


AIR CIRCUIT



MCC *Equipment & Service Center*
Your Sales, Service and Solutions Team

COMPRESSOR TYPES

- **Rotary Screw Air Compressor**
 - 100% duty cycle
 - Provides more consistent air pressure than piston machine.
 - Typically after-cooled delivering 100 - 110deg. exiting air
 - Wide range of fluids, ATF to 8000 Hour Synthetics
 - Maintenance
 - Fluid
 - Air-Filter
 - Oil-Filter
 - Separator
 - Drain Kit
 - Cooler Cleaning
 - Etc.



COMPRESSOR TYPES

- **Piston Air Compressor**
 - 60/40 duty cycle
 - Typically non after-cooled, after cooler available as upgrade on most models
 - 180-200° air from non after-cooled compressor
 - Maintenance
 - Fluid
 - Belts



DRYERS

- **Pressure Dewpoint**
 - Dewpoint is defined as the temperature to which a gas (e.g. air) must be cooled, at constant pressure, for water vapor to begin to condense to liquid water.
 - Dewpoint temperature is a measure of how much water vapor there is in a gas.

DRYERS

- **Refrigerated Dryer**

- A compressed air refrigerated dryer will cool the incoming air using refrigerant and heat exchangers, the moisture is removed through a moisture separator/drain, the air is slightly pre-heated utilizing the heat exchangers and introduced into your air circuit.
- Standard Refrigerated dryers are sized for 100deg. inlet temp, 100deg. ambient temp, 100psig
- Typically maintain between 39-50deg. dewpoint, providing clean dry air
- Pre-Filter Importance



DRYERS

- **High Temperature Refrigerated Dryer**

- Standard Refrigerated dryer with air cooled after-cooler incorporated into unit
- Able to accept 180-200° from non after-cooled compressor
- Air is passed through air cooled after-cooler prior to refrigerated dryer
- Typically maintain between 39-50° dew-point, providing clean dry air



DRYERS

- **3-Stage Filter System**
 - Water Separator
 - Pre-Filter
 - Particulate Filter, 1 micron & .5 ppm
 - After-Filter
 - Coalescer, .01 micron & .01 ppm



DRYERS

- **Refrigerated System Moisture Removal**
 - 68% of intake moisture removed by compressor after-cooler
 - 28% of intake moisture refrigerated dryer removes
 - 4% of intake moisture carried into plant (39°F)



