VAN AIR SYSTEMS INC

# Technical Specifications

# Freedom Dryers 2 through 16,000 SCFM

## Main Features

Van Air Freedom compressed air dryers remove costly compressed air line moisture effectively and economically. Specially formulated Van Air absorbent desiccants enable the Freedom dryer to provide a self-adjusting pressure dew point that is automatically regulated by the inlet temperature to the dryer.

All Van Air Freedom dryers feature...

**Energy-Free, Environmentally Friendly Operation**

- No electricity is required for dryer operation.
- No refrigerants are needed. Dry-O-Lite® desiccant is non-toxic, non-polluting and adds no harmful acidity to the drain solution. Material Safety Data Sheets and independently conducted bioassay test results are available on request.

**Low Initial and Operating Costs**

- No electrical costs, low pressure drop (less than 1% of operating pressure), automatic desiccant usage regulation based on air flow and a low purchase price compared to other dryer types save money.

**Application and Installation Versatility**

- Ideal for a wide range of uses, the Freedom dryer protects against freeze-ups in the winter and liquid in the summer. It may be installed indoors or out and can be incorporated into stationary or portable compressed air systems. It is also suitable for dusty and hazardous locations.

**Call Us for Larger or Engineered-to-Order Models for Your Application**

## Operation

Wet compressed air enters the bottom of the dryer and flows upward through a bed of desiccant which absorbs moisture as it slowly dissolves. Condensate drops to the bottom to be drained. Dry air exits the top.

The Freedom dryer automatically provides a pressure dew point that is 20°F/11°C lower than the inlet temperature to the dryer. If the inlet air temperature to the dryer is 80°F/27°C, the dryer will provide a 60°F/15.5°C pressure dew point. If the inlet air temperature to the dryer is 30°F/-1.1°C, the dryer will provide a 10°F/-12.2°C pressure dew point.

## Standard Equipment

**Model D-2 (7 scfm)**

- Manual drain valve (1/4" NPT)
- Sight window (to check desiccant level)
- Epoxy interior coating
- PVC plastic bed support grid
- Epoxy exterior finish
- 10-year warranty

**Models D-4 and D-8 (10 & 50 scfm)**

- Manual drain valve (1/2" NPT)
- Sight window (to check desiccant level)
- Vessel fabricated to ASME Code, Section VIII, UM stamped & certified
- Epoxy interior coating
- Epoxy coated carbon steel bed support grid
- Primer & enamel exterior finish
- 10-year warranty

**Models D-12 through D-36 (75-850 scfm)**

- Manual drain valve (1" NPT)
- Sight windows (2 - to check desiccant level)
- Elliptical direct entry hatch cover
- Pressure relief coupling
- Vessel fabricated to ASME Code, Section VIII (models D-12 and D-16 UM stamped & certified, models D-20 through D-36 U stamped & certified)
- Epoxy interior coating
- Epoxy coated carbon steel bed support grid
- Primer & enamel exterior finish
- 10-year warranty

**Models D-42 through D-156 (1250-16,000 scfm)**

- Manual drain valve (1" NPT on D-42 through D-54, 2" NPT on D-60 through D 156)
- Sight windows (2 - to check desiccant level)
- Elliptical direct entry hatch cover
- Inspection coupling
- Pressure relief connection
- Vessel fabricated to ASME Code, Section VIII and U stamped & certified
- Epoxy and polyurethane interior coating
- ABS plastic bed support grid
- Primer & enamel exterior finish
- 10-year warranty

## Optional Equipment

**Model D-2 (7 scfm)**

- Pressure gauge kit

**Models D-4 and D-8 (10 & 50 scfm)**

- Pressure gauge kit
- Canadian Registration Number

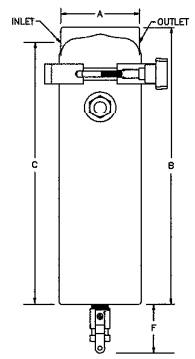
**Models D-12 through D-36 (75-850 scfm)**

