Mechanically Attached and Adhered Roofing Systems

Part I
Design Criteria

TABLE OF CONTENTS

December 2006

A. Description ............................................................................................................................................................... 3
B. General Design Considerations .............................................................................................................................. 3
C. Quality Assurance..................................................................................................................................................... 5
D. Warranty ..................................................................................................................................................................... 5
E. Code Approvals ......................................................................................................................................................... 6
F. Wood Nailers .............................................................................................................................................................. 6
G. Vapor Retarder .......................................................................................................................................................... 6
H. Roof Deck/Substrate Criteria .................................................................................................................................... 7
I. Insulation/Underlayment ............................................................................................................................................ 8
J. Insulation Attachment ................................................................................................................................................ 8
K. Membrane Securement Criteria .............................................................................................................................. 10
L. Membrane Splicing .................................................................................................................................................. 10
M. Additional Membrane Securement .......................................................................................................................... 10
N. Flashing Considerations ........................................................................................................................................ 11
O. Metal Work ............................................................................................................................................................... 11
P. Walkways ................................................................................................................................................................ 12

ATTACHMENTS
Attachment I - Products/Coverage Rates
Attachment II - Withdrawal Resistance Criteria
Attachment III – Mechanically Attached Membrane Securement Criteria
Mechanically Attached and Adhered Roofing Systems

PART I
Design Criteria

December 2006

The information contained herein is to serve as criteria for specifiers regarding the design of this WeatherBond PRO Mechanically Attached or Adhered Roofing System. Specifiers are advised to fully familiarize themselves with this section and the applicable "Application" Section, Part II, prior to completing the project specifications.

Information pertaining to the products utilized with this roofing system can be found in "Attachment I", Products/Coverage Rates.

A. DESCRIPTION

1. The WeatherBond PRO Mechanically Attached Roofing System incorporates 12’, 10’ or 8’ wide, white, 45, 60, 72 or 80-mil thick scrim-reinforced, WeatherBond PRO Thermoplastic Polyolefin (TPO) membrane field sheets. Insulation is mechanically attached to an acceptable roof deck. WeatherBond PRO perimeter sheets (5’ or 6’ used with 10’ and 12’ wide field sheets; 4’ used with 8’ wide field sheets) are installed along building edges and field membrane sheets are mechanically attached to the roof deck with the appropriate WeatherBond Fasteners and Fastening Plates. Adjoining sheets of WeatherBond PRO membrane are overlapped and joined together with a minimum 1-1/2” wide heat weld. Membrane fastening requirements are outlined in Attachment III at the end of this section.

2. The WeatherBond PRO Adhered Roofing System incorporates maximum 12’ wide white, 45, 60-mil thick scrim-reinforced WeatherBond PRO Thermoplastic Polyolefin (TPO) membrane. WeatherBond Insulation is mechanically attached to the roof deck or secured with FAST™ Adhesive, OlyBond 500 BA, OlyBond Spot Shot or other Insulation Adhesive and the membrane is fully adhered to the insulation with WeatherBond PRO Bonding Adhesive. Adjoining sheets of membrane are overlapped approximately 2” and joined together with a minimum 1-1/2” wide heat weld.

3. These Roofing Systems can also be specified over an existing standing seam, flat seam or corrugated metal roof (mechanically Attached systems incorporate membrane securement into the structural purlins). Refer to the Metal Retrofit Roofing System Specification, published separately, for applicable requirements.

B. GENERAL DESIGN CONSIDERATIONS

1. The maximum roof slope for Mechanically Attached Roofing Systems is 18” in one horizontal foot. There are no maximum slope restrictions for the application of the Adhered Roofing System.

2. When roof slopes exceed 5” per horizontal foot, use of an Automatic Heat Welder may be more difficult. A Hand Held Hot Air Welder should be specified.

3. The mechanically attached roofing system is not acceptable for installations on steel decks lighter than 22 gauge unless the steel deck is used in conjunction with lightweight concrete and a minimum of 360 pounds pullout per fastener is achieved with HPWX Fasteners into the steel deck below. An Adhered Roofing System may be specified or refer to the Metal Retrofit Roofing System Specification, published separately for other roofing options.

4. Petroleum based products; certain chemicals and waste products may not be compatible with this roofing system. WeatherBond must be contacted for verification of compatibility and recommendations concerning an acceptable roofing assembly.

5. The following projects should be sent to WeatherBond for review prior to installation and preferably prior to bid to ensure that WeatherBond ’s minimum requirements are met:
   a. Air pressurized buildings, canopies, and buildings with large openings where the total wall openings exceed 10% of the total wall area on which the openings are located (such as, airport hangars, warehouses and large maintenance facilities).
b. Cold storage buildings and freezer facilities.

6. It is the responsibility of the specifier to review local, state and regional codes to determine their impact on this WeatherBond PRO Roofing System.

7. Coordination between various trades is essential to avoid unnecessary rooftop traffic over completed sections of the roof and to prevent subsequent damage to the WeatherBond PRO membrane roofing system.

8. Concentrated loads from rooftop equipment may cause deformation of insulation/underlayment and possible damage to the membrane if proper protection is not provided. A protection course or sleepers must be specified.

9. The WeatherBond PRO white (TPO) membrane meets the ENERGY STAR® Roofing Products program guidelines for energy efficiency. This product will help reduce energy costs. Energy savings is climate specific and may vary significantly from building to building and geographic location. The greatest savings will occur in buildings located in hot, sunny climates that have a large roof surface to building volume ratio, and lower levels of insulation with lesser thermal resistance.

For additional information on savings obtainable from installing the ENERGY STAR Roofing Product, contact WeatherBond, one of WeatherBond’s Representatives/Distributors or call 1-888-STAR-YES (1-888-782-7937). For information regarding CRRC (Cool Roof Rating Council) and LEED™, refer to the applicable Technical Data Bulletins.

10. Drainage

a. Drainage must be evaluated by the specifier in accordance with all applicable codes. Slopes may be provided by tapering the structure or through the use of tapered insulation; a sufficient number of roof drains should also be specified and properly located to allow for positive drainage. Significant ponding that could remain after 48 hours should be eliminated with the addition of auxiliary drains in low areas where ponding is anticipated.

WeatherBond specifically disclaims responsibility for the design and selection of an adequate drainage system and drain accessories. Selection must be made by the building owner or the owner's design professional.

b. Small incidental areas of ponded water will not impact the performance of this roofing system; however, in accordance with industry standards, the roofing assembly should be designed to prevent ponding of water on the roof for prolonged periods (longer than 48 hours). Good roofing practice dictates proper drainage to prevent possible excessive live load and, in the event of a roof leak, to minimize potential interior damage to the roofing assembly and to the interior of the building.

c. Tapered edge strips, crickets or saddles are recommended where periodic ponding of water may occur. When the slope of the taper exceeds 2" to one horizontal foot, additional membrane securement at the base of the tapered edge strip will be required.

11. Retrofit - Recover Projects (when the existing roofing material is left in place)

a. The removal of existing wet insulation and membrane must be specified. The specifier shall select an appropriate and compatible material as filler for voids created by removal of old insulation or membrane.

b. Entrapment of water between old and new membrane can damage and deteriorate new insulation/underlayment between the two membranes. If a vapor retarder or air barrier is not specified, WeatherBond recommends the existing membrane be perforated to avoid potential moisture accumulation to allow for detection of moisture to enable the building owner to take corrective action. This can be accomplished by drilling approximately 3/4" diameter holes every 100 square feet in the existing built-up roof or single-ply membrane (excluding PVC membrane).

c. Existing PVC membrane may be totally removed or existing membrane must be cut into maximum 10’ X 10’ sections. All PVC flashings at the perimeter, roof drains and roof penetrations must be removed.

C. QUALITY ASSURANCE

1. WeatherBond recommends the use of WeatherBond supplied products for use with WeatherBond PRO Roofing Systems. The performance or integrity of products by others, when selected by the specifier and accepted as compatible by WeatherBond, is not the responsibility of WeatherBond and is expressly disclaimed by WeatherBond.
2. This roofing system must be installed by a contractor in compliance with drawings and specifications as approved by WeatherBond Incorporated.

