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GL 115411

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**FIRE TEST REPORT:** An Open Floor/Ceiling Assembly with 2 x 8 Pine, Wood Joists, 16" O.C., Subfloor - 3/4" x 6" T&G Oak, Finish Floor- 3/4" x 6" T&G Oak flooring; the Joists and Exposed Side Of The O.S.B. Were Coated With 27 mil Thick Intumescent Coating, ForceField FireGuard E 84.

**CLIENT/MFG:** Shield Industries, Inc.  
131 Smokehill Lane  
Woodstock, GA 30168

**MODEL, NAME & NUMBER:** ForceField FireGuard E 84 Intumescent Coating,

**STANDARDS TESTED TO:** ASTM E-119-10B Floor/Ceiling; NFPA 251; UL 263;  
ULC-S-101-07 With No Load Capacity, Small Scale Test.

**REPORT NO:** GL 115411

**TEST DATE:** 12/7/11

**REPORT DATE:** 12/19/11

**TEST RESULTS:** 1 Hour Fire Endurance Rating.

**TEST PERFORMED AND  
REPORT PREPARED BY:** GUARDIAN FIRE TESTING LABORATORIES, INC.  
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**Section II**

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**Abstract**

This report describes the results obtained when an open ceiling/floor assembly was coated with a 27 mil thickness intumescent coating: ForceField Fireguard E 84.

The ceiling assembly consisted of:

2" x 8" Pine wood joists, spaced 16" O.C.; 8" Pine wood rim headers;  
Sub-Floor: 3/4" x 6" tongue and groove Oak.  
Finish-Floor: 3/4" 6" T&G Oak finish floor.

The assembly was built to a small scale.  
All floor/ceiling wood components were purchased at Home Depot.

There was no load on the assembly.

The test standards used were: ASTM E-119, ULC-S-101, NFPA 251 and UL 623.

The test achieved a 1 hour Fire Endurance Rating.

The test was terminated at 67 minutes.

The high temperature on the unexposed side of the assembly at 60 minutes was 207°F with an allowable of 383°F.

The average temperature on the unexposed side at 60 minutes was 169°F with an allowable of 308°F.

1. General

- 1.1 Units of measurement used in this test are English: inches, feet and temperature degrees Fahrenheit.
- 1.2 The testing was conducted by Guardian Fire Testing Laboratories personnel at Guardian's fire testing lab at 480 Hinman Ave., Buffalo, NY. The assembly was constructed by Shield Industries personnel.
- 1.3 Guardian is an ISO 17025:2005 accredited fire testing laboratory.

2. Performance

This report presents the results of a floor/ceiling assembly fire test conducted according to ASTM E-119 and ULC-S-101 and UL 623. This report contains a description of the material evaluated, procedures used and the test results. The results listed apply only to the specimens tested, in the manner tested. This assembly went 67 minutes.

2.1 Construction

The test assembly was constructed using the following materials:

- a. Pine wood floor joists—2" x 8", spaced 16" O.C.; 2" x 8" pine rim headers;
- b. Subfloor-3/4" x 6" T&G Oak flooring.
- c. 3/4" x 6" T&G Oak finish flooring.
- d. 27-mil thickness of ForceField Fireguard E-84 Intumescent Coating applied to floor joists and exposed side of sub floor.

2.2 Assembling

- 2.2a Wood joists were spaced 16" on center with a rim header, nailed together with 10d common nails.
- 2.2b The sub floor was placed on top of the joists on the unexposed side and was fastened with 1-5/8" screws. The test assembly was 4 feet x 4 feet.
- 2.2c 3/4" T&G oak hardwood flooring was attached to the unexposed side of the sub floor with 1 5/8" screws.
- 2.2d 27-mil thick coating of intumescent coating on the floor joists and exposed side of the O.S.B.

