



# User manual

## SERIES SD

- SD-220 / SD-600
- DDS OPTION
- 3V OPTION

SD Heatless Desiccant  
Compressed Air Dryers

REF: 02250130-734

## TABLE OF CONTENTS

FOREWORD.....	4
<b>SECTION 1 INTRODUCTION.....</b>	<b>5</b>
1.1 GENERAL INFORMATION .....	5
1.2 SAFETY INSTRUCTIONS.....	5
1.2.1 Identification of signs and symbols in this technical manual .....	6
1.2.2 Safety tips for maintenance, inspection and assembly work.....	6
1.3 PERSONNEL QUALIFICATION.....	7
1.4 PRODUCT INFORMATION .....	8
1.4.1 Pressure vessel regulations.....	8
1.4.2 Airtightness test .....	8
1.4.3 Overloading.....	8
1.4.4 Technical data sheet .....	9
1.4.5 Transport.....	10
1.4.6 Storage .....	10
1.4.7 Use of a pre and after filter .....	10
<b>SECTION 2 INSTALLATION.....</b>	<b>11</b>
2.1 SET-UP AND INSTALLATION.....	11
<b>SECTION 3 START UP AND OPERATION .....</b>	<b>12</b>
3.1 START UP/ SHUT DOWN.....	12
3.2 DESCRIPTION OF THE OPERATION .....	13
3.2.1 Description of the operation.....	13
3.2.2 Dryer operating sequence (No control or alarm option) .....	14
3.2.3 Operating sequence (DDS Option) .....	15
3.2.4 Alarms.....	16
3.2.5 Electrical control.....	17
3.3 SPECIAL EQUIPMENT .....	18
3.3.1 DDS Controls.....	18
3.3.2 DDS Controls – Start up and operation .....	18
<b>SECTION 4 MAINTENANCE .....</b>	<b>20</b>
4.1 REPLACEMENT OF THE DESICCANT .....	21
4.2 DISPOSAL OF THE DESICCANT .....	21
4.3 CHANGING OF THE REGENERATION ORIFICE .....	22
4.4 TECHNICAL DOCUMENTS .....	23
4.4 TECHNICAL DOCUMENTS .....	24
4.5 FILTERS.....	25
4.5.1 General comments and use .....	25
4.5.2 Function .....	25
4.5.3 Assembly and installation .....	25
4.5.4 Maintenance.....	25
4.5.5 Changing of filter elements.....	26
4.5.6 Accessories .....	26

<b>SECTION 5</b>	<b>DRYER FLOW CAPACITY AND PURGE ADJUSTMENT</b> .....	27
5.1	DRYER FLOW CAPACITY .....	27
5.2	CORRECTION FACTOR FOR INLET TEMPERATURE .....	27
5.3	PURGE ADJUSTMENT .....	28
<b>SECTION 6</b>	<b>SPARE PARTS LIST</b> .....	29
6.1	SPARE PARTS LIST FOR SD-220 TO SD-400 .....	29
6.1	SPARE PARTS LIST FOR SD-500 TO SD-600 .....	30
6.2	INLET-EXHAUST VALVE MANIFOLD .....	31
6.2	OUTLET-CHECK VALVE MANIFOLD .....	32
<b>SECTION 7</b>	<b>TROUBLE SHOOTING &amp; FAULTS</b> .....	33
7.1	THE DEW POINT IS TOO HIGH .....	33
7.2	THE ADSORPTION DRYER DOES NOT SWITCH OVER .....	33
7.3	BACK PRESSURE IS TOO HIGH DURING REGENERATION PHASE .....	34
7.4	SHORT-TERM SHUT-DOWN .....	34
7.5	SHUT-DOWN IN CASE OF A FAULT OR FOR MAINTENANCE.....	35
7.6	RE-STARTING .....	35
<b>SECTION 8</b>	<b>ANNEX</b> .....	1

## **FOREWORD**

This technical manual of **Sullair®** is an aid in getting to know the adsorption dryer better and in utilising its possibilities for application in accordance with its intended use. Furthermore, this manual contains important information for safe, proper and economic operation.

All instructions must be followed as written in order to avoid danger and damages which could cause downtime and premature wear and tear on the adsorption dryer.

In addition to the technical manual and the accident prevention regulations which are valid and compulsory in the country and in the particular workplace where the adsorption dryer is being used, the recognized special rules for safe and proper working procedures are also to be heeded. The technical manual must always be within reach wherever the adsorption dryer is being used.

Each person involved with the set-up, start-up, operation, maintenance and repair of the adsorption dryer in the User Company must have first read and understood the technical manual and especially the safety tips.

## **SECTION 1**

## **INTRODUCTION**

### **1.1 GENERAL INFORMATION**

The adsorption dryer of the SD-220 / SD-600 series is built according to the latest technological developments and recognized safety rules. Its use however can endanger life and limb of the user or of third parties, and can lead to considerable damage to the adsorption dryer and other material assets if:

- *it is operated by personnel not trained or instructed in its use,*
- *it is improperly used,*
- *it is improperly maintained or serviced.*

**This can result in the loss of all damage claims.**

This adsorption dryer is designed for neutral media free of aggressive water, oil and solid elements. Sullair® accepts no liability for corrosion damage and malfunctions caused by aggressive media.

Applications other than those mentioned in this manual must be agreed to by Sullair® and confirmed in writing.

In the interest of further development, Sullair® reserves the right to make changes at any time, which, in keeping with the essential characteristics of the adsorption dryer described here, may be necessary for increasing efficiency or for reasons relating to safety or to normal business practice.

### **1.2 SAFETY INSTRUCTIONS**

This technical manual contains basic tips, which must be followed during set-up, operation and servicing. It is thus of utmost importance that it be read by the assembly technician before installation and start-up as well as by the specialist / operator in charge, and it must always be within reach at the place where the adsorption dryer is being used.

