Drying & Filtration Solution

EverAir
Drying & Filtration Solutions

Saving . Purification . German Quality

You need the Clean Compressed Dry Air

No more problems as equipment corrosion, product defects, line freeze-ups caused by solids, liquids, vapors or gases ever appear anymore. Clean compressed dry air means energy saving, productivity, long-lasting tools and reduced system maintenance. These issues are the utter priority when you mean clean compressed dry air.

The solution to solve these problems would be high quality and energy efficient air and gas purification systems.

Objects present in the atmosphere surrounding an air compressor enter the compressor, entrained and concentrated gradually in the process air. These contaminants are present in different phases, They can be water/oil in liquid form, hydrocarbons vapors or gaseous carbon dioxide/hydrogen chloride/sulfur dioxide In liquids, and even solids like sand, dust and soot. Usually the filter alone is not sufficient to remove the water vapor, which is produced in the rate approximately 20 to 30 liters per 1,000m^3 of compressed air. Seriously damage of process equipments and/or degradation of the final products would result through corrosion/erosion, freeze-ups, ubiological growth and product spoilage if such contaminants are NOT REMOVED.

EverAir Technology GmbH provides you reliable total solution to these problems efficiently and economically. Our systems are tailored to your production requirements.

Air Quality

The International Stands Organization (ISO) has established the following air quality classifications relating to maximum size and concentration of particles, maximum pressure dew point and maximum oil content.

ISO 8573.1 Air Quality Classes

Class	Particles		Max. PDP °C	Max. Oil Content (mg/m^3)
	Max. Size (microns)	Max. Concentration (mg/m^3)		
1	0.1	0.1	-70	0.01
2	1	1	-40	0.1
3	5	5	-20	1
4	15	8	3	5
5	40	10	7	25

Zero Purge Lose Heat Regenerated Adsorption Compressed Air Dryer – EverAir Dryer

The outstanding feature of the EverAir heated blower purge dryer utilize atmospheric air for regeneration of the desiccant bed. No process air is used during this phase of the overall dryer cycle. The complete drying system operates fully automatically and continuously. The EverAir dryer can help you to achieve the operating cost saving up to 40% when delivery the ISO 8573.1 class 1, -70°C pressure dew point compressed dry air.

The heat-regenerated purification system consists of two vessels operating in parallel and connected together, to be cycled alternatively as adsorption and regenerating chambers.

To ensure continuous operation while one vessel is adsorbing the water vapour from the incoming air, the other vessel is regenerated. The regeneration takes place by using an externally mounted blower and an electric heater.

The operation of adsorption and regeneration takes place simultaneously, without interruption of the process.

Regeneration is conducted by a blower inhaling ambient air which is heated up to the required temperature and led through the vessel.

Flowing through the vessel from top to bottom the heated air desorbs water from the desiccant and leads it via the regeneration exhaust to the atmosphere.

The temperature at the regeneration outlet increases when the adsorbed water is totally evaporated.

The regeneration cycle is finished when the necessary desorption temperature is reached. Cooling takes place directly after desorption, using the closed loop (with an air/fresh water-heat exchanger) to avoid preloading of

