TPO Application and Specifications Manual

Mechanically Applied Systems

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- Roof Design
- Mechanically Attached System Construction Details
Mechanically Attached Systems

Product Performance

Contents

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- TPO 80 mil membrane
- TPO 45 Fleece Back mil membrane
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- TPO 80 Fleece Back mil membrane
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- Base and Ply Sheets
- Air and Vapor Barriers
- Separation Sheets
- EnergyGuard PolyIso
- EnergyGuard Tapered PolyIso
- EnergyGuard Composite Board PolyIso
- Sealants
- Drill-Tec Fasteners and Plates
- Adhesives and Primers
- TPO Chemical Resistance Table
Product Data Sheet
EverGuard® TPO
45 mil Membrane

Description
GAF EverGuard® TPO 45 mil thermoplastic polyolefin single-ply membrane systems have been engineered to provide premium performance at a very cost-effective price. Strong, flexible, durable EverGuard TPO 45 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Fully Adhered, and Ballast Applied.

Compared to typical single-ply EPDM, PVC and TPO membranes, GAF EverGuard TPO 45 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

Applicable Standards
UL approved for use in the construction of Class A, B, or C roofs, FM Approved, ASTM D6878, Dade County Product Approval, ICC-ES Legacy Report #ER-6030

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>ASTM Test Method</th>
<th>ASTM 6878 Minimum</th>
<th>EverGuard Typical Test Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Thickness</td>
<td>ASTM D-751</td>
<td>0.039&quot; (min.)</td>
<td>0.045&quot;</td>
</tr>
<tr>
<td>Breaking Strength</td>
<td>ASTM D-751</td>
<td>220 lbf/in.</td>
<td>285 lbf x 245 lbf</td>
</tr>
<tr>
<td>Factory Seam Strength</td>
<td>ASTM D-751</td>
<td>66 lbf</td>
<td>Pass (membrane failure)</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D-751</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Heat Aging</td>
<td>ASTM D-573</td>
<td>9% Retention of Breaking Strength and Elongation at Break</td>
<td>100%</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>ASTM D-751</td>
<td>55 lbf</td>
<td>124 lbf x 140 lbf</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>FTM 101C Method 2031</td>
<td>Not Established</td>
<td>290 lbs.</td>
</tr>
<tr>
<td>Cold Brittleness</td>
<td>ASTM D-2137</td>
<td>-40 C</td>
<td>-40 C</td>
</tr>
<tr>
<td>Permeance</td>
<td>ASTM E-96</td>
<td>Not Established</td>
<td>0.070 Perms</td>
</tr>
<tr>
<td>Dimensional Change</td>
<td>ASTM D-1204 @158 F, 6 hrs.</td>
<td>+/- 1%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D-471 @158 F, 1 week</td>
<td>+/- 3.0% max.</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hydrostatic Resistance</td>
<td>ASTM D-751Method D</td>
<td>Not Established</td>
<td>390 psi</td>
</tr>
<tr>
<td>Ozone Resistance</td>
<td>ASTM D-1149</td>
<td>No visible deterioration @ 7 x magnification</td>
<td>No visible deterioration @ 7 x magnification</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>ASTM C1549 &amp; E408</td>
<td>N/A</td>
<td>0.76</td>
</tr>
<tr>
<td>Emissivity</td>
<td>ASTM E408</td>
<td>N/A</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Product Data

<table>
<thead>
<tr>
<th>Roll Size</th>
<th>Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colors</td>
<td>Full Roll Size</td>
</tr>
<tr>
<td>White, Tan, Gray</td>
<td>10' x 100' (1,000 sq.ft.)</td>
</tr>
</tbody>
</table>

Note: Membrane rolls shipped horizontally on pallets.

Storage
Store rolls on their sides on pallets or shelving in a dry area

Safety Warning
Membrane rolls are heavy, and are best positioned and installed by at least two people

* White Membrane Only
Description
GAF EverGuard® TPO 60 mil thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard TPO 60 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Fully Adhered, and Ballast Applied.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard TPO 60 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

Applicable Standards
UL approved for use in the construction of Class A, B, or C roofs, FM Approved, ASTM D6878, Dade County Product Approval, ICC-ES Legacy Report #ER-6030

Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
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<th>ASTM 6878 Minimum</th>
<th>EverGuard Typical Test Data</th>
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</thead>
<tbody>
<tr>
<td>Nominal Thickness</td>
<td>ASTM D-751</td>
<td>0.039&quot; (min.)</td>
<td>0.060&quot;</td>
</tr>
<tr>
<td>Breaking Strength</td>
<td>ASTM D-751 Grab Method</td>
<td>220 lbf/in.</td>
<td>320 lbf x 270 lbf</td>
</tr>
<tr>
<td>Factory Seam Strength</td>
<td>ASTM D-751</td>
<td>66 lbf</td>
<td>Pass (membrane failure)</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D-751</td>
<td>15%</td>
<td>28%</td>
</tr>
<tr>
<td>Heat Aging</td>
<td>ASTM D-573</td>
<td>90% Retention of Breaking Strength and Elongation at Break</td>
<td>100%</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>ASTM D-751 8&quot; x 8&quot; Sample</td>
<td>55 lbf</td>
<td>70 lbf x 150 lbf</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>FTM 101C Method 2031</td>
<td>Not Established</td>
<td>380 lbs.</td>
</tr>
<tr>
<td>Cold Brittleness</td>
<td>ASTM D-2137</td>
<td>-40 C</td>
<td>-40 C</td>
</tr>
<tr>
<td>Permeance</td>
<td>ASTM E-96</td>
<td>Not Established</td>
<td>0.01 Perms</td>
</tr>
<tr>
<td>Dimensional Change</td>
<td>ASTM D-1204 @ 158 F, 6 hrs.</td>
<td>+/- 1%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D-471 @ 158 F, 1 week</td>
<td>+/- 3.0% (top coating only)</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hydrostatic Resistance</td>
<td>ASTM D-751Method D</td>
<td>Not Established</td>
<td>430 psi</td>
</tr>
<tr>
<td>Ozone Resistance</td>
<td>ASTM D-1149</td>
<td>Pass No visible deterioration @ 7 x magnification</td>
<td>No visible deterioration @ 7 x magnification</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>ASTM C1549 &amp; E408</td>
<td>N/A</td>
<td>0.76</td>
</tr>
<tr>
<td>Emissivity</td>
<td>ASTM E408</td>
<td>N/A</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Product Data

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<tr>
<th>Roll Size</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Colors</td>
<td></td>
</tr>
<tr>
<td>White, Tan, Gray</td>
<td>10' x 100' (1,000 sq.ft.)</td>
</tr>
<tr>
<td>Storage</td>
<td>Store rolls on their sides on pallets or shelving in a dry area</td>
</tr>
<tr>
<td>Safety Warning</td>
<td>Membrane rolls are heavy, and are best positioned and installed by at least two people</td>
</tr>
</tbody>
</table>

* White Membrane Only
Description
GAF EverGuard® TPO 80 mil thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard TPO 80 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Fully Adhered, and Ballast Applied.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard TPO 80 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, no liquid plasticizing, and high tear/puncture resistance.

Applicable Standards
UL approved for use in the construction of Class A, B, or C roofs, FM Approved, ASTM D6878, Dade County Product Approval, ICC-ES Legacy Report #ER-6030

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>ASTM Test Method</th>
<th>ASTM 6878 Minimum</th>
<th>EverGuard Typical Test Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Thickness</td>
<td>ASTM D-751</td>
<td>0.039” (min.)</td>
<td>0.080”</td>
</tr>
<tr>
<td>Breaking Strength</td>
<td>ASTM D-751 Grab Method</td>
<td>220 lbf/in.</td>
<td>310 lbf x 300 lbf</td>
</tr>
<tr>
<td>Seam Strength</td>
<td>ASTM D-751</td>
<td>66 lbf</td>
<td>110 lb.</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D-751</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Heat Aging</td>
<td>ASTM D-573</td>
<td>90% Retention of Breaking Strength and Elongation at Break</td>
<td>100%</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>ASTM D-751 8” x 8” Sample</td>
<td>55 lbf</td>
<td>60 lbf x 130 lbf</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>FTM 101C Method 2031</td>
<td>Not Established</td>
<td>&gt;380 lbs.</td>
</tr>
<tr>
<td>Cold Brittleness</td>
<td>ASTM D-2137</td>
<td>-40 C</td>
<td>-40 C</td>
</tr>
<tr>
<td>Permeance</td>
<td>ASTM E-96</td>
<td>Not Established</td>
<td>0.01 Perms</td>
</tr>
<tr>
<td>Dimensional Change</td>
<td>ASTM D-1204 @158 F, 6 hrs.</td>
<td>+/- 1%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D-471 @158 F, 1 week</td>
<td>+/- 3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hydrostatic Resistance</td>
<td>ASTM D-751Method D</td>
<td>Not Established</td>
<td>&gt;430 psi</td>
</tr>
<tr>
<td>Ozone Resistance</td>
<td>ASTM D-1149</td>
<td>No visible deterioration @ 7 x magnification</td>
<td>No visible deterioration @ 7 x magnification</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>ASTM C1549 &amp; E408</td>
<td>N/A</td>
<td>0.76</td>
</tr>
<tr>
<td>Emissivity</td>
<td>ASTM E408</td>
<td>N/A</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Product Data
Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation.

<table>
<thead>
<tr>
<th>Roll Size</th>
<th>Full Roll Size</th>
<th>Full Roll Weight</th>
<th>Half Roll Size</th>
<th>Half Roll Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, Tan, Gray</td>
<td>10’ x 100’ (1,000 sq.ft.)</td>
<td>420 lbs.</td>
<td>5’ x 100’ (500 sq.ft.)</td>
<td>210 lbs.</td>
</tr>
</tbody>
</table>

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.

Storage
Store rolls on their sides on pallets or shelving in a dry area.

Safety Warning
Membrane rolls are heavy, and are best positioned and installed by at least two people.

* White Membrane Only
Description
GAF EverGuard® 45 mil Fleece-Back (FB) thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard 45 mil FB membrane is suitable for use in Mechanically Attached and Fully Adhered single-ply systems and the polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard 45 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

Applicable Standards
UL approved for use in the construction of Class A, B, or C roofs, FM Approved, ASTM D6878, Dade County Product Approval

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<th>Physical Properties</th>
<th>ASTM Test Method</th>
<th>ASTM 6878 Minimum</th>
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</thead>
<tbody>
<tr>
<td>Nominal Thickness</td>
<td>ASTM D-751</td>
<td>0.039&quot; (min.)</td>
<td>0.045&quot;</td>
</tr>
<tr>
<td>Breaking Strength</td>
<td>ASTM D-751 Grab Method</td>
<td>220 lb/in.</td>
<td>375 lb x 330 lb</td>
</tr>
<tr>
<td>Seam Strength</td>
<td>ASTM D-751</td>
<td>66</td>
<td>90</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D-751</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Heat Aging</td>
<td>ASTM D-573</td>
<td>90% Retention of Breaking Strength and Elongation at Break</td>
<td>100%</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>ASTM D-751 8&quot; x 8&quot; Sample</td>
<td>55 lb</td>
<td>90 lb x 120 lb</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>FTM 101 Method 2031</td>
<td>Not Established</td>
<td>&gt;290 lbs.</td>
</tr>
<tr>
<td>Cold Britteness</td>
<td>ASTM D-2137</td>
<td>-40 C</td>
<td>-40 C</td>
</tr>
<tr>
<td>Permeance</td>
<td>ASTM E-96</td>
<td>Not Established</td>
<td>0.070 Perms</td>
</tr>
<tr>
<td>Dimensional Change</td>
<td>ASTM D-1204 @ 158 F, 6 hrs.</td>
<td>+/- 1%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D-471 @ 158 F, 1 week</td>
<td>+/- 3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hydrostatic Resistance</td>
<td>ASTM D-751Method D</td>
<td>Not Established</td>
<td>390 psi</td>
</tr>
<tr>
<td>Ozone Resistance</td>
<td>ASTM D-1149</td>
<td>No visible deterioration @ 7 x magnification</td>
<td>No visible deterioration @ 7 x magnification</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>ASTM C1549 &amp; E408</td>
<td>N/A</td>
<td>0.76</td>
</tr>
<tr>
<td>Emissivity</td>
<td>ASTM E408</td>
<td>N/A</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Product Data

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

<table>
<thead>
<tr>
<th>Colors</th>
<th>Full Roll Size</th>
<th>Full Roll Weight</th>
<th>Half Roll Size</th>
<th>Half Roll Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, Tan, Gray</td>
<td>10' x 100' (1,000 sq.ft.)</td>
<td>284 lbs.</td>
<td>5' x 100' (500 sq.ft.)</td>
<td>142 lbs.</td>
</tr>
</tbody>
</table>

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.

Storage
Store rolls on their sides on pallets or shelving in a dry area.

Safety Warning
Membrane rolls are heavy, and are best positioned and installed by at least two people.

* White Membrane Only
Description
GAF EverGuard® 60 mil Fleece-Back FB thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard 60 mil FB membrane is suitable for use in Mechanically Attached and Fully Adhered single-ply systems. The polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard 60 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Data is based upon typical membrane only product performance, and is subject to normal manufacturing tolerances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Thickness</td>
<td>ASTM D-751</td>
<td>0.039&quot; (min.)</td>
<td>0.060&quot;</td>
</tr>
<tr>
<td>Breaking Strength</td>
<td>ASTM D-751 Grab Method</td>
<td>220 lbf/in.</td>
<td>400 lbf x 360 lbf</td>
</tr>
<tr>
<td>Seam Strength</td>
<td>ASTM D-751</td>
<td>66</td>
<td>90</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D-751</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Heat Aging</td>
<td>ASTM D-573</td>
<td>90% Retention of Breaking Strength and Elongation at Break</td>
<td>100%</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>ASTM D-751 8&quot; x 8&quot; Sample</td>
<td>55 lbf</td>
<td>70 lbf x 130 lbf</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>FTM 101 Method 2031</td>
<td>Not Established</td>
<td>&gt;380 lbs.</td>
</tr>
<tr>
<td>Cold Britteness</td>
<td>ASTM D-2137</td>
<td>-40 C</td>
<td>-40 C</td>
</tr>
<tr>
<td>Permeance</td>
<td>ASTM E-96</td>
<td>Not Established</td>
<td>0.01 Perms</td>
</tr>
<tr>
<td>Dimensional Change</td>
<td>ASTM D-1204 @158 F, 6 hrs.</td>
<td>+/- 1%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D-471 @158 F, 1 week</td>
<td>+/- 3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hydrostatic Resistance</td>
<td>ASTM D-751Method D</td>
<td>Not Established</td>
<td>430 psi</td>
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<tr>
<td>Ozone Resistance</td>
<td>ASTM D-1149</td>
<td>No visible deterioration @ 7 x magnification</td>
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<tr>
<td>Reflectivity</td>
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<td>N/A</td>
<td>0.76</td>
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<tr>
<td>Emissivity</td>
<td>ASTM E408</td>
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<td>0.90</td>
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Product Data
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<table>
<thead>
<tr>
<th>Roll Size</th>
<th>Full Roll Size</th>
<th>Full Roll Weight</th>
<th>Half Roll Size</th>
<th>Half Roll Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, Tan, Gray</td>
<td>10' x 100' (1,000 sq.ft.)</td>
<td>350 lbs.</td>
<td>5' x 100' (500 sq.ft.)</td>
<td>175 lbs.</td>
</tr>
</tbody>
</table>

Note: Membrane rolls shipped horizontally on pallets. Stacked pyramid-style and banded

Storage
Store rolls on their sides on pallets or shelving in a dry area

Installation Tips
Membrane rolls are heavy, and are best positioned and installed by at least two people.

* White Membrane Only
Product Data Sheet
EverGuard® TPO
80 mil Fleece-Back Membrane

Description
GAF EverGuard® 80 mil Fleece-Back (FB) thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard 80 mil membrane is suitable for use in Mechanically Attached and Fully Adhered single-ply systems. The polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

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<th>EverGuard Typical Test Data</th>
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<tr>
<td>Nominal Thickness</td>
<td>ASTM D-751</td>
<td>0.039&quot; (min.)</td>
<td>0.080&quot;</td>
</tr>
<tr>
<td>Breaking Strength</td>
<td>ASTM D-751 Grab Method</td>
<td>220 lbf/in.</td>
<td>400 lbf x 360 lbf</td>
</tr>
<tr>
<td>Seam Strength</td>
<td>ASTM D-751</td>
<td>66</td>
<td>90</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D-751</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Heat Aging</td>
<td>ASTM D-573</td>
<td>90% Retention of Breaking Strength and Elongation at Break</td>
<td>100%</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>ASTM D-751 8&quot; x 8&quot; Sample</td>
<td>55 lbf</td>
<td>70 lbf x 130 lbf</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>FTM 101 Method 2031</td>
<td>Not Established</td>
<td>&gt;380 lbs.</td>
</tr>
<tr>
<td>Cold Brittnessness</td>
<td>ASTM D-2137</td>
<td>-40 C</td>
<td>-40 C</td>
</tr>
<tr>
<td>Permeance</td>
<td>ASTM E-96</td>
<td>Not Established</td>
<td>0.01 Perms</td>
</tr>
<tr>
<td>Dimensional Change</td>
<td>ASTM D-1204 @158 F, 6 hrs.</td>
<td>+/- 1%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D-471 @158 F, 1 week</td>
<td>+/- 3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hydrostatic Resistance</td>
<td>ASTM D-751Method D</td>
<td>Not Established</td>
<td>430 psi</td>
</tr>
<tr>
<td>Ozone Resistance</td>
<td>ASTM D-1149</td>
<td>No visible deterioration @ 7 x magnification</td>
<td>No visible deterioration @ 7 x magnification</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>ASTM C1549 &amp; E408</td>
<td>N/A</td>
<td>0.76</td>
</tr>
<tr>
<td>Emissivity</td>
<td>ASTM E408</td>
<td>N/A</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Product Data

**Roll Size**

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

<table>
<thead>
<tr>
<th>Colors</th>
<th>Full Roll Size</th>
<th>Full Roll Weight</th>
<th>Half Roll Size</th>
<th>Half Roll Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, Tan, Gray</td>
<td>10' x 50' (500 sq.ft.)</td>
<td>232 lbs.</td>
<td>5' x 50' (250 sq.ft.)</td>
<td>116 lbs.</td>
</tr>
</tbody>
</table>

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded

**Storage**

Store rolls on their sides on pallets or shelving in a dry area

**Safety Warning**

Membrane rolls are heavy, and are best positioned and installed by at least two people.

* White Membrane Only

Product Data Sheet 6
Description
The GAF EverGuard® TPO single-ply roofing system includes an extensive line of EverGuard TPO flashing accessories for use with EverGuard TPO roofing systems. EverGuard flashing accessories are heat welded to the EverGuard roofing membrane. They are easy to install and provide secure protection from roof edge to parapet to penetration to wall. The following EverGuard TPO flashing accessories are available in standard colors of white, gray and tan.

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preformed Vent Boots</td>
<td>.075” thick molded membrane</td>
<td>• One standard size accommodates most common pipe and conduit • Supplied with stainless steel clamping rings.</td>
<td></td>
<td>9 lbs/carton</td>
</tr>
<tr>
<td>Preformed Corners</td>
<td>.060” thick molded membrane</td>
<td>• Universal style corner accommodates both inside and outside corners of base and curb flashings</td>
<td>4” x 4” with 6” flange • 20 Corners per carton</td>
<td>6 lbs/carton</td>
</tr>
<tr>
<td>Prefabricated Expansion Joint Covers</td>
<td>.045” thick reinforced membrane with foam supported bellows</td>
<td>• Two standard sizes to accommodate most common joint widths • 50’ continuous length minimizes joints • Universal style suitable for both field and wall expansion joints • Factory-fabricated terminations and transitions available</td>
<td>Small: 4” bellows for 1-2” joints • 50’ continuous roll</td>
<td>Small: 50 lbs/roll</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large: 6” bellows for 2-3” joints • 50’ continuous roll</td>
<td>Large: 65 lbs/roll</td>
</tr>
<tr>
<td>UN-55 Detailing Membrane</td>
<td>.055” thick unreinforced membrane</td>
<td>• Alternative flashing/reinforcement material for penetrations and corners • Required wherever preformed vent boots cannot be used</td>
<td>24” x 60’ roll</td>
<td>28 lbs/roll</td>
</tr>
<tr>
<td>TPO 45 mil Utility Flashing Strip</td>
<td>.045” thick reinforced membrane</td>
<td>• Use as membrane cover strip over coated metal joints • Use for stripping in coated metal flanges</td>
<td>8” x 100’ roll</td>
<td>18 lbs/roll</td>
</tr>
<tr>
<td>Coated Metal Sheets</td>
<td>25 gauge steel with a .025” thick membrane film</td>
<td>• TPO membrane is laminated to galvanized sheet metal • Cuts and forms like standard sheet metal • Field and flashing TPO membrane heat welds directly to coated metal • For metal gravel stop and drip edges, metal base and curb flashings, sealant pans and scupper sleeves</td>
<td>4’ x 10’ sheets • 10 or 30 sheets per pallet</td>
<td>47 lbs/sheet</td>
</tr>
<tr>
<td>UN-55 T-Joint Cover Patches</td>
<td>.055 thick reinforced membrane</td>
<td>• Conforming membrane seal for use over T-joints in 60 and 80 mil membrane applications</td>
<td>100 patches per box</td>
<td>9 lbs</td>
</tr>
<tr>
<td>Cut Edge Sealant</td>
<td>Solvent-based liquid sealant</td>
<td>• Sealant provided in squeeze-bottle for use sealing along T-joint patches and exposed edges where required</td>
<td>1 pint bottle</td>
<td>24 lbs/carton</td>
</tr>
<tr>
<td>Walkway Pads and Rolls</td>
<td>1/8” thick (125 mil) extruded and embossed TPO</td>
<td>• Herringbone traction surfacing in gray color • Available in both pads and rolls • Heat welds directly to membrane or installed with seam tape</td>
<td>Pads: 30” x 36”; 1 pad/carton Rolls: 30” x 50’</td>
<td>8 lbs/pad or 118 lbs/roll</td>
</tr>
<tr>
<td>TPO Cover Tape</td>
<td>.045” TPO membrane laminated to butyl tape</td>
<td>• For use in stripping in primed galvanized edge metal • For use in 10 &amp; 15 year guarantees only</td>
<td>6” x 100’ roll • 2 rolls/carton</td>
<td>50 lbs/carton</td>
</tr>
</tbody>
</table>