3. Fire Endurance Test

- 3.1 The ASTM E-119 Tibor Harmathy design horizontal furnace was used for the fire endurance test.
- 3.2 Seven thermocouples were placed on the unexposed surface of the assembly one at the approximate center and four at the approximate center of its quarter sections, and 2 random locations.
- 3.3 The test unit was placed on the top surface of the horizontal furnace.
- 3.4 The furnace was ignited, and the temperature curve complied with the standard. The furnace average temperature followed the standard temperatures curve's nomenclature.
- 3.5 The furnace was shut off at 67 minutes.
- 3.6 The unit was left on the furnace and covered with gypsum wallboard to cool down.

3. Fire Endurance Test (cont'd)
  - 3.7 Test Observations are attached to this report.
  - 3.8 Visual records, test photos are attached to this report.
  - 3.9 Furnace Temperatures are attached.

4. **Conclusions**

This test assembly achieved a 1 hour Fire Endurance Rating.

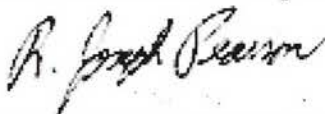
The 27 mil thickness of ForceField Fireguard E-84 intumescent coating applied to the floor joists and exposed side of the 3/4" Sub-floor resisted flame-through for 60 minutes.

The time for flame resistance in the tested open floor/ceiling assembly can be compared to unprotected floor joists with 3/4" O.S.B. Flame-through in such an assembly occurs in 14 to 17 minutes.

The high unexposed temperature at 60 minutes was 207°F with an allowable single high temperature of 383°F.

The average temperature was 169°F with an allowable high average temperature of 308°F.

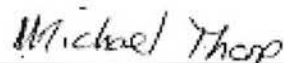
Test Conducted and Reported by:



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R. Joseph Pearson  
Fire Testing Engineer

Test Witnessed by and Report Reviewed By:



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Michael Thorp  
Fire Testing Technician

Uncertainty Measurement in Guardian's fire testing is less than 1% as per ASTM E 2536-06.

This test is accredited and meets the requirements of ISO/IEC 17025 as verified by ANSI/ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation Report AT1247.

Guardian also is accredited as an Inspection Agency per ISO 17020 through ANSI/ASQ National Accreditation Board/ACLASS, Report 1547.

**N.B.: ANSI/ASQ/ACLASS is a signatory member of the International Laboratory Accreditation Cooperation's (ILAC) Mutual Recognition Arrangement (MRA). ANSI/ASQ/ACLASS accreditation of Guardian ensures global recognition for Guardian's services.**

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The laboratory's test report does not constitute or imply product certification, approval or endorsement by this laboratory.

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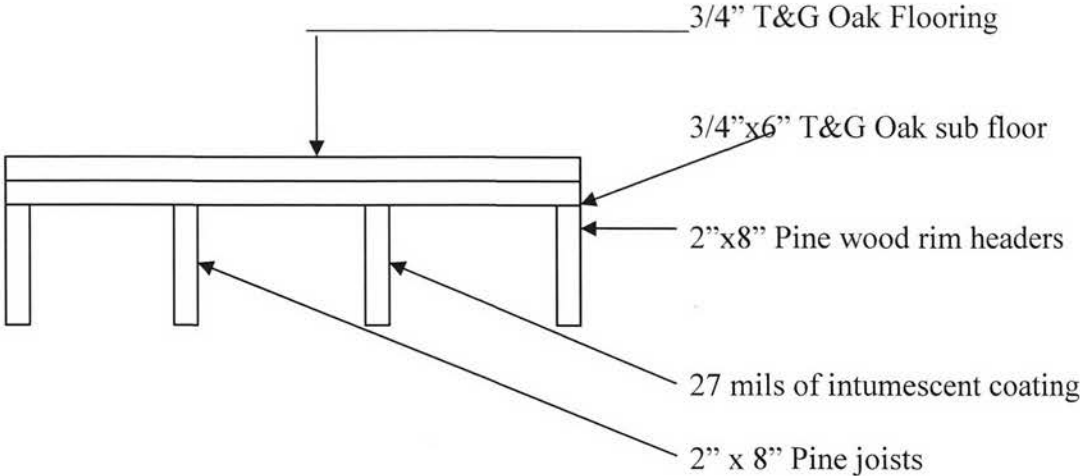
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**Assembly Drawing**

