

# THERMOPLASTIC ROOFING

## SECTION 9 - PROTECTED MEMBRANE & COMBINATION DESIGNS

### 9.1 GENERAL

- .1 A protected membrane roofing design is an insulated and ballasted roofing system in which the primary insulation is applied above the thermoplastic membrane and retained in place by ballast.
- .2 A combination roofing assembly is comprised of a conventional insulated membrane system where the primary thermoplastic membrane is covered with insulation held in place with ballast.
- .3 Protected membrane and combination designs do not require back nailing of the primary membrane plies for roof slopes 1:8 (1 1/2"/ft.) and greater

### 9.2 DRAINAGE

- .1 For protected membrane and combination designs the drainage slope shall be a minimum 1:50 (1/4"/ft.).
- .2 The maximum roof slope is restricted to 1:6 (2"/ft.).
- .3 When flow control drains are incorporated into the roof drainage system, membrane level scuppers shall be provided at the roof perimeter as emergency drainage. Roof drains and scuppers must have gravel screens installed when gravel ballast is specified. Drainage openings are not permitted through expansion joints.

### 9.3 PENETRATIONS AND PERIMETER HEIGHTS

- .1 Roof area dividers are not required for protected membrane designs.
- .2 Except for roof drains, all membrane penetrations shall be contained within or supported by a curb secured to the structure or decking.
- .3 Curb and control joint tops shall extend a minimum distance of 200mm (8") above the insulation when using gravel ballast or minimum 200mm (8") above the paver surface, when concrete pavers are selected as ballast. Curbs shall extend a minimum distance of 200mm (8") above the surface of concrete topped insulation systems.
- .4 The minimum parapet height above the gravel ballast or concrete paver surface shall be minimum 200mm (8").

### 9.4 MEMBRANE FLASHING

- .1 A minimum of one (1) ply of thermoplastic membrane flashing shall be installed at internal roof drains, parapet, curb and wall junctions.
- .2 When gravel ballast is specified, the vertical extension of the membrane flashing shall terminate a minimum vertical distance of 200mm (8") above the surface of the primary insulation.

- .3 For concrete pavers or concrete topped insulation systems, the vertical extension of the membrane flashing shall terminate a minimum distance of 200mm (8") above the top of the concrete surface.
- .4 The maximum membrane flashing height is 1100mm (42") above the surface of the primary membrane. A variance request must be submitted to the Technical Committee when membrane flashing height is to exceed 1100mm (42").

## **9.5 INSULATION**

- .1 The roof insulation shall be Type 4 Extruded Polystyrene Insulation loose-laid over the primary membrane. The insulation provides ultraviolet light protection for the membrane, as well as the thermal resistance for the roofing system.
- .2 Roof insulation 100mm (4") thick and less shall be installed in a single layer.
- .3 For multi-layer insulation applications, the base layer of insulation boards shall not be less than 100mm (4") thick. When using more than one insulation layer, the board joints shall be offset a minimum distance of 300mm (12") from the joints of the previous insulation layer.

## **9.6 BALLAST**

- .1 Poured-in-place concrete topping ballast is not accepted for Warranty Certificate issuance.
- .2 The ballast may be comprised of rock, concrete pavers or a concrete topped Type 4 insulation system.
- .3 Gravel (rock) ballast must be relatively free of fines and other foreign matter and shall contain gravel sizes between 19mm (3/4") and 37.5mm (1 1/2") in diameter.
- .4 An acceptable filter fabric must be installed over the insulation when using gravel ballast.
- .5 A minimum ballast mass of 50 kg/m<sup>2</sup> (10 lbs/ft.<sup>2</sup>) is recommended over the field of the filter fabric and loose-laid insulation. With the minimum gravel ballast mass, the filter fabric may be visible. For thick insulation layers, consult with the insulation manufacturer for ballasting requirements.
- .6 For concrete paver ballast, the weight of individual pavers shall not exceed 45 kg (100 lbs.) in mass. When using a paver ballast system, the pavers shall be elevated above the insulation to provide an air space between the paver and the primary insulation. Pedestals or insulation strips shall be employed to elevate the concrete pavers above the surface of the Type 4 insulation boards. Paver ballast shall not be placed on a bedding medium.
- .7 An interlocking concrete topped insulation system may be substituted for concrete paver or gravel ballast. A perimeter securement system, designed by the insulation manufacturer, is critical to the successful performance of the roofing system. The system shall be designed to ensure insulation boards are not displaced during anticipated wind loads. The building owner is responsible for the periodic inspection and maintenance of the insulation securement system. Hairline cracks in the bonded concrete topping may not cause premature or delamination of the concrete topping.

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- .8 The design parameters of the roof structure itself must include the weight of the newly installed ballasted roofing system. The structure must be capable of supporting the weight of the roofing system plus the specified ballast without encroaching on the necessary live load allowance and without creating or aggravating water ponding problems. A design professional should be consulted to certify that the structural system will support these loads.

## **9.7 SHEET METAL FLASHINGS**

- .1 Drip edge flashings are not accepted for roof edge terminations.
- .2 For a gravel ballast system, the sheet metal base flashings, when required, shall contain a minimum 50mm (2") wide horizontal leg that rests on the top surface of the primary insulation.
- .3 With paver ballast, the 50mm (2") horizontal base flashing, when required, leg shall rest on the surface of the paver.
- .4 When using a concrete topped insulation system, the sheet metal base flashings, when required, shall be minimum 24 Ga., and a minimum 50mm (2") wide horizontal base flashing leg shall be mechanically fastened to the concrete topping. Follow the manufacturers written application instructions for base flashing securement.