3. There must be no deviations made from WeatherBond ’s specifications or WeatherBond ’s approved shop drawings without the PRIOR WRITTEN APPRO VAL of WeatherBond.

4. After completion of the installation, upon request, an inspection may be conducted by a Technical Representative of WeatherBond to ascertain that the membrane roofing system has been installed according to WeatherBond ’s published specifications and details applicable at the time of bid. This inspection is not intended as a final inspection for the benefit of the owner.

5. The solar reflectance of this roofing product may decrease over time due to environmental defacement such as dirt, biological growth, ponded water, etc. The roof should be monitored at regular intervals and maintained or cleaned when necessary to assure the maximum solar reflectance. Refer to the appropriate “Application” Section, Part II, for cleaning procedures.

D. WARRANTY

A Membrane Material Warranty is available for roofing systems on commercial buildings within the United States and applies only to products manufactured or marketed by WeatherBond.

1. A 15-year Membrane Material Warranty is available for 45 mil and thicker TPO at no charge.

2. A 20-year Membrane Material Warranty is available for 60 mil and thicker TPO at no charge

CAUTION: APPLICATIONS SUCH AS WALKING DECKS, TERRACES, PATIOS OR AREAS SUBJECTED TO CONDITIONS NOT TYPICALLY FOUND ON ROOFING SYSTEMS WILL NOT BE ELIGIBLE FOR A ROOFING MEMBRANE WARRANTY.

6. Access for warranty service

It shall be the owner's responsibility to expose the membrane in the event that warranty service is required when access is impaired. Such impairment includes, but is not necessarily limited to:

a. Design features, such as window washer systems, which require the installation of traffic surface units in excess of 80 pounds per unit.

b. Any equipment, ornamentation, building service units and other top surfacing materials that are not defined as part of this specification.

c. Rooftop equipment that does not provide WeatherBond with reasonable access to the membrane system for purposes of warranty investigation and related repairs.

d. Severely ponded conditions.

7. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of WeatherBond and WeatherBond shall not be responsible for any claims, repairs, restoration or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.

E. CODE APPRO VALS

1. Building codes are above and beyond the intended purpose of this specification. The respective owner or specifier should consult local codes for applicable requirements and limitations.

2. For code approvals with WeatherBond’s WeatherBond PRO Roofing Systems, refer to the Factory Mutual (FM) Approval Guide or Underwriters Laboratories (UL) Fire Resistance or Roofing Materials and Systems Directories.

F. WOOD NAILERS
A horizontal wood nailer is used to provide an effective substrate for some installation details or other roof accessories. In addition, it is used to provide solid protection for edges of the membrane underlayment. Minimum thickness of the nailer must be such that the top of the nailer is flush with the top of the membrane underlayment.

1. Wood nailers are required for the securement of metal edgings, scuppers, and insulated pipes. **Parapet walls and most curbs do not require the utilization of wood nailers.**
   
   **Note:** The width of the wood nailers must be specified to exceed the width of the metal flange of edgings and insulated metal collars.

2. When treated lumber is specified, it is recommended that only lumber, which has been pressure treated with salt preservatives be specified. Lumber treated with any of the wood preservatives such as, Creosote, Pentachlorophenol, Copper Naphthenate and Copper 8-quinolinolate will adversely affect the FleeceBACK membrane when in direct contact and are, therefore, unacceptable.

   If non-treated lumber is to be specified, it must be stored to protect from moisture sources. A seal should be provided between the non-treated lumber and the concrete or gypsum substrate (similar to a sill sealer).

3. Methods used to fasten the nailer vary with building conditions; however, it is essential that secure attachment of durable stock be accomplished with non-corrosive fasteners. Factory Mutual Loss Prevention Data Sheet 1-49 (Perimeter Flashing, June 1985) contains options for the spacing and sizing of fasteners.

**G. VAPOR RETARDER**

WeatherBond does not require a vapor retarder for the protection of the membrane; however, the specifier should consider the following criteria.

1. The use of a vapor retarder to protect insulation and reduce moisture accumulation within an insulated roofing assembly should be investigated by the specifier, especially on projects with high interior humidity, such as, swimming pools, breweries, pulp mills, etc.

2. In the generally temperate climate of the United States, during the winter months, water vapor flows upward from a heated, more humid interior toward a colder, drier exterior. Vapor retarders are more commonly required in northern climates than in southern regions, where downward vapor pressure may be expected and the roofing membrane itself becomes the vapor retarder.

3. On cold storage/freezer facilities, the perimeter details must be selected to provide an air seal and prevent outside air from infiltrating and condensing within the roofing assembly.


**H. ROOF DECK/SUBSTRATE CRITERIA**

1. Proper decking shall be provided by the building owner. The building owner or its designated representative must ensure that the building structure is investigated by a registered engineer to assure its ability to withstand the total weight of the specified roofing system, as well as construction loads and live loads, in accordance with all applicable codes. The specifier must also designate the maximum allowable weight and location for material loading and storage on the roof.

2. The following chart identifies the acceptable roof decks/substrates and the minimum underlayment requirements.

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>Acceptable Roof Deck/Substrate</th>
<th>Mechanically Attached</th>
<th>Adhered</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>Steel (min. 22 gauge) (1) (2), Wood Plank (3/4&quot; min.) and Fibrous Cement</td>
<td>Insulation</td>
<td>Insulation</td>
</tr>
<tr>
<td></td>
<td>Structural Concrete (min. 3000 psi) or Gypsum</td>
<td>Insulation</td>
<td>Direct Application</td>
</tr>
<tr>
<td></td>
<td>Plywood (min. 15/32&quot; thick) or Oriented Strand Board (min. 7/16&quot; thick)</td>
<td>Direct Application</td>
<td>Direct Application</td>
</tr>
<tr>
<td></td>
<td>Lightweight Insulating Concrete</td>
<td>Direct Application</td>
<td>Direct Application (10)</td>
</tr>
<tr>
<td>Retrofit/No Tearoff</td>
<td>Existing Smooth Surface BUR (3) or Mineral Surface Cap Sheet</td>
<td>Direct Application (6)</td>
<td>Direct Application (6)</td>
</tr>
<tr>
<td></td>
<td>Gravel Surfaced BUR (4) or Coal Tar Pitch (4) (5)</td>
<td>Insulation</td>
<td>Insulation</td>
</tr>
</tbody>
</table>
Existing Single-Ply  | Direct Application (8)  | Insulation  
| Modified Bitumen  | Direct Application (6) (9)  | Direct Application (6) (9)  
| Sprayed-in-Place Urethane  | Complete Tearoff Required (7)  | Complete Tearoff Required (7)  

**Retrofit/Tearoff**

- Existing roof material removed (regardless of deck type)
- Insulation
- Insulation

**Notes:**

Refer to Paragraph I, Insulation/Underlayment, for various insulations approved with this roofing system.

1. Local codes must be consulted regarding thermal barrier requirements.
2. Mechanically Attached Systems cannot be specified on steel decks less than 22 gauge or for corrugated steel decks, regardless of gauge. Refer to the Metal Retrofit Roofing System Specification, published separately, for installation options.
3. Existing Type III or IV smooth asphalt BUR only.
4. Loose gravel must be removed to avoid entrapment of moisture.
5. Existing coal tar could drip into the building, especially when new insulation does not provide sufficient thermal value to prevent the surface of the coal tar from softening.
6. Possible staining/discoloration of the membrane may result when installing this system directly over existing smooth surfaced BUR or modified bitumen. If aesthetics are critical, an approved insulation should be specified beneath the membrane.
7. An approved underlayment is required over existing ballasted single-ply systems and PVC roofing systems of any type.
8. Direct application permitted over smooth surfaced modified bitumen. Membrane shall be positioned with length of sheets parallel to modified bitumen field seams. 6" wide WeatherBond PRO Flashing must be heat welded over intersections.
9. New approved cellular or perlite lightweight insulating concrete must have a minimum compressive strength of 225 psi. Except when the lightweight concrete is poured over slotted steel decks, pressure relief vents must be installed every 2,000 square feet in accordance with WeatherBond Detail SWA-8. Direct application is not permitted where lightweight concrete is poured over an existing roofing material. Equilibrium moisture content after hydration/curing shall not exceed 12%. Refer to Part II "Application", Attachment III for additional requirements.