## **SECTION 1**

### 1.2.1 Identification of signs and symbols in this technical manual

The safety tips contained in this technical manual, whose disregard could endanger people and machines, are indicated by a general danger sign and the additional markings **Danger!** or **Attention!**



#### **Danger! / Caution!**

Safety sign in accordance with DIN 4844 - W9



#### **Warning against electrical voltage!**

Safety sign in accordance with DIN 4844 - W8

Safety tips printed directly on the adsorption dryer must be heeded at all times and must be kept completely legible.



#### **Advices**

**This sign refers to a procedure or sequence of particular interest or importance. All tips must be followed to ensure proper use of this adsorption dryer.**

- This dot refers to working or operational steps. The steps are to be carried out in the order of their appearance from top to bottom.
- The sign of a hyphen marks enumerations.

### 1.2.2 Safety tips for maintenance, inspection and assembly work

The operator is to make sure that all maintenance, inspection and assembly work is carried out by special personnel who are authorized and qualified, and who are adequately informed through careful study of the technical manual. For this reason, special attention should be paid to the following attention and danger sign:

## SECTION 1



### CAUTION!

- Never make structural changes to the adsorption dryer!
- Only use original spare and accessory parts!
- Never weld on a pressure vessel or change it in any way!

Carry out maintenance work only when the adsorption dryer is switched off, is depressurized and disconnected from the electric power supply.



#### Advices

Refer to the desiccant material safety data sheet (MSDS) when installing or disposing of desiccant.



### DANGER!

**Wear protective goggles when working with the desiccant!**



#### Advices for protection

- If desiccant comes into contact with the eyes, rinse eyes immediately with a lot of clear water.
- If the desiccant is spilled, clean up without causing swirls of dust.
- In case of fire, there is no restriction on the use of fire extinguishing material; the reaction with water and foam is defined as strong.
- A mask must be worn.

## 1.3 PERSONNEL QUALIFICATION

The personnel involved in operation, maintenance, inspection and assembly must have the corresponding qualifications to do this work. Areas of responsibility and supervision of the personnel must be precisely established by the operator. Should the personnel not possess the necessary knowledge, then they must be trained and instructed. If need be, this training may be carried out by the manufacturer / supplier at the request of the operator of the adsorption dryer. Further, the operator is to make sure that the personnel completely understand the contents of the technical manual.

## **SECTION 1**

### **1.4 PRODUCT INFORMATION**

The adsorption dryer is used for the purpose of drying compressed air and other gases according to its respective design. As a "standard model" the adsorption dryer is equipped with two desiccant vessels and a pre- and after-filter, and depending on certain conditions at the outlet, provides pure, dry and oil-free compressed air or gases.

#### **1.4.1 Pressure vessel regulations**

The pressure vessels are designed according to the standard technical requirements. They fulfill the test of the certifying procedure and carry the “U”, “UM” ASME Symbol.

*Range of application*

Type	SD-220 TO SD-600	
<b>Operating overpressure</b>	Max.	150 PSIG
<b>Temperature</b>	Max.	500 °F
	Min.	-20 °F

#### **1.4.2 Airtightness test**

All adsorption dryers are subjected to an airtightness test prior to shipment using compressed air.

#### **1.4.3 Overloading**



### **CAUTION!**

#### **Protect the adsorption dryer from overloads!**

The adsorption dryer can become overloaded, if:

- The flow capacity of the medium to be dried increases,
- The temperature of the air at entry, and correspondingly its humidity increases,
- The min. operating pressure is under cut,
- The pre-filtration and separation of impurities are not sufficient, or filter drain fails.

## **SECTION 1**

### 1.4.4 Technical data sheet

TYPE	SD-220	SD-300	SD-400	SD-500	SD-600
Medium	<b>Air, free of aggressive elements</b>				
Connection NPT	1-1/2" NPT	1-1/2" NPT	1-1/2" NPT	2"	2"
Flow capacity <sup>(1)</sup> (STD) SCFM	220	300	400	500	600
	<b>Desiccant</b>				
Standard	Input temp.: from 100°F and dew point <sup>(2)</sup> -40°C (-40°F) Filled with: activated alumina				
Quantity of desiccant / Vessel [Lbs.]	126	167	220	272	350
Filter size (mph/mpr)	300	300	420	470	700
Control	Electronic board or PLC Controller				
	<b>Operating Voltage</b>				
Standard	120 V / 60 Hz (AC)				
Special voltage	Consult factory				
	<b>Drying time</b>				
Standard	5 min				

<sup>(1)</sup> Flow capacity in SCFM at 100 PSIG according to DIN ISO 7183

<sup>(2)</sup> Pressure dew point

**NOTE: Settings for DDS:**

Standard dryers      DDS Control (-41°C)      High humidity (-36°C)

## **SECTION 1**

### **1.4.5 Transport**

After the adsorption dryer has been delivered, it must be checked for damage that may have occurred during transport. If necessary, the Transport company must be informed to register the damage.



#### **Advices**

**For transport within the company, only the skid of the adsorption dryers SD-220 /SD- 600 may be used.**

### **1.4.6 Storage**

If the adsorption dryer is to be stored for a longer period of time, its place of storage must be dry and free of dust. There has to be a min. ambient temp. of +1°C (33°F).

### **1.4.7 Use of a pre and after filter**

In order to prevent droplets of condensate, oil and dirt from getting into the desiccant, a pre-filter is installed in front of the adsorption dryer, since an oil film on the desiccant reduces the drying capacity and the dewpoint. In order to prevent breakdowns in downstream consumers caused by material that has been abraded from the desiccant bed, an after-filter is mounted behind the adsorption dryer. Since no condensate accumulates in the after-filter, this filter is always equipped with a manual valve.

Both filters are equipped with a differential pressure gauge (standard) as this ensures an indirect display of the degree of contamination of the filter elements.