- Pressure gauge
- Temperature gauge
- Temperature/pressure gauge
- High condensate level alarm (gauge coupling may be used for installation on models D-12 through D-20)
- Electric automatic ball valve drain
- Canadian Registration Number

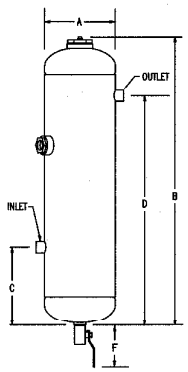
**Models D-42 through D-156 (1250-16,000 scfm)**

- Pressure gauge
- Temperature gauge
- Temperature/pressure gauge
- High condensate level alarm
- Electric automatic ball valve drain
- Canadian Registration Number

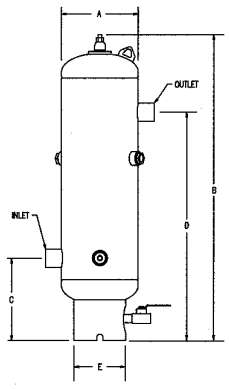
## Dimensions and Specifications



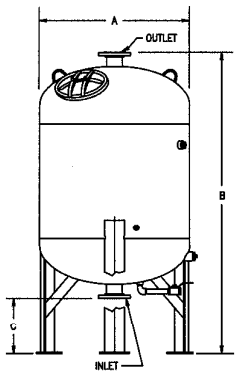

*D-2*




*D-4 through D-8*




*D-12 through D-36*




*D-42 through D-156*

| MODEL NO. | Rated Flow @ 100 psig (6.9 bar) SCFM | Nm³/hr | A in | A cm | B in | B cm | C in | C cm | D in | D cm | E in | E cm | F in | F cm | In/Out Conn. in | Filler Hatch Opening in | Vessel Weight lbs | Vessel Weight kg | Initial Fill* Dry-O-Lite lbs | Initial Fill* Dry-O-Lite kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D-2 | 7 | 11.3 | 3.5 | 9 | 12.5 | 32 | 11.8 | 30 | — | | — | | 1.2 | 3 | ½ NPT | Removable | 4 | 1.8 | 2 | 0.9 |
| D-4 | 10 | 16.1 | 4.5 | 11.5 | 28 | 71 | 7 | 18 | 22.5 | 57 | — | | 5.1 | 13 | ¾ NPT | 2 NPT | 30 | 14 | 6 | 2.7 |
| D-8 | 50 | 80 | 8.5 | 21.5 | 35 | 89 | 9.5 | 24 | 28 | 71 | — | | 5.1 | 13 | ¾ NPT | 2 NPT | 60 | 27 | 30 | 14 |
| D-12 | 100 | 161 | 13 | 33 | 51 | 130 | 14 | 36 | 38 | 97 | 8.5 | 22 | — | | 2 NPT | 4 x 3 | 130 | 59 | 130 | 59 |
| D-16 | 155 | 249 | 16 | 41 | 55 | 140 | 15.5 | 39 | 42 | 107 | 13 | 33 | — | | 2 NPT | 4 x 3 | 145 | 65 | 220 | 100 |
| D-20 | 250 | 402 | 20 | 51 | 56 | 142 | 16 | 41 | 43 | 109 | 16 | 41 | — | | 2 NPT | 4 x 6 | 210 | 95 | 360 | 163 |
| D-24 | 375 | 603 | 24 | 61 | 59 | 150 | 17 | 43 | 44 | 112 | 16 | 41 | — | | 2 NPT | 4 x 6 | 285 | 128 | 500 | 227 |
| D-30 | 625 | 1005 | 30 | 76 | 64 | 163 | 22 | 56 | 45 | 114 | 24 | 61 | — | | 3 NPT | 4 x 6 | 640 | 290 | 710 | 322 |
| D-36 | 850 | 1367 | 37 | 94 | 70 | 178 | 25 | 64 | 49 | 124 | 24 | 61 | — | | 3 FLG | 4 x 6 | 780 | 353 | 1130 | 513 |
| D-42 | 1250 | 2010 | 43 | 109 | 86 | 218 | 16 | 41 | — | | — | | — | | 4 FLG | 12 x 16 | 1275 | 580 | 1700 | 770 |
| D-48 | 1500 | 2412 | 49 | 124 | 91 | 231 | 18.5 | 47 | — | | — | | — | | 4 FLG | 12 x 16 | 2150 | 975 | 2300 | 1045 |
