

DOCUMENT NUMBER: 4L 55A

ORDER OF DATA

<i>DATA</i>	<i>DATE</i>	<i>NO. OF PAGES</i>
BULLETIN	2-9-96	45
BULLETIN	8-30-95	11
YL 55A	7-26-93	19

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Subjects 774A (790, 997, 2218)
 (In reply, refer to Subject 774A)

333 Pfingsten Road
 Northbrook, IL 60062
 February 9, 1996

TO: Fire Council of Underwriters Laboratories Inc.,
 Subscribers to UL's Standards Service for:
 Tests for Fire Resistance of Roof Covering Materials
 Wind Resistance of Prepared Roof Covering Materials
 Subscribers to UL's Listing Service for:
 Built-Up Roof Covering Materials (TFJR)
 Prepared Roof Covering Materials (TFWZ)
 Prepared Roof Covering Materials Certified for Canada (TFWZ7)
 Roofing Systems (TGFU)
 Ridge Vents (TGEW)
 Subscribers to UL's Recognition Service for:
 Prepared Roof Covering Materials (TFWZ2)
 Roof Covering Materials - Component (TEVT2)
 Roofing Systems - Component (TGFU2)
 Subscribers to UL's Classification Service for Roofing Systems Certified for
 Canada (TGFU7)

SUBJECT: Report of the Meeting of the Industry Advisory Conference of UL for Prepared Roof
 Covering Materials; Request for Comments on Proposed Requirements for the Proposed
 First Edition of the Standard for Impact Resistance of Prepared Roof Covering Materials,
 UL 2218; PROPOSED EFFECTIVE DATE

SUMMARY OF TOPICS

The following topics were discussed at the meeting:

1. Purpose of UL's IACs
2. Review of product specifications for Class A and Class C shingles and their relationship to pending ASTM revisions
3. Proposed First Edition of the Standard for Impact Resistance of Prepared Roof Covering Materials, UL 2218

(Continued)

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SUMMARY OF TOPICS (Cont'd)

4. Tab bond strength test
5. Follow-Up Services
6. Miscellaneous

COMMENTS DUE: March 9, 1996

A meeting of the Industry Advisory Conference of UL for Materials for Built-Up Roof Coverings was held on January 9, 1996 at UL's Northbrook office. The purpose of the meeting was to discuss issues relating to roof coverings.

Attached as Appendix A are proposed requirements for UL 2218. Attached as Appendix E is a list of those who attended the meeting. Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix F of this bulletin regarding designated responsibility for the subject product category.

Please note that proposed requirements are of a tentative and early nature and are for review and comment only. Current requirements are to be used to judge a product until these requirements are published in final form.

PROPOSED EFFECTIVE DATE

The proposed requirements specified in Appendix A will not necessitate a review or additional testing of currently Listed, Recognized, or Classified roofing products. Therefore, UL proposes that the new requirements become effective upon publication.

* * * * *

The following report is not intended to be a verbatim transcript of the discussions at the meeting, but is intended to record the significant features of those discussions.

1. PURPOSE OF UL's IACs**DISCUSSION**

UL outlined the purposes and goals of the IAC as representing an important step in UL's procedure for the development of requirements, test methods, standards and related product evaluation programs. Members of the IAC are appointed by UL on the basis of their technical expertise and involvement in UL's programs. UL establishes technical requirements on the basis of information from a variety of sources. It is intended that IAC members, functioning in an advisory role, serve as individual representatives of industry. Therefore, UL calls upon the IAC for discussion and review of proposals prior to submission for review by all involved manufacturers, UL's engineering councils, and others expressing an interest in the product categories. The IAC representatives are also given an opportunity to present new ideas, modifications of existing ideas or requirements, and suggestions as to how UL may better serve its clients.