## **SECTION 2**

## **INSTALLATION**

### **2.1 SET-UP AND INSTALLATION**

Once at the installation location, the adsorption dryers of the series SD-220 / SD-600, which are supplied with a base frame, must be positioned so that sides are easily accessible. The piping is to be connected to the adsorption dryer at a light slope. A shut-off valve is to be installed on the inlet and outlet sides of the adsorption dryer. Also, a by-pass pipe with an additional shut-off valve should be mounted onto the adsorption dryer, in order to be able to guarantee an uninterrupted supply of compressed air in case the adsorption dryer breaks down. Should vibrations occur on the installation location, the adsorption dryer is to be placed onto vibration dampers.

Since the adsorption dryer has already been completely wired at our factory, the customer only has to connect the power supply cable to the terminal strip according to the supplied wiring diagrams.



#### **Advice**

**Should you still have questions regarding installation, you can request installation blueprints separately from Sullair®, Michigan City, IN.**



#### **CAUTION!**

**Do not hydrotest dryer, all vessel assemblies are factory pressure tested per design requirements prior to release from the manufacturer.**

## **SECTION 3**

## **START UP AND OPERATION**

### **3.1 START UP/ SHUT DOWN**



### **CAUTION!**

#### **All pipes and wire connections are to be tightened!**

Furthermore, before start-up:

- The pipes must be checked for the presence of scale, abraded material from the threading, or other similar impurities.
- All shut off valves on the pre-filter, adsorption dryer, after-filter and on the bypass line should be closed.
- The ambient temperature must not be less than 33°F

Breakdowns resulting from faulty installation do not fall under Sullair's warranty obligation.



### **Advices**

The following sequence is to be heeded for the initial start-up:

- **Slowly open the inlet valve** and observe the pressure build-up on the chamber pressure gauge of the adsorption dryer. **A too abrupt pressure build-up is to be avoided.**
- Turn the switch to the "**POWER ON**" position.
- The adsorption dryer must be powered approx. 3-4 h with the shut off valve behind the after-filter closed; this regenerates the desiccant.
- After the regeneration phase, open the shut off valve behind the after-filter slowly while observing the chamber pressure gauge; if the shut off valve is opened too abruptly, it could put a stress on the system.
- The adsorption dryer is now ready for operation and functions continuously and fully automatically.

## **SECTION 3**

### **3.2 DESCRIPTION OF THE OPERATION**

The Sullair® adsorption dryer of the series SD-220 / SD-600 functions according to the pressure change principle, using dry air regeneration. Two adsorption vessels filled with desiccant are installed parallel to each other for this purpose. While the medium is being dried in one vessel, regeneration takes place in the other vessel. The changeover from one vessel to the other is performed in a fixed rhythm by means of a time-dependent control system. The adsorption dryer operates continuously and fully automatically.

#### **3.2.1 Description of the operation**

- The Sullair® SD dryer has a NEMA cycle time of 10 minutes. In a 10 minute cycle, 5 minutes is dedicated to drying for each chamber (5 minutes half cycle).
- Through the inlet switching valve wet air enters either desiccant chamber at the inlet (bottom) and is dried as it flows upward through the desiccant bed. Dry air exits the dryer through the outlet check valve.
- At the outlet of each chamber, a portion of the dry air (purge air) is diverted to the regenerating chamber. The dry air, at near atmospheric pressure, will remove previously adsorbed moisture as it flows downward through the desiccant bed exiting through the purge exhaust mufflers.
- The purge air is controlled by a purge adjusting valve and purge orifices located in the purge line. Purge pressure can be monitored on the purge pressure gauge. Refer to section on purge adjustment for instructions on setting the purge rate.
- Near the end of each half cycle, the chamber being regenerated will be re-pressurized. For this to occur, the exhaust valve of the chamber being regenerated closes while purge air continues to flow. Re-pressurizing the regenerated chamber to operating pressure before placing it into service minimizes fluidization of the desiccant and helps prevent desiccant abrasion which causes desiccant dust to prematurely block pilot and after-filter elements.
- Dryers operating at pressures greater than 120-125 PSIG or in an accelerated NEMA cycle could be fitted with a re-pressurizing valve. This valve assists the regenerated chamber to reach dryer operating pressure before chamber switchover.
- Chamber switchover takes place when both towers are fully pressurized to minimize desiccant movement.

When switchover is complete, the regenerated tower will be placed into service and the exhausted tower will begin a depressurization/regeneration cycle.

### **SECTION 3**

#### **3.2.2 Dryer operating sequence (No control or alarm option)**

The Sullair® SD-220 / SD-600 heatless air dryers use a PLC as its standard controller. In the event of a power failure, the inlet valves will remain in their positions and the exhaust valves will close. The dryer system will repressurize.

**Energizing control panel:** Power is turned ON – electrical circuit energized.

When power is applied or restored to the control panel, the dryer will remain in a standby state for one (1) minute period, allowing the dryer system to repressurize.

#### **STEP 1**

##### **SELECT LEFT CHAMBER DRYING.**

- De-energize solenoid EV-1R and EV-2L.
- Energize solenoid EV-1L and EV-2R.
- Inlet valve positioned for left chamber drying.
- Exhaust valve opened for right chamber regeneration.
- When regeneration time is complete, *go to STEP 2*

#### **STEP 2**

##### **RIGHT CHAMBER REPRESSURIZATION.**

- De-energize solenoid EV-1L and EV-2R.
- Inlet valves remain in open position.
- Right chamber exhaust valve closes.
- The repressurization timer starts a countdown of 45 sec.
- When repressurization time is complete, *go to STEP 3*

#### **STEP 3**

##### **SELECT RIGHT CHAMBER DRYING.**

- Energize solenoid EV-1R and EV-2L.
- Inlet valve positioned for right chamber drying.
- Exhaust valve opened for left chamber regeneration.
- When regeneration time is complete, *go to STEP 4*

#### **STEP 4**

##### **LEFT CHAMBER REPRESSURIZATION**

- De-energize solenoid EV-1R and EV-2L
- Inlet valves remain in open position.
- Left chamber exhaust valve closes.
- The repressurization timer starts a countdown of 45 sec.
- When repressurization time is complete, *go to STEP 1*

The dryer has completed one (1) full cycle and will repeat steps 1 through 4 until power is removed from the control panel.

