FIELD VERIFICATION OF ROOF WIND UPLIFT RESISTANCE

FM Global clients must contact the local FM Global office before beginning uplift testing or any roofing work.

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1.0 SCOPE

This data sheet describes two methods of field testing above-deck roofing assemblies to determine if there is adequate wind resistance. It also provides alternative visual construction observation guidelines. Confirmation of acceptable wind uplift resistance on completed roof systems is critical in hurricane-prone regions. Field testing may also be used where inferior construction is suspected (or known to be present) or where a partial blow-off has occurred. Field tests are not applicable to metal panel roofs (standing seam and through fastened), ballasted roofs, or mechanically fastened covers with fasteners spaced more than 2 ft (0.6 m) apart in either direction.

1.1 Changes

July 2012. The following changes were made:

A. The option to provide visual construction observation (VCO) in lieu of conducting field uplift tests was added. The title of this document was revised to reflect this change.

B. The number of tests recommended when using the bonded pull test was increased to account for the smaller sample area.

C. The recommended field test safety factor was reduced from 1.5 to 1.25.

D. The deflection limit for thin, mechanically fastened cover boards was increased.

E. Additional pass/fail criteria were provided.

2.0 LOSS PREVENTION RECOMMENDATIONS

2.1 Introduction

In regions that are both (a) prone to hurricanes, typhoons, or tropical cyclones (see Appendix A for definitions), and (b) located where design wind-speeds are greater or equal to 100 mph (45 m/s), ensure one of the following is done for new above-deck roofing assemblies (including those that are re-roofed or re-covered, if construction is compatible) for all FM Global client locations:

A. Satisfactory completion of uplift tests in accordance with 2.1.1 and 2.1.2 or 2.1.3.

B. Visual construction observation (VCO) in accordance with 2.1.4 and 3.5.

If uplift tests are performed, ensure testing requirements are included in the building contract to determine that the wind uplift performance for the test areas meets the specifications in this data sheet. Ensure testing is witnessed by the owner's representative.

Record the results of uplift tests or VCO on FM Global Form X2688, *Application for Acceptance of Roofing Systems*, which must be maintained on file and forwarded to the FM Global local servicing office. See Appendix C for a copy of the certificate and suggested contract wording. Have a roofing professional present to repair the test areas and return the roof area to a watertight condition should any of the tests fail.

Exception: New roof covers (single-ply, or multi-ply with a mechanically fastened base sheet) that are mechanically fastened directly to the decks listed below, provided the roof cover fastener spacing is verified to be adequate. Verification may be made by visual identification or nondestructive examination (e.g., metal detection). This exception applies only to the following deck types:

- minimum 22 ga (0.295 in.; 0.75 mm) steel deck
- wood deck
- cementitious wood fiber deck
- structural concrete with a minimum ultimate compressive strength (f'_c) of 2500 psi (17.4 mPa)
- lightweight insulating concrete (LWIC), only if the roof cover fastener completely penetrates the LWIC and engages minimum 22 ga. (0.0295 in., 0.75 mm) steel form deck.

Table 1 provides guidance regarding various roof systems that are practical to test and for which testing is recommended.

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Table 1. Recommended Tests for Various Roof Systems

Type of Test or Analysis/ Roof Type	*MF SP, MF BUR[2] or MF Mod Bit[2] to deck other than LWIC*	*MF SP[1],MF BUR[2] or Mod Bit[2] to LWIC*	*FA SP, BUR or Mod Bit w/MF insulation*	*FA BUR or Mod Bit w/FA insul.*	*FA SP w/FA insul.*	*Metal Roofs*	*Ballasted See DS 1-29*
Negative Pressure Test	DNA	R[1]	R	R	R	DNA	DNA
Bonded Uplift Test	DNA	NR	NR	R	R	DNA	DNA

1. Fastener spacing does not exceed 2 ft (0.6 m)in both directions.
2. Base sheet is mechanically attached and upper plies are adhered.

MF – mechanically fastened
FA – fully adhered
SP – single-ply membrane
Mod Bit – modified bitumen roof cover
Metal Roofs – standing seam (concealed clip securement) or lap seam (through fastened)
R – recommended
NR – not recommended
BUR – built-up roof
DNA – does not apply

2.1.1 General

2.1.1.1 The negative pressure test generally is more desirable than the bonded uplift test because it is potentially nondestructive. It is not to be used directly on porous surfaces because the test requires an airtight seal between the test apparatus and the roof covering.

2.1.1.2 Negative pressure uplift tests may be conducted on totally adhered built-up roofs (BUR), modified bitumen (mod bit), or single-ply membranes. They can only be performed on mechanically attached base sheets, or reinforced single plies with membrane fasteners spaced no more than 2 ft (0.6 m) on center in either direction.

2.1.1.3 Neither the negative pressure test nor the bonded uplift test can be used on ballasted roofs or metal-panel roofs. The bonded pull test is not recommended where any type of mechanically fastened cover or insulation is used.

2.1.1.4 Ensure roof adhesives cure according to the manufacturer's instructions. Cold adhesives normally require 28 days to cure to the strength obtained during FM Approvals testing, which allows a maximum 28-day cure time. These may acquire additional strength after 28 days and it is acceptable to conduct uplift testing after 28 days.

2.1.1.5 Conduct tests only when the roof surface temperature is between 40 and 100°F (5 and 38°C). Do not add anti-freeze to the manometer's water solution (if applicable) on cold weather days, or food coloring to facilitate level reading, because the change in specific gravity will alter the manometer's readings.

2.1.1.6 Ensure repair procedures are in accordance with Data Sheets 1-30, *Repair of Wind Damaged Roof Systems;* 1-28, *Wind Design;* and 1-29, *Roof Deck Securement and Above-Deck Roof Components.*

2.1.1.7 To prevent water damage to insulation, promptly patch and make watertight all failed test areas.

2.1.1.8 Determine the needed design wind pressure using the Roof*Nav* Rating Calculator or Data Sheet 1-28, Table 6 and Tables 3, 4, or 5 (depending on the surface roughness) to determine the field, perimeter, and corner design pressures. Multiply those numbers by a safety factor of 1.25 to determine the needed passing uplift test pressure (U_1) for the field, perimeter, and corner areas. (Note that for low roof slopes and a minimum 3 ft [0.9 m] parapet around the entire outside edge of the roof, the passing uplift test pressure used for the building corners is the same as that for the perimeter.)

Except where otherwise noted, passing is based on successfully withstanding the equivalent of the design pressure for the respective area of the roof times a safety factor of 1.25 for a period of 1 minute. Note that Table 2 is intended to allow ease of application. In some cases its use may be overly conservative; consequently, refer to footnote 1 and examples 1 and 2.

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Table 2. Passing Uplift Test Pressures for Enclosed Low-Slope Buildings[1]

FM Global Roof Wind Rating (field of the roof)	Passing Uplift Test Pressures (U[1])					
	Field of the Roof		Roof Perimeter		Roof Corners	
	lbf/ft^2	kPa	lbf/ft^2	kPa	lbf/ft^2	kPa
60	38	1.8	64	3.1	96	4.6
75	47	2.2	79	3.8	119	5.7
90	56	2.7	94	4.5	142	6.8
105	66	3.1	111	5.3	167	8.0
120	75	3.6	126	6.0	189	9.0
135	84	4.0	141	6.8	213	10.2
150	94	4.5	158	7.6	238	11.4
165	103	4.9	173	8.3	261	12.5
180	113	5.4	190	9.1	286	13.7
195	122	5.8	205	9.8	309	14.8
210	131	6.3	220	10.5	331	15.9

[1] For design pressures that fall between or above the ratings above, the passing uplift test pressure is equal to 125% of the design wind uplift pressure for the field, perimeter, and corners of the roof as calculated using DS 1-28. The above passing uplift test pressures for the perimeter and corners are for enclosed buildings with gable roofs (without overhangs) with low slopes and eave roof heights less than or equal to 60 ft (27.4 m).

