

# Chapter 8

## RAIN LOADS

### 8.1 SYMBOLS

$R$  = rain load on the undeflected roof, in lb/ft<sup>2</sup> (kN/m<sup>2</sup>). When the phrase “undeflected roof” is used, deflections from loads (including dead loads) shall not be considered when determining the amount of rain on the roof.

$d_s$  = depth of water on the undeflected roof up to the inlet of the secondary drainage system when the primary drainage system is blocked (i.e., the static head), in in. (mm).

$d_h$  = additional depth of water on the undeflected roof above the inlet of the secondary drainage system at its design flow (i.e., the hydraulic head), in in. (mm).

### 8.2 ROOF DRAINAGE

Roof drainage systems shall be designed in accordance with the provisions of the code having jurisdiction. The flow capacity of secondary (overflow) drains or scuppers shall not be less than that of the primary drains or scuppers.

### 8.3 DESIGN RAIN LOADS

Each portion of a roof shall be designed to sustain the load of all rainwater that will accumulate on it if the primary drainage system for that portion is blocked plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow.

$$R = 5.2(d_s + d_h) \quad (8.3-1)$$

In SI:  $R = 0.0098(d_s + d_h)$

If the secondary drainage systems contain drain lines, such lines and their point of discharge shall be separate from the primary drain lines.

### 8.4 PONDING INSTABILITY

“Ponding” refers to the retention of water due solely to the deflection of relatively flat roofs. Susceptible bays shall be investigated by structural analysis to assure that they possess adequate stiffness to preclude progressive deflection (i.e., instability) as rain falls on them or meltwater is created from snow on them. Bays with a roof slope less than 1/4 in./ft., or on which water is impounded upon them (in whole or in part) when the primary drain system is blocked, but the secondary drain system is functional, shall be designated as susceptible bays. Roof surfaces with a slope of at least 1/4 in. per ft (1.19°) towards points of free drainage need not be considered a susceptible bay. The larger of the snow load or the rain load equal to the design condition for a blocked primary drain system shall be used in this analysis.

### 8.5 CONTROLLED DRAINAGE

Roofs equipped with hardware to control the rate of drainage shall be equipped with a secondary drainage system at a higher elevation that limits accumulation of water on the roof above that elevation. Such roofs shall be designed to sustain the load of all rainwater that will accumulate on them to the elevation of the secondary drainage system plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow (determined from Section 8.3).

Such roofs shall also be checked for ponding instability (determined from Section 8.4).