

## Section III: Materials Used in Modified Bituminous Roofing Systems

### Deck Materials

The roof deck provides structural support for the modified bitumen roofing system, which includes live and dead loads as well as lateral stress induced from wind and seismic forces. All decks should be attached to the building's supporting members to resist vertical and horizontal movement. Common decks consist of metal, structural and lightweight structural concrete, lightweight insulating concrete, wood, cementitious wood fiber and gypsum.

Table 2A

Design Properties	Performance Criteria	References
Structural Support	Deck deflection should be minimal to avoid damage to the roofing system when subjected to live and dead loads. Maximum deflection of L/240 of the clear span or in compliance with building codes.	<ul style="list-style-type: none"> <li>• Calculation and/or measurement</li> <li>• Producer's specifications for each type of decking</li> <li>• FM 4451, Approval Standard for Profiled Steel Panels for Use as Decking in Class 1 Insulated Roof Construction</li> </ul>
Dimensional Stability	The amount of dimensional change in the deck should not cause damage to the modified bitumen roofing system. The deck should cause no damage to the modified bitumen roofing system. Deck expansion and contraction should be considered in the design and installation of the total roofing system. These dimensional changes may be related to, but not limited to, temperature and/or moisture.	<ul style="list-style-type: none"> <li>• Calculation and/or measurement.</li> <li>• Producer's specifications for each type of decking.</li> </ul>
Drainage	Positive drainage is strongly recommended to prevent ponding water on the surface of the roofing membrane. Proper design and installation of the deck should result in the roof draining freely. A minimum slope of ¼:12 is required for modified bitumen roofing systems.	<ul style="list-style-type: none"> <li>• Observation, inspection.</li> <li>• 2015 IBC, Section 1507.11.1 Slope</li> <li>• 2015 IRC, Section R905.11.1 Slope</li> </ul>

Table 2b

Design Properties	Performance Criteria	References
Surface	<p>The deck surface should be smooth, even, firm, and free of moisture, dirt and foreign material. Design and installation should provide a maximum offset or projection from the plane of the deck not to exceed 1/8" (3 mm). The deck should be a suitable substrate for the insulation, temporary roof/vapor retarder (if specified), or roof membrane.</p>	<ul style="list-style-type: none"> <li>• Inspection and analysis.</li> <li>• Property Loss Prevention Data Sheet 1-28.</li> <li>• To test a poured-in-place deck for dryness, pour approximately one pint of hot bitumen at approx. 400 °F (204 °C) on the deck. If the bitumen foams or if it strips readily from the deck upon cooling, the deck is not sufficiently dry to roof.</li> <li>• ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method</li> <li>• Core Sample Analysis.</li> <li>• Infrared Analysis.</li> <li>• Nuclear Gauge Analysis.</li> <li>• ASTM F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes</li> </ul>
Expansion and Contraction	<p>Expansion/relief joints should be used to compensate for expansion and contraction of roof decks or other building components. An effective waterproof seal must be provided to bridge the gap between areas of roofing separated by the joints; expansion/relief joint covers must provide continuity for the roofing membrane, and also accommodate the movement which occurs because of expansion and contraction. Typically, roof system expansion joints should be installed at:</p> <ul style="list-style-type: none"> <li>• Expansion or contraction joints in the structural systems.</li> <li>• Changes in direction of structural shell, framing or decking.</li> <li>• Roof structure direction changes such as in "T", "H", "L", or "U" shaped buildings.</li> <li>• Locations where differential movement of the structure can be expected.</li> <li>• The location where an addition joins an existing building.</li> </ul>	<ul style="list-style-type: none"> <li>• Observation, inspection.</li> </ul>

Design Properties	Performance Criteria	References
	<ul style="list-style-type: none"> <li>• Changes in type of deck material.</li> <li>• Situations where the building's length exceeds 150 feet (45 m) and is dependent upon membrane and overall roof system design.</li> <li>• At junctions where interior heating or moisture conditions change.</li> </ul>	

## Steel Decks

Steel roof deck panels are normally 1 ½” (38 mm) deep and are constructed in three configurations:

- Intermediate rib steel deck
- Narrow rib steel deck
- Wide rib steel deck

Other configurations, while not as common, are available in depths from 2” to 7 ½” (51 mm to 190 mm) with rib spacing up to 12” (305 mm). Verify that the gauge, width, depth and span meet appropriate building code and design requirements.

Steel deck panels should be no lighter than 22 gauge and are to be either galvanized or shop coated, and side and end laps are mechanically fastened or button -punched during construction.

A steel deck is not a suitable substrate for the installation of a roofing membrane. A solid separation board—roof boards and insulation boards capable of spanning the flutes—should be installed between a steel deck and a roofing membrane. A vapor barrier attached to a steel deck is not considered a part of the roof membrane. If a vapor barrier is needed, it is the responsibility of the designer/specifier.

## Structural Concrete Decks

Structural concrete decks are generally monolithic slabs, poured in place over removable forms and steel reinforcement. These decks have a minimum compressive strength of 2,300 pounds per square inch (110 kPa) and a density of approximately 150 pounds per cubic foot (2400 kg/m<sup>3</sup>). These decks are considered noncombustible when they are a minimum of 2” (51 mm) thick. This deck type is produced by mixing aggregate with Portland cement, water, and, in some cases, with chemical additives. Steel bars and/or welded steel mesh are used to reinforce the concrete. Due