**SECTION 3****3.2.3 Operating sequence (DDS Option)**

The Sullair® SD-220-DDS – SD-600-DDS heatless air dryer uses a PLC as its standard controller. In the event of a power failure, the inlet valves remain in their position, and the exhaust valves will close and dryer will pressurize both chambers. The dryer will return to the same step in the cycle dryer was in before power was lost. (See NOTE 2)

**Energizing control panel:** Power is turned ON – electrical circuit energized.

**STEP 1 SELECT LEFT CHAMBER DRYING.**

- De-energize solenoid EV-1R.
- Energize solenoid EV-1L.
- Inlet valve positioned for left chamber drying.
- When 3 seconds have passed, *go to STEP 2*

**STEP 2 RIGHT CHAMBER DE-PRESSURIZATION.**

- Keep energized EV-1L

If not in DDS mode:

- Energize EV-2R opening right chamber dump/exhaust valve.

If in DDS mode and dewpoint is better than hygrometer setpoint:

- EV-2R does not energize.

When regeneration time has passed, *go to STEP 3*

**STEP 3 RIGHT CHAMBER REPRESSURIZATION.**

- Keep energized EV-1L.
- De-energize EV-2R closing right chamber dump/exhaust valve.
- The repress timer begins a countdown of 45 sec. (See Note 1)
- Inlet valve remains in current position.
- When repressurization time has passed, *go to STEP 4*

**STEP 4 RIGHT CHAMBER DRYING.**

- De-energize solenoid EV-1L
- Energize solenoid EV-1R.
- Inlet valve positioned for right chamber drying.
- When 3 seconds have passed, *go to STEP 5*

**STEP 5 LEFT CHAMBER DEPRESSURIZATION.**

- Keep energized EV-1R

If not in DDS mode:

- Energize EV-2L opening right chamber dump/exhaust valve.

If in DDS mode and dewpoint is better than hygrometer setpoint:

- EV-2R does not energize.

When regeneration time has passed, *go to STEP 6*

### **SECTION 3**

#### 3.2.3 Operating sequence (DDS option) – (Continued)

- STEP 6**      **LEFT CHAMBER REPRESSURIZATION.**
- Keep energized EV-1R.
  - De-energize EV-2L closing left chamber dump/exhaust valve.
  - The repress timer begins a countdown of 45 sec. (See note 1)
  - Inlet valve remains in current position.

**NOTE 1:**      EV-3 and repress valves could be used if dryer operating at pressure above 125 PSI (G) and / or dryer operating on a timing cycle other than 10 minute cycle. Refer to the specification sheet in this manual or to the flow schematic supplied with the dryer.

**NOTE 2:**      If power failure occurs to the dryer or unit is turned off, both exhaust valves will close. The inlet valve will remain in their position.

**NOTE 3:**      The actual timer setting may differ from the previously noted sequence. Example: A dryer requiring 30 seconds to re-pressurize the regenerating chamber will have a regeneration time of 4 minutes and 30 seconds. The half cycle time will remain at 5 minutes and full cycle at 10 minutes.

**NOTE 4:**      The regeneration and repressurization times should be adjusted by Sullair® trained personnel only. Changing the factory settings will result in loss of dewpoint and/or failure to repressurize before changeover.

#### 3.2.4 Alarms

##### **COMMON ALARM RELAY**

Common alarm relay comes with any optional alarm. If any one of the alarms are activated, the common alarm relay will also be activated.

##### **SWITCHING FAILURE ALARM (OPTIONAL, INCLUDED WITH DDS OPTION)**

Two pressure switches, sensing desiccant chamber pressure, are provided. An alarm will be activated if both chambers remain at full pressure when regeneration is required. Furthermore, if pressure in both chambers remain below set pressure, after depressurization an alarm will be activated.

**NOTE:**      Dryers equipped with DDS and operating in the DDS mode do not depressurize during the purge cycle (and do not purge) when an acceptable dew point is maintained. During this condition, the switching failure alarm is cancelled.

The alarm has a one-(1) minute delay.

### **SECTION 3**

#### 3.2.4 Alarms (Continued)

##### **HIGH HUMIDITY ALARM (OPTIONAL, INCLUDED WITH DDS OPTION)**

The hygrometer provided has been programmed to initiate an alarm if the dryer outlet dew point falls below the setting. An alarm light is provided.

**NOTE:** The alarm has a 20-minute delay when the dryer is first powered up, then the alarm is instant if the condition exists.

##### **IF THE HYGROMETER BOARD TO PROBE CONNECTION FAILS,**

then a fault will be observed by the hygrometer. The high humidity alarm light will flash on and off. The dryer will go into a fixed cycle mode. The digital display will indicate "OPN".

#### 3.2.5 Electrical control



##### **DANGER!**

**Work on electrical installations may only be done by a specialist or by other persons instructed in this type of work as long as they are under the instruction and supervision of a specialist; the general rules for working with electricity must be followed!**

You find the corresponding operating and control voltage on the data sheet.

The Sullair® adsorption dryer of the SD series is normally operated with a PLC controller. The set times are adjusted at the factory during the test run.



##### **CAUTION!**

**Do not change these adjustments!**

## **SECTION 3**

### **3.3 SPECIAL EQUIPMENT**

#### **3.3.1 DDS Controls**

The DDS control option is a dewpoint demand switching system that monitors the dryer dewpoint performance and manages the requirement for regeneration of the dryer. The DDS controls major components are a digital dewpoint display hygrometer and a humidity sensor.

