

CLIENT: **Jiangsu Tefute Building Materials**
1520 E Francis St.
Ontario, Ca 91761

Test Report No: RJ5131P-2

Date: December 9, 2016

SUBJECT: Assembly testing of Tefute Stone Coated Metal Roofing system to UL 2218, Impact Resistance of Prepared Roof Covering Materials

SAMPLE ID: Tefute Stone Coated Metal Roofing System. See Preparation, Appendix and Photograph section for additional details of assembly and profile tested.

SAMPLING DETAIL: Test samples were randomly selected by a QAI representative at the client's storage facility located at 1520 E Francis St. Ontario, CA on November 21, 2016. QAI documented the materials selected from inventory correlate to the product specifications in accordance with ICC-ES AC85, Section 3.1.

DATE OF RECEIPT: Samples were received at QAI Laboratories on November 22, 2016.

TESTING PERIOD: December 6, 2016.

AUTHORIZATION: Testing authorized by Zhong Zhang under QAI Test Proposal # 16MB11042 dated on November 04, 2016.

TEST RESULTS: Detailed test results are provided on page 3 of this report.

CONCLUSION: The Tefute Stone Coated Metal Roofing System **passed** the test and met the Class 4 requirements of UL2218, Impact Resistance of Prepared Roof Covering Materials.

Prepared By:



Victor Peinado
Laboratory Technician

**Signed for and on behalf of
QAI Laboratories**



Drew Mersereau
Laboratory Supervisor

IMPACT RESISTANCE TEST PER UL2218

Test Deck Preparation and Conditioning

One 3' x 3' test deck consisting of a 36mm x 45mm wood batten frame with $1\frac{5}{32}$ " thick A-C Exterior Grade, Group1 Plywood, Tigerpaw Synthetic Roofing Underlayment. The Metal roof tiles were installed on the deck following the manufacture's installation instructions. The test was conditioned at a temperature of 73°F until the deck lumber had a maximum moisture content of 12%. See Appendix and Photograph section of this report for additional details of the assembly and profile tested.

Test Procedure

The test deck was placed on a solid level surface and the roof tiles subjected to two coincident drops at six different locations using a 2" diameter steel ball dropped from a height of 20 feet. After the first drop at each location, the resultant depression was measured and recorded. At the completion of the test, the tiles were removed from the deck and visually examined for damage under 5X magnification.

Test Requirements

- 1) 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 through any prepared roof covering layer.
- 2) For plastic roof covering materials, a surface crack shall not be determined to be a failure. A crack that extends through the cross-section of the roof covering material layer shall be determined to be a failure.
- 3) Cosmetic damage in and of itself shall not be determined to be a failure. Cosmetic damage such as denting, damage not extending through the cross-sectional area of a roof covering material layer, cracking of any paint finish, etc. shall not be determined to be a failure.

IMPACT RESISTANCE TEST PER UL2218**Test Results****Steel Ball Parameters**

Diameter: 2"
Weight: 1.15 lbs.
Composition: Chrome Steel
Hardness (Rockwell C): 60

Drop Location	Drop No.	Depression Depth (in)
Flat Surface	1	0.365
Flat Surface	2	0.388
Tile Edge	1	0.286
Tile Edge	2	0.365
Unsupported Area	1	0.460
Unsupported Area	2	0.516
Tile Joint	1	0.293
Tile Joint	2	0.327
Tile Corner	1	0.310
Tile Corner	2	0.451
Tile Edge	1	0.319
Tile Edge	2	0.458

Observations:

No tearing, fracturing, cracking, splitting, rupture, crazing or other evidence of opening through any prepared roof covering layer was observed at any of the twelve impact locations when viewed through 5X magnification.