Cross Sectional View



Shield Industries ForceField, FireGuard E-84 Coating on an Open Floor/Ceiling Assembly: Temperatures °F

| Time | Ambient | Furnace<br>Temperatures<br>°F |      |      |      | Unexposed<br>Surface °F |     |     |     |     |     |     |      |
|------|---------|-------------------------------|------|------|------|-------------------------|-----|-----|-----|-----|-----|-----|------|
|      | 1       | 2                             | 3    | 4    | 5    | 1                       | 2   | 3   | 4   | 5   | 6   | 7   | Avg. |
| 0:0  | 64      | 52                            | 57   | 52   | 52   | 56                      | 57  | 57  | 58  | 56  | 55  | 55  | 56   |
| 5    | 64      | 710                           | 768  | 768  | 916  | 59                      | 60  | 60  | 65  | 62  | 61  | 59  | 61   |
| 10   | 65      | 1340                          | 1418 | 1266 | 1539 | 63                      | 66  | 65  | 80  | 73  | 74  | 68  | 70   |
| 15   | 70      | 1484                          | 1524 | 1581 | 1636 | 70                      | 75  | 73  | 98  | 85  | 88  | 80  | 81   |
| 20   | 68      | 1310                          | 1346 | 1452 | 1429 | 78                      | 83  | 79  | 101 | 85  | 93  | 90  | 59   |
| 25   | 73      | 1484                          | 1460 | 1453 | 1471 | 93                      | 100 | 94  | 126 | 100 | 113 | 110 | 105  |
| 30   | 71      | 1505                          | 1539 | 1576 | 1601 | 103                     | 113 | 106 | 136 | 118 | 125 | 123 | 118  |
| 35   | 74      | 1560                          | 1535 | 1553 | 1568 | 121                     | 128 | 124 | 158 | 142 | 142 | 136 | 136  |
| 40   | 69      | 1595                          | 1548 | 1547 | 1558 | 132                     | 134 | 133 | 166 | 146 | 150 | 144 | 144  |
| 45   | 68      | 1606                          | 1554 | 1577 | 1574 | 139                     | 137 | 137 | 171 | 149 | 155 | 150 | 148  |
| 50   | 63      | 1670                          | 1691 | 1692 | 1725 | 145                     | 143 | 143 | 183 | 154 | 164 | 159 | 159  |
| 55   | 67      | 1675                          | 1709 | 1693 | 1748 | 151                     | 150 | 149 | 198 | 159 | 170 | 167 | 163  |
| 60   | 66      | 1694                          | 1710 | 1690 | 1750 | 156                     | 156 | 153 | 207 | 161 | 174 | 177 | 169  |
| 65   | 64      | 1731                          | 1741 | 1731 | 1762 | 162                     | 162 | 159 | 220 | 169 | 182 | 197 | 179  |

Gas off: Test terminated 67 minutes

After test notes:

