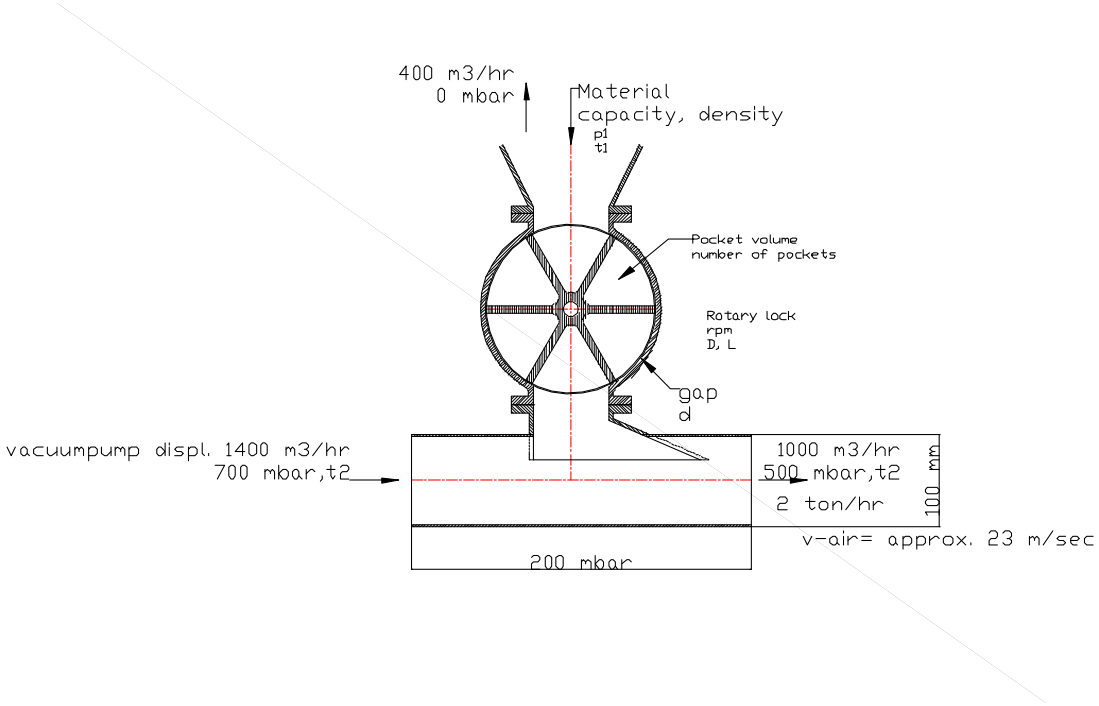
Regarding the calculation of rotary lock leakage, you can try the following.



p1 and p2 in absolute pressure

p1 is pressure at rotary lock inlet

p2 is pipeline pressure

RotarylockVolume = pocket volume * number of pockets

Capacity rotary lock = RotarylockVolume * rpm * material density * η vol *60 / 1000 tons/hr

Mass in pocket at p1 , t1 :

$$\text{Mass1} = 1.293 * \frac{p1}{1} * \frac{273}{(273 + t1)} * \text{RotarylockVolume}$$

$$\text{Mass2} = 1.293 * \frac{p2}{1} * \frac{273}{(273 + t2)} * \text{RotarylockVolume}$$

Rotary lock volume loss = (Mass2 – Mass1) / air density * rpm / 60

Rotary lock volume loss =

$$\left(\frac{p2}{273+t2} - \frac{p1}{273+t1}\right) * \frac{(273 + tambient)}{p(amb)} * RotarylockVolume * \frac{rpm}{60}$$

in which:
p2 – p1 = convey pressure
p2 = absolute compressor pressure
p1 = absolute hopper/silo pressure (ambient (atmospheric))
p(ambient) = absolute ambient (atmospheric) pressure (intake pressure compressor)
t2 = convey air temperature
t1 = hopper/silo temperature
tambient = intake temperature compressor

additional the product displacement and the gap losses have to be added to this value.