The Sullair® type SD Air dryer is designed to provide a specific pressure dewpoint performance (generally –40 F (-40 C)) at the most severe operating conditions specified. (Maximum flow at lowest pressure and highest inlet temperature). The regeneration purge flow rate required for the dryer is calculated and adjusted to achieve this dewpoint and is based on these conditions.

For example, for dryers operating at 100 PSIG (690 kPa) and 100 F (38 C) the purge flow rate is approximately 15% of the specified maximum inlet flow. Dryers operating under less severe inlet conditions will introduce a reduced humidity load. The DDS controls have been factory programmed to monitor the dryer outlet dewpoint performance and prevent initiation of a regeneration cycle under these conditions.

The DDS controls system has the following standard features, refer to the enclosed technical bulletin for a complete overview of the digital hygrometer display.

- Digital display can be toggled to degrees F, C, and PPM.
- Detection for cable fault between hygrometer and moisture probe.
- Stainless steel humidity probe sampling cell with service valves.

#### **3.3.2 DDS Controls – Start up and operation**

The DDS controls system when supplied should be disabled for the initial 8 hours of dryer operation. A dryer fitted with the DDS control will have a 3-position selector switch on the electrical control panel. The 3 positions of this switch will perform the following actions:

- Position 1: **POWER OFF**
- Position 2: **POWER ON**
- Position 3: **DDS ON**

**SECTION 3****3.3.2 DDS Controls – Start up and operation (Continued)**

The POWER ON position will allow the hygrometer to be energized yet force the dryer to operate on a FIXED CYCLE mode. The dryer **SHOULD BE OPERATED IN THIS POSITION AT TIME OF INITIAL STARTUP AND AT ALL TIMES WHEN THE HYGROMETER OR HUMIDITY PROBE ARE REMOVED FOR SERVICE OR CALIBRATION.**

The DDS ON position will control the dryer regeneration steps when the dewpoint of the dryer is better than the factory adjusted setpoint programmed into the digital hygrometer.

The startup procedure for the DDS system will be as follows. Refer to the assembly drawing in the following section.

1. Verify that the sample line (1/8 Teflon tube) is connected from the dryer outlet (see flow schematic enclosed) to the inlet valve on the humidity probe sample cell. The humidity probe comes in a transport container found inside the control panel. Remove probe from container, and install in sample humidity cell. Close the container and keep inside the control panel for future maintenance.
2. Connect the coaxial cable to the humidity probe
3. Fully open the inlet valve to the sample cell
4. Partially open the discharge valve of the sample cell to bleed off a small amount of sample air. Do not fully open discharge valve
5. Perform a soap test to verify for leaks on all parts of the sample line connections and the humidity sample cell.
6. The digital display will now read the dewpoint of the dryer system. It will take a short period of time for a humidity probe to be purged of humidity.

**Humidity cell assembly**

**SECTION 4**

**MAINTENANCE**



**Advice**

**In order to ensure continuous and trouble-free operation, a maintenance contract with Sullair® is recommended.**

Also, the following points should be checked **regularly**:

**Daily**

- Carry out a general visual check and watch out for possible disturbances during operation.
- Check function by manually operating the automatic condensate drain on the pre-filter.
- Do an optical color test on the blue gel indicator for non-DDS dryers:

Indicator	Color	Approx. dew point [ °C]
<b>Blue gel</b>	Blue	- 25
	Pink	0
	Transparent	+ 15

**Weekly**

- Check the differential pressure on the pre-filter, which should not exceed 10 PSID. Values greater than this indicate that the filter cartridge must be changed.
- Check the differential pressure on the after-filter, which should not exceed 10 PSID. Values greater than this indicate that the filter cartridge must be changed.
- Check the backpressure at the silencer placed behind the exhaust valve combination; it should not exceed 5 PSIG. Use the gauge of the vessel that is to be regenerated.
- Drain inlet and exhaust valve chambers using valves provided below the valve (refer to photo attached).
- Drain pilot air filter housing of condensate (refer to photo attached).

## **SECTION 4**

### **Annually or after every 2500 hours of operation**

- Check the desiccant for impurities and change it if necessary. A brownish / yellowish tone indicates that it has been soiled with oil. The desiccant has a normal lifetime of about 8000 operating hours.
- Check the screens installed in the unit for impurities and if necessary, clean them.
- Check the function of the inlet/exhaust valve combination by sending electrical control signals.
- Replace pilot air filter element.

### **4.1 REPLACEMENT OF THE DESICCANT**

- Close dryer inlet/outlet isolation valves.
- Depressurize and switch off the adsorption dryer.
- Remove the drain plug and empty the old desiccant into a container.
- Screw the plug back in and fill new desiccant from above into the vessels.
- Pressurize the adsorption dryer and restore power to the dryer.

**NOTE:** In order to ensure trouble-free operation, we recommend replacing the desiccant every 8000 Hours, or every 2 years on latest.

### **4.2 DISPOSAL OF THE DESICCANT**



#### **DANGER!**

**The desiccant can be disposed of at a suitable disposal site in accordance with local or official regulations.**

**Don't forget: The desiccant may contain pollutants!**

## **SECTION 4**

### **4.3 CHANGING OF THE REGENERATION ORIFICE**

- Depressurize and remove power from the dryer.
- The regeneration orifice (Quantity = 2) are integrated into compression fittings that are threaded directly into the top distribution block/check valve.
- Unscrew the tubing compression nuts on the orifice fittings, as well as the common tubing.
- Remove regeneration orifice and re-install new orifice as required.
- Verify all tubing compression nuts are properly secured.

**NOTE:** Consult Sullair® for recommendations and or replacement of the purge regeneration orifice. Modification of the regeneration orifice can lead to performance deterioration of the dryer.



