2.3 A No. 2 sized porcelain crucible is to be heated for 2 hours in a furnace at 800°C (1472°F), cooled to room temperature in a desiccator, and then weighed.

9.2.4 Under a fume hood, a 4.8 – 5.2 g (0.0106 – 0.0115 pound) adhesive sample is to be transferred to the crucible and ignited over a gas burner until smoke ceases.

9.2.5 The crucible is to be placed in a furnace at 800°C (1472°F) for 2 hours, cooled to room temperature in a desiccator, and then weighed. If testing a material that oxidizes at 800°C (1472°F), the furnace temperature is to be reduced to just below the temperature that produces the interfering reaction.

9.2.6 The crucible is to be returned to the furnace for an additional 2 hours, cooled, and then weighed.

9.2.7 The residue is to be heated for additional 2 hour increments until it has reached constant weight. Loss in weight of less than 0.010 g (0.0004 ounces) between successive heatings is considered to be constant weight.

9.2.8 The ash content is to be calculated as follows:

$$Percent\ Ash = (A \times 100)/S$$

Where:

A = the grams (pounds) of residue remaining after the final cycle; and

S = grams (pounds) of sample used.

9.3 Method for determination of ash content in liquid samples

9.3.1 A portion of the one pint sample of the adhesive is to be used for the determination of ash content in liquid samples.

9.3.2 The adhesive material is to be homogeneously mixed to ensure that a representative sample, with no trace of solids remaining on the bottom, is used for the test.

9.3.3 The percent ash calculations are able to be conducted on a ″wet basis″ or ″dry basis″, as agreed upon by all involved parties.

9.3.4 A No. 2 sized porcelain evaporating dish is to be heated for no less than 2 hours in a furnace at a temperature of 800°C (1472°F), cooled to room temperature in a desiccator, and then weighed.