3. Withdrawal resistance tests are required for WeatherBond’s approval on certain types of roof decks. Refer to "Attachment II" at the end of this section for identification of approved decks and proper procedures for conducting pullout tests.

4. For direct application over an acceptable roof deck/substrate as outlined on the chart above, the substrate must be smooth, steel trowel finished (structural concrete), free of debris, protrusions, sharp edges and loose and foreign material. Cracks or voids in the substrate, greater than 1/4", must be filled with an appropriate material.

5. On retrofit projects, all existing phenolic insulation must be removed.

**I. INSULATION/UNDERLAYMENT**

1. General
   a. Roof insulation thickness must be determined by the thermal value required for each project and may be subject to code approval limitations. On projects where a vapor retarder is used, the specifier must calculate insulation thickness to ensure the temperature at the vapor retarder will not fall below the calculated dew point.
   b. Multiple layers of insulation are recommended with all joints staggered between layers.

<table>
<thead>
<tr>
<th>Insulation</th>
<th>Minimum Thickness</th>
<th>Mechanically Attached</th>
<th>Adhered</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Recovery Board</td>
<td>1/2&quot;</td>
<td>Acceptable (1)</td>
<td>Acceptable (1)</td>
</tr>
<tr>
<td>Dens-Deck/Dens-Deck Prime</td>
<td>1/4&quot;</td>
<td>Acceptable (6)</td>
<td>Acceptable (Dens-Deck Prime only) (6)</td>
</tr>
<tr>
<td>EPS Composite Board</td>
<td>1-1/4&quot;</td>
<td>Acceptable (2,3)</td>
<td>Acceptable (2,3)</td>
</tr>
<tr>
<td>EPS overlaid with HP Recovery Board or Dens-Deck Prime</td>
<td>1-1/4&quot;</td>
<td>Acceptable (2,3)</td>
<td>Acceptable (2,3)</td>
</tr>
<tr>
<td>Thermapink 18 and 25 Foamular® 400 and Durapink or Dow Styrofoam or Recovermate Extruded Polystyrene</td>
<td>1/2&quot;</td>
<td>Acceptable (2,3,4,5)</td>
<td>Not Acceptable (must be overlaid with approved insulation)</td>
</tr>
<tr>
<td>Polyisocyanurate HP-H, HP-N or HP-W</td>
<td>1&quot;</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>

**Notes:**

WeatherBond PRO Design Criteria 07/2006
(1) 1/2" thick HP Recovery Board cannot be specified as the sole membrane underlayment over wide rib (Type B) or intermediate rib (Type F) steel decks. HP Recovery Board must be at least specified with 1/2" thick gypsum board or 3/4" thick perlite.

(2) Local codes must be consulted regarding the acceptance of expanded or extruded polystyrene insulation directly over steel decks.

(3) EPS, the EPS surface of EPS Composite Board, Foamular or Dow roof insulation cannot be installed directly over coal-tar pitch roof surfaces.

(4) Foamular or Dow insulation cannot be installed directly over existing PVC membranes. A layer of protective mat must be specified as a separator.

(5) Dens-Deck/Dens-Deck Prime is recommended for use on top of an approved insulation. Their direct use over an existing roofing membrane or monolithic roof deck is not permitted for projects with a 20-year warranty.

**Tapered** EPS, ThermaPink 25, Dow Deckmate or Deckmate Plus and Polyisocyanurate Insulations are also available.

**Restrictions:**

a. WeatherBond Roofing Systems cannot be specified in conjunction with Phenolic Insulation.

b. Fiberglass insulation cannot be specified, even if overlaid with additional insulation.

c. Do not specify perlite boards directly under the membrane.

**J. INSULATION ATTACHMENT**

1. **Mechanically Attached Roofing Systems**

   a. **Insulation** must be mechanically attached to the roof deck with Fasteners and Seam Fastening Plates or Insulation Plates as follows.

      1) For minimum 1/2" thick HP Recovery Board, minimum 1/4" thick Dens-Deck® or minimum 1-1/2" thick Polyisocyanurate insulation, a minimum of 5 fasteners and plates per 4’ x 8’ board (1 per 6.4 square feet) is required. For 4’ x 4’ boards, a minimum of 4 fasteners and plates (1 per 4 square feet) shall be used. Refer to Detail WBPMA-27A for fastening requirements.

      2) For Polyisocyanurate insulation less than 1-1/2” in thickness or Foamular and Dow Extruded Polystyrene insulation, any thickness (for use with white WeatherBond PRO membrane only), a minimum of 6 fasteners and plates per 4’ X 8’ board (1 per 5.3 square feet) and 4 fasteners and plates per 4’ X 4’ board (1 per 4 square feet) must be utilized. Refer to Detail WBPMA-27.1 (Polyisocyanurate insulation) or WBPMA-27.2B (Foamular and DOW insulation) for fastening requirements.

   b. Gypsum board may be specified as a membrane underlayment to meet certain fire ratings. Gypsum board must be fastened at the same rate as HP Recovery Board as noted above.

   c. Hunter Panels Polyisocyanurate Insulation must be mechanically attached to the roof deck in accordance with the insulation manufacturer’s recommendations.

2. **Adhered Roofing Systems**

   a. **Insulation** must be mechanically secured to the roof deck with **one 3” diameter plate and fastener every 2 square feet** except as follows:

      For structural concrete, minimum 22 gauge steel, 1” wood planks or 15/32” thick plywood decks:

      1) When a single or top layer of **minimum 1-1/2” thick Polyisocyanurate** is specified, the Insulation may be secured at the minimum rate of 1 per 3.2 square feet (10 Fasteners and Plates per 4’ x 8’ board; 5 fasteners per 4’ x 4’ board).

      2) When a single or top layer of **minimum 2” thick Polyisocyanurate** Insulation is specified, the insulation may be mechanically secured with **one Fastener and Plate every 4 square feet**.

      3) Dens-Deck Prime (1/4” or 1/2” thick) may be fastened at the rate of 12 fasteners/plates per 4’ x 8’ board (1 per 2.67 square feet). Dens-Deck Prime (5/8” thick) may be fastened at the rate of 8 fasteners/plates per 4’ x 8’ board (1 per 4 square feet).

   **On reroof / no tearoff projects** with a maximum roof height of 40’ any insulation (i.e., HP Recovery Board, Polyisocyanurate Insulation less than 1-1/2” thick) may be secured at the minimum rate of **11 fasteners per 4’ x 8’ board**.
8' board (5 fasteners per 4' x 4' board).

4) Hunter Panels Polyisocyanurate Insulation must be mechanically attached to the roof deck in accordance with the insulation manufacturer’s recommendations.

b. When an approved oriented strand board (OSB) is specified as the membrane underlayment, it must be mechanically attached to the roof deck in accordance with WeatherBond Detail WBPA-27.4.

d. For projects specified to achieve a Factory Mutual (FM) rating, additional insulation fasteners will be required at roof perimeter and corners Factory Mutual Loss Prevention Data Sheets 1-28 and 1-29 or for specific requirements.

e. Alternate Insulation Attachment Methods

1) FAST Adhesive, a 100% spray-applied or bead-applied, two-component, low-rise urethane adhesive may be specified for insulation attachment in lieu of mechanical securement.

2) OlyBond 500 BA or Spot Shot, a two-component polyurethane adhesive applied in approximately 1/2”- 3/4” beads spaced a maximum of 12” on center in the field of the roof and 6” on center at the perimeter (based on building height) may be utilized.

3) Versigrip Insulation Adhesive, a one-component, moisture-curing, polyurethane adhesive applied in approximately 1/2”- 3/4” beads spaced a maximum of 12” on center in the field of the roof and 6” on center at the perimeter (based on building height) may be utilized.

4) The building owner or specifier may select an alternate insulation attachment method, which incorporates a solid mopping of insulation with hot asphalt. Refer to "Attachment V" in Part II, Application, in the WeatherBond PRO Adhered Roofing System for applicable requirements when this alternate insulation attachment method is specified.

