

# Energy Saving Refrigerated Air Dryers

DES SERIES 90 to 675 scfm (153 to 1148 nm<sup>3</sup>/h)



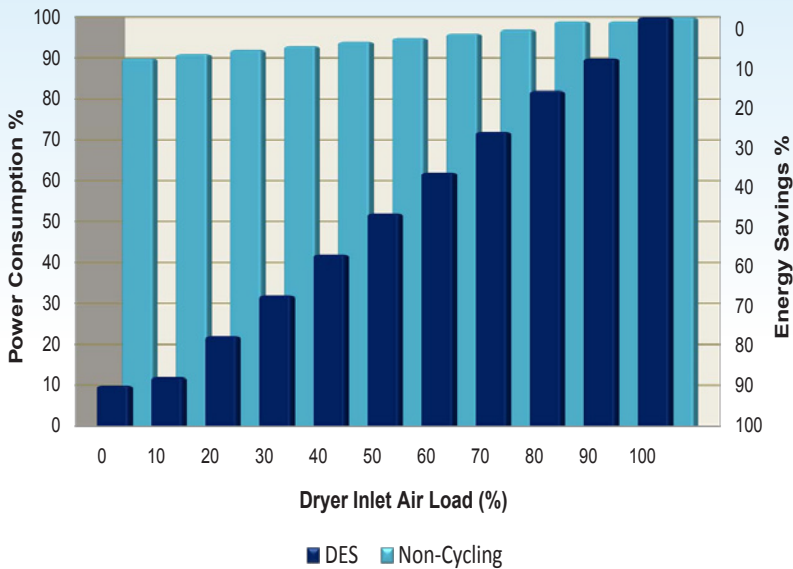
## Load Matching Profile for Sustainable Energy Savings



Energy costs continue to escalate globally, having a negative impact on plant profitability and production costs. Sustainability initiatives in plant operations must be implemented to maintain a competitive advantage.

The DES Series Refrigerated Compressed Air Dryers are the ideal solution. By matching power consumption to compressed air demand power costs are lowered and productivity is improved.

The graph provides a baseline comparison of power consumed between non-cycling dryers and the DES Series.



Non-cycling dryers operate with the refrigeration compressor running continuously, regardless of inlet load conditions. Minimal energy savings are realized from 100% down to 0% inlet air load.

DES Series dryers automatically cycle (on/off) the refrigeration compressor in response to inlet load conditions. As the inlet air load is reduced, the power requirement to dry the air is matched in proportion to the demand.

For example, at 60% inlet air load, a non-cycling dryer consumes 96% of the full load power consumption, a 4% energy savings. By comparison, at 60% inlet air load, a DES Series dryer consumes 62 % of the full load power consumption, a 38% energy savings.

The load matching design reduces power costs and saves energy. The example to the left provides annual DES energy savings with respect to non-cycling designs.

### Example:

- Air Dryer: Model DES540 rated for 540 scfm (917 nm<sup>3</sup>/h) at ISO 7183 (Option A2) conditions
- Operating Time: 8,000 hours
- Cost Of Power: \$0.10/kWh
- Average Inlet Air Load: 60%
- Annual Energy Savings: \$946



# Delivers ISO 8573.1 Quality Class Air

The International Organization for Standardization (ISO) identified three forms of contamination as common in compressed air systems - solid particles, water and oil. ISO Standard 8753.1: 2009 categorized each contaminant and assigned a quality class, ranging from Class 0, the highest purity level, to Class 9, the most relaxed.

The DES Series effectively removes all three contaminant forms in a single air treatment system.

## Innovation at Work

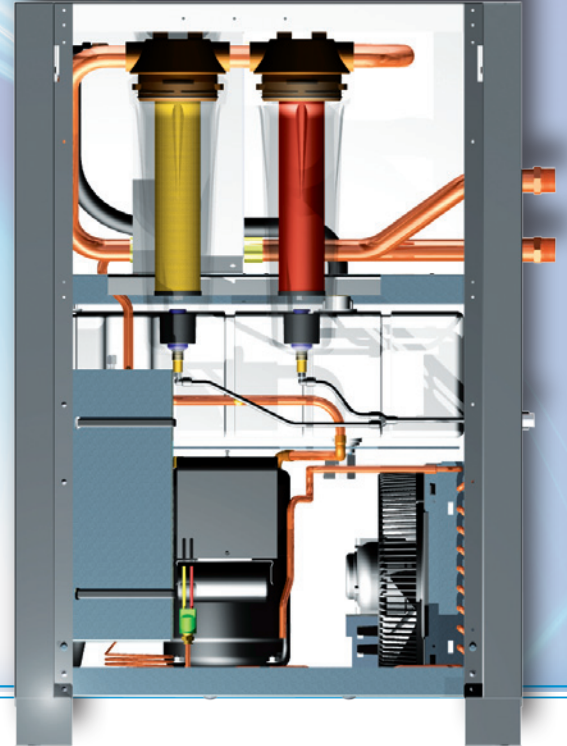
### The standard dryer is equipped with a Grade D filter/separator-

