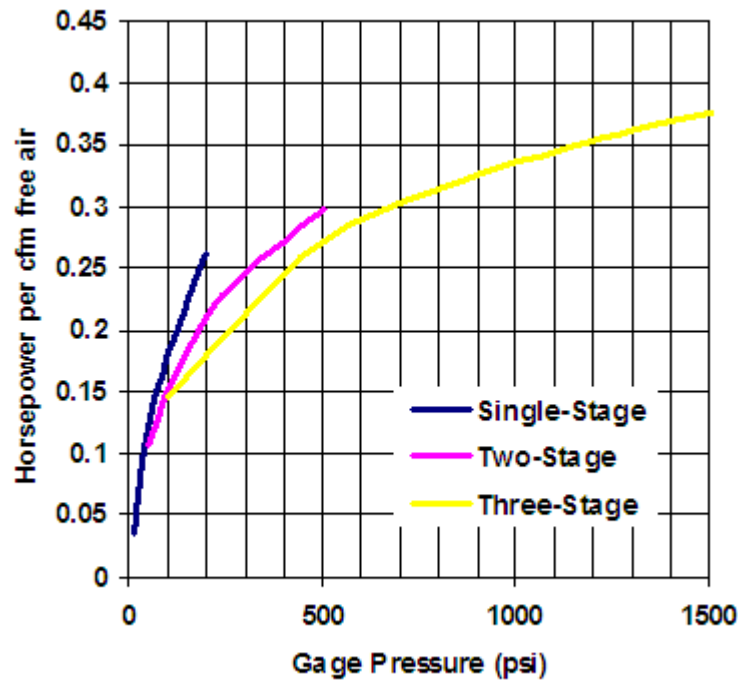




Theoretical horsepower required to compress one cubic foot of free air

Theoretical horsepower required to compress one cubic foot of free air (atmospheric pressure) for single-staged, two-staged and three-staged compressors are indicated in the diagram below. In general - plus 15-20% friction.



The power required to adiabatic compress of air can be expressed as

$$HP = [144 N P_1 V k / 33000 (k - 1)] [(P_2 / P_1)^{(k-1)/Nk} - 1]$$

(1)

where

HP = horsepower

N = number of compression stages

k = 1.41 = adiabatic expansion coefficient



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P_1 = absolute initial atmospheric pressure (psi) (14.1 psi at sea level)

P_2 = absolute final pressure after compression (psi)

V = volume of air at atmospheric pressure (cfm)

- adiabatic compression (or expansion) takes place without transmission of heat

Fuente: The Engineering Tool box



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