5) When adhesive marketed by others is specified, contact the respective manufacturer regarding specific installation requirements and available warranty coverage. WeatherBond warranties exclude products not supplied or marketed through WeatherBond.

K. MEMBRANE SECUREMENT CRITERIA

1. Mechanically Attached Roofing Systems (membrane fastening)

   a. WeatherBond Fasteners and Fastening Plates must be used for membrane securement and are dependent on the roof deck type. Refer to "Attachment II", Withdrawal Resistance Criteria, at the end of this section, for specific fastener and plate requirements.

   b. The field and perimeter membrane width and fastening requirements are dependent upon the project wind zone, building height and deck type and are outlined in “Attachment III” at the end of this section.

2. Adhered Roofing System (membrane bonding)

   Maximum 12’ wide WeatherBond PRO Membrane is fully adhered to an approved insulation or substrate with WeatherBond PRO Bonding Adhesive or WeatherBond PRO Low VOC Bonding Adhesive. The Bonding Adhesive shall be applied to both the membrane and the surface to which it is being bonded at a coverage rate of approximately 60 square feet per gallon per finished surface (includes coverage on both membrane and the substrate).

   As an option, AquaBase™ 120 Bonding Adhesive (water-based) may be used when applied to both the membrane and the surface to which it is being bonded at a coverage rate of approximately 120 square feet per gallon per finished surface (includes coverage on both membrane and the substrate).

L. MEMBRANE SPLICING

Adjoining sheets of WeatherBond PRO Membrane are heat welded using an Automatic Heat Welder or Hot Air Hand Welder and silicone roller. For specific installation requirements, refer to the applicable Part II, Application Section in the WeatherBond PRO Specifications.
M. ADDITIONAL MEMBRANE SECUREMENT

Additional membrane securement is required at the perimeter of each roof level, roof section, curb, skylight, interior wall, penthouse, etc., at any inside angle change where slope or combined slopes exceed 2" in one horizontal foot, and at other penetrations in accordance with the applicable WeatherBond details.

Securement may be achieved as follows:

1. **On Mechanically Attached Roofing Systems**, WeatherBond’s HPWX Fastening Plates are used to secure membrane at the base of walls and penetrations and flashed as shown on the applicable WeatherBond detail (excluding OSB, cementitious wood fiber and gypsum decks where required WeatherBond Fastener is installed with associated 2" diameter plate). **On Adhered Roofing Systems**, standard 2" diameter Seam Fastening Plates may be used in lieu of HPWX Plates.

2. As an option, **TPO Pressure Sensitive RUSS** 6" wide strip of reinforced WeatherBond PRO membrane, may be installed in conjunction with WeatherBond Fasteners and 2" diameter Seam Fastening Plates spaced a maximum of 12" on center below the membrane (HPWX Fasteners and HPWX Plates are required for Mechanically Attached Roofing Systems over steel and wood decks). The securement strip shall be installed horizontally at the base of walls or penetrations.

   The underside of deck membrane is primed with V-150 Primer, spliced to the RUSS and continued as wall flashing resulting in continuous membrane flashing without penetration of the deck membrane.

3. **On Mechanically Attached Roofing Systems**, when mechanical securement is not provided in some of the WeatherBond PRO Details (i.e., pipes and sealant pockets), additional Fastening Plates must be used for membrane securement. The plates must be positioned a maximum of 12" away from the penetration, spaced a maximum of 12" on center and flashed in accordance with the applicable WeatherBond Detail.

N. FLASHING CONSIDERATIONS

1. The height of new wall flashing must extend above the anticipated water level or slush line.

2. **Bonding Adhesive** is not required on vertical surfaces (walls, curbs, pipes, etc.) when flashing height is 12" or less and the membrane is terminated under metal counterflashing. When a coping or termination bar is used for the vertical termination, Bonding Adhesive may be eliminated when flashing height is 18" or less.

3. **WeatherBond’s Termination Bar**, in conjunction with Water Cut-Off Mastic, must be specified under all metal counterflashings and surface mounted reglets.

4. **On retrofit projects**
   a. The removal of existing loose flashing should be specified. New flashing must not extend above through-wall counterflashing and must not conceal any weep holes.
   b. The specifier must examine structural supports for rooftop equipment to determine if reasonable access to the membrane beneath the equipment is provided. WeatherBond should be consulted for clarification when access to the membrane system will be restricted.

5. Bitumen based roof cement must be removed or concealed with an acceptable membrane underlayment.

6. When hot pipes or other similar penetrations exceed 120° F, they must be designed to incorporate an insulated metal collar and rain hood designed to maintain a surface temperature less than 120° F.

7. **Roof Drains**

   It is recommended that roof drain sumps be designed with slopes less than 3" to one horizontal foot to avoid additional membrane securement. When a greater slope is necessary in the roof drain sump area, additional membrane securement will be required. Refer to Detail WBPC-6.2.

O. METAL WORK

1. When a compression bar termination is to be specified, the use of WeatherBond’s Termination Bar is recommended.
2. Termination bars and surface mounted reglets must be installed directly to the wall surface.

3. WeatherBond recommends WeatherBond PRO Coated Metal, VersiTrim™ Metal Edging/Coping, VersiTrim Metal Edging or Drip Edge for membrane termination. Installation instructions are available from the Manufacturer.

4. Metal work by others, when specified and approved by WeatherBond, must be fastened to prevent metal from pulling free or buckling and sealed to prevent moisture from entering the roofing system or building. Unless supplied by WeatherBond, metal work securement is not included in this specification and is excluded from the WeatherBond Warranty.

5. On retrofit projects, existing counterflashings, edging, expansion joint covers, copings, etc., shall not be reused unless investigated by the specifier to determine its compliance to WeatherBond’s current details.

P. WALKWAYS

Walkways are required at all traffic concentration points (i.e., roof hatches, access doors, rooftop ladders, etc.), and if regular maintenance (once a month or more) is necessary to service rooftop equipment.

Walkway types:

1. **WeatherBond PRO Heat Weldable Walkway Rolls** are required when walkway pads are to be specified. The Walkway Rolls are heat welded to the WeatherBond PRO membrane using an Automated Heat Welder or Hand-Held Heat Welder. As an option, the WeatherBond PRO Walkway Roll may be adhered to the membrane surface with Seam/V-150 Primer.

2. **Concrete pavers**, when specified, must be loose laid over a slip-sheet of membrane or 2 layers of MP Safeguard Mat and cannot weigh more than 80 pounds per paver for ease of removal.

3. **Interlocking Pavers®, 24" X 24" X 2"**, weighing approximately 6 pounds per square foot, may be loose laid directly over the membrane. Installation instructions sheets are available from WeatherBond.

4. Pavers are not recommended for use as walkways where roof slopes exceed 2" in 12".

5. Walkways are considered a maintenance item and are excluded from the WeatherBond warranty.

6. Window washing equipment will require special maintenance; runways or window washing tracks must be utilized to prevent damage to membrane or insulation. Such details must be reviewed by WeatherBond to determine reasonable access to the membrane and associated insulation/underlayment components.
WeatherBond PRO ® Roofing Systems
"Attachment I"
Products/Coverage Rates
July 2006

A. Membrane

WeatherBond PRO TPO Membrane meets or exceeds the requirements of ASTM D6878, standard specification for Thermoplastic Polyolefin Based Sheet Roofing. In addition to the physical properties listed below, refer to the WeatherBond PRO Membrane Technical Data Bulletin for Cool Roof Rating Council (CRRC) and LEED™ radiative properties as well as U.S.E.P.A. Toxic Leachate Testing and dynamic puncture resistance.

1. WeatherBond PRO 45 or 60-mil thick Reinforced Thermoplastic Polyolefin (TPO) membrane conforms to the following physical properties. Field membrane sheets are available in rolls 12', 10' or 8' wide by 100' long. Perimeter membrane sheets are available in widths of 6' and 5' (used with 12' and 10' wide field sheets) or 4' (used with 8' wide field sheets) by 100' long. WeatherBond PRO Membrane is available in white.