- ISO Quality Class 3: Solid particle removal
- ISO Quality Class 5: Pressure dew point
- ISO Quality Class 5: Remaining oil concentration

### Optional PYRAMID™ Grade Filtration-

- ISO Quality Class 1: Solid particle removal
- ISO Quality Class 1: Remaining oil concentration
- ISO Quality Class 5: Pressure dew point

The annual purchase of a maintenance kit provides a lifetime of ISO Quality Class Air.



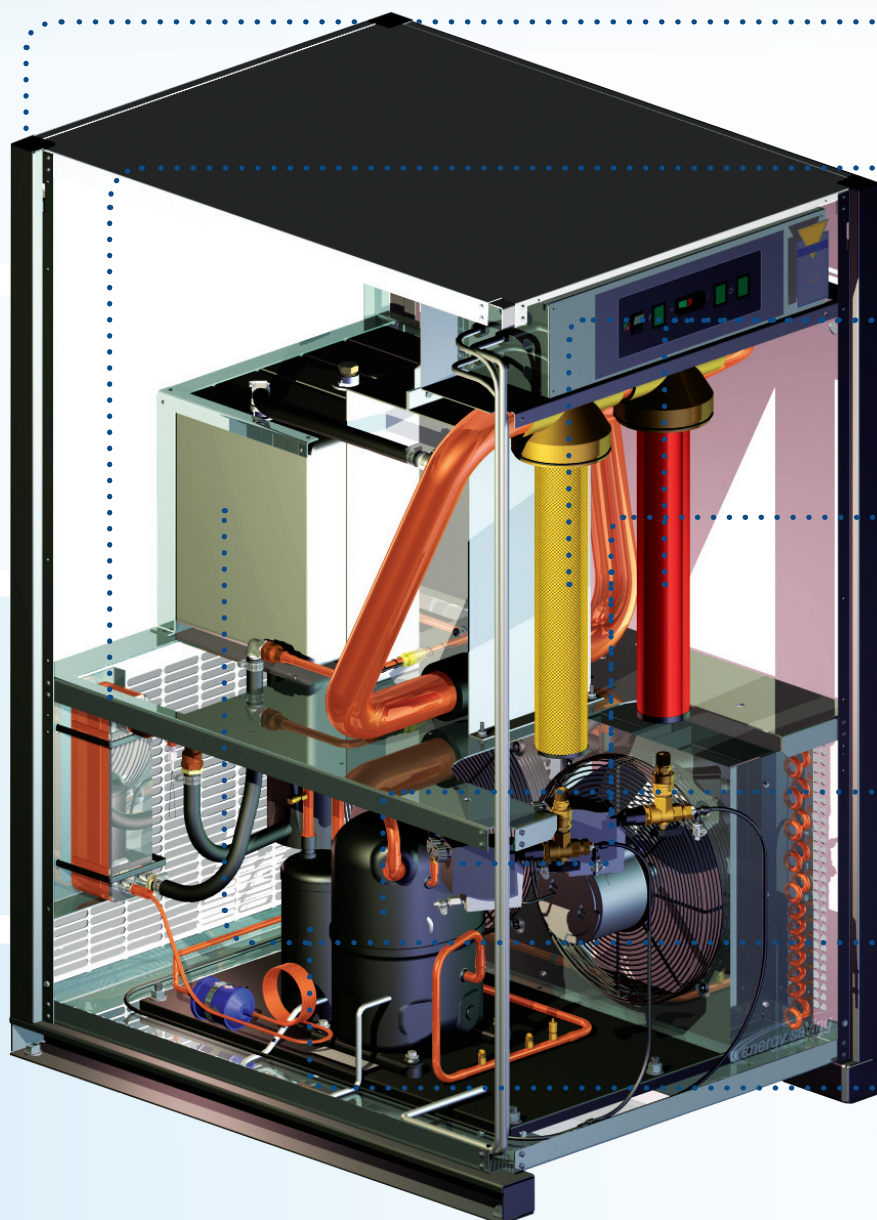
## ISO 8573.1 Quality Classes

To best define your air quality requirements for specific applications, please refer to the table below.