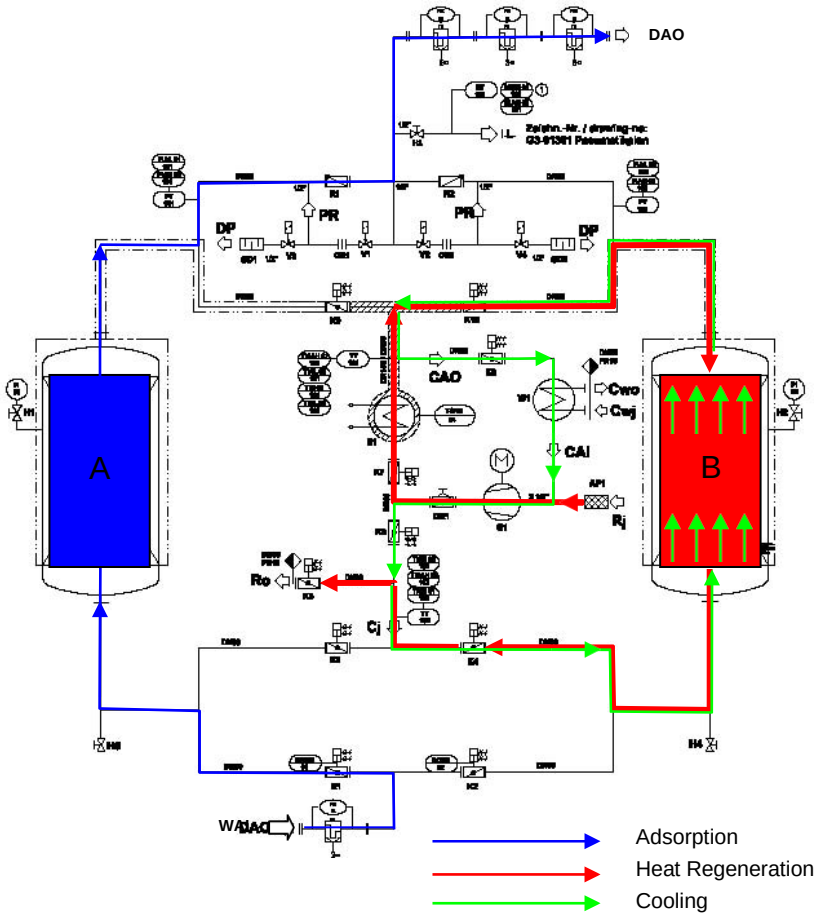
the desiccant by ambient air. The heaters are now switched off.

After finishing cooling the freshly regenerated vessel rests in stand-by until change over is initiated by the control.

The Principle of EverAir Dryer

Adsorption from Bottom to Top

Incoming air flows to the dryer inlet via the inlet valve installed at the bottom, it then passes into the adsorber vessel via the stainless steel inlet gas distributor. The air is diffused homogenously across the desiccant bed, utilising all the adsorption material. During the adsorption process water vapour is attracted to the surface of the hydroscopic desiccant. The wet air is dried to the required dew point as it passes through the desiccant bed from bottom to top. The purified air then flows via the stainless steel diffuser screen, to the outlet valve.



Desorption from Top to Bottom

Air is taken in by a blower and heated up to the necessary regeneration temperature by an electrical heater. The temperature is set by thermostats. The heated air is led via the upper valve and a gas diffuser into the vessel which is to be regenerated.

The air is diffused homogenously and vaporises the water from the desiccant. Via the lower gas diffuser and the outlet valve the saturated air is led to the atmosphere.

Vaporising the water, the heated air is cooled down. Thus, the temperature of the humid exhaust air isn't higher than the temperature of vaporisation.

When desorption is accomplished and the humidity is removed, temperature will rise at the regeneration outlet. At the regeneration outlet a temperature switch ends desorption phase as soon as a preset temperature value is attained.

Cooling from Bottom to Top

To avoid preloading of the regenerated adsorber by ambient air cooling takes place in a closed circuit.
Air, conveyed by the blower, takes up the heat from the desiccant, the vessels and pipes and is led into the cooler, where it is cooled down before it is sucked again by the blower.
As soon as a preset temperature value is attained, cooling is finished by a thermostate.

Change Over

The reliability of the change over is based on a control system supported by a PLC.
The change over consists of following steps:

a. Pressure equalization between vessel A and B by closing regeneration outlet valve (Vessel B).
b. Opening of adsorption outlet valves (vessel B).
c. 10 minutes parallel running with both vessels in adsorption.
d. Closing of adsorption in and outlet valves (vessel A).
e. Opening of regeneration outlet valves (vessel A).
f. Regeneration takes place in vessel A

Major Components

Desiccant

Beaded activated alumina, Molecular Sieve or Silica Gel are used as the adsorption media in different purposes heated desiccant dryers. The beads exhibit a very high internal surface area and high moisture separation efficiency. Each lot of desiccant is thoroughly tested for density, moisture content, abrasion resistance, surface area, mesh size and granule strength to assure that it meets our strict design requirements.

