Unvignetted Peephole

We need y and $\bar{y}$ at each lens for both FOVs.

Marginal Ray – does not change with FOV

from before: $y(L1) = .266$ mm

$y(L2) = 2.00$ mm

Chief Ray – $+/- 45°$ $\quad \bar{u}_0 = 1.00$

from before $\quad \bar{y}(L1; 45) = -3.77$ mm

$\bar{y}(L2; 45) = -3.32$ mm

Chief Ray – $+/- 30°$ $\quad \bar{u}_0 = \tan(30°) = .577$

this chief ray can be found by scaling the chief ray for $+/- 45°$

$\bar{y}(L1; 30) = .577\ \bar{y}(L1; 45) = -2.17$ mm

$\bar{y}(L2; 30) = .577\ \bar{y}(L1; 45) = -1.92$ mm

Fully Vignetted at $+/- 45°$

$a = |\bar{y}| - |y|$ and $a > |y|$

L1: $a_1 = |-3.77| - |.266| = 3.50$ mm

L2: $a_2 = |-3.32| - |2.00| = 1.32$ and $a_2 > 2.00$

$a_2 = 2.00$ mm

As before, the required diameters for the fully vignetted field of view:

$D_1 = 7.00$ mm

$D_2 = 4.00$ mm

Unvignetted at +/- 30°

$$a = |\bar{y}| + |y|$$

L1: $a_1 = |-2.171| + |.266| = 2.436$ mm

L2: $a_2 = |-1.92| + |2.001| = 3.92$ mm

The required diameters for this condition are

$$D_1 = 4.87 \text{ mm}$$

$$D_2 = 7.84 \text{ mm}$$

System Requirement

The fully vignetted FOV is determined by L1
The unvignetted FOV is determined by L2

$$D_1 = 7.00 \text{ mm}$$

$$D_2 = 7.84 \text{ mm}$$

The larger of the two requirements is used.