2. REVIEW OF PRODUCT SPECIFICATIONS FOR CLASS A AND CLASS C SHINGLES AND THEIR RELATIONSHIP TO PENDING ASTM REVISIONS

DISCUSSION

UL indicated that in a bulletin to industry dated October 14, 1988, the Standard for Class C Asphalt Organic-Felt Shingles, UL 55B, was formally withdrawn. The product specifications in UL 55B, including prescriptive requirements, were relocated to the Follow-Up Service Procedures to describe each Listed product as applicable. Specifications described in the Follow-Up Service Procedures such as back coating weight and per cent saturation were then subject to subsequent revision upon request.

It was noted that ASTM standards covering roofing materials are becoming more performance oriented. UL asked industry representatives whether some of the prescriptive requirements particularly those which evolved through field performance concerns should be retained and again included as part of the UL evaluation of roofing materials, in addition to UL's Standards that evaluate materials for fire, wind, and impact resistance. Industry representatives indicated that UL should continue to utilize product specifications typically utilized in ASTM Standards as a means to verify that continuing production matches the originally-tested product. Industry representatives also noted that the existing UL and ASTM product specifications do a good job of evaluating roofing materials for overall performance.

UL indicated that its adjunct testing program which provides for testing to ASTM standards has received considerable attention over the past few years from the roofing industry, in particular, from asphalt shingle manufacturers. Products that meet the ASTM standard in question are eligible to bear the UL Classification Mark attesting to compliance with the ASTM standard, in addition to the Listing Mark indicating compliance with the UL standard. Industry representatives stated that UL should continue to offer adjunct testing to ASTM standards.

3. PROPOSED FIRST EDITION OF THE STANDARD TEST FOR IMPACT RESISTANCE OF PREPARED ROOF COVERING MATERIALS, UL 2218

DISCUSSION AND RATIONALE

UL briefly reviewed the background of the development of the proposed Standard Test for Impact Resistance of Prepared Roof Covering Materials, UL 2218. UL research was sponsored by the Insurance Institute for Property Loss Reduction (IIPLR), to develop a means to evaluate the resistance of prepared roof covering materials to resist damage when subjected to energy impact such as occurs during hailstorms. The research was sponsored because of significant loss due to hail damage to roofs.

The initial draft of UL 2218 was contained in UL's August 30, 1995 Subject 2218 bulletin. After considering input received following review and comment of the draft standard by industry, UL developed a revised draft of UL 2218 for discussion at the IAC meeting.

Industry representatives made a number of suggestions, such as recommending specifying in the Scope a definition for "prepared roof covering materials"; including an ambient test temperature in the test procedure; as well as a number of editorial corrections and improvements. An industry representative noted that the standard contains no provision for testing aged as well as new material. UL noted that the most immediate concern was to develop a basic, repeatable, comparative test approach to evaluate materials. It was also noted that IIPLR representatives have indicated that often hail-damaged roofs are not very old due to the frequency of hailstorms in particular areas of the country. An industry representative stated that requiring two steel-ball drops exactly in the same spot is difficult to achieve and too stringent. It penalizes one product's evaluation where a precise double hit occurs vs. off-center hits. UL indicated a tolerance perhaps could be included in the standard. Industry representatives expressed the concern that the UL Marking for impact resistance should not include reference to size of steel ball but rather should consist of reference to its class of impact resistance further detailed in the Guide Information for the product category in the Roofing Materials and Systems Directory. In addition, this system should not conflict with or be confused with the current Classification system. UL concurred and indicated that the Classification and Marking system would be covered within the Guide Information which will precede this new category in UL's Roofing Materials and Systems Directory.

Your specific comments about the proposed first edition of UL 2218 as contained in Appendix A are invited.

IMPACT

As proposed UL 2218 provides for a new product category, no changes to currently Listed, Recognized or Classified products would be required for current UL product certifications to remain in effect. Therefore, the proposed requirements would become effective upon publication.

4. TAB BOND STRENGTH TEST

DISCUSSION

UL noted that the ASTM Standard for Shingle Tab Bond Strength (expected to be formally adopted soon) provides a measure of a shingle tab sealant's resistance to a mechanical uplift force applied in a plane perpendicular to a shingle tab. UL asked industry representatives what role, if any, the ASTM tab bond test procedure should play in the Standard for Wind Resistance for Prepared Roof Covering Materials, UL 997. Industry representatives recommended that tab bond strength testing not be included in UL 997 at this time, but that UL offer such testing on an adjunct basis. It was also noted that UL 997 has served industry needs extremely well. Industry representatives recommended that the wind speed in UL 997 remain at 60 mph. UL indicated it would continue to offer testing at higher wind speeds for manufacturers desiring such testing service.