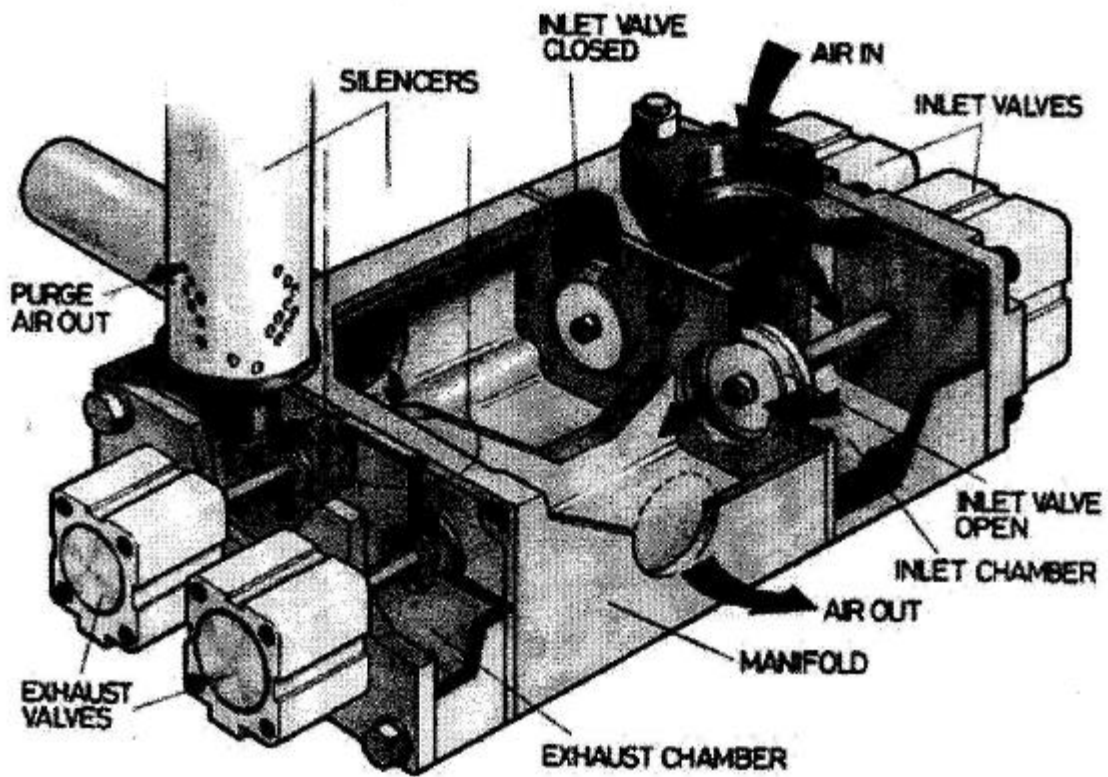
#### **Advice**

Should the need for spare parts arise during work on the Sullair® adsorption dryer of the SD-220 / SD-600 series, then the dryer type and the construction of the adsorption dryer must always be indicated. This information is given on the nameplate mounted on the electric cabinet.

**SECTION 4**

**4.4 TECHNICAL DOCUMENTS**

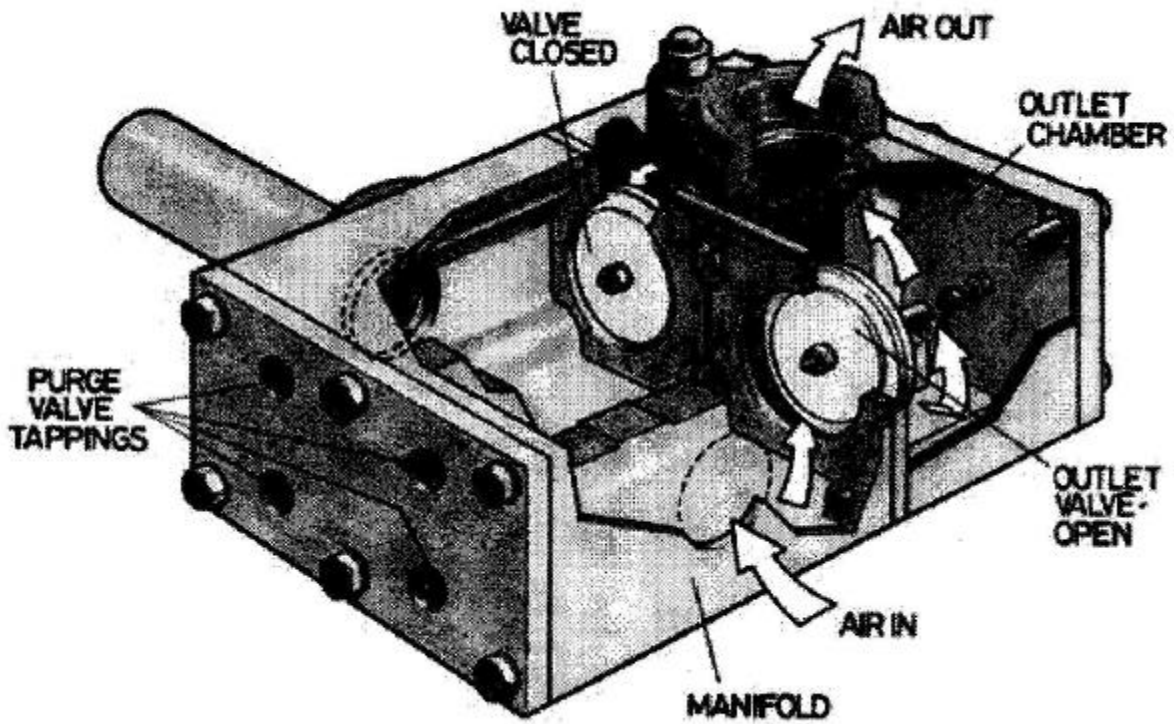
Inlet – purge exhaust manifold  
For SD-220/ SD-600 in the P & I flow diagram



**SECTION 4**

**4.4 TECHNICAL DOCUMENTS**

Outlet – purge exhaust manifold  
For SD-220/ SD-600 in the P & I flow diagram



## **SECTION 4**

### **4.5 FILTERS**

#### **4.5.1 General comments and use**

Filters of the series MPH are suitable for filtering solids, oil and condensate out of compressed air and other neutral, compressed gases. This new filtration concept is characterized by high flows at low differential pressure.

