

Hydraulická zařízení

Lis	S_1	S_2	F_1	F_2
1	1 cm ²	100 cm ²	10 N	1000 N
2	20 cm ²	300 cm ²	100 N	1500 N
3	1,5 cm ²	0,3 m ²	5 kN	10 MN
4	2,5 cm ²	0,5 m ²	200 N	400 kN

1. $S_1 = 1 \text{ cm}^2 = 0,0001 \text{ m}^2$

$$S_2 = 100 \text{ cm}^2 = 0,01 \text{ m}^2$$

$$F_1 = 10 \text{ N}$$

$$F_2 = ? \text{ [N]}$$

$$p = \frac{F_1}{S_1}$$

$$p = \frac{F_2}{S_2}$$

$$\Rightarrow F_2 = p \cdot S_2$$

$$p = \frac{10}{0,0001}$$

$$F_2 = 100\,000 \cdot 0,01$$

$$F_2 = 1000 \text{ N}$$

$$p = 100\,000 \text{ Pa}$$

$$\frac{F_2}{F_1} = \frac{S_2}{S_1}$$

$$F_2 = \frac{S_2}{S_1} \cdot F_1$$

$$F_2 = \frac{100}{1} \cdot 10$$

$$F_2 = 1000 \text{ N}$$

Velikost síly působící
na větší píst je
1000 N.

2.

$$S_1 = ? \text{ [m}^2\text{]}$$

$$S_2 = 300 \text{ cm}^2 = 0,03 \text{ m}^2$$

$$F_1 = 100 \text{ N}$$

$$F_2 = 1500 \text{ N}$$

$$p = \frac{F_1}{S_1}$$

\Rightarrow

$$S_1 = \frac{F_1}{p}$$

$$p = \frac{F_2}{S_2}$$

$$S_1 = \frac{100}{50000}$$

$$p = \frac{1500}{0,03}$$

$$S_1 = 0,002 \text{ m}^2$$

$$p = 50000 \text{ Pa}$$

$$S_1 = 20 \text{ cm}^2$$

$$\frac{F_2}{F_1} = \frac{S_2}{S_1}$$

$$\frac{F_1}{F_2} = \frac{S_1}{S_2}$$

$$S_1 = \frac{F_1}{F_2} \cdot S_2$$

$$S_1 = \frac{100}{1500} \cdot 300$$

$$S_1 = 20 \text{ cm}^2$$

Plocha malého
pístu je 20 cm^2 .

3.

$$S_1 = 1,5 \text{ cm}^2 = 0,00015 \text{ m}^2$$

$$S_2 = 0,3 \text{ m}^2$$

$$F_1 = ? \text{ [N]}$$

$$F_2 = 10 \text{ MN} = 10\,000\,000 \text{ N}$$

$$\mu = \frac{F_1}{S_1}$$

$$\Rightarrow F_1 = \mu \cdot S_1$$

$$\mu = \frac{F_2}{S_2}$$

$$F_1 = 33\,333\,333,3 \cdot 0,00015$$

$$\mu = \frac{10\,000\,000}{0,3}$$

$$\underline{\underline{F_1 = 5000 \text{ N}}}$$

$$\underline{\underline{\mu = 33\,333\,333,3 \text{ Pa}}}$$

$$\frac{F_2}{F_1} = \frac{S_2}{S_1}$$

$$\frac{F_1}{F_2} = \frac{S_1}{S_2}$$

$$F_1 = \frac{S_1}{S_2} \cdot F_2$$

$$F_1 = \frac{0,00015}{0,3} \cdot 10\,000\,000$$

$$\underline{\underline{F_1 = 5000 \text{ N}}}$$

Velikost působící síly
na malý píst je
5 000 N.

4.

$$S_1 = 2,5 \text{ cm}^2 = 0,00025 \text{ m}^2$$

$$S_2 = ? [\text{m}^2]$$

$$F_1 = 200 \text{ N}$$

$$F_2 = 400 \text{ kN} = 400\,000 \text{ N}$$

$$p = \frac{F_1}{S_1}$$

$$p = \frac{200}{0,00025}$$

$$p = 800\,000 \text{ Pa}$$

$$p = \frac{F_2}{S_2}$$

\Rightarrow

$$S_2 = \frac{F_2}{p}$$

$$S_2 = \frac{400\,000}{800\,000}$$

$$S_2 = 0,5 \text{ m}^2$$

$$\frac{F_2}{F_1} = \frac{S_2}{S_1}$$

$$S_2 = \frac{F_2}{F_1} \cdot S_1$$

$$S_2 = \frac{400\,000}{200} \cdot 0,00025$$

$$S_2 = 0,5 \text{ m}^2$$

Plocha veľkého pístu je $0,5 \text{ m}^2$.