5. FOLLOW-UP SERVICES

DISCUSSION

Revised Standardized Appendix Pages (Gray Pages); Cost Structure

Attached as Appendix B are proposed revised Standardized Appendix Pages (Gray Pages) that were discussed at the meeting. Essentially, the revised Gray Pages eliminate certain Follow-Up tests and relocate others from Appendix A of the Gray Pages (which require test witnessing by the UL Field Representative) to Appendix D of the Gray Pages (which require a records check by the Field Representative rather than witnessing). UL indicated it developed the revised pages based upon an analysis of test results/experience with the industry, which showed that certain tests are no longer needed, or could be conducted and audited but not witnessed by UL. If the revised Gray Pages are implemented there will be a reduction in service charge fees to the industry for Follow-Up Service inspections.

Tests that are eliminated are the Ash Determination, Weight Per Unit Area, Intermittent Flame and Spread of Flame. Tests relocated from Appendix A (UL Field Representative witnessing) to Appendix D (UL Field Representative auditing) are the Loss-on-Ignition, Percent Saturation of Felt, Average Finished Weight, Weight of Back Coating, Flash Point, Softening Point, Granule Adhesion, Self Sealing Adhesive Thickness, Bending and the Tendency to Stick or Crack.

Appendix C compares some of the costs under the old (current) system with costs under the new (proposed) system.

Plywood Used for Test Purposes

UL reported it has had discussions with American Plywood Association (APA) staff concerning plywood thickness specifications. UL noted that it has experienced some instances of plywood specifications not meeting the thickness ordered (industry trade size 3/8" thick plywood may not be as thick as stated). APA staff indicated to UL that 3/8" plywood that meets the industry standard does exist, and should be specified when placing orders. UL indicated it will continued to specify 3/8" thick plywood for test purposes in the future. The possibility of using alternative materials such as APA rated oriented strand board sheathing was also discussed.

6. MISCELLANEOUS

DISCUSSION

Cost of UL Standards

Representatives of industry asked that the cost of UL Standards be discussed. UL reported that a new pricing structure had recently been implemented to balance UL Standards development costs with the actual price of standards charged. Representatives of industry expressed concern at the degree of price increases. UL noted that unlike many other standards developing organizations, UL has for all practical purposes absorbed the cost of Standards development, production, distribution, maintenance and revision. UL's expenses have largely been recouped through certification and follow-up service fees. This practice has been altered so as to remain price competitive in certification and follow-up services, and recover standards development costs through the sales of documents to the user. UL reported that IAC members will continue to receive distributions for those standards in which the IAC is involved. An industry representative indicated that industry needs something economical to give to architects detailing information about UL Listed Prepared Roof Covering Materials. UL indicated it would provide an abstract of such information in this meeting report (Appendix D contains this information).

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Name Changes/Document Distributions

An industry representative indicated he continues to receive mail from UL addressed to former employees of his organization. UL indicated it was aware of this frustrating problem and that it is implementing new billing procedures and the like to help ensure better mailing list accuracy in the future.

REQUESTS FOR COMMENTS ON PROPOSALS

Please provide the following:

1. Your comments concerning the meeting report and the proposed requirements; and
2. Your comments concerning the proposed effective date, should the proposals be adopted.

Written comments should be sent to the attention of C. H. McCall at UL's Northbrook office, 333 Pfingsten Road, Northbrook, IL 60062-2096. Please reference all correspondence to Subject 774A.

All comments should be sent by March 9, 1996.

Unless specifically requested to do so, UL will not acknowledge comments indicating concurrence with these proposals.

UNDERWRITERS LABORATORIES INC.

