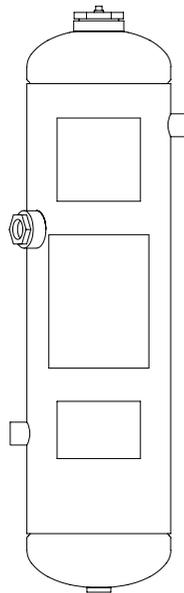


## INSTALLATION, OPERATION, & MAINTENANCE INSTRUCTIONS FOR **SINGLE TOWER**

*COMPRESSED AIR DRYER*

MODELS  
**D-4 & D-8**



**DO NOT REMOVE, REPAIR, OR REPLACE ANY ITEM ON THE DRYER WHILE IT IS UNDER PRESSURE. DEPRESSURIZE THE DRYER COMPLETELY BEFORE STARTING INSTALLATION AND/OR MAINTENANCE PROCEDURES. SERIOUS PERSONAL INJURY MAY RESULT IF THESE SAFETY RULES ARE NOT FOLLOWED.**

**DO NOT OPERATE THIS PRESSURE VESSEL ABOVE MAXIMUM WORKING PRESSURE (MWP) AT MAXIMUM OPERATING TEMPERATURE (°F) AS SHOWN ON THE ASME DATA PLATE.**

**THIS ASME CODE VESSEL MUST BE PROTECTED BY A PRESSURE RELIEF VALVE. Refer to OSHA 1910.169 Par. b, Sub. Par (3) and ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, UG-125 through UG-136. Also check government regulations, i.e., state and local codes.**

**DO NOT WELD, GRIND, OR SAND VESSEL, OR IT WILL NOT BE SAFE TO OPERATE. (Note: Any alteration to the vessel will void the ASME Code Certification and the warranty.)**

**ANY DAMAGE TO THE VESSEL CAN MAKE IT UNSAFE. INSPECT OUTSIDE AND INSIDE OF VESSELS REGULARLY FOR BULGES, CORROSION, DENTS, GOUGES, LEAKS OR SIGNS OF FIRE. IF DAMAGED, TAKE OUT OF SERVICE IMMEDIATELY AND NOTIFY YOUR CERTIFYING AUTHORITY.**

**USE THE PROPER SAFETY RULES FOR THE GAS BEING PROCESSED.**

**DO NOT REMOVE THE FILL PORT UNTIL ALL AIR PRESSURE IS OUT OF THE VESSEL.**

## 1.0 PURPOSE OF OPERATION

The purpose of installing a Van Air single tower dryer in a compressed air system is to remove the water vapor (humidity) which has been drawn into the system at the compressor intake. The Van Air process dries the air as it flows through the vessel, which is filled with a special drying agent. The dryer operates automatically. There are no moving parts and no external source of power is required. If an automatic drain is installed, a power source is required only to operate the valve.

The wet air enters the centrally located inlet which channels the flow into the lower portion of the dryer. Liquid water and solid particles are separated by gravity and fall to the bottom of the vessel.

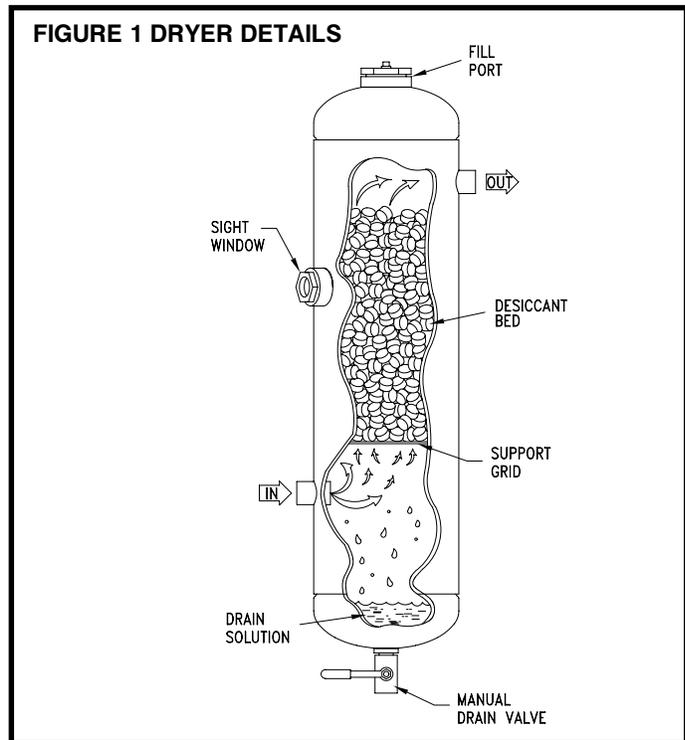
The process air moves upward through the bed of desiccant tablets which attract and absorb the moisture from the air before it flows through the dryer outlet. The tablets dissolve gradually as they absorb the moisture.