Notes: 1. Mass and dimensions stated are nominal unless otherwise indicated.
2. Store accessory flashing materials in original cartons, rolls, or sheets on pallets or shelving, in a dry area.
## Description

GAF EverGuard® single-ply roofing systems include a full line of GAFGLAS® asphalt fiberglass base and ply sheets. GAF base and ply sheets are always included as part of a TriPosite™ system. In addition, GAF base sheets can also be installed in conjunction with EverGuard fleece-backed membrane as a venting base sheet recover/separation layer. The following base and ply sheets are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Applicable Standards</th>
</tr>
</thead>
</table>
| **GAFGLAS Stratavent® Eliminator™ Perforated Venting Base Sheet** | Perforated heavy-duty asphalt coated fiberglass base sheet with mineral surfacing on underside | • Dry-applied venting base sheet over isocyanurate insulation, smooth surfaced asphalt built-up/modified bitumen roofing, and prepared mineral-surfaced asphalt or SBS cap sheets
• Perforations allow hot asphalt attachment of EverGuard fleece-backed membrane through base sheet to underlying substrate
• 1 roll provides 1.25 square coverage | • 39” x 40 2/3’
• 75 lbs. | ASTM D4897, Type II
UL Type G2
FM Approved
Dade County Product Approval |
| **GAFGLAS Stratavent Eliminator Nailable Venting Base Sheet** | Non-perforated heavy-duty asphalt coated fiberglass base sheet with mineral surfacing on underside | • Mechanically attached venting base sheet installed directly over nailable decks of all types, and as separation sheet over smooth or mineral surfaced existing roof surfaces
• Allows hot asphalt attachment of EverGuard fleece-backed membrane directly to base sheet | • 39” x 40 2/3’
• 75 lbs. | ASTM D4897, Type II
UL Type G2
FM Approved
Dade County Product Approval |
| **GAFGLAS FlexPly® 6 Premium Ply Sheet** | Premium asphalt coated fiberglass Type VI ply sheet | • Ply sheet installed as 2-ply or 3-ply assembly beneath fleece-backed membrane in TriPosite™ system
• Ply sheet installed as 1-ply or 2-ply vapor retarder assembly
• 1 roll provides 5 square coverage | • 39” x 162’
• 44 lbs. | ASTM D2178, Type VI
UL Type G1
FM Approved
Dade County Product Approval |
| **GAFGLAS Ply 4** | Asphalt coated fiberglass Type IV ply sheet | • Ply sheet installed as 2-ply or 3-ply assembly beneath fleece-backed membrane in TriPosite system
• Ply sheet installed as 1-ply or 2-ply vapor retarder assembly
• Meets or exceeds ASTM D2178, type IV
• 1 roll provides 5 square coverage | • 39” x 162’
• 40 lbs. | ASTM D2178, Type IV
UL Type G1
FM Approved
Dade County Product Approval |
| **GAFGLAS #75 Base Sheet** | Premium roofing base sheet | • Allows hot asphalt attachment of EverGuard fleece-backed membrane directly to base sheet
• Allows mechanical attachment of base sheet to all types of nailable decks
• Meets or exceeds ASTM D4601, Type II
• 1 roll provides 3 square coverage | • 39” x 97.5’
• 75 lbs. | ASTM D4601, Type II
UL Type G2
FM Approved
Dade County Product Approval |
| **GAFGLAS #80 Ultima Base Sheet** | High performance roofing base sheet | • Allows hot asphalt attachment of EverGuard fleece-backed membrane directly to base sheet
• Allows mechanical attachment of base sheet to all types of nailable decks
• Meets or exceeds ASTM D4601, Type II
• 1 roll provides 2 square coverage | • 39” x 65’
• 75 lbs. | ASTM D4601, Type II
UL Type G2
FM Approved
Dade County Product Approval |
| **Ruberoid® 20** | SBS modified premium base sheet | • Base sheet installed as 2-ply assembly beneath fleece-backed membrane in TriPosite system
• Base sheet installed as a 1 ply vapor retarder assembly
• Meets or exceeds ASTM D6163, Type I
• 1 roll provides 1.5 square coverage | • 39” x 49’
• 95 lbs. | ASTM D6163, Type I
Grade S
UL Listed
FM Approved
Dade County Product Approval |

**Note:** Mass and dimensions stated as nominal unless otherwise indicated.
Description

GAF EverGuard® single-ply roofing systems include a full line of GAF air and vapor barrier sheets. GAF air and vapor barrier sheets are easy to install; loose applied sheets require little or no mechanical attachment; fully adhered sheets are adhered with asphalt-based cold adhesive. The following GAF air and vapor barrier sheets are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Weight</th>
</tr>
</thead>
</table>
| Lexsuco® Air/Vapor Barrier Sheet | PVC-based .010" black flexible sheet       | • Air or vapor barrier sheet installed loose over deck and secured by mechanically attached insulation layer  
• Vapor barrier sheet adhered to deck or insulation with Lexsuco adhesive  
• ASTM E-96 Procedure A perm rating of 0.5 or less | 6' X 300'/roll | 143 lbs./roll |
| Lexsuco Adhesive            | Solvent-based rubberized asphaltic adhesive | • Single-surface adhesive applied to deck or insulation substrate surfaces            | 5 gal./pail    | 58 lbs./pail |
| Permate® Vapor Barrier Sheet | Asphalt-impregnated laminated kraft sheet  | • Vapor barrier sheet adhered to deck or insulation with Permate adhesive  
• ASTM E-96 Procedure A perm rating of 0.5 or less | 96" X 405'/roll | 14 lbs./roll |
| Permate Adhesive            | Solvent-based rubberized asphaltic adhesive | • Single-surface adhesive applied to deck or insulation substrate surfaces            | 5 gal./pail    | 58 lbs./pail |

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation. Store air/vapor barrier material in original rolls or pails on pallets or shelving in a dry area. Store adhesives in a 50-80°F conditioned area away from open flame or other combustion source.
Description

GAF EverGuard® single-ply roofing systems include a full line of EverGuard separation sheets, both non-woven polyester (beige in color) and fiberglass fire-resistant (green in color) mat. EverGuard separation sheets are easy to install; loose applied sheets require little or no mechanical attachment. They protect the EverGuard membrane from damage, in the case of non-woven polyester sheets, and improve the overall fire resistance of roof assemblies, in the case of fiberglass sheets. The following EverGuard non-woven polyester sheets and fiberglass sheets are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiberglass Fire Sheet 10</td>
<td>Fire-resistant fiberglass mat</td>
<td>• Separation sheet installed over polystyrene foam insulation beneath mechanically attached and ballast applied membranes to obtain certain fire ratings • Separation sheet installed beneath insulation over wood decks to obtain certain fire ratings</td>
<td>4' X 250'/roll</td>
<td>80 lbs./roll</td>
</tr>
<tr>
<td>Fiberglass Fire Sheet 50</td>
<td>Fire-resistant fiberglass mat</td>
<td>• Separation sheet installed beneath mechanically attached and ballast applied membranes over wood decks to obtain certain fire ratings • Separation sheet installed beneath insulation over wood decks to obtain certain fire ratings</td>
<td>4' X 105'/roll</td>
<td>79 lbs./pail</td>
</tr>
<tr>
<td>Polymat Separation Layer 3 oz.</td>
<td>Non-woven polyester UV-stabilized mat, 3 oz/sq. yd.</td>
<td>• Separation sheet installed beneath mechanically attached and ballast applied membranes to protect from smooth surfaced substrates • Separation sheet installed over ballast applied membranes to protect from sharp edges of crushed or reused stone ballast, and beneath lightweight interlocking concrete pavers</td>
<td>10' X 492'/roll</td>
<td>116 lbs./roll</td>
</tr>
<tr>
<td>Polymat Cushioning Layer 6 oz.</td>
<td>Non-woven polyester UV-stabilized mat, 6 oz/sq. yd.</td>
<td>• Separation sheet installed beneath mechanically attached or ballast applied membranes to protect from granule surfaced, rough and irregular surfaced substrates • Separation sheet installed over ballast applied membranes beneath standard non-interlocking concrete pavers</td>
<td>10' X 328'/roll</td>
<td>125 lbs./roll</td>
</tr>
</tbody>
</table>

Note: Store separation materials in original rolls on pallets or shelving in a dry area. Mass and dimensions stated are nominal unless otherwise indicated.
Product Data Sheet
EnergyGuard™
PolyIso Insulation

Description
EnergyGuard™ Roof Insulation Board is made of organic/glass facers bonded to a core of isocyanurate foam.

Advantages
• High insulation value — Excellent “LTTR” value compared to any other FM Class I rated products of equivalent thickness.
• FM Approved — Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the Factoy Mutual Research Approvals Guide.
• Environmentally safe — Uses EPA accepted blowing agents.
• Lightweight — Lighter than most other insulating products offering comparable thermal resistance; as much as five times lighter in weight than many other materials with the same R-value.
• Excellent dimensional stability.
• Low water permeability — lower overall perm rating than many conventional insulation boards.
• High moisture resistance and no capillarity; is stable and maintains its physical and insulating characteristics.
• Easier handling and faster to install — Because it is light weight, this material is easier to handle on the job site and installs faster.
• Easier cutting in the field provides the installer with simplified fabricating on the roof deck. Minimizes on-the-job damage.

Uses
• EnergyGuard™ Roof Insulation is designed for use over structural roof decks where “R” values of 6.0 or higher are required, along with comprehensive U.L. and FMRC approvals.
• When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
• Refer to the application specifications in the current Membrane Manufacturer’s Application and Specifications Manual for proper installation procedures.

Limitations and Potential Fire Hazard
• EnergyGuard™ Roof Insulation is a non-structural, no-load bearing material. It is not designed for direct traffic usage unless adequately protected.
• EnergyGuard™ Roof Insulation should be stored dry and protected from the elements. No more insulation should be installed than can be completely covered with roofing on the same day.
• As unprotected polyisocyanurate will burn, fire safety precautions should be observed wherever insulation products are used.
• Direct torching of modified bitumen roofing to EnergyGuard™ Roof insulation will present a fire hazard. A properly installed fiber glass base sheet MUST be used over the insulation.

Code Compliance
• Listed by Underwriters Laboratories for use as part of a Class A, B or C Roof Covering. See U.L. Inc. Roofing Materials and Systems Directory for details.
• Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the Factoy Mutual Research Approvals Guide.
• Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.

Thermal and Physical Characteristics

<table>
<thead>
<tr>
<th>Thickness*</th>
<th>LTTR Value**</th>
<th>Maximum Flute Spanability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches/mm</td>
<td>LTR Value*</td>
<td>Spansability</td>
</tr>
<tr>
<td>1.0</td>
<td>25.4</td>
<td>6.0</td>
</tr>
<tr>
<td>1.1</td>
<td>27.9</td>
<td>6.6</td>
</tr>
<tr>
<td>1.2</td>
<td>30.5</td>
<td>7.2</td>
</tr>
<tr>
<td>1.3</td>
<td>33.0</td>
<td>7.8</td>
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<tr>
<td>1.4</td>
<td>35.6</td>
<td>8.4</td>
</tr>
<tr>
<td>1.5</td>
<td>38.1</td>
<td>9.0</td>
</tr>
<tr>
<td>1.6</td>
<td>40.6</td>
<td>9.6</td>
</tr>
<tr>
<td>1.7</td>
<td>25.4</td>
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<td>16.6</td>
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<td>71.1</td>
<td>17.2</td>
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<td>73.6</td>
<td>17.9</td>
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<td>3.0</td>
<td>76.2</td>
<td>18.5</td>
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<tr>
<td>3.1</td>
<td>78.7</td>
<td>19.1</td>
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<tr>
<td>3.2</td>
<td>81.2</td>
<td>19.8</td>
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<td>3.3</td>
<td>83.8</td>
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<td>3.4</td>
<td>86.4</td>
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<td>3.5</td>
<td>88.9</td>
<td>21.7</td>
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<td>3.6</td>
<td>91.4</td>
<td>22.4</td>
</tr>
<tr>
<td>3.7</td>
<td>93.9</td>
<td>23.0</td>
</tr>
<tr>
<td>3.8</td>
<td>96.5</td>
<td>23.7</td>
</tr>
<tr>
<td>3.9</td>
<td>99.1</td>
<td>24.3</td>
</tr>
<tr>
<td>4.0</td>
<td>101.6</td>
<td>25.0</td>
</tr>
</tbody>
</table>

* Other thicknesses available upon request.
** Long Term Thermal Resistance Value provide a 15 year time weighted average in accordance with CAN/ULC S770.
(1) Note: Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances.

Typical Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Absorption, % by Volume—</td>
<td>1.5 max.</td>
<td>ASTM C 209</td>
</tr>
<tr>
<td>Dimensional Stability Change</td>
<td>2 days @158°F (70°C), 90-100% RH</td>
<td>ASTM C 2126</td>
</tr>
<tr>
<td>Lengthwise &amp; Crosswise</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Compression Resistance*</td>
<td>10% Consolidation—psi (kPa)</td>
<td>ASTM D 1621</td>
</tr>
<tr>
<td>20 (138) nom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laminar Tensile Strength—psi (kPa)</td>
<td>4 (28)</td>
<td>ASTM C 209</td>
</tr>
<tr>
<td>Moisture Vapor Transmission**</td>
<td>&lt;1 perm (57.5 g/PA•hr•ft²)</td>
<td>ASTM E 96</td>
</tr>
<tr>
<td>Flame Spread ***</td>
<td>&lt;75</td>
<td>ASTM E 84</td>
</tr>
<tr>
<td>Service Temperature</td>
<td>-100 to 200° F (−73 to 93 °C)</td>
<td></td>
</tr>
</tbody>
</table>

* Also available in 25 psi (172 kPa)
** Foam core only.
***These numerical ratings are not intended to reflect hazards presented by these or any other material under actual fire conditions.

WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE CONDITIONS, INCLUDING MOLD.

31 Product Data Sheet 18
**Product Data Sheet**

**EnergyGuard™ Tapered PolyIso Insulation**

**Description**
EnergyGuard™ Tapered PolyIso Foam Roof Insulation has a thermally efficient polyisocyanurate core bonded between organic/glass facers. It is readily available in the two most popular and efficient tapers, 1/8 inch per foot (1%) and 1/4 inch per foot (2%).

**Advantages**
- Properly designed and installed EnergyGuard™ Tapered PolyIso Foam Insulation Systems virtually eliminates ponding water.
- High thermal efficiency.
- Easily installed with mechanical fasteners, hot asphalt or loose laid in a ballasted system.
- Low point and letter codes are designated on each board.
- Engineering design board lay-outs are available from your plans and field verified dimensions.

**Uses**
- EnergyGuard™ Tapered PolyIso Foam Roof Insulation is designed for use over structural roof decks to provide slope to drain and to provide thermally efficient insulation.
- When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
- Refer to the application specifications in the current Membrane Manufacturer’s Application and Specifications Manual for proper installation procedures.

**Limitations and Potential Fire Hazard**
- EnergyGuard™ Tapered PolyIso Foam Roof Insulation is a non-structural, non-load bearing board. It is not designed for direct traffic usage unless adequately protected.
- EnergyGuard Tapered PolyIso Insulation should be stored dry and be protected from the elements. Once properly loaded at the job site, remove factory wraps and cover with a breathable tarp.
- As an unprotected polyisocyanurate will burn, fire safety precautions must be observed wherever any insulation products are used.
- Direct torching of modified bitumen roofing to EnergyGuard™ Tapered PolyIso Foam Roof Insulation will present a fire hazard. A properly installed fiber glass base sheet MUST be used over the insulation.
- These tapered systems are designed to provide a top surface of slope. Each board is manufactured to exact thickness specifications. GAF cannot be held responsible for field conditions such as actual building dimensions and deck deflection.

**Installation Suggestions for Tapered Systems**
Although each tapered system is different, here are some suggested methods for installing a Tapered PolyIso Foam Roof Insulation system efficiently.

1. Verify building dimensions and drain locations with the Tapered Foam Roof Insulation Shop Drawing. Discrepancies should be reported to GAF prior to shipment.
2. Verify that the proper number of truckloads and piece quantities have been received on the job site.
3. Determine the area to be completed that day.
4. Measure the distance from the drain to the perimeter where the shop drawing indicates full 4 feet x 4 feet insulation boards. Verify that the system will meet the drain piece.
5. Start installing the tapered system utilizing full 4 feet x 4 feet boards. Work from the drain and finish the area where the shop drawing indicates field cutting.

---

6. When more than one layer of insulation is utilized, all vertical board joints should be staggered, preferably by 1/2 board.
7. Cover the insulation with the complete membrane system the same day.

**Code Compliance**
- Listed by Underwriters Laboratories for use under Class A, B, or C Roof Covering. See UL, ULC Inc. Building Materials and Systems Directory for details.
- Approved component of Factory Mutual System Class I, Insulated Steel Deck Construction when secured to the steel deck with mechanical fasteners (such as DRILL-TEC™ roof insulation fastener system).
- Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.

**WARNING:** DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

**Tapered Board Label Designations**

<table>
<thead>
<tr>
<th>1/8&quot; (1%) Slope</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5&quot; to 1.0&quot;</td>
<td>AA</td>
</tr>
<tr>
<td>1.0&quot; to 1.5&quot;</td>
<td>A</td>
</tr>
<tr>
<td>1.5&quot; to 2.0&quot;</td>
<td>B</td>
</tr>
<tr>
<td>2.0&quot; to 2.5&quot;</td>
<td>C</td>
</tr>
<tr>
<td>2.5&quot; to 3.0&quot;</td>
<td>D</td>
</tr>
<tr>
<td>3.0&quot; to 3.5&quot;</td>
<td>E</td>
</tr>
<tr>
<td>3.5&quot; to 4.0&quot;</td>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1/4&quot; (2%) Slope</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5&quot; to 1.5&quot;</td>
<td>X</td>
</tr>
<tr>
<td>1.5&quot; to 2.5&quot;</td>
<td>Y</td>
</tr>
<tr>
<td>2.5&quot; to 3.5&quot;</td>
<td>Z</td>
</tr>
</tbody>
</table>

**NOTE:** REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE CONDITIONS, INCLUDING MOLD.
Typical Tapered Layouts

Two Way Tapered System (Crickets Optional)

Modified Two Way Tapered System with Constant Edge Thickness (Crickets Optional)

Four Way Tapered System with Perimeter Drain

Four Way Tapered System with Variable Edge Thickness

Typical Cross Section 1/8" slope (tapered 1/8" to the foot)

Note: Consult FM Loss Prevention Data Sheets 1-29, 1-49 for specific perimeter and corner fastening details.

Due to ongoing testing programs and changes in FM Global requirements, the number of fasteners and their placement are subject to change without notice.

Consult current FM Approvals Guide and Loss Prevention Data Sheets 1-28, 1-29 and 1-29R for approved fastener density for EnergyGuard Roof Insulations.
Product Data Sheet

EnergyGuard™ Composite Board Polyiso Insulation

Description
EnergyGuard™ Composite Board Roof Insulation consists of an isocyanurate foam core integrally bonded to 1/2 inch thick EnergyGuard™ High Density Fiberboard or EnergyGuard™ perlite on one side and a strong organic glass facer sheet on the other.

Advantages
• The excellent insulating qualities of isocyanurate foam are combined with the strong surface characteristics of high density fiberboard or perlite.
• The fiberboard or perlite side is able to receive hot mopped roof membranes that comply with NRCA bulletin #9.
• Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the Factory Mutual Approvals Guide.
• Fast and easy to apply — light in weight — can be applied to metal decks with mechanical fasteners such as the FM-approved DRILL-TEC™ roof insulation fastener system.
• Bonded components — possibility of delamination virtually eliminated.
• High resistance to compression — not easily damaged by imposed loads, construction traffic, shipping or handling.

Uses
• EnergyGuard™ Composite Board roof insulation is designed for use over structural roof decks where “R” values of 7.4 or higher are required, along with moderate insulation thickness for roof edge detailing, and where comprehensive U.L. and FM approvals are necessary.
• When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
• Refer to the application specifications in the current edition of the Factory Mutual Approvals Guide.
• EnergyGuard™ Composite Board roof insulation, installed fiberboard or perlite side up, is an ideal insulation surface to receive a solid mopped, built-up or modified bitumen roof system.

Limitations and Potential Fire Hazard
• EnergyGuard™ Composite Board is normally installed with the fiberboard or perlite side up.
• EnergyGuard™ Composite Board roof insulation is non-structural, non-load bearing material. It is not designed for direct traffic usage unless adequately protected.
• EnergyGuard™ Composite Board insulation with perlite is not designed to be used with fully adhered single ply membranes. (Use fiberboard for single ply)
• EnergyGuard™ Composite Board roof insulation should be stored dry and protected from the elements. No more insulation should be installed than can be completely covered with roofing on the same day.
• As unprotected composite board will burn, fire safety precautions must be observed wherever insulation products are used.
• Direct torching of modified bitumen roofing to EnergyGuard™ Composite Board roof insulation will present a fire hazard. A properly installed fiber glass base MUST be used over the insulation.

Code Compliance
• Listed by Underwriters Laboratories for use as part of a Class A, B or C Roof Covering.

• Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the Factory Mutual Approvals Guide.
• Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.
• Federal Specifications HH-I-1972/Gen, and HH-I-1972/3

Thermal Values**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>LTR Values</th>
<th>Weight</th>
<th>kg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>38.1</td>
<td>7.4</td>
<td>1.60</td>
</tr>
<tr>
<td>2.0</td>
<td>50.8</td>
<td>10.4</td>
<td>1.69</td>
</tr>
<tr>
<td>2.5</td>
<td>63.5</td>
<td>13.5</td>
<td>1.77</td>
</tr>
<tr>
<td>3.0</td>
<td>76.2</td>
<td>16.7</td>
<td>1.85</td>
</tr>
<tr>
<td>3.5</td>
<td>88.9</td>
<td>19.9</td>
<td>1.93</td>
</tr>
<tr>
<td>4.0</td>
<td>101.6</td>
<td>23.1</td>
<td>2.02</td>
</tr>
</tbody>
</table>

* Other thicknesses available upon request.
** Long Term Thermal Resistance Values provide a 15 year time weighted average in accordance with CAN/ULC S770.

