ENVIRONMENTAL & SAFETY OF MINES SUBJECT

Airflow through Mine Openings and Ducts

College of Petroleum & Mining Eng.

Mining Engineering Dept.

4th Class

Lecture No.1 – Chapter 5-Part-II

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Overview-PART-II

- Correction for K Value
- K Value in case of Timbered Air way
- Determination of Airway Friction factor K for Vent Pipe
- Estimation of Airway Friction factor K by Graph

Correction for K Value

- K Value from tables 5.1 & 5.2 has to be corrected before using it in equs. (5.18 or 5.20), when air specific weight is not standard. Means if it's >or < 0.0750.

- Corrections using below equ.

$$\text{Corrected } K = (\text{table } K)\left(\frac{w}{0.0750}\right) \qquad (5.22)$$

K Value in case of Timbered Air way-Page 157

- If the airway is timbered and the sets are spaced on other than 5-ft.(1.5-m) centers, **modify** *K* according to Fig. 5.11. If roof bolting is used in place of timbering, assume an unlined airway.

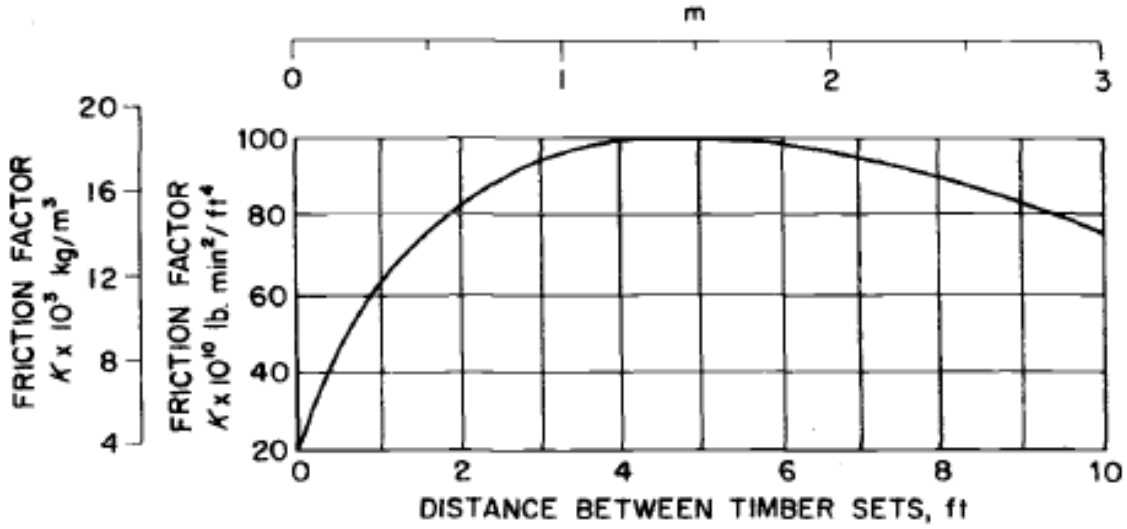

FIGURE 5.11 Effect of spacing of timber sets on friction factor *K*. (After McElroy, 1935.)

Determination of Airway Friction factor K for Vent Pipe- Pages 157-158

- For vent pipe use the following table to get the K- Value
- We need (pipe type & condition)

Pipe or Tubing	Friction Factor, $K \times 10^{10}$ lb·min^2/ft^4 (kg/m^3)	
	Good, New	Average, Used
Steel, wood, fiberglass (rigid)	15 (0.0028)	20 (0.0037)
Jute, canvas, plastic (flexible)	20 (0.0037)	25 (0.0046)
Spiral-type canvas	22.5 (0.0042)	27.5 (0.0051)

Estimation of Airway Friction factor K by Graph Page 158

- Nomograph, Fig. A-2 in Appendix A, for circular shape duct to find K Value
- We need,

1. Hydraulic radius, Rh=(A/O)
2. Velocity
3. Friction Loss H_f (per 100ft length) from

$$H_f = \frac{KLV^2}{5.2R_H}$$

- Corrected H_f if w_{air} is >or <than 0.0750 using eq. below

$$\text{corrected } H_f = \text{graph } H_f \times w/0.0750.$$

Estimation of Airway Friction factor K by Graph Page 158

- Friction loss f, from Fig. A-3 in Appendix A,
- We need only two of the following parameter in order to use the figure

1. Velocity
2. Duct Diameter
3. Air Quantity

Note:

f read from figure per 100ft of pipe length

END OF Ch.5-PART-II