The tablets create a structured bed that does not crush under its own weight. In the bed of an operating dryer, the lower tablets are consumed first.

The tablets in the top portion serve as a reserve supply. When the reserve supply is depleted, the dryer must be refilled to maintain performance.

The solution, which consists of dissolved desiccant and water, falls into the claim area at the bottom of the vessel. The dryer must be drained at least once a shift to remove the accumulated solution.

FIGURE 1 DRYER DETAILS



## 2.1 LOCATION

The ability of a dryer to provide dry compressed air depends on the correct location of the unit. Inlet air temperature and pressure are the keys to selecting the proper location.

**IMPORTANT**  
**ALWAYS PROCESS AIR THROUGH THE DRYER AT THE LOWEST POSSIBLE TEMPERATURE AND THE HIGHEST PRACTICAL PRESSURE.**

### 2.1-A INLET AIR TEMPERATURE

The dew point of the outlet air is directly related to the inlet air temperature and the type of desiccant being used. The lower the inlet temperature, the lower the dew point of the outlet air. Determine the lowest ambient temperature where the compressed air is used or where the lines are located. If you are using DRY-O-LITE or 10BF desiccants, do not exceed 100°F inlet air temperature. If you are using SP desiccant, do not exceed 80°F inlet air temperature.

### 2.1-B AFTERCOOLING

Air discharged by the compressor is extremely hot (from 150°F to 350°F). An aftercooler, finned tubing or extended run of piping will usually be necessary to reduce the inlet air temperature to the dryer.

### 2.1-C OUTDOOR AIR USAGE

If some or all of the air supplied by the Van Air single tower dryer will be used outdoors, install the dryer outdoors in the coolest possible

area. Make sure that the dryer is not exposed to ambient temperatures below the minimum design temperature stamped on the vessel data tag. When the dryer will be exposed to the direct rays of the sun, install a sun shield to protect it (i.e. a roof).

### 2.1-D INDOOR AIR USAGE

If all of the air from the dryer will be used indoors where temperatures remain within a fixed range, locate the dryer in the coolest indoor area. When air equipment or piping is located in an air conditioned area, install the dryer in the coolest area--usually the air conditioned area.

### 2.1-E AIR RECEIVER

The Van Air single tower dryer should be located where it will be provided with the coolest inlet temperature. If the receiver is located in an area where the ambient temperature is lower than the outlet air from the aftercooler, locate the dryer downstream of the receiver to allow additional cooling of the air before it enters the dryer. (Exception: In systems where usage creates sudden demands on the air supply, locate dryer before the receiver to minimize air surges through the dryer.) If the ambient temperature around the receiver is higher than the outlet air temperature from the aftercooler, locate the dryer between the aftercooler and the receiver.