C. H. McCall

C. H. McCALL (Ext. 42320)
Senior Engineering Associate
standards Department

REVIEWED BY:

William S Metes

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Managing Engineer
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SR:JTM

774ABUL.P01

PROPOSED REQUIREMENTS ARE OF A TENTATIVE AND EARLY NATURE AND ARE FOR REVIEW AND COMMENT ONLY. CURRENT REQUIREMENTS ARE TO BE USED TO JUDGE A PRODUCT UNTIL THESE REQUIREMENTS ARE PUBLISHED IN FINAL FORM.

A P P E N D I X A

PROPOSED FIRST EDITION OF THE STANDARD FOR HAIL IMPACT RESISTANCE OF PREPARED ROOF COVERING MATERIALS, UL 2218

FEBRUARY, 1996 DRAFT

For your convenience in review, proposed additions to the August, 1995 draft of proposed UL 2218 are shown underlined and proposed deletions are shown ~~lined out~~.

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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 employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the 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 This test method is intended to provide ~~ball impact~~ resistance data for the evaluation of prepared roof covering materials. For purposes of this Standard prepared roof covering materials are considered to be small units, sheets or panels designed for installation with multiple layers of such materials installed in overlapping rows normally on inclines exceeding 25 percent. The performance of the prepared roof covering materials is predicated on the manner by which these products, as assembled to represent actual field installations, resist damage due to free-falling steel balls dropped from height generating velocities and kinetic energies consistent with like diameter hailstones falling at terminal velocities.~~simulating the kinetic energy from the impact of various size hailstones.~~

1.2 The test evaluates the effect of impact from the steel ball at locations on the assembly selected to be most vulnerable, such as (but not limited to) edges, corners, unsupported sections and joints. ~~Supporting roof decks are selected to represent span conditions and physical properties such as gauge, thickness of lumber/plywood and related factors.~~

1.3 Due to the differences in composition and geometry of steel balls vs. hailstones, damage to prepared roof covering materials sustained by steel ball, impacts described in this standard are not necessarily consistent with the damage sustained by the impacts from hailstones of like diameters.

2 General

2.1 If a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

PERFORMANCE

3 General

3.1 Representative samples of roof covering material, assembled to test decks as described in Section 4, are to be subjected to the impact tests described in Sections 5 and 6.

4 Preparation of Samples

4.1 General

4.1.1 Representative samples of a roof covering material are to be applied, as described in 4.3, to test decks constructed as described in 4.2. The assemblies are to be conditioned in accordance with 4.4 prior to testing.

4.2 Preparation of Test Decks

4.2.1 The test decks are to be 3 feet (0.91 M) by 3 feet (0.91) consisting of 15/32 in. (11.9) thick plywood securely nailed to a nominal 2X4 (38 by 89 mm) wood batten frame, with an additional 2X4 (38 by 89 mm) vertical support batten, midspan of the deck. The plywood (A-C Grade, Group 1, exterior) is to have face and back veneers of Douglas Fir. The perimeter battens are to be located under and flush with the outer edges of the deck.

4.3 Application

4.3.1 The roof covering material to be tested is to be applied in accordance with the manufacturers instructions, to the test deck. The material is to extend to and be flush with the edges of the deck, except for a 1 inch (25.4 mm) overhang at the leading edge.

4.4 Conditioning

4.4.1 The completed test assemblies are to be stored indoors at temperatures not lower than 16°C (60°F) nor higher than 32°C (90°F) for the period of time necessary to cure the material, but not more than 60 days. Should storage conditions vary from those specified, the decks are to be stored until moisture determinations indicate that the deck lumber has no less than 8 percent nor more 12 percent moisture content. Test decks are to be stored so that each will be surrounded by freely circulating air.