Typical Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Absorption, % by Volume—</td>
<td>1.5 max.</td>
<td>ASTM C 209</td>
</tr>
<tr>
<td>2 hrs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensional Stability Change</td>
<td>&lt;2%</td>
<td>ASTM D 2126</td>
</tr>
<tr>
<td>7 days 41°F(70°C), 90-100% RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lengthwise</td>
<td>&lt;2%</td>
<td></td>
</tr>
<tr>
<td>Crosswise</td>
<td>&lt;2%</td>
<td></td>
</tr>
<tr>
<td>Compression Resistance</td>
<td>20 (138) nom.</td>
<td>ASTM D 1621</td>
</tr>
<tr>
<td>10% Consolidation.—psi (kPa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laminar Tensile Strength—psi (kPa)</td>
<td>4 (28)</td>
<td>ASTM C 209</td>
</tr>
<tr>
<td>Moisture Vapor Transmission**</td>
<td>&lt;1 perm</td>
<td>ASTM E 96</td>
</tr>
<tr>
<td>(57.5 ng/(Pa•s•m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame Spread**,</td>
<td>&lt;75</td>
<td>ASTM E 84</td>
</tr>
<tr>
<td>Service Temperature</td>
<td>-100 to 200 °F (-73 to 93 °C)</td>
<td></td>
</tr>
</tbody>
</table>

**Foam core only.
***These numerical ratings are not intended to reflect hazards presented by these or any other material under actual fire conditions.

WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE CONDITIONS, INCLUDING MOLD.
Description

GAF EverGuard® single-ply roofing systems include a full line of EverGuard/GAF® sealants.

Note: EverGuard/GAF sealants are specially formulated for specific applications; use the correct sealant for the application.

The following EverGuard/GAF sealants are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Units Per Carton</th>
<th>Carton Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>EverGuard Caulk</td>
<td>One-part polyurethane sealant</td>
<td>• Suitable for sealing upper lip of exposed termination bars</td>
<td>Ten (10) 10.3 oz. cartridges</td>
<td>7 lbs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Suitable for sealing around upper edge of penetration clamping rings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Meets ASTM C-920-87, Type S, Grade NS, Class 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EverGuard Water Block</td>
<td>One-part butyl-based high-viscosity sealant</td>
<td>• Suitable for sealing between flashing membrane and substrate surface behind exposed termination bars</td>
<td>Ten (10) 10.5 oz. cartridges</td>
<td>13 lbs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Suitable for sealing between roofing membrane and drain flanges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EverGuard 2-Part Pourable Sealant</td>
<td>100% solids epoxy-based two-part sealant</td>
<td>• Suitable for filling sealant pans at irregularly-shaped penetrations</td>
<td>1 kit = 1 gal Part A and 1 pint Part B</td>
<td>60 lbs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Part A - epoxy</td>
<td>4 kits per carton</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Part B - polyamide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EverGuard Cut Edge Sealant</td>
<td>Sealant used at any non-factory edge of TPO membrane</td>
<td>• Used to seal non-factory edges (cut edges) as a final step in membrane installation</td>
<td>12 pints/ctn.</td>
<td>12 lbs.</td>
</tr>
</tbody>
</table>

Note: Store sealants in original containers on pallets or shelving in a dry area. Store sealants in 50-100°F conditioned area away from open flame or other combustion source.
Description

GAF EverGuard® single-ply roofing systems include a full line of DRILL•TEC fasteners and plates. DRILL•TEC fasteners and plates are required for use with EverGuard roofing systems. All screws, anchors and plates meet the corrosion resistance requirements of FM 4470.

The following DRILL•TEC fasteners and plates are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SXHD Screws (#21)</td>
<td>Super extra heavy duty membrane screws for steel decks</td>
<td>• 2“ – 8” lengths&lt;br&gt;• .320” thread diameter&lt;br&gt;• #3 Phillips head&lt;br&gt;• CR-10 coating</td>
<td>• 500 (2” to 6”)&lt;br&gt;• 250 (7” to 8”)</td>
<td>16 - 44 lbs.&lt;br&gt;26 - 29 lbs.</td>
</tr>
<tr>
<td>XHD Screws (#15)</td>
<td>Extra heavy duty membrane screws for steel decks</td>
<td>• 2“ – 16” lengths&lt;br&gt;• .275” thread diameter&lt;br&gt;• #3 Phillips head&lt;br&gt;• CR-10 coating&lt;br&gt;Special thread and point designed specifically for steel decks</td>
<td>• 1000 (2” to 6”)&lt;br&gt;• 500 (7” to 16”)</td>
<td>20 - 56 lbs.&lt;br&gt;34 - 40 lbs.</td>
</tr>
<tr>
<td>HD Screws (#14)</td>
<td>Heavy duty membrane screws for wood decks</td>
<td>• 1-1/4“ – 16” lengths&lt;br&gt;• .245” thread diameter&lt;br&gt;• #3 Phillips head&lt;br&gt;• CR-10 coating&lt;br&gt;• Suitable for steel and concrete decks&lt;br&gt;• Also suitable for securing termination bar to wood, steel and concrete/masonry surfaces&lt;br&gt;• Pre-drilling 3/16” hole required for concrete/masonry applications</td>
<td>• 1000 (1-1/4“ to 4“)&lt;br&gt;• 500 (5“ to 16”)</td>
<td>12 - 34 lbs.&lt;br&gt;21 - 36 lbs.</td>
</tr>
<tr>
<td>Standard Screws (#12)</td>
<td>Standard duty insulation screws for steel and wood decks</td>
<td>• 1-5/8” – 8” lengths&lt;br&gt;• .215” thread diameter&lt;br&gt;• #3 Phillips head&lt;br&gt;• CR-10 coating&lt;br&gt;• Most economical insulation securement&lt;br&gt;• Preassembled screws and plates also available</td>
<td>• 1000 (all lengths)</td>
<td>12 - 50 lbs.</td>
</tr>
<tr>
<td>DRILL•TEC Spikes</td>
<td>Nail-type membrane/insulation fasteners for concrete</td>
<td>• 2“ – 12” lengths&lt;br&gt;• .250” shank diameter&lt;br&gt;Flat top pan head&lt;br&gt;• CR-10 coating&lt;br&gt;• Pre-drilling 7/32” hole required&lt;br&gt;• Split-bulb design exerts pressure on walls of hole&lt;br&gt;• Hammer-in application</td>
<td>• 500 (all lengths)</td>
<td>12 - 65 lbs.</td>
</tr>
<tr>
<td>DRILL•TEC Polymer Screws</td>
<td>Auger-type membrane/insulation fasteners for gypsum and cementitious wood fiber decks</td>
<td>• 2-1/2“ – 10” lengths&lt;br&gt;• .750” thread diameter 1/4” hex drive&lt;br&gt;• Double internal hex drive&lt;br&gt;• Locking wire barbs for back-out resistance for membrane securement&lt;br&gt;• Glass-filled nylon</td>
<td>• 500 (2-1/2“ to 7-1/2“)&lt;br&gt;• 250 (8“ to 10“)</td>
<td>15 - 34 lbs.&lt;br&gt;18 - 22 lbs.</td>
</tr>
</tbody>
</table>
| SXHD Plates | Super extra heavy duty double barbed steel membrane plates | • 2-3/4” diameter, double barbs<br>• Galvalume coating<br>Required for use with SXHD Screws, HD and DRILL•TEC Spikes for certain FM-approved assemblies. | • 1000 | 38
# Product Data Sheet

**DRILL•TEC™ Fasteners & Plates**

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILL•TEC XHD Plates</td>
<td>Super extra heavy duty double barbed steel membrane plates</td>
<td>• 2-3/8” diameter • Galvalume coating • Suitable for use with Standard Screws, HD Screws, XHD Screws, and DRILL•TEC Spikes</td>
<td>1000</td>
<td>54 lbs.</td>
</tr>
<tr>
<td>DRILL•TEC SHD Plates</td>
<td>Double barbed steel membrane plates</td>
<td>• 2” diameter • Galvalume coating • Suitable for use with Standard Screws, HD Screws, XHD Screws, SHD Screws and DRILL•TEC Spikes</td>
<td>1000</td>
<td>28 lbs.</td>
</tr>
<tr>
<td>DRILL•TEC Insulation Plates</td>
<td>Standard steel insulation plates</td>
<td>• 3” diameter • Galvalume coating • Special design for use with DRILL•TEC Polymer Screws • Polyethylene plastic version also available • Suitable for use with Standard Screws, HD Screws, DRILL•TEC Spikes, and DRILL•TEC Polymer Screws</td>
<td>1000</td>
<td>48 lbs.</td>
</tr>
<tr>
<td>Masonry Anchors</td>
<td>Zinc alloy drive anchor for securing termination bar to masonry/concrete substrates</td>
<td>• 1-1/4”, 1-1/2” lengths • .250” diameter • Stainless steel drive pin • Pre-drilling 1/4” hole required • Hammer-in application</td>
<td>1000</td>
<td>25 lbs.</td>
</tr>
<tr>
<td>Lip Termination Bar</td>
<td>Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener</td>
<td>• 10’ bar length • 3/4” width • .090” cross-section • Prepunched slotted holes at 6” o.c. or 8” o.c.</td>
<td>50 (fifty) 10’ lengths (per tube)</td>
<td>75 lbs. (per tube)</td>
</tr>
</tbody>
</table>

Note: Store in original boxes/tubes on pallets or shelving in a dry area

Mass and dimensions stated as nominal unless otherwise noted.
### Description

EverGuard® single-ply roofing systems include a full line of EverGuard/GAF® adhesives.

**Note:** EverGuard/GAF adhesives are specially formulated for use with specific EverGuard membranes; use the correct adhesive for the application. The following EverGuard/GAF adhesives are available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Benefit/Application</th>
<th>Quantity/Size</th>
<th>Weight</th>
</tr>
</thead>
</table>
| **EverGuard PVC Bonding Adhesive** | Solvent-based rubberized adhesive for use with PVC-based membranes         | • Two-surface contact adhesive applied to both underside of membrane and substrate surface  
  • Suitable for roofing and flashing membranes, including fleece-backed membranes.  
  • Compatible with isocyanurate and fiberboard insulations, and fiber glass-faced gypsum panels  
  • Compatible with concrete, masonry, metal and wood flashing substrates | 5 gallon pail | 36 lbs. |
| **EverGuard TPO Bonding Adhesive** | Solvent-based rubberized adhesive for use with TPO-based membranes         | • Two-surface contact adhesive applied to both underside of membrane and substrate surface  
  • Suitable for roofing and flashing membranes including fleece-backed membranes.  
  • Compatible with isocyanurate and fiberboard insulations, and fiber glass-faced gypsum panels  
  • Compatible with concrete, masonry, metal and wood flashing substrates | 5 gallon pail | 36 lbs. |
| **EverGuard H₂O Bonding Adhesive** | Water-based rubberized adhesive for PVC-based and TPO-based membranes | • Two-surface contact adhesive applied to both underside of membrane and substrate surface  
  • Suitable for roofing and flashing membranes, including fleece-back membranes  
  • Compatible with isocyanurate and fiberboard, insulations, and fiber glass-faced gypsum panels  
  • Compatible with concrete, masonry, metal and wood flashing substrates | 5 gallon pail | 38 lbs. |
| **EverGuard TPO Primer**       | Standard solvent-based primer                                                | • Solvent based primer for galvanized metal edges cover tape  
  • Cleans and prepares TPO membrane and galvanized metal edges prior to installation of EverGuard TPO Cover Tape  
  • Apply Primer using Scotch Brite Pad or equivalent.  
  • Application rate approximately 560 lineal feet per gallon. | 1 gallon can  
  5 gallon pail | 8 lbs.  
  40 lbs. |
| **EverGuard TPO Seam Cleaner** | Solvent-based seam cleaner                                                    | • Use to clean exposed or contaminated seam prior to heat welding.  
  • Use with self-adhering membrane prior to adhering the lap. | 1 gallon can | 7 lbs. |
| **GAF Asphalt Primer**         | General purpose solvent-based asphalt primer                                 | • Meets ASTM D-41  
  • Asphalt primer required prior to application of roofing asphalt  
  • Seals and conditions surface of old smooth and mineral-surfaced built-up roofs, structural, cellular and gypsum concrete decks, and masonry wall surfaces | 5 gallon | 37 lbs. |

Note: Store adhesives and primers in original pails on pallets or shelving in a dry area. 50-100°F conditioned area away from open flame or other. Mass and dimensions stated as nominal unless otherwise indicated.
Chemical Resistance Guide For EverGuard TPO Membrane Systems

While it is difficult to foresee all the potential chemicals and environments to which the EverGuard TPO Roofing Membrane may be subjected, the following guide is suggested to help guide your decisions. The best means to determine whether a substance is compatible with the EverGuard TPO membrane is a laboratory analysis which can take some time to perform.

Some of the following factors affect the severity of a chemical in direct exposure to EverGuard TPO Roofing membrane.

1. Higher temperatures generally have a greater effect on severity of the chemical on the membrane.
2. The concentration of the chemical has a direct effect on degree of compatibility. Usually, the greater the dilution, the greater the potential for compatibility.
3. Occasional exposure to the chemical is typically less severe than continuous exposure.

When roofs are covered with another substance, such as grease, oil or a pool of chemicals, the membrane will be affected in one way or another. It is not a good practice to let any substance remain on the roof surface over time as it will compromise the reflectivity of the membrane and will become a haven for dirt and foreign substances to congregate.

The following chart is suggested to rate the relative effects of the chemical on the EverGuard TPO Roofing membrane according to the following scale:

A = Negligible effect

B = Limited effect

C = Extensive Absorption

D = Extensive Attack

** May produce cracking in material under stress.
-- No data available

Note: When a concentration is not shown, the substance is pure or concentrated.
### EverGuard®
#### TPO Chemical Resistance Guide

<table>
<thead>
<tr>
<th>Environment</th>
<th>Concentration</th>
<th>Temperature °F (°C)</th>
<th>Environment</th>
<th>Concentration</th>
<th>Temperature °F (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>70 (21) 140 (60)</td>
<td></td>
<td></td>
<td>70 (21) 140 (60)</td>
</tr>
<tr>
<td>Acetic acid (glacial)</td>
<td>97</td>
<td>A B</td>
<td>Barium sulfate</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>50</td>
<td>A A</td>
<td>Barium sulfide</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>40</td>
<td>A A</td>
<td>Beer</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>10</td>
<td>A A</td>
<td>Benzene</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Acetone</td>
<td>A A</td>
<td></td>
<td>Benzoic acid</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Acetophenone</td>
<td>B B</td>
<td></td>
<td>Benzyl alcohol</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Acriflavine (2% soln in H₂O)</td>
<td>2</td>
<td>A A</td>
<td>Bismuth carbonate</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Acrylic emulsions</td>
<td>A A</td>
<td></td>
<td>Brine</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Aircraft exhaust (gas &amp; jet fully burned)</td>
<td>A A</td>
<td></td>
<td>Calcium carbonate</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Airport environment (fumes &amp; gases)</td>
<td>A A</td>
<td></td>
<td>Calcium chloride</td>
<td>A</td>
<td>A</td>
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**Note:** The table above lists various chemicals and their corresponding temperatures and concentrations under different environments. The codes (A, B, C, etc.) likely represent different levels of resistance or categories. The °F and °C values indicate the temperature ranges at which these chemicals are effective.
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<tr>
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## EverGuard®
### TPO Chemical Resistance Chart

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</tr>
<tr>
<td>Sodium chlorate 2</td>
<td>10 A A</td>
<td></td>
<td>Trichloroacetic acid 10</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium chlorate 5</td>
<td>A A</td>
<td></td>
<td>Trichloroethylene</td>
<td>C C</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>A A</td>
<td></td>
<td>Triethanolamine</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium chloride 10</td>
<td>A A</td>
<td></td>
<td>Turpentine</td>
<td>C C</td>
</tr>
<tr>
<td>Sodium chloride 20</td>
<td>A A</td>
<td></td>
<td>Urea</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium cyanide</td>
<td>A A</td>
<td></td>
<td>Urine</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>A A</td>
<td></td>
<td>Vegetable oils (general)</td>
<td>A B</td>
</tr>
<tr>
<td>Sodium ferricyanide</td>
<td>A A</td>
<td></td>
<td>Vinegar</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium ferricyanide</td>
<td>A A</td>
<td></td>
<td>Water (distilled, soft, hard &amp; vapor)</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium fluoride</td>
<td>A A</td>
<td></td>
<td>Wet chlorine gas</td>
<td>-- D</td>
</tr>
<tr>
<td>Sodium hydroxide 50</td>
<td>A A</td>
<td></td>
<td>Whisky</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium hydroxide 10</td>
<td>A A</td>
<td></td>
<td>White paraffin</td>
<td>A B</td>
</tr>
<tr>
<td>Sodium hypochlorite 20</td>
<td>A B</td>
<td></td>
<td>White spirit</td>
<td>B C</td>
</tr>
<tr>
<td>Sodium nitrate</td>
<td>A A</td>
<td></td>
<td>Wines</td>
<td>A A</td>
</tr>
<tr>
<td>Sodium nitrate</td>
<td>A A</td>
<td></td>
<td>Xylene</td>
<td>C D</td>
</tr>
<tr>
<td>Sodium silicate</td>
<td>A A</td>
<td></td>
<td>Yeast</td>
<td>A A</td>
</tr>
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<td>Zinc chloride</td>
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<td></td>
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</tr>
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<tr>
<td>Stannous chloride</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stannic chloride</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfates of calcium &amp; magnesium</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfates of potassium &amp; sodium</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid 98</td>
<td>**C D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid 60</td>
<td>B C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid 50</td>
<td>B C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sulfuric acid 10</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-50 Sulfuric-Nitric Acid</td>
<td>**C D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugars and syrups</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfamic acid</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tallow</td>
<td>A B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tannic acid 10</td>
<td>A A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** The data shown are the result of laboratory tests and are intended only as a guide. No performance warranty is intended or implied and GAF guarantees and limited warranties do not cover damage due to oil, grease or chemicals. Ratings were determined by visual examination of coated fabric samples after contact with test fluid for 28 days at room temperature. When considering EverGuard® TPO roofing membrane for a specific application, it is important to study other requirements such as permeability, service temperature, concentration, size to be contained, etc. A sample of EverGuard TPO roofing membrane should be tested in actual service before specification. When impractical, tests should be devised which simulate actual service conditions as closely as possible. The GAF Contractor Services Department should be consulted for further recommendations. This table is presented and accepted at user's risk.
Roof Design

Provides a quick reference of technically oriented suggestions for EverGuard® roofing system design.

Contents

- General
- Building Utilization
- Tear-off or Recover
- Roof Decks
- Parapet Walls
- Roof Drainage
- Expansion Joints
- Area Dividers
- Equipment Mountings
- Fire Resistance
- Wind Performance
- Energy Efficiency
- Water Vapor Transfer
Roof Design

General

Proper roofing system design and selection requires the consideration of many factors. Although our expertise is in roofing system design and materials manufacturing, and not in engineering, architecture, or specialized roof consulting, GAF does have extensive experience in the practical aspects of roofing.

Our experience suggests that careful consideration of the following will provide a fundamentally sound basis for design and selection of EverGuard® single ply roofing systems.

Building Utilization

Building utilization can have a significant impact on roofing system selection and design. The most common building utilization considerations are as follows: extremes in internal temperature/humidity, positive internal pressure, rooftop traffic/abuse, rooftop-exhausted contaminants, and the use of the roof as living space.

- **Internal Temperature/Humidity**
  Extremes in internal temperature/humidity are most often associated with cold storage/freezer buildings, swimming pool facilities, drying kilns, food processing plants, per/pulp mills, and smelting/blast furnace facilities. What makes these building applications unusual is that the pronounced difference in vapor pressure between the building interior and the exterior can cause a pronounced vapor flow through the roof assembly. This can result in a significant build-up of condensation within the roof assembly, and severe deterioration of both the roof assembly itself and the structural deck.
  Relevant design considerations include:
  - Incorporation of vapor retarder at deck level to control vapor flow into and through roof assembly;
  - Attention to vapor-tight seal between roof and side walls/penetrations;
  - Utilization of closed-cell foam insulation and stainless steel fasteners to minimize potential for condensation-related degradation of roof system;
  - Limitation of penetrations through roof deck;
  - Avoidance of roof system attachment through vapor retarder.

- **Positive Internal Pressure**
  Positive internal pressure is most often associated with manufacturing/clean room facilities, mechanical air-handling rooms, aircraft hangars, distribution centers with multiple overhead doors, and high-rise office/residential towers. In all these instances, positive internal pressures can act on the underside of the roof system. Conditions where the positive internal pressure is constant, as in the case of clean room facilities and high-rise towers, may cause the roof system to billow up, i.e., mattress effect, and will reduce the overall uplift resistance of the roofing system. This effect is most pronounced in mechanically attached systems and can cause attachment concerns with all three system types. Conditions where the positive internal pressure is applied suddenly, as in the case of hangars and distribution centers, may cause failure of the roofing system due to pressure impact.
  Relevant design considerations include:
  - Use of air-impermeable deck construction such as poured-in-place concrete or insulating cellular concrete over steel pan;
  - Alternatively, installation of an air barrier such as PVC or PE sheeting at deck level beneath mechanically attached insulation with attachment sufficient to balance positive pressure;
  - Attention to air-tight seal between roof and side walls/penetrations.

- **Physical Abuse**
  Roofing installations that can be expected to experience a high degree of roof traffic due to equipment maintenance, vandalism or other unauthorized access, frequent hailstorms or high winds, and prolonged periods of temperature extremes or rapid fluctuations in temperature, will require a more durable roofing system. Relevant design considerations include:
  - Use of thicker membrane or multiple ply membrane, e.g. Triposite™;
  - Use of a higher compressive strength insulation substrate;
  - Application of a concrete paver or insulated paver overlay for extreme conditions.