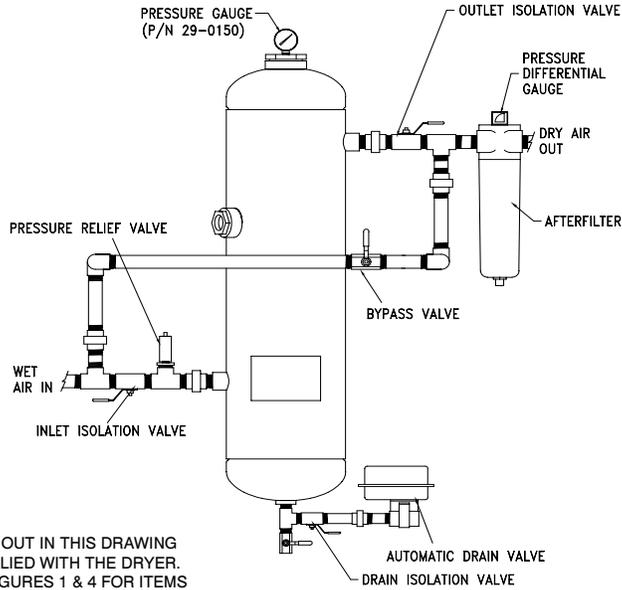
### 2.1-F SPECIAL EQUIPMENT INSTALLATION

If the Van Air Dryer is being installed on a branch line to protect a specific piece of air-operated equipment, locate the dryer on the high pressure side of any pressure regulators.

FIGURE 2 MAXIMUM CAPACITIES -SCFM ( $Nm^3/hr$ )

MODEL NO.	MAXIMUM WORKING PRESSURE	5 PSIG 0.3 Bar	10 PSIG 0.7 Bar	20 PSIG 1.4 Bar	40 PSIG 2.8 Bar	60 PSIG 4.1 Bar	80 PSIG 5.5 Bar	90 PSIG 6.2 Bar	100 PSIG 6.9 Bar	125 PSIG 8.6 Bar	150 PSIG 10.3 Bar	200 PSIG 13.8 Bar	250 PSIG 17.2 Bar
D 4	250 PSIG	1.7 2.7	2.2 3.5	3 4.8	4.8 7.7	6.5 10.5	8.3 13.3	9.1 14.6	10 16	12.2 19.6	14.4 23.2	18.7 30.1	23.1 37.1
D 8	250 PSIG	9 14.5	11 17.7	15 24.1	24 38.6	33 53	41 66	46 74	50 80	61 98	72 116	94 151	115 185

**FIGURE 3 RECOMMENDED INSTALLATION DRAWING**



NOTE:  
ITEMS CALLED OUT IN THIS DRAWING  
ARE NOT SUPPLIED WITH THE DRYER.  
REFERENCE FIGURES 1 & 4 FOR ITEMS  
INCLUDED WITH DRYER.

**2.2-D MANUAL DRAIN VALVE**

The drain port is a 1/2" NPT tapped hole in the center of the vessel bottom head.

Shipped separately with the dryer is (1) 1/2" NPT close nipple and (1) 1/2" NPT brass ball valve. Install the nipple and valve into the drain port.

The drain of the dryer can be remotely piped away from the dryer. Make sure that the line is vented to atmospheric pressure. Any remote drain piping should be of the same size and on the same level or lower than the drain valve.

**IMPORTANT**

The drain solution may contain lubricants. Comply with all applicable regulations concerning the disposal of these chemicals

**DO NOT CONNECT THE DRAIN TO A PRESSURIZED LINE.**

**2.1-G OPERATING PRESSURE**

More air can be processed through the dryer at higher pressures. Locate the dryer at the highest practical pressure, but do not exceed the maximum rated working pressure of the dryer. Refer to FIGURE 2 located on page 3 for the maximum working pressure for your dryer.

**2.2 PIPING AND ANCILLARY EQUIPMENT**

Locate the dryer in the proper location as explained in the previous section.

If the dryer is being installed in an existing piping system, make sure that the pipe is free of scale and rust.

The dryer will be supported by the piping system. Adequate pipe supports must be used to prevent damage to the pipeline and dryer.

**2.2-A INLET AND BYPASS PIPING**

Using Figure 3 as a reference, make the necessary piping connections into the dryer.

Inlet and outlet isolation valves should be installed on the dryer. These valves will aid in the start up and shutdown of the dryer. The inlet isolation valve should be mounted before the pressure relief valve. The outlet isolation valve should be installed on the dryer outlet.

A bypass valve and piping should also be installed. This will allow the dryer to be taken off stream without interrupting the air system.