Example No. 1

An enclosed, low slope roof is less than 60 ft (18 m) high and has a **field of roof design pressure of 45 psf**. The **needed test pressures are 56 psf, 94 psf, and 142 psf**, respectively for the field, perimeter and corner areas. This is in accordance with Table 2, and equals the recommended design pressures in each roof area times a field safety factor of 1.25.

Example No. 2

An enclosed, low slope roof is less than 60 ft (18 m) high has a **field of roof design pressure of 38 psf**. Because it is in the low end of its range of design pressures for the field of the roof in Table 2 above, it is acceptable to determine the needed test pressures by multiplying the design pressure by the respective pressure coefficients. **The recommended test pressure for the field of the roof is 48 psf** or 1.25 times the recommended design pressure there. **The normalized pressure coefficients in this situation are 1.68 and 2.53 for the perimeter and corners, respectively.** This results in a needed **wind uplift test pressures of 81 psf and 122 psf for the perimeter and corners, respectively.** This is effectively a form of interpolation of Table 2, and results in a field safety factor of 1.25.

2.1.1.9 Use Table 3 to determine the minimum number of negative pressure tests. Perform two tests in the field, two tests in the perimeter, and one test in the corner of each roof area (NOT per building). (See Figure 1 and Appendix A). Perimeters and corners are only tested when the roof area terminates along an outside edge, not when interior roof areas (of approximately equal height) terminate against another roof area at the same elevation. Only two field tests are required for an interior roof area.

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Table 3. Minimum Number of Negative Pressure Tests

Roof Area (A, ft^2 or m^2)	Minimum No. of Tests
A ≤ 10,000 (1000)	3 (1 F, 1 P, 1 C)
10,000 (1,000) < A ≤ 60,000 (6,000)	5 (2 F, 2 P, 1 C)
A > 60,000 (6,000) or multiple adjoining roof areas	See Section 2.1.1.9 and Figure 1

Where F = field of roof. P = perimeter of roof. C = corner of roof

Refer to DS 1-28, *Roof Design Outward Pressure Multipliers for Roof Zones 1, 2 and 3,* to determine perimeter and corner widths.

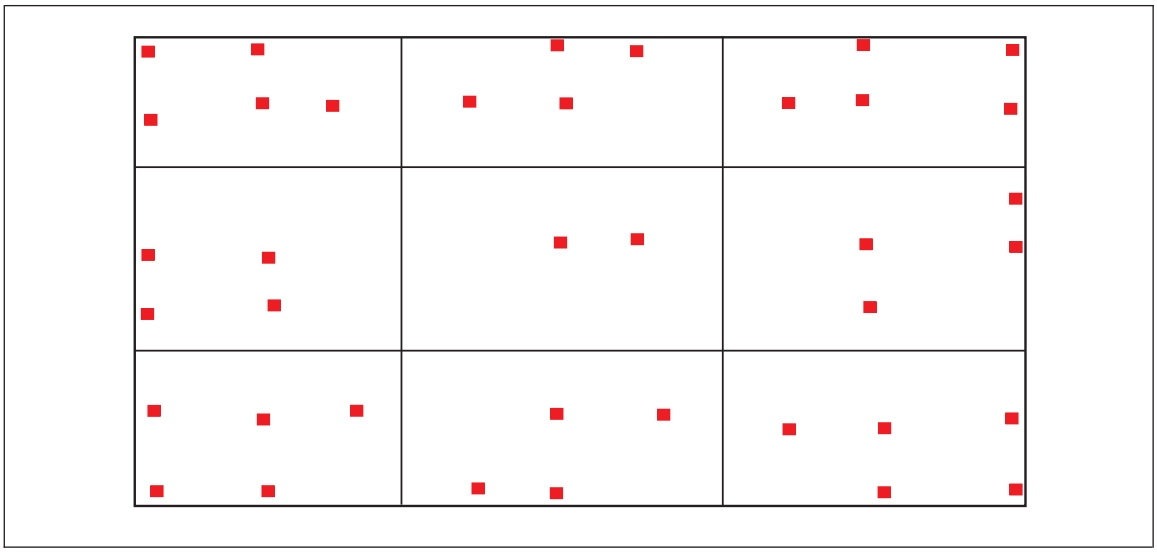

Fig. 1. Uplift test location example: nine sections with roof areas up to 60,000 ft^2 (6,000 m^2) (each ■- approximate test locations)

See Appendix A for definition of ‘‘roof area.’’

2.1.2 Negative Pressure Test

2.1.2.1 Ensure the vacuum pump and dome has sufficient capacity to create the negative pressures required per Table 1 or its footnote 1. It must be equipped with controls to maintain a constant negative pressure at each test increment. The manometer, when used, also acts as a safety device to prevent negative pressure that could cause the dome to collapse.

2.1.2.2 Conduct negative pressure tests in accordance with Section 3.3.

2.1.2.3 Locate the test site between supporting beams or joists (where practical), except when testing roofs on pre-cast concrete roof decks, in which case locate the test site over the joints in the pre-cast concrete deck.

2.1.2.4 Place the deflection bar in the center of the dome.

2.1.2.5 For built-up roof coverings, when tests are to be made on a granule, gravel, or slag-covered roof, the first step is to sweep away any loose surfacing material from the test area and from a 1 ft (0.3 m) wide area around the perimeter of the test area. This will prevent pump damage and aid in sealing. Pour a compatible sealant such as asphalt or coal tar pitch (whichever is on the existing roof), not to exceed 0.5 in. (13 mm) in thickness, over the perimeter of the test area to make a smooth surface that will allow contact between the apparatus and roof and, therefore, the drawing of negative pressure. When the roof is smooth, the existing surface usually is tight enough to draw a vacuum without the pouring. However, if the surface is ‘‘alligatored’’, blistered, or otherwise rough, the bitumen layer will be necessary.

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2.1.2.6 For single-ply membranes, remove any sand or small granules adhered to the top surface in the area of the seal. Sweep away loose material from the entire test area. The test apparatus will cross over lap joints or splice edges, creating void areas at the edge of the lap that must be sealed by the foam strip.

2.1.2.7 Consider the test to be a failure if a crease forms (see Figs. 2 and 3) during the test on the roof cover surface before the design wind pressure has been held (safety factor = 1.0). Experience indicates this reflects that a crack has formed in the insulation or cover board (see Fig. 4) below the crease in the roof cover.

Fig. 2. Crease in single-ply roof cover while subjected to uplift pressure

Fig. 3. Crease in single-ply roof cover while subjected to uplift pressure

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Fig. 4. Crack in underside of cover board at fasterner and beneath where crease was visible in the single-ply roof cover

2.1.3 Bonded Uplift Test

2.1.3.1 The bonded uplift test is not valid if the insulation, base sheet, or membrane is secured with mechanical fasteners. Do not perform this test when roof slope exceeds 1.2°.