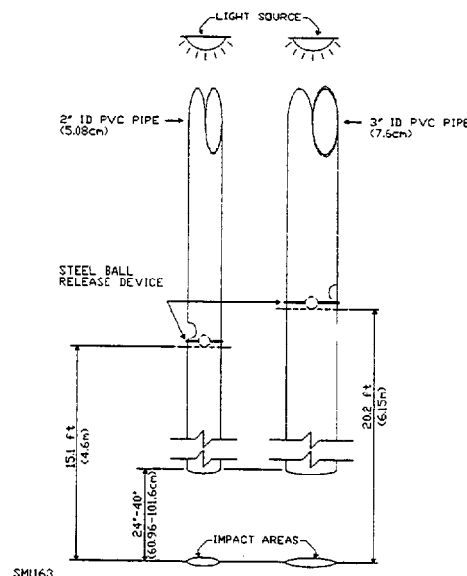
4.4.2 For a material expected to be hygroscopic in nature, its equilibrium moisture content is to be determined by heating a small sample to constant weight in an oven at 100°C (212°F). If its equilibrium moisture content is not between 8 and 12 percent (the moisture content prescribed for deck lumber), the material is to be conditioned in a cell at a temperature not exceeding 60°C (140°F) until its moisture content is equal to that prescribed for deck lumber (8 to 12 percent).

4.4.3 If the equilibrium moisture content of the material under the conditions described in 4.4.1 and 4.4.2 is under the range of 8 to 12 percent, the material is acceptable for application to the test deck and subjection to the impact tests at its equilibrium moisture content.

35 Test Apparatus

3-15.1 The test apparatus is to consist of lengths of 2-inch (50.8 mm) diameter (ID) and 3-inch (76.2 mm) diameter (ID) schedule 40 PVC pipe secured vertically over the target specimen. Drop positions are to be prepared to provide for the release of steel balls down the centerline of the pipe at the drop heights specified for each size (diameter) of steel ball. See ILL-1Figure 5.1.

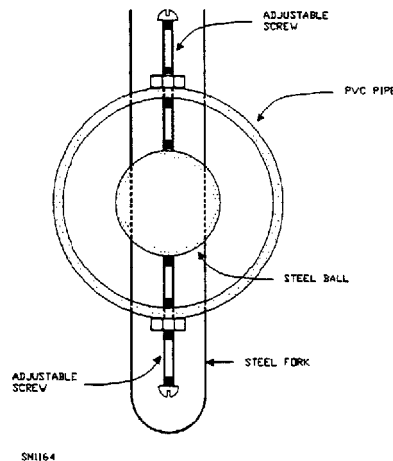
Figure 5.1
Test Apparatus



3-25.2 The steel balls chrome or stainless shall be 1.25 ± 0.01 in. (31.8 ± 0.25 mm), 1.50 ± 0.01 in. (38.1 ± 0.25 mm), 1.75 ± 0.01 in. (44.5 ± 0.25 mm) and 2.00 ± 0.01 in. (50.8 ± 0.25 mm) in diameter, weighing 0.28 ± 0.01 lb (128.2 ± 6.4 g), 0.48 ± 0.02 lbs (222.0 ± 9 g), 0.79 ± 0.04 lb (358.0 ± 18.0 g) and 1.15 ± 0.04 lbs (522.0 ± 18 g), respectively with a Rockwell C hardness of 57 to 66.

3-35.3 The release device is to be designed so as to assure a straight drop down the centerline of the pipe. A sketch of an acceptable device is shown in ~~ILL-2~~ Figure 5.2. Other release devices are acceptable provided the objective for release of the steel balls down the centerline of the pipe is met.

Figure 5.2
Release Device



3-45.4 Table 35.1 is to be used to determine the drop height and pipe diameter to be used with each respective steel ball size (diameter).

Table 3-15.1
Drop height and pipe diameter

Steel ball diameter		Distance		Schedule 40 PVC pipe ID	
Inches	(mm)	Feet	(m)	Inches	(mm)
1-1/4	(31.8)	12.0	(3.7)	2	(50.8)
1-1/2	(38.1)	15.0	(4.6)	2	(50.8)
1-3/4	(44.5)	17.0	(5.2)	3	(76.2)
2	(50.8)	20.0	(6.1)	3	(76.2)

4 Test Assembly

4.1 ~~The prepared roof covering test assembly is to be representative as to materials, workmanship and installation specifications under normal field conditions of use. Properties of the materials and ingredients used in the test assembly, together with their location and method of attachment, are to be determined and recorded. This includes underlayments, insulations, coverboards, and the like as appropriate for the assembly being evaluated.~~