**2.2-B OPTIONAL PRESSURE RELIEF VALVE (p/n 14-2213)**

A pressure relief valve should be installed to conform to OSHA safety standards. Refer to OSHA Standard Section 1910.169, paragraph "b", subparagraph "3" and any other federal, state or local codes concerning pressure vessels.

**2.2-C OPTIONAL PRESSURE GAUGE (p/n 29-0150)**

An optional pressure gauge is available for this dryer.

**THE DRAIN SOLUTION WILL BE DISCHARGED UNDER LINE PRESSURE. POINTING THE DRAIN IN THE DIRECTION OF PEOPLE AND EQUIPMENT MAY RESULT IN INJURY AND DAMAGE.**

**DO NOT INSTALL A FLOAT TYPE (OTHER THAN THE PDV-500) OR SOLENOID TYPE DRAIN ON THE DRYER. THE DRAIN SOLUTION WILL CAUSE THESE TYPES OF DRAINS TO FAIL, THUS RESULTING IN FLOODING OF THE DRYER.**

**2.2-E OPTIONAL AUTOMATIC DRAIN VALVE (p/n 39-221121)**

The MDV-400I drain valve is recommended. Use model PDV-500 (PN 39-0283) for pneumatic applications. Contact your local VAN AIR representative to order.

Complete the automatic drain valve installation as outlined in the instructions supplied with the drain. The drain line can be remotely piped, follow the precautions as outlined previously.

**2.2-F AFTERFILTER**

The installation of an afterfilter prevents any accidental flow of materials from the dryer into the downstream piping.

The afterfilter can be installed before or after the outlet isolation valve. If the afterfilter is installed before the isolation valve, the filter can be isolated from the air system when the dryer is isolated for maintenance. Contact your local VAN AIR representative to order.

DRYER	FILTER
D-4	F200-15-1/4-B
D-8	F200-55-1/2-B

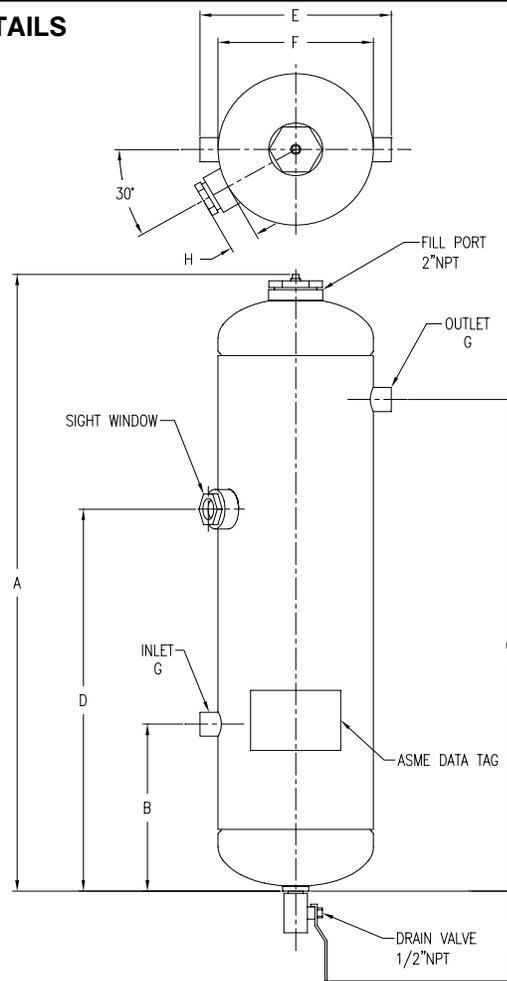
**2.2-G DESICCANT INSTALLATION**

**IMPORTANT**

This dryer was shipped WITHOUT the desiccant installed. The desiccant MUST BE INSTALLED before using the dryer

The procedures for filling the dryer with desiccant are outlined in Section 4.4 of this manual.

