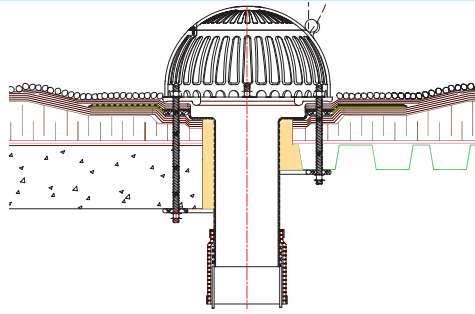


ROOF SPECIALTIES

CALCULATING DRAIN SIZE & QUANTITY



INTRODUCTION

Roofing experts today all agree roofs should be drained to avoid ponding; no accidental ponds should be left after a rain. Freezing of ponded water that has penetrated into the plies can delaminate the membrane. Standing water can promote the growth of vegetation and fungi, create breeding places for insects, and produce objectionable odors. Plant roots can puncture the membrane and spread into the insulation thereby influencing leaks, blisters, wrinkles, and destruction of the insulation. Wide temperature variations in a randomly ponded roof can promote a warping pattern of surface elongation and construction, possibly wrinkling the membrane. Further it is impossible to apply a new built-up membrane or to repair a roof with ponds of standing water. Evidence of ponded water on a roof surface after a rainfall can nullify some manufacturers roofing warranties.

RAINFALL RECORDS

In any case, when calculating drain size and quantity, an examination of rainfall records must be carried out. For rainfall data for various cities, refer to the appropriate guide information provided by the Sheet Metal & Airconditioning Contractors National Association (SMACNA), Architectural Sheet Metal Manual, or search weather bureau records.

CALCULATION DATA

Following are some general guidelines provided by Thaler, keeping in mind that a slope of 1:50 (2%) is about the minimum practicable slope to achieve reasonable drainage on low slope/flat roofs. This minimum is accepted by roofing authorities around the world.

FLOW IN U.S. GALLONS PER MINUTE (GPM)

ROOF AREA TO BE DRAINED

VERTICAL LEADER	
Leader Size	U.S. Gallon Per Minute
2"	30 gpm
3"	90 gpm
4"	192 gpm
5"	348 gpm
6"	566 gpm

Inches per hour vs Square Ft. of Roof					
Leader Size	1" h	2" h	3" h	4" h	5" h
2"	2880 sf	1440 sf	960 sf	720 sf	575 sf
3"	8880 sf	4400 sf	2930 sf	2200 sf	1760 sf
4"	18,400 sf	9200 sf	6130 sf	4600 sf	3680 sf
5"	34,600 sf	17,300 sf	11,530 sf	8680 sf	6920 sf
6"	54,000 sf	27,000 sf	18,000 sf	13,500 sf	10,800 sf

CALCULATING DRAINAGE IN U.S. GPM

GPM = U.S. Gallons Per Minute
 A = Roof Area in square feet
 R = Rainfall in inches per hour
 0.0104 = Conversion Factor
 Roof Area= Assume a roof area 320'-0" x 350'-0" or 112,000 sq.ft.

Example

GPM = Factor x Rain Fall in inches per hour x Roof Area in square feet
 GPM = 0.0104 x 2" x 112,000 sq.ft. = 2329 GPM

Assume a 3" Leader for a flow rate of 90 U.S. GPM, 2" rainfall per hour for every 4400 square feet of roof area

2329 GPM ÷ 90 = 25.88 rounded to 26 vertical leaders required of 3" diameter.

NOTES:

1. The number and size of roof drains should be determined by the building designer. The method used will vary geographically, and be influenced by local building regulations and other factors relating to building design e.g. slope of roof, angle of horizontal leader under the roof, and similar considerations.
2. On school roofs, specify drains with vandalproof and shatterproof strainers.