<table>
<thead>
<tr>
<th>Property (Metric-SI Units)</th>
<th>Test Method</th>
<th>Property of Unaged Sheet 45 or 60-mil</th>
<th>Property After Aging (1) 28 days @ 240° F 45 or 60-mil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolerance on Nominal Thickness, %</td>
<td>ASTM D 751</td>
<td>±10</td>
<td>±10</td>
</tr>
<tr>
<td>Thickness Over Scrim, min. (mm)</td>
<td>ASTM D 6878 Optical Method</td>
<td>45-mil 0.015 (0.381) ±10 60-mil 0.020 (0.508) ±10</td>
<td>45-mil 0.015 (0.381) ±10 60-mil 0.020 (0.508) ±10</td>
</tr>
<tr>
<td>Breaking Strength, min. lbf (kN)</td>
<td>ASTM D 751 Grab Method</td>
<td>45-mil 225 (1.0) Min. 320 (1.4) Typical 60-mil 250 (1.1) Min. 360 (1.6) Typical</td>
<td>45-mil 225 (1.0) Min. 320 (1.4) Typical 60-mil 250 (1.1) Min. 360 (1.6) Typical</td>
</tr>
<tr>
<td>Elongation at Break of Fabric, min. %</td>
<td>ASTM D 751</td>
<td>25 Typical</td>
<td>25 Typical</td>
</tr>
<tr>
<td>Tearing Strength, min. lbf (N) 8&quot; by 8&quot; specimen</td>
<td>ASTM D 751 B Tongue Tear</td>
<td>55 (245) Min. 130 (578) Typical</td>
<td>55 (245) Min. 130 (578) Typical</td>
</tr>
<tr>
<td>Brittleness Point, max. °F (°C)</td>
<td>ASTM D 2137</td>
<td>40 (-40) Min. -50 (-46) Typical</td>
<td>40 (-40) Min. -50 (-46) Typical</td>
</tr>
<tr>
<td>Linear Dimensional Change (shrinkage), %</td>
<td>ASTM D 1204</td>
<td>+/- 0.5 max. -0.2 Typical</td>
<td>+/- 0.5 max. -0.2 Typical</td>
</tr>
<tr>
<td>Ozone Resistance, 100 pphm, 168 hours</td>
<td>ASTM D 1149</td>
<td>No Cracks</td>
<td>No Cracks</td>
</tr>
<tr>
<td>Resistance to Water Absorption After 7 days immersion at 158°F (70°C) Change in mass, max. %</td>
<td>ASTM D 471</td>
<td>4.0 Min. 2.0 Typical</td>
<td>4.0 Min. 2.0 Typical</td>
</tr>
<tr>
<td>Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth)</td>
<td>ASTM D 3274 2 yr. S. Florida</td>
<td>9 – 10 Typical</td>
<td>9 – 10 Typical</td>
</tr>
<tr>
<td>Field seam strength, lbf/in. (kN/m) Seam tested in peel</td>
<td>ASTM D1876</td>
<td>25 (4.4) Min. 60 (10.5) Typical</td>
<td>25 (4.4) Min. 60 (10.5) Typical</td>
</tr>
<tr>
<td>Water vapor permeance, Perms</td>
<td>ASTM E 96</td>
<td>0.10 Max. 0.05 Typical</td>
<td>0.10 Max. 0.05 Typical</td>
</tr>
<tr>
<td>Puncture resistance, lbf (N)</td>
<td>FTM 101C Method 2031</td>
<td>45-mil 250 (1.1) Min. 325 (1.4) Typical 60-mil 300(1.3) Min. 350 (1.6) Typical</td>
<td>45-mil 250 (1.1) Min. 325 (1.4) Typical 60-mil 300(1.3) Min. 350 (1.6) Typical</td>
</tr>
<tr>
<td>Resistance to xenon-arc Weathering (2) Xenon-Arc, 10,080 kJ/m² total radiant exposure, Visual condition at 10X</td>
<td>ASTM G 155 0.70 W/m² 80°C B.P.T.</td>
<td>No Cracks</td>
<td>No Cracks No loss of breaking or tearing strength</td>
</tr>
</tbody>
</table>

(1) Aging conditions are 28 days at 240° F (116° C) equivalent to 400 days at 176° F (80° C) for breaking strength, elongation, tearing strength, linear dimensional change, ozone and puncture resistance.

(2) Approximately equivalent to 8000 hours exposure at 0.35 W/m².
2. WeatherBond PRO 72 or 80-mil thick Reinforced Thermoplastic Polyolefin (TPO) membrane conforms to the following physical properties. Field membrane sheets are available in rolls 12', 10' or 8' wide by 100' long. Perimeter membrane sheets are available in widths of 6' and 5' (used with 12' and 10' wide field sheets) or 4' (used with 8' wide field sheets) by 100' long. WeatherBond PRO Plus Membrane is available in white.

<table>
<thead>
<tr>
<th>Property (Metric-SI Units)</th>
<th>Test Method</th>
<th>Property of Unaged Sheet</th>
<th>PropertyAfter Aging (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolerance on Nominal Thickness, %</td>
<td>ASTM D 751</td>
<td>±10</td>
<td></td>
</tr>
<tr>
<td>Thickness Over Scrim, min, in. (mm)</td>
<td>ASTM D 4637</td>
<td>0.030 (0.762)</td>
<td>±10</td>
</tr>
<tr>
<td>Breaking Strength, min, lbf (kN)</td>
<td>ASTM D 751</td>
<td>350 (1.6) Min.</td>
<td>400 (1.8) Typical</td>
</tr>
<tr>
<td>Elongation at Break of Fabric, min, %</td>
<td>ASTM D 751</td>
<td>25 Typical</td>
<td>25 Typical</td>
</tr>
<tr>
<td>Tearing Strength, min, lbf (N) 8&quot; by 8&quot; specimen</td>
<td>ASTM D 751</td>
<td>55 (245) Min.</td>
<td>130 (578) Typical</td>
</tr>
<tr>
<td>Brittleness Point, max, °F (°C)</td>
<td>ASTM D 2137</td>
<td>-40 (min)</td>
<td>-50 (-46) Typical</td>
</tr>
<tr>
<td>Linear Dimensional Change (shrinkage), %</td>
<td>ASTM D 1204</td>
<td>+/- 0.05 max.</td>
<td>-0.2 Typical</td>
</tr>
<tr>
<td>Ozone Resistance, 100 pphm, 168 hours</td>
<td>ASTM D 1149</td>
<td>No Cracks</td>
<td></td>
</tr>
<tr>
<td>Resistance to Water Absorption After 7 days immersion at 158°F (70°C) Change in mass, max, %</td>
<td>ASTM D 471</td>
<td>4.0 Min.</td>
<td>2.0 Typical</td>
</tr>
<tr>
<td>Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth)</td>
<td>ASTM D 3274</td>
<td>9 – 10 Typical</td>
<td></td>
</tr>
<tr>
<td>Field seam strength, lbf/in. (kN/m) Seam tested in peel</td>
<td>ASTM D1876</td>
<td>40 (7.0) Min.</td>
<td>60 (10.5) Typical</td>
</tr>
<tr>
<td>Water vapor permeance, Perms</td>
<td>ASTM E 96</td>
<td>0.10 Max.</td>
<td>0.05 Typical</td>
</tr>
<tr>
<td>Puncture resistance, lbf (N)</td>
<td>FTM 101C Method 2031</td>
<td>350 (1.6) Min.</td>
<td>400 (1.8) Typical</td>
</tr>
<tr>
<td>Resistance to xenon-arc Weathering (2)</td>
<td>ASTM G 155</td>
<td>No Cracks</td>
<td></td>
</tr>
</tbody>
</table>

(1) Aging conditions are 28 days at 240°F (116°C) equivalent to 400 days at 176°F (80°C) for breaking strength, elongation, tearing strength, linear dimensional change, ozone and puncture resistance.

(2) Approximately equivalent to 8000 hours exposure at 0.35W/m².