APPENDIX:

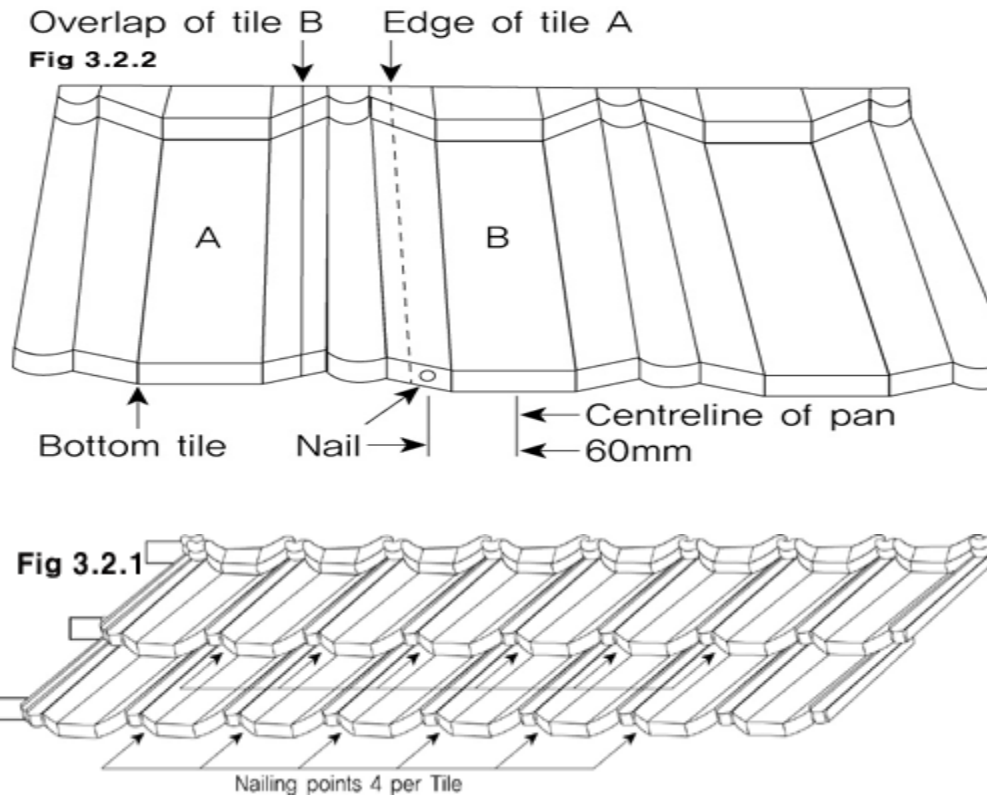


Diagram 1: Nailing Pattern used in test assemblies followed from “Tefute Stone Coated Metal Roofing System” Installation Procedure provided by the client.

Appendix

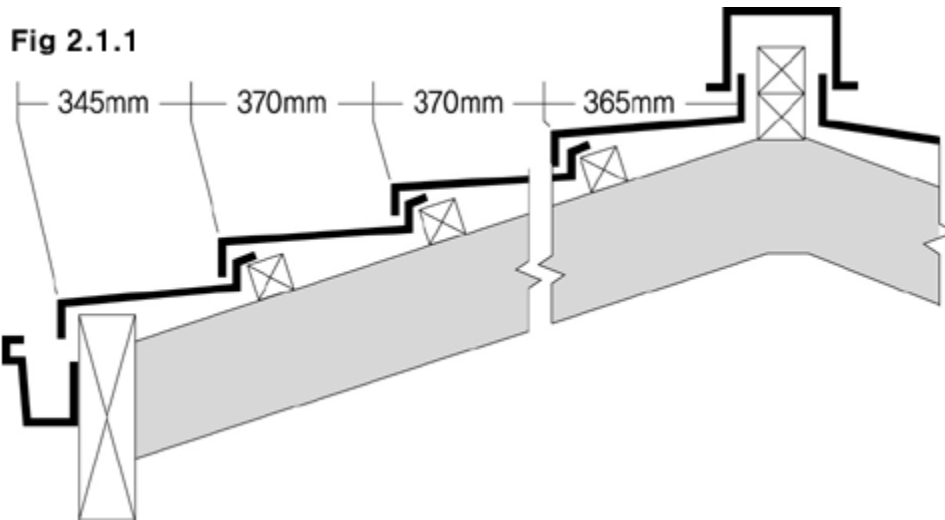


Diagram 2. Installation Batten Spacing test assemblies followed from “Tefute Stone Coated Metal Roofing System” Installation Procedure provided by the client. Note, Sheathing and underlayment were used in the test frames as mentioned in the assembly details section of this report.