| D-54 | 2000 | 3215 | 55 | 140 | 94 | 239 | 18.5 | 47 | — | | — | | — | | 4 FLG | 12 x 16 | 2640 | 1195 | 2900 | 1315 |
| D-60 | 2500 | 4019 | 61 | 155 | 97 | 246 | 18.5 | 47 | — | | — | | — | | 4 FLG | 12 x 16 | 2700 | 1225 | 3600 | 1635 |
| D-66 | 3000 | 4823 | 67 | 170 | 100 | 254 | 18.5 | 47 | — | | — | | — | | 6 FLG | 12 x 16 | 3200 | 1450 | 4400 | 1995 |
| D-72 | 3500 | 5627 | 73 | 185 | 110 | 279 | 18.5 | 47 | — | | — | | — | | 6 FLG | 12 x 16 | 4075 | 1850 | 6300 | 2860 |
| D-78 | 4000 | 6431 | 79 | 201 | 115 | 292 | 21 | 53 | — | | — | | — | | 6 FLG | 12 x 16 | 4775 | 2165 | 7400 | 3355 |
| D-84 | 4500 | 7235 | 85 | 216 | 124 | 315 | 21 | 53 | — | | — | | — | | 6 FLG | 12 x 16 | 5700 | 2585 | 10000 | 4535 |
| D-90 | 5500 | 8842 | 91 | 231 | 127 | 323 | 21 | 53 | — | | — | | — | | 6 FLG | 12 x 16 | 7200 | 3265 | 11000 | 4990 |
| D-96 | 6000 | 9646 | 97 | 246 | 130 | 330 | 21 | 53 | — | | — | | — | | 6 FLG | 12 x 16 | 7800 | 3540 | 13000 | 5895 |
| D-102 | 7000 | 11254 | 103 | 262 | 137 | 348 | 25 | 64 | — | | — | | — | | 8 FLG | 12 x 16 | 9000 | 4080 | 14000 | 6350 |
| D-108 | 7500 | 12058 | 109 | 277 | 139 | 353 | 24 | 61 | — | | — | | — | | 8 FLG | 12 x 16 | 10300 | 4670 | 16000 | 7255 |
| D-114 | 8500 | 13665 | 115 | 292 | 142 | 361 | 24 | 61 | — | | — | | — | | 8 FLG | 12 x 16 | 12440 | 5645 | 18000 | 8165 |
| D-120 | 9500 | 15273 | 121 | 307 | 145 | 368 | 24 | 61 | — | | — | | — | | 8 FLG | 12 x 16 | 12900 | 5850 | 20000 | 9070 |
| D-126 | 10500 | 16881 | 127 | 323 | 148 | 376 | 24 | 61 | — | | — | | — | | 8 FLG | 12 x 16 | 15800 | 7165 | 22000 | 9980 |
| D-132 | 11500 | 18489 | 133 | 338 | 157 | 399 | 24 | 61 | — | | — | | — | | 8 FLG | 12 x 16 | 16700 | 7575 | 24000 | 10885 |
| D-138 | 12500 | 20096 | 140 | 356 | 155 | 394 | 24 | 61 | — | | — | | — | | 10 FLG | 12 x 16 | 17800 | 8075 | 27000 | 12245 |
| D-144 | 13500 | 21704 | 146 | 371 | 158 | 401 | 24 | 61 | — | | — | | — | | 10 FLG | 12 x 16 | 18900 | 8570 | 29000 | 13155 |
| D-156 | 16000 | 25723 | 158 | 401 | 168 | 427 | 28 | 71 | — | | — | | — | | 10 FLG | 12 x 16 | 21000 | 9525 | 34000 | 15420 |

*Price of dryer includes initial fill of Dry-O-Lite® desiccant. Additional Dry-O-Lite is sold in 50 lb. bags, 50 lb. pails, 506 lb. metal drums and 2000 lb. bulk bags.