#### **4.5.2 Function**

The soiled medium flows through the filter element "Series MPH" from the inside to the outside. Solids are filtered out by impact or by the effect of inertia, whereas oil particles and drops of humidity are filtered out by the effect of coalescence. By the force of gravity, the filtered-out droplets collect in the lower filter vessel and are drained automatically or manually.

#### **4.5.3 Assembly and installation**



##### **Advices**

- Within the piping system, the filters should always be used where the air or gas temperature is lowest.
- The piping system must be cleaned before filters assembling.
- The filters must always be installed vertically.
- An arrow on the upper part of the housing marks the direction of the flow.
- Sufficient free space should be left at the bottom for the changing of filter elements.

#### **4.5.4 Maintenance**



##### **Advices**

- The filter element should be replaced when a differential pressure of > 10 PSID has been reached, or on latest after 1 year of operation.
- The functioning of the automatic condensate drain is to be tested weekly by manual operation.
- Should there be no condensate drain, then, depending on the amount, the condensate on the pre-filter is to be removed several times a day by opening the hand drain.

## **SECTION 4**

### **4.5 FILTERS** (Continued)

#### 4.5.5 Changing of filter elements



#### **DANGER!**

The soiled filter elements are changed only when the housings are **DEPRESSURIZED!**



#### **CAUTION!**

The filter can be disposal of at a suitable disposal site in accordance with local regulations.

Filter elements are to be changed according to the following steps:

- Separate the lower part of the housing from the upper part.
- Loosen and remove the element by hand.
- Install the new element and the O-ring and making sure that the element seats perfectly.
- Re-install filter bowl assembly.
- Elements of the “MPH” or “MPR” series can NOT be cleaned with compressed air.

#### 4.5.6 Accessories



#### **Advices**

##### **Pressure differential gauge:**

Indicates the degree to which the elements are soiled.

##### **Automatic condensate drain:**

Continuously draws off the condensate that has collected.

##### **Hand drain:**

Used when there is little or no condensate.

**SECTION 5**

**DRYER FLOW CAPACITY AND PURGE ADJUSTMENT**

**5.1 DRYER FLOW CAPACITY**

**Model Selection Chart**

MODEL	Max. Inlet Air Pressure (Psig)	Average Inlet Air Flow (SCFM)						
		Based upon 100 F Inlet Air Temperature Inlet Air Pressure						
		80	90	100	110	120	130	140
<b>SD-220</b>	150	175	202	220	253	272	293	310
<b>SD-300</b>	150	230	265	300	340	362	390	416
<b>SD-400</b>	150	305	352	400	438	470	510	544
<b>SD-500</b>	150	378	435	500	550	590	635	675
<b>SD-600</b>	150	485	555	600	700	760	810	850
<b>SD-820</b>	150	640	735	820	890	960	1035	1105
<b>SD-1050</b>	150	830	960	1050	1215	1325	1410	1590
<b>SD-1200</b>	150	980	1095	1200	1305	1415	1520	1615
<b>SD-1450</b>	150	1110	1280	1450	1510	1700	1825	1950
<b>SD-1710</b>	150	1325	1515	1710	1810	1945	2080	2230
<b>SD-2000</b>	150	1530	1720	2000	2100	2220	2390	2530
<b>SD-2350</b>	150	1875	2165	2350	2700	2930	3150	3350
<b>SD-2750</b>	150	2085	2400	2750	2990	3225	3490	3720
<b>SD-3400</b>	150	2775	3080	3400	3650	3950	4250	4540

1. Higher pressures available as an option. Consult factory
2. Based on – 40 F PDP, 10 Minute NEMA cycle, activated alumina and average inlet air flow.

**5.2 CORRECTION FACTOR FOR INLET TEMPERATURE**

TEMPERATURE DEGREES F	80	90	100	105	110	115	120
Correction Factor	1.1	1.1	1.0	0.83	0.69	0.565	0.455

To correct for an inlet temperature other than 100 F multiply dryer capacity by the temperature correction factor listed above.

## **SECTION 5**

### **5.2 CORRECTION FACTOR FOR INLET TEMPERATURE** (Continued)

**Example:** To size for an inlet flow of 950 SCFM @ 105 F and 110 Psig.

1. Select models that produce at least 950 SCFM at 110 Psig. This case would be the SD-1050 which can dry 1215 SCFM.
2. Multiply pressure corrected flow by the temperature correction factor to obtain the flow of the dryer corrected for pressure and temperature:  
 $1140 \times (0.85) = 1008 \text{ SCFM}$
3. Confirm model selection. Model SD-1050 can flow 1008 SCFM at the inlet conditions specified. The requirements of 950 SCFM is less, so model SD-1050 is correct.

### **5.3 PURGE ADJUSTMENT**

To adjust the purge pressure, the following steps are to be followed, refer to the flow schematics at the end of this manual:

- 1 The power is turned on, the dryer is operating.
- 2 When either chamber is depressurized and being regenerated, adjust the pressure on the pressure gauge using the purge adjusting valve supplied.
- 3 Refer to below table to adjust purge based on operating/inlet pressure.