Air Quality Classes ISO 8573.1	Solid Particles			Humidity and Water		Oil	
	Maximum number of particles per m <sup>3</sup>			Maximum Pressure Dew Point		Maximum Concentration, Aerosol, Liquid and Vapor	
	Particle size (d), $\mu\text{m}$						
	0.10 < d ≤ 0.5	0.5 < d ≤ 1.0	1.0 < d ≤ 5.0	°C	°F	mg / m <sup>3</sup>	ppm w/w
0	As specified by the equipment user or supplier and more stringent than class 1						
1	≤ 20,000	≤ 400	≤ 10	≤ -70	≤ -94	≤ 0.01	≤ 0.008
2	≤ 400,000	≤ 6,000	≤ 100	≤ -40	≤ -40	≤ 0.1	≤ 0.08
3	-	≤ 90,000	≤ 1,000	≤ -20	≤ -4	≤ 1	≤ 0.8
4	-	-	≤ 10,000	≤ +3	≤ +37	≤ 5	≤ 4
5	-	-	≤ 100,000	≤ +7	≤ +45		
	Mass Concentration						
	C <sub>p</sub> (mg/m <sup>3</sup> )						
6	0 < C <sub>p</sub> ≤ 5			≤ +10	≤ +50		
				Liquid Water Content, C <sub>w</sub> g/m <sup>3</sup>			
7	5 < C <sub>p</sub> ≤ 10			C <sub>w</sub> ≤ 0.5			
8				0.5 < C <sub>w</sub> ≤ 5			
9				5 < C <sub>w</sub> ≤ 10			
X	C <sub>p</sub> > 10			C <sub>w</sub> > 10		> 5	> 4

\* Not Specified  
Per ISO 8573.1: 2009

## Rebate Ready Energy Saving Design



### **Optimized Cabinet Design**

- Promotes ease of access from all four sides
- Certified to CSA C22.2 No. 236-05 / UL 1995

### **Stainless Steel Brazed Plate Heat Exchangers**

- Compact, thermally efficient
- Ensures delivery of an ISO 8573.1: 2009 Air Quality Class 5 pressure dew point

### **Integral Filtration**

- Standard Filter/Separator removes solids down to 3.0 microns and oil aerosols to 5.0 mg/m<sup>3</sup>
- Optional PYRAMID™ Grade Filtration captures solids to 0.01 microns and oil aerosols to < 0.01 mg/m<sup>3</sup>

### **No Air Loss Condensate Drains**

*\*Standard on all models*

- Mechanical float drain are standard on models 90-140 scfm (153-238 nm<sup>3</sup>/h)
- Electric demand drain are standard on models 190-675 scfm (323-1148 nm<sup>3</sup>/h)

### **Hermetically Sealed Refrigerant Compressor**

- Environmentally friendly R-134a refrigerant
- High reliability, long service life

### **Rugged Glycol Reservoir**

- Stores food-grade propylene glycol cooling media
- Leak-free, rotational molded construction

### **Reliable Thermal Media Circulation Pump**

- Continuously moves cooling medium through the dryer
- Cartridge design promotes reliability and ease of service

### **DES Series Options:**

- Advanced Electronic Controls emm+™ (models 190 to 675 scfm)
- Optional upgrade to a PYRAMID™ Refrigerated Drying system.
- NEMA 4 electrics (models 190 to 675 scfm)
- Water-cooled condensing unit (models 190 to 675 scfm)
- Low ambient protection
- 3 valve block and by-pass
- Four gauge package (panel mounted)