**FIGURE 4 DRYER DIMENSIONAL DETAILS**



MODEL NO.	APPROX WEIGHT W/O Desiccant	A	B	C	D	E	F	G	H	J
D 4	30 LBS	27-3/4" 704.9mm	6-15/16" 176.2mm	22-7/16" 569.9mm	19-5/16" 490.5mm	6-1/2" 165.1mm	4-1/2" 114.3mm	3/4" NPT	1-3/8" 34.9mm	5-1/8" 130.2mm
D 8	60 LBS	35-1/16" 890.6mm	9-1/2" 241.3mm	28" 711.2mm	21-3/4" 552.5mm	10-5/8" 269.9mm	8-5/8" 219.1mm	3/4" NPT	1-9/16" 39.7mm	5-1/8" 130.2mm

**3.1 START UP PROCEDURES**

Close the inlet isolation valve and open the bypass valve.

Open the outlet isolation valve **SLOWLY** and allow some air to bleed through the drain valve; then close the drain valve. When the dryer reaches normal operating pressure, **SLOWLY** turn the inlet valve to full open position; then close the bypass valve.

If the vessel was installed without the bypass or isolation valves, **SLOWLY** pressurize the air system. Allow some air to bleed through the drain valve. Once the vessel starts to pressurize, the drain valve can be closed.

Close the bypass valve, the dryer is now on stream.

**Make sure that the dryer is not subjected to sudden flow surges. Always open the valves slowly to permit gradual equalization of pressure between the dryer and the air supply lines.**

**3.2 OPERATING THE DRYER**

The simple design of the single tower dryer allows for easy operation.

The dryer requires two procedures to ensure peak performance.

**3.2-A DAILY DRAINING**

The accumulated solution in the bottom of the dryer should be drained at least once for every 8 hours of operation. Depending upon actual operating conditions, the dryer may require draining on a more frequent basis.

If an automatic ball valve type drain valve was installed on the dryer, set the time cycle for every 4 to 8 hours. The manual drain valve must be opened at least once every 4 to 8 hours to drain the dryer.

**If the dryer is not drained regularly, it may become flooded. Accumulated liquid may enter the air system and cause damage to downstream equipment.**

On a new installation, continue to drain all downstream traps for several days (or until no water is evident) after dryer is installed. This period is required to dry out any accumulated water in the compressed air system. Once the water is removed, the downstream traps should not need to be drained again.

### 3.2-B REFILLING THE DRYER WITH DESICCANT

During the VAN AIR drying process, the desiccant tablets dissolve slowly. More tablets must be added to the supply when the top of the bed drops to the sight window level (minimum level). Reference FIGURE 5.

The desiccant consumption rate is dependent upon several factors, such as inlet temperature, flow, pressure and the type of desiccant being used. With average conditions, the desiccant will usually need to be added only two to three times per year when the dryer is operating one shift per day. However, until the actual usage rate is determined, check the bed level monthly.

Reference Section 4.4 for estimated consumption rates and refilling instructions.

**IMPORTANT**  
Use VAN AIR desiccant only. Filling dryer with any other material will void the warranty.

### 3.3 USING THE SIGHT WINDOW

**IF SIGHT WINDOW IS DAMAGED IN ANY WAY, REPLACE IT IMMEDIATELY WITH VAN AIR PART NO. 26-0104 only. REFERENCE SECTION 4.3.**

To check the level of the desiccant bed, look into the sight window. When the top of the desiccant bed is level with the sight window, the desiccant supply has dropped to the minimum level. The bed must be replenished to raise the bed level to the maximum level.

### 4.1 DAILY PROCEDURES

After every 8 hour period of operation, drain accumulated solution from the bottom of dryer. Open manual drain valve and allow the solution to discharge from the dryer; then close the manual drain valve securely.

### 4.2 MONTHLY PROCEDURES

Check the level of the desiccant bed by looking into the sight window. If the top of the desiccant bed is level with the sight window, the desiccant bed must be replenished.

Check the operation of all equipment installed before and after the dryer.

Check the afterfilter element condition. If the pressure differential across the filter is high (6 to 9 PSID), replace the element.

Inspect the hatch cover for signs of corrosion and/or leaks. Replace the cover and/or gasket if necessary.