2.1.3.2 Conduct bonded uplift tests and record data in accordance with Section 3.4.

2.1.3.3 For proper surface preparation, sweep the test area when the roof has a smooth surface.

For roofs with gravel or slag surfaces, do the following

- Sweep the test area.
- If necessary to maintain a seal, pour a thin layer of asphalt or coal tar around the perimeter of the test area.
- Remove stones with a shovel, being careful not to disturb the adhesive bond of the insulation and roof covering.

2.1.3.4 Conduct four times as many bonded uplift tests (BPT) as recommended by Table 3, Figure 1 and Recommendation 2.1.9 to account for the smaller test sample area than that recommended for the negative pressure test (NPT). The four BPT samples should be prepared in close proximity to each other, taking into consideration that a complete cut needs to be made down to the top of the deck around the entire perimeter of the sample, and the required bearing points for the tripod legs. This allows testing of the same approximate sample area as in the NPT, and minimizes the area requiring repair after.

2.1.4 Visual Construction Observation (VCO)

2.1.4 Use full-time visual construction observation (VCO) during roof system installations as an alternative to performing field wind uplift testing for verification of adequate wind resistance.

Terminate the use of all noncompliant material or workmanship practices immediately, and replace or repair all noncompliant installation areas as needed. Document all noncompliance issues as well as related corrective measures in the daily construction report.

Follow guidelines in Section 3.5.

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3.0 SUPPORT FOR RECOMMENDATIONS

3.1 Background Information

Performing these tests can identify inferior roofs that might be damaged by wind with resulting water damage to building contents and possible interruption to business. Do not substitute uplift testing for built-in quality. Ensure the roof system is designed to be wind-resistant, and the construction work is performed by a professional roofing contractor who employs quality-control measures that guarantee the system is installed as intended.

Whether tests are to be run on new roofs, or simply because the construction is unknown, passing criteria is based on 62.5% of the intended wind rating (e.g., for a Class 1-90 rating, the minimum test pressure, U_1, to pass is 56 lbf/ft^2 [2.7 kPa] for the field of the roof, with higher pressures for the perimeter and corner areas due to the higher uplift pressures experienced in those areas).

The ability of the roof deck and edge conditions to resist wind uplift are also critical but uplift testing does not accurately evaluate the uplift resistance of the roof deck or edge securement, such as flashing, coping, etc. Lifting of metal edge flashing and coping and subsequent lifting and progressive membrane peeling is the most common cause of membrane loss. See Data Sheet 1-29, *Roof Deck Securement and Above-Deck Roof Components*, for proper deck securement, the *Approval Guide*, an online resource of FM Approvals and DS 1-49, *Perimeter Flashing*, for proper flashing securement.

3.2 Loss History

An extensive loss history exists on failures of roof systems due to wind forces. Since the majority of roof deficiencies leading to wind uplift failures are not readily visible on completed roofs, the uplift testing and roof cuts are offered as an evaluation tool.

3.3 Negative Pressure Test

The test apparatus (Fig. 5) includes a chamber 5 by 5 ft (1.5 by 1.5 m) sufficiently strong to withstand the necessary negative pressure without collapsing. The chamber is dome-shaped and of rigid acrylic plastic, fiberglass-reinforced plastic (FRP), or aluminum construction with polycarbonate view windows. The type of material and thickness will vary depending on the intended capacity of the apparatus. It is generally manufactured in two or four equal segments for ease in transporting it to and from the roof. The segments are provided with flanges so the units can be secured together. The flanges also act as structural ribs. A rubber gasket is provided to seal between the segments. One segment of the dome has a hole, usually 1.6 in. (41 mm) in diameter, to accommodate the vacuum pump, and another hole to accommodate a water or electric manometer. The dome has a bottom flange to set on the roof surface, and this flange is equipped with a flexible foam strip to seal the dome to the roof surface.

Note: Various manometer arrangements and higher calibrations are available. A deflection bar and gauge are placed on the roof surface prior to assembly of the dome (the bar and gauge are not needed when the roof covering is a spot-attached, or mechanically fastened type.

When provided, water manometers are made of clear plastic and generally calibrated to indicate negative pressures of 15 lbf/ft^2 (0.72 kPa), 22.5 lbf/ft^2 (1.08 kPa), 30 lbf/ft^2 (1.44 kPa), 45 lbf/ft^2 (2.16 kPa), etc. The manometer is equipped with a flexible tube to connect to the plastic dome. When the liquid is water, each 30 lbf/ft^2 (1.44 kPa) of negative pressure is equivalent to a vertical distance on the manometer water column of 5.77 in. (147 mm). (Inches of water required to pass equals lbf/ft^2 required to pass multiplied by 0.1924)

Maximum pressure of this equipment varies depending on the exact make, but goes up to approximately 340 lbf/ft^2 (16.28 kPa).

The vertical distance of the water column is the difference between the elevation of the two water columns and not the distance of one column from the original 0 set point. To convert other levels of water in a manometer, refer to Table 4.

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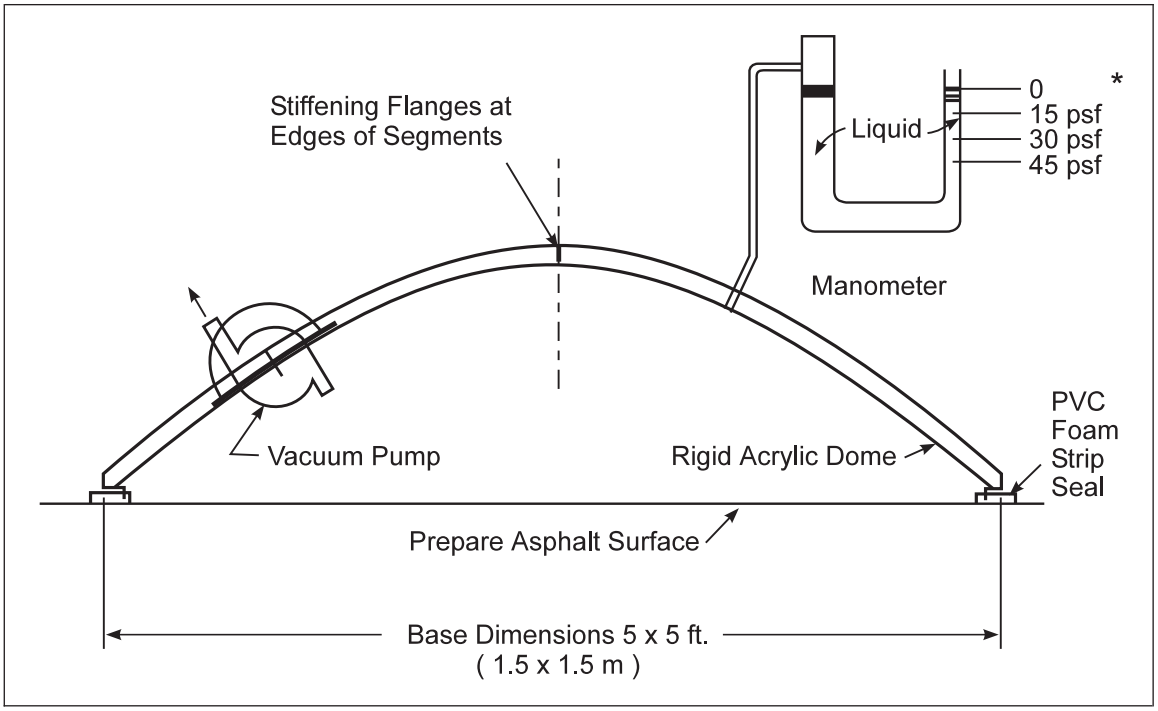

