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# TECHNICAL BULLETIN

## Tectum™ I Meets Factory Mutual Research Corporation

Rev. June 2013

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Tectum Inc. submitted Tectum I plank to Factory Mutual Research Corporation (FMRC) for approval requirements for Class I fire and I-60 and I-90 wind storm classifications. The FMRC examined through testing the interior fire spread and structural pull through and pull out testing and as a result approved Tectum I plank for Class I when installed as specified in the conclusions of the report.

The complete report is a part of this bulletin. Please review it and it may be presented to architects and engineers who wish to use Tectum I plank products in a Class I construction that is insured by Factory Mutual.

Please note that this report is subject to re-examine and manufacturing inspections by FMRC. Tectum I plank will also be listed in the FMRC Approval Guide.



## Factory Mutual Research

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P.O. Box 9102  
Norwood, Massachusetts 02062

OW4A5.AM  
(4457)

March 26, 1993

TECTUM PLANK  
for  
CLASS 1  
ROOF DECK CONSTRUCTION

from

TECTUM, INC.  
P.O. BOX 920  
NEWARK, OHIO 43058-0920

### I INTRODUCTION

1.1 Tectum, Inc. submitted their Tectum Plank to determine if it meets the Factory Mutual Research Corporation (FMRC) Approval requirements for Class 1 Fire and 1-60 or 1-90 Windstorm Classifications.

1.2 Examination included testing of the potential interior fire spread, structural pull-through and pull-out testing.

1.3 Tests show that the Tectum Plank as tested meets the FMRC Approval requirements when installed as specified in the CONCLUSIONS of this report.

### II MATERIALS TESTED

2.1 Tectum I roof deck is a factory prepared plank which consists of Aspen wood fiber and magnesium oxysulfate hydraulic cement, treated with inorganic binder. It is manufactured with tongue and groove sides in a minimum 1 1/2 in. (38 mm) thickness.

2.2 Construction Fasteners, Inc. Dekfast 14 - The screw is a size No. 14 with No. 14 diameter thread design and truss No. 3 Phillips head. The carbon steel screws are coated with Construction Fasteners, Inc. Senti finish.

2.3 Construction Fasteners, Inc. 2 in. (51 mm) diameter plates are 0.025 in. (0.6 mm) galvalume sections with a 0.26 in. (6.7 mm) hole in the center.

2.4 The proprietary formulations are on file at FMRC.

### III TESTS AND PROCEDURES

3.1 FMRC corrosion resistance testing was waived because of previous satisfactory performance of the fasteners in prior Approval programs sponsored by the fastener manufacturer.

#### 3.2 FMRC Calorimeter Fire Tests

The fire test from below the roof deck was conducted using the FMRC Construction Materials Calorimeter which measures the maximum rate of fuel contribution by the sample roof, also expressed as maximum heat release rate (HRR); e.g, for a Class 1 rating, the assembly must exhibit a HRR no greater than 410 Btu/ft<sup>2</sup>/min (77.6 kW/m<sup>2</sup>) in any 3 minute time frame during the 30 minute fire exposure.

#### 3.3 Tensile Pull-Through Tests

3.3.1 Tensile pull-through tests were conducted with the fastener and plate/Tectum deck combination to determine the ability of the Tectum deck assembly to remain in place up to the 60 psf (2.9 kPa) or 90 psf (4.3 kPa) uplift pressure.

3.3.2 Tests were conducted using a Tinius Olsen tensile testing machine. The fastener and plate was placed through the center of the Tectum sample with the fastener held in the upper stationary jaws of the tester and the jig holding the Tectum sample attached to the moving head. Force was exerted in a direct line parallel to the shank of the fastener at a crosshead speed of 2 in./min (51 mm/min) until failure occurred.

#### 3.4 Tensile Pull-Out Tests

3.4.1 Tensile pull-out tests were conducted with the fastener/substrate combinations to determine the performance of the fastener in resisting pull-out from the substrate.

3.4.2 Tests were conducted using a Tinius Olsen tensile testing machine. The fastener was installed in each substrate sample with the fastener secured to the upper stationary jaws of the tester and the frame holding the substrate sample attached to the moving head. Force was exerted in a direct line parallel to the shank of the fastener at a crosshead speed of 2 in./min (51 mm/min) until failure occurred.

### IV TEST SAMPLES

#### 4.1 FMRC Calorimeter Test Panel

One 4-1/2 by 5 ft. (1.4 by 1.5 m) panel was constructed.