**Due to our policy of continuous improvement, dimensions and specifications may change without notice. Request certified drawing for pre-piping. Contact factory for larger or special models.**

## Maximum Capacities - *scfm* ($Nm^3/hr$)

| MODEL NO. | 5 psig 0.3 bar | 10 psig 0.7 bar | 15 psig 1.0 bar | 25 psig 1.7 bar | 50 psig 3.4 bar | 75 psig 5.2 bar | 100 psig 6.9 bar | 125 psig 8.6 bar | 150 psig 10.3 bar | 175 psig 12.1 bar | 200 psig 13.8 bar | 250 psig 17.2 bar |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D-2 | **1.2** 1.9 | **1.5** 2.4 | **1.8** 2.9 | **2.4** 3.9 | **3.9** 6.3 | **5.5** 8.8 | **7** 11.3 | **8.5** 13.7 | **10.1** 16.2 | **11.6** 18.6 | **13.1** 21 | **16.2** 26 |
| D-4 | **1.7** 2.8 | **2.2** 3.5 | **2.6** 4.2 | **3.5** 5.6 | **5.6** 9.1 | **7.8** 12.6 | **10** 16.1 | **12.2** 19.6 | **14.4** 23.1 | **16.5** 27 | **19** 30 | **23** 37 |
| D-8 | **8.6** 14 | **11** 17 | **13** 21 | **17** 28 | **28** 45 | **39** 63 | **50** 80 | **61** 98 | **72** 115 | **83** 133 | **94** 150 | **115** 186 |
| D-12 | **17** 28 | **22** 35 | **26** 42 | **35** 56 | **56** 91 | **78** 126 | **100** 161 | **122** 196 | **144** 231 | **165** 266 | **187** 301 | **231** 371 |
| D-16 | **27** 43 | **33** 54 | **40** 65 | **54** 86 | **87** 141 | **121** 195 | **155** 249 | **189** 304 | **223** 358 | **256** 412 | **290** 466 | **358** 575 |
| D-20 | **43** 69 | **54** 87 | **65** 104 | **87** 139 | **141** 227 | **196** 314 | **250** 402 | **304** 490 | **359** 577 | **413** 665 | **468** 752 | — |
| D-24 | **64** 104 | **81** 130 | **97** 156 | **130** 209 | **212** 340 | **293** 471 | **375** 603 | **457** 734 | **538** 866 | **620** 997 | **702** 1129 | — |
| D-30 | **107** 173 | **135** 216 | **162** 260 | **216** 348 | **353** 567 | **489** 786 | **625** 1005 | **761** 1224 | **897** 1443 | **1034** 1662 | **1170** 1881 | — |
| D-36 | **146** 235 | **183** 294 | **220** 354 | **294** 473 | **479** 771 | **665** 1069 | **850** 1367 | **1035** 1664 | **1221** 1962 | **1406** 2260 | — | — |
| D-42 | **215** 345 | **269** 433 | **324** 520 | **433** 696 | **705** 1134 | **978** 1572 | **1250** 2010 | **1522** 2448 | **1795** 2886 | — | — | — |
| D-48 | **258** 414 | **323** 519 | **388** 624 | **519** 835 | **846** 1360 | **1173** 1886 | **1500** 2412 | **1827** 2937 | **2154** 3463 | — | — | — |
| D-54 | **344** 552 | **431** 692 | **518** 833 | **692** 1113 | **1128** 1814 | **1564** 2515 | **2000** 3215 | **2436** 3916 | **2872** 4617 | — | — | — |