B. Flashing: WeatherBond PRO non-reinforced flashing is available in rolls 12" and 24" wide by 50' long. Flashing is used for inside/outside corners and field fabricated pipe flashings when the use of pre-molded or pre-fabricated accessories is not feasible. In addition, 6" wide by 100' long WeatherBond PRO reinforced membrane is available for overlaying fasteners and fastening plates.

C. WeatherBond PRO Bonding Adhesive: A high-strength, synthetic rubber adhesive used for bonding WeatherBond PRO membrane to various surfaces. The adhesive is applied to both the membrane and the substrate at a coverage rate of approximately 60 square feet per gallon per finished surface (includes coverage on both surfaces).

D. Low VOC Bonding Adhesive: An alternate, high-strength, adhesive using a blend of VOC exempt and non-exempt solvent which complies with the state of California Clean Air Act of 1988 (updated in 1997).

E. Aqua Base 120 Bonding Adhesive: A semi pressure-sensitive, water based adhesive used as a two-sided contact adhesive. Coverage rate is 120 square feet per gallon per finished surface (applied to membrane and substrate).

F. Cut-Edge Sealant: A white or clear colored sealant used to seal cut edges of reinforced WeatherBond PRO membrane. A coverage rate of approximately 225 - 275 linear feet per squeeze bottle can be achieved when a 1/8" diameter bead is applied.

G. Water Cut-Off Mastic: Used as a mastic to prevent moisture migration at drains, compression terminations and beneath conventional metal edging (at a coverage rate of approximately 10' per tube or 100' per gallon).

H. PT 304 Sealant: A single component, moisture-curing, gun-grade, multi-purpose construction sealant used to seal above termination bars and metal counterflashings at a coverage rate of approximately 10' per tube. Also designed to seal most types of construction joints.

I. Thermoplastic One-Part Pourable Sealer: A one-part, moisture curing, elastomeric polyether sealant used to fill TPO Molded Pourable Sealant Pockets. Packaged in 4, 2-liter foil pouches inside a reusable plastic bucket. 1 pouch will fill 2 TPO Molded Pourable Sealant Pockets.
Pockets.

J. **Weathered Membrane Cleaner:** Used to prepare membrane that has been exposed to the elements for approximately 7 days prior to heat welding or to remove general construction dirt at an approximate coverage rate of 400 square feet per gallon (one surface).

K. **PS Cover Strip:** A nominal 40-mil thick non-reinforced TPO membrane laminated to nominal 35-mil thick cured synthetic rubber pressure-sensitive adhesive used in conjunction with V-150 Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates). Available in rolls 6" wide by 100' long in colors of white Not for use on 20-year Warranty projects.

L. **TPO PS RUSS:** A nominal 6" and 10" wide, .045" thick reinforced TPO membrane with nominal 3" wide 35-mil thick cured synthetic rubber pressure-sensitive adhesive laminated along one end on 6" wide RUSS and along both ends on 10" wide RUSS. Used in conjunction with V-150 Primer. 6" wide RUSS is used as a base membrane securement along walls, curbs, etc.; 10" wide RUSS is used to form perimeter sheets on Mechanically Attached Systems.

M. **TPO T-Joint Covers:** A 60-mil thick non-reinforced TPO flashing cut into a 4.5" diameter circle used to seal step-offs at seam intersections. Installation is mandatory on all 60, 72, and 80-mil TPO systems and on 45-mil systems where step-offs have not been properly sealed. Packaged in boxes of 100. Available in white.

N. **WeatherBond V-150 Primer:** A solvent-based primer used to prepare the surface of WeatherBond PRO Membrane prior to application of PS Cover Strips, TPO PS RUSS and other PS products.

O. **WeatherBond PRO Coated Metal:** A 24 gauge, galvanized steel sheet coated with a layer of non-reinforced WeatherBond PRO Flashing. The sheet is cut to the appropriate width and used to fabricate metal drip edges or other roof perimeter edging profiles. WeatherBond PRO Membrane may be heat welded directly to the coated metal. Coated metal is available in sheets 4' X 10' and comes packaged 25 sheets per pallet (also available packaged 10 sheets per pallet on a direct ship basis). Available in white.

P. **WeatherBond Seam Adhesive:** Used for adhering membrane flashing at tie-ins to WeatherBond Black and White EPDM membrane. Applied at a coverage rate of approximately 100 square feet per gallon on each surface.

Q. **WeatherBond PRO Heat Weldable Walkway Rolls:** Consists of recycled WeatherBond PRO Membrane offering superior tear, puncture and weather resistance and designed to protect WeatherBond PRO membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to WeatherBond PRO membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 30" wide by 50' long and are nominal 120 mils thick. Available in white.

Q. **Pre-Molded Accessories:**

1. **Inside Corners:** A pre-molded corner flashing for inside corners. Available in white, 60-mil thick.

2. **Outside Corners:** A pre-molded corner flashing for outside corners. Available in white, 60-mil thick.

3. **TPO Curb Wrap Corners:** Fabricated flashings are made of 45-mil thick reinforced WeatherBond PRO membrane designed to reduce installation time to flash a curb when compared to conventional methods. Each corner is fabricated with a 6" wide base flange and a 12" overall height. Six sizes are available to fit curbs up to 6' by 6' in size. One curb requires 4 corners for a complete installation. TPO Curb Corners are packaged in boxes of twelve. Custom sizes are available as a special order product requiring lead-time.

4. **Pipe Flashings:** A pre-molded white pipe flashing used for pipe penetrations. Available for 1" – 6" diameter pipes with clamping rings included.

5. **Split Pipe Seals:** A prefabricated flashing consisting of 45-mil thick reinforced WeatherBond PRO Membrane for pipes 1" – 6" in diameter. A split (cut) and overlapped tab are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration. Custom sizes are available as a special order product requiring lead-time.

6. **TPO Square Tubing Wraps:** Fabricated flashings made of 45-mil thick reinforced WeatherBond PRO membrane for square tubing. A split (cut) and overlap tab are incorporated into these parts to allow the seals to be opened and wrapped around a square penetration. Available for 3", 4", 5" and 6" diameter square tubing.

7. **Molded TPO Sealant Pockets:** A pre-fabricated, interlocking, 2-piece, injection molded, flexible pocket with a rigid polypropylene vertical wall and pre-formed deck flanges. Used in conjunction with Thermoplastic One-Part Pourable Sealer for waterproofing pipe clusters or other odd shaped penetrations. Available in white. Forms a 7-1/2" by 6" oval when completed.
8. **Pre-Fabricated Sealant Pockets**: A two-piece, pre-fabricated sealant pocket that utilizes reinforced TPO membrane and coated metal to form a rigid, oversized sealant pocket with a weldable horizontal deck flange. Available in 12” (total volume of 1.87 gallons), 16” (total volume of 2.77 gallons) and 20” (total volume of 3.81 gallons). Packaged 2 per carton and available in white only. Refer to the applicable Technical Data Bulletin for dimensions and installation instructions.

9. **Sealant Pocket Extension Legs**: Designed for use with the TPO Molded Sealant Pocket and the Pre-Fabricated Sealant Pocket to extend the length in increments of 10”. Fabricated from 45-mil thick reinforced TPO membrane and TPO coated metal. Can be used full length, cut to size for customized lengths or welded to each other for extra long applications. Packaged 10 legs per carton and available in white only.

R. **Fasteners**:

1. **WeatherBond HPWX Fastener**: A heavy duty #15 threaded fastener with a Phillips head used for membrane and insulation attachment over steel, wood plank or minimum 15/32” thick plywood.

S. **Fastening Plates**:

1. **HPWX Plates**: A 2-3/8” diameter metal barbed fastening plate used with WeatherBond HPWX, CD-10 or MP 14-10 Fasteners for membrane securement. This plate can be used for insulation securement.

T. **Seam Probe**: A hand tool used to check the integrity of heat welded seams on heat welded roofing systems. The probe has a heat-treated tip and the handle is tapped to fit standard threaded extension handles allowing the tool to be used from a standing position.
WeatherBond PRO® Roofing Systems
"Attachment II"

Withdrawal Resistance Criteria
July 2006

A. The following chart indicates the appropriate WeatherBond Fastener for use with the referenced roof deck and includes the minimum pullout and fastener penetration requirements for membrane/insulation securement on Mechanically Attached Roofing Systems and for insulation attachment on Adhered Roofing Systems.

