

Vinidexair



THE BLUE AIR PRESSURE PIPING SYSTEM



System design guidelines for the selection of Vinidexair compressed air pipelines

It is customary to find the Inside Diameter of the pipe by using formulas such as shown below. The formulas used are generally for approximation purposes only, surmising that the temperature of the compressed air corresponds roughly to the induction temperature. You will obtain an acceptable approximation through the following equation.

$$d = 5 \sqrt{\frac{450 \cdot L_E \cdot Q^{1.85}}{\Delta p \cdot p}}$$

Where:

d = Pipe Internal Diameter in mm
 L_E = Pipe Length in m
 Q = Volumetric Flowrate in L/s
 Δp = Pressure Decrease in bar
 p = Working Pressure in bar

The use of a nomogram is a quicker and easier method to source information (see Figure 1). In this nomogram the Pressure Decrease (Δp) is indicated in bar, the Working Pressure (p) in bar, the Volumetric Flowrate (Q) in L/s, the Pipe Length (L_E) in m, and the Pipe Nominal Diameter DN.

Note

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The advantage of using the nomogram is that no further conversion factors are required for pipe sizing. Also, when four of the parameters are known the fifth can be determined by reading directly from the nomogram.

Example for the use of the air-line nomogram to determine the required pipe size

Working Pressure 7 bar
 Volumetric Flowrate 30 L/s
 Nominal length 200 m
 Pressure Decrease 0.05 bar

- 1 Utilising the above operating figures, proceed to mark those positions around the perimeter of the nomogram.
- 2 Locate the separation line between (Δp) & (p). (See base of nomogram.)
- 3 Commencing at the lower right hand side of the nomogram draw a line up from the Working Pressure (p) to the line indicating the Volumetric Flowrate (Q).

- 4 Using point (3) draw a diagonal line to the separation line.
- 5 Go to top of nomogram and use the point indicating the Length of Pipe and draw a line down to meet horizontal line from point (4).
- 6 Move to the Pressure Decrease in the Pipe (Δp) at the bottom of nomogram and draw a vertical line up to meet the diagonal drawn from point (5).
- 7 The Nominal Diameter of Pipe can now be found by reading from point (6) across to the left hand side of the nomogram. From this example DN63 pipe should be selected. If the completed nomogram falls between two sizes of pipe, always use the larger size.

Correction factors for fittings

The table below indicates the approximate pressure loss for fittings in terms of an equivalent length of straight pipe in metres. For each pipeline fitting, add the equivalent length of pipe to the original length of pipeline. This length is used for the calculation of the equation above or for the nomogram (Figure 1).

Fitting	equivalent pipe length in m						
	DN 20	DN 25	DN 32	DN 40	DN 50	DN 63	DN 90
socket welding joint	0.2	0.2	0.3	0.4	0.5	0.6	1.1
45° bend	0.2	0.3	0.4	0.6	0.9	1.2	2.3
90° bend	0.4	0.7	1.0	1.3	1.8	2.3	4.5
tees	0.8	1.4	1.9	2.4	2.8	3.8	7.5
reducer	0.3	0.4	0.5	0.6	0.7	0.9	2.1

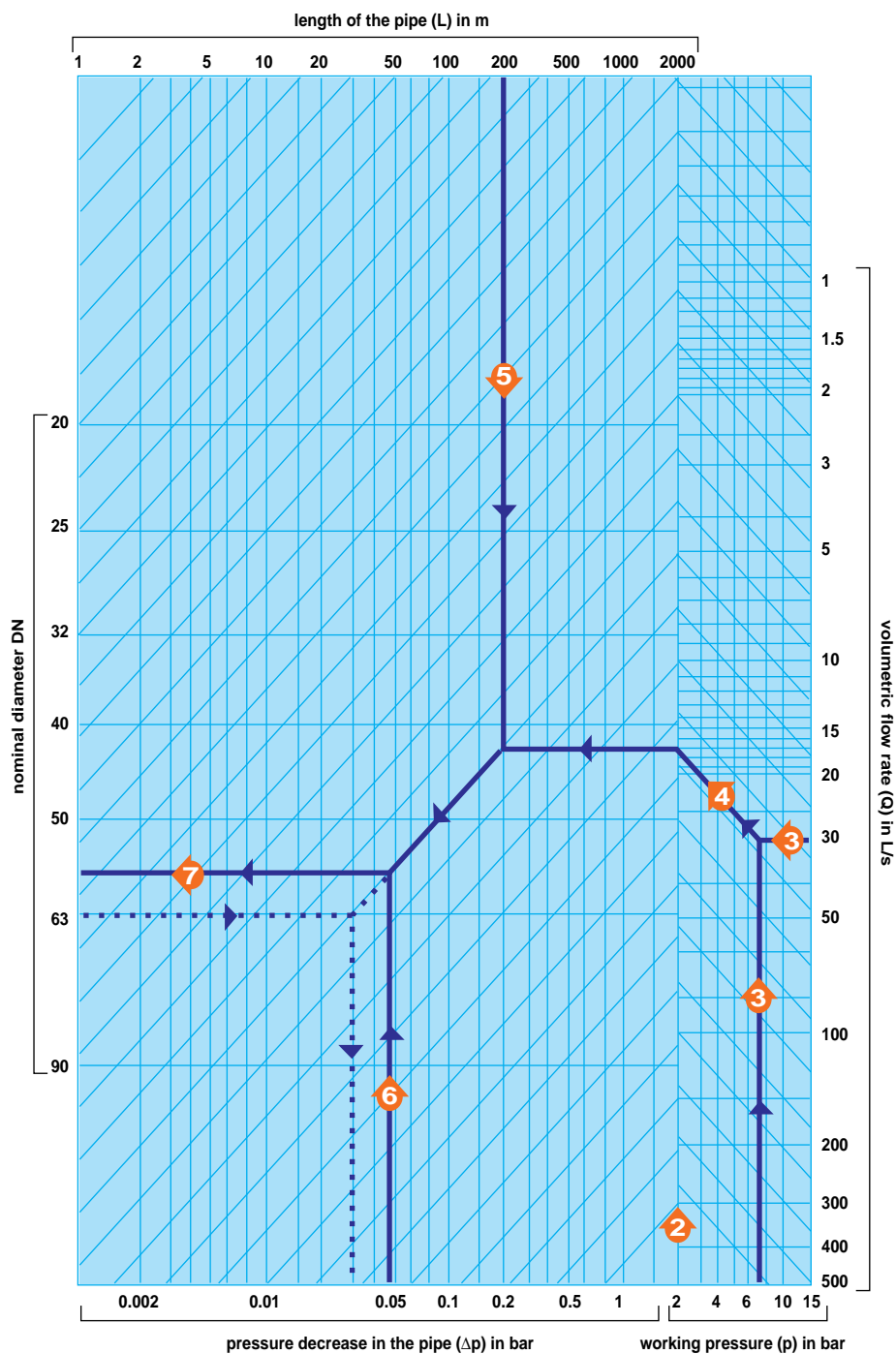


Figure 1

Sources: Feldmann, K.H.: Druckluftverteilung in der Praxis (München 1985)
 Atlas Copco : information sheets

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