### 4.3 REPLACING THE SIGHT WINDOW (P/N 26-0104)

**DEPRESSURIZE DRYER COMPLETELY BEFORE REMOVING THE SIGHT WINDOW.**

Open the bypass valve. Close the dryer inlet and outlet isolation valves. If the bypass and inlet and outlet isolation valves were not installed, shutdown the air system.

Using a pipe wrench, unthread the old sight window. Remove all pipe sealant, rust or dirt from the coupling.

Apply a layer of pipe sealant to the threads of the new sight window. **DO NOT USE TEFLON TAPE.** Tape may prevent the sight window from threading into the coupling far enough.

### 4.4 ADDITION OF DESICCANT

**DO NOT REMOVE, REPAIR, OR REPLACE ANY ITEM ON THE DRYER WHILE IT IS UNDER PRESSURE. DEPRESSURIZE THE DRYER COMPLETELY BEFORE STARTING INSTALLATION AND/OR MAINTENANCE PROCEDURES.**

Open the bypass valve. Close the dryer inlet and outlet isolation valves. If the bypass and inlet and outlet isolation valves were not installed, shut down the air system.

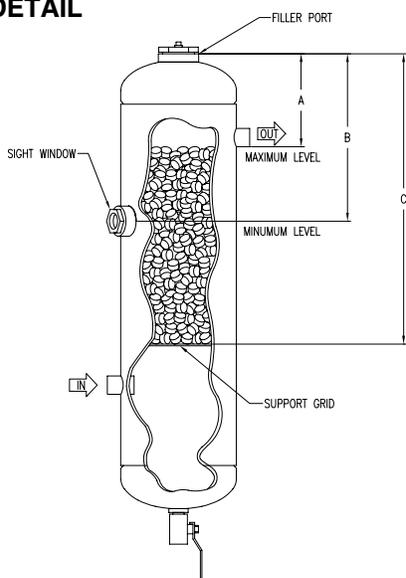
Open the drain valve and allow the dryer to depressurize completely.

Remove the fill port.

Add the amount of desiccant tablets required to raise the supply to the normal operating level or to maximum level (see FIGURE 5); then level off the tablet bed.

Replace and tighten the fill port.

**FIGURE 5 BED LEVEL DETAIL**



MODEL	BED DIMENSIONS INCHES ( <i>centimeters</i> )		
	A MAX. Level	B MIN. Level	C Total Depth
D4	5-1/4" <i>(13.33)</i>	7-11/16" <i>(19.53)</i>	17-11/16" <i>(44.93)</i>
D8	6-15/16" <i>(17.62)</i>	12-1/2" <i>(31.75)</i>	21-11/16" <i>(55.09)</i>

MODEL	DRY-O-LITE QUANTITY* POUNDS ( <i>kilograms</i> )				SP QUANTITY* POUNDS ( <i>kilograms</i> )				10 BF QUANTITY* POUNDS ( <i>kilograms</i> )			
	Lbs./In of bed**	MIN. Level	MAX Level	MIN to MAX Level	Lbs./In of bed**	MIN. Level	MAX Level	MIN to MAX Level	Lbs./In of bed**	MIN. Level	MAX Level	MIN to MAX Level
D4	0.55 <i>0.25</i>	5.53 <i>2.51</i>	6.86 <i>3.11</i>	1.33 <i>0.60</i>	0.405 <i>0.18</i>	4.05 <i>1.84</i>	5.02 <i>2.28</i>	0.97 <i>0.44</i>	0.48 <i>0.22</i>	4.8 <i>2.18</i>	5.96 <i>2.70</i>	1.16 <i>0.53</i>
D8	2.32 <i>1.05</i>	21.61 <i>9.80</i>	34.44 <i>15.62</i>	12.83 <i>5.82</i>	1.70 <i>0.77</i>	15.84 <i>7.19</i>	25.24 <i>11.45</i>	9.40 <i>4.26</i>	2.01 <i>0.91</i>	18.72 <i>8.49</i>	29.84 <i>13.54</i>	11.12 <i>5.04</i>

\* Amounts are pounds (*kilograms*) required to fill dryer to levels indicated. \*\* Amounts in italics are kilograms per centimeter of bed depth.