- **Contamination**
  Many roofing installations are exposed to oil, grease and chemical contamination in excess of normal air-borne contaminants. These conditions are most often associated with restaurants, food processing plants, chemical and pharmaceutical plants, refineries, machining and manufacturing facilities, and airports. Most roofing materials are degraded by certain families of contaminants, and will become brittle, swell and soften, or dissolve, depending on the material formulation and contaminant type. Long-term exposure, i.e., 28-day immersion testing of roofing material and specific contaminant, remains the preferred method of determining material resistance. Even then, unforeseen combinations of contaminants, environmental exposure effects, and variation
in contaminant concentration prevent an absolute prediction in all but the most common situations. Relevant design/maintenance considerations include:

- Use of TPO or PVC membrane in most contaminated roofing environments;
- Isolation of contaminated roof area with expectation of more frequent roof membrane replacement;
- Periodic power washing of roofing membrane with moderate pressure;
- Limitation of rooftop spillage/exhaust of contaminating materials.

Refer to TPO and PVC Chemical Resistance Charts starting on page 43.

**Tear-Off or Recover**

The decision to tear-off/replace or to repair/recover an existing roofing system before installing a new roofing system is not always clear-cut.

Although not an exhaustive list, the following additional design elements typically require consideration for any reroofing project:

- Replacement of damaged roof decking or structural components;
- Improvement of roof access;
- Removal of unused rooftop equipment and associated equipment mountings;
- Remounting of rooftop equipment to allow proper roofing and flashing technique;
- Matching of architectural elements such as special perimeter metalwork;
- Repair of deteriorated parapet and penthouse walls;
- Protection of roofing membrane by means of concrete paver overlay or walkway pad system.

**Tear-off/Replace**

Factors that support the tear-off approach include:

- Two or more existing roofs (building code restriction);
- Structural weight limitation;
- Over 25% existing roof area wet;
- Flashing height limitation;
- Need to maximize long-term performance.

The basis for any tear-off project is to provide a sound substrate for the installation of a new roofing system and minimize potential damage from tear-off activities. At a minimum, attention to the following considerations is recommended:

- Thoroughly inspect decking, flashing substrates, and wood nailers before installing new materials;
- Plan tear-off strategy so that roof drainage patterns are never blocked, and so that construction traffic is directed away from new roof areas;
- Protect new roof areas adjacent to tear-off areas from dirt, debris and damage.

**Recover**

Factors that support the recover approach include:

- Need to minimize cost;
- Disposal restrictions;
- Difficult access to roof.

The basis for any recover project is to eliminate defects in the existing roof assembly so that their effect on the new roofing system is minimized. At a minimum, attention to the following considerations is recommended:

- Raise all perimeter flashings, penetrations and equipment to provide required flashing heights;
- Address drainage deficiencies to provide positive drainage;
- Remove and replace all wet roofing materials;
- Concentrate on thorough surface preparation.

**Roof Decks**

Most common structural roof deck types are suitable substrates for the installation of an EverGuard® roofing system. It is the responsibility of the engineer, architect, building owner or roofing contractor to determine the fitness of a deck for a specific roofing system installation.

**Structural Steel**

- Min. 22 gauge (standard FM-approved steel decking is 22 ga. in thickness).
- 24-26 gauge decks require EverGuard Contractor Services approval. Thinner-gauge steel decks usually require additional mechanical fasteners to achieve comparable roof attachment performance.
- 18 ga., 20 ga., and 22 ga. Grade E high-strength steel decks usually require fewer mechanical fasteners to achieve comparable roof attachment performance.

**Structural Concrete**

- Min. 2500 psi compressive resistance
- Min. 2" thickness (precast), min. 4" thickness (poured-in-place).
- Cannot be wet or frozen. If the deck is determined to be wet, it must be allowed to dry.
- For insulated decks, wood nailers of equivalent thickness
to the roof insulation must be provided at perimeters and projection openings to act as an insulation stop and to provide for the nailing of the flanges of metal flashing.

- Ridges and other irregularities require grinding to provide a smooth and even substrate surface.
- For non-insulated decks, nailers must be flush with deck surfaces.
- When applying insulation directly to the deck in hot asphalt, prime with asphalt/concrete primer, ASTM D41, at a rate of 1 gal/square and allow the primer to dry prior to the application of the roofing system.

- Poured-in-place decks:
  - must be properly cured prior to application of the roofing system; twenty eight (28) days is normally required for proper curing. Curing agents must be checked for compatibility with roofing materials. Prior to the installation of the roof assemblies, GAF recommends the evaluation of the surface moisture and deck’s dryness through the use of ASTM D-4263 or hot bitumen test.

- Pre-cast concrete decks:
  - are usually manufactured as planks or slabs and constructed of steel reinforced Portland cement and solid aggregate; often they are made with hollow cores to minimize their weight.
  - all deformed panels must be replaced.
  - joints must be filled with a masonry grout to correct imperfections between slabs and feathered to provide a slope not greater than 1/8” per foot for fully adhered insulated assemblies.
  - if the joints cannot be grouted and finished smooth, then a leveling course of lightweight insulating concrete (minimum 2” thickness) must be applied. Do not seal joints between the slabs; leave open to permit venting and drying of the roof fill from below.

- Prestressed concrete decks:
  - GAF recommends a minimum 2” cellular lightweight concrete fill be installed over all prestressed concrete decks prior to installation of the roof system and/or insulation because variations in camber and thickness of prestressed concrete members may make securement of the roof system difficult.
  - provisions must be made for the curing or drying of the fill installed over the top of the prestressed deck members. Do not seal joints between the slabs/leave open to permit venting and drying of the roof fill from below.

- All boards must have a bearing on rafters at each end and be securely fastened.
- Lumber should be kiln dried.
- Preservatives or fire retardants used to treat decking must be compatible with roofing materials.
- Decking should be kept dry and roofed promptly after installation.
- Tape and staple fastening systems may be used on wood decks when they comply with local building codes and agencies.

- Plywood/Oriented Strandboard
  - Min. 1/2” thickness (standard FM-approved plywood decking is fire-rated 3/4” in thickness).
  - Tongue & groove edges or full blocking required.
  - Oriented strandboard (OSB) decks shall comply with Structural 1 rating.
  - Plywood sheathing shall be exterior grade, minimum 4 ply, not less than 15/32” thick.
  - Must be installed over joists not greater than 24” o.c.
  - Must be installed so that all four sides of each panel bear on and are secured to joists and cross blocking; the panels must be secured in accordance with the APA–The Engineered Wood Association recommendations. “H” clips are not acceptable.
  - Panels must be installed with a 1/8” to 1/4” gap between panels and must match vertically at joints to within 1/8”.
  - Decking should be kept dry and roofed promptly after installation.
  - Tape and staple fastening systems may be used on wood decks when they comply with local building codes and agencies.

- Gypsum Concrete
  - Min. 2” thickness
  - Steel reinforcing mesh and permanent formboards required for poured-in-place monolithic decks.
  - Steel-reinforced edges required for precast decking units.
  - An average fastener withdrawal resistance as recommended by the fastener manufacturer must be obtained. If proper mechanical attachment cannot be achieved, please contact our Technical Hotline for assistance with installation recommendations.
  - If either surface-wet or frozen, a poured gypsum deck is not suitable to receive a roof.

- Cementitious Wood Fiber
  - Min. 2” thickness
  - Tongue & groove panel edges required.
OSB or insulation composite decks for use with fully adhered systems require EverGuard Contractor Services approval.

Should not be installed over high humidity occupancies.

All structural wood fiber deck panels must be anchored against uplift and lateral movement.

**Insulating Concrete**
- Min. 2” thickness
- Cellular concrete decks may be installed over permanent venting steel forms.
- Aggregate lightweight insulating concrete decks must be installed over permanent venting steel forms.
- Insulating concrete installed over structural concrete or existing roof membrane substrates requires EverGuard Contractor Services approval.
- Lightweight insulating concrete decks are required to have a minimum compressive strength of 125 psi and a density of 22 pcf. Individual deck manufacturers’ standards apply when their specifications exceed these GAF minimum thickness, compressive strength, and density requirements.
- Where the Mean January Temperature (reference current ASHRAE Fundamentals Handbook) is below 40F, lightweight insulating concrete decks must be poured and roofed between April 1st and October 31st; this type of deck is unacceptable in Alaska.
- Lightweight insulating concrete should not be poured during rainy periods; deck areas which have frozen before they have cured must be removed and replaced. Decks which receive precipitation prior to installation of the roof membrane must be checked for moisture content and dryness.
- Solid metal decking and structural concrete decks are among those not acceptable to receive an aggregate based lightweight insulating concrete mix.
- Cellular lightweight insulating concrete decks can be installed over non-slotted, galvanized metal decking designed for cellular lightweight insulating concrete or structural concrete.
- Fully adhering an EverGuard fleece-back membrane to insulating concrete is acceptable when the deck has less than 15% moisture content. Contact GAF Contractor Services for additional requirements.

**Mineral Panel/Steel Composite**
- Min. 25 ga. steel decking, 15/16” deep with 1/2” thick mineral board top panel
- Polystyrene or polyisocyanurate insulation is optional.
- Most common brand name is Loadmaster™.
- Requires EverGuard Contractor Services approval.

**Parapet Walls**

Most common structural wall types are suitable substrates for the installation of EverGuard membrane flashing.

**Brick/Block Masonry**
- Standard-finish brick and concrete block with standard tooled mortar joints.
- Split-face block, textured block and brick, and deeply tooled mortar joints require a cementitious parget coating or plywood facing to provide a smooth and even substrate surface.

**Structural Concrete**
- Steel trowel, wood float or removable form finish.
- Ridges and other irregularities require grinding to provide a smooth and even substrate surface.

**Stucco/EIFS**
- Stucco finish and EIFS systems must be removed to the underlying substrate surface.

**Plywood/Oriented Strandboard**
- Min. 1/2” thickness (exterior-grade).
- Tongue and groove edges or full blocking required.

**Sheet Metal**
- Min. 24 ga. steel.
- Min. .032” aluminum.
- Corrugated panels require overlay of 15/32” plywood/oriented strandboard or silicone-impregnated gypsum panel.
- Requires air block at the top of the wall to prevent billowing of the base flashing.

**Gypsum Panel (Dens-Deck®)**
- Min.1/2” thickness.
- Silicone-impregnated fiberglass-faced panels.
- Most common brand name is Dens-Deck™.
- Underlying substrate must allow securement of flashing at prescribed spacing. Mechanical attachment to gypsum panels is not acceptable.
- Requires EverGuard® Contractor Services approval.

**Roof Drainage**

Providing positive roof drainage is important. Standing water can result in deck deflection and possible structural damage. In addition, in the event of an opening through the roofing...
membrane, standing water can significantly worsen damage to the roof system, the building itself, and interior contents by providing a reservoir of water ready to gravitate through the membrane opening. Providing structural slope in the deck assembly, installing a tapered lightweight cellular concrete overlay, installing a tapered insulation system, or adding additional drains are the most common methods of achieving positive drainage.

National building codes generally require a minimum 1/4" per 12" slope to drain in order to provide positive drainage and accommodate deck irregularities. Although existing buildings may or may not be required to achieve this degree of roof slope, providing positive slope to drain remains an important design consideration.

In situations where roof edge conditions, window/door height above the roof surface, parapet wall height, weep hole locations, rooftop equipment mountings, or other factors prevent the installation of a full slope-to-drain system, a combination of additional drain locations, tapered saddles, and crickets to direct drainage to drain points should be considered.

**Expansion Joints**

The function of a structural expansion joint is to minimize the effect of stresses and movements on building components and to prevent these stresses from adversely affecting the building. The design, location and use of building structural expansion joints must be considered at the time of original building design and are the responsibility of the architect, engineer and building owner.

Expansion joints:
- Must be continuous along the break in the structure and not terminated short of the end of the roof deck.
- Should never be bridged with insulation or roofing membrane.
- Construction ties must be removed in order for expansion joints to function properly.
- Extend expansion joints at least 8" above the roof surface on curbs and use either Metalastic® flexible expansion joint covers or metal caps or covers.
- Design drainage flow patterns so they are not blocked by any structural expansion joints.
- Where possible, position walkways on roof access points to limit roof traffic over expansion joints; provide protective coverings for expansion joints at locations of repeated roof traffic.

**Area Dividers**

Area dividers are not considered structural expansion joints. They can be installed to separate different roofing systems and can be either a curb or low profile type. Contact our Technical Helpline for recommendations regarding area dividers.

**Equipment Mountings**

Proper mounting of equipment is an important consideration. In general, rooftop equipment should be mounted in such a way as to provide adequate flashing height for both new and anticipated recover roof system applications, sufficient clearance around and beneath the equipment to facilitate roof system installation, and compatibility with roofing and flashing materials so that standard flashing methods can be readily applied.

Alternately, lightweight equipment and gas/conduit lines can be installed on pressure treated wood blocking or other prefabricated device that does not penetrate the roofing system. This type of application should not be used for heavy equipment or where excessive movement can damage the substrate or membrane.

**Fire Resistance**

Resistance by the roofing system to fire applied to the exterior roof surface is important. Typically, a UL Class A or B rating is required by building code. Occasionally, depending on the use of the building, special resistance to fire applied from within the building is required. This is normally expressed in the form of hourly ratings, and usually requires the use of a specialized roof assembly.

Reference to current EverGuard® listings in the appropriate UL directory is recommended to verify roof assembly requirements for specific fire ratings.

**Wind Performance**

Ideally, roofing systems should be capable of resisting the forces generated by the maximum anticipated wind speed for a specific building. One widely accepted method for specifying wind performance is to require the appropriate FM 1-60, 1-90, or other rated system as appropriate for a specific building based upon location and exposure.

The following are common wind codes and approvals typically used in conjunction with EverGuard® roofing systems:
• Factory Mutual Research Corporation
  – Testing based on method described in Approval Standards 4450 and 4470.
  – Measures resistance to upward pressure applied to the roof system.

• American Society of Civil Engineers 7-02 Wind Design
  – A comprehensive analysis of wind forces acting on buildings. Requires detailed calculations to determine actual wind pressures at different regions of the roof.
  – Referenced by building codes.

Refer to Factory Mutual Loss Prevention Data Sheets 1-28 and 1-29 for specific installation guidelines.

GAF provides the following thermoplastic half sheet table to use as a guide for mechanically attached systems because wind pressures are increased in the corners of the roof, with somewhat lower increased pressures acting along the remaining roof perimeter. The remaining field area of the roof normally experiences significantly lower wind pressures than either the corner or perimeter areas.

**Perimeter Half Sheet Table**

<table>
<thead>
<tr>
<th>Building Width</th>
<th>Building Height</th>
<th>Number of EverGuard TPO 60” Half Sheets</th>
<th>Number of EverGuard PVC 36” Half Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;200’</td>
<td>0-34’</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>35-100’</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&gt;200’</td>
<td>&gt;100’</td>
<td>Install half sheets throughout the perimeter and corner region. The width of this region is defined as the least of the following two measurements: 0.1 x building width or 0.4 x building height. Note: The minimum width is 4’.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>any height</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The perimeter area, as defined in the above table, may be fully adhered as an alternative to using half sheets. When fully adhering the perimeter area, the number of insulation fasteners must be increased in these areas; refer to the insulation attachment section for fully adhered membranes. Refer to the sheet lay-up details in the mechanically attached system section for requirements on the installation of these half sheets.

**Energy Efficiency**

Thermal transmission standards have been established by building codes for most buildings. Roof insulation installed above the roof deck is a practical means of achieving the necessary energy efficiencies. In addition, the use of white-colored reflective membranes can reduce the heat load on air conditioning equipment, as well as providing a moderating effect on the temperature in proximity to the building.

• **U-Value**
  – Thermal Transmittance – The number of BTU’s (energy) that pass through a 1 square foot sample of a total material assembly in one hour with a temperature difference between the two surfaces of 1 degree F.
  – The U-value is the reciprocal of the Summation of all R-values for all materials in an assembly.
  – Units of Thermal Transmittance are expressed as: (BTU) / (h) (sq.ft.) (F).
  – Thermal Transmittance applies to an actual total material assembly, and as such is a quantitative physical property that can be used to represent the overall thermal performance of a system.

• **R-Value**
  – Thermal Resistance – The number of degrees difference between two surfaces (energy difference) that is required to obtain an energy flow of 1 Btu through a 1 square foot sample of a given material thickness in one hour.
  – The R-value is the reciprocal of the C-value.
  – Units of Thermal Resistance are expressed as: (F) (sq.ft.) (h) / (BTU).
  – Thermal Resistance applies to an actual thickness of a material, and as such is a quantitative physical property that can be used for determining insulation requirements.

• **Reflectance**
  – A measure of the % of solar energy that is reflected away from a surface
  – Dark materials absorb more heat from the sun and can be up to 70°F hotter than a reflective white surface given the same outside temperature and conditions such as wind speed, location, etc.

• **Emittance**
  – A measure of the infrared radiation emitted from a roof surface. Unlike reflectance, infrared emissivity may not be affected by dirt or discoloration of the surface of a material.

The following references provide useful information regarding energy efficiency:

• **ASHRAE Fundamentals Handbook**
  – Provides detailed design calculations and material energy transfer information utilized by mechanical engineers in the design of heating, ventilation and air conditioning systems.
- Suitable for complex energy evaluation considerations such as solar heat gain, exterior shading, total building envelope, building usage, and lighting.

- **NRCA Energy Manual**
  - Provides a simplified method for determining the amount of insulation necessary to construct an energy efficient low-slope roof system.
  - Provides a simplified method for determining the energy cost savings resulting from the installation of additional roof insulation.
  - Suitable for most roofing-related energy evaluations.

- **DOE Energy Calculator**
  - Go to www.ornl.gov/sci/roofs-walls/facts/CoolCalcEnergy.htm to find the Cool Roof Calculator.
  - This tool measures the energy savings for low slope roofs with non-black roof surfaces.

- **Energy Star Reflective Roof Products**
  - Go to www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products for the current listing of Energy Star qualified roof products
  - Low slope roofing materials requires minimum solar reflectance of 0.65 as manufactured and 0.50 after 3 years of aging.

### Water Vapor Transfer

Typical single-ply roof assemblies do not include vapor retarders as a standard assembly component. For these applications, there is a natural transfer of water vapor into the roof assembly during a portion of the year, followed by a natural transfer of water vapor out of the roof assembly during the balance of the year. Under normal conditions, this type of cyclical water vapor flow does not cause a significant deterioration of the roof insulation or reduction in insulation thermal performance.

However, for projects where there is a significant difference in vapor pressure between building interior and exterior, the volume of water vapor flow is much greater, and control of water vapor transfer into and through a roof system becomes an important consideration. Without adequate control provisions, the roof insulation can become saturated with water, with a corresponding reduction in insulation thermal performance. Structural deck damage and/or condensation into the building interior may also occur.

Vapor flow is referenced in various ways. The following is a description of common terminologies:

- **Permeance**
  - The time rate of vapor transmission through a flat material or construction induced by vapor pressure difference between two specific surfaces, under specified temperature and humidity conditions.
  - Units of Permeance are expressed as: (gr) / (h) (sq.ft.) (in. Hg).
  - The permeance, or perm rating, of a material is a performance evaluation specific to a sample of material, and not a specific property of the material.

- **Relative Humidity**
  - Relative humidity is the ratio of the pressure of water vapor present in air to the pressure of fully saturated water vapor at the same temperature.
  - Relative Humidity is expressed as a percentage.

- **Dew Point Temperature**
  - The temperature at which air becomes saturated with saturated vapor (100 percent relative humidity) and condensation begins to form.
  - Dew Point Temperature is expressed as F degrees.
  - A number of basic considerations factor into the need and location of a vapor retarder. Determining the need and location of the vapor retarder is the responsibility of the Design Professional.

- **Temperature and Relative Humidity**
  - Vapor flows based upon a difference in vapor pressure between two locations, and flows from higher to lower pressure regions.
  - Normally, the higher the temperature, the higher the vapor pressure.
  - In determining the need for a vapor retarder for most typical conditions, the exterior winter temperature and the interior winter relative humidity are the most critical factors.
  - Temperature information is readily available from the National Weather Service.
  - Relative humidity information is typically available from the building HVAC design professional or the building operations manager. Relative humidity can also be field measured.

- **Vapor Retarder Location**
  - Vapor retarders are intended to be installed as close to the warm side of the roof assembly as possible. Normally, this places the vapor retarder directly on the structural deck or directly over a minimal layer of EnergyGuard insulation or fire barrier.
  - A sufficient amount of EnergyGuard® insulation must be installed over the vapor retarder to raise the dew point location above the level of the vapor retarder.

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• **Sealing At Perimeter And Penetrations**
  - Vapor retarders shall be completely sealed at all perimeter and penetration locations.
  - Sealing methods shall be selected in accordance with type of vapor retarder being installed.
  - Air leakage at perimeter and penetrations will significantly reduce the effectiveness of the vapor retarder by allowing moist air to penetrate into the roof assembly where it can condense and cause roof deterioration.

• **Building Usage**
  - Normal building usage such as offices, schools, retail, warehousing, etc. will not normally require the use of a vapor retarder except when located in the most northerly climates.
  - Building usage such as swimming pools, food processing, paper manufacturing, foundries, etc. that result in increased internal temperatures and humidity conditions will likely require the use of a vapor retarder except when located in the most southerly climates.
  - These generalizations are not intended to substitute for actual vapor flow calculations based upon specific building and climatic conditions.

• **The Case For The Use Of A Vapor Retarder**
  - A vapor retarder can protect the long term thermal resistance of insulation sandwiched between the vapor retarder and the membrane.
  - A vapor retarder provides a good safeguard against vapor migration in case a building’s use changes from a “dry” use to a “wet” use.

• **The Case Against The Use Of A Vapor Retarder**
  - The vapor retarder, together with the roofing membrane, may seal within the roof system entrapped moisture that can eventually destroy the insulation, wrinkle the membrane or, in gaseous form, blister it.
  - In the event of a roof leak through the membrane, the vapor retarder will trap the water in the insulation and release it through punctures, breaks, or poor seals in the vapor retarder that may be some lateral distance from the roof leak, thus making leak discovery more difficult. A large area of insulation may be saturated before the punctured roof membrane is discovered and repaired.
  - A vapor retarder is a disadvantage in summer, when vapor migration is generally downward through the roof (hot, humid air can infiltrate the roofing sandwich through the vents, or through diffusion through the roof membrane; it may condense on the vapor retarder itself).