Fig. 5. Negative pressure test apparatus (schematic) with water manometer

Table 4. Conversion From Pressure to Depth of Water

WIND UPLIFT CALCULATIONS			
1 lbf/in.^{2} = 144 lbf/ft^2			
1 in. water = 25.4 mm water = 5.2 lbf/ft^2 = 0.25 kPa			
0.1924 in. of water = 1 lbs/ft^2			
lbf/ft^2	**kPa**	**in. H_2O**	**mm H_2O**
15.0	0.7	2.9	73.7
22.5	1.1	4.3	109.2
30.0	1.4	5.8	147.3
37.5	1.8	7.2	182.9
45.0	2.2	8.7	221.0
52.5	2.5	10.1	256.5
60.0	2.9	11.5	292.1
67.5	3.2	13.0	330.2
75.0	3.6	14.4	365.8
82.5	4.0	15.9	403.9
90.0	4.3	17.3	439.4
97.5	4.7	18.8	477.5
105.0	5.0	20.2	513.1
112.5	5.4	21.6	548.6
120.0	5.7	23.1	586.7
127.5	6.1	24.5	622.3
135.0	6.5	26.0	660.4
142.5	6.8	27.4	696.0
150.0	7.2	28.9	734.1
157.5	7.5	30.3	769.6
165.0	7.9	31.7	805.2
172.5	8.3	33.2	843.3
180.0	8.6	34.6	878.8
187.5	9.0	36.1	916.9
195.0	9.3	37.5	952.5

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WIND UPLIFT CALCULATIONS			
1 lbf/in.^{2} = 144 lbf/ft^2			
1 in. water = 25.4 mm water = 5.2 lbf/ft^2 = 0.25 kPa			
0.1924 in. of water = 1 lbs/ft^2			
lbf/ft^2	**kPa**	**in. H_2O**	**mm H_2O**
202.5	9.7	39.0	990.6
210.0	10.1	40.4	1026.2
217.5	10.4	41.8	1061.7
225.0	10.8	43.3	1099.8
232.5	11.1	44.7	1135.4
240.0	11.5	46.2	1173.5
247.5	11.9	47.6	1209.0
255.0	12.2	49.1	1247.1
262.5	12.6	50.5	1282.7
270.0	12.9	51.9	1318.3
277.5	13.3	53.4	1356.4
285.0	13.6	54.8	1391.9
292.5	14.0	56.3	1430.0
300.0	14.4	57.7	1465.6
307.5	14.7	59.2	1503.7
315.0	15.1	60.6	1539.2
322.5	15.4	62.0	1574.8
330.0	15.8	63.5	1612.9
337.5	16.2	64.9	1648.5
345.0	16.5	66.4	1686.6
352.5	16.9	67.8	1722.1
360.0	17.2	69.3	1760.2
367.5	17.6	70.7	1795.8
375.0	18.0	72.2	1833.9
382.5	18.3	73.6	1869.4
390.0	18.7	75.0	1905.0
397.5	19.0	76.5	1943.1
405.0	19.4	77.9	1978.7

Place the assembled dome on top of the prepared roof surface located between supporting beams or joists, when practical. Clean all dust, dirt, and loose granules from the area. Make sure the apparatus encompasses at least one lap joint.

When using a water manometer, attach the flexible hose to the dome and fill the manometer with water to the zero calibration level or to a plus or minus calibration level. Place the vacuum pump over the hole provided in the dome. Check that the bypass valve on the pump is open, then start the pump. Be sure the dome is in complete contact with the surface to allow the necessary negative pressure to be drawn. Applying water under the foam strip will facilitate sealing.

Raise the pressure level to 15 lbf/ft^2 (0.72 kPa) and hold for 1 minute. Then raise in increments of 7.5 lbf/ft^2 (0.36 kPa) and hold for 1 minute at the end of each increment. When the passing uplift test pressure (U_1) is reached, the roof passes the test if that pressure is held for 1 minute with no separation within the roof covering, or separation of the roof covering from the roof deck or insulation, and deflection is within the parameters stated below. In the event of failure, record the previous pressure that was successfully held for 1 minute (this represents the actual uplift strength of the roof covering).

When a vacuum is drawn on the covering, most roof decks will exhibit a very small upward deflection that will increase with each load increment.

Observers not directly involved in operating the test equipment should not stand immediately adjacent to the test area. Also, it is imperative that there be no walking near the test area between the time the deflection gauge has been zeroed out and the test is complete. For example, if someone stands immediately adjacent to the center of the test area while the gauge is being zeroed out, then moves away from that area before the test is complete, the deflection gauge reading may be unrealistically high. In contrast, if someone is initially

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standing away from the test area, but later walks immediately adjacent to the center of the test area after the gauge was zeroed out, it can cause the deflection gauge reading to be unrealistically low.

Laboratory tests have revealed that some improperly adhered roof assemblies may not show obvious signs of ballooning and failure, but will experience considerable deflection (see Section 3.3.1). Field testing of successful roof samples typically results in negligible deflection.

Interpreting Test Results

- If all test results indicate that all measured deflections are within the maximum recommended in this data sheet, the roof is acceptable from a wind uplift performance perspective.
- Areas where measured deflections exceed the maximum recommended in this data sheet deflection are suspect; and during testing these areas are sometimes accompanied by a noise at the time of failure. For these areas, carefully cut out the above-deck assembly down to the deck to determine if failure did occur. If no failure is evident, the roof is acceptable from a wind uplift performance perspective.
- If failure is verified from a roof cut visual inspection as described above, the roof area tested does not pass the test. Identify the mode of failure, any construction details that are not in accordance with FM Approvals or FM Global data sheets, and other obvious defects.
- It is not uncommon for some field areas to pass and some field areas to fail. For single-ply membranes adhered to mechanically fastened insulation, when test results vary within the same test pressure requirement attempt to visually identify different insulation fastener densities and / or patterns between the two areas which exhibit different uplift performance. If certain areas clearly are similar to the areas that passed, while others are clearly similar to the areas that failed, the former areas are acceptable from a wind uplift performance perspective; the other areas are not. For example, say the north and south sections of a new roof were installed on two different days by two different crews. All tests conducted on the north section passed, while all those conducted on the south section failed. Close inspection reveals that the area per insulation fastener was adequate for the north side, but was 50% greater on the south side. Conclusion: the north section is acceptable and the south section must be repaired.
- In cases, where some tests passed and other failed, additional tests may be conducted to limit the areas needing added securement.
- Provide retrofit securement enhancements for areas that failed the test.

The test is considered a failure if the cover suddenly balloons. The test is considered suspect if the gauge shows excessive deflection. Reasonable deflection is generally limited to 0.25 in. (6 mm), except as noted in Table 4. Where a mechanically fastened roof cover is tested, deflection need not be monitored. If localized deflection seems excessive, continue the test until the needed test pressures are held for one minute or obvious failure has occurred. **In either case,** the tested roof section must be carefully cut out down to the deck to determine if failure has occurred and what caused the failure. The sample should be removed carefully to help ascertain what the initial failure mode was.

