

Examples

1. A single-acting reciprocating compressor induces 1 m^3 of air per minute at 1.013 b , 15°C , and delivers it at 7 b . Compression follows $p v^{1.35} = c$ and the clearance can be neglected. Determine the indicated power.
2. If the compressor above operates at the speed $N=300$ rpm, determine the cylinder bore if the stroke to bore ratio is $1.5:1$
3. Find the isothermal efficiency for the compressor above.

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4. A double-acting compressor induces 14 m^3 air per minute at 1.013 b and 15°C . Delivery pressure is 7 b and the compressor speed is 300 rpm . If the clearance volume is 5% of swept volume and compression index is 1.3 , find V_s and indicated power.
5. Air at free air condition of 1.013 b and 15°C enters a double-acting compressor at $14 \text{ m}^3/\text{min}$. During the intake stroke, cylinder pressure is 0.95 b and the temperature is 32°C . Delivery pressure is 7 b and the compression and expansion index is 1.3 . If the clearance volume is 5% of the swept volume, find the volumetric efficiency.

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6. In a single-acting, 2 stage compressor, 4.5 kg/min of air is compressed from 1.013 b and 15 °C over a 9:1 pressure ratio. Both stages have the same pressure ratios and follow $pv^{1.3}=c$ for all compression and expansion processes. Clearance volume is 5% of the swept volume for both stages, and the compressor operates at 300 rpm. If intercooling is complete, find the indicated power and the swept volume for both stages.