The following resources may provide useful information regarding vapor retarders:
  - NRCA Energy Manual
  - U.S. Army Corps of Engineers – CRREL
  - ASHRAE Fundamentals Handbook
Mechanically Attached Systems

Membrane attached in the lap with screws and plates

Contents

- Specification Plates
- Insulation Attachment Plate
- Membrane Attachment Plate
- TPO Mechanically Attached Installation Specification
- Roofing Details
## INSULATED TPO MECHANICALLY ATTACHED SYSTEMS SPECIFICATION PLATE

### Membrane Type
- **T**: TPO
- **P**: PVC
- **E**: EPDM

### Construction Type
- **N**: New
- **R**: Recover
- **T**: Tear Off (Complete)

### Insulation
- **I**: Insulated
- **N**: Non-Insulated

### Membrane Attachment
- **MA**: Mechanically Attached
- **FA**: Fully Attached
- **RA**: Roll Applied

### TMA R I 60FB

### Specification Number

<table>
<thead>
<tr>
<th>Specification Number</th>
<th>Attachment Type</th>
<th>Construction Type</th>
<th>Insulation</th>
<th>TPO Thickness</th>
<th>Guarantee Length Up To (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MA-N-I-45</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>Yes</td>
<td>.045</td>
<td>12</td>
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<tr>
<td>T-MA-N-I-60</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>Yes</td>
<td>.060</td>
<td>15</td>
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<tr>
<td>T-MA-N-I-80</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>Yes</td>
<td>.080</td>
<td>20</td>
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<tr>
<td>T-MA-T-I-45</td>
<td>Mechanically Attached</td>
<td>Tear Off</td>
<td>Yes</td>
<td>.045</td>
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<tr>
<td>T-MA-T-I-60</td>
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<td>Tear Off</td>
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<tr>
<td>T-MA-T-I-80</td>
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<td>Mechanically Attached</td>
<td>Recover</td>
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<td>.045</td>
<td>12</td>
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<tr>
<td>T-MA-R-I-60</td>
<td>Mechanically Attached</td>
<td>Recover</td>
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</tr>
<tr>
<td>T-MA-R-I-80</td>
<td>Mechanically Attached</td>
<td>Recover</td>
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<td>.080</td>
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<tr>
<td>T-MA-N-I-45FB</td>
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<td>Yes</td>
<td>.045 FB</td>
<td>12</td>
</tr>
<tr>
<td>T-MA-N-I-60FB</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>Yes</td>
<td>.060 FB</td>
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</tr>
<tr>
<td>T-MA-N-I-80FB</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>Yes</td>
<td>.080FB</td>
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</tr>
<tr>
<td>T-MA-T-I-45FB</td>
<td>Mechanically Attached</td>
<td>Tear Off</td>
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</tr>
<tr>
<td>T-MA-T-I-60FB</td>
<td>Mechanically Attached</td>
<td>Tear Off</td>
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<tr>
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<td>Mechanically Attached</td>
<td>Tear Off</td>
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<td>.080FB</td>
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</tr>
<tr>
<td>T-MA-R-I-45FB</td>
<td>Mechanically Attached</td>
<td>Recover</td>
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<td>.045 FB</td>
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<tr>
<td>T-MA-R-I-60FB</td>
<td>Mechanically Attached</td>
<td>Recover</td>
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<tr>
<td>T-MA-R-I-80FB</td>
<td>Mechanically Attached</td>
<td>Recover</td>
<td>Yes</td>
<td>.080FB</td>
<td>20</td>
</tr>
</tbody>
</table>

Refer to Insulation Attachment and Membrane Attachment Tables for attachment requirements.
Mechanically attached system require the use of half sheets.
# NON-INSULATED TPO MECHANICALLY ATTACHED SYSTEMS SPECIFICATION PLATE

<table>
<thead>
<tr>
<th>Specification Number</th>
<th>Attachment Type</th>
<th>Construction Type</th>
<th>Insulation</th>
<th>TPO Thickness</th>
<th>Guarantee Length Up To (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MA-N-N-45</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>No</td>
<td>.045</td>
<td>12</td>
</tr>
<tr>
<td>T-MA-N-N-60</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>No</td>
<td>.060</td>
<td>15</td>
</tr>
<tr>
<td>T-MA-N-N-80</td>
<td>Mechanically Attached</td>
<td>New</td>
<td>No</td>
<td>.080</td>
<td>20</td>
</tr>
<tr>
<td>T-MA-T-N-45</td>
<td>Mechanically Attached</td>
<td>Tear Off</td>
<td>No</td>
<td>.045</td>
<td>12</td>
</tr>
<tr>
<td>T-MA-T-N-60</td>
<td>Mechanically Attached</td>
<td>Tear Off</td>
<td>No</td>
<td>.060</td>
<td>15</td>
</tr>
<tr>
<td>T-MA-T-N-80</td>
<td>Mechanically Attached</td>
<td>Tear Off</td>
<td>No</td>
<td>.080</td>
<td>20</td>
</tr>
<tr>
<td>T-MA-R-N-45</td>
<td>Mechanically Attached</td>
<td>Recover</td>
<td>No*</td>
<td>.045</td>
<td>12</td>
</tr>
<tr>
<td>T-MA-R-N-60</td>
<td>Mechanically Attached</td>
<td>Recover</td>
<td>No*</td>
<td>.060</td>
<td>15</td>
</tr>
<tr>
<td>T-MA-R-N-80</td>
<td>Mechanically Attached</td>
<td>Recover</td>
<td>No*</td>
<td>.080</td>
<td>20</td>
</tr>
<tr>
<td>T-MA-N-N-45FB</td>
<td>Mechanically Attached</td>
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<td>No</td>
<td>.045 FB</td>
<td>12</td>
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<tr>
<td>T-MA-N-N-60FB</td>
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<tr>
<td>T-MA-N-N-80FB</td>
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<td>.080FB</td>
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</tr>
<tr>
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<td>Tear Off</td>
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<td>Recover</td>
<td>No</td>
<td>.060 FB</td>
<td>15</td>
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<tr>
<td>T-MA-R-N-80FB</td>
<td>Mechanically Attached</td>
<td>Recover</td>
<td>No</td>
<td>.080FB</td>
<td>20</td>
</tr>
</tbody>
</table>

* Separator Sheet required; 3/6 oz polymat or FR 50/10

Refer to Insulation Attachment and Membrane Attachment Tables for attachment requirements.
Mechanically attached system require the use of half sheets.
### Insulation Attachment Table For Mechanically Attached Systems
(Meets FM attachment requirements*)

<table>
<thead>
<tr>
<th>Insulation Type</th>
<th>Board Size</th>
<th>Thickness</th>
<th>Fasteners/Board</th>
<th>Field</th>
<th>Perimeter</th>
<th>Corner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isocyanurate</td>
<td>4x4</td>
<td>any</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>1/2&quot; - 1.2&quot;</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>≥1.3&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Perlite</td>
<td>4x4</td>
<td>any</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Wood fiber</td>
<td>4x4</td>
<td>any</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>any</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Extruded Polystyrene***</td>
<td>4x4</td>
<td>any</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>1/2&quot; – 1.2&quot;</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>≥1.3&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Expanded Polystyrene***</td>
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<td>4</td>
<td>4</td>
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<td>4x8</td>
<td>1/2&quot; – 1.2&quot;</td>
<td>6</td>
<td>6</td>
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<td>6</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>≥1.3&quot;</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>XEPS Fanfold – TPO or Fleece backed PVC only</td>
<td>Fanfold**</td>
<td>3/8&quot; min.</td>
<td>2-1-2-1-2</td>
<td>2-1-2-1-2</td>
<td>2-1-2-1-2</td>
<td></td>
</tr>
<tr>
<td>Gypsum Board</td>
<td>4x8</td>
<td>1/4&quot; – 5/8&quot;</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

### TYPE OF INSULATION FASTENER

<table>
<thead>
<tr>
<th>Deck</th>
<th>Fastener</th>
<th>Plate</th>
<th>Penetration (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel – all gauges</td>
<td>Drill*Tec HD (#14) or Standard (#12)</td>
<td>3” Galvalume</td>
<td>3/4” through the deck</td>
</tr>
<tr>
<td>Wood – plank and sheathing</td>
<td>Drill*Tec HD (#14) or Standard (#12)</td>
<td>3” Galvalume</td>
<td>1” thread into/through the deck</td>
</tr>
<tr>
<td>Structural Concrete</td>
<td>Drill<em>Tec HD (#14) or Drill</em>Tec Spike</td>
<td>3” Galvalume</td>
<td>1” thread/shank into the deck</td>
</tr>
<tr>
<td>Insulating Concrete</td>
<td>Drill*Tec HD (#14)</td>
<td>3” Galvalume</td>
<td>3/4” thread through steel form</td>
</tr>
<tr>
<td>Gypsum Concrete</td>
<td>Drill*Tec Polymer screw</td>
<td>3” Galvalume</td>
<td>1 1/2” thread into the deck</td>
</tr>
<tr>
<td>Cementitious Wood Fiber</td>
<td>Drill*Tec Polymer screw</td>
<td>3” Galvalume</td>
<td>1 1/2” thread into the deck</td>
</tr>
</tbody>
</table>

*Attachment requirements to meet determined uplift resistance are dependent on deck type, specific fastener, etc. Refer to FM Loss Prevention Data Sheet 1-28.

**Fanfold attachment spacing is for each 2’x4’ section.

***Smooth PVC must have 3/6 oz. polymat separator sheet.
# TPO Membrane Attachment Table For Mechanically Attached Systems

(10’ field sheets, except when noted)

<table>
<thead>
<tr>
<th>Deck Type</th>
<th>Minimum Pull-out Values (lbs)</th>
<th>Fastener Type</th>
<th>Plate</th>
<th>Penetration</th>
<th>Standard Pattern</th>
<th>90 psf Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 ga. standard</td>
<td>450</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td>450</td>
<td>Drill•Tec XHD (#15)</td>
<td>2” double barbed</td>
<td>3/4” through the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td>450</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/4” double barbed SXHD</td>
<td>3/4” through the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td>22 ga. high strength (Grade E)</td>
<td>750</td>
<td>Drill•Tec SXHD (#21)</td>
<td>2 3/4” double barbed SXHD</td>
<td>3/4” through the deck</td>
<td>12” o.c.</td>
<td>12” o.c.</td>
</tr>
<tr>
<td></td>
<td>450</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/4” double barbed SXHD</td>
<td>3/4” through the deck</td>
<td>12” o.c.</td>
<td>12” o.c. (8’ wide field sheets only)</td>
</tr>
<tr>
<td>24 ga. standard</td>
<td>350</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec XHD (#15)</td>
<td>2” double barbed</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/4” double barbed SXHD</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>3/4” through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td>2” Nominal Wood Plank</td>
<td>800</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td>1” Nominal Wood Plank</td>
<td>450</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>Through the deck</td>
<td>9” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>450</td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>Through the deck</td>
<td>9” o.c.</td>
<td></td>
</tr>
<tr>
<td>3/4” Nominal Wood Plank</td>
<td>525</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>Through the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td>525</td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>Through the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
</tbody>
</table>

*90 psf is attachment pattern to provide 90 lbs. per square foot of uplift pressure resistance and may equate to FM I-90, Refer to current FMRC Approval Guide.

NOTE: For designing at elevated uplift pressures, please consult the current FMRC Approval Guide.
<table>
<thead>
<tr>
<th>Deck Type</th>
<th>Minimum Pull-out Values (lbs)</th>
<th>Fastener Type</th>
<th>Plate</th>
<th>Penetration</th>
<th>Standard Pattern</th>
<th>90 psf Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; Plywood</td>
<td>350</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>Through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>Through the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td>Structural Concrete</td>
<td>700</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/8” barbed XHD</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec XHD (#15)</td>
<td>2” double barbed</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td>900</td>
<td>Drill•Tec Spike (#15)</td>
<td>2 3/8” barbed XHD</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec Spike (#15)</td>
<td>2” double barbed</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec Spike (#15)</td>
<td>2 3/4” double barbed SXHD</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td>Lightweight Insulating Concrete, 22 ga. standard form</td>
<td>450</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the form</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec XHD (#15)</td>
<td>2” double barbed</td>
<td>3/4” through the form</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the form</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>3/4” through the form</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>Drill•Tec HD (#14)</td>
<td>2 3/4” double barbed SXHD</td>
<td>1” into the deck</td>
<td>12” o.c.</td>
<td>6” o.c.</td>
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<tr>
<td>Lightweight Insulating Concrete, 24 ga. standard form</td>
<td>350</td>
<td>Drill•Tec XHD (#15)</td>
<td>2 3/8” barbed XHD</td>
<td>3/4” through the form</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec XHD (#15)</td>
<td>2” double barbed</td>
<td>3/4” through the form</td>
<td>6” o.c.</td>
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<td>Drill•Tec HD (#14)</td>
<td>2 3/8” barbed XHD</td>
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<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec HD (#14)</td>
<td>2” double barbed</td>
<td>3/4” through the form</td>
<td>6” o.c.</td>
<td></td>
</tr>
<tr>
<td>Gypsum Concrete</td>
<td>400</td>
<td>Drill•Tec Polymer Screw</td>
<td>2” double barbed</td>
<td>1 1/2” into the deck</td>
<td>9” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill•Tec Polymer Screw</td>
<td>2 3/8” barbed XHD</td>
<td>1 1/2” into the deck</td>
<td>9” o.c.</td>
<td>6” o.c.</td>
</tr>
<tr>
<td>Cementitious Wood Fiber</td>
<td>300</td>
<td>Drill•Tec Polymer Screw</td>
<td>2” double barbed</td>
<td>1 1/2” into the deck</td>
<td>6” o.c.</td>
<td></td>
</tr>
</tbody>
</table>

*90 psf is attachment pattern to provide 90 lbs. per square foot of uplift pressure resistance and may equate to FM I-90. Refer to current FMRC Approval Guide.

NOTE: For designing at elevated uplift pressures, please consult the current FMRC Approval Guide. 88
Part 1 – General

1.01 System Description
A. Mechanically attached heat-welded thermoplastic sheet roof membrane system.
B. EverGuard® PVC and EverGuard TPO materials are not compatible with one another. DO NOT combine EverGuard PVC and EverGuard TPO membranes, flashings, and flashing accessories together in the same roofing system.

1.02 Specification Designations
A. See Plates.

1.03 Regulatory Requirements
A. Conform to all applicable building and jurisdictional codes, including roof assembly wind uplift and fire resistance requirements and slope.
B. Follow your local jurisdiction requirements for disposing of used and expired adhesives and sealants.

1.04 Delivery, Storage and Protection
A. Deliver products to site in original containers with seals unbroken and labeled with manufacturers’ name, product brand name and type.
B. Store materials in weather protected environment, clear of ground and moisture, in accordance with EverGuard or GAF instructions.
C. All materials stored outside shall be raised above ground or roof level on pallets, and covered with a tarpaulin or other waterproof material. Factory-installed plastic wrapping is not an adequate covering. Extreme heat conditions may require special storage requirements. Contact EverGuard Contractor Services for suggestions.
D. Follow EverGuard or GAF directions and requirements for protection of materials prior to and during installation.
E. Materials that are wet or damaged to the extent that they will no longer serve their intended purpose shall not be used. All roof insulation that has been wet is considered damaged, even if later dried out. Remove all damaged materials from the jobsite.

1.05 Environmental Requirements & Restrictions
A. Do not apply roofing materials during inclement or threatening weather.
B. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.
C. When ambient temperatures are below 40°F, follow GAF’s cold weather application procedures.
D. High or gusting winds make the installation of materials difficult.
E. Material installation during periods of high ambient temperatures, typically above 90°F, can result in poor installation quality due to condensation on the membrane surface, and excessively fast adhesive drying rates.
F. Material installation during periods of low ambient temperatures, typically below 30°F, can result in poor installation quality due to increased material stiffness and vulnerability to damage and excessively slow adhesive drying rates. To avoid these problems:
   1. Store materials in a warming box
   2. Use as soon as possible
   3. Allow adhesives to properly cure
   4. Use a weighted lawn roller over membrane

1.06 Working Environment
A. Provide a safe working environment, including, but not limited to, adequate fall protection, restriction of unauthorized access to the work area, and protection of the building and its occupants.
B. Safe work practices should be followed, including, but not limited to, keeping tools in good operating order, providing adequate ventilation if adhesives are used, and daily housekeeping to remove debris and other hazards.

Part 2 – Products

2.01 Membrane
A. EverGuard TPO (smooth reinforced) thermoplastic polyolefin membrane.
B. EverGuard TPO Fleece-Back thermoplastic polyolefin membrane
C. EverGuard PVC (smooth reinforced) thermoplastic membrane
D. EverGuard PVC Fleece-Back thermoplastic membrane

2.02 Flashing
A. EverGuard membrane flashings to be of same type, thickness and color as roofing membrane.
B. EverGuard TPO and PVC Fleece Back membranes are optional flashing membranes for all EverGuard TPO and PVC roofing systems respectively. These membranes may be a solution when a contaminated substrate is encountered.

2.03 Flashing Accessories
A. EverGuard preformed flashing accessories to be of same type as roofing membrane.
1. EverGuard TPO and PVC laminated metal flashings to be a minimum of 25 mils of non-reinforced thermoplastic membrane of same type as roofing membrane, laminated to 25 ga. galvanized steel sheet metal.

2. Pre-formed Vent Boots with stainless steel clamping bands.

3. Pre-formed Universal Corners for reinforcement of inside and outside corners.

4. Pre-formed Expansion Joint Covers for roof-roof and roof-wall expansion joints.

5. Membrane Flashing Strips for miscellaneous applications.

6. UN-55 Detailing Membrane for flashing of miscellaneous penetrations.

7. EverGuard TPO Cover Strip for stripping in of flat metal edges.

8. EverGuard 6” RTS Strip.

2.04 Fasteners

A. DRILL•TEC membrane fasteners and plates, insulation fasteners and plates, and flashing fasteners and termination bars. Refer to the Insulation Attachment Table and the appropriate Membrane Attachment Table at the end of this section for the correct type, length and diameter.

2.05 Adhesives and Sealants

A. EverGuard® bonding adhesives, sealants and caulking.

1. EverGuard TPO and PVC Bonding Adhesive (solvent-based).

2. EverGuard H2O Bonding Adhesive (low VOC).


4. EverGuard Caulking for use in sealing termination bars and penetration clamping bands.

5. EverGuard TPO Cut Edge Sealant.

6. EverGuard Water Block for use in sealing behind termination bars and at drain flanges as a water cut-off.

7. EverGuard TPO Primer.

2.06 Traffic Protection

A. EverGuard TPO and PVC walkway pads/rolls.

2.07 Insulation

A. EnergyGuard™ foam insulation of the following types. Minimum 1” thickness. Board size to be 4’ x 8’ panels for mechanical attachment, and 4’ x 4’ for adhered attachment and tapered systems.

1. EnergyGuard and EnergyGuard Ultra polyisocyanurate insulation with glass-based facer meeting or exceeding the requirements for ASTM C-1289 (min. 16 psi compressive strength).

2. EnergyGuard extruded polystyrene insulation meeting or exceeding the requirements for ASTM D-578, Type X (min. 15 psi compressive strength).

3. EnergyGuard expanded polystyrene insulation with plastic facer meeting or exceeding the requirements for ASTM D-578, Type II (min. 15 psi compressive strength).

2.08 Insulation – High Traffic Applications

A. EnergyGuard foam insulation of the following types. Minimum 1” thickness. Board size to be 4’ x 8’ panels for mechanical attachment, and 4’ x 4’ for adhered attachment and tapered systems.

1. EnergyGuard and EnergyGuard Ultra polyisocyanurate insulation with glass-based facer meeting or exceeding the requirements for ASTM C-1289, (min. 25 psi compressive strength).

2. EnergyGuard extruded polystyrene insulation meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).

3. EnergyGuard expanded polystyrene insulation with plastic facer meeting or exceeding the requirements for ASTM D-578, Type IX (min. 25 psi compressive strength).

2.09 Recover Board

A. EnergyGuard Perlite insulation, minimum 1/2”, ASTM C-728

B. High density wood fiber insulation, minimum 1/2”, ASTM C-208, Class E

C. EnergyGuard foam recover board of the following types.

1. EnergyGuard and EnergyGuard Ultra 1/2” polyisocyanurate recover board insulation with glass-based facer meeting or exceeding the requirements for ASTM C-1289 (min. 16 psi compressive strength).

2. EnergyGuard 3/8” extruded polystyrene fan-fold recover board with plastic facer meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).

3. EnergyGuard 1/2” extruded polystyrene recover board meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).
4. EnergyGuard 1/2" expanded polystyrene recover board with plastic facer meeting or exceeding the requirements for ASTM D-578, Type II (min. 15 psi compressive strength).

2.10 Base Sheets
A. GAFGLAS® Stratavent® Eliminator™ Nailable Base Sheet
B. GAFGLAS® #80 Ultima™ Base Sheet
C. GAFGLAS® #75 Base Sheet

2.11 Protection Layer
A. EverGuard Polymat slipsheet, 3.0 oz/sq.yd.
B. EverGuard Polymat cushioning slipsheet, 6.0 oz/sq.yd.
C. EverGuard Firesheet 10 fiberglass slipsheet.
D. EverGuard Firesheet 50 fiberglass slipsheet.

2.12 Other Accessories
A. Subject to compliance with requirements, provide the following products not available from EverGuard or GAF:
   1. Wood Nailers: New wood nailers shall be pressure-treated for rot resistance, #2 or better lumber. Asphaltic or creosote-treated lumber is not acceptable.
   2. Roofing Nails: Galvanized or non-ferrous type and size as required to suit application.
   3. Temporary Sealant: Polyurethane foam sealant or similar as required to provide temporary watertight sealing of roofing.
   4. Air/Vapor Barrier: Polyethylene sheeting, min. 6 mil. for TPO only.
   5. Fire Barrier: Silicone-treated fiberglass-faced gypsum panels, min. 1/4" thick (Dens-Deck®, by Georgia-Pacific).

Part 3 – Execution

3.01 Site Conditions
A. Obtain verification that the building structure can accommodate the added weight of the new roofing system.
B. Confirm the adequacy of the new roofing system to provide positive slope to drain. Eliminate ponding areas by the addition of drainage locations or by providing additional pitch to the roof surface.
C. All defects in the roof deck or substrate shall be corrected by the responsible parties before new roofing work commences. Verify that the deck surface is dry, sound, clean and smooth, free of depressions, waves, or projections.
D. Protect building surfaces against damage and contamination from roofing work.
E. Where work must continue over completed roof areas, protect the finished roofing system from damage.
F. Deck preparation is the sole responsibility of the building owner or roofing contractor. All defects in the roof deck or substrate shall be corrected before roofing work commences.

