# *Introduction*

Emergency rentals prompted by anything from natural disaster to equipment failure are a major part of Aggreko's business. As North America's Rental Specialist, Aggreko knows that a well thought through contingency plan—complete with the specialized requirements of your plant or facility for power, chillers or compressed air systems—is the best defense in successfully coping with the unexpected.

Be prepared. Crisis and confusion...or an orderly restoration of services and return to production: planning makes the difference. Unfortunately, emergencies rarely seem to occur from 8 to 5. A crisis in the middle of the night is not the best time to plan how you will restore essential power, chiller or compressed air services.

Develop a solid contingency plan by thinking through the process long before the emergency. This allows you to make unhurried decisions, gather detailed specifications and organize essential contacts so you can quickly, efficiently and economically deal with unexpected problems.

This Emergency Planning Guide offers suggestions, checklists, reference charts and other information to make planning for emergencies easier. Working up detailed contingencies may not seem like a priority right now, but if an emergency occurs this investment of your time will pay big dividends for your company.

These helpful checklists offer a useful starting point. However, the special requirements of your plant, site or facility are essential components of your rental plan. Detail these requirements carefully and you will have the information necessary to minimize delay and maximize the effectiveness of your emergency rentals.

We hope you never face such an emergency. But, if you do, you can rely on Aggreko's 24-hour-a-day commitment to rental equipment and our experienced personnel to help you successfully weather the crisis.

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North America's Rental Specialist

## *Contingency planning checklists*

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- **Plant personnel to be notified for power emergencies**
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- **Rental equipment**
- **Equipment specifications**
- **Notes**

## *24-hour emergency contact numbers*

- **Aggreko emergency contact phone numbers (by region)**
- **Notes**

## *Reference guide: charts & formulas*

- **Psychometric chart**
- **kVA/kW amperage chart (80% power factor)**
- **Useful formulas: power, temperature and compressed air**
- **Notes**

## *Conditions of contract*

- **Aggreko's rental agreement terms and conditions**

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Contingency Planning Checklists

# *Utility contingency planning process*

1. **Need for rental occurs**
   - A. Emergency
   - B. Planned
2. **Equipment requirements determined**
3. **Response time required**
4. **Aggreko called / response - availability - costs**
5. **Cost justification of rental determined**
6. **When ordering equipment, Aggreko will need:**
   - A. Purchase order
   - B. Contract
   - C. Deposit (if required)
7. **Shipment of Equipment** – *Rental begins*
8. **Determine location and placement of equipment**
9. **Delivery - Offloading requirements**
   - A. Personnel
   - B. Forklift
   - C. Crane
10. **Installation responsibilities**
    - A. Contractor
    - B. Aggreko
    - C. Plant personnel
11. **Start up / Check - test - run - instruct**
12. **Operation of rental equipment**
    - A. Service numbers - 24 hours
    - B. Maintenance schedule
    - C. Parts required on site
13. **Rental requirements ends – call to schedule return**
14. **Disassemble and reload responsibilities**
    - A. Personnel
    - B. Equipment
15. **Return to Aggreko – Inspection of equipment** – *Rental ends*
16. **Internal review of Aggreko and plant performance**

# *Power planning worksheet*

*As a starting point for your emergency plan for a temporary diesel powered generator, you will need the following information:*

## 1 Size of generator(s) required

**Do you need the entire facility at 100% power or can you get by with less? What areas are critical, in order of importance? You will need the load in kW, kVA or amps for each area to determine total required load. Note any specialty or unusual power requirements, i.e. HP of large motors and locked rotor amps, voltage requirements, semi-conductor needs, high harmonic imbalances, etc.**

_____

_____

_____

_____

**Total load:** _____

**Voltage:** _____

## 2 Location

**Will all equipment be in the same location? Will multiple units be run in parallel? Are there any location restrictions that could be affected by the weight, access or air flow of the equipment? How close can the equipment be located to your tie-ins?**

_____

_____

_____

_____

_____

_____

## 3 Installation

**In-house personnel or outside electrical contractor?**

_____

_____

**Any engineering, distribution work or permits required?**

_____

_____

## 4 Optional equipment

❑ **Cable**

_____ **ft.**

❑ **Distribution needed for multiple connections and/or different voltages?**

❑ **Breakers**

_____

❑ **Transfer switch required?**

❑ **Transformers**

**What voltage is required? Wye or Delta configuration?**

_____

_____

❑ **Auto start required?**

❑ **Trailer mounting**

*Units can be off-loaded or one or two units can be trailer mounted.*

❑ **Additional fuel tanks needed**

_____ **gallons**

*Separate fuel tanks are available to eliminate need for multiple fuel truck deliveries per day.*

*NOTE: Double-wall EnviroTANKS are available from Aggreko to virtually eliminate risk of fuel leaks.*

# *Emergency power contacts*

**Electric company:** _____

**Customer service contact(s):** _____

_____

**Phone number:** _____

**24-hour emergency number:** _____

**Pager/cellular phone numbers:** _____

---

**Electric contractor(s)** _____

_____

_____

**Contact(s):** _____

_____

**Phone number:** _____

**24-hour emergency number:** _____

**Pager/cellular phone numbers:** _____

---

Aggreko contact: _____

**Phone number:** _____

**Pager number:** _____

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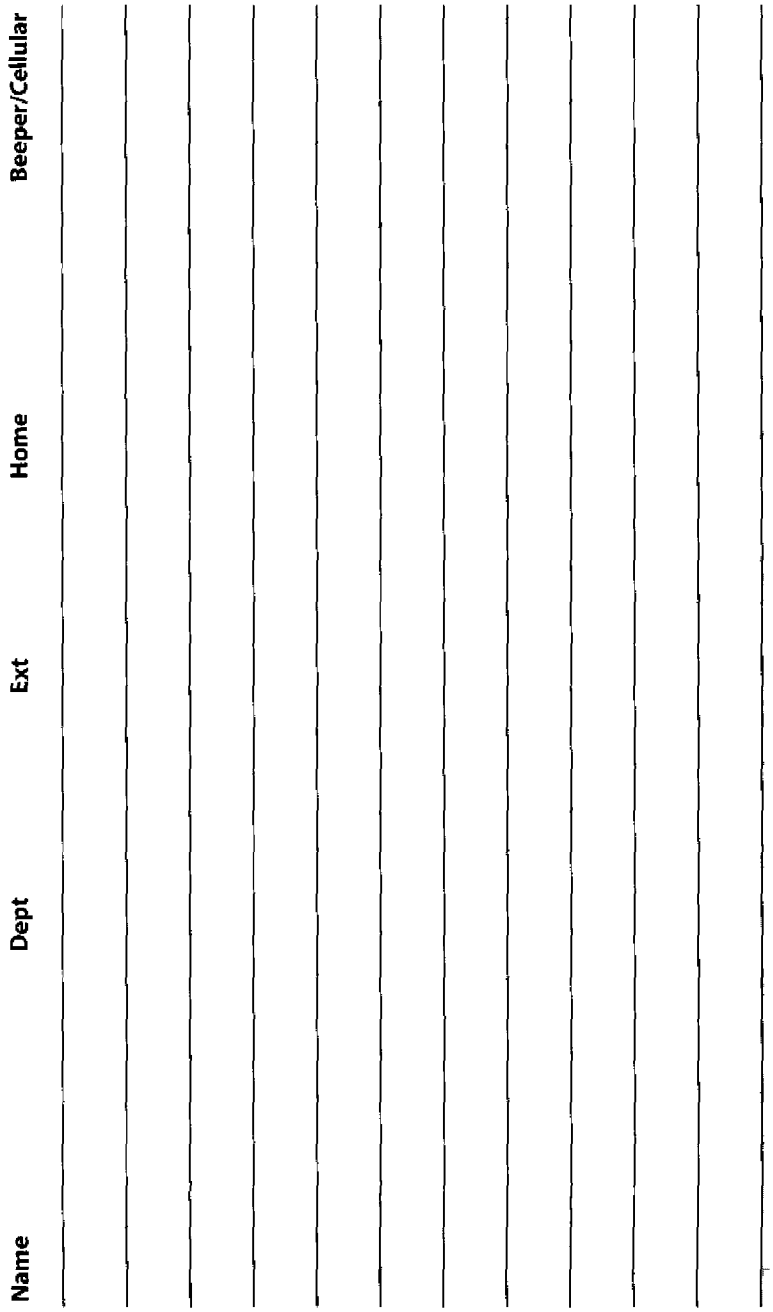
*National Power Technical Support 1-800-323-6086 8AM - 5PM CST*

## *Plant personnel*

*to be notified in case of power emergencies:*



# *Chiller planning worksheet*

*As a starting point for your emergency plan for temporary chiller services, you will need the following information.*

## 1 Existing size and type chiller(s)

❑ **Air-cooled** ❑ **Water-cooled**

_____ **Tons**

**Temperatures:** _____ **Return**

_____ **Discharge**

_____ **GPM**

## 2 Size of rental chillers required

- **Water (HVAC) Conditions**

_____ **total tons * required at nominal conditions (44° / 54°F. at 2.4 GPM/Ton)**

**Temperature split:** _____ **(Δ T°F)**

**Flow rate:** _____ **GPM**

*Note cooling tower conditions for water-cooled units.*

*If other than normal conditions, please note differences for correct sizing. You must know cooling tower conditions for water-cooled units.*

_____

_____

- **Brine (Process) Conditions**

_____ **total tons * at** _____ **°F.**

**Temperature split:** _____ **(Δ T°F)**

**Flow rate:** _____ **GPM**

**Type of Brine** _____ **and** _____ **% solution (if applicable).**

*Note cooling tower conditions for water-cooled units*

**NOTE. Tons needed are not necessarily the size of the chiller that is out of service. The* ***true load*** *is the determining factor—many times a rental chiller is smaller than the permanent chiller.*

## 3 Air-cooled or water-cooled?

**• Air-cooled (screw and reciprocating)**

**Advantages**

*Quick, easy installation*
*No cooling tower required*
*Outdoor installation*
*Usually used in short-term*

**Limitations**

*Higher energy draw than water-cooled*
*Air circulation room needed*
*Readily available in single sizes to 200 tons*
*Larger sizes in limited availability*

**• Water-cooled (centrifugals and screw)**

**Advantages**

*Low kW/ton energy costs*
*Larger single sizes*

**Limitations**

*Higher installation costs (minimal difference with containers)*
*Needs weather protection (except containers)*
*Cooling tower required (can be provided at additional cost)*