Where the deck is wide rib steel (see DS 1-29) and the test pressure exceeds 60 psf (2.88 kPa), additional upward deflection may be allowed at the rate of an added 1/4 in. (6.5 mm) of deflection for each added 60 psf (2.88 kPa) of test pressure (see Table 5). If intermediate or narrow rib deck is used, the allowable deflection shown in Table 5 may be doubled, up to a maximum of 2 in. (50 mm).

Table 5. Maximum Recommended Deflection for Adhered Covers on Wide Rib Steel Deck Roofs Before the Sample is Considered Suspect

Test Pressure, psf (kPa)	*Maximum Deflection, in. (mm)*
P ≤ 60 (2.88)	¼ or 0.25 (6.5)
60 < P ≤ 120 (5.76)	½ or 0.50 (13)
120 < P ≤ 180 (8.64)	¾ or 0.75 (19)
180 < P ≤ 225 (10.8)	15⁄16 or 0.94 (24)

- Where the roof cover is mechanically attached, deflection need not be measured.
- Where a thin (e.g., ½ in. (12.7 mm) cover board or flexible (e.g., glass fiber), mechanically attached insulation is used, a maximum deflection of 2 in. (50 mm) should be used to determine if the test sample

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is considered suspect. Where a thin topping board is adhered to a substrate immediately below using ribbons of adhesive, a maximum deflection of 1 in. (25 mm) should be used to determine if the test sample is considered suspect.

Possible reasons for failure:

- The inadequately adhered roof covering separated from lower cover layers (if applicable) or from the insulation, or any other subsequent adhered intersection.
- The top facing of the insulation or cover board delaminated, or the core of the board separated.
- The insulation board separated from the deck (possibly breaking the insulation).
- One or more fasteners pulled out of the deck, or the insulation board fracture around the stress plate.

Upward deflections can be determined by careful observation of the test gauge. Due to the high sensitivity of these gauges, hold the final pressure increment for one minute and then release it slowly so revolutions can be counted as the pressure returns to zero.

Deflection gauges should preferably be capable of measuring up to 2 in. (50 mm) of deflection. Some deflection gauges show a maximum of 1 in. (25.4 mm) deflection, and in those cases, when the gauge indicates a 1 in. (25.4 mm) deflection, the potential deflection may be greater.

ASTM E-907, *Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems*, is frequently referenced by contractors conducting uplift tests. This standard allows a 1 in. (25.4 mm) deflection.

3.3.1 Mechanically Fastened Roof Coverings

Mechanically attached single-ply membranes normally will balloon between supports when subjected to uplift pressures. Consequently, it is usually impractical to use a deflection gauge with such an assembly; visual observations must be made.

When fasteners are located in rows and only at laps in the membrane, with or without a batten-type strip, neither type of conventional uplift test will yield satisfactory results. Proper uplift can be simulated only by testing the full membrane freespan on both sides of the fastener row. Row spacing is normally too wide to accommodate this criterion.

When fasteners do not exceed 2 ft (600 mm) in either direction, select a typical square or rectangular fastening pattern. In the case of membranes attached to stress plates or fastener plates beneath, the spots of attachment can readily be found because they are smooth and flat. The negative pressure apparatus may be used on these membranes provided at least one fastener is tested at its full fastener-to-fastener span in all directions. This is possible only when spacing in both directions is 2 ft (600 mm) or less. This allows one fastener to be centered beneath the apparatus with the entire membrane span contributing to the uplift in normal fashion. Criteria for failure is either pull-out of the fasteners or tearing of the cover around fastener stress plates or batten bars before the passing uplift test pressure is held for one minute.

3.4 Bonded Uplift Test

The following articles are sufficient for four bonded uplift tests.

Materials

- 1 sheet of plywood, 4 ft × 8 ft × ¾ in. (1.2 m × 2.4 m × 18 mm), 5 ply, APA Rated Exposure 1, Grade A-D
- 48 wood screws, 1¼ in. (32 mm) long, No. 12 round head
- 4 eyebolts, ½ in. (13 mm), 3 in. (75 mm) of thread, with nuts and washers
- Adhesive: 1 keg (100 lb [45 kg]) of steep asphalt, or coal tar pitch, or appropriate adhesive
- Insulation and roofing covering for repairs

Equipment

- 1 calibrated spring scale or other measurement device with suitable force capacity
- 1 block and tackle, hand chain hoist or hydraulic lift device

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- 1 tripod (or equivalent support system)
- 1 patching kettle with heating torch (for bituminous roofs)
- 1 Class B fire extinguisher

Tools

- Electric drill with 5⁄8 and 1⁄8 in. (16 and 3 mm) bits
- Electric sabre saw with blades
- Crosscut hand saw
- Screwdriver
- Adjustable open-end wrench, 8 or 10 in. (200 or 250 mm)
- Ruler and linoleum knife
- Broom, shovel (square-end, preferably for gravel-surfaced covers), and asphalt mop (if applicable)

3.4.1 Preparation of Test Panel

1. Cut the piece of plywood into 2 x 2 ft (0.6 x 0.6 m) squares.

2. Fasten two squares together to form one 2 ft × 2 ft × 1 ½ in. (0.6 m × 0.6 m × 38 mm) panel by drilling twelve 1⁄8 in. (3 mm) holes and using wood screws. Figure 6 shows suggested screw locations.

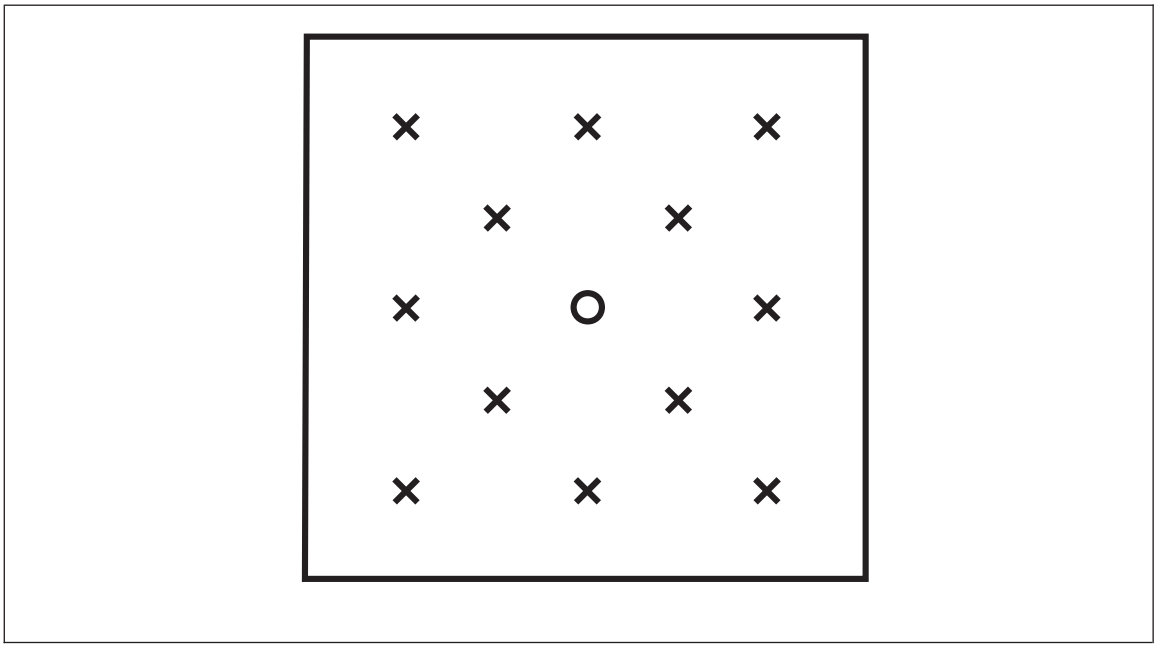

Fig. 6. Suggested screw locations

3. Drill a 5⁄8 in. (16 mm) hole in the center of the test panel through both pieces of plywood.

4. Connect one of the eyebolts to the test panel with a nut and washer.

5. Suspend the test panel with an eyebolt from the calibrated spring scale and record the weight (W). The weight may vary from about 15 lb (6.8 kg) to 18 lb (8.2 kg).

