and for the two dimensional slots:

$$K_o = \left(1 - \frac{b}{B} C_c\right)^2 \quad \frac{1}{\left(\frac{b}{B}\right)^2 C_c^2} \qquad 14.4$$

Equation 14.1 is the base for determining the loss coefficients for a range of components considered in the next four sections 14.2. to 14.5. Within valves the vena contracta is often undefined and the contracted flow may be subjected to turning. Valves are considered in section 14.6. Section 14.7 is concerned with laminar flows.

14.2. ORIFICES, SCREENS AND PERFORATED PLATES

The correlation of loss coefficients in this section is based on the geometric ratio:

$$\frac{A_2}{A_1} = \frac{\text{Free area at plain of orifice or screen}}{\text{Area of pipe or passage}}$$

A solidity parameter is sometimes used in the literature and is given by:

$$S = 1 - \frac{A_2}{A_1} = \frac{\text{Blockage area of screen}}{\text{Area of pipe or passage}}$$

Loss coefficients for components such as screens and orifice plates are based upon measurements made just sufficiently far upstream to be unaffected by the component and just after the component, where the flow has expanded to fill the pipe or passage and any static pressure recovery is complete. If the component is not followed within four diameters by another component, the loss coefficient should be increased by 0.01 for each additional diameter of length, up to ten diameters, in order to allow for flow re-development (class 3). This is in addition to the normal friction loss in the pipe or passage.

If the effective free area of a screen or perforated plate is less than 50 percent of the pipe or passage area the flow out of the screen or plate will tend to coalesce into a number of discrete jets, resulting in a very poor downstream velocity distribution. If screens are used to improve flow distribution several low loss screens are much more effective than a single high loss screen.

14.2.1. SHARP EDGE THIN ORIFICES (CLASS 1)

Loss coefficients, K_o, against area ratio for sharp edged thin orifices are shown on Fig. 14.3. The coefficients are based upon the mean velocity in the pipe or passage and apply to Reynolds numbers above 10^3. The Reynolds number is based on the orifice diameter and the mean orifice velocity. Correction factors to account for orifice edge radii are given in Fig. 14.4.

14.2.2. SHARP EDGED LONG ORIFICES Re>1000 (CLASS 2)

Correction factors to apply to the sharp edged thin orifice coefficients of Fig. 14.3, in order to find loss coefficients for orifices of length to diameter ratios between 0.1 and 3.0, are plotted on Fig. 14.5. Over a range of length to diameter ratios of 0.1 to 0.8 instabilities may occur because of intermittent flow re-attachment in the orifice and coefficients are Reynolds number dependent. If the orifice is longer than 3 diameters friction losses in the