## 4 Location

**Will all equipment be in the same location? Are there any location restrictions that could be affected by the weight, access or air flow of the equipment?**

_____

_____

_____

## 5 Pressure required for system's chilled water

_____ **PSI**

*NOTE. Higher pressure applications, such as high rises, which require over 150 PSI will require the appropriate higher-pressure equipment.*

## 6 Installation

_____ **Ground level**

_____ **Rooftop**

_____ **How many stories high is the building?**
*(If applicable)*

## 7 Power available

____ **Voltage**

____ **Amps**

____ **Disconnect available?**

**Piping tie-in points**

____ **Size pipe**

____ **Connection size available**
*(i.e. flanges, etc.)*

## 8 Load swings

**Constant or batch-type flow?**

_____

_____

**Optional equipment**

*Which of the following, if any, would also be required to maintain the same quality as your existing chiller system?*

❑ **Cooling towers**

**Size? Conditions? Temperature and flow? Makeup? Chemical treatment? Blow down to where?**

_____

_____

❑ **Trailer mounting**

*Flat bed and drop deck usually for air-cooled or containers.*

❑ **Pump(s)**

_____ **PSI**

_____ **GPM**

*For both chilled water loop and cooling tower (if applicable).*

❑ **Hoses**

**Length inlet:** _____ **ft.**

**Length outlet:** _____ **ft.**

*Flexible hoses are available in 25' sections.*

# *Emergency chiller contacts*

**Manufacturer:** _____

_____

_____

Manufacturer contacts:

**Sales:** _____

**Service mgr.:** _____

**Last serviced by:** _____

Phone number: _____

**24-hour emergency number:** _____

**Pager/cellular phone numbers:** _____

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**Installed by:** _____

_____

**Contact(s):** _____

_____

**Phone number:** _____

**24-hour emergency number:** _____

**Pager/cellular phone numbers:** _____

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Aggreko contact: _____

**24-hour emergency number:** _____

Pager number: _____

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*National Chiller Technical Support 1-800-443-2447 8AM - 5PM CST*

## *Plant personnel*

*to be notified in case of chiller emergencies:*

| Name | Dept | Ext | Home | Beeper/Cellular |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# *Compressed air planning worksheet*

*As a starting point for your emergency plan for temporary compressed air services, you will need the following information:*

## 1 Size compressor(s) required

_____ **CFM capacity to maintain operations**

_____ **PSI (pressure required). Allow for distance of installation and possible pressure drop.**

_____ **Discharge temperature required.**

## 2 Location

**Will all equipment be in the same location? Are there any location restrictions that could be affected by the weight, access or air flow of the equipment?**

## 3 100% oil-free or oil-flooded

**Is existing system oil-free or oil-flooded?**

_____

**If oil-free, can you use oil-flooded for temporary duty?**
*NOTE. Account for any critical applications such as instrumentation, processes, breathing air uses, etc.*
*Will residual oil cause any complications in the future?*

_____

_____

_____

**If oil-flooded, could higher oil carryover rates cause any problems?**

_____

## 4 Optional equipment

*Which of the following, if any, would also be required to maintain the same quality as your existing compressed air system? Do any lines run outside? Is there any instrumentation on system?*

❑ **Air dryer(s)**

_____ **CFM (flow rate)**

_____ **PSI**

_____ **Required dew point**

❑ **Aftercooler(s)**

_____ **CFM (flow rate) required**

_____ **Temperature at outlet required**

❑ **Filters**

**Are filters used for the entire system or only dedicated areas (if so, which areas)?**

_____

_____

**What is the specification for your filtration?**

_____

_____

❑ **Trailer mounting**

*Units can be off-loaded or one or two units can be trailer mounted.*

❑ **Hoses**

_____ **ft.**

*Flexible hoses are available in 25' sections.*

❑ **Additional fuel tanks needed**

_____ **gallons**

*Separate fuel tanks are available to eliminate need for multiple fuel truck deliveries per day.*

*NOTE. Double-wall EnviroTANKS are available from Aggreko to virtually eliminate risk of fuel leaks.*

# *Emergency compressed air contacts*

**Manufacturer:** _____

_____

_____

**Manufacturer contacts:**

**Sales:** _____

**Service mgr.:** _____

**Last serviced by:** _____

**Phone number:** _____

**24-hour emergency number:** _____

**Pager/cellular phone numbers:** _____

---

**Installed by:** _____

_____

**Contact(s):** _____

_____

**Phone number:** _____

**24-hour emergency number:** _____

**Pager/cellular phone numbers:** _____

---

Aggreko contact: _____

**24-hour emergency number:** _____

**Pager number:** _____

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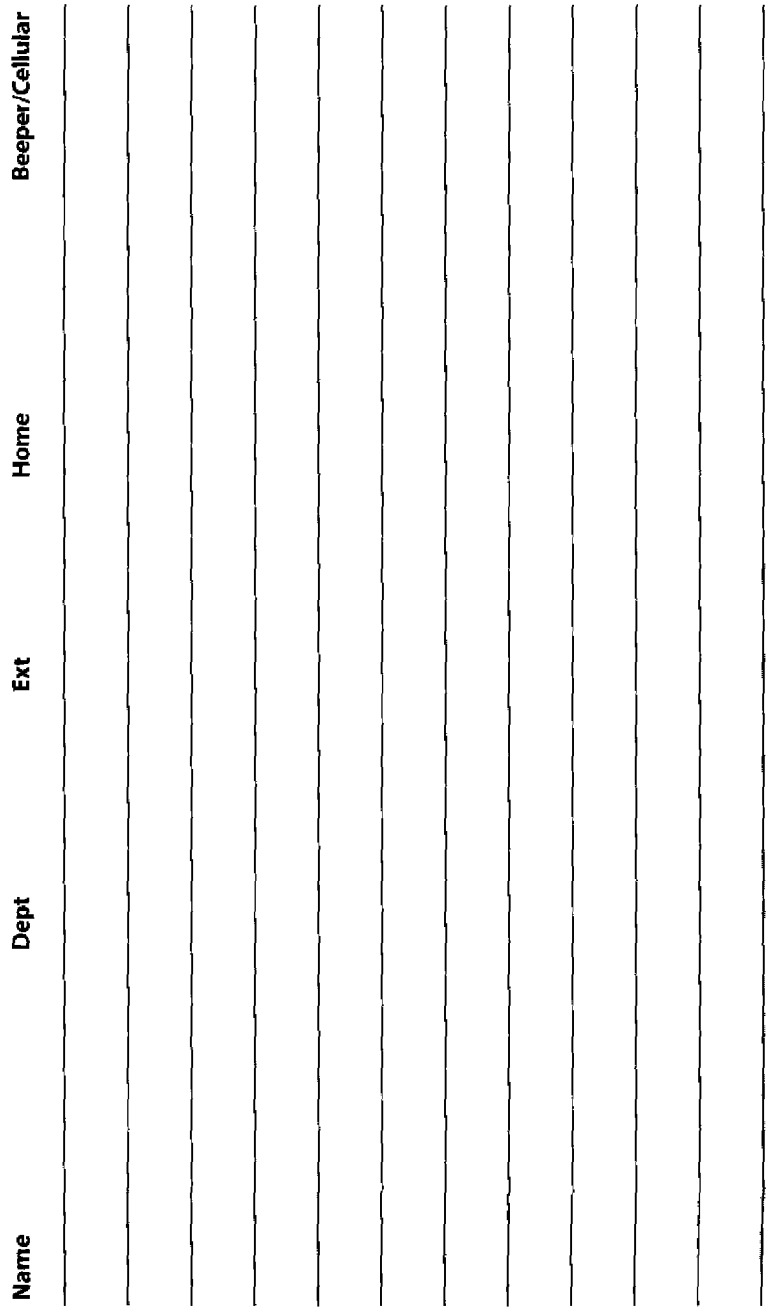
*National Compressed Air Technical Support 1-800-269-5200 8AM - 5PM CST*

## *Plant personnel*

*to be notified in case of compressed air emergencies:*



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Equipment List

*See following Equipment Specifications pages for additional details*

## Power Equipment

**Silenced Diesel Generators**

World-renowned Aggreko silenced diesel generators are available in individual sizes from 15kW to 2000kW for both emergency and planned outages, 24 hours a day throughout North America. Any standard voltage and any frequency is available.

**GreenPower Generators**

Recognizing that rental equipment can have an environmental impact at their job sites, Aggreko committed to develop and build the most environmentally-responsible generator available—GreenPower. Our new GreenPower generators are the world's most environmentally-friendly units, offering total fluid containment, silencing and the lowest emission engines available.

**Transformers, Distribution and Cable**

A total power job site can be sourced with a single call to Aggreko. High-voltage step-up or step-down transformers in sizes from 100kVA to 5000kVA up to 13800V, complete distribution systems to 3000 amps, automatic transfer switches and over 200 miles of cable are available from Aggreko to help build almost any power system.

**Load Banks**

Aggreko load banks are available in both resistive and reactive configurations in individual sizes from 1000 to 5000kW. Aggreko load banks are the best way to test your generators.

**EnviroTANKS**

The most rugged and environmentally-responsible fuel tank design available in the market. These double-wall tanks are virtually leakproof and available in sizes to 2300 gallons.

**Industrial Twin Packs**

The ultimate in uninterruptible silenced power, Aggreko Twin Packs use two generators that work as one to obtain a fully-redundant backup on line at all times.

**Design Assistance**

Ranging from complete turnkey capabilities to site management to equipment servicing are available to fulfill all your power requirements with a single call.

## Temperature Control Equipment

**Water Chillers**

A full range of both air-cooled and water-cooled chillers is available from Aggreko in sizes from 30 to 1000 tons. These units are capable of operating at HVAC conditions or process conditions to -40° F. All Aggreko chillers and refrigeration equipment use only environmentally-friendly HCFC-22 refrigerant.

**Air Conditioners**

A full range of heavy-duty New Generation air conditioners is available in single sizes to 60 tons for comfort cooling and industrial applications.

**Dehumidifiers**

Aggreko offers a superior line of heavy-duty, desiccant dehumidifiers in sizes from 1,000 to 10,000 CFM and able to dry up to 940 gallons-a-day. Severe ambient conditions or complete water saturation will not decrease performance.