<table>
<thead>
<tr>
<th>Deck Type</th>
<th>Minimum Pullout</th>
<th>Approved Fasteners &amp; Plates for membrane securement on Mechanically Attached Systems (1) and approved fasteners for insulation attachment on Adhered Systems (5)</th>
<th>Minimum Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, 22 gauge or heavier (2)</td>
<td>500 pounds (Mechanically Attached)</td>
<td>HPWX Fasteners &amp; HPWX Plates</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td></td>
<td>360 pounds (Adhered)</td>
<td>HPWX</td>
<td></td>
</tr>
<tr>
<td>Steel, less than 22 gauge (3)</td>
<td>300 pounds (Adhered only) (3)</td>
<td>HPWX</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Lightweight Insulating Concrete over Steel (4)</td>
<td>360 pounds</td>
<td>HPWX Fasteners &amp; HPWX Plates (Mechanically Attached)</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Structural Concrete, rated 3,000 psi or greater</td>
<td>800 pounds</td>
<td>CD-10 or MP 14-10 Fasteners and HPWX Plates</td>
<td>1&quot;</td>
</tr>
<tr>
<td>Wood Planks and Plywood, min. 15/32&quot; thick APA Grade CDX</td>
<td>360 pounds</td>
<td>HPWX Fasteners &amp; HPWX Plates</td>
<td>1&quot; (Max. 1-1/2&quot; on wood planks)</td>
</tr>
<tr>
<td>Oriented Strand Board (OSB), Min. 7/16&quot; thick (7) APA Rated non-veneer</td>
<td>360 pounds (Mechanically Attached)</td>
<td>HPWX Fasteners &amp; HPWX Plates</td>
<td>1&quot;</td>
</tr>
<tr>
<td></td>
<td>250 pounds (Adhered)</td>
<td>HPWX</td>
<td></td>
</tr>
<tr>
<td>Cementitious Wood Fiber and Gypsum</td>
<td>300 pounds</td>
<td>NTB Fastener with 2&quot; diameter plates</td>
<td>1-1/2&quot;</td>
</tr>
</tbody>
</table>

Notes:
1. For membrane fastening density requirements, refer to Attachment III at the end of this section.
2. Mechanically Attached Roofing Systems are not permitted over corrugated steel decks, regardless of gauge.
3. Mechanically Attached Roofing Systems are not permitted over steel decks less than 22 gauge unless used in conjunction with lightweight insulating concrete and acceptable pullouts are obtained using HPWX Fasteners.
4. Fasteners are installed through the lightweight insulating concrete into the steel deck below.
5. For adhered systems, only 3" diameter insulation fastening plates can be used for insulation attachment.

An independent laboratory, fastener manufacturer or a representative of WeatherBond on the following roof decks, may conduct Withdrawal resistance testing. The results of the pullout tests must be documented and submitted to WeatherBond when the pullout results are less than listed above.

1. Cementitious wood fiber or gypsum
2. Lightweight insulating concrete over steel decks lighter than 22 gauge
3. Minimum 7/16" thick oriented strand board (OSB)
4. For 22 gauge steel, wood plank, plywood or structural concrete decks, a withdrawal resistance test is strongly recommended.
5. **On retrofit projects**, a core cutter shall be used to remove existing roofing material prior to conducting the withdrawal resistance test (even if the existing roofing membrane is specified to remain). Existing roofing materials will contribute to a higher, misleading pullout value.

6. The following minimum trial fastener samples must be installed and tested over the roof deck at each level:
a. For each roof level of 5,000 square feet or less, conduct a minimum of 3 pullouts.

b. For each roof level greater than 5,000 square feet and less than 20,000 square feet, conduct a minimum of 10 pullouts.

c. For each roof level greater than 20,000 square feet and less than 50,000 square feet, conduct a minimum of 15 pullouts.

d. For each roof level greater than 50,000 square feet and less than 100,000 square feet, conduct a minimum of 20 pullouts.

e. For each roof level greater than 100,000 square feet, conduct a minimum of 1 pullout per each 5,000 square feet.

Note: On projects with multiple roof levels, when pullouts are conducted on the main roof level, smaller canopies, overhangs, penthouses, etc., of 1,000 square feet or less will not require pullout tests providing these areas consist of the same decking material as the main roof level.

7. The trial fastener installations must be tested in various locations of the roof deck including roof corners and perimeters (areas parallel to the edge of the roof with a width which is 0.4 times the building height). Designate the test locations on a roof plan and include with the submittals to WeatherBond when requested.
WeatherBond PRO ® Mechanically Attached Roofing Systems  
"Attachment III"  

Membrane Securement Criteria  
July 2006

A. For designation of wind zones listed on the following chart, refer to Basic Wind Speed Map in this Attachment. To determine appropriate securement requirements, identify project wind zone from the map (at the end of this section) and select the chart based on project deck type. The building height is then used to determine membrane securement requirements for the project.

<table>
<thead>
<tr>
<th>Wind Zone</th>
<th>Deck Type</th>
<th>Building Height</th>
<th>Field Membrane Width</th>
<th>Fastening Density (Field &amp; Perimeter Sheets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1 Up to 100 MPH</td>
<td>Steel, Lightweight Insulating Concrete over Steel, Structural Concrete, Wood Planks</td>
<td>Max. 40’</td>
<td>12’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td>Steel, Lightweight Insulating Concrete over Steel, Structural Concrete, Plywood, Wood Planks or Oriented Strand Board (3)</td>
<td>Max. 75’</td>
<td>10’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td>Gypsum and Cementitious Wood Fiber</td>
<td>Max. 75’</td>
<td>10’</td>
<td>9” O.C.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td>Zone 2 100-119 MPH</td>
<td>Steel, Lightweight Insulating Concrete over Steel, Wood Planks (New or Tearoff)</td>
<td>Max. 40’</td>
<td>12’</td>
<td>6” O.C.</td>
</tr>
<tr>
<td></td>
<td>Steel, Lightweight Insulating Concrete over Steel, Wood Planks (Reroof/No Tearoff)</td>
<td>Max. 40’</td>
<td>12’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td>Steel, Lightweight Insulating Concrete over Steel, Plywood, Wood Planks or Oriented Strand Board (3)</td>
<td>Max. 50’</td>
<td>10’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td>Structural Concrete</td>
<td>Max. 40’</td>
<td>12’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. 75’</td>
<td>10’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td>Gypsum and Cementitious Wood Fiber</td>
<td>Max. 50’</td>
<td>10’</td>
<td>9” O.C.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td>Zone 3 120-129 MPH (4)</td>
<td>Steel, Lightweight Insulating Concrete over Steel</td>
<td>Max. 75’</td>
<td>10’</td>
<td>9” O.C. *</td>
</tr>
<tr>
<td></td>
<td>Structural Concrete</td>
<td>Max. 50’</td>
<td>10’</td>
<td>12” O.C.</td>
</tr>
<tr>
<td></td>
<td>Plywood, Wood Planks (2), Oriented Strand Board (3), Gypsum and Cementitious Wood Fiber</td>
<td>Max. 50’</td>
<td>8’</td>
<td>9” O.C.</td>
</tr>
<tr>
<td>Zone 4 130 MPH or Greater</td>
<td>Steel or Lightweight Insulating Concrete over Steel</td>
<td>Max. 75’</td>
<td>10’</td>
<td>6” O.C. **</td>
</tr>
<tr>
<td></td>
<td>Structural Concrete</td>
<td>Max. 50’</td>
<td>8’</td>
<td>9” O.C. *</td>
</tr>
</tbody>
</table>

Notes:  
1. Refer to “Attachment II, for minimum roof deck/pullout requirements and the required WeatherBond Fastener.  
2. On plywood or wood plank decks, if pullout tests exceed 425 pounds per fastener, the membrane securement requirements for steel decks may be followed providing the pullout tests are submitted to WeatherBond for approval.  
3. On oriented strand board decks less than 5/8” in thickness, specific fasteners are required for membrane securement. For oriented strand board decks 5/8” thick or greater, HPWX Fasteners may be used for membrane securement if a minimum pullout value of 360 pounds can be achieved.  
4. Those areas located between wind zone contours of 120-129 MPH within 20 miles of the coastline shall be considered as a Zone 4 Wind Zone.
B. **Perimeter sheets are required along the roof perimeter**, which is defined as all edges of each roof section. Where multi-level roofs meet at a common wall, the adjacent edge of the upper roof is treated as a roof perimeter if the difference in height is greater than 3’. Perimeter sheets are not required at the base of the wall at the lower level. Refer to Detail WBPM2A in Part II “Application” for further information.