# DES Series Operation

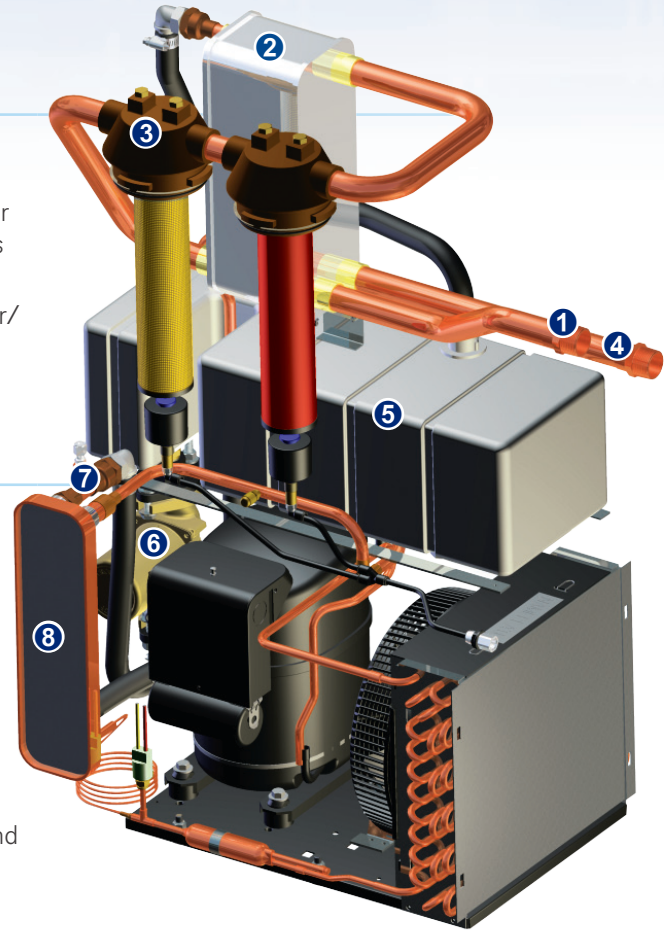
## Stages of Operation

### The Drying Process-Compressed Air Circuit

- ❶ Warm, saturated compressed air enters the dryer through the inlet pipe connection.
- ❷ Air travels through the air-to-air heat exchanger and the glycol-to-air heat exchanger. Propylene glycol surrounds the passages and cools the air to the desired pressure dew point.
- ❸ Moisture, solid particulates and oil aerosols are removed by the filter/separator. A no-air-loss condensate drain discharges contaminants from the system.
- ❹ Dry, filtered air exits the dryer for use.

### The Cooling Process-Glycol Circuit

- ❺ Glycol exits the air-to-glycol heat exchanger and then enters the glycol storage tank.
- ❻ A circulation pump continuously moves the thermal medium throughout the circuit.
- ❼ A thermal sensor monitors the glycol temperature and turns the refrigeration compressor off whenever the glycol is cooled to its lowest temperature. The cooling medium continues to dry the air. After the medium warms up, the thermal sensor restarts the refrigeration compressor.
- ❽ The glycol-to-refrigerant heat exchanger chills the thermal media and travels back to the air-to-glycol heat exchanger.

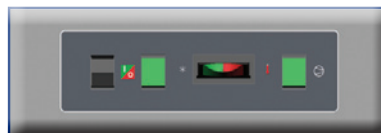


## TWO LEVELS OF CONTROLS

### Standard Level I (DES90-DES675)

Easy to monitor controls provide dryer status

- Dryer on/off switch
- Dryer on light
- Thermal medium temperature
- Dryer energized (DES190-DES675)
- Compressor on light



Standard Level I (DES90-DES140)



Standard Level I (DES190-DES675)

### Optional Level II (DES190-DES675)

DES Series emm+™ microprocessor controller

- Operator Interface Displays:
  - Date/time/operating status
  - Hours to service
  - Total compressor operating time
- Energy Savings Interface:
  - Daily average load
  - Monthly average load
  - Annualized energy savings in Dollars or Euros
  - Scheduler mode for automatic start/stop operation



Optional Level II (DES190-DES675)

## Customer Support Solutions

### “Peace of Mind”

As an extra measure of protection, Deltech provides an extended warranty beyond the standard 2 year coverage.

Purchase a maintenance kit on an annual basis and receive an additional 3 years of protection, parts and labor.


All major components are covered.

### Register on-line

Receive automatic email reminders that it's time to service your product

Register on-line at [www.deltech-spx.com](http://www.deltech-spx.com)  
*click dryer registration*




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### Product Registration


Please complete the form below to register your product. Please make sure the information provided is accurate.


\* = required field

Purchased Product Type: \* ☐ Refrigerated Air Dryer ☐ Desiccant Air Dryer ☐ Filtration Product

Product Serial Number: \*

Product Model: \*

Date Purchased: \*  

Date of Start-Up: \*  

Contact Name: \*


Contact Job Title: \*

Company Name: \*


Address Line 1: \*

Address Line 2:

City: \*


State / Province: \*  

Zip / Postal Code: \*

Country: \*  

Phone Number: \*


Email Address: \*

Industry: \*  

Please provide information on where you purchased your product from:

Business Name: \*

City: \*

State / Province: \*  

Zip / Postal Code:

### Extended Warranty Program rogram

**Refrigerated Air Dryers**  
HYDROGUARD® HGD and DES Series  
with optional PYRAMID Grade filtration  
To qualify for the extended 3 year warranty, total of 5 years of parts and labor coverage, the end users must:

- Purchase a yearly maintenance kit with the initial purchase of the refrigerated air dryer and,
- Register the product on the manufacturer's website or submit the warranty registration card shipped with the equipment...