**Electric Heaters**

Clean, fume-free and moisture-free electric heaters are available from 20 to 150kW in temperatures to 300° F. Eliminating potentially harmful or dangerous by-products and flames allow Aggreko's electric heaters to be used where propane or #2 oil units cannot.

**Temperature Accessories**

In addition to our main temperature control equipment, Aggreko also offers all the components needed to package a complete system. This includes cooling towers, heat exchangers, pumps, hoses, valves, air handling units, ductwork, pre-coolers, after-coolers and the expertise to offer complete custom designed solutions.

## Air Compressors

**100% Oil-Free Compressors**

Aggreko's 100% oil-free air compressors are available in sizes up to 1500 CFM. These units have discharge pressures to 135 PSI while providing an industry leading 15° F above ambient discharge air temperature. In addition to 100% oil-free air, each unit offers fluid containment, low-emission engines and silencing. A full line of accessories are available including dryers, hoses and receivers.

| HUSHPOWER | FUEL | | ELECTRICAL | | DIMENSIONS IN FEET | | | WEIGHTS | |
|---|---|---|---|---|---|---|---|---|---|
| 60 Hz at 1,800 RPM<br>50 Hz at 1,500 RPM | Avg Fuel Consumption at Full Load | Tank Capacity | Rated Line Amps 480V | Assorted Voltages | Length | Width | Height | Dry (lbs.) | Wet (lbs.) |
| 15kW | 0.8 gph | 15 gals. | 22 | 110/600 | 6' | 3' | 3' | 1,400 | 1,500 |
| 20-30kW | 1.0-3.0 gph | 40 gals. | 30-36 | 110/600 | 8' | 4' | 3' 10" | 2,200 | 2,700 |
| 40-100kW | 3.5-8.0 gph | 80 gals | 50-130 | 110/600 | 12'-13' | 4' 4' 6" | 5' 10" | 5,000 | 6,000 |
| | | | | | | | | 6,000 | 8,350 |
| 125-200kW | 9.0-14.0 gph | 100 gals. | 180-240 | 110/600 | 14' | 4' 8" | 7' | 8,450 | 9,350 |
| | | | | | | | | 9,500 | 10,500 |
| 225-350kW | 15.0-24.0 gph | 170 gals | 330-420 | 110/600 | 16' 6" | 5' 10" | 8' 2" | 12,350 | 13,500 |

| GREENPOWER | FUEL | | ELECTRICAL | | DIMENSIONS IN FEET | | | WEIGHTS | |
|---|---|---|---|---|---|---|---|---|---|
| 60 Hz at 1,800 RPM<br>50 Hz at 1,500 RPM | Avg Fuel Consumption at Full Load | Tank Capacity | Rated Line Amps 480V | Assorted Voltages | Length | Width | Height | Dry (lbs.) | Wet (lbs.) |
| 30kW | 2.2 gph | 40 gals | 36 | 110/600 | 8' 1" | 3' 4" | 5' | 3,350 | 3,700 |
| 60kW | 4.4 gph | 80 gals. | 72 | 110/600 | 9' 11" | 4' | 6' 8" | 4,500 | 5,150 |
| 100kW | 7.5 gph | 90 gals. | 120 | 110/600 | 11' 2" | 4' | 6' 8" | 6,000 | 6,300 |
| 180kW | 12.2 gph | 90 gals. | 216 | 110/600 | 14' 4" | 4' | 7' | 7,800 | 8,600 |
| 300kW | 20.9 gph | 110 gals | 360 | 110/600 | 14' 11" | 4' | 8' 5" | 11,075 | 12,000 |

| CONTAINERS | FUEL | | ELECTRICAL | | DIMENSIONS IN FEET | | | WEIGHTS | |
|---|---|---|---|---|---|---|---|---|---|
| 20 FT. ISO CONTAINER | Avg Fuel Consumption at Full Load | Tank Capacity | Rated Line Amps 480V | Assorted Voltages | Length | Width | Height | Dry (lbs.) | Wet (lbs.) |
| 400kW | 26.0 gph | 600 gals | 602 | 380/600 | 20' | 8' | 8' 6" | 18,150 | 22,110 |
| 500kW | 32.0 gph | 600 gals | 752 | 380/600 | 20' | 8' | 8' 6" | 20,000 | 23,000 |
| 600kW | 42.0 gph | 600 gals | 902 | 380/600 | 20' | 8' | 8' 6" | 25,500 | 28,650 |
| 800kW | 54.0 gph | 600 gals | 1,128 | 380/600 | 20' | 8' | 8' 6" | 30,800 | 35,200 |
| 1,000kW | 67.0 gph | 600 gals | 1,503 | 380/600 | 20' | 8' | 8' 6" | 31,250 | 35,650 |
| 1,250kW | 84.0 gph | 600 gals | 1,886 | 380/600 | 20' | 8' | 8' 6" | 33,470 | 37,870 |
| 30 FT or 40 FT ISO CONTAINER | Avg Fuel Consumption at Full Load | Tank Capacity | Rated Line Amps 480V | Assorted Voltages | Length | Width | Height | Dry (lbs.) | Wet (lbs.) |
| 1,500kW | 105 gph | 800/1,200 | 2,260 | 380/600 | 30' | 8' | 9' 6" | 45,000 | 50,000 |
| 1,750kW | 135 gph | 800/1,200 | 2,640 | 380/600 | 30' or 40' | 8' | 9' 6" | 53,900 | 59,900 |
| 2,000kW | 150 gph | 800/1,200 | 3,015 | 380/600 | 30' or 40' | 8' | 9' 6" | 53,900 | 59,900 |

| EnviroTANK | CAPACITY | U.S. DOT SPECIFICATIONS | RETURN, SUCTION AND DRAIN | DIMENSIONS IN FEET | | | WEIGHT (WET) |
|---|---|---|---|---|---|---|---|
| | | | | Length | Width | Height | |
| Double-Walled Fuel Tanks | 1100 U.S. gals. | IM 102 | 1" Connectors | 7' 9" | 6' 7" | 7' 4" | 15,000 lbs |
| | 2300 U.S. gals. | IM 102 | 1" Connectors | 10' | 8' | 8' 6" | 29,400 lbs |

| OIL-FREE AIR | SIZE | MAXIMUM DISCHARGE | DISCHARGE TEMPERATURE | DIMENSIONS IN FEET | | | WEIGHT (WET) |
|---|---|---|---|---|---|---|---|
| | | | | Length | Width | Height | |
| 100% Oil-Free Air Compressors | 900-1500 CFM | 135 psi | 15°F Over Ambient | 18' 3" | 6' 10" | 7' 8" | 20,640 lbs. |

| AIR CONDITIONERS | | | ELECTRICAL+ | DIMENSIONS IN FEET | | | WEIGHTS |
|---|---|---|---|---|---|---|---|
| SIZE | OBTAINABLE TEMPERATURES | FLOW | Rated Line Amps 480V | Length | Width | Height | (lbs) |
| 3 ton | 57°F | 900-1,750 CFM | 12.5 FLA | 6' 9" | 4' | 3' 6" | 600 |
| 5 ton | 57 F | 1,500-2,500 CFM | 16.7 FLA | 6' 9" | 4' | 3' 6" | 675 |
| 10 ton | 57 F | 2,250-3,750 CFM | 29 FLA | 8' 4" | 4' | 4' 1" | 1,150 |
| 20 ton | 45°F | 3,000-8,000 CFM | 55 FLA | 8' | 6' | 8' | 4,500 |
| 30 ton | 45°F | 2,500-10,000 CFM | 75 FLA | 10' | 7' 10" | 7' 9" | 6,500 |
| 60 ton | 45°F | 2,500-13,500 CFM | 125 FLA | 13' 10" | 7' 10" | 7' 10" | 8,500 |

| WATER CHILLERS | | | ELECTRICAL+ | DIMENSIONS IN FEET | | | WEIGHTS |
|---|---|---|---|---|---|---|---|
| SIZE | OBTAINABLE TEMPERATURES | FLOW | Rated Line Amps 480V | Length | Width | Height | (lbs) |
| 30 ton | -15°Ft | 30-100 GPM | 65 FLA | 10' | 7' 10" | 6' 10" | 6,500 |
| 60 ton | -15°Ft | 60-200 GPM | 110 FLA | 10' | 7' 10" | 7' 10" | 8,500 |
| 100 ton | -15°Ft | 100-300 GPM | 165 FLA | 16' 10.5" | 7' 10" | 8' 5" | 14,500 |
| 150 ton | -15°Ft | 150-450 GPM | 255 FLA | 20' 9.5" | 7' 9" | 8' 5" | 21,000 |
| 200 ton | +20°Ft | 300-600 GPM | 480 FLA | 18' 10" | 7' 8.5" | 8' 2" | 16,000 |
| 400 ton | +20°Ft | 600 1,200 GPM | 550 FLA | 22' 1" | 8' | 8' 6" | 38,000 |
| 500 ton | +20°Ft | 750-1,500 GPM | 600 FLA | 22' | 8' | 8' | 19,050 |
| 1,000 ton | +20°Ft | 1,500-3,000 GPM | 1,000 FLA | 28' | 8' | 8' | 35,000 |

| ELECTRIC HEATERS | | | ELECTRICAL | DIMENSIONS IN FEET | | | WEIGHTS |
|---|---|---|---|---|---|---|---|
| SIZE | OBTAINABLE TEMPERATURES | FLOW | Rated Line Amps 480V/600V | Length | Width | Height | (lbs) |
| 20kW | 100°-185°F+ | N/A | 60 @ 208V Only | 1' 10" | 1' 10" | 2' 4" | 93 |
| 50kW | 100°-300°F+ | 1,500-3,500 CFM | 58/47 | 6' | 3' 4" | 4' 5" | 1,480 |
| 100kW | 100°-300°F+ | 3,500-7,500 CFM | 120/94 | 8' 1" | 4' 2" | 4' 9" | 1,920 |
| 150kW | 100°-300°F+ | 4,500-10,000 CFM | 165/130 | 8' 3" | 4' 4" | 5' | 2,160 |

| DESICCANT DEHUMIDIFIERS | | | ELECTRICAL | DIMENSIONS IN FEET | | | WEIGHTS |
|---|---|---|---|---|---|---|---|
| SIZE | MOISTURE REMOVAL | FLOW | Rated Line Amps 480V | Length | Width | Height | (lbs) |
| Model 95 | up to 95 gal/day | 1,000-1,500 CFM | 51 FLA | 6' | 3' | 4' | 1,420 |
| Model 330 | up to 330 gal/day | 3,000-4,500 CFM | 98 FLA | 10' 6" | 4' 4" | 5' 7" | 3,600 |
| Model 610 | up to 610 gal/day | 3,500-7,000 CFM | 167 FLA | 12' | 8' | 8' | 4,780 |
| Model 940 | up to 940 gal/day | 10,000 CFM | 258 FLA | 20' | 8' | 8' | 5,900 |