The components and sequence of installation were as follows:

Tectum I plank, 1.5 in. (38 mm) thickness.  
Conventional 4 ply asphalt BUR roof cover

#### 4.2 Tensile Pull-Through Test Samples

Three (3) samples were prepared by inserting the fastener and plate through the center of the Tectum sample with the fastener held in the upper stationary jaws of the tester and the jig holding the Tectum sample attached to the moving head. Force was exerted in a direct line parallel to the shank of the fastener at a crosshead speed of 2 in./min (51 mm/min) until failure occurred.

#### 4.3 Tensile Pull-Out Test Samples

Six (6) samples (three for each fastener/substrate combination) were prepared by installing the fastener in each substrate sample with the fastener secured to the upper stationary jaws of the tester and the frame holding the substrate sample attached to the moving head. Force was exerted in a direct line parallel to the shank of the fastener at a crosshead speed of 2 in./min (51 mm/min) until failure occurred.

### V RESULTS

#### 5.1 FMRC Calorimeter Fire Test

The calorimeter test showed the test panel to have fuel contribution rates below the maximum permissible rates for Class 1 construction. These rates and the Class 1 limits are noted below:

Maximum Average Rate of Fuel Contribution  
for Various Time Intervals  
Btu/ft<sup>2</sup>/min (kW/m<sup>2</sup>)

<u>Time Interval</u>	<u>3 min</u>	<u>5 min</u>	<u>10 min</u>	<u>Average</u>
Class 1 Standard	410(77.6)	390(73.8)	360(68.1)	285(53.0)
Test Sample	226(42.8)	226(42.8)	226(42.8)	180(34.1)

#### 5.2 Tensile Pull-Through Tests

The tensile pull-through tests result (average of three) produced a value of 674 lbf (2998 N).

#### 5.3 Tensile Pull-Out Tests

5.3.1 The results of the tensile pull-out tests (average of three) were as follows:

<u>Substrate</u>	<u>lbf (N)</u>
Lumber	576 (2560)
Minimum 3/16 in. (5 mm) steel	2192 (9748)

5.3.2 The fastener referenced above requires predrilling of the steel support substrate. The pilot hole diameter is 7/32 in. (5.5 mm).

## VI CONCLUSIONS

6.1 The above test results, information submitted by Tectum, Inc. and wind uplift test results conducted in an approval program whose sponsor allowed use of data for the purpose of this program indicates that Tectum I Plank meets FMRC Approval requirements when secured to the supporting substrate with the above referenced fastener and plate applied as outlined in Tectum, Inc. publication 03500/TEC.

6.2 Tests show that the tested roof construction in and of themselves would not create a need for automatic sprinklers.

6.3 The tested construction meets the FMRC Approval criteria and when Approval is effective will be listed in the FMRC Approval Guide in Cementitious Wood Fiber Roof Deck section.

6.4 Approval is effective when the Approval Agreement is signed and received by FMRC.

6.5 Continued approval will depend upon satisfactory field experience and periodic Quality Audit Inspections.

6.6 Roof covers must be installed using an FMRC Approved Roof Perimeter Flashing System (see FMRC Approval Guide).

## VII MARKING

7.1 The manufacturer shall mark each wrapping or shipping container with the manufacturer's name and product trade name. In addition, the container must be marked with the FMRC Approval Mark and the words "Subject to the conditions of Approval as a Cementitious Wood Fiber Roof Deck when installed as described in the current edition of the FMRC Approval Guide".

7.2 The manufacturer agrees that use of the FMRC name or Approval Mark is subject to the conditions and limitations of the FMRC Approval. Such conditions and limitations must be included in all references to FMRC Approval.



VIII MANUFACTURER'S RESPONSIBILITIES

8.1 To assure compliance with his procedures in the field, the manufacturer shall supply to the roofer such necessary instruction or assistance required to produce the desired performance achieved in the tests.

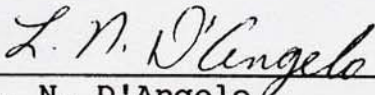
8.2 The manufacturer shall notify FMRC of any planned change in the Approved product, prior to general sale or distribution, using Form 797, Approved Product Revision Report.

IX QUALITY AUDIT INSPECTION AND RE-EXAMINATION

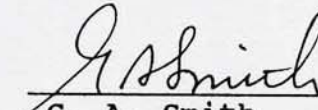
9.1 Re-examination and manufacturing inspections will be conducted periodically on the Approved products at the Tectum, Inc. manufacturing location in Newark, Ohio to determine that the quality and uniformity of the materials have been maintained and will provide the same level of performance as originally Approved.

TESTS AND REPORT BY:

REPORT APPROVED BY:



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