

Pneumatik

Dimensioneringsuppgift

"Press"

Cykinderstorlek

$$F_{+verk} = A_1(P_{in} - \Delta P_{in} - \Delta P_{frik}) - A_2(P_{ut})$$
$$550 = A_1(6,3 - 0,6 - 0,6) \times 10 - 0,85A_1(0,5 \times 6,3) \times 10$$

Antag: $A_2 = 0,85 \times A_1$

$$\Delta P_{in} = 0,6 \text{ bar}$$
$$P_{ut} = 50\%$$

$$A_1 = \frac{550}{51A_1 - 25,2A_1} \quad A_1 = 21,3 \text{ cm}^2$$
$$A = \frac{\pi \times D^2}{4} \quad D = \sqrt{\frac{A \times 4}{\pi}} \quad D = \sqrt{\frac{21,3 \times 4}{\pi}}$$

$$D = 5,2 \text{ cm} = 52 \text{ mm} \quad \text{STD: CYL 63 mm}$$

$$A_1 = 31 \text{ cm}^2$$
$$A_2 = 28 \text{ cm}^2$$

Kontroll std.cyl 63mm

$$F_{+verk} = A_1(P_{in} - \Delta P_{in} - \Delta P_{frik}) - A_2(P_{ut}) \quad F_{+verk} = 31(6,3 - 0,6 - 0,6) \times 10 - 28(0,5 \times 6,3) \times 10$$
$$F_{+verk} = 699 \text{ N} \quad 699 \text{ N} > 550 \text{ N} \quad 63 \text{ mm cyl OK}$$

Momentana luftförbrukningen

$$Q_{vmom} = A \times v \times P_a \quad Q_{vmom} = 31 \times 15 \times (6,3 + 1) \quad Q_{vmom} = 3395 \text{ Ncm}^3 / \text{s} \quad Q_{vmom} = 3,4 \text{ NI} / \text{s}$$

Maxflöde

$$Q_{max} = Q_{vmom} \times 2 \quad Q_{max} = 3,4 \times 2 \quad Q_{max} = 6,8 \text{ NI} / \text{s}$$

C-värde

$$C_{in} = \frac{Q_{max}}{P_a} \quad C_{in} = \frac{6,8}{(6,3 + 1)} \quad C_{in} = 0,93 \text{ NI} / \text{s} \cdot \text{bar}$$

Alt. 1

Komponenterna delar lika på tryckfallet

Korrigerat C-värde

$$C_v = C_{in} \times k \quad 2 \text{ komp. } K=1,41$$

$$C_v = 0,93 \times 1,41$$

$$C_v = 1,3 \text{ NI} / \text{s} \cdot \text{bar}$$

Ledning

Tabell

6mm inv. diam. Max 10m

Ventil

Tag fram nya Q_{max} ur C_v

$$Q_{max} = C_v \times P_a$$

$$Q_{max} = 1,3 \times (6,3 + 1)$$

$$Q_{max} = 9,6 \text{ NI} / \text{s} = 575 \text{ NI} / \text{min}$$

Ventilens nominella flöde $Q_n = Q_{vmom}$

$$Q_n = \frac{Q_{max}}{2} \quad Q_n = \frac{575}{2} \quad Q_n = 287 \text{ NI} / \text{min}$$

Alt. 2

Tryckfallet faller mest över ventilen

$$C_{in} = 0,93 \text{ NI} / \text{s} \cdot \text{bar}$$

$$Q_{max} = C_{in} \times P_a$$

$$Q_{max} = 0,93 \times (6,3 + 1)$$

$$Q_{max} = 6,8 \text{ NI} / \text{s} = 407 \text{ NI} / \text{min}$$

Ventil

Ventilens nominella flöde $Q_n = Q_{vmom}$

$$Q_n = \frac{Q_{max}}{2} \quad Q_n = \frac{407}{2} \quad Q_n = 204 \text{ NI} / \text{min}$$

Ledning (C_L)

$$C_L = C_{in} \times k \quad 2 \text{ komp. } K=2$$

$$C_L = 0,93 \times 2$$

$$C_L = 1,83 \text{ NI} / \text{s} \cdot \text{bar}$$

Tabell

6mm inv. diam. Max 5m

Sammanfattning

Alt 1. Std.cyl 63mm
 Q_n ventil=287NI/min
Slang 6mm (max 10m)

Alt 2. Std.cyl 63mm
 Q_n ventil=204NI/min
Slang 6mm (max 5m)