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24-Hour Emergency
Contact Numbers

# *Aggreko 24-hour emergency contacts*

*All Aggreko depot telephones are answered 24 hours a day with each depot operating a rotation system for sales or service response within a few minutes*

| | | Home Phone # | Pager # |
|---|---|---|---|
| **Mobile - 24-hour emergency number: 334-452-0452** | | | |
| Scott Boudreau | *D* | 334-621-8216 | 334-660-4830 |
| Doug Taylor | *R/C* | 334-928-7444 | 334-602-2599 |
| Tony Bell | *S* | 334-633-2519 | 334-660-4063 |
| **Baton Rouge - 24-hour emergency number: 504-751-3525** | | | |
| Ron Grant | *D* | 504-753-1355 | 504-352-1872 |
| Richard Sagona | *R/C* | 504-473-2604 | 504-352-1875 |
| Tim Ryan | *S* | 504-275-3815 | 504-352-1874 |
| Ron Bergeron | *S* | 504-753-6118 | 504-296-4070 |
| **Lake Charles - 24-hour emergency number: 318-625-3450** | | | |
| Kevin Olson | *D* | 318-477-3024 | 318-431-2307 |
| Don Martin | *S* | 318-527-0389 | 318-431-2306 |
| **New Iberia - 24-hour emergency number: 318-365-5479** | | | |
| Keith Sanner | *Regional* | 318-856-9518 | 800-443-7243 (055311) |
| Kent Delcambre | *D* | 318-394-5450 | 318-369-0378 |
| Julie Oubre | *S* | 318-364-8350 | 318-369-1857 |
| Blaine Hebert | *S* | 318-365-5378 | 318-369-0369 |
| Charles "Bubba" Carlin | *S* | 318-984-3799 | |
| **New Orleans - 24-hour emergency number: 504-733-0555** | | | |
| Blair Cottingham | *D* | 504-781-6001 | 504-551-2403 |
| Richard Bender | *R/C* | 504-831-9291 | 504-544-3980 |
| Richard Brister | *S/M* | 504-455-1577 | 800-443-7243 (047873) |

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Notes:

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1-800-269-5200 Compressed Air

1-800-443-2447 Chillers

1-800-323-6086 Power

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| | | Home Phone # | Pager # |
|---|---|---|---|
| **Beaumont - 24-hour emergency number: 409-866-1824** | | | |
| Louis Miller | *D* | 409-735-7538 | 409-723-5007 |
| Rodney Stimac | *R/C* | 409-755-0108 | 409-654-9526 |
| Tracy Williams | *S* | 409-722-0172 | 409-723-5008 |
| **Corpus Christi - 24-hour emergency number: 512-289-5684** | | | |
| Ronnie Goins | *D* | 512-528-3296 | 800-374-6477 (1686) |
| **Dallas - 24-hour emergency number: 972-293-0491** | | | |
| Kurt White | *D* | 972-223-7609 | 214-410-9500 |
| Tracey McCoy | *S* | 214-824-5634 | 214-920-6796 |
| Craig Roberts | *S* | 817-261-8942 | 214-573-9280 |
| **Houston - 24-hour emergency number: 281-485-4471** | | | |
| Dwayne Long | *Regional* | 281-485-8353 | 800-844-8084 (1105464) |
| Neil Hamilton | *D* | 281-376-4082 | 281-226-4606 |
| Randy Osburn | *R/C* | 713-862-2767 | 281-226-4645 |
| John Powers | *S* | 713-952-6591 | 281-226-4651 |
| David Swan | *S* | 281-441-2113 | 281-226-4631 |
| Mike Valentine | *S* | 713-528-1494 | 281-226-4635 |
| Paul Torres | *S* | 713-747-5845 | |

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| | | Home Phone # | Pager # |
|---|---|---|---|
| **Toronto, Canada - 24-hour emergency number: 905-459-3321** | | | |
| **Andy Holland** | *D* | 905-336-7710 | 416-378-6154 |
| Michael Tachich | *S* | 416-656-3087 | 416-378-6081 |
| Andrew Lee | *S* | 416-691-3797 | 416-378-6115 |
| **Chicago - 24-hour emergency number: 630-257-8480** | | | |
| Paul Duncan | *Regional* | 630-637-0833 | 888-583-0014 |
| Tim Sinclair | *D* | 630-257-8480 | 888-362-3016 |
| Tom Degaetano | *S* | 630-892-6908 | 888-582-9453 |
| Steve Ryan | *S* | 312-292-0800 | 888-582-9437 |
| Art Victorson | *S* | 219-865-8535 | 888-582-9444 |
| **Detroit - 24-hour emergency number: 810-486-4100** | | | |
| Scott Webb | *D* | 313-878-4748 | 313-709-9351 |
| Kevin O'Connell | *S* | 810-486-1711 | 313-606-5005 |
| Jim Prior | *S* | 810-489-9003 | 313-714-4169 |
| Ed Pellegrini | *S* | 313-381-7898 | 313-714-4855 |
| **Minneapolis - 24-hour emergency number: 612-894-5992** | | | |
| Donovan Driscoll | *D* | 612-440-2772 | 612-642-3892 |
| Greg Zahalka | *S* | 612-946-9865 | 612-642-3077 |
| **Charleston - 24-hour emergency number: 304-744-9434** | | | |
| David Tippie | *D* | 304-755-1859 | 304-353-8571 |
| Russell Murray | *R/C* | 304-768-2168 | 304-540-3614 |

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| | | Home Phone # | Pager # |
|---|---|---|---|
| **Kansas City - 24-hour emergency number: 913-321-3140** | | | |
| Jeff Wahl | *D* | 816-461-0678 | 800-759-8888(5372658) |
| Jim Cumiskey | *S* | 913-362-0478 | 816-759-8888(5372683) |
| **St. Louis - 24-hour emergency number: 314-349-6550** | | | |
| Keith Jackson | *Regional* | 314-282-2327 | 800-948-3029 |
| Kevin Crosier | *D* | 314-647-1566 | 314-836-4143 |
| Steve Saathoff | *R/C* | 618-654-8591 | 314-871-8985 |
| James Barbour | *S* | 314-291-1202 | 314-871-8984 |
| **Memphis - 24-hour emergency number: 901-873-4702** | | | |
| Tony Little | *D* | 901-873-4702 | 800-671-2297 |
| David Hundt | *S* | 901-382-4789 | 904-765-0268 |
| Randy McMinn | *S* | 901-873-4702 | 901-765-7440 |
| **Nashville - 24-hour emergency number: 615-459-0888** | | | |
| David Dickert | | 615-355-0596 | 800-759-7243(3111442) |
| David Greer | *S* | 615-333-1866 | 800-635-1945 |
| Shannon Litten | *S* | 615-367-2718 | 800-732-6598 |

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| | | Home Phone # | Pager # |
|---|---|---|---|
| **Jacksonville - 24-hour emergency number: 904-731-7336** | | | |
| Tim Ainslie | *Regional* | 904-519-0496 | 888-517-5745 |
| John Sepa | *D* | 904-778-1334 | 888-517-5747 |
| Scott Davis | *R/C* | 904-292-2810 | 904-817-1479 |
| Robin Russell | *S* | 904-249-4752 | 904-646-8209 |
| Bob Randolph | *S* | 904-260-4305 | 800-503-6092 |
| Tim Currie | *S* | 904-268-3452 | 904-464-1877 |
| **Lakeland - 24-hour emergency number: 941-680-2522** | | | |
| Scott Telford | *D* | 813-752-1043 | 941-568-7244 |
| **Miami - 24-hour emergency number: 305-854-5420** | | | |
| Bob Romano | *S* | 305-542-3531 | 305-956-0094 |
| **Atlanta - 24-hour emergency number: 770-987-2444** | | | |
| Mike Young | *D* | 770-207-6294 | 404-738-4951 |
| Ryan O'Connor | *S* | 770-392-1067 | 770-327-2601 |
| **Fayetteville - 24-hour emergency number: 910-433-4355** | | | |
| Brad Johnson | *D* | 910-640-3411 | 919-899-2852 |
| Joe Crnko | *S* | 910-488-3286 | 919-899-4706 |
| **Columbia - 24-hour emergency number: 803-957-7475** | | | |
| Tray Huff | *D* | 803-957-7850 | 803-733-0292 |
| Don Harris | *S* | 803-356-0987 | 803-540-5731 |

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| | | Home Phone # | Pager # |
|---|---|---|---|
| **Los Angeles - 24-hour emergency number: 310-802-7972** | | | |
| **Peter O'Neill** | *Regional* | 714-579-1930 | 310-406-3147 |
| **Tom Nuber** | *D* | 909-795-8280 | 714-764-5586 |
| **William Lee** | *S* | 818-917-9515 | 310-406-4642 |
| **Gerald Lewis** | *S* | 818-907-6589 | 310-898-0359 |
| **Sacramento - 24-hour emergency number: 916-373-9001** | | | |
| **San Francisco - 24-hour emergency number: 707-746-8812** | | | |
| **James Bishop** | *D* | 707-748-0892 | 707-493-2011 |
| **David Flores** | *R/C* | 510-906-0452 | 510-442-8024 |
| **Matt DeVillers** | *S* | 501-946-1942 | 510-442-8022 |

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| | | Home Phone # | Pager # |
|---|---|---|---|
| **Denver - 24-hour emergency number: 303-293-3818** | | | |
| Chris Lockwood | *D* | 303-423-0672 | 303-610-6715 |
| Mike Malachuk | *S* | 303-722-3225 | 303-610-0654 |
| **Salt Lake City - 24-hour emergency number: 801-280-6800** | | | |
| Ken Wormington | *D* | 801-963-5696 | 800-913-3953 |
| Ken Troester | *R/C* | 801-266-3448 | 800-980-2149 |
| Todd Gaffin | *S* | 801-253-3228 | 800-913-3956 |
| **Seattle - 24-hour emergency number: 206-939-3443** | | | |
| Jim Conrad | *Regional* | 206-840-2742 | 800-778-5214 |
| Peter Cedergreen | *D* | 206-933-0643 | 800-503-3082 |
| Judy Lichens | *R/C* | 206-630-2109 | 206-916-3861 |
| Tom Catey | *S* | 206-778-4507 | 206-918-3194 |
| Gary Stracke | *S* | 206-891-9434 | 206-917-0473 |