3.02 Preparation of Roofing Area – New and Tear-off Applications
A. Remove all existing roofing materials to the roof decking, including flashings, metal edgings, drain leads, pipe boots, and pitch pockets, and clean substrate surfaces of all asphalt and adhesive contaminants.
B. Confirm quality and condition of roof decking by visual inspection and by fastener pull-out testing.
C. Secure all loose decking. Remove and replace all deteriorated decking.
D. Remove abandoned equipment and equipment supports.
E. Confirm that height of equipment supports will allow the installation of full-height flashings.

3.03 Preparation of Roofing Area – Recover Applications
A. Remove all stone ballast, loose gravel, and debris from the roof surface.
B. Remove blisters and ridges from the roof membrane.
C. Cut membrane away from all perimeter and penetration securements.
D. Remove all existing flashings, including metal edgings, drain leads, pipe boots, and pitch pockets, and clean substrate surfaces of all asphalt and adhesive contaminants.
E. It is strongly recommended that the building owner have a moisture survey performed to ascertain the condition and suitability of the existing roofing materials to receive a recover system. A survey is required if perlite or wood fiber insulation is used in a recover system. GAF will not be responsible for damage to the roofing system if it results from moisture in the existing roofing system. Remove and replace all existing roofing materials that contain moisture.
F. Confirm quality and condition of roof decking by visual inspection if possible, and by fastener pullout testing. Remove and replace all deteriorated decking.
G. Remove abandoned equipment and equipment supports.
H. Raise equipment supports to allow the installation of full-height flashings.

3.04 Wood Nailer Installation
A. Acceptable Material
1. Solid Blocking:
   Pressure-treated wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers.

2. Shim Material:
   Pressure-treated plywood, 1/2" x width to match solid blocking.

B. Existing Nailers
   Anchor to resist 250 lb. per ft. load applied in any direction.
   1. DRILL•TEC HD screws 18" on center attachment to structural wood, steel decks. Min. 1" thread embedment.
   2. DRILL•TEC spikes 18" on center attachment to concrete decks. Min. 1" shank penetration.
   3. Polymer screws 12" on center attachment to gypsum concrete, cellular concrete, cementitious wood fiber decks. Min. 1-1/2" thread embedment.
   4. Three anchors per length of wood nailer minimum.

C. New Nailers
   Anchor to resist 250 lb. per ft. load applied in any direction.
   1. DRILL•TEC HD screws 18" on center attachment to structural wood, steel decks. Min. 1" thread embedment.
   2. DRILL•TEC spikes 18" on center attachment to concrete decks. Min. 1" shank penetration.
   3. Polymer screws 12" on center attachment to gypsum concrete, cellular concrete, cementitious wood fiber decks. Min. 1-1/2" thread embedment.
   4. Three anchors per length of wood nailer minimum.

D. Shim Material
   Secure simultaneously with overlying solid wood nailer.
   1. Shim material must be continuous; spaced shims are not acceptable.

3.05 Gypsum Board Installation

A. General
   1. Gypsum fire barrier board shall typically be installed when required by design professional or code authority to address code or approval requirements.

B. Placement
   1. Butt gypsum boards together with a 1/4" maximum space between adjoining boards. Fit gypsum boards around penetrations and perimeter with a 1/4" maximum space between board and penetration.
   2. Install gypsum boards in pieces a minimum of 2' x 2' in size.
   3. Gypsum boards installed over steel decking shall have boards placed perpendicular to deck flutes with edges over flute surface for bearing support.

C. Securement
   1. Mechanical Attachment
      a. Use appropriate type and length of DRILL•TEC™ fastener for structural deck type. See Insulation Attachment Table.
      b. Install required number of fasteners per board size, and type of roofing system installed.
      c. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
      d. Install fasteners such that the fastener plate is pulled slightly below the insulation board surface.

   2. Hot Asphalt
      a. Use ASTM D-312, Type III or Type IV asphalt.
      b. Apply asphalt at the rate of 25 lbs. per 100 sq. ft. over the entire surface to which the board is to be adhered.
      c. Asphalt application rates of up to 60 lbs. per 100 sq. ft. may be required if the substrate surface is rough or porous, such as an existing flood coat and gravel surfacing.
      d. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475°F degrees.
      e. Walk in the boards after installation to ensure a proper bond.
      f. Maximum board size: 4' x 4'.
      g. Hot asphalt application requires priming of concrete and gypsum decks and existing asphaltic roofing systems.

   3. Foam Adhesive
      a. Depending on foam adhesive type, apply adhesive in full 1/4" - 1/2" thick coverage or in 3/4"-1" continuous beads according to the manufacturer’s instructions.
      b. Adhesive beads shall be evenly spaced at the rate required for the board size and type of roofing system being installed.

4. Gypsum boards that are wet, warped or buckled shall not be installed and must be discarded. Insulation boards that are broken, cracked, or crushed shall not be installed unless the damaged area is first removed and discarded.

5. Gypsum boards that become wet or damaged after installation must be removed and replaced.

6. Install no more gypsum board than can be properly covered by the end of each day with roofing membrane.
c. Apply adhesive when the air and surface temperature is at least 40°F.

   d. Walk in the boards after installation to ensure a proper bond.

   e. Maximum board size: 4’ x 4’.

3.06 Air/Vapor Barrier Installation

A. General

1. Air/vapor barrier sheet shall typically be installed when required by design professional to address internal building air pressure or humidity conditions.

2. Insulation must be installed over the air/vapor barrier sheet and mechanically attached to the deck.

B. Application

1. Install air/vapor barrier sheet loose-applied to the deck or fire barrier board so that wrinkles and buckles are not formed.

2. Overlap air/vapor barrier sheet a minimum of 6” for side and end laps. Tape laps together with duct tape or double sided tape.

3. Seal perimeter and penetration areas with foam sealant.

3.07 Protection Layer Installation – Polyester

A. General

1. Polymat protection layer shall be installed between the roofing membrane and the substrate, in accordance with the Design Table.

B. Application

1. Install polymat protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.

2. Overlap polymat protection layer a minimum of 6” for side and end laps.

3. Seal perimeter and penetration areas with foam sealant.

3.08 Protection Layer Installation – Fiberglass

A. General

1. Fire Sheet 50 or 10 fiberglass sheet protection layer shall typically be installed when required by design professional or code authority to address code or approval requirements, or as a separator layer in accordance with the Design Table.

B. Application

1. Install fiberglass sheet protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.

2. Overlap fiberglass sheet protection layer a minimum of 6” for side and end laps.

3.09 Base Sheet Installation

A. General

1. Fiberglass base sheet shall typically be installed over all nailable substrates other than gravel-surfaced built-up roofing whenever insulation, recover board, or fire barrier board is installed in hot asphalt or adhesive.

2. Nailable base sheet shall be applied over substrates that are not suitable for asphalt adhesion. Requires installation of insulation in hot asphalt or adhesive.

3. Install base sheet so that wrinkles and buckles are not formed.

4. Overlap base sheet a minimum of 2” for side laps and 6” for end laps.

B. Mechanical Securement-Nailable Base Sheet

1. Secure venting nailable base sheet through existing substrate to the deck. Use appropriate type and length of approved fastener for structural deck type, and install required number of fasteners in accordance with Figure 1.

   Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.

3. Install fasteners such that the fastener plate is pulled flush with the venting base sheet surface and lies flat on the deck.
3.10 Recover Board/Insulation Installation

A. General
1. Insulation board and recover board shall be installed as required, in accordance with the Design Table.
2. The use of extruded and expanded polystyrene insulations is limited to a maximum roof membrane temperature of 165°F. Use under colored membranes requires special approval from EverGuard® Contractor Services.
3. The use of extruded or expanded polystyrene insulation is limited in PVC roofing systems to under a fleece back membrane, where protected by a 3 or 6 oz. polymat slip-sheet, or where an overlay board is used.

B. Placement
1. Butt insulation boards together with a 1/4" maximum space between adjoining boards. Fit insulation boards around penetrations and perimeter with a 1/4" maximum space between board and penetration.
2. Install insulation boards in pieces a minimum of 2’ x 2’ in size. Every piece shall be properly secured to the substrate.
3. Insulation boards installed in multiple layers shall have the joints between boards staggered a minimum of 6” between layers.
4. Insulation boards installed over steel decking shall have boards placed perpendicular to deck flutes with edges over flute surface for bearing support.
5. Insulation shall be tapered to provide a sump area a minimum of 36” x 36” at all drains with a maximum slope of 4:12.
6. Insulation boards that are wet, warped or buckled shall not be installed and must be discarded. Insulation boards that are broken, cracked, or crushed shall not be installed unless the damaged area is first removed and discarded.
7. Insulation boards that become wet or damaged after installation must be removed and replaced.
8. Install no more insulation than can be properly covered by the end of each day with roofing membrane.

C. Securement
1. Mechanical Attachment
   a. Use appropriate type and length of DRILL•TEC™ fastener for structural deck type. See Insulation Attachment Table.
   b. Install required number of fasteners per insulation type, board size, and type of roofing system installed.
   c. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
   d. Install fasteners such that the fastener plate is pulled slightly below the insulation board surface.
2. Hot Asphalt
   a. Use ASTM D-312, Type III or Type IV asphalt.
   b. Apply asphalt at the rate of 25 lbs. per 100 sq. ft. over the entire surface to which the insulation is to be adhered.
   c. Asphalt application rates of up to 60 lbs. per 100 sq. ft. may be required if the substrate surface is rough or porous, such as an existing flood coat and gravel surfacing.
   d. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475°F.
   e. Walk in the insulation boards after installation to ensure a proper bond.
   f. Maximum board size – 4’ x 4’.
   g. Hot asphalt application requires priming of concrete and gypsum decks and existing asphaltic roofing systems.
3. Foam Adhesive
   a. Depending on foam adhesive type, apply adhesive in full 1/4” - 1/2” thick coverage or in 3/4”-1” continuous beads according to the manufacturer’s instructions.
   b. Adhesive beads shall be evenly spaced at the rate required for the insulation board size and type of roofing system being installed.
   c. Apply adhesive when the air and surface temperature is at least 40°F.
   d. Walk in the insulation boards after installation to ensure a proper bond.
   e. Maximum board size: 4’ x 4’.

3.11 Membrane Installation

A. Placement
1. Place roof membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent securement. Roof membrane shall be mechanically fastened after it is rolled out, followed by welding to adjacent sheets.
2. Full-width rolls shall be installed in the field of the roof.
3. Half-width rolls shall be installed in the perimeter region of the roof. Width of the roof perimeter region shall be determined in accordance with the Perimeter Half Sheet Table.
4. Overlap roof membrane a minimum of 5” for side laps of mechanically attached systems, and a minimum of 3” for end laps. Membranes are provided with a lap line along
the side laps, the inside line is for mechanically attached system overlaps (6” for TPO and 5” for PVC) and the
other line is for adhered and ballasted systems overlap
5. Install membrane so that the laps run across the roof
slope lapped towards drainage points. On metal decking,
install sheets perpendicular to deck direction so that
fasteners will penetrate the top flanges and not the flutes.
6. All exposed sheet corners shall be rounded a minimum
of 1”.
7. Overlap roof membrane a minimum of 3” for end laps of
EverGuard® PVC and TPO membranes. End laps for
EverGuard fleece-back membranes are made by butting
adjacent sheets and heat welding an 8” wide EverGuard
PVC or EverGuard TPO reinforced membrane flashing
strip over the joints.
B. Securement
1. Roof membrane shall be mechanically fastened in the
side lap area to the roof deck with fasteners and plates of
a type and spacing appropriate to the deck type and as
required by the Membrane Attachment Table.
2. The metal plates must be placed within 1/4” - 3/4” of the
membrane edge. Plates must not be placed closer than
1/4” to the membrane edge.
3. Fasteners must be installed to achieve the proper
embendment depth. Install fasteners vertical to the deck,
without lean or tilt.
4. In the corner regions, additional fasteners will also be
installed through the perimeter half-width membrane
rolls to form a grid pattern, with an 8” wide reinforced
membrane flashing strip heat-welded over the additional
fasteners. Corners include both outside and inside
corners that measure 75-105 angle degrees.
5. Mechanically attach membrane with screws and plates to
the roof deck at locations of deck angle changes in
excess of 5 angle degrees (1” in 12”).
6. Membrane may be heat welded to coated metal flanges.
Membrane must be secured to the roof deck within 6” of
the base of walls and curbs, at the perimeter, and all pen-
etrations with DRILL•TEC Fasteners and Plates of a
type and spacing in accordance with in-lap attachment
requirements, with a 12” on center maximum spacing.
Alternatively, membrane may be extended vertically
3” up walls and curbs and secured to the wall/curb
substrate within 2” of the plane of the roof with
DRILL•TEC Fasteners and inverted Termination Bar of
type and spacing in accordance with in-lap attachment
requirements, with a 12” on center maximum spacing.
This detail is required to be used for pressurized buildings.
7. Install fasteners so that the plate is drawn down tightly to
the membrane surface. Properly installed fasteners will
not allow the plate/termination bar to move (underdriv-
ing), but will not cause wrinkling of the membrane
(overdriving).
C. Field Seaming
1. Fabricate field seams using a current-generation
automatic hot air welding machine and a 10,000
watt voltage-controlled generator minimum. Outdated
welding equipment and inadequate/fluctuating electrical
power are the most common causes of poor seam welds.
2. Equipment Settings- The correct speed and temperature
settings for automatic welders are determined by prepar-
ing test welds at various settings. The welds are tested
by application of pressure, causing the seam to peel
apart. A satisfactory weld will fail by exposing the scrim
reinforcement called a “film tearing bond.” A deficient
weld fails by separating between the two layers of the
membrane.
3. Adjustments to Equipment Settings- Many factors will
affect the settings: thicker membranes, lower air temper-
atures, and overcast skies will generally require a slower
speed than would be required with thinner membranes,
higher air temperatures, and sunny skies. The slower
speed provides additional heat energy to compensate for
heat-draining conditions. The test weld procedure should
be conducted at the beginning of every work period (i.e.,
morning and afternoon) and following a significant
change in weather (i.e., air temperature, wind speed,
cloud cover.)
4. Membrane laps shall be heat-welded together. All welds
shall be continuous, without voids or partial welds.
Welds shall be free of burns and scorch marks.
5. Weld width shall be a minimum 1-1/2” in width for
automatic machine welding. Weld width shall be a
minimum 2” in width for hand welding.
6. All cut edges of TPO reinforced membrane must be
sealed with EverGuard® TPO Cut Edge Sealant.
D. Substrate Surface Preparation
1. Prepare substrate surfaces thoroughly prior to
application of new roofing materials. This is
particularly important for recover and reroofing applica-
tions.
2. Preparation includes, but is not limited to, removal of
existing flashings, replacement of wet/damaged existing
roofing materials, removal of loose aggregate, removal
of abandoned equipment, supports and penetrations,
replacement of damaged decking, etc.
3. Providing a smooth, even, sound, clean and dry substrate minimizes the likelihood that underlying deficiencies will cause premature deterioration or even failure of the new roofing system.

E. Membrane Surface Preparation
1. Membrane must be clean of dirt and contaminants, and free from dew, rain, and other sources of moisture. Factory-fresh membrane typically will not require cleaning prior to automatic welding, provided that welding is performed immediately after placement and securement of the membrane.
2. Membrane that has been exposed for over 12 hours or has become contaminated will require additional cleaning methods.
3. Light Contamination - Membrane that has been exposed overnight up to a few days to air-borne debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard TPO or PVC Cleaner. Be sure to wait for solvent to flash off prior to welding.
4. Dirt-Based Contamination - Membrane that is dirt-encrusted will require the use of a low-residue cleaner such as Formula 409 and a mildly abrasive scrubbing pad to remove the dirt. This must be followed by cleaning with a white cloth moistened with EverGuard TPO or PVC Cleaner. Be sure to wait for solvent to flash off prior to welding.
5. Exposure-Based Contamination - Membrane that is weathered/oxidized will require the use of EverGuard® TPO or PVC Cleaner and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard TPO or PVC Cleaner. Be sure to wait for solvent to flash off prior to welding.
6. Chemical-Based Contamination - Membrane that is contaminated with bonding adhesive, asphalt, flashing cement, grease and oil, and most other contaminants usually cannot be cleaned sufficiently to allow an adequate heat weld to the membrane surface. Removal and replacement of the membrane is indicated in these situations.

3.12 Flashing Installation
A. General
1. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.

B. Coated Metal Flashings
1. Coated metal flashing allows much of the metal-work used in typical roofing applications to benefit from the security of heat-welded membrane seaming, with a corresponding reduction in required metalwork maintenance during the life of the roofing system. Coated metal is required to be used in extended length guarantees.
2. Coated metal shall be formed in accordance with construction details and SMACNA guidelines.
3. Coated metal sections used for roof edging, base flashing, and coping shall be butted together with a 1/4” gap to allow for expansion and contraction. Heat weld a 6” wide membrane flashing strip to both sides of the joint, with approximately 1” on either side of the joint left unwelded to allow for expansion and contraction. 2” wide aluminum tape can be installed over the joint as a bond-breaker, to prevent welding in this area.
4. Coated metal used for sealant pans and scupper inserts, and corners of roof edging, base flashing and coping shall be overlapped or provided with separate metal pieces to create a continuous flange condition, and pop-riveted securely. Heat weld a 6” wide reinforced membrane flashing strip over all seams that will not be sealed during subsequent flashing installation.
5. Coated metal base flashings must be provided with min. 4” wide flanges nailed to pressure-treated wood nailers. Coated metal base flashings must be formed with a 1” cant.
6. Provide a 1/2” hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
7. In addition, provide a 1/2” hem for all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.
8. Coated metal flashings are nailed to treated wood nailers or otherwise mechanically attached to the roof deck,
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or to the wall or curb substrate, in accordance with construction detail requirements.

C. Adhered Reinforced Membrane Flashings - Smooth Surface
1. The thickness of the flashing membrane shall be the same as the thickness of the roofing membrane.
2. When using EverGuard® TPO and PVC adhesives, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), high density wood fiber board, Dens Deck, Dens Deck Prime, Dens Guard, cured structural concrete absent of curing and sealing compound, untreated OSB, untreated CDX plywood, Type X gypsum board, and dry, sound masonry absent of curing or sealing compounds.
3. Apply bonding adhesive to both the substrate surface and the underside of the flashing membrane, at the rate of 120 sq. ft./gal. which covers both surfaces yielding 60 square feet of finished, mated surface per gallon for solvent-based bonding adhesives, and at the rate of 200 sq. ft./gal. covering both surfaces yielding 100 square feet of finished, mated surface area per gallon for water-based bonding adhesive. Solvent-based adhesive must be allowed to dry until tacky to the touch before mating flashing membrane. Water based adhesive must be allowed to dry completely to the touch; install the flashing within one hour of drying.
4. Apply the adhesive only when the outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow easier adhesive application.
5. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
6. All laps in EverGuard smooth-reinforced flashing membrane shall be heat welded in accordance with heat welding guidelines.
7. Non-selvage edge laps in EverGuard Fleece-Back flashing membrane are made by butting adjacent sheets and heat welding an 8" wide strip of EverGuard PVC or EverGuard TPO Flashing membrane over joint.
8. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.

D. Adhered Reinforced Membrane Flashings - Fleece Back
1. Apply bonding adhesive to the substrate at the rate of 60 sq. ft./gal. for solvent based adhesive and at a rate of 100 sq. ft./gal for water based adhesive.
2. The bonding adhesive must remain wet to the touch for one surface applications.
3. Apply the adhesive only when the outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow easier adhesive application.
4. All selvage edge laps in EverGuard Fleece-Back flashing membrane shall be heat welded in accordance with heat welding guidelines. Lap width is 3”.

E. Loose Reinforced Membrane Flashing
1. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.
2. Carefully position the EverGuard® smooth reinforced flashing membrane prior to application to avoid wrinkles and buckles.
3. All laps in Everguard smooth reinforced flashing membrane shall be heat welded in accordance with heat welding guidelines.
4. Maximum flashing height is 18” unless incremental attachment is used.

F. Unreinforced Membrane Flashings
1. Unreinforced membrane is used as a field-fabricated penetration/reinforcement flashing only where pre-formed corners and pipe boots cannot be properly installed.
2. Penetration flashings constructed of unreinforced membrane is typically installed in two sections, a vertical piece that extends up the penetration, and a horizontal piece that extends onto the roofing membrane. The two pieces are overlapped and heat-welded together.
3. The unreinforced vertical membrane flashing shall be adhered to the penetration surface. Apply bonding adhesive to both the penetration surface and the underside of the flashing membrane, at the rate of 120 sq. ft./gal. which covers both surfaces yielding 60 square feet of finished, mated surface area per gallon for solvent-based bonding adhesives, and at the rate of 200 sq. ft./gal. covering both surfaces yielding 100 square feet of finished, mated surface area per gallon for water-based bonding adhesive. Coverage rates will vary depending on substrate. Solvent based adhesive must be allowed to dry until tacky to the touch before flashing membrane application. Water based adhesive must be allowed to dry completely to the touch; install the flashing within one hour of drying.
G. Roof Edging
1. Roof edge flashing is applicable for both gravel stop/drip edge conditions as well as exterior edges of parapet walls.
2. Flash roof edges with coated metal flanged edging with minimum 3” wide flange nailed 4” on center to pressure-treated wood nailers, and heat weld roof membrane to metal flanges.
3. Coated metal roof edging must be provided with a continuous metal hook strip to secure the lower fascia edge if the fascia width is 4” or greater. The continuous hook strip must be secured to the building a minimum of 12” on center.
4. Alternatively, flash roof edges with a 2-piece snap-on fascia system, adhering roof membrane to metal cant with bonding adhesive and face nailing the membrane 8” on center prior to installing the snap-on fascia.
5. Galvanized metal edging may be flashed using EverGuard TPO Self-Adhering Cover Strip after priming both the metal and the TPO membrane for guarantee lengths up to 15 years. Allow approximately 2” of tape to cover the metal edge with the remaining 3” of tape onto the TPO membrane. Caulk the back edge of the tape with EverGuard Caulking when slope exceeds 1” in 12”.
6. Flash roof edge scuppers with a scupper insert of coated metal that is mechanically attached to the roof edge and integrated as part of the metal edging.