~~4.2 The dimensions of the test assembly are to be a minimum of 3 feet by 3 feet (0.9 m by 0.9 m). The prepared roof covering shall contain sidelaps, endlaps, overlaps, corners and edges representative of field installation.~~

56 Test Procedure

5.16.1 Tests are to be conducted in a room at temperatures not lower than 16°C (60°F) nor higher than 32°C (90°F). Each test assembly is to be subjected to a series of two coincident three drops from a specific size steel ball at each of six locations location selected based upon examination for vulnerability. These locations are to include but not be limited to edges, corners, unsupported areas (such as directly above a three tabs asphalt shingle head lap), overlaps and joints. The drop shall be considered coincident when the approximate center of the impact depression of the second drop is measured to be within 1/2 inch. of the first. To facilitate this measurement it is permitted to use polyester or similar type film (not to exceed 0.001 in. thick) fitted over the roofing material.

5.26.2 After the third drop the prepared roof covering material is to be carefully removed from the test assembly and examined on both top and bottom surfaces at the impacted areas. Where multiple layers of the prepared roof covering material are located under the impacted area each layer is to be examined separately. After the first drop at each location, the resultant depression is to be measured and recorded to the nearest 0.01 in. (0.25 mm). After the assembly has been subjected to all drops at the selected impact locations the prepared roof covering material is to be carefully removed from the test assembly and examined on both top and bottom surfaces at the impacted areas. Where multiple layers of the prepared roof covering material are located under the impacted area each layer is to be examined separately.

5.36.3 For metal roofing products the depth of the residual depression is to be recorded to the nearest 0.01 inch (0.25 mm). Visual damage observations shall be facilitated by examining the samples under 5X magnification and recorded for each impact location, based upon the Acceptance Criteria in Section 7 and the Report information specified in Section 8.

5.46.4 The maximum size of steel ball used for the drop which resulted in acceptable performance of the prepared roof covering as determined in Acceptance Criteria, Section 6, is to be recorded. Damage assessments of asphalt shingles and other flexible roof covering materials shall be facilitated by bending the roof covering layer over a 2 in. Mandrel at each impact location, with the top surface in contact with the mandrel. The roof covering layer shall be bent over the mandrel on both depression axes (machine direction and 90° to the machine direction).

67 Acceptance Criteria

6.17.1 The prepared roof covering material is to be evaluated by the following criteria based on examination after being subjected to the test procedure described in Test Procedure, Section 56:

a) The depth of the residual depression for metal roofing products shall not exceed the material thickness.

b) The prepared roof covering material exposed surface, back surface and underneath layers shall show no evidence of tearing, fracturing, cracking, splitting, rupture, crazing or other evidence of opening of the prepared roof covering material layer. Spalling of the surface of cement or clay based roof covers that is attributed to the steel ball impacting the hard surface is not to be considered as evidence of unsuccessful performance.

~~e) The prepared roof covering material back surface shall show no evidence of tearing, cracking, rupture, splitting, crazing or other evidence of opening of the prepared roof covering material.~~

~~d) The prepared roof covering materials layered beneath the impacted top layer shall show no evidence of tearing, cracking, rupture, crazing or other evidence of damage that would affect performance.~~

MARKING

7 Details

~~7.1 The rating for the roofing covering is to be expressed as "H X" where "X" represents the maximum size, 1 1/2 or 2 inches (38.1 or 50.8 mm), steel ball resisted with acceptable performance.~~

REPORT

8 General

8.1 The report shall include the following:

- a) Description of the sample preparation and deck construction;
- b) Description of the sample;
- c) Size of steel ball and impact locations; and
- d) Observations and measurements (when required) of the performance of the roofing product as described under the Acceptance Criteria, Section 6 of each impact location, including:
 - 1) Depth of depressions, if any, following the single impacts.
 - 2) Any tearing, fracturing, cracking, splitting, rupture, crazing, or other evidence of opening of the roof covering layer
 - 3) Any chipping or peeling of metal shingle coatings or other coated roof covering materials.
 - 4) Any chipping or spalling of concrete tile or fiber cement shingles, other than those which extended through the shingle or tile cross-section.