Control Valves

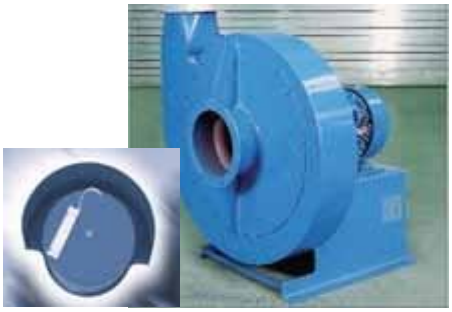
Dryer operation is controlled by a combination of butterfly, check and globe valves, providing optimum control and maximum reliability at minimum cost. Butterfly valves are used at the dryer inlet, purge exhaust outlet and main pipes. These valves are designed with a unique continuous annular raised land on the disc that provides a sure seal around the valve stem.

In addition, the butterfly valves offer the following features:

- High flow stainless steel disc design minimizes obstruction in flow path
- Double o-ring seal at valve stem
- Bronze stem bearings to eliminate stem seizures, provide reliable load support and minimize torque
- Hard-backed cartridge seat providing superior disc sealing integrity and easier replacement due to slip-fit into valve body; also eliminates high torque and premature failure caused by elastomer distortion found in other seat designs.
- Integral flange seal eliminates need for gaskets or o-rings.
- Position indicators.
- Double acting worm-driven actuators.

Blower

A direct drive radial blade centrifugal blower is used to provide ambient air for thermal regeneration of the off-stream bed. The blower wheel is constructed of heavy gauge high strength steel to assure long life and efficient operation. Wheels are dynamically balanced for smooth operation and the shaft is sealed with a Teflon seal. The blower/motor assembly is factory tested to assure vibration free levels.



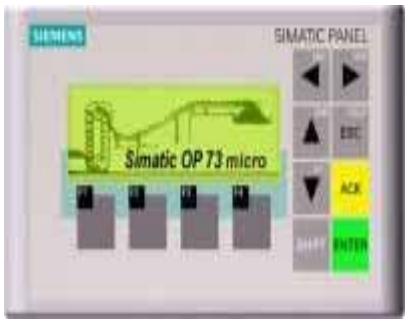
Electrical Heater

Ambient air from the centrifugal blower is directed through an electric resistance heater to elevate the temperature to 200°C for regeneration of the off-stream bed. Heaters are designed with a low watt density for low surface temperatures and long element life. The heating elements are contained within stainless steel tubes which are themselves protected with direct-contact type “K” thermocouples.

Electrical Controls

The entire drying/regeneration cycle is controlled by a Siemens SIMATIC PLC, among the most reliable controllers available. The PLC is supplied with a Siemens micro display panel which, among other items, will provide the operator with the following information:

- Indicate alarm when a system fault is detected and identify the specific fault.
- Indicate current status of each vessel (drying, regenerating or in standby)
- Indicate time remaining of each phase of the cycle



The PLC has equiped with RS485 port with std protocal communication capability. The HMI with PI control system is also available as optional.

Energy Management System

The energy management system was a standard built in feature of EverAir dryer. When operating at partial capacity. The energy management control is monitoring the outlet dew point of the process air to determine whether or not regeneration should be initiated. The drying stage will be extended until the dew point rises above given set point. Only then will switchover to the standby vessel occur and the regeneration cycle begin.

EverAir Series Heater/Blower Adsorption Dryer

Model	Flow Nm³/h	In / Outlet	Dimension（mm）				Weight(kg)	
			Length	Width		Height	XL (0% Purge)	XP (2%Purge)
				XL	XP			
660	660	DN50	2400	1150	1150	2300	1200	1200
950	950	DN50	2400	1150	1150	2300	1200	1200
1200	1200	DN80	2400	1450	1450	2650	1800	1600
1500	1500	DN80	2400	1450	1450	2650	1900	1700
2000	2000	DN80	2400	1450	1450	2650	2100	1850
2500	2500	DN100	3196	1835	1826	2906	3000	2500
3000	3000	DN100	3196	1835	1826	2906	3100	2600
3500	3500	DN100	3196	1835	1826	2906	3300	2700
4000	4000	DN100	3196	1835	1826	2906	3400	2900
4500	4500	DN100	3196	1835	1826	2906	3550	3100
5000	5000	DN125	3250	1868	1870	3000	4300	4200
6000	6000	DN125	3250	1868	1870	3000	5600	4800
7000	7000	DN150	4000	2500	2206	3200	6000	5300
8000	8000	DN150	4000	2500	2206	3200	6400	5700
9500	9500	DN150	4000	2500	2206	3200	6800	6200
11000	11000	DN150	4000	2500	2206	3200	7400	6700

