Applied Compression Systems

ACS
APPLIED COMPRESSION SYSTEMS
"Complete Compressor Packaging Solutions"

TECHNICAL BULLETIN

CALCULATION FOR COMPRESSOR TIME ON & TIME OFF

The following formula can be used to calculate the approximate running time and time off for the reciprocating air compressor.

With this method of control the compressor runs until a pre-determined air pressure is reached in the receiver and then stops. The compressor then re-starts when the pressure has fallen to the original (high pressure) level.

The following formulae apply:

Compressor ON (Running) - Time (minutes) = $\frac{Vr\ (P2-P1)}{(Qin - Qout) \times 14.7}$

ompressor OFF (Stopped) - Time (minutes) = $\frac{Vr\ (P2-P1)}{Qout \times 14.7}$

Where:

T	is time required – min.
Vr	is tank (or system) volume in-cu ft. (cu ft = gal/7.48)
P1	is initial tank pressure – PSIG
P2	is final tank pressure – PSIG
Qin	is compressor output CFM (input to receiver)
Qout	is plant air demand, CFM (FAD)

Example: Compressor delivery is 100 CFM and demand is 80 CFM. Receiver capacity is 150 cu ft and permissible pressure drop 10 PSI. Find the cycle time and number of starts per hour for the compressor.

Compressor ON - Time = $\frac{150 \times 10}{(100 - 80) \times 14.7}$

= 5.1 minutes

Compressor OFF - Time = $\frac{150 \times 10}{80 \times 14.7}$

= 1.28 minutes

Cycle time = 5.1 + 1.28 = 6.38 minutes

Number of starts per hour = 60 ÷ 6.28 = 9.5

AIR RECEIVER SIZE & CAPACITIES (Gallon ÷ 7.48 = Cubic Feet)

30 gal	(Approx. 16" X 38")	=	4.0 cu ft
60 gal	(Approx. 20" X 48")	=	8.0 cu ft
80 gal	(Approx. 20" X 63")	=	10.7 cu ft
120 gal	(Approx. 24" X 72")	=	16.04 cu ft
240 gal	(Approx. 30" X 84")	=	32.09 cu ft
400 gal	(Approx. 36" X 93")	=	53.48 cu ft
660 gal	(Approx. 42" X 117")	=	88.24 cu ft
1060 gal	(Approx. 48" X 144")	=	141.71 cu ft
1550 gal	(Approx. 60" X 190")	=	207.2 cu ft
2200 gal	(Approx. 60" X 220")	=	294.1 cu ft

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