

where  $h_L$  = headloss, m

$C$  = an empirical discharge coefficient to account for turbulence and eddy losses, typically 0.7 for a clean screen and 0.6 for a clogged screen

$V$  = velocity of flow through the openings of the bar screen, m/s

$v$  = approach velocity in upstream channel, m/s

$g$  = acceleration due to gravity, 9.81 m/s<sup>2</sup>

The headloss calculated using Eq. (5-1) applies only when the bars are clean. Headloss increases with the degree of clogging. The buildup of headloss can be estimated by assuming that a part of the open space in the upper portion of the bars in the flow path is clogged. The use of Eq. (5-1) is illustrated in Example 5-1.

**EXAMPLE 5-1 Headloss Buildup in Coarse Screens** Determine the buildup of headloss through a bar screen when 50 percent of the flow area is blocked off due to the accumulation of coarse solids. Assume the following conditions apply:

Approach velocity = 0.6 m/s

Velocity through clean bar screen = 0.9 m/s

Open area for flow through clean bar screen = 0.19 m<sup>2</sup>

Headloss coefficient for a clean bar screen = 0.7

**Solution**

1. Compute the clean water headloss through bar screen using Eq. (5-1).

$$h_L = \frac{1}{C} \left( \frac{V^2 - v^2}{2g} \right)$$

$$h_L = \frac{1}{0.7} \left[ \frac{(0.9 \text{ m/s})^2 - (0.6 \text{ m/s})^2}{2(9.81 \text{ m/s}^2)} \right] = 0.033 \text{ m}$$

2. Estimate the headloss through the clogged bar screen (reducing the screen area by 50 percent results in a doubling of the velocity).

The velocity through the clogged bar screen is

$$V_c = 0.9 \text{ m/s} \times 2 = 1.8 \text{ m/s}$$

Assuming the flow coefficient for the clogged bar screen is approximately 0.6, the estimated headloss is

$$h_L = \frac{1}{0.6} \left[ \frac{(1.8 \text{ m/s})^2 - (0.6 \text{ m/s})^2}{2(9.81 \text{ m/s}^2)} \right] = 0.24 \text{ m}$$

**Comment** Where mechanically cleaned coarse screens are used, the cleaning mechanism typically is actuated by the buildup of headloss. Headloss is determined by measuring the water level before and after the screen. In some cases, the screen is cleaned at predetermined time intervals, as well as at a maximum head differential.

Although most screens use rectangular bars, optional shapes, i.e., "teardrop" and trapezoidal, are available. For the optional shapes, the wider width dimension is located