

## TECHNICAL BULLETIN

### QUICK FACTS AND RULES OF THUMB

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- Existing compressed air systems in the United States consume air estimated 90 billion kWh/year of electricity.
- Compressed air is responsible for approximately 10 – 15% of all industrial electricity consumption.
- In a U.S. survey of over 40 compressed air systems, the following average findings were made:

- Well applied uses for compressed air	46%
- Leakage	18%
- Questionable usage of compressed air	11%
- Artificial demand	9%
- Open blowing	8%
- Condensate drain waste	5%
- Dryer purge losses	2%
- Incorrect or worn orifices	1%
- That air volume increases (expands) as temperature increases (e.g. a hot air balloon)? (Charles' Law).
- Every 2-psi pressure drop cost 1% of compressor horsepower in efficiency. Therefore a compressor operating at 125 PSIG will consume 12 ½% more power than one operating at 100 PSIG.
- It takes 7 to 8 hp of electricity to produce 1 hp worth of air force.
- Many rotary compressors with modulating inlet pressure control consume 90% of their full-load power when they are at 50 – 60% of their full flow.
- If a compressor is operating 24 hours a day at or near full load the annual electricity costs will be about the same as the initial capital cost of the compressor.
- The cost for electricity to power a 1 HP electric motor, at full load (24 hours/day) for 1 year assuming a power cost of 6 cents/kW hour, is about \$400/year.
- A ¼" air leak at 100 PSIG consumes electrical power equivalent to leaving approximately TWO HUNDRED AND FIFTY, 60 watt light bulbs on 24 hours a day, seven days a week.
- A \$100/year leak in an air system cannot be felt or heard. A \$400/year leak can be felt, but not heard. A \$700/year leak can be both felt and heard.

- Approximate capacity (free air delivery) produced by most positive displacement air compressors per horsepower.

100 PSIG	4 – 4.5 CFM
150 PSIG	3.6 – 4 CFM
200 PSIG	3.5 – 3.6 CFM
250 PSIG	2.75 – 3.5 CFM

- The estimated discharge temperature of air compressors at 80° F ambient:

<b>PRESSURE</b>	<b>100 PSIG</b>	<b>150 PSIG</b>	<b>200 PSIG</b>
Single Stage	510	615	--
Two stage	325	365	395
Rotary (Oil Rejected)	180	190	200

- For every 20° F increase in compressor operating temperature above 180° F, the lubricant life is cut by 50%.
- 94% of the heat generated by an air-cooled rotary compressor can be recovered to perform other work, such as heating the plant or heating water.
- A positive displacement air compressor will dissipate approximately 2545 BTU/hr of heat for each Bhp divided as follows:

5%	Radiant Heat	(127 BTU/hr per HP)
35%	Aftercooler	(890 BTU/hr per HP)
60%	Intercoolers and Cylinders or Oil Cooler	(1528 BTU/hr per HP)

- Water-cooled compressors and aftercoolers operating at 100 PSIG will require the following cooling water flow rates:

Air Compressor Only:	1.5 GPM/100 CFM
Air Compressor & Aftercooler Combined:	4 GPM/100 CFM

- Most air motors require approximately 35 – 40 CFM at 90 PSIG per horsepower rating.
- At saturated conditions, for every 20° F decrease in air temperature, there is a 50% reduction in the water vapor content.
- At 100 PSIG every 20°F increase in saturated air temperature DOUBLES the amount of moisture in the air.
- At 80°F ambient and 60% RH, a 100 CFM (25 horsepower) compressor will draw in 16.8 gallons of water vapour per day.
- The purge air loss for most heatless air dryers at various inlet pressures will be:

75 PSIG -	19%
100 PSIG -	15%
125 PSIG -	12%
150 PSIG -	10%

- The approximate amperage draw per Bhp will be:

115/1/60:	12 amps/HP
230/1/60:	6 amps/HP
230/3/60:	3 amps/HP
460/3/60:	1.5 amps/HP
575/3/60:	1.1 amps/HP

- Each process control valve actuator or other control device will require approximately 1/3 – 1/2 CFM per end device.
- Cigarette smoke is approximately 2 – 8 microns in size.
- The following are typical noise levels:
 

20 Dba	-	Whisper
35 Dba	-	Library
60 Dba	-	Normal speech level
75 Dba	-	Electric typewriter
80 Dba	-	Busy street
90 Dba	-	Noisy factory
95 Dba	-	Pavement breaker at 3 meters
120 Dba	-	Threshold of pain
120 Dba	-	Jet engine on take off at 60 meters (180 feet)
120 Dba	-	Air raid siren
- OSHA requires a maximum exposure time of 8 hours for 85 Dba.

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