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**Desiccant Air Dryers**  
HCS, HCL & HCT Series  
To qualify for the extended 4 year warranty, total 5 years parts and labor, the end user must:

- Purchase a factory mounted or stand-alone filter package with the initial purchase of the desiccant air dryer and,
- Register the product on the manufacturer's website or submit the warranty registration card shipped with the equipment...

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# DES 90-675 Series Specifications

Model	Rated Flow <sup>1</sup>		Voltages	Power	In/Out Connection <sup>2</sup>	Dimensions						Weight		Std $\Delta p^3$ Grade D		Opt $\Delta p^4$ Grade B	
	scfm	nm <sup>3</sup> /h				H		W		D		lbs	kg	psig	bar	psig	bar
DES90	90	153	100/1/50 115/1/60 208-230/1/60 220-240/1/50	0.95	1.0"	38	965	27	686	20	508	241	109	2.9	0.2	4.1	0.3
DES120	120	204		1.28	1.0"	38	965	27	686	20	508	258	117	3.7	0.3	5.0	0.3
DES140	140	238		1.29	1.0"	38	965	27	686	20	508	263	119	4.1	0.3	5.5	0.4
DES190	190	323		1.36	1.5"	39	991	34	864	32	813	408	185	3.3	0.2	4.6	0.3
DES240	240	408	208-230/3/60 380-420/3/50 460/3/60 575/3/60	1.94	1.5"	39	991	34	864	32	813	478	217	4.4	0.3	5.7	0.4
DES280	280	476		1.95	1.5"	46	1168	35	889	32	813	497	225	4.4	0.3	5.7	0.4
DES360	360	612		2.07	2.0"	46	1168	35	889	32	813	540	244	3.0	0.2	4.1	0.3
DES450	450	765		2.49	2.5"	58	1473	35	889	42	1067	708	321	3.6	0.2	4.9	0.3
DES540	540	918		3.08	2.5"	58	1473	35	889	42	1067	793	360	3.7	0.3	5.3	0.4
DES675	675	1148		4.35	2.5"	58	1473	35	889	42	1067	844	382	4.3	0.3	6.6	0.5

<sup>1</sup> Rated Flow Capacity - Conditions for rating dryers are in accordance with ISO 7183 (option A2) working conditions: inlet air temperature 100°F (38°C), inlet air pressure 100 psig (6.9 bar), ambient air temperature 100°F (38°C), 100% saturated air, operating on 60 Hz power supply.

<sup>2</sup> BSP Connections available

<sup>3</sup> Pressure drop inclusive of integral filtration

<sup>4</sup> Cumulative pressure drop includes Grade B and Grade E filter/separator elements

## Technical Specifications

Flow Model		Max. Working Pressure (Float Drain)		Max. Working Pressure (Electric Drain)		Min. Working Pressure		Max. Inlet Air Temperature		Min. Inlet Air Temperature		Max. Ambient Air Temperature		Min. Ambient Air Temperature	
scfm	nm <sup>3</sup> /h	psig	bar	psig	bar	psig	bar	°F	°C	°F	°C	°F	°C	°F	°C
90 - 140	153 - 238	250	17.2	-	-	30	2.1	130	54	40	4	110	43	40	4
190 - 675	323 - 1148	-	-	232	16.0	30	2.1	130	54	40	4	110	43	40	4

**Table 1 - Capacity Correction Factors**

Inlet Pressure		Inlet Temperature					
psig	bar	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C
30	2.1	1.24	0.92	0.71	0.56	0.44	0.35
50	3.4	1.40	1.07	0.83	0.66	0.54	0.44
80	5.6	1.55	1.19	0.95	0.77	0.63	0.52
100	6.9	1.61	1.25	1.00	0.82	0.68	0.56
125	8.6	1.67	1.30	1.05	0.86	0.72	0.61
150	10.3	1.71	1.34	1.08	0.90	0.75	0.64
175	12.1	1.75	1.37	1.11	0.92	0.78	0.66
200	13.8	1.77	1.39	1.14	0.95	0.80	0.68
250	17.2	1.81	1.43	1.17	0.98	0.83	0.72

**Table 2 - Correction Factors for Ambient Temperature \***

Ambient Temperature	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C
Multiplier	1.12	1.06	1.00	0.94

\* Air-cooled models only.

For water-cooled use a 1.15 multiplier if cooling water is less than 95°F (35°C).

## DES Series

90 to 675 scfm

(153 to 1148 nm<sup>3</sup>/h)



## Global locations

### USA

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ISSUED 06/2012 DES 90-675

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