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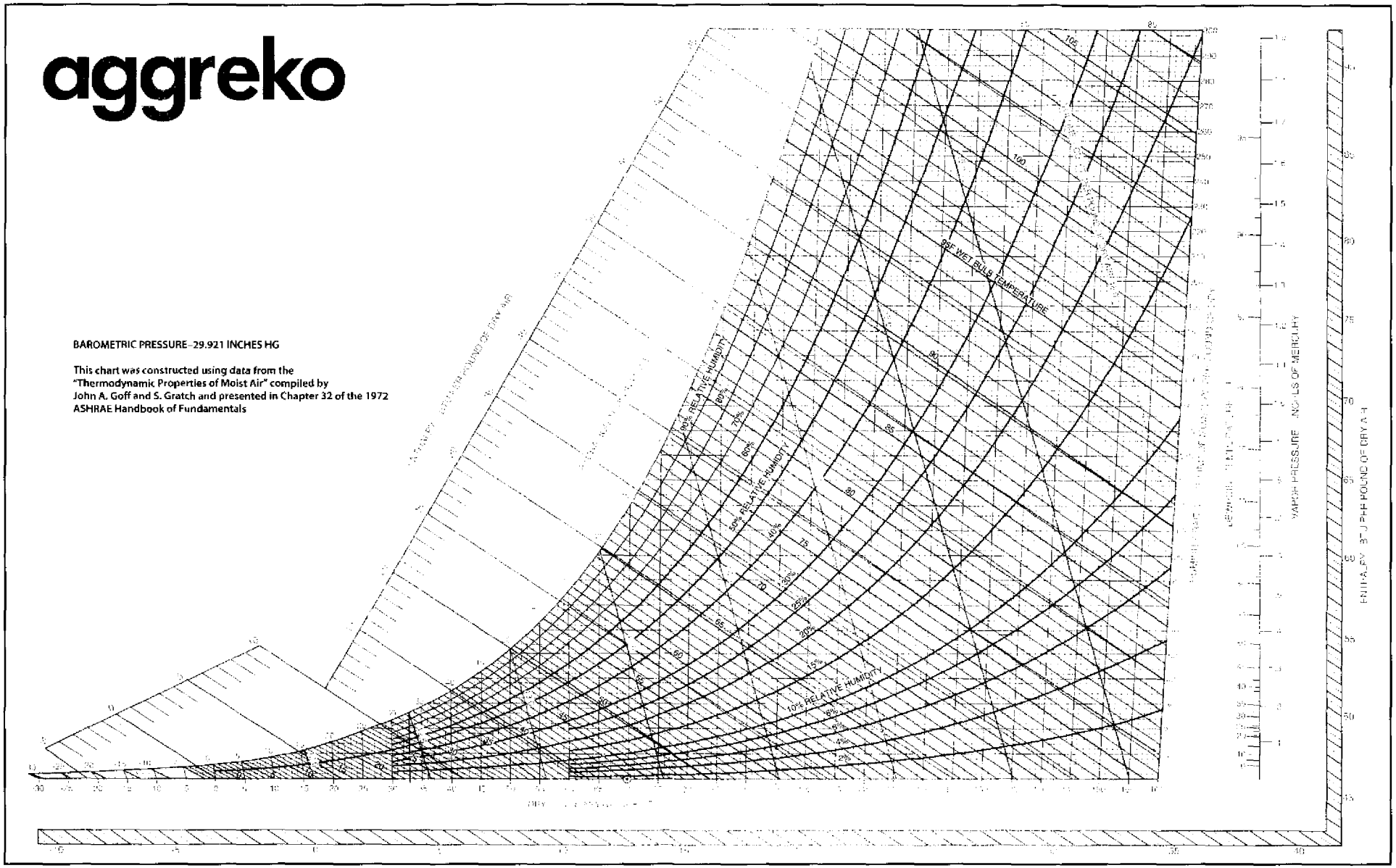
Reference Guide:
Charts & Formulas

# *Psychrometric chart*



## DESSICANT DEHUMIDIFIER PERFORMANCE

| UNIT SIZE | NORMAL DRYING CAPACITY LB/HR | MAXIMUM DRY PROCESS AIR SCFM | NOMINAL PROCESS FACE AREA FT2 | MINIMUM REACTIVATION AIR REQUIRED SCFM | MAXIMUM REACTIVATION AIR CAPACITY SCFM |
|---|---|---|---|---|---|
| 600 CFM | 1-23 | 600 | 1.0 | 100 | 230 |
| 1125 CFM | 3-40 | 1,125 | 1.88 | 100 | 400 |
| 2250 CFM | 10-60 | 2,250 | 3 75 | 250 | 600 |
| 4500 CFM | 20-120 | 4,500 | 7.50 | 500 | 1,300 |
| 9000 CFM | 40-300 | 9,000 | 15 0 | 1,000 | 2,800 |

FIGURE 1

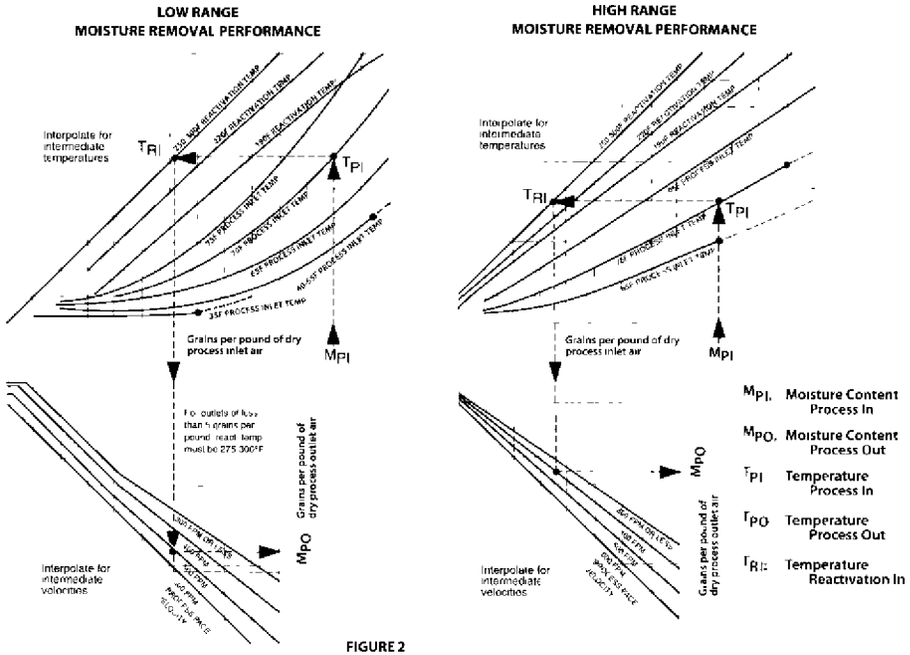



FIGURE 2

## INSTRUCTIONS

The performance of any Dessicant Dehumidifier can be quickly determined using this method

The following information must be known

A Dehumidifier Model
B Process Air Flow (SCFM)
C Process Air Conditions

Procedure

1 Divide process air flow rate ($_V$P) by nominal process face area (Figure 1) to determine process face velocity

2 Enter chart Fig 2 at process air inlet moisture ($_M$PI) (Use low range when condition is less than 65 Gr/Lb 75°F)

3 Plot a line vertically up to process inlet temperature (TPI)

4 Continue line horizontally to 250-300 F reactivation temperature (TRI)

5 Continue line down vertically to process face velocity

6 Proceed horizontally to process outlet moisture content (MPO)

7 From Figure 3 determine k value

8 Determine approximate process outlet temperature from formula

TPO = TPI + 625 (MPI - MPO) ÷ k (TRI* - TPI)

*Use TRI = 250°F unless actual temperature leaving reactivation heaters is known

9 Determine reactivation airflow rate from formula

$$VR = MP \times \frac{TPO - TPI}{TRI - 120} \text{ SCFM}$$

10 If VR calculated is less than maximum reactivation air capacity shown in Figure 1, the selection is okay Otherwise go to next larger size and repeat procedure