Photographs

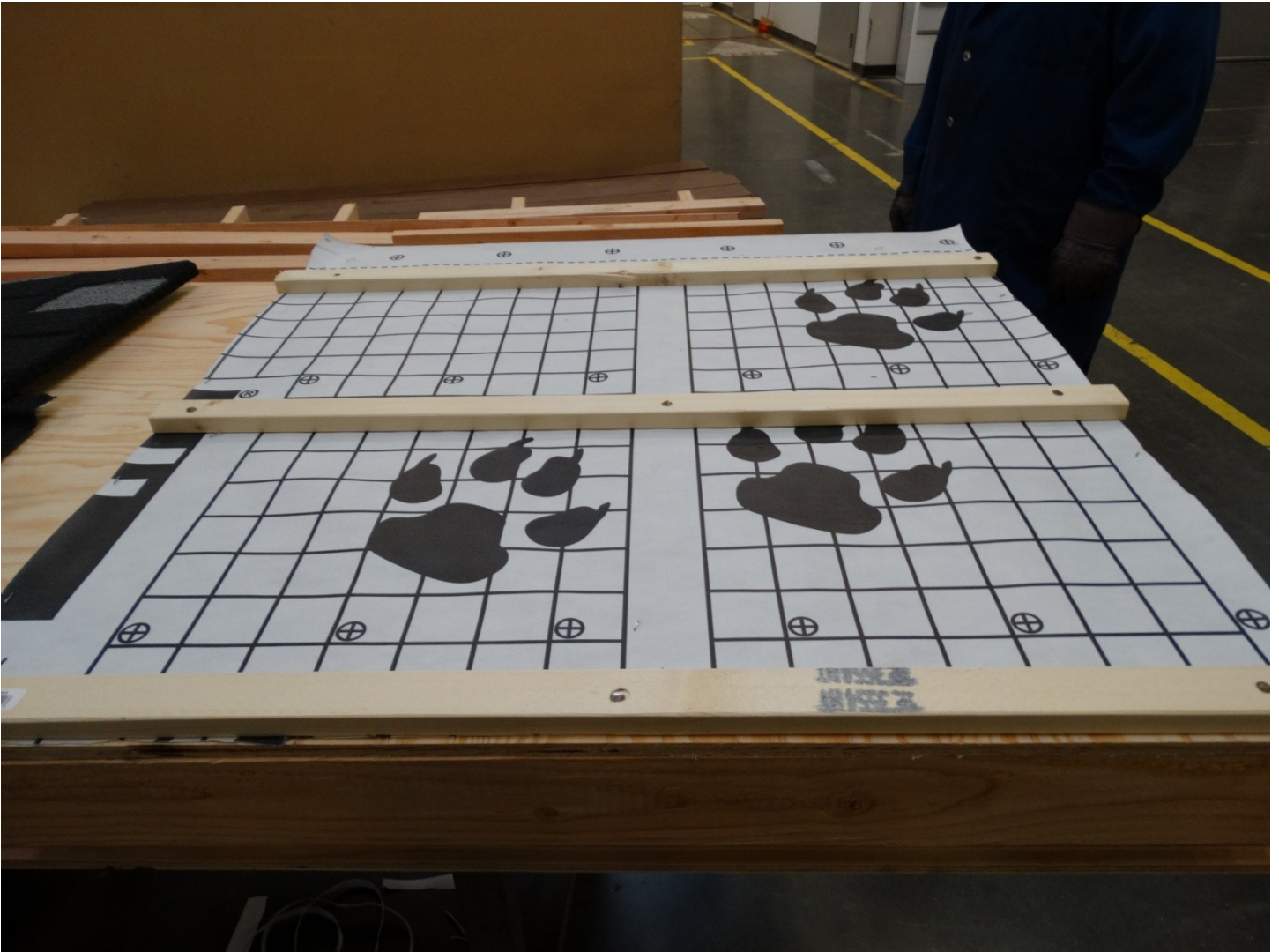


Photo1: 3x3 test deck with Tigerpaw Synthetic Underlayment and wood Battens.

Photographs



Photo2: UL2218 Test Deck Assembly from the top.

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Photographs



Photo 3:

Drop 1 (Flat Surface), Drop 2 (Tile Edge), Drop 3 (Unsupported Area).

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Photographs



Photo 4:
Drop 4 (Tile Joint), Drop 5 (Tile Corner), Drop 6 (Tile Edge).

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Photographs



Photo 6:

Test deck assembly after two coincident drops at six different locations using a 2" diameter steel ball dropped from a height of 20 feet.

*****<END OF REPORT>*****

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