3.4.2 Bonded Uplift Test Procedure

The following guidelines are provided for the bonded uplift test:

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Fig. 7. Bonded uplift test

- Cut an indentation in the center of the roof covering of the test area to accommodate the nut and washer of the eyebolt.
- Place adhesive on top of the test surface. Apply a flood coat of hot steep asphalt to the test surface when roofing bitumen is asphalt (coal tar pitch when that material is used), or other compatible adhesive for single-ply covers.
- Place the test panel in the hot bitumen to ensure complete contact.
- Allow a curing period for the test panel, dependant on the type of adhesive used. (Two hours for hot asphalt; 48 hours for coal tar pitch.)
- Cut a 2 to 3 in. (51 to 76 mm) wide strip through the roof covering and insulation (if applicable) around the test panel, all the way down to the top of the roof deck. Do not stand on the panel while cutting, and avoid walking on it.
- Set up the tripod with attached block and tackle over the test panel. The lift must be perpendicular to the plane of the roof deck.
- Connect one end of the scale to the test panel, the other to the block and tackle. The scale also may be connected to the top of the tripod.
- Determine the passing uplift test pressure (U_1) as described in section 2.1.1.8.

Determine the passing scale reading for the required passing uplift test pressure (U_1).

Passing scale reading (lbs/kg) = U_1 (psf/kPa)* AREA (ft^2/m^2) + W (lbs/kg)

- Apply uplift force to roof holding at each increment for 1 minute. When reading the load scale, consider the test panel area and weight (W). The example in Table 6 are based on a 4 ft^2 (1.2 m^2) panel that weighs 15 lbs (6.8 kg). For this case, the scale reading equals 4 U_1 + 15 lbs (6.8 kg).

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Table 6. Typical Scale Readings for 4 ft^2 (1.2 m^2) Test Panel That Weighs 15 lbs (6.8 kg)

Uplift Test Pressure		*Scale Reading*	
lbf/ft^2	(kPa)	lb	(kg)
15.0	(0.7)	75	(34)
22.5	(1.1)	105	(48)
30.0	(1.4)	135	(61)
37.5	(1.8)	165	(75)
45.0	(2.2)	195	(88)
52.5	2.5	225	102
60.0	2.9	255	116
67.5	3.2	285	129
75.0	3.6	315	143
82.5	4.0	345	156
90.0	4.3	375	170
97.5	4.7	405	184
105.0	5.0	435	197
112.5	5.4	465	211
120.0	5.7	495	225
127.5	6.1	525	238
135.0	6.5	555	252
142.5.	6.8	585	265
150.0	7.2	615	279
157.5	7.5	645	293
165.0	7.9	675	306
172.5	8.3	705	320
180.0	8.6	735	333
187.5	9.0	765	347
195.0	9.3	795	361
202.5	9.7	825	374
210.0	10.1	855	388
217.5	10.4	885	401
225.0	10.8	915	415
232.5	11.1	945	429
240.0	11.5	975	442
247.5	11.9	1005	456
255.0	12.2	1035	469
262.5	12.6	1065	483
270.0	12.9	1095	497
277.5	13.3	1125	510
285.0	13.6	1155	524
292.5	14.0	1185	538
300.0	14.4	1215	551
307.5	14.7	1245	565
315.0	15.1	1275	578
322.5	15.4	1305	592
330.0	15.8	1335	606
337.5	16.2	1365	619
345.0	16.5	1395	633
352.5	16.9	1425	646
360.0	17.2	1455	660
367.5	17.6	1485	674
375.0	18.0	1515	687
382.5	18.3	1545	701
390.0	18.7	1575	714
397.5	19.0	1605	728
405.0	19.4	1635	742

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- When the next increment below U_1 has been held for one minute, increase the force to the roof until it equals U_1.
- When the passing scale reading is reached, the roof passes the test if that pressure is held for one minute and the roof covering hasn't separated within itself or from the roof deck. If it fails before the passing scale reading is reached, record the last scale reading reached that held for one minute and calculate the equivalent uplift pressure. Uplift pressure = (scale reading – W)/test panel area). This equals the scale reading minus 15 lbs ([6.8kg] divided by 4 (for a 4 ft^2 panel weighing 15 lbs [6.8kg]). This is the uplift strength of the roof and should be recorded on the "Contractor's Material & Uplift Test Certificate for Roof Systems" form.
- For example: If the highest scale reading was 375 lbs (170 kg) and the panel weighed 15 lbs (6.8 kg) and was 4 ft^2 (1.2 m^2) in area, the pressure held was (375-15) lbs/4 ft^2 = 90 psf
- If the plywood test panel separates from the roof covering, re-adhere the panel and increase the curing period of the adhesive.

Repair procedures must be in accordance with Data Sheet 1-30, *Repair of Wind Damaged Roof Systems*, as well as Data Sheets 1-28, *Wind Design*, and 1-29, *Roof Deck Securement and Above-Deck Components*.

After the test is complete, remove all insulation and adhesive in the test area. Cut a new insulation square of the same material and thickness as that removed and secure it to the deck with compatible adhesive. Replace the covering with a similar type, providing appropriate laps.

3.5 Visual Construction Observation (VCO)

3.5.1 The following are the minimum guidelines for visual construction observation (VCO) when used as an alternative to field uplift testing.

A. The presence of, or opinions expressed by, the Construction Observer (CO) in no way relieve the design professional, roofing contractor, manufacturer, owner, or any other responsible party of their contractual obligations.

B. The information provided by the CO is for the benefit of the owner, roofing contractor, and FM Global, and no warranty of roof performance (including wind uplift resistance), expressed or implied, is offered.

C. The design professional, roofing contractor, manufacturer, or owner provide the CO with the approved RoofNav Assembly Number, FM Approval Report, contract documents, shop drawings, and other submittals or documentation as required to delineate the proposed roofing system and application parameters.

D. The contract documents become the basis of design and are to be used by the CO as the standard for construction.

E. The CO provides full-time on-site visual construction observation during roof system installation and will report on the roof construction process in an accurate and objective manner.

F. The CO is not a direct employee of the owner, design professional, or installing roof contractor of record, to avoid any conflict of interest.

G. The CO verifies that:

1. All materials used on the project conform to those listed in the FM Approved/ Accepted assembly, contain the appropriate FM Approvals labeling and meet installation guidelines of relevant FM Global Data Sheets (see Section 4.0).