**Make sure that the desiccant does not cover the screen on the outlet pipe.**

**Do NOT overfill the vessel.**

Start up the dryer following the procedures in Section 3.1.

**4.4-A BED LEVEL GUIDE**

To determine the supply of desiccant in the dryer, insert a measuring stick through the fill port until it reaches the top of the desiccant bed; dimensions in FIGURE 5 are calculated from the fill port to levels indicated on the drawing. (NOTE: Dimensions are approximate and are intended as a general guide only.)

**4.4-B DESICCANT USAGE GUIDE**

The chemical and physical characteristics of Van Air desiccant contribute to its effectiveness and economy.

The DESICCANT CONSUMPTION RATE should be used as a guide to estimate the usage of desiccant your installation will require. The formula is based on an annual usage rate of one shift per day, 5 days per week and 50 weeks per year or 2,000 operating hours per year. The figure is an average and may vary depending upon your actual conditions (i.e. 24 hour operation, higher inlet temperature, excessive liquid water content and/or contaminants.)

**DESICCANT CONSUMPTION**

(Based upon 1 shift for a one year period @ 100 psig inlet pressure and 75°F inlet temperature, 100% RH.)

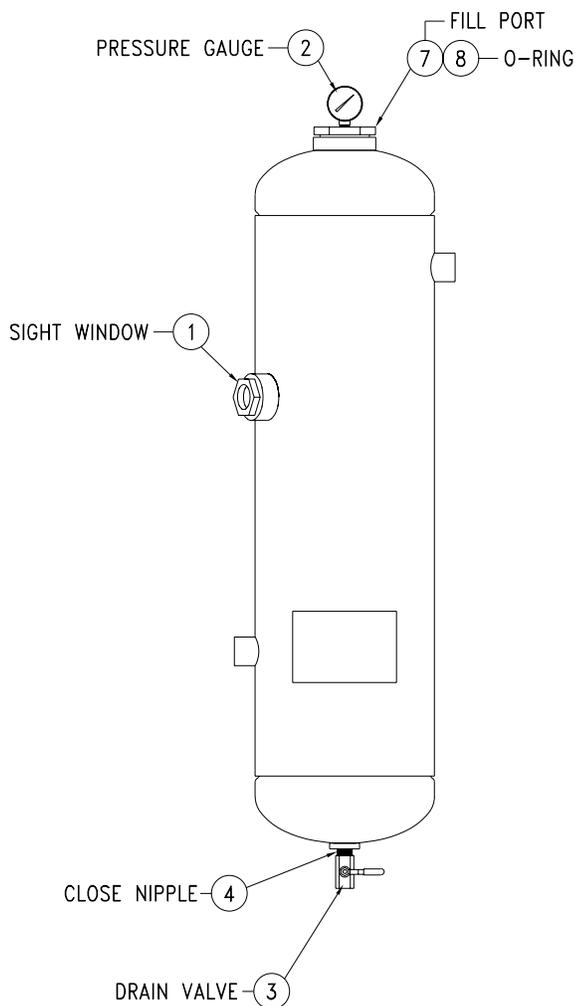
To use the chart, first determine the SCFM that is being processed through the dryer. Locate the nearest flow rate listed on the chart and interpolate as necessary.

The consumption rate is proportional to the moisture loading. Each 20°F change in inlet temperature changes the moisture loading by a factor of nearly 2:1.

The quantity shown in the consumption rate chart is NOT the quantity that must be added to the dryer at one time. The bed level should be maintained at least to the minimum level at all times to ensure optimum drying capabilities. The consumption rate is an approximation of how much desiccant will be added over a period of one year.

The desiccant bed should be filled approximately 2 to 3 times a year.