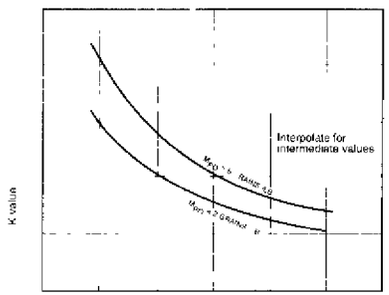



FIGURE 3

## DEWPOINT SCALE
## DEGREES °F °C TO GRAINS PER POUND

| DEWPOINT Degrees °F | DEWPOINT Degrees °C | GRAINS/ POUNDS | DEWPOINT Degrees F | DEWPOINT Degrees C | GRAINS/ POUNDS | DEWPOINT Degrees °F | DEWPOINT Degrees °C | GRAINS/ POUNDS |
|---|---|---|---|---|---|---|---|---|
| 120 | 48 89 | 570 4 | 40 | 4 44 | 36 49 | -40 | -40 00 | 5548 |
| 119 | 48 33 | 552 8 | 39 | 3 89 | 35 08 | -41 | -40 56 | 5219 |
| 118 | 47 78 | 535 6 | 38 | 3 33 | 33 73 | -42 | 41 11 | 4890 |
| 117 | 47 22 | 519 0 | 37 | 2 78 | 32 42 | -43 | -41 67 | 4597 |
| 116 | 46 67 | 503 0 | 36 | 2 22 | 31 15 | 44 | -42 22 | 4304 |
| 115 | 46 11 | 487 3 | 35 | 1 67 | 29 93 | -45 | -42 78 | 4043 |
| 114 | 45 55 | 472 2 | 34 | 1 11 | 28 75 | -46 | -43 33 | 3784 |
| 113 | 45 00 | 457 5 | 33 | 0 56 | 27 61 | -47 | -43 89 | 3554 |
| 112 | 44 44 | 443 3 | 32 | 0 00 | 26 52 | -48 | -44 44 | 3323 |
| 111 | 43 89 | 429 4 | 31 | -0 56 | 25 32 | -49 | -45 00 | 3118 |
| 110 | 43 33 | 416 1 | 30 | -1 11 | 24 19 | -50 | -45 56 | 2914 |
| 109 | 42 78 | 403 1 | 29 | -1 67 | 23 08 | -51 | -46 11 | 2749 |
| 108 | 42 22 | 390 5 | 28 | -2 22 | 22 03 | -52 | -46 67 | 2583 |
| 107 | 41 66 | 378 3 | 27 | -2 78 | 21 02 | -53 | -47 22 | 2418 |
| 106 | 41 11 | 366 4 | 26 | -3 33 | 20 06 | -54 | -47 78 | 2253 |
| 105 | 40 56 | 354 9 | 25 | -3 89 | 19 13 | -55 | -48 33 | 2088 |
| 104 | 40 00 | 343 8 | 24 | -4 44 | 18 24 | -56 | -48 89 | 1967 |
| 103 | 39 44 | 332 9 | 23 | -5 00 | 17 40 | -57 | -49 44 | 1846 |
| 102 | 38 89 | 322 4 | 22 | -5 56 | 16 58 | -58 | -50 00 | 1725 |
| 101 | 38 33 | 312 2 | 21 | -6 11 | 15 81 | -59 | -50 56 | 1604 |
| 100 | 37 78 | 302 3 | 20 | -6 67 | 15 06 | -60 | -51 11 | 1483 |
| 99 | 37 22 | 292 7 | 19 | 7 22 | 14 36 | 61 | -51 67 | 1395 |
| 98 | 36 67 | 283 4 | 18 | -7 78 | 13 67 | -62 | 52 22 | 1307 |
| 97 | 36 11 | 274 4 | 17 | -8 33 | 13 03 | -63 | -52 78 | 1220 |
| 96 | 35 55 | 265 6 | 16 | -8 89 | 12 40 | -64 | -53 33 | 1132 |
| 95 | 35 00 | 257 1 | 15 | -9 44 | 11 81 | -65 | -53 89 | 1044 |
| 94 | 34 44 | 248 9 | 14 | -10 00 | 11 24 | 66 | -54 44 | 09808 |
| 93 | 33 89 | 240 9 | 13 | -10 56 | 10 70 | 67 | 55 00 | 09176 |
| 92 | 33 33 | 233 1 | 12 | -11 11 | 10 18 | 68 | 55 56 | 08544 |
| 91 | 32 78 | 225 6 | 11 | 11 67 | 9 681 | 69 | 56 11 | 07912 |
| 90 | 32 22 | 218 3 | 10 | 12 22 | 9 205 | 70 | 56 67 | 07280 |
| 89 | 31 67 | 211 2 | 9 | 12 78 | 8 751 | -71 | 57 22 | 06831 |
| 88 | 31 11 | 204 3 | 8 | 13 33 | 8 323 | -72 | -57 78 | 06383 |
| 87 | 30 55 | 197 7 | 7 | 13 89 | 7 91 | -73 | -58 33 | 05934 |
| 86 | 30 00 | 191 2 | 6 | 14 44 | 7 518 | 74 | -58 89 | 05486 |
| 85 | 29 44 | 184 9 | 5 | 15 00 | 7 140 | -75 | -59 44 | 05037 |
| 84 | 28 89 | 178 8 | 4 | -15 56 | 6 784 | -76 | 60 00 | 04721 |
| 83 | 28 33 | 173 0 | 3 | -16 11 | 6 443 | -77 | -60 56 | 04404 |
| 82 | 27 78 | 167 2 | 2 | -16 67 | 6 117 | -78 | -61 11 | 04086 |
| 81 | 27 22 | 161 7 | 1 | -17 22 | 5 806 | -79 | -61 67 | 03769 |
| 80 | 26 67 | 156 3 | 0 | -17 78 | 5 510 | 80 | -62 22 | 03451 |
| 79 | 26 11 | 151 1 | 1 | 18 33 | 5 228 | -81 | -62 77 | 03228 |
| 78 | 25 55 | 146 0 | -2 | -18 89 | 4 960 | -82 | -63 33 | 03006 |
| 77 | 25 00 | 141 1 | -3 | -19 44 | 4 704 | -83 | -63 89 | 02784 |
| 76 | 24 44 | 136 4 | 4 | -20 00 | 4 460 | 84 | -64 44 | 02562 |
| 75 | 23 89 | 131 7 | -5 | -20 56 | 4 228 | 85 | -65 00 | 02340 |
| 74 | 23 33 | 127 3 | -6 | 21 11 | 4 007 | 86 | -65 56 | 02186 |
| 73 | 22 78 | 123 0 | -7 | -21 67 | 3 796 | 87 | -66 11 | 02033 |
| 72 | 22 22 | 118 8 | -8 | -22 22 | 3 596 | 88 | -66 67 | 01877 |
| 71 | 21 67 | 114 7 | -9 | -22 78 | 3 406 | 89 | -67 22 | 01723 |
| 70 | 21 11 | 110 7 | -10 | -23 33 | 3 224 | 90 | -67 78 | 01569 |
| 69 | 20 56 | 107 0 | 11 | -23 89 | 3 051 | 91 | -68 33 | 01463 |
| 68 | 20 00 | 103 2 | 12 | -24 44 | 2 888 | 92 | -68 89 | 01358 |
| 67 | 19 44 | 99 68 | 13 | -25 00 | 2 732 | 93 | -69 44 | 01253 |
| 66 | 18 89 | 96 18 | 14 | -25 56 | 2 584 | 94 | -70 00 | 01147 |
| 65 | 18 33 | 92 82 | 15 | -26 11 | 2 444 | 95 | -70 56 | 01042 |
| 64 | 17 78 | 89 60 | 16 | -26 67 | 2 311 | 96 | -71 11 | 009704 |
| 63 | 17 22 | 86 45 | 17 | -27 22 | 2 184 | 97 | -71 67 | 008988 |
| 62 | 16 67 | 83 37 | 18 | -27 78 | 2 064 | 98 | -72 22 | 008272 |
| 61 | 16 11 | 80 43 | 19 | -28 33 | 1 950 | 99 | -72 78 | 007556 |
| 60 | 15 56 | 77 56 | 20 | 28 89 | 1 841 | -100 | 73 33 | 006840 |
| 59 | 15 00 | 74 83 | -21 | -29 44 | 1 741 | -101 | 73 89 | 006360 |
| 58 | 14 44 | 72 10 | -22 | -30 00 | 1 641 | -102 | 74 44 | 005879 |
| 57 | 13 89 | 69 54 | -23 | -30 56 | 1 551 | -103 | 75 00 | 005399 |
| 56 | 13 33 | 67 02 | -24 | -31 11 | 1 461 | -104 | 75 56 | 004918 |
| 55 | 12 78 | 64 60 | -25 | -31 67 | 1 375 | -105 | 76 11 | 004438 |
| 54 | 12 22 | 62 26 | -26 | -32 22 | 1 289 | -106 | 76 67 | 004119 |
| 53 | 11 67 | 59 98 | -27 | -32 78 | 1 222 | -107 | 77 22 | 003800 |
| 52 | 11 11 | 57 79 | -28 | 33 33 | 1 154 | 108 | 77 78 | 003482 |
| 51 | 10 56 | 55 66 | -29 | 33 89 | 1 090 | -109 | 78 33 | 003163 |
| 50 | 10 00 | 53 61 | 30 | 34 44 | 1 025 | -110 | 78 89 | 002844 |
| 49 | 9 44 | 51 62 | -31 | 35 00 | 9668 | -111 | 79 44 | 002635 |
| 48 | 8 89 | 49 70 | -32 | 35 56 | 9086 | -112 | -80 00 | 002426 |
| 47 | 8 33 | 47 84 | -33 | 36 11 | 8564 | -113 | -80 56 | 002218 |
| 46 | 7 78 | 46 05 | -34 | 36 67 | 8043 | -114 | -81 11 | 002009 |
| 45 | 7 22 | 44 32 | -35 | 37 22 | 7578 | -115 | -81 67 | 001800 |
| 44 | 6 67 | 42 64 | -36 | 37 78 | 7112 | -116 | -82 22 | 001665 |
| 43 | 6 11 | 41 02 | -37 | 38 33 | 6699 | -117 | -82 78 | 001530 |
| 42 | 5 56 | 39 47 | -38 | 38 89 | 6286 | -118 | -83 33 | 001394 |
| 41 | 5 00 | 37 95 | -39 | 39 44 | 5917 | -119 | -83 89 | 001259 |
| | | | | | | -120 | -84 44 | 001124 |