H. Parapet and Building Walls
1. Flash walls with membrane flashing adhered to the wall substrate with bonding adhesive, or with coated metal flashing fastened 4” on center to pressure-treated wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the wall surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened 6” on center; termination bars that are counterflashed shall be fastened 12” on center.
3. Roof membrane must be mechanically attached along the base of walls that are flashed with membrane flashing with screws and plates/termination bar at a fastener spacing in accordance with in-lap attachment requirements, with a 12” on center maximum spacing.
4. All coated metal wall flashings and loose membrane flashings must be provided with separate metal counterflashings or metal copings.
5. Metal counterflashings may be optional with fully adhered membrane wall flashings depending on guarantee duration. All termination bars must be sealed with caulking.
6. Flash wall scuppers with a scupper insert of coated metal that is mechanically attached to the wall and integrated as part of the wall flashing. Refer to scupper section.
7. Maximum flashing height without intermediate fastening:
   - 18” - Loose-Applied Flashing
   - 54” - Adhered Flashing

I. Round and Square Tube Penetrations
1. Flash penetrations with pre-formed vent boots provided that the penetrations are accessible from the top. Otherwise, field-fabricate flashing with two-piece field fabricated flashings of unreinforced membrane.
2. All flashings require the installation of a stainless steel draw band around the top of the flashing. Seal the top edge with water block and add draw band with caulking.
3. Roof membrane must be mechanically attached at the base of each penetration with screws and plates a maximum of 12” on center, with a minimum of four fasteners per penetration.

J. Irregularly-Shaped Penetrations
1. Flash irregularly shaped penetrations with flanged sealant pans formed of coated metal, secured to the deck through the roof membrane with screws 6” on center, a minimum of two per side.
2. Strip in metal flanges and the vertical pop riveted seam with 8” wide membrane flashing strips heat welded to both the roof membrane and the metal flanges.
3. Fill sealant pans with EverGuard 2-part pourable sealant. Alternatively, fill sealant pans with non-shrink quick-set grout, and top off sealant pans with a 2” minimum thickness of EverGuard 2-part pourable sealant.

K. Curbs and Ducts
1. Flash curbs and ducts with membrane flashing adhered to the curb substrate with bonding adhesive, or with coated metal flashing nailed 4” on center to pressure-treated wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the curb/duct surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 6” on center; termination bars that are counterflashed shall be fastened 12” on center.
3. Roof membrane must be mechanically attached along the base of curbs and ducts that are flashed with membrane flashing with screws and plates/termination bar at
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a fastener spacing in accordance with in-lap attachment requirements, with a 12" on center maximum spacing.

4. All coated metal curb flashings and loose membrane flashings must be provided with separate metal counterflashings, metal copings, or flashed with equipment flanges.

5. Metal counterflashings may be optional with fully adhered membrane curb and duct flashings depending on guarantee duration. All termination bars must be sealed with caulk.

L. Expansion Joints
1. Install prefabricated expansion joint covers at all flat type and raised cant/curb type expansion joint conditions. All metal nailing strips must either be nailed to pressure-treated wood nailers, cants or curbs, or secured to walls with screws or expansion anchors appropriate to substrate type.

2. Roof membrane must be mechanically attached along the base of raised cant/curb expansion joints with screws and plates a minimum of 12" on center.

3. Expansion joint bellows must be twice the width of the expansion joint opening to allow for proper expansion/contraction.

4. Metal nailing strip must be set in water block and secured with fasteners and neoprene washers fastened 6" o.c.

5. Alternately, expansion joints may be field fabricated.

M. Roof Drains
1. Roof drains must be fitted with compression clamping rings and strainer baskets. Both original-type cast iron and aluminum drains, as well as retrofit-type cast aluminum and molded plastic drains, are acceptable.

2. Roof drains must be provided with a min. 36" x 36" sumped area. Slope of tapered insulation within the sumped area shall not exceed 4" in 12".

3. Extend the roofing membrane over the drain opening. Locate the drain and cut a hole in the roofing membrane directly over the drain opening. Provide a 1/2" of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.

4. For cast iron and aluminum drains, the roofing membrane must be set in a full bed of Water Block on the drain flange prior to securement with the compression clamping ring. Typical Water Block application rate is one 10.5 oz. cartridge per drain.

5. For fleece-backed roof membrane applications, the fleece-backed membrane is cut just short of the drain flange. A separate smooth reinforced membrane drain flashing sheet is heat welded to the roofing membrane and set into the drain above in a full bed of water block and secured as above.

6. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate smooth reinforced membrane drain flashing a minimum of 12" larger than the sump area must be installed. The membrane flashing shall be heat welded to the roof membrane.

7. Tighten the drain compression clamping ring in place.

N. Scuppers
1. Coated metal roof edge scuppers must be provided with a min. 4" wide flange nailed to pressure-treated wood nailers, with hemmed edges and secured with continuous clips in accordance with the gravel stop assembly.

2. Coated metal wall scuppers must be provided with 4" wide flanges, with additional corner pieces pop-riveted to the flanges to create a continuous flange. All flange corners must be rounded.

3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC fasteners 6" on center, a minimum of 2 fasteners per side.

4. All corners must be reinforced with EverGuard PVC or EverGuard TPO Universal Corners.

5. Strip in scupper with flashing membrane target sheet.

O. Heater Stacks
1. Field-fabricated two-piece membrane flashings of EverGuard UN 55 Unreinforced flashing are typically installed at heater stacks.

2. Heater stacks must be equipped with either cone-shaped or vertical tube-type flashing sleeves so that the membrane flashing is not adhered directly to the heater stack.

3. Mechanically attach the roof membrane to the structural deck with DRILL-TEC™ screws and plates around the penetration base prior to flashing installation.

4. All stack flashings must be secured at their top edge by a stainless steel clamping band over water block and sealed with EverGuard Caulking.

5. Field-fabricated membrane flashings must be adhered to the flashing sleeve with EverGuard TPO or EverGuard PVC Bonding Adhesive.
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P. Drain Inserts - PVC Only
1. EverGuard® PVC roofing membrane is typically terminated EverGuard® PVC at drain inserts by heat welding the membrane to the PVC coated drain flange (if available), or by securing the membrane between the drain flange and the clamping ring.
2. Drain inserts shall only be used in the event the original drain is damaged and cannot be repaired without complete replacement of the drain.
3. All drains shall be provided with a drain sump of a 36" x 36" minimum dimension.
4. The drain insert is installed on top of the roofing membrane and is secured to the roof deck 6" O.C. with DRILL-T®TEC screws.
5. A separate reinforced membrane drain flashing sheet is heat welded to the roofing membrane. The drain flashing sheet is heat welded to a compatible drain flange.
6. Install the drain clamping ring over the drain flashing sheet if applicable.
7. All drains shall be provided with a strainer basket.

Q. Wood Support Blocking
1. Pressure-treated wood support blocking, typically 4" x 4", is typically installed under light-duty or temporary roof-mounted equipment, such as electrical conduit, gas lines, condensation and drain lines.
2. Install wood support blocking over a protective layer of EverGuard PVC or TPO membrane or EverGuard Walkway Pad.

R. Satellite Dish Support Bases
1. Install satellite dish support bases over a protective layer of EverGuard Walkway Pad.

S. Lightning Suppression Clips
1. Embed lightning suppression clips in EverGuard Caulking applied to a protective layer of EverGuard PVC or EverGuard TPO Flashing membrane heat welded to the roof membrane.
2. Alternatively, secure lightning suppression clips to the roof surface by means of 2" wide EverGuard PVC or EverGuard TPO Flashing membrane strips heat welded to the roof membrane.

3.13 Traffic Protection
A. Install walkway pads/rolls at all roof access locations including ladders, hatchways, stairs and doors, and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.
B. Walkway pads must be spaced 2" to allow for drainage between the pads.
C. Fully adhere walkway pads/rolls to the roof membrane with solvent based bonding adhesive, applied at the rate of 1 gal. per 120 sq. ft. to both the walkway and roof membrane surfaces. Press walkway in position once adhesive is tacky to the touch. Finish by placing a bead of caulk around the entire walkway pad or roll.
D. Alternatively, heat weld walkway pads/rolls to the roof membrane surface continuously around the walkway pad perimeter.
E. TPO Walkway pads may also be installed with TPO primer and 3" seam tape. First, roll or brush the TPO primer on the back of the TPO pad along the edges and down the middle of length of the pad. Clean and prime the roof membrane where the pad will be installed. Install tape to the back of the pad where cleaned (edges and middle) and roll in with a silicone hand roller. Remove the release paper and install the taped pads directly onto the roof membrane. Secure the pads by rolling into place.

3.14 Temporary Closures
A. The roofing installation must be made watertight at the end of each day’s activity to prevent water infiltration into the completed roofing system installation.
B. Complete all flashings and terminations as the roofing installation progresses.
C. At the edge of the completed roofing system installation, extend the roofing membrane a minimum of 6" beyond the edge. Seal the roofing membrane to the surrounding deck or substrate surface with hot asphalt or foam sealant.
D. Remove all temporary night seal materials prior to continuing with the roof installation and dispose of properly.

3.15 Field Quality Control
A. Inspect completed roof sections on a daily basis. It is the contractor’s responsibility to probe all heat-welded seams and perform an adequate number of seam cuts to ascertain seam consistency.
B. Immediately correct all defects, irregularities, and deficiencies identified during inspections.
C. Remedial work shall be performed with like materials and in a manner consistent with the balance of the roofing installation so as to minimize the number of repair patches.
D. Excessive patchwork will require replacement of the entire affected membrane section, from lap to lap.
3.16 Cleaning
A. Remove bonding adhesive, bituminous markings and other contaminants from finished surfaces. In areas where finished surfaces are soiled by asphalt or any other source of soiling caused by work of this or other sections, consult manufacturer of surfaces for cleaning advice and conform to those instructions.
B. Cut out and remove any sheet membrane contaminated with solvent based adhesive, bituminous markings, and other contaminants from finished surface. Repair sheet damage by first cleaning the area with an all-purpose cleaner, then rinse off soapy residue. Reactivate membrane using the appropriate EverGuard cleaner, wiping with a damp (not saturated) rag. Complete repair by installing a patch of like material to specific system requirements.

3.17 Maintenance
A. Upon completion of the roofing system, provisions should be made to establish a semi-yearly inspection and maintenance program in accordance with standard good roofing practice guarantee requirements.
B. Repair cuts, punctures and other membrane damage by cleaning membrane with EverGuard® TPO or PVC Cleaner, followed by heat welding a membrane repair patch of sufficient size to extend a minimum of 2” beyond the damaged area.
C. Any damage to adhered membrane areas or at locations of mechanical attachment shall be repaired so that the repaired area remains fully adhered or mechanically attached.
NOTE:
SEE EVERGUARD® MECHANICALLY ATTACHED SYSTEM GUIDELINES TO DETERMINE FASTENER SPACING FOR VARIOUS DECK TYPES AND WIND UPLIFT REQUIREMENTS, AND FOR REQUIRED NUMBER OF PERIMETER HALF SHEETS.
NOTE: FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAF GUARANTEE SERVICES FOR ALTERNATE ATTACHMENT REQUIREMENTS

SECTION A–A

SIDE LAP
LAP WIDTH

HEAT WELDED LAP

EVERGUARD® MEMBRANE SHEET

2"

8"

DRILL-TEC™ PLATES & SCREWS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

SECTION A–A

COVER STRIP

APPLICABLE SYSTEMS: MA

DATE: 01/01/06

DRAWING NUMBER:

MA 103
LAP WIDTH

HEAT WELDED LAP

EVERGUARD® MEMBRANE SHEET

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

SECTION A–A

END LAP
EVERGUARD® MEMBRANE, 60 OR 80 MIL FOR TPO
80 MIL FOR PVC

EVERGUARD® COVER PATCH IS MANUALLY
ROLLED A MIN. 1 1/2 " INTO LOWER
LAYERS OF MEMBRANE BY HEAT WELDING

NOTE: T-JOINT MAY BE FIELD FABRICATED FROM UNREINFORCED MEMBRANE
SUPPLIED AS A GAF ACCESSORY

T–JOINT COVER PATCH DETAIL
WINDSTORM RESISTANCE DESIGN AS REQUIRED BY SPEC.
OR SHALL BE DETERMINED FROM FM PREVENTION DATA
SHEET 1−29

WIDTH OF PERIMETER TREATMENT SHALL BE 10% OF THE
BUILDING NARROWEST WIDTH OR 40% OF THE BUILDING
EAVE HEIGHT WHICHEVER IS LESS. FOR EXAMPLE
ABOVE:  B = 0.4H2 OR 0.1W2  A = 0.4H1 OR 0.1W1
NOTE: REFERENCE SPECIFIC SYSTEM/INSULATION TYPE AND THICKNESS REQUIREMENTS
FIELD AREA

PERIMETER AREA (OPTIONAL)

CORNER AREA (OPTIONAL)

4 FASTENERS PER 4’ x 4’ BOARD

6 FASTENERS PER 4’ x 4’ BOARD

8 FASTENERS PER 4’ x 4’ BOARD

2-1-2 FASTENERS PER 2’ x 4’ SECTION

2-2-2 FASTENERS PER 2’ x 4’ SECTION

3-2-3 FASTENERS PER 2’ x 4’ SECTION

NOTE: REFERENCE SPECIFIC INSULATION/SYSTEM TYPE AND THICKNESS REQUIREMENTS
NOTE: FOR ANGLE CHANGE GREATER THAN 2:12 NOT REQUIRED FOR FA & TRI

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAF GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS
EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQUIRED FOR FA & TRI SYSTEMS

EVERGUARD® MEMBRANE

DRILL—TEC™ PLATES & SCREWS PER IN—LAP SPACING

HEAT WELDED LAP

FULL WIDTH ROLL OF EVERGUARD® MEMBRANE FULLY ADHERED WITH EVERGUARD® BONDING ADHESIVE

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE: FLEECE BACKED MEMBRANE MAY ALSO BE ADHERED WITH HOT ASPHALT FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAF GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS

VALLEY DETAIL
EVERGUARD® MEMBRANE

HEAT WELDED LAP

DRILL-TEC™ PLATES & SCREWS PER IN-LAP SPACING (MA ONLY)

ROLL OF EVERGUARD® MEMBRANE FULLY ADHERED WITH EVERGUARD® BONDING ADHESIVE (FA AND TRI SYSTEMS)

FOR MA SYSTEMS GREATER THAN 2:12 USE A HALF SHEET OF MEMBRANE AS A CAP

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:
FLEECE-BACK MEMBRANE MAY ALSO BE ADHERED IN HOT ASPHALT

FOR INSULATION THICKNESS GREATER THAN 8" CONTACT GAF GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS
EVERGUARD® COATED METAL GRAVEL STOP WITH HEMMED EDGE

22 GAUGE CONTINUOUS HOOK STRIP SECURED WITH DRILL-TEC™ FASTENERS @ 12” O.C.

HEAT WELDED LAP

GALVANIZED ANNULAR RING SHANK NAIL @ 4” O.C. STAGGERED

EVERGUARD® 8” WIDE MEMBRANE FLASHING STRIP

TREATED WOOD NAILER, MIN. 3/2” WIDE SECURED TO DECK

HEAT WELDED LAP

EVERGUARD® MEMBRANE (PERIMETER SHEET IF REQUIRED)

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

EVERGUARD® ADHESIVE OR HOT ASPHALT (NOT SHOWN) REQUIRED FOR FA SYSTEMS

NOTE: CONTINUOUS HOOK STRIP NEEDED ONLY IF FACE OF METAL EXCEEDS 4”.

COATED METAL ROOF EDGE
22 GAUGE CONTINUOUS HOOK STRIP SECURED WITH DRILL-TEC™ FASTENERS @ 12” O.C.

HEAT WELDED LAP

GALVANIZED ANNULAR RING SHANK NAIL @ 4” O.C. STAGGERED

EVERGUARD® COATED METAL GRAVEL STOP WITH HEMMED EDGE

TREATED WOOD NAILER, MIN. 3 1/2” WIDE SECURED TO DECK

EVERGUARD® MEMBRANE (PERIMETER SHEET IF REQ’D)

ENERGYGUARD™ TAPERED EDGE STRIP

EVERGUARD® ADHESIVE / ASPHALT (NOT SHOWN) REQUIRED FOR FA SYSTEMS

DRILL-TEC™ PLATES AND SCREWS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE: CONTINUOUS HOOK STRIP NEEDED ONLY IF FACE OF METAL EXCEEDS 4”.

COATED METAL TAPERED EDGE
1/4" EXPANSION SPACE

6" WIDE EVERGUARD® FLASHING STRIP OR UNREINFORCED MEMBRANE WELDED OVER EXPANSION SPACE

22 GA. GALV. CONTINUOUS HOOK STRIP, FASTENED 12" O.C. W/ DRILL-TEC™ FASTENERS

NOTES:

MAX FACE DIMENSION SHOULD BE 5" TO PREVENT DISTORTION FROM "OIL CANNING." IF SURFACE DISTORTION IS ACCEPTABLE, FACE DIMENSION MAY BE INCREASED TO 8".

FOR FASCIAS GREATER THAN 8" INSTALL IN TWO SECTIONS

CONTINUOUS HOOK STRIP NEEDED ONLY IF FACE OF METAL EXCEEDS 4".

COATED METAL JOINT DETAIL

APPLICABLE SYSTEMS: ALL

DATE: 01/01/06

DRAWING NUMBER:
MA/FA/BA/TRI 204
APPROVED SNAP-ON FASCIA SYSTEM
FASTENED @ 12” O.C. AS PER MANUFACTURER’S SPECS.

EVERGUARD® CAULK

TREATED WOOD NAILER, MIN 3 1/2” WIDE SECURED TO DECK

EVERGUARD® MEMBRANE/PERIMETER SHEET IF REQ’D

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN)
REQ’D FOR FA AND TRI SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTES:

FASCIA FASTENERS ARE STAINLESS STEEL SCREWS PROVIDED WITH THE FASCIA ASSEMBLY.

IF BOTTOM ROW OF FASTENERS ALIGN WITH SUBSTRATE OTHER THAN NAILER, AN APPROPRIATE AND APPROVED FASTENER SHALL BE USED.
APPROVED SNAP-ON FASCIA

22 GAUGE CONTINUOUS CANT DAM FACE FASTENED 12" O.C.

EVERGUARD® MEMBRANE FLASHING

GALVANIZED ANNULAR RING SHANK NAIL @ 4" O.C. STAGGERED

TREATED WOOD NAILER, MIN 3 1/2" WIDE SECURED TO DECK

EVERGUARD® MEMBRANE OR PERIMETER SHEET IF REQUIRED

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ'D FOR FA AND TRI SYSTEMS

HEAT WELDED LAP

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:

IF BOTTOM ROW OF FASTENERS ALIGN WITH SUBSTRATE OTHER THAN NAILER, AN APPROPRIATE AND APPROVED FASTENER SHALL BE USED.
NOTE:

MAXIMUM 15 YEAR GUARANTEED SYSTEMS ONLY.

GAF WATER BLOCK TO BE INSTALLED BETWEEN SHEET AND WOOD BLOCKING
**Coated Metal Edge Scupper**

Use 2" Foil Tape as bond breaker

Everguard® Coated Metal Gravel Stop with Hemmed Edge

Treated Wood Nailer

1/4" Expansion Space


Roof Deck/Substrate

Notes:

Max. face dimension should be 5” to prevent distortion from "oil canning." If surface distortion is acceptable, face dimension may be increased to 8”.

For fascias greater than 8” install in two sections
EVERGUARD® 8” WIDE FLASHING STRIP

EVERGUARD® COATED METAL FLANGED GUTTER WITH HEMMED EDGE

HEAT WELDED STRIP

ANNULAR ROOFING NAILS 6” O.C.

TREATED WOOD NAILER, MIN. 3 1/2” WIDE SECURED TO DECK

EVERGUARD® MEMBRANE/PERIMETER SHEET IF REQ’D

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA AND TRI SYSTEMS

ROOF DECK / SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

GALV. ANNULAR SHANK ROOFING NAILS 4” O.C. STAGGERED

COATED METAL FLANGED GUTTER
GUTTER WITH COATED METAL EDGE

EVERGUARD® 8" WIDE FLASHING STRIP

EVERGUARD® COATED METAL DRIP EDGE WITH HEMMED EDGE

HEAT WELDED STRIP

SHEET METAL GUTTER

ANNULAR ROOFING NAILS 6" O.C.

TREATED WOOD NAILEY, MIN. 3 1/2" WIDE SECURED TO DECK

EVERGUARD® MEMBRANE/PERIMETER SHEET IF REQ'D

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ'D FOR FA AND TRI SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD® ROOF INSULATION

GALV. ANNULAR SHANK ROOFING NAILS 4" O.C. STAGGERED

22 GAUGE CONTINUOUS CLEAT

APPLICABLE SYSTEMS: MA/FA/TRI
DATE: 01/01/06
DRAWING NUMBER: MA/FA/TRI 211
NOTE: MAXIMUM 15 YEAR GUARANTEED SYSTEMS ONLY.

GUTTER WITH TERMINATION BAR

APPLICABLE SYSTEMS: MA/FA/TRI
DATE: 01/01/06
DRAWING NUMBER: MA/FA/TRI 212
NOTES:

FLASHING MUST BE A MINIMUM OF 8" HIGH. REUSE OF EXISTING COUNTERFLASHING IS ACCEPTABLE IF ABOVE MAXIMUM FLOOD LEVEL AND METAL IS IN GOOD CONDITION. FUNCTIONAL WEEP HOLES MUST NOT BE BLOCKED.

STONE/PAVER BALLAST (NOT SHOWN) REQUIRED FOR BA SYSTEMS

PLATES & SCREWS 8" O.C. REQUIRED FOR BA SYSTEMS

FOR INSULATION THICKNESS GREATER THAN 8" CONTACT GAF GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.
1/4" (6.35 mm) TO 1/2" (12.7 mm)

EVERGUARD® TPO COVER TAPE
SEE NOTE #2

2" (50.8 mm) MIN.

EVERGUARD® CAULKING IS REQUIRED ALONG UPSLOPE EDGE OF EVERGUARD TPO COVER TAPE WHEN ROOF SLOPE IS 1" (25.4 mm) PER FOOT OR GREATER.