2. All materials used on the project are installed in new and undamaged condition.

H. The CO observes and records the following: (observations should be made each day any of the following work is accomplished:)

1. Condition of the substrate; substrate preparation, repair, replacement, or supplemental attachment

2. Installation and attachment of any base sheet, thermal barrier or vapor barrier, including the type of fasteners or adhesive used and patterns and spacing

3. Installation and attachment of any insulation and/or cover board, including the type of fasteners or adhesive used and fastening patterns and spacing

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4. Installation and attachment of any roof covering or materials that comprise the finished roof membrane, including the type of fasteners or adhesive used, fastening patterns and spacing, as well as specified material quantities, temperatures and any other measurement relative to the type of roof membrane being installed

5. Installation and detailing of roof system perimeter and penetration flashings

6. Installation, detailing, and attachment of roof-related sheet metal components

7. Installation of roof-surfacing materials

I. A report will be provided by the CO that includes both a written and photographic record of the construction project. The report will be made available to the owner, FM Global, the manufacturer, and the roofing contractor within 24 hours after each day's site visit. Documentation will include a plan that clearly identifies the location of the activities covered by the particular daily report. Documents will accurately describe the sequence of work, materials used, installation methods, condition of existing components, workmanship and noncompliance issues as well as related corrective measures..

K. The CO will provide non-biased visual construction observation services.

L. The CO will identify and disclose all relationships with any of the project entities that may create a conflict of interest.

M. The CO will have the following minimum qualifications:

1. The CO will have a thorough knowledge of the roofing system being installed, relevent industry accepted-practices, contract documents, blueprint reading, and FM Approval requirements and relevant FM Global data sheets.

2. The CO will have a thorough knowledge of the roofing system specified and the manufacturer's requirements.

3. The CO will have completed one or more of the following:

a. Certification as a registered roof consultant (RRC) by RCI, Inc.
Inc.

b. Certification as a registered roof observer (RRO) by RCI, Inc.

c. For locations outside the United States where individuals with the above qualifications are not available, completion of specialized training or certification as a rooftop quality assurance observer from an industry-recognized organization

N. Performance of the visual construction observation is dependent on all parties involved in the project agreeing that the CO has the authority and obligation to identify and divulge material and workmanship practices not in compliance with the FM Approved/FM Global Accepted assembly information and any appropriate FM Global data sheet recommendations. The CO will notify the following immediately (in order of preference) of any observed noncompliant material or workmanship practices:

- Roofing contractor
- Owner
- FM Global field engineer

4.0 REFERENCES

4.1 FM Global

Data Sheet 1-28, *Wind Design*

Data Sheet 1-29, *Roof Deck Securement and Above-Deck Roof Components*

Data Sheet 1-30, *Repair of Wind Damaged Roof Systems*

Roof*Nav*, FM Approvals software

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4.2 Other

American Society for Testing and Materials (ASTM) International, Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems. ASTM E-907

APPENDIX A GLOSSARY OF TERMS

Construction Observer (CO): The properly qualified, unbiased consultant who is conducting the VCO.

FM Approved: Reference to ‘‘FM Approved’’ in this data sheet means the product or service has satisfied the criteria for Approval by FM Approvals. Refer to Roof*Nav* for a complete listing of products and services that are FM Approved, as well as their respective ratings for wind resistance when used in combination.

Hurricane-prone regions: Areas vulnerable to hurricanes. Areas in the United States and its territories include:

1. The U.S. Atlantic Coast and Gulf of Mexico Coast, including parts of Mexico and Central America, where the basic wind speed per DS 1-28 is greater than 90 mph, and
2. Hawaii, Puerto Rico, Guam, Virgin Island, and American Samoa.

For locations outside the United States, any areas that are in a “tropical cyclone” region or “typhoon-prone” region. This includes but is not limited to parts of Australia, Bermuds, the Bahamas, Indonesia, India, Bangladesh, the Phillipines, Japan, South Korea, Hong Kong, Macau, Vietnam, and Taiwan, where the basic wind speed per DS 1-28 is greater than 90 mph.

Negative pressure: Pressure less than that of atmosphere.

Roof area: A single roof area for uplift testing is a section of roof (single composition including the same substrate that was installed at the same time) up to it’s termination point which is either the roof outside edge, an expansion joint, or a roof area divider.

Tropical cyclone-prone region: An area prone to tropical storms in which winds rotate about a center of low atmospheric pressure (clockwise in the southern hemisphere and counter-clockwise in the northern hemisphere), where the basic wind speed per DS 1-28 is greater than 90 mph (40 m/s).

Typhoon-prone region: Areas including but not limited to the Philippines, China, Taiwan, Japan, South Korea, Hong Kong, Macau, and Vietnam.

Visual construction observation (VCO): The practice of using a properly qualified consultant to continuously observe the installation of roofing components.

APPENDIX B DOCUMENT REVISION HISTORY

July 2012. The following changes were made:

A. The option to provide visual construction observation (VCO) in lieu of conducting field uplift tests was added. The title of this document was revised to reflect this change.

B. The number of tests recommended when using the bonded pull test was increased to account for the smaller sample area.

C. The recommended field test safety factor was reduced from 1.5 to 1.25.

D. The deflection limit for thin, mechanically fastened cover boards was increased.

E. Additional pass/fail criteria were provided.

April 2009. The following was done for this revision:

- Changed wind uplift testing recommendations to exempt new roof covers that are mechanically fastened to minimum 22 ga (0.295 in.; 0.75 mm) steel, wood, or cementitious wood fiber deck or structural concrete.
- Added guidance for evaluating tests in which deflection seems excessive, but failure of the assembly is not obvious.

Februuary 2007. This revision of the document changes the test pressure (to include perimeter and corner pressure coefficients and a safety factor = 1.5), the number of uplift tests required, and requires uplift tests for new above-deck roofing assemblies in regions that are prone to hurricanes, typhoons and tropical cyclones and where design wind speeds are at least 100 mph (45 m/s).

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May 2000. The document was reorganized to provide a consistent format.

September 1999. A conversion table was added to convert psf to in. of water. Discussion on roof cuts was added for situation s where testing is not practical.

February 1986. Information was added regarded the maximum fastener spacing for mechanically fastened covers for which the negative pressure test is applicable. Also, research test data was added regarding negative pressure tests with unadhered rigid insulation boards that showed excessive deflection.

August 1980. Information was added regarding the negative pressure test apparatus.

January 1978. Details for fastening existing deficient roofs were moved from this document to another data sheet.

March 1975. Examples were added.

August 1970. Document first published.

APPENDIX C CONTRACTOR'S MATERIALS

C.1 Proposed Contract Wording for Uplift Testing:

"ABC Roofing Company agrees to satisfy an uplift test of the completed roofing installation in accordance with FM Global Property Loss Prevention Data Sheet 1-52, *Field Verification of Roof Wind Uplift Resistance*. ABC Roofing Company is responsible for obtaining the most recent edition of Data Sheet 1-52 from FM Global and for supplying all labor, materials, and test equipment. Results of the tests shall be recorded and made available to FM Global. Acceptance and final payment shall be contingent upon favorable interpretation of the test results (as measured by the specifications) by FM Global."