| D-60 | **429** 690 | **538** 866 | **647** 1041 | **865** 1391 | **1410** 2267 | **1955** 3143 | **2500** 4019 | **3045** 4895 | — | — | — | — |
| D-66 | **515** 828 | **646** 1039 | **777** 1249 | **1038** 1669 | **1692** 2721 | **2346** 3772 | **3000** 4823 | **3654** 5874 | — | — | — | — |
| D-72 | **601** 966 | **754** 1212 | **906** 1457 | **1211** 1948 | **1974** 3174 | **2737** 4401 | **3500** 5627 | **4263** 6853 | — | — | — | — |
| D-78 | **687** 1105 | **861** 1385 | **1036** 1665 | **1384** 2226 | **2256** 3627 | **3128** 5029 | **4000** 6431 | **4872** 7832 | — | — | — | — |
| D-84 | **773** 1243 | **969** 1558 | **1165** 1873 | **1558** 2504 | **2538** 4081 | **3519** 5658 | **4500** 7235 | **5481** 8812 | — | — | — | — |
| D-90 | **945** 1519 | **1184** 1904 | **1424** 2290 | **1904** 3061 | **3102** 4988 | **4301** 6915 | **5500** 8842 | **6699** 10770 | — | — | — | — |
| D-96 | **1031** 1657 | **1292** 2077 | **1554** 2498 | **2077** 3339 | **3384** 5441 | **4692** 7544 | **6000** 9646 | **7308** 11749 | — | — | — | — |
| D-102 | **1202** 1933 | **1507** 2423 | **1813** 2914 | **2423** 3895 | **3949** 6348 | **5474** 8801 | **7000** 11254 | **8526** 13707 | — | — | — | — |
| D-108 | **1288** 2071 | **1615** 2597 | **1942** 3122 | **2596** 4173 | **4231** 6802 | **5865** 9430 | **7500** 12058 | **9135** 14686 | — | — | — | — |
| D-114 | **1460** 2347 | **1830** 2943 | **2201** 3538 | **2942** 4730 | **4795** 7708 | **6647** 10687 | **8500** 13665 | **10353** 16644 | — | — | — | — |
| D-120 | **1632** 2623 | **2046** 3289 | **2460** 3955 | **3288** 5286 | **5359** 8615 | **7429** 11944 | **9500** 15273 | **11571** 18602 | — | — | — | — |
| D-126 | **1803** 2899 | **2261** 3635 | **2719** 4371 | **3634** 5843 | **5923** 9522 | **8211** 13202 | **10500** 16881 | **12789** 20560 | — | — | — | — |
| D-132 | **1975** 3175 | **2476** 3981 | **2978** 4787 | **3980** 6399 | **6487** 10429 | **8993** 14459 | **11500** 18489 | **14007** 22518 | — | — | — | — |
| D-138 | **2147** 3452 | **2692** 4328 | **3237** 5204 | **4327** 6956 | **7051** 11336 | **9776** 15716 | **12500** 20096 | **15224** 24476 | — | — | — | — |
| D-144 | **2319** 3728 | **2907** 4674 | **3496** 5620 | **4673** 7512 | **7615** 12243 | **10558** 16973 | **13500** 21704 | **16442** 26435 | — | — | — | — |
| D-156 | **2748** 4418 | **3446** 5539 | **4143** 6661 | **5538** 8903 | **9025** 14510 | **12513** 20117 | **16000** 25723 | **19487** 31330 | — | — | — | — |