# *kVA/kW amperage chart - 80% power factor*

| kVA | kW | 208V | 220V | 240V | 380V | 400V | 440V | 450V | 480V | 600V | 2400V | 3300V | 4160V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.3 | 5 | 17.5 | 16.5 | 15.2 | 9.6 | 9.1 | 8.3 | 8.1 | 7.6 | 6.1 | | | |
| 9.4 | 7.5 | 26.1 | 24.7 | 22.6 | 14.3 | 13.6 | 12.3 | 12 | 11.3 | 9.1 | | | |
| 12.5 | 10 | 34.7 | 33 | 30.1 | 19.2 | 18.2 | 16.6 | 16.2 | 15.1 | 12 | | | |
| 18.7 | 15 | 52 | 49.5 | 45 | 28.8 | 27.3 | 24.9 | 24.4 | 22.5 | 18 | | | |
| 25 | 20 | 69.5 | 66 | 60.2 | 38.4 | 36.4 | 33.2 | 32.4 | 30.1 | 24 | 6 | 4.4 | 3.5 |
| 31.3 | 25 | 87 | 82.5 | 75.5 | 48 | 45.5 | 41.5 | 40.5 | 37.8 | 30 | 7.5 | 5.5 | 4.4 |
| 37.5 | 30 | 104 | 99 | 90.3 | 57.6 | 54.6 | 49.8 | 48.7 | 45.2 | 36 | 9.1 | 6.6 | 5.2 |
| 50 | 40 | 139 | 132 | 120 | 77 | 73 | 66.5 | 65 | 60 | 48 | 12.1 | 8.8 | 7 |
| 62.5 | 50 | 173 | 165 | 152 | 96 | 91 | 83 | 81 | 76 | 61 | 15.1 | 10.9 | 8.7 |
| 75 | 60 | 208 | 198 | 181 | 115 | 109 | 99.6 | 97.5 | 91 | 72 | 18.1 | 13.1 | 10.5 |
| 93.8 | 75 | 261 | 247 | 226 | 143 | 136 | 123 | 120 | 113 | 90 | 22.6 | 16.4 | 13 |
| 100 | 80 | 278 | 264 | 240 | 154 | 146 | 133 | 130 | 120 | 96 | 24.1 | 17.6 | 13.9 |
| 125 | 100 | 347 | 330 | 301 | 192 | 182 | 166 | 162 | 150 | 120 | 30 | 21.8 | 17.5 |
| 156 | 125 | 433 | 413 | 375 | 240 | 228 | 208 | 204 | 188 | 150 | 38 | 27.3 | 22 |
| 187 | 150 | 520 | 495 | 450 | 288 | 273 | 249 | 244 | 225 | 180 | 45 | 33 | 26 |
| 219 | 175 | 608 | 577 | 527 | 335 | 318 | 289 | 283 | 264 | 211 | 53 | 38 | 31 |
| 250 | 200 | 694 | 660 | 601 | 384 | 364 | 332 | 324 | 301 | 241 | 60 | 44 | 35 |
| 312 | . | 866 | . | 751 | 480 | 455 | 415 | 405 | 376 | 300 | 75 | 55 | 43 |
| 375 | . | 1040 | . | 903 | 576 | 546 | 498 | 487 | 451 | 361 | 90 | 66 | 52 |
| 438 | 350 | 1220 | 1155 | 1053 | 672 | 637 | 581 | 568 | 527 | 422 | 105 | 77 | 61 |
| 500 | 400 | 1390 | 1320 | 1203 | 770 | 730 | 665 | 650 | 602 | 481 | 120 | 88 | 69 |
| 625 | 500 | 1735 | 1650 | 1504 | 960 | 910 | 830 | 810 | 752 | 602 | 150 | 109 | 87 |
| 750 | 600 | 2080 | 1980 | 1803 | 1150 | 1090 | 996 | 975 | 902 | 721 | 180 | 131 | 104 |
| 875 | 700 | 2430 | 2310 | 2104 | 1344 | 1274 | 1162 | 1136 | 1052 | 842 | 210 | 153 | 121 |
| 1000 | 800 | 2780 | 2640 | 2405 | 1540 | 1460 | 1330 | 1300 | 1203 | 962 | 241 | 176 | 139 |
| 1125 | 900 | 3120 | 2970 | 2709 | 1730 | 1640 | 1495 | 1460 | 1354 | 1082 | 271 | 197 | 156 |
| . | . | 3470 | 3300 | 3009 | 1920 | 1820 | 1660 | 1620 | . | . | 301 | . | 174 |
| . | . | 4350 | 4130 | 3765 | 2400 | 2280 | 2080 | 2040 | . | . | 376 | . | 218 |
| 1875 | 1500 | 5205 | 4950 | 4520 | 2880 | 2730 | 2490 | 2440 | 2260 | 1805 | 452 | 327 | 261 |
| . | . | . | . | 5280 | 3350 | 3180 | 2890 | 2830 | 2640 | 2106 | 528 | 380 | 304 |
| . | . | . | . | 6020 | 3840 | 3640 | 3320 | 3240 | 3015 | 2405 | 602 | 436 | 348 |
| 2812 | 2250 | . | . | 6780 | 4320 | 4095 | 3735 | 3645 | 3400 | 2710 | 678 | 491 | 392 |
| 3130 | . | . | . | 7520 | 4800 | 4560 | 4160 | 4080 | 3765 | 3005 | 752 | 546 | 435 |
| 3750. | . | . | . | 9040 | 5760 | 5460 | 4980 | 4880 | 4525 | 3610 | 904 | 654 | 522 |
| 4375 | 3500 | . | . | 10550 | 6700 | 6360 | 5780 | 5660 | 5285 | 4220 | 1055 | 760 | 610 |
| 5000 | 4000 | . | . | 12040 | 7680 | 7280 | 6640 | 6480 | 6035 | 4810 | 1204 | 872 | 695 |

# *Useful formulas*

## Power

| TO OBTAIN: | SINGLE PHASE | THREE PHASE |
|---|---|---|
| Kilowatts | $\frac{V \times I \times PF}{1000}$ | $\frac{1.732 \times V \times I \times PF}{1000}$ |
| kVA | $\frac{V \times I}{1000}$ | $\frac{1.732 \times V \times I}{1000}$ |
| Horsepower required when generator kW is known (if generator efficiency is unknown, use 0.93) | $\frac{kW}{0.746 \times \text{Efficiency (Generator)}}$ | $\frac{kW}{0.746 \times \text{Efficiency (Generator)}}$ |
| kW input when motor Hp known (if motor efficiency is unknown, use 0.85 x Hp) | $\frac{Hp \times 0.746}{\text{Efficiency (Motor)}}$ | $\frac{Hp \times 0.746}{\text{Efficiency (Motor)}}$ |
| Amperes when motor Hp known | $\frac{Hp \times 746}{V \times PF \times \text{Efficiency}}$ | $\frac{Hp \times 746}{1.732 \times V \times PF \times \text{Efficiency}}$ |
| Amperes when kW known | $\frac{kW \times 1000}{V \times PF}$ | $\frac{kW \times 1000}{1.732 \times V \times PF}$ |
| Amperes when kVA known | $\frac{kVA \times 1000}{V}$ | $\frac{kVA \times 1000}{1.732 \times V}$ |

## Temperature

| | |
|---|---|
| Tons (Fluid) = | $\frac{\text{G.P.M.} \times 500 \times \text{sp.heat} \times \text{sp.gravity} \times \Delta T}{12{,}000}$ |
| Tons (Air) = | $\frac{\text{C.F.M.} \times 4.45 \times \Delta h \text{ (enthalpy)}}{12{,}000}$ |
| kW Heat (Structure) = | $\frac{\text{Surface area} \times \text{u factor} \times \Delta T}{3413}$ |
| C.F.M. = | $\frac{\text{Volume} \times \text{\# of required air changes}}{60}$ |
| kW Heat = | $\frac{\text{C.F.M.} \times 1.08 \times \Delta T}{3413}$ |
| kW (Temperature) = | $\frac{\text{BTU / Hr.}}{3413}$ |
| Tons (Refrigeration) = | $\frac{\text{BTU / Hr.}}{12{,}000}$ |
| Tons (Nominal) = | $\frac{\text{Tons (effective) or BTU / Hr. of work}}{\text{deration factor}}$ |

## Compressed Air

| Multiply | By | To obtain |
|---|---|---|
| VOLUME: | | |
| cubic feet/minute | 0.472 | liter/second |
| liters/minute | 0.2642 | gallons/minute |
| cubic meter | 35.315 | cubic feet |
| PRESSURE: | | |
| inches mercury | 0.4912 | psi |
| inches water | 25.4 | mm water |
| psi | 27.7 | inches water |
| bar | 14.504 | psi |

## Compressed Air

### Rules of thumb and useful information

- CFM/horsepower for air at various discharge pressures:

| PSIG | CFM/BHP |
|---|---|
| 100 | 4 - 5.0 |
| 125 | 4.0 |
| 150 | 3.8 |
| 300 | 2.9 |

- Desiccant dryers de-rate a compressor's capacity (CFM) due to purge air requirements. This is typically about 13 - 15%.
- Every 20° F temperature drop in saturated compressed air, 50% of the water vapor condenses into liquid.
- Under average conditions, every 100 CFM of air compressed to 100 PSIG produces 20 gallons of condensate per day.
- Most instrument air applications require a -40° F pressure dew point.
- Air-driven aftercoolers de-rate a compressor's capacity (CFM) by about 7%.
- Maximum entry temperature for most dryers and plant air systems is 120° F.
- Most plant air systems have an operating pressure ranging between 90 PSI and 125 PSI.

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Conditions of Contract

# *Rental agreement terms and conditions*

1 RENTAL PERIOD The rental period shall commence from the date of shipment of the equipment covered by this agreement (the "Equipment") from the point of shipment and shall continue until the Equipment is returned to the lessor's yard or such other point as the lessor shall in writing direct

2 DETERMINATION OF RENTAL CHARGES The lessee shall pay for the rental period on each piece of Equipment named in the list of equipment in this agreement at the rate herein stipulated A rental rate is for a minimum rental period of one week, any portion of a week will be charged as a full week A month is defined as a period of twenty-eight (28) days
Unless otherwise advised in writing, all rental rates are based on a shift system, single shift is defined as eight (8) hours in a day, forty (40) hours in a week or one hundred seventy-six (176) hours in a twenty-eight (28) day month Double shift is defined as eighty (80) hours in a week or three hundred fifty-two (352) hours in a twenty-eight (28) day month Triple shift is unlimited hours in a twenty-eight (28) day month

3 PAYMENT All rentals due under this agreement are due and payable in advance on a weekly basis, to the lessor, at the address designated in this agreement unless otherwise agreed in writing Payment for the minimum rental period is due before the delivery of the Equipment to the lessee or the latter's agent or carrier All overdue payments, for all charges including damages and losses referred to in Sections 8 and 16, shall bear interest at the lesser of 18% per annum or the highest amount otherwise allowed by law without prejudice to the lessor's rights and in particular without prejudice to the lessors right contained in Section 13 to terminate this agreement for non payment of rental

4 LOADING, UNLOADING AND TRANSPORTATION The lessee at his own expense and responsibility shall load the Equipment for transit to his receiving point and shall unload the Equipment upon its return to lessor's yard and shall pay all demurrage charges incurred at the shipping or receiving points The lessee shall pay all shipping expenses from the original point of shipment to his receiving point and all return shipping expenses to the lessor's yard or such other point as the lessor shall in writing direct However, if the lessee is directed, in writing by the lessor to return all Equipment to a place other than the lessor's yard, then the lessee shall pay the shipping expenses up to but not beyond the amount which would have been required to return the Equipment to the lessor's yard

5 RECALLING AND RETURNING NOTICE The lessor may recall any or all equipment upon thirty (30) days written notice to the lessee and the lessee may return any or all Equipment upon like notice to the lessor In the event of recall, the lessee shall remain responsible for any loading, unloading, and transportation costs as referred to in Section 4

6 MAINTENANCE, OPERATION AND REPAIRS The lessee shall not make any alterations, additions or improvements to the Equipment without the lessors prior written consent The lessee shall at his own expense operate, maintain and keep in good repair the Equipment and return it in the same condition in which it was received Specifically the lessee must