GALLONS PER DAY CHART

| Refrigerated System Moisture Removal | | | | | | | | | | | | | | | | |
|--|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 68.0% | Percent of intake moisture removed by compressor after cooler. | | | | | | | | | | | | | | | |
| 28.0% | Refrigerated Dryer - Percent of intake moisture removed. | | | | | | | | | | | | | | | |
| 4.0% | Percent of intake moisture carried into plant (39° F PDP). | | | | | | | | | | | | | | | |
| 100.00% | Total | | | | | | | | | | | | | | | |
| Gallons per day per each CFM compressor capacity | | | | | | | | | | | | | | | | |
| Inlet Air Temp (°F) | Relative Humidity (RH) | | | | | | | | | | | | | | | |
| | 25% | 30% | 35% | 40% | 45% | 50% | 55% | 60% | 65% | 70% | 75% | 80% | 85% | 90% | 95% | 100% |
| 50 | 0.025 | 0.030 | 0.035 | 0.040 | 0.045 | 0.050 | 0.055 | 0.060 | 0.065 | 0.070 | 0.075 | 0.080 | 0.085 | 0.090 | 0.096 | 0.101 |
| 55 | 0.030 | 0.036 | 0.042 | 0.048 | 0.054 | 0.060 | 0.066 | 0.072 | 0.078 | 0.084 | 0.090 | 0.096 | 0.102 | 0.108 | 0.114 | 0.120 |
| 60 | 0.035 | 0.043 | 0.050 | 0.057 | 0.064 | 0.071 | 0.078 | 0.085 | 0.092 | 0.099 | 0.106 | 0.113 | 0.120 | 0.128 | 0.135 | 0.142 |
| 65 | 0.042 | 0.050 | 0.059 | 0.067 | 0.075 | 0.084 | 0.092 | 0.100 | 0.109 | 0.117 | 0.126 | 0.134 | 0.142 | 0.151 | 0.159 | 0.167 |
| 70 | 0.049 | 0.059 | 0.069 | 0.079 | 0.089 | 0.099 | 0.108 | 0.118 | 0.128 | 0.138 | 0.148 | 0.158 | 0.168 | 0.177 | 0.187 | 0.197 |
| 75 | 0.058 | 0.069 | 0.081 | 0.092 | 0.104 | 0.116 | 0.127 | 0.139 | 0.150 | 0.162 | 0.173 | 0.185 | 0.196 | 0.208 | 0.220 | 0.231 |
| 80 | 0.068 | 0.082 | 0.096 | 0.109 | 0.123 | 0.136 | 0.150 | 0.164 | 0.177 | 0.191 | 0.205 | 0.218 | 0.232 | 0.246 | 0.259 | 0.273 |
| 85 | 0.079 | 0.095 | 0.110 | 0.126 | 0.142 | 0.158 | 0.173 | 0.189 | 0.205 | 0.221 | 0.236 | 0.252 | 0.268 | 0.284 | 0.299 | 0.315 |
| 90 | 0.093 | 0.111 | 0.130 | 0.148 | 0.167 | 0.185 | 0.204 | 0.222 | 0.241 | 0.259 | 0.278 | 0.296 | 0.315 | 0.333 | 0.352 | 0.370 |
| 95 | 0.106 | 0.127 | 0.149 | 0.170 | 0.191 | 0.212 | 0.233 | 0.255 | 0.276 | 0.297 | 0.318 | 0.340 | 0.361 | 0.382 | 0.403 | 0.424 |
| 100 | 0.124 | 0.149 | 0.173 | 0.198 | 0.223 | 0.248 | 0.272 | 0.297 | 0.322 | 0.347 | 0.372 | 0.396 | 0.421 | 0.446 | 0.471 | 0.495 |
| 105 | 0.141 | 0.170 | 0.198 | 0.226 | 0.254 | 0.283 | 0.311 | 0.339 | 0.367 | 0.396 | 0.424 | 0.452 | 0.481 | 0.509 | 0.537 | 0.565 |
| 110 | 0.164 | 0.197 | 0.229 | 0.262 | 0.295 | 0.328 | 0.360 | 0.393 | 0.426 | 0.459 | 0.491 | 0.524 | 0.557 | 0.590 | 0.622 | 0.655 |
| 115 | 0.188 | 0.225 | 0.263 | 0.300 | 0.338 | 0.375 | 0.413 | 0.450 | 0.488 | 0.525 | 0.563 | 0.600 | 0.638 | 0.675 | 0.713 | 0.751 |
| 120 | 0.209 | 0.251 | 0.293 | 0.335 | 0.377 | 0.419 | 0.461 | 0.503 | 0.545 | 0.586 | 0.628 | 0.670 | 0.712 | 0.754 | 0.796 | 0.838 |

Procedure:

- Determine local inlet air temperature and % RH. Keep in mind that it has to be measured where ambient air enters the compressor.
- Find the value at the intersection of the "Inlet Air Temp" row and the RH column on the chart corresponding to your inlet temp.
- Multiply this value by the CFM rating of your compressor(s).
- The result will be the amount of condensation you should collect from your entire system(s) in a 24-hour period.

Example:

- Ambient air temperature = 75°F and RH = 75%
- The value at the intersection = 0.17336 gallons in 24 hours for each CFM flowing.
- One (1) 150 HP compressor rated at 750 CFM X 0.17336 gal/day = 130 gallons per day of condensate.
- The compressor will ingest and send to the system 130 gallons of condensate each day of operation, or 5.42 gal/hr.

AIR-COOLED AFTER COOLER

- **Air Cooled After Cooler Importance**
 - Must introduce incoming air to refrigerated dryer at 100° or utilize high-temp refrigerated dryer.
 - If air isn't after-cooled prior, dryer will not be able to properly dry air as needed and there is a good chance you'll have moisture issues.
 - Moisture can cause problems in many places in your air circuit including stick pumps, out at the gun, in chemical, etc.

DISTRIBUTION & STORAGE

- **Distribution Types**
 - aluminum, galvanized, schedule 40, rubber hose,
 - **ABSOLUTELY NO PVC**
- **The less bottlenecks the better**
- **Quick disconnect performance loss**
- **Storage provides a buffer and an additional moisture removal point**
 - provides more constant pressure to point of use
- **Always recommended to have storage/buffer in your air circuit so your compressor can react to the receiver and not line pressure.**

GENERAL AIR CIRCUIT MAINTENANCE

- **Maintain compressor per user manual**
 - Blow out compressor cooler, check fluid levels, basic checks
- **Drain Tank - zero air loss drain, timer drain, ball valve**
- **Change in-line filter elements on appropriate schedule**
 - Varies depending on conditions
- **Air quality check prior to use**

OVERALL IMPORTANCE

- Prolong life of equipment/components
- Limit downtime
- Avoid costly repairs/replacements
- Mixing of water with expensive chemicals

USEFUL REFERENCES

- www.mccind.com (equipment manuals)
- MCC Tech Department Support
- compressedairchallenge.com (compressed air question reference)

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317-209-1111 www.mccind.com