Flow base on 0℃,1atm - Normal Condition,Inlet：7kg/cm²，30℃。

Technical Data

Compressed Air Filter EverClean

Carbon Steel Filterhousing with flange connection and bottom hinged flange

Type EC	Volume Flow (V_{nom})		Connections	Dimensions (mm)				Weight	Filter
	m³/h	cfm	PN 16 DIN 2633	A	B	C	D	Kg	Q'ty
0950	1000	590	DN 50	290	575	775	450	30	1
0150	1500	883	DN 80	340	700	1160	450	42	1
0200	2000	1177	DN 80	430	800	1050	600	90	2
0300	3000	1765	DN 100	430	800	1050	600	120	2
0400	4000	2353	DN 100	600	1050	1020	850	145	3
0500	5000	3059	DN 100	600	1050	1250	850	150	4
0600	6000	3530	DN 150	600	1050	1250	850	170	4
0700	7000	4118	DN 150	700	1050	1500	850	180	5
0800	8000	4707	DN 150	700	1050	1500	850	190	6
0950	9500	5590	DN 150	700	1050	1500	850	200	6
1100	11000	6470	DN 150	700	1050	1500	850	210	6

Volume Flow (V_{nom}) related to 20°C and 1 bar abs. and based on **7 bar g** operating pressure

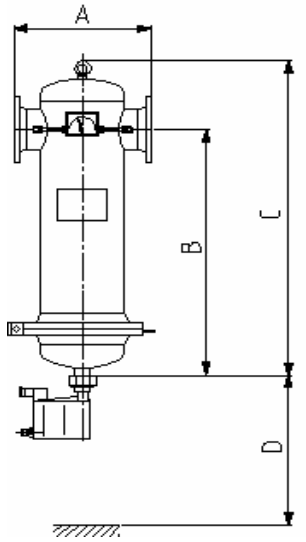
Conversion factor **(f)** for sizing, depending on operating pressure

operating pressure bar g															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,25	0,38	0,50	0,63	0,75	0,88	**1,00**	1,13	1,25	1,38	1,50	1,63	1,75	1,88	2,00	2,13

Filterelements	Prefilter P-Filter	Microfilter F-Filter	Extra Microfilter M-Filter	Super Microfilter S-Filter	Activated Carbon A-Filter
Particle filtration	25 Micron	5 Micron	1 Micron	0,01 Micron	-
Residual oil content at 20 °C	10 mg/m³	5 mg/m³	0,1 mg/m³	0,01 mg/m³	0,003 mg/m³
Residual oil content at max. concentration	25 mg/m³	10 mg/m³	5 mg/m³	5 mg/m³	0,01 mg/m³
Initial Pressure drop at V_{nom}	25 mbar	35 mbar	70 mbar	90 mbar	70 mbar
Recom. operating Temp. (max.) °C	2 -60 (120)	2 - 60 (120)	2 - 60 (80)	2 - 60 (80)	2 - 35 (40)

Filterhousing

- Carbon steel housing, completely galvanized, externally painted RAL 5009
- Design pressure: up to size 0435 — 16 bar g
  from size 0570 — 10 bar g (16 bar g optional)
- Design temperature: 120 °C
- Design, Construction and Testing: according to AD2000
- Inspection: according to PED 97/23/EC



Accessories:

- Pressure indicator **DI**
- Differential pressure gauge **DP**
- Level controlled condensate drain **LS**

(Power supply: 230V/50-60Hz, 115V/50-60Hz, 24 V/AC-DC)

Guidance for determinating the size
Inlet volume flow **Vo** : 2500 m³/h
Operating pressure: 5 bar ü

Conversion factor **f** : 0,75

Corrected volume flow = $\frac{\mathbf{Vo}}{\mathbf{f}} = \frac{2500}{0,75} = 3333$ m³/h

Selected size: **0435**

Example for type designation:

EC 0400 M - DP - 220

- 220 — power 220V
- DP — level controlled condensate drain, differential pressure gauge
- M — filter-elemen
- 0400 — type/size

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