The number of perimeter sheets required is dependant on project wind zone and building height as identified in the chart below. At **roof ridges** (when slopes exceed 3” to the horizontal foot), one perimeter membrane sheet, centered approximately over the roof ridge is required.

1. **When using 12’ and 10’ wide field sheets, 6’ or 5’ wide perimeter sheets** are utilized along roof edges.
2. **When using 8’ wide field sheets, 4’ wide perimeter sheets** are utilized along roof edges.
3. As an option to the use of perimeter sheets, 10” wide TPO PS RUSS can be used beneath the field sheets to create perimeter sheets. Refer to the WeatherBond PRO Mechanically Attached Application Section, Part II, for specific requirements.

<table>
<thead>
<tr>
<th>Wind Zone</th>
<th>Building Height</th>
<th># Of Perimeter Sheets Required (Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100 mph (Zone 1)</td>
<td>Up to 50’</td>
<td>1 or 2 (Note 2)</td>
</tr>
<tr>
<td></td>
<td>51 to 75’</td>
<td>2</td>
</tr>
<tr>
<td>100 to 129 (Zones 2 &amp; 3)</td>
<td>Up to 75’</td>
<td>2 (Note 3)</td>
</tr>
<tr>
<td>130 mph or Greater (Zone 4)</td>
<td>Up to 75’</td>
<td>4</td>
</tr>
</tbody>
</table>

**Notes:**
1. Fastener spacing for perimeter membrane sheets is equivalent to the fastener spacing for field sheets.
2. Two perimeter sheets required when 12’ sheets are fastened 12” o.c.
3. Gypsum and cementitious wood fiber decks in Zone 3 require 3 perimeter sheets.

C. **Buildings With Large Openings and Overhangs**

When any wall contains major openings with a combined area, which exceeds 10% of the total wall area on which the openings are located, four (4) perimeter sheets (centered over the opening) must be specified as shown.

1. **When using 12’ or 10’ wide field membrane sheets, 6’ or 5’ wide perimeter sheets are utilized.** When using 8’ wide field sheets, 4’ wide perimeter sheets are utilized. 10” wide PS RUSS can also be used beneath the field sheets to create perimeter sheets.
2. As an option to the above perimeter securement, an adhered membrane section may be used in lieu of the mechanically attached membrane at large openings in accordance with the WeatherBond Specification for WeatherBond PRO Adhered Systems.

**Large Openings**

*Note: Fastening plates are required at the end laps of the Perimeter membrane sheets on both sides of the opened area*

**Overhangs**

*The membrane must be specified with perimeter sheets installed over the entire overhang area extending onto the main roof deck when at the same level.*
Basic Wind Speed Map
(Based on ASCE 7-02)

Zone 1 – Up to 100 MPH
Zone 2 – 100 - 119 MPH
Zone 3 – 120 - 129 MPH
Zone 4 – 130 MPH or Greater
Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33’ above Ground for Exposure C category.
2. Linear interpolation between wind contours is appropriate.
3. Islands and coastal areas outside the last contour shall use the wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Seek 50 year MRI wind speed values from local building officials. As a minimum, increase the wind speed values by 10%.
Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33' above Ground for Exposure C category.
2. Linear interpolation between wind contours is appropriate.
3. Islands and coastal areas outside the last contour shall use the wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Seek 50 year MRI wind speed values from local building officials. As a minimum, increase the wind speed values by 10%.
Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33' above Ground for Exposure C category.
2. Linear interpolation between wind contours is appropriate.
3. Islands and coastal areas outside the last contour shall use the wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Seek 50 year MRI wind speed values from local building officials. As a minimum, increase the wind speed values by 10%.
Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33' above Ground for Exposure C category.
2. Linear interpolation between wind contours is appropriate.
3. Islands and coastal areas outside the last contour shall use the wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Seek 50 year MRI wind speed values from local building officials. As a minimum, increase the wind speed values by 10%
### Metrics

#### Length
- 0.045 inch = 1.1 mm
- 0.060 inch = 1.5 mm
- 1/8 inch = 3 mm
- 1/4 inch = 6 mm
- 7/16 inch = 11 mm
- 15/32 inch = 12 mm or 1.2 cm
- 1/2 inch = 13 mm or 1.3 cm
- 9/16 inch = 14 mm
- 5/8 inch = 16 mm or 1.6 cm
- 3/4 inch = 19 mm or 1.9 cm
- 1 inch = 2.5 cm
- 1-1/4 inches = 3.8 cm
- 1-1/2 inches = 4 cm
- 2 inches = 5 cm
- 2-1/2 inches = 6.4 cm
- 3 inches = 8 cm
- 3-1/4 inches = 8.3 cm
- 4 inches = 10.5 cm
- 5 inches = 12.7 cm
- 5-1/2 inches = 14 cm
- 6 inches = 16.5 cm
- 9 inches = 23 cm
- 10 inches = 25 cm
- 12 inches = 31 cm
- 18 inches = 46 cm
- 24 inches = 61 cm
- 3 feet = .9 m
- 3 feet, 6 inches = 1.1 m
- 4 feet = 1.2 m
- 4 feet, 6 inches = 1.4 m
- 5 feet = 1.5 m
- 6 feet = 1.8 m
- 8 feet = 2.4 m
- 10 feet = 3 m
- 12 feet = 3.7 m
- 12.5 feet = 3.8 m
- 15 feet = 4.6 m
- 33 feet = 10 m
- 50 feet = 15.2 m
- 75 feet = 22.9 m
- 100 feet = 30 m
- 225 feet = 69 m
- 250 feet = 76.2 m
- 275 feet = 84 m

10 feet per minute = 3 m per minute
15 feet per minute = 4.6 m per minute
2 inches in 12 inches = 16 cm/m
3 inches in 1 horizontal foot = 25 cm/m
5 inches in 12 inches = 41 cm/m
18 inches in 12 inches = 150 cm/m

1 per 4 square feet = 1 per 3.72 m²
1 per 5.3 square feet = 1 per 4.93 m²
1 per 6.4 square feet = 1 per 5.95 m²

60 square feet/gallon = 5.6 m²/liter
120 square feet/gallon = 11.1 m²/liter
225 linear feet = 69 m
275 linear feet = 84 m
600 linear feet = 183 m

#### Weight
- 80 pounds = 36 kg
- 300 pounds = 136 kg
- 360 pounds = 163 kg
- 500 pounds = 227 kg
- 800 pounds = 363 kg

#### Miles Per Hour
- 55 mph = 34 km per hour
- 72 mph = 45 km per hour
- 79 mph = 49 km per hour
- 80-89 mph = 50 – 55 km per hour
- 90-99 mph = 56 – 61.5 km per hour
- 100 mph = 62.1 km per hour

#### Fahrenheit/Celsius
- 40°F Fahrenheit = 4.5°C Celsius
- 90°F Fahrenheit = 32°C Celsius
- 120°F Fahrenheit = 49°C Celsius
- 1000°F Fahrenheit = 538°C Celsius
- 1004°F Fahrenheit = 540°C Celsius

#### Pressure
- 3000 psi = 211 kg/cm²

#### Volume
- 1 gallon – 3.78 liter
- 5 gallon – 18.9 liter
- 22 gauge – .75 m

Distributed by:
BEST MATERIALS LLC
Phoenix AZ
Ph: 800-474-7570, 602-272-8128
Fax: 602-272-8014
Email: sales@bestmaterials.com
www.bestmaterials.com