EVERGUARD® TPO MEMBRANE

HOT DIPPED GALVANIZED NAILS 1 1/4" (31.7 mm) LONG WITH 3/8" (9.5 mm) DIA. HEAD (MIN.) AT 6" (152.4 mm) O.C.

WOOD NAILER MUST EXTEND BEYOND METAL FLANGE IN ALL DIRECTIONS.

APPLY WATER BLOCK, EVERGUARD® CAULKING OR FULLY ADHERE MEMBRANE TO THE WOOD NAILER FOR MECHANICALLY ATTACHED SYSTEMS.

NOTES:

IF THE ROOF EDGE INCLUDES A GRAVEL STOP, AND SEALANT IS NOT APPLIED BETWEEN THE LAPS IN THE METAL EDGING, AN ADDITIONAL PIECE OF TPO COVER TAPE SHALL BE APPLIED OVER THE METAL LAP AFTER THE INITIAL APPLICATION OF EVERGUARD® TPO COVER TAPE. EVERGUARD® CAULKING SHALL BE APPLIED AT THE INTERSECTIONS OF THE TWO FLASHING SECTIONS.

IF THE METAL EDGE FLANGE IS NOT COMPLETELY COVERED WITH EVERGUARD® TPO COVER TAPE, THEN ALL JOINTS IN METAL SHALL BE COVERED WITH EVERGUARD® TPO COVER TAPE.

ROOF EDGE WITH TPO COVER TAPE

APPLICABLE SYSTEMS: MA/FA/TRI
DATE: 01/01/06
DRAWING NUMBER: MA/FA/TRI 213
EVERGUARD®
TPO COVER
TAPE
1” MIN
OVERLAP

APPLY A BEAD
OF EVERGUARD®
CAULKING

EVERGUARD®
TPO MEMBRANE

3”

6” SECTION OF EVERGUARD®
TPO COVER TAPE CENTERED
OVER TPO COVER TAPE "T"
JOINTS

APPLY A BEAD OF
EVERGUARD®
CAULKING AROUND
ENTIRE PERIMETER
OF TPO COVER
TAPE & EXTEND 3”
BEYOND PATCH AT
ALL SEAMS

TPO COVER TAPE OVERLAP AT ROOF EDGE

APPLICABLE SYSTEMS: MA/FA/TRI
DATE: 01/01/06
DRAWING NUMBER:
MA/FA/TRI 215
T-JOINT AT EDGE CORNER

APPLICABLE SYSTEMS: MA/FA/TRI
DATE: 01/01/06
DRAWING NUMBER: MA/FA/TRI 216
NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.
PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.
CAULK ALL FASTENER HEADS.
MAXIMUM 15 YEAR GUARANTEED SYSTEMS ONLY.

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.

ADD TOP EDGE TERMINATION IMMEDIATELY AFTER MEMBRANE INSTALLATION.

WALL FLASHING WITH TERMINATION BAR
22 GA CONTINUOUS CLIP FASTENED 12” O.C. WITH DRILL-TEC™ FASTENERS

TREATED WOOD NAILER SECURED TO WALL

EVERGUARD® COATED METAL OR METAL CAP BY OTHERS DRILL-TEC™ FASTENER 12” O.C.

EVERGUARD® BONDING ADHESIVE

EVERGUARD® MEMBRANE FLASHING

DRILL-TEC™ PLATES & SCREWS

HEAT WELDED LAP

EVERGUARD® MEMBRANE/PERIMETER SHEET IF REQ’D

EVERGUARD® ADHESIVE/GAF ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:

PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.
22 GA CONTINUOUS CLIP FASTENED 12" O.C. WITH DRILL-TEC™ FASTENERS

EVERGUARD® COATED METAL DRIP EDGE WITH HEMMED EDGE

HEAT WELDED LAP

GALV ANNULAR RING SHANK NAIL 4" O.C. STAGGERED

TREATED WOOD NAILER SECURED TO WALL

EVERGUARD® 8" WIDE MEMBRANE FLASHING STRIP

EVERGUARD® BONDING ADHESIVE

EVERGUARD® MEMBRANE FLASHING

DRILL-TEC™ PLATES & SCREWS 12" O.C.

HEAT WELDED LAP

EVERGUARD® MEMBRANE OR PERIMETER SHEET IF REQUIRED

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

PLATES & SCREWS 8" O.C. REQ’D FOR BA SYSTEMS.

FOR INSULATION THICKNESS GREATER THAN 8" CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.

CONTINUOUS HOOK STRIP NEEDED ONLY IF METAL EXCEEDS 4".

WALL FLASHING WITH COATED METAL EDGE

EverGuard®

APPLICABLE SYSTEMS: MA/FA/BA

DATE: 01/01/06

DRAWING NUMBER: MA/FA/BA 304
SEE SPECIFIC WALL TERMINATION

EVERGUARD® BONDING ADHESIVE

DRILL-TEC™ TERMINATION BAR OR
DRILL-TEC™ PLATES & SCREWS
FASTENED 12” O.C. (TYP.)

HEAT WELDED LAP

EVERGUARD® MEMBRANE FLASHING

DRILL-TEC™ PLATES & SCREWS 12” O.C.

HEAT WELDED LAP

EVERGUARD® MEMBRANE OR PERIMETER SHEET IF REQ’D

EVERGUARD® ADHESIVE/ASPHALT
(NOT SHOWN) REQ’D FOR FA SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:
18” MAX. DIMENSION FOR LOOSE-APPLIED FLASHINGS;
54” MAX. DIMENSION FOR FULLY ADHERED FLASHINGS.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC
GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT
REQUIREMENTS.
NOTE:

ALTERNATIVE WALL FLASHINGS BASE TERMINATION SUItable FOR 301 THROUGH 307 IN LIEU OF DRILL-TEC™ PLATES AND SCREWS INTO ROOF DECK.

SCREWS/ANCHORS 8” O.C. REQ’D FOR BA SYSTEMS.

*REQ’D ON BUILDINGS WITH HIGH INTERNAL AIR PRESSURES.
NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.
22 GA CONTINUOUS CLIP FASTENED 12" O.C. WITH DRILL-TEC™ FASTENER
TREATED WOOD NAIDER SECURED TO WALL
EVERGUARD® CAULKING
EVERGUARD® COATED METAL OR METAL CAP BY OTHERS
GAF WATER BLOCK
DRILL-TEC™ FASTENER 12" O.C.
EVERGUARD® COATED METAL BASE FLASHING W/ HEMMED EDGE
HEAT WELDED LAP
ANNULAR RING NAILS 4" O.C. STAGGERED
EVERGUARD® MEMBRANE OR PERIMETER SHEET IF REQ'D
EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ'D FOR FA SYSTEMS
TREATED WOOD NAIDER, MIN. 3 1/2" WIDE SECURED TO DECK
ROOF DECK/SUBSTRATE
ENERGYGUARD™ ROOF INSULATION

NOTE:
STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.

COATED METAL CAP FLASHING
6" WIDE EVERGUARD® FLASHING STRIP OR UNSUPPORTED MEMBRANE WELDED OVER EXPANSION SPACE

USE FOIL TAPE AS BOND BREAKER

EVERGUARD® COATED METAL WITH HEMMED EDGE

EXTEND 6" STRIP BEYOND EDGE OF EVERGUARD® METAL

1/4" EXPANSION SPACE

NOTES:
DETAIL TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATION CONTAINING REQUIREMENTS FOR NAILERS, INSULATION ETC.

COATED METAL JOINT DETAIL

| APPLICABLE SYSTEMS: ALL          | DATE: 01/01/06 | DRAWING NUMBER: MA/FA/BA/TRI310 |
COATED METAL WALL SCUPPER

NOTE: REMEMBER TO INSTALL EVERGUARD® UNREINFORCED OR PREMANUFACTURED OUTSIDE CORNERS TO THE SCUPPERS’ FOUR ROOF SIDE CORNERS
NOTE:
REFERENCE EVERGUARD® WALKWAY PAD SECUREMENT DETAIL.

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.

THRESHOLD FLASHING

METAL THRESHOLD
GAF WATER BLOCK
EVERGUARD® COATED METAL OR GALVANIZED COUNTERFLASHING
EVERGUARD® BONDING ADHESIVE
EVERGUARD® MEMBRANE FLASHING
DRILL-TEC™ PLATES & SCREWS
HEAT WELDED LAP
WALK PAD
EVERGUARD® MEMBRANE OR PERIMETER SHEET IF REQ’D
EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS
ROOF DECK/SUBSTRATE
ENERGYGUARD™ ROOF INSULATION
NOTE:

EVERGUARD® CAULKING TO BE ADDED TO ALL TERMINATIONS.
DRILL-TEC™ FASTENER @ 8” O.C.

EVERGUARD® COATED METAL EDGING WITH HEMMED EDGE

EVERGUARD® MEMBRANE FLASHING

EVERGUARD® PREMOLDED UNIVERSAL CORNER OR FIELD FABRICATED WITH UNREINFORCED MEMBRANE

WALL FLASHING WITH COATED METAL EDGE
EVERGUARD® COATED METAL OR MEMBRANE FLASHING

EVERGUARD® PREMOLDED UNIVERSAL CORNER HEAT WELDED 2” CONTINUOUSLY

CORNER SPLICE: POP-RIVET METAL PIECE TO METAL FLANGES, OR HEAT WELD MEMBRANE PIECE TO MEMBRANE FLASHING

EVERGUARD® COATED METAL OR MEMBRANE FLASHING

EVERGUARD® PREMOLDED UNIVERSAL CORNER HEAT WELDED

CORNER SPLICE: POP-RIVET METAL FLANGE TOGETHER, OR HEAT WELD MEMBRANE PIECE TO MEMBRANE FLASHING

NOTE:
INSIDE AND OUTSIDE CORNERS MAY ALSO BE FIELD FABRICATED USING UNREINFORCED MEMBRANE.
EVERGUARD® PRE-FAB. EXPANSION JOINT FASTENED 4" O.C. STAGGERED W/ GALV. ANNULAR RING NAILS

BATT INSULATION
TREATED WOOD NAILERS, MIN. 3 1/2"
WIDE SECURED TO DECK

EVERGUARD® MEMBRANE
EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS

ROOF DECK/SUBSTRATE
ENERGYGUARD™ ROOF INSULATION

NOTE:
STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

FOR TPO APPLICATIONS TAPE AND PRIMER SUPPLIED WITH THE EVERGUARD® EXPANSION JOINT MUST BE USED TO COMPLETE SEAMING OF THE VERTICAL SEAM. THIS DETAIL CAN ALSO BE FIELD FABRICATED WITH REINFORCED FIELD SHEET.
EVERGUARD® PRE-FAB. EXPANSION JOINT FASTENED
4” O.C. STAGGERED W/GALV. ANNULAR RING NAILS

BATT INSULATION

HEAT WELDED LAP

TREATED WOOD NAILERS

EVERGUARD® MEMBRANE

DRILL-TEC "PLATES & SCREWS 12” O.C.

HEAT WELDED LAP

EVERGUARD® MEMBRANE

EVERGUARD® ADHESIVE/GAF ASPHALT
(NOT SHOWN) REQ’D FOR FA SYSTEMS

TREATED WOOD NAILERS, MIN. 3 1/2”
WIDE SECURED TO DECK

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.

FOR TPO APPLICATIONS TAPE AND PRIMER SUPPLIED WITH THE
EVERGUARD® EXPANSION JOINT MUST BE USED TO COMPLETE
SEAMING OF THE VERTICAL SEAM. THIS DETAIL CAN ALSO BE FIELD
FABRICATED WITH REINFORCED FIELD SHEET.
NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.

FOR TPO APPLICATIONS TAPE AND PRIMER SUPPLIED WITH THE EVERGUARD® EXPANSION JOINT MUST BE USED TO COMPLETE SEAMING OF THE VERTICAL SEAM. THIS DETAIL CAN ALSO BE FIELD FABRICATED WITH REINFORCED FIELD SHEET.

WALL EXPANSION JOINT – FLAT TYPE

APPLICABLE SYSTEMS: MA/FA/BA
DATE: 01/01/06
DRAWING NUMBER: MA/FA/BA 403
NOTE:

STONE/PAVING BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.

PLATES & SCREWS 8" O.C. REQ'D FOR BA SYSTEMS.

FOR TPO APPLICATIONS TAPE AND PRIMER SUPPLIED WITH THE EVERGUARD EXPANSION JOINT MUST BE USED TO COMPLETE SEAMING OF THE VERTICAL SEAM. THIS DETAIL CAN ALSO BE FIELD FABRICATED WITH REINFORCED FIELD SHEET.
NOTE:

PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.
NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.
PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.
MAXIMUM 15 YEAR GUARANTEED SYSTEMS ONLY.
FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC
GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT
REQUIREMENTS.

CURB FLASHING WITH TERMINATION BAR
GALV. ANNULAR SHANK ROOFING NAILS 6” O.C.
METAL COUNTERFLASHING/EQUIPMENT HOUSING
EVERGUARD® BONDING ADHESIVE
EVERGUARD® MEMBRANE FLASHING
DRILL-TEC™ PLATES & SCREWS 12” O.C.
HEAT WELDED LAP
EVERGUARD® MEMBRANE
EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS

NOTE:
STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.
PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.
FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.

CURB FLASHING WITH NAILED TERMINATION
NOTE:
ALTERNATE CURB FLASHING BASE TERMINATION SUITABLE IN LIEU OF DRILL-TEC™ PLATES AND SCREWS INTO ROOF DECK.
METAL COUNTERFLASHING
COMPRESSIBLE FOAM ROD @ 50% COMPRESSION
EVERGUARD® BONDING ADHESIVE
EVERGUARD® MEMBRANE FLASHING
DRILL-TEC™ PLATES & SCREWS 12" O.C.
HEAT WELDED LAP
EVERGUARD® MEMBRANE

8" MIN.

ROOF DECK/SUBSTRATE
ENERGYGUARD™ ROOF INSULATION

ROOF HATCH CURB FLASHING
NOTE:

DO NOT CUT PREMOLDED BOOT. IT MUST BE PULLED OVER VENT PIPE.

PREMOLDED BOOTS ARE AVAILABLE IN SMALL AND LARGE SIZES AND SHOULD BE USED WHENEVER POSSIBLE TO FLASH PIPES 1/2” TO 8” IN DIAMETER.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

4 PLATES & SCREWS REQ’D FOR BA SYSTEMS.

TPO SELF-ADHERED PIPE BOOTS MAY BE USED WITH TPO SYSTEMS FOR UP TO A 15 YEAR GUARANTEE.

IF A SELF-ADHERED PIPE BOOT IS USED AND THE FLANGE IS INSTALLED OVER A SEAM THEN A TARGET SHEET MUST FIRST BE INSTALLED.
NOTE:

IF BOTTOM LAYER OF UNREINFORCED FLASHING MEMBRANE MUST BE SPLIT TO FIT AROUND STACK, A 6" WIDE EVERGUARD® FLASHING STRIP MUST BE HEAT WELDED OVER SPLIT.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

4 PLATES & SCREWS REQ’D FOR BA SYSTEMS.

TARGET SIZE SHALL EXTEND 6" OUT PAST THE PENETRATION.
EVERGUARD® UNREINFORCED TARGET

DRILL-TEC™ SCREWS 4” O.C. STAGGERED

HIGH TEMPERATURE PIPE STACK

RAIN HOOD

EVERGUARD® BONDING ADHESIVE

STAINLESS STEEL CLAMP

GAF WATER BLOCK

22 GA. GALV. PAN

EVERGUARD® FLASHING MEMBRANE

EVERGUARD® 2–PIECE UNREINFORCED FLASHING MEMBRANE

HEAT WELDED LAP

EVERGUARD® MEMBRANE SHEET

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA & TRI SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

TREATED WOOD NAILER, MIN. 3 1/2” WIDE SECURED TO DECK

NOTE:

TO BE USED WHEN TEMPERATURE OF STACK EXCEEDS 140°F.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

FOR INSULATION THICKNESSES GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.

TARGET SIZE SHALL EXTEND 6” OUT PAST THE PENETRATION.

HIGH TEMPERATURE STACK FLASHING

EverGuard®

APPLICABLE SYSTEMS: ALL

DATE: 01/01/06

DRAWING NUMBER: MA/FA/BA/TRI 508
NOTE:

BEND EVERGUARD COATED METAL TO FORM A SEALANT BOX AS SHOWN.

ALLOW 2" CLEARANCE AROUND THE PROJECTION.

INSIDE SURFACE OF EVERGUARD® COATED METAL SEALANT BOX (BARE METAL SIDE) MUST BE CLEAN AND DRY BEFORE SEALANT IS APPLIED.

STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.

UNREINFORCED FIELD FABRICATED CORNERS MAY ALSO BE USED.

PREFABRICATED HEAT WELDABLE PVC & TPO PIPE BOOTS MAY ALSO BE USED. CUT OFF STEPPED SECTIONS OF BOOT LEAVING LARGE BOTTOM OF BOOT INTACT. WELD FLANGE IN PLACE AND FILL WITH POURABLE SEALER TO TOP AND ADD STAINLESS STEEL BAND.

IF USING TPO BOOT, PRIME INSIDE OF BOOT.
NOTE:

SLOPE TOP OF COVER AWAY FROM EXISTING PIPES.

IT IS THE CONTRACTOR’S RESPONSIBILITY TO SEAL AROUND THE PIPES AT THE COVER OPENINGS.

VERTICAL SEAM OF THE METAL BOX MUST BE STRIPPED IN WITH 4” WIDE UNREINFORCED MEMBRANE.
NOTE:

IF THE INSULATION COMPRESSIVE STRENGTH IS INSUFFICIENT FOR THE EQUIPMENT WEIGHT, INSTALL TREATED WOOD UNDER THE EQUIPMENT CARRYING SLEEPER, MATCHING THE HEIGHT OF THE INSULATION.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.
 EQUIPMENT SUPPORT BRACKET
EVERGUARD® CAULK
EQUIPMENT SUPPORT SECURED TO DECK
EVERGUARD® BONDING ADHESIVE
EVERGUARD® MEMBRANE FLASHING
DRILL-TEC™ PLATES & SCREWS @ 12” O.C.
HEAT WELDED LAP
EVERGUARD® MEMBRANE
EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS

ROOF DECK/SUBSTRATE
ENERGYGUARD™ ROOF INSULATION

NOTES:

EQUIPMENT SUPPORT HEIGHT SHOULD BE SUFFICIENT TO ELEVATE THE EQUIPMENT SUPPORT BRACKET ABOVE THE PONDING WATER LEVEL.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.

FOR INSULATION THICKNESS GREATER THAN 8” CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.
NOTE:

A FIELD WELD CANNOT PASS WITHIN 9” OF THE CLAMPING RING, OR WITHIN THE DRAIN SUMP ITSELF.

MEMBRANE MUST EXTEND MINIMUM 1” BEYOND THE BOLT HOLES, THE CLAMPING RING BOLTS MUST PENETRATE THE MEMBRANE.

TAPERED INSULATION TO CREATE A ROOF SUMP MINIMUM 36” X 36” IN SIZE.
NOTE:

A FIELD WELD CANNOT PASS WITHIN 9” OF THE CLAMPING RING.

MEMBRANE MUST EXTEND MINIMUM 1” BEYOND THE BOLT HOLES, THE CLAMPING RING BOLTS MUST Penetrate THE MEMBRANE.

TAPERED INSULATION TO CREATE A ROOF SUMP MINIMUM 36” X 36” IN SIZE.

TRIPOSITE SYSTEMS USE GAF ASPHALT FLASHING CEMENT INSTEAD OF EVERGUARD® CAULKING.

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

PLATES & SCREWS 8” O.C. REQ’D FOR BA SYSTEMS.
NOTE:

TRIPOSITE SYSTEMS USE GAF ASPHALT FLASHING CEMENT INSTEAD OF EVERGUARD® CAULKING.

STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.
NOTE:

MINIMUM SLOPE IS 3" : 12"

STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.

PLATES & SCREWS 8" O.C. REQ'D FOR BA SYSTEMS.

FOR INSULATION THICKNESS GREATER THAN 8" CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.
NOTES:

STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.

PLATES & SCREWS 8" O.C. REQ'D FOR BA SYSTEMS.

FOR INSULATION THICKNESS GREATER THAN 8" CONTACT GAFMC GUARANTEE SERVICES FOR ALTERNATE MEMBRANE ATTACHMENT REQUIREMENTS.

TERMINATION AT FLAT ROOF
FULLY ADHERE ENTIRE PAD TO ROOF MEMBRANE USING EVERGUARD® BONDING ADHESIVE

ROUND CORNERS

EVERGUARD® WALKWAY PAD

EVERGUARD® BONDING ADHESIVE

EVERGUARD® CAULKING

EVERGUARD® MEMBRANE

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA SYSTEMS

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:

THIS DETAIL IS FOR TPO ONLY AND ALL EDGES OF WALKWAY PAD MUST BE SEALED WITH A HEAVY BEAD OF EVERGUARD® CAULKING. REMEMBER DO NOT CROSS SEAMS WITH WALKWAY PADS.
NOTE:

HEAT WELD EDGE OF WALKWAY ROLLS CONTINUOUSLY.

FOR TPO ONLY 3” SEAM TAPE MAY BE APPLIED IN 3 STRIPS RUNNING THE LENGTH OF THE PAD.

REMEMBER TO PRIME THE PAD AND TPO SHEET PRIOR TO INSTALLATION.

REMEMBER DO NOT CROSS SEAMS WITH WALKWAY PADS.
NOTE: REMEMBER DO NOT CROSS SEAMS WITH CONCRETE PAVER.
NOTE:
STONE/PAVER BALLAST (NOT SHOWN) REQ'D FOR BA SYSTEMS.
EVERGUARD® MEMBRANE

ROUNDED CORNERS

EVERGUARD® MEMBRANE STRIPS MIN. 4" WIDE

CABLE LINE

EVERGUARD® MEMBRANE STRIPS MIN. 2" WIDE

HEAT WELDS

EVERGUARD® MEMBRANE

EVERGUARD® ADHESIVE/ASPHALT (NOT SHOWN) REQ’D FOR FA & TRI SYSTEMS

LIGHTNING ROD

ROOF DECK/SUBSTRATE

ENERGYGUARD™ ROOF INSULATION

NOTE:

STONE/PAVER BALLAST (NOT SHOWN) REQ’D FOR BA SYSTEMS.

LOOPED LIGHTNING SUPPRESSION MOUNTING