(a) Ensure that the Equipment is operated in accordance with applicable manufacturer's guidelines and instructions by qualified personnel
(b) Comply with all applicable federal and state laws and regulations in connection with operating, handling and transporting the Equipment
(c) Supply all fuel, coolants and lubricants necessary to operate the Equipment
(d) Perform all repairs and maintenance necessary to keep the Equipment in good running order
(e) Replace all broken or worn out parts
(f) Return the Equipment in a clean and unmarred condition

7 INSPECTION Before the Equipment is loaded for transit to the lessee, the lessee may require an inspection thereof by a qualified inspector If the Equipment is not in a satisfactory condition the reasonable cost of such inspection shall be paid for by the lessor If the lessee does not inspect the Equipment before it is loaded for transit, then the lessee is conclusively deemed to have accepted that the Equipment is in good running order without broken or worn out parts and in a clean and unmarred condition The lessor shall have the right at any time and from time to time to enter the premises occupied by the Equipment and shall be given free access thereto and afforded necessary facilities for the purpose of inspection

8 DAMAGE TO EQUIPMENT The lessee shall be liable to the lessor for all loss or damage to the Equipment, while it is in the possession of the lessee, regardless of the cause or origin of such loss or damage, except as limited by Section 16 Subject to the provisions of Section 7 hereof either party shall advise the other within seven (7) days of the receipt of the Equipment of any shortages or damage claim which it might have against the other and unless such notice is given within such period such claim for shortage or damage shall be invalid and unenforceable
In the event of partial loss or damage to the Equipment, lessee shall immediately notify lessor of such, and if its failure to so notify lessor results in additional or consequential damage to lessor lessee agrees to pay for all such damage The repair of the damaged Equipment will be governed by Section 16 below
In the event of total loss to the Equipment while it is in the possession of the lessee, lessee agrees to pay, within thirty (30) days from such loss, the amount printed on the face of this contract entitled "Replacement Cost" which the parties agree is the current fair replacement value of the Equipment Additionally the parties hereto acknowledge that the Equipment is unique in design and manufacture, and as to lessor, it is inherently valuable as rental equipment Therefore, in the event of total loss of the Equipment, lessor and lessee agree that the loss to lessor comprises, in addition to the Replacement Cost the loss of use of such rental Equipment (rentals) until it can be replaced In such event lessee shall also be liable for and agrees to pay within thirty (30) days from receipt of lessors invoice the loss of rentals which such Equipment could have produced, for such period of time which elapses from the total loss until the Equipment can be replaced

9 LIABILITY OF LESSEE The liability for injury, disability and/or death of workmen and other persons caused by the operation, handling or transportation of the Equipment pursuant to this agreement shall be that of the lessee and lessee shall indemnify and hold harmless the lessor against all such liability The lessee shall also indemnify and hold harmless the lessor against all loss, expense, damages and/or penalty or penalties which may arise out of any action for damages to property or person or persons occasioned by the operation, handling or transportation of the Equipment pursuant to this agreement

10 INSURANCE The lessee shall at lessee's own expense (i) maintain public liability and property insurance to protect the lessee and the lessor against damage to property or persons from the operation handling or transportation of the Equipment during the rental period (ii) insure the Equipment for loss by fire, theft, damage or other risk of loss customarily insured against on such Equipment, (iii) maintain marine insurance on marine equipment and (iv) maintain such other insurance as may be requested by the lessor in advance of shipment by the lessor to the lessee Insurance protecting against loss of or damage to the Equipment shall be maintained in an amount not less than the sum shown on the contract as "Replacement Cost" Upon request, lessee shall provide lessor with proof of any such insurance

11 LEGAL EXPENSES The lessee shall pay all costs, charges and expenses including reasonable attorneys' fees incurred in retaking possession of the Equipment hereby rented or in the collection of any such sums which may be due and owing the lessor by the lessee, including the defense of any action brought against the lessor for damages caused by the Equipment to any person while the Equipment is in the

# *Rental equipment terms and conditions* **(continued)**

possession of the lessee The Equipment shall be deemed to be in the possession of the lessee for all purposes of this agreement from the time lessee begins loading it for transit from lessor's yard until the time that the lessee has completed unloading the Equipment at the lessor's yard or such other points as the lessor shall in writing direct

12 SUBLETTING No equipment shall be sublet by the lessee nor shall lessee assign or transfer any interest in this agreement without the prior consent in writing of the lessor

13 TERMINATION OF THE AGREEMENT Should the lessee (i) fail to make payment in accordance with the terms of this agreement and such failure continue for a period of five (5) days (ii) become bankrupt become insolvent or make an assignment for the benefit of its creditors, (iii) fail to maintain and/or operate or to return the Equipment as provided by this agreement, (iv) fail to maintain the insurance required by Section 10, or (v) violate any material provision hereof, the lessor may, after three (3) days notice in writing of such event terminate this agreement, take possession of the Equipment wherever it may be found without becoming liable for damages or for trespass, and, in addition to any other remedies lessor may have recover all amounts due together with any damages for injury to the Equipment and all expenses incurred in returning and repossessing the equipment

14 WARRANTY The Equipment rented hereunder has been selected by lessee for his own purposes and lessee expressly disclaims any reliance upon any statements or representations made by lessor EXCEPT FOR SATISFACTORY RATED OPERATION OF THE EQUIPMENT, LESSOR MAKES NO EXPRESS OR IMPLIED WARRANTIES OF ANY KIND, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE EQUIPMENT AND LESSOR HEREBY DISCLAIMS SAME The lessor's liability under this Section 14 is limited to repairing or replacing (at the discretion of the lessor) any Equipment not performing according to rated operation

15 AUTHORITY OF AGENTS The execution hereof by an agent of lessee shall conclusively establish the authority of such agent to contract herein, unless lessor receives written notification to the contrary prio to the loading of the Equipment for transit

16 SPECIAL CONDITIONS Notwithstanding any provisions contained herein to the contrary

a If the Equipment goes down for maintenance or repairs while in lessee's service lessee may notify lessor and if lessee elects to return the down Equipment lessor will make arrangements to send lessee Equipment to replace it The lessee will be charged for all applicable transportation costs

b (i) If the Equipment goes down for maintenance or repairs while in lessees service and lessee elects not to return the down Equipment lessor will send a qualified technician to repair it Lessee will be charged travel time mileage, labor and parts for such technician

(ii) if lessor determines that the required maintenance or repairs is lessor's responsibility, the labor and parts required for repair will be provided at no charge to lessee All travel time and mileage will be charged at lessor's regular rate

(iii) if lessor determines that the repairs (including those resulting from improper maintenance or the failure to perform required maintenance, or for any reason other than lessor's negligence) is lessee's responsibility, then the lessee agrees to pay, within thirty (30) days from receipt of lessor's invoice, for all applicable transportation costs, travel time, mileage, labor, and parts for the repair Additionally, the parties hereto acknowledge that the Equipment is unique in design and manufacture and as to lessor, it is inherently valuable as rental equipment Therefore in the event of damage to the Equipment which does not constitute a total loss lessor and lessee agree that the loss to lessor comprises, in addition to the cost of labor and parts to repair the Equipment, as well as transportation costs travel time mileage, and other such incidental costs, the loss of use of such rental Equipment (rentals) until it can be fully repaired In such event, lessee shall also be liable for, and agrees to pay within thirty (30) days from receipt of lessor's invoice the loss of rentals which such damaged Equipment could have produced, during the time it is being repaired, had it not been damaged

17 TAXES AND FEES The lessee shall pay all license fees, registration fees assessments duties and taxes which may now or hereafter be imposed upon the ownership, possession lease or use of the Equipment, excepting only those based on the lessor's net income or exempted by law The lessee shall promptly notify the lessor of the receipt of any tax notices, tax reports or inquiries or notices from taxing or other authorities concerning taxes, fees or assessments

18 AIR QUALITY The lessee shall comply with all laws rules and regulations with regard to the operation of the Equipment under any local, state or Federal Air Quality Legislation

19 OWNERSHIP OF EQUIPMENT, ENCUMBRANCES The Equipment is, and shall at all times remain the property of the lessor, and the lessee shall have no right, title or interest therein, or thereto except the right of possession and use of the Equipment pursuant to the terms of this agreement Lessee shall not remove or deface any plate or marking on the Equipment identifying lessor as the owner of the Equipment or the manufacturer's serial number The Equipment is, and shall at all times remain, personal property notwithstanding that the Equipment or any part thereof may now be or hereafter become, in any manner affixed or attached to any other personal or real property, The lessee shall keep the Equipment free and clear of any and all levies, liens, security interests and encumbrances of any kind and shall give the lessor prompt notice of any attachment or judicialprocess affecting the Equipment

20 LIMITED LIABILITY IN NO EVENT SHALL THE LESSOR BE LIABLE TO THE LESSEE OR ANY OTHER PARTY FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES

21 SCOPE OF DAMAGES THE LESSOR S LIABILITY FOR DAMAGES SHALL IN NO EVENT EXCEED THE TOTAL RENTALS, IF ANY, RECEIVED FROM THE LESSEE BY THE LESSOR FOR THE EQUIPMENT WHICH IS THE SUBJECT OF CLAIM OR DISPUTE

22 ENTIRE AGREEMENT GOVERNING LAW VENUE (U S A ) This agreement constitutes the entire agreement between the lessor and the lessee, and supercedes any representations, warranties or agreements (written or oral) *heretofore* made or entered into between the parties relating to the Equipment This contract shall be governed by the laws of Texas applicable to contracts made and to be performed in Texas Lessor and lessee hereby irrevocably consent to the jurisdiction of the state and federal courts located in Dallas county, Dallas, Texas and shall be bound by any judgments rendered thereby after all appeals taken ENTIRE AGREEMENT, GOVERNING LAW (Canada) This agreement constitutes the entire agreement between the lessor and the lessee, and supercedes any representations, warranties or agreements (written or orall heretofore made or entered into between the parties relating to the Equipment This contract shall be governed by the laws of the Province of Ontario applicable to contracts made and to be performed in Ontario

23 CHANGES MODIFICATIONS, WAIVERS, ETC Changes, modifications, waivers, additions or amendments to the *terms and conditions* of this agreement shall be binding on lessor only if such are in writing and signed by a duly authorized representative of lessor The failure of lessor to enforce, at any time or for any period of time, any of the provisions of this agreement shall not constitute a waiver of such provisions or of the right of lessor to enforce each and every provision