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C.2 Application for Acceptance of Roofing System (Form X2688)

APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

CONTACT INFORMATION: **INDEX NUMBER:**

ROOFING CONTRACTOR (NAME & ADDRESS)	TELEPHONE NO.:	*FAX:*
	E-MAIL ADDRESS:	CONTACT:
CLIENT (NAME & ADDRESS)	TELEPHONE NO.:	FAX:
	E-MAIL ADDRESS:	CONTACT:

OVERVIEW OF WORK: *(Submit 1 form per roof area)*

Building Name & Number:		
Building Dimensions: Length: *ft/m;*	Width: *ft/m.;*	Height: *ft/m.*
Roof Slope:		
Parapet Height ,max *(in./m)*:	Parapet Height ,min *(in./m):*	
Type of Work: ❒ New Construction ❒Recover (New roof over existing Roofing System) ❒ Reroof (New cover/remove existing roofing system to deck) ❒ Other		
FM Approved RoofNav Assembly Numbers:		

ROOF SURFACING:

❒ None	
❒ Coating	(Trade Name/Application Rate)
❒ Granules	(Application Rate)
❒ Gravel/Slag	(Application Rate)
❒ Ballast: ❒ Stone Size; ❒ Pavers *(Beveled or square edge)*; ❒ Other: Ballast Weight (psf): Field: Perimeter: Corners:	

ROOF COVER/MEMBRANE:
(Please provide ALL applicable details including trade name, type, number of plies, thickness, reinforced, adhesive)

❒ Panel: ❒ Through Fastened Metal ❒ Standing Seam metal ❒ Fibre Reinforced Plastic (FRP) ❒ Other:			
❒ Built Up Roofing (BUR)			
❒ Modified Bitumen			
❒ Single Ply:	❒ Adhered	❒ Fastened	❒ Ballasted
❒ Spray Applied			
❒ Other:			

BASE SHEET:
(Please include Trade Name, Type, Width)

❒ None		
Trade Name:		Width: ❒ 36 In. ❒ 1 meter (39 In.)
❒ Fastened		❒ Adhered
❒ Secured per RoofNav	**OR**	❒ Per FM Global Loss Prevention Data Sheet 1-29
Comments:		
❒ Air Retarder		
❒ Vapor Retarder		

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APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

INSULATION

Layer	Trade Name	Thickness (In.)	Fastened	Adhered	Tapered
1. Top			❒	❒	❒
2. Next			❒	❒	❒
3. Next			❒	❒	❒
4. Next			❒	❒	❒

❒ Glass Fiber/Mineral Wool/Batt	❒ Facer Type/Vapor Barrier
❒ Thermal Barrier	
❒ Other:	
❒ None	

DECK:

(Please include manufacturer, type, yield strength, thickness/gage, etc.)

❒ Steel:	
❒ LWIC (Form Deck):	❒ Cementitious Wood Fiber:
❒ Concrete: ❒ Pre-cast panels or ❒ Cast in Place	
❒ Wood	
❒ Fiber Reinforced Cement	❒ Fiber Reinforced Plastic
❒ Gypsum: ❒ Plank	❒ Poured
❒ Other:	
Comments:	

ROOF STRUCTURE (Include Size, Gage, Etc.):

❒ Purlins ❒ "C" OR ❒ "Z"		
❒ Joists ❒ Wood OR ❒ Steel		
❒ Beams ❒ Wood OR ❒ Steel		
❒ Other:		
Spacing: Field:	Perimeter:	Corners:
Comments:		

FASTENERS USED IN ROOF ASSEMBLY:

Roof Cover Fasteners: Trade Name:	Length:	Diameter:
Stress Plate/Batten:		
Spacing: Field: **X**	Perimeter: **X**	Corners: **X**
Insulation Fasteners: Trade Name:	Type:	
Size:	Stress Plate:	
Spacing: Field:	Perimeter:	Corners:
Deck Or Roof Panels Fasteners: Trade Name:	Type:	
Length:	Size Washer:	
If Weld: Size:	Weld:	Washer:
Deck Side Lap Fasteners: Field: **X**	Perimeter: **X**	Corners: **X**
Spacing: Field: **X**	Perimeter: **X**	Corners: **X**
Base Sheet Fasteners Trade Name:	Type:	
Head Diameter:	Length:	
Spacing: (Attached Sketches as necessary)		
Spacing Along Laps: Field:	Perimeter:	Corners:
No. Intermediate Rows: Field:	Perimeter:	Corners:
Spacing Along Intermediate Rows: Field:	Perimeter:	Corners:

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APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

PERIMETER FLASHING:
(Attach a detailed sketch of metal fascia, gravel stop, nailer, coping, etc.)

❒ FM Approved Flashing	❒ *Per FM Global Loss Prevention Data Sheet 1-49*
❒ Other:	Comments:

DRAINAGE:

For new construction: Has roof drainage been designed by a Qualified Engineer per FM Global Loss Prevention Data Sheet 1-54 and the local building code? ❒ Yes ❒ No (Attach details)
For re-roofing and recovering: will the roof drainage be changed from the original design (for example: drain inserts, drains covered or removed, new expansion joints, blocked or reduced scupper size? ❒ Yes ❒ No If yes, were the changes reviewed by a Qualified Engineer? ❒ Yes ❒ No (Attach details)
Is secondary (emergency) roof drainage provided per FM Global Data Sheet 1-54? ❒ Yes ❒ No (Attach details)

Signature of Property Owner:_____

Title: _____ Date: _____

Signature of Installing Contractor:_____

Title: _____ Date:_____

FM GLOBAL OFFICE REVIEW
(Please leave blank for FM Global Office Review)

WIND:

Design Wind Speed: *(mph)*	Ground Terrain: ❒ B ❒ C ❒ D
Uplift Pressure in field: *(psf)*	Uplift Rating Required:
Adequate Uplift Rating Provided:	Adequate? ❒ Yes ❒ No

FIRE:

Internal Assembly Rating: ❒ Class 1 ❒ Class 2 ❒ Non-Combustible	
External Fire Rating: ❒ Class A ❒ Class B ❒ Class C ❒ None	
Concealed Spaces? ❒ Yes ❒ No	Sprinklers below Roof? ❒ Yes ❒ No
Adequate? ❒ Yes ❒ No	

HAIL:

Hail Rating Needed? ❒ SH ❒ MH ❒ None	Hail Rating Provided? ❒ SH ❒ MH ❒ None
Adequate? ❒ Yes ❒ No	

COLLAPSE:

If standing seam, has collapse been reviewed? ❒ Yes ❒ No

COMMENTS:

Reviewed By: _____

Date:_____

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APPLICATION FOR ACCEPTANCE OF ROOFING SYSTEM

FM Global Field Review:
(Leave blank for on-site review by FM Global Loss prevention Consultant):

System installed per reviewed/accepted plans? ❒ Yes ❒ No
If no, explain:

Installation witnessed by FM Global? ❒ Yes ❒ No
Uplift test needed? ❒ Yes ❒ No
(Uplift testing REQUIRED for applicable new roofs, re-roofs and recover roofs in hurricane, typhoon or tropical cyclone prone regions and where design wind speed is at least 100 mph [45 m/s] [see DS 1-28, DS 1-29, and 1-52 for more information].)

Uplift testing satisfactorily completed O Yes O No O DNA
If yes, note pressures held for the: field_____ perimeter _____ corners _____
If no, explain and provide required and obtained uplift pressures and other details and attach to this form.

Reviewed By: _____
Date: _____

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