**MWP: D-2 = 300 psig, D-4 through D-16 = 250 psig, D-20 through D-30 = 200 psig, D-36 = 175 psig, D-42 through D-54 = 150 psig, D-60 and larger = 125 psig. Higher pressures available on request.**

## *Sizing Instructions*

1. Determine the highest anticipated flow (peak load volume of the compressor). If this must be estimated, use a ratio of 4 to 5 scfm per compressor horsepower.
2. Determine the minimum operating pressure.
3. On the chart above, locate the column for the minimum operating pressure and read down to the capacity that meets or exceeds the scfm requirement; then find the corresponding dryer model in the left column.
   Example: For an installation that will operate at 125 psig and handle a flow of 3000 scfm, select model D-60.

## Dry-O-Lite® Desiccant

Non-toxic and non-polluting Dry-O-Lite® desiccant dissolves slowly, making it a long-lasting desiccant that keeps operating costs low. With most single-shift operations, desiccant only needs to be added to the dryer a couple of times per year.

Formed of hygroscopic materials compacted into tablets under high pressure, Dry-O-Lite creates a structured bed within the dryer that, unlike some competitive desiccants, will not crush under its own weight.

Each tablet maintains a definite shape. Minimal contact points expose almost all surface areas and air flows freely around the tablets for greatest efficiency and low pressure drop.

Tablets continue to absorb moisture until they are completely consumed and Dry-O-Lite adds no harmful acidity to the solution, unlike some competitive formulations.

Packaged in 50 lb. (23 kg) multiple-layered heat sealed bags or plastic resealable pails, Dry-O-Lite has an unlimited shelf life. It is also available in 506 lb. metal drums and 2000 lb. bulk bags with pour spouts for easy filling of larger dryers.

Material Safety Data Sheets and independently conducted bioassay test results are available on request.

Other desiccants with enhanced dew point performance are also available.

**Desiccant Usage**

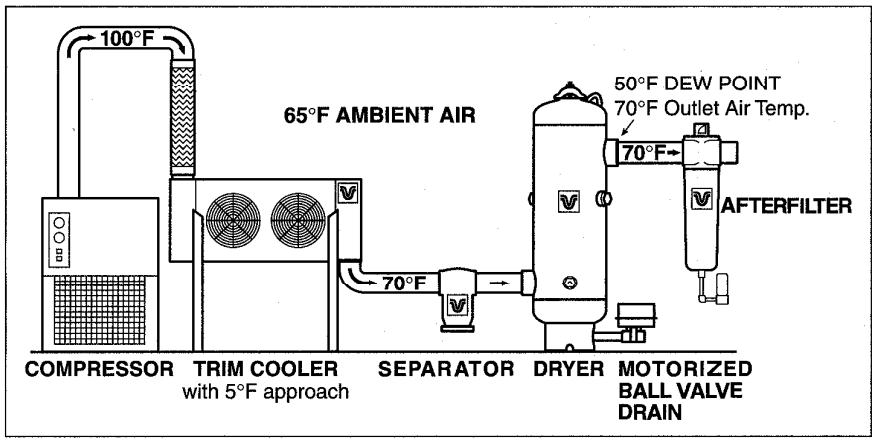
- Automatically adjusts to system demand
- Proportional to moisture loading
- Each 20°F change in inlet temperature to the dryer changes moisture loading by a factor of nearly 2:1. (Inlet temperature to the dryer is affected by the trim cooler - see Typical System Installation below.)

**Usage Example:**

Based on 2000 hrs. (1 shift for 1 year) @100 psig and a 75°F average inlet temperature to the dryer:

| Flow (scfm) | Desiccant Usage (lbs./yr.) |
|---|---|
| 10 | 13 |
| 50 | 65 |
| 100 | 130 |
| 500 | 650 |
| 1000 | 1300 |

## Typical System Installation




For greatest operating efficiency, locate the dryer at the **highest practical pressure** (which does not exceed the maximum working pressure of the dryer) and the **lowest possible temperature.** More air can be processed through the dryer at higher pressures and less desiccant will be consumed at lower temperatures. Choose the indoor or outdoor location which provides the coolest ambient temperature. Inlet temperatures above 100°F are not recommended. A Van Air **trim cooler** may be needed to provide additional cooling.

Installation requires air inlet and outlet connections, bypass piping with three valves and provision for drain solution disposal. A **motorized ball valve-type drain** is recommended and is available from Van Air.

If large quantities of compressor lubricant are present in the system, a **coalescing prefilter** is recommended to protect the desiccant bed. A **filter downstream** of the dryer will prevent desiccant dust from reaching equipment. For your convenience, both are also offered by Van Air.

A **high level alarm** is also available to sense high condensate levels within the dryer.

Refer to the Installation, Operation and Maintenance manual for specific instructions on your dryer model.

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