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February, 1996

APPENDIX B

PROPOSED STANDARDIZED APPENDIX PAGES FOR ASPHALT SHINGLES AND SHEET ROOFING

NOTE: THIS APPENDIX CONSISTS OF FOLLOW-UP SERVICES INFORMATION IDENTIFIED AS APP. A,
APP. B, APP. C AND APP. D.

App. A Page 1

Issued: _____
Revised: _____

Asphalt Shingles and Sheet Roofing (Prepared Roof Covering Materials) (TFWZ)

A P P E N D I X A

FIELD REPRESENTATIVE'S DUTIES AND INSTRUCTIONS
FOR EXAMINATION OF PRODUCT

FIELD REPRESENTATIVE'S DUTIES:

The Field Representative's duties include, but are not limited to:

Examine the construction of production intended to bear the UL Mark or Marking to determine compliance with the description of the product and any other requirements expressed in this Procedure.

Where so specified by an Appendix B, forward samples to UL for follow-up tests.

Where so specified by an Appendix D, inspect the test records and facilities of the manufacturer to ensure that:

- A. The proper number of samples are undergoing the required tests, and
- B. The required tests are being performed correctly, and
- C. The proper information is being recorded and is up-to-date, and
- D. The instruments being used for the tests have been calibrated at the prescribed interval and are in good working order.

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App. A Page 2 Issued: _____
Revised: _____

Asphalt Shingles and Sheet Roofing (Prepared Roof Covering Materials) (TFWZ)

WITNESS OF MANUFACTURER'S TESTS

Witness the manufacturer conducting the tests (as specified in Appendix D) on component materials, production samples, or stock samples selected by the UL Representative. Tests are to be witnessed at each inspection on a lot from which tests have not been previously witnessed.

Report to the manufacturer and Follow-Up Services Department by means of a Variation Notice (VN) if:

- A. Variations in construction are found,
- B. The manufacturer's method and/or frequency of test is not as described.
- C. The records maintained by the manufacturer are not as described,
- D. The manufacturer's inspection program is not being performed as described, or
- E. Unacceptable test results are witnessed during tests conducted specifically for the Field Representative.

Explain to the manufacturer that a Variation Notice is a means of communication with the manufacturer and forms a record of those items where nonconformance to the Procedure has been found.

When a product does not comply with the Follow-Up Services Procedure, require that the manufacturer either shall (1) remove any markings referencing UL from the product, or (2) suitably modify all products that do not comply with the Follow-Up Services Procedure, or (3) hold shipment pending further instructions from Follow-Up Services.

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App. A Page 3 Issued: _____
 Revised: _____

Asphalt Shingles and Sheet Roofing (Prepared Roof Covering Materials) (TFWZ)

[In the event of a disagreement between the manufacturer and the Field Representative as to whether a product is acceptable, the manufacturer shall hold production at the factory pending resolution of the variations. The manufacturer has the right to appeal a decision with which he disagrees and the field representative shall provide the name of the FUS engineer to whom the appeal is to be made. Should Follow-Up Services grant temporary authorization for the continued use of the UL Mark, such temporary authorization shall only be for the time needed to review and/or process the Procedure revisions, or as otherwise specified to cover a particular lot or production run.]

INSTRUCTIONS FOR INSPECTION OF THE PRODUCT:

At each inspection samples of current production and/or stock shall be examined for compliance with the applicable descriptions and requirements contained in this Procedure.

Periodically, the Field Representative will review the application instructions on the bundles or rolls to determine that they compare favorably with those illustrated in this Procedure.