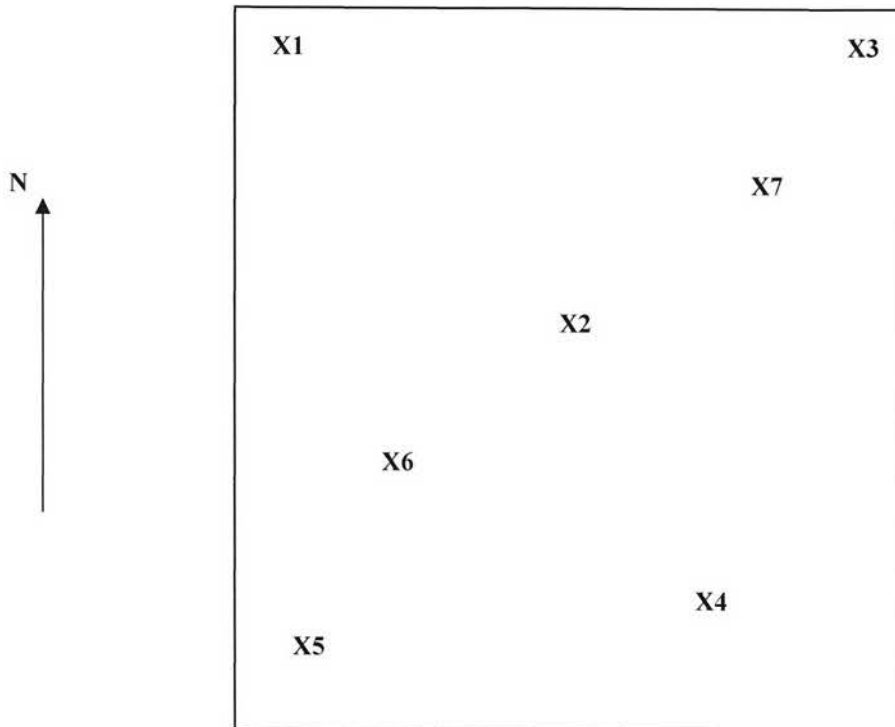
T/C temperature recorder calibrated date- 7/12/11

Temperatures recorded as per UL 623

**Test Observations: ForceField FireGuard E 84 intumescent coating**  
**Thickness of Coating: 27 mils on open Floor/Ceiling Assembly**

Test Time Minutes

|    |   |
|----|---|
| 8  | Minimal smoking of perimeter area   |
| 13 | Steaming and condensation points on perimeter edges.                      |
| 30 | Smoking tongue and groove butt-seam at south center perimeter.            |
| 33 | Tongue and groove cupping on west edge perimeter.                         |
| 34 | Smoking at southeast edge and south central edge.                         |
| 35 | Crackling sounds and charring at edges of perimeter south east perimeter. |
| 44 | Charring @ southeast corner.  |
| 49 | Smoking decreases to minimal amounts along perimeter.                     |
| 53 | Smoking is pulsating  |
| 55 | Charring along perimeter.   |
| 60 | Assembly achieved a one hour Fire Endurance Rating.                       |
| 67 | Test Terminated.  |



**UNEXPOSED T/C LOCATIONS**



Photos: Shield, ASTM-E-119 Test 1-hour open floor joist construction coated with 27 mil thickness of Fire Guard E-84 applied to exposed side of joists & tongue & groove oak sub floor, 1" x 6" wide; unexposed floor of tongue & groove oak 1" thick x 6" wide

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Time In Hours & Minutes

12/7/11

Before Test

Gas on →



00:15



00:30



00:35: smoke appears in upper corner



00:36: surface mildly warm to the touch

Photos: Shield, ASTM-E-119 Test 1-hour open floor joist construction coated with 27 mil thickness of Fire Guard E-84 applied to exposed side of joists & tongue & groove oak sub floor, 1" x 6" wide; unexposed floor of tongue & groove oak 1" thick x 6" wide

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Time In Hours & Minutes

12/7/11



00:45



00:59



01:05: gas off



After test: unexposed side—no flame through



Thick chunks of intumesced coating  
sprayed off exposed sub-floor & floor  
joists.



Photos: Shield, ASTM-E-119 Test 1-hour open floor joist construction coated with 27 mil thickness of Fire Guard E-84 applied to exposed side of joists & tongue & groove oak sub floor, 1" x 6" wide; unexposed floor of tongue & groove oak 1" thick x 6" wide

Time In Hours & Minutes

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After test: unexposed side



Illustrating thickness of intumesced coating