FLOW SCFM	DRY-O-LITE LBS/YEAR	SP LBS/YEAR	10 BF LBS/YEAR
10	13.2	66.5	57.6
20	26.4	133	115.2
40	52.8	266	230.4
50	66.0	332.5	288.0
75	99.0	498.8	432.0
100	132.0	665.0	576.0



ITEM	PART NO.	DESCRIPTION	D4 QTY	D8 QTY
1	26-0104	Sight Window	1	1
2	29-0150	Pressure gauge (0-200 PSIG) only	1	1
3	14-0450	Manual Drain Valve 1/2" NPT	1	1
4	12-0520	Close nipple 1/2" NPT	1	1
5		DESICCANT		
	33-0313	DRY-O-LITE Desiccant, 50 LB PAIL	1	1
	33-0311	DRY-O-LITE Desiccant, 50 LB BAG	1	1
	33-0205	SP Desiccant, 50 LB BAG	1	1
	33-0232	10BF Desiccant, 25 LB PAIL	1	1
6	14-2213	Pressure Relief Valve (not shown)	1	1
7	14-2188	Fill Port	1	1
8	26-10264	O-Ring	1	1

## 1. DECREASED PERFORMANCE OR INCREASED DESICCANT USAGE.

### High inlet air temperatures.

Check the aftercooler performance. Make sure that the aftercooler was properly sized and installed. Check the aftercooler operation manual for further details.

If an aftercooler was not installed, one may be required.

Check the compressor capacity or air usage vs. the dryer rating.

Was a different compressor installed?

### High ambient temperatures.

Check the location of the dryer for changes in ambient temperatures.

Was the dryer moved to a different location?

Was a piece of equipment or piping installed near the dryer that caused an increase in ambient temperatures? Relocate the dryer or equipment if possible. If relocation is not possible, correct the ambient temperature.

### Dryer overloaded.

Check the flow through the dryer. Check the flow at peak usage periods. Have the flow requirements of the system increased?

Was the dryer properly sized for the actual operating conditions? Check the capacity of the dryer for the system conditions. If the system requirements exceed the dryer's capability, a larger dryer must be installed.

### Desiccant bed below required level.

Check the desiccant bed level. The level should be checked at least once a month. The usage of desiccant will vary with the operating conditions and the type of desiccant being used. The dryer will require more desiccant during the warmer months of the year.

Desiccant quantities and filling procedures are outlined in Section 4.4 of this manual.

## 2. LIQUID DOWNSTREAM OF THE DRYER.

### Improper draining. The dryer may be flooded.

The dryer must be drained at least once for every 8 hours of operation.

Check the drain valve(s) and piping for clogs. Repair or replace faulty valves. If the piping is clogged, it must be cleared.

If the dryer is installed outdoors where ambient temperatures fall below freezing, the drain line and valve(s) may freeze. If ambient temperatures fall below freezing, the drain line can be wrapped with heat tracing and/or insulation to prevent freezing.

If maintaining the required draining schedule is a problem, an automatic ball type drain valve should be installed. Reference Section 2.2-E in this manual for installation instructions.

**IMPORTANT:** Never install a float type (other than Van Air model PDV-500) or solenoid type drain valve on this dryer.

**Bypass valve open or faulty.**

Check the dryer bypass valve. It might be faulty or open allowing untreated air to enter the air system.

**Low or no desiccant in the dryer.**

Check the dryer desiccant bed level. Reference Section 4.4 for filling quantities and procedures.

**3. DECREASED PERFORMANCE, low desiccant usage.**

**The desiccant bed may be contaminated.**

The dryer will tolerate normal amounts of compressor lubricant. If the compressor manufacturer's recommended lubrication rate is exceeded, the desiccant bed can become contaminated with compressor lubricants.

Periodically check the desiccant bed. If the tablets are discolored (deep yellow or brown), the bed may be contaminated.

If the bed has become contaminated, it can be flushed with an adequate supply of water. Depending upon the severity of contamination, it might be necessary to completely flush the entire bed from the dryer and replace it with new desiccant.

Check the compressor for proper operation. The compressor might be worn or over lubricated. Check the compressor operator's manual and correct.

Check the atmospheric air near the compressor air intake. Heavy concentrations of acid fumes or smoke and dust will cause contamination if they are drawn into the air system. Check or install a filter on the compressor intake.

If it is not possible to reduce the amount of lubricants in the air system, a separator and/or coalescing filter should be installed before the dryer.

If the check list in this section does not remedy the problem, consult your local VAN AIR distributor or call the VAN AIR factory.