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App. B Page 1

Issued: _____
Revised: _____

Asphalt Shingles and Sheet Roofing (Prepared Roof Covering Materials) (TFWZ)

A P P E N D I X B

INSTRUCTIONS FOR UL REPRESENTATIVE
FOR SAMPLE PICK-UP

UL REPRESENTATIVE:

Certain products covered by this Procedure employ constructions or materials requiring Follow-Up Tests by UL. The Field Representative shall select samples of one product or component thereof as detailed below:

Twice a year one square of Class A asphalt glass fiber mat shingles shall be selected and forwarded to the Fire Protection Department, Northbrook Office, for Class A fire tests.

Twice a year select 2/3 square of Class A or Class C asphalt self-sealing and/or lock shingles and forward to the Fire Protection Department, Northbrook Office, for wind tests.

Once a year select the following:

- A. Asphalt glass mat shingles.
 - 1. 1 qt of filled coating.
- B. asphalt organic-felt shingles.
 - 1. 1 qt of filled coating.

and forward to the Follow-Up Services Department at the Northbrook Office. The tests to be conducted are indicated in Appendix C.

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App. C Page 1 Issued: _____
 Revised: _____

Asphalt Shingles and Sheet Roofing (Prepared Roof Covering Materials) (TFWZ)

A P P E N D I X C

INSTRUCTIONS FOR
 FOLLOW-UP TESTS AT UL

GENERAL:

The samples forwarded by the Field Representative shall be subjected to the appropriate tests described below.

DEPARTMENT 411E:

The shingles forwarded for fire tests shall be subjected to two Class A burning brand fire tests as described in UL 790 - "Tests for Fire Resistance of Roof Covering Materials."

The shingles forwarded for the wind test shall be subjected to the 2 h test at 60 mph as prescribed in UL 997 - "Wind Resistance of Prepared Roof Covering Materials."

DEPARTMENT 416C:

The component samples forwarded shall be subjected to the following test:

- A. Filled Coating Stabilizer Content (Percent insoluble in 1.1.1.-trichlorethane).

COATING STABILIZER TEST

Test Sample

A quantity of the stabilized coating is to be heated at low temperature (to prevent overheating and volatilization) and thoroughly stirred when sufficiently fluid. A 10 to 30 g sample of the coating is to be taken.

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Test Method

An extraction thimble is to be dried and weighed. The weighed sample is to be placed in the thimble and the thimble is to be suspended by a fine wire in a flask beneath a condenser. Forty to 50 ml of 1,1,1-trichloroethane are to be poured over the sample and the flask is to be continuously heated to vaporize the solvent. Cold water is to be circulated through the condenser during the heating. The extraction is to be continued until the solvent drops colorless from the thimble.

The thimble is to be removed and dried to constant weight. The solution in the flask is to be rinsed into a weighed porcelain dish or crucible and the solvent evaporated. The residue is to be ignited over a flame or in a muffle furnace, the ash weighed, and the weight added to that of the mineral matter in the thimble to obtain the total weight of mineral stabilizer in the coating.

Basis for Acceptability

The basis for acceptability shall be as specified in the individual sections of the Follow-Up Service Procedure.

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A P P E N D I X C

MANUFACTURER'S RESPONSIBILITIES AND
 REQUIREMENTS FOR FACTORY TESTS

MANUFACTURER'S RESPONSIBILITIES:

The manufacturer's responsibilities include, but are not
 limited to:

Restrict the use of markings that reference UL (either
 directly or by use of the name, an abbreviation of it, or
 the UL symbol or Recognition Mark, or indirectly by means of
 agreed-upon markings that are understood to indicate
 acceptance by UL) to those products that are found by the
 manufacturer's own inspection to comply with the Follow-Up
 Service Procedure description. Use of such markings is
 further limited by the agreements that have been executed by
 the subscriber and UL.

Conduct the Factory Tests detailed in the Appendix.

Determine that the test equipment is functioning properly
 and have it calibrated annually, or whenever it has been
 subject to abuse (such as being dropped or struck with an
 object) or its accuracy is questionable. Calibration may be
 by the manufacturer or an outside laboratory. In either
 case, it shall be by comparison with a standard that is
 traceable to the applicable U.S. or foreign National
 Standard. Certification of calibration shall be maintained
 by the manufacturer until the next succeeding certification,
 and shall be readily available for review by the UL Field
 Representative.

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