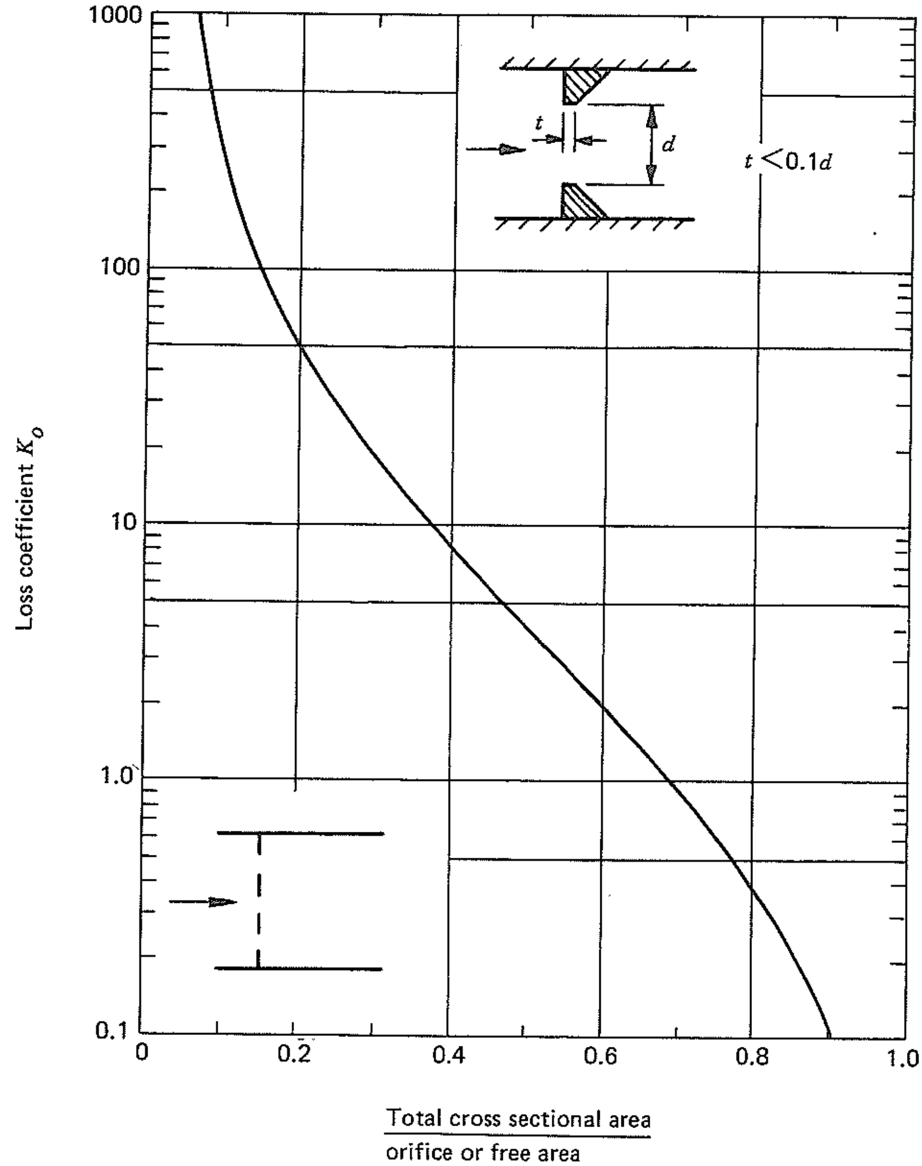

Fig. 14.3. Loss coefficients for sharp edged thin orifices (also applies to square holes)

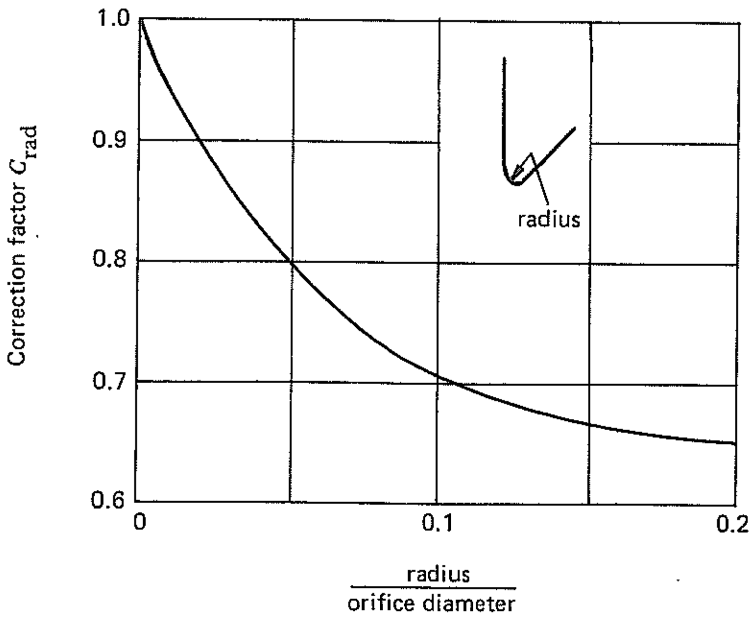

Fig. 14.4. Correction factors for edge radii