		<b>MODEL</b>				
		<b>SD-220</b>	<b>SD-300</b>	<b>SD-400</b>	<b>SD-500</b>	<b>SD-600</b>
<b>P1</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>
80	80	80	80	80	80	CF
90	88	85	86	86	84	86
100	90	90	91	91	89	88
110	95	93	92	92	91	94
120	97	95	94	94	92	96

**NOTE:** CF = CONSULT FACTORY

**P1** = Dryer inlet pressure (PSIG)

**P2** = Dryer purge pressure (PSIG) based on dryer inlet temperature (100°F)

**SECTION 6                      SPARE PARTS LIST**

**6.1 SPARE PARTS LIST FOR SD-220 TO SD-400**

DESCRIPTION	SD-220 Part no.	SD-300 Part no.	SD-400 Part no.
Desiccant: Activated Alumina (Lbs./dryer )	02250130-253 (252 Lbs.)	02250130-253 (334 Lbs.)	02250130-253 (440 Lbs.)
Pressure Gauge	02250130-190	02250130-190	02250130-190
Muffler	02250096-518	02250096-518	02250096-518
Inlet valve	02250130-310	02250130-310	02250130-310
Check valve block	02250130-308	02250130-308	02250130-308
Blue gel filling	02250130-258	02250130-258	02250130-258
Solenoid Assembly	02250130-243	02250130-243	02250130-243
Pilot light bulb	02250130-203	02250130-203	02250130-203
Relief Valve	02250130-298	02250130-298	02250130-298
Fuse	02250130-237	02250130-237	02250130-237
Alarm Relay *	02250130-240	02250130-240	02250130-240
Pressure Switch *	02250130-191	02250130-191	02250130-191
Probe Line Filter element *	02250106-667	02250106-667	02250106-667

- (\*) FOR USE ON DDS MODELS ONLY

**SECTION 6                      SPARE PARTS LIST**

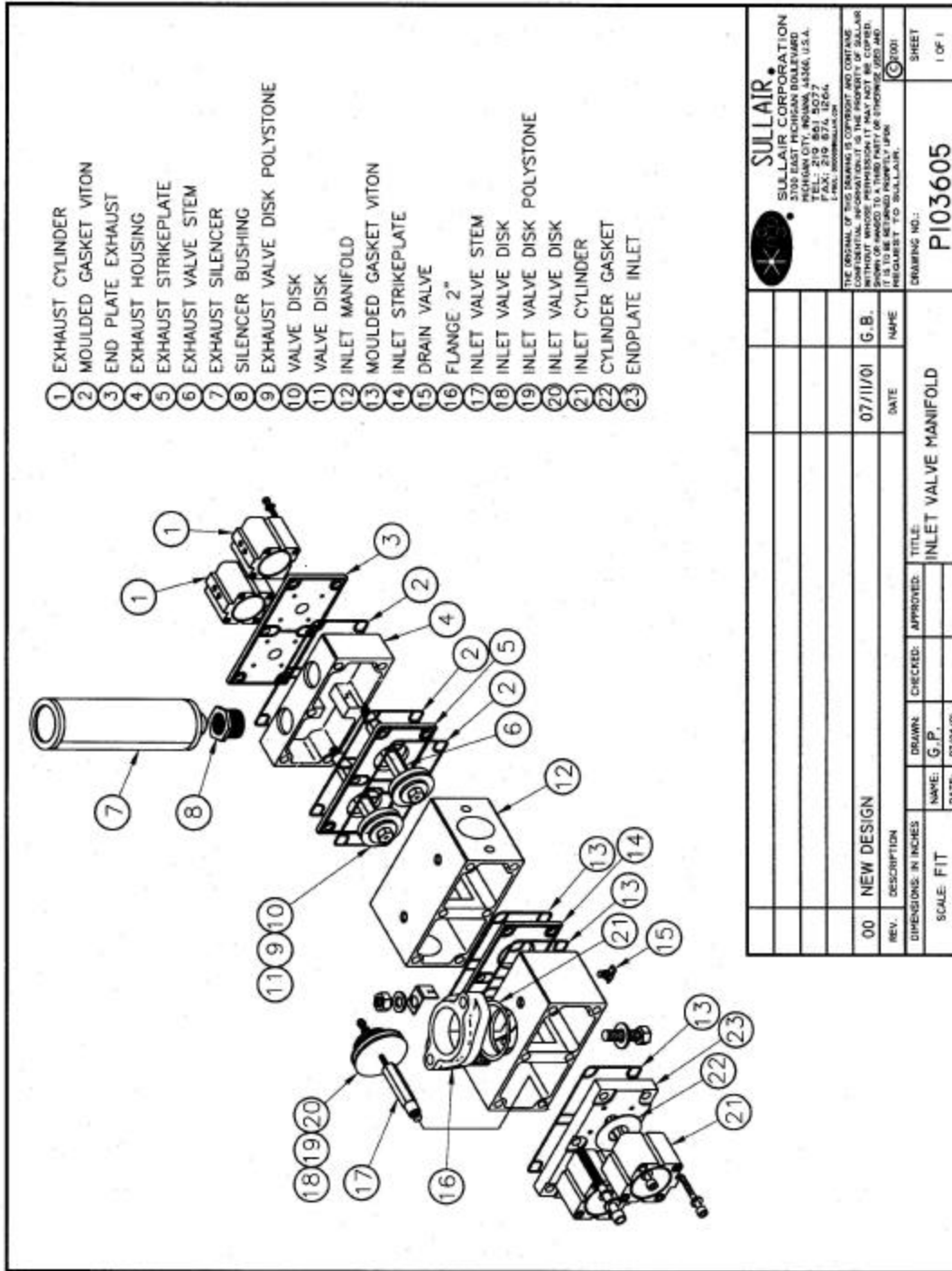
**6.1 SPARE PARTS LIST FOR SD-500 TO SD-600**

DESCRIPTION	SD-500 Part no.	SD-600 Part no.
Desiccant: Activated Alumina (Lbs./dryer )	02250130-253 (554 Lbs.)	02250130-253 (700 Lbs.)
Pressure Gauge	02250130-190	02250130-190
Muffler	02250096-518	02250096-518
Inlet valve	02250130-310	02250130-310
Check valve block	02250130-308	02250130-308
Blue gel filling	02250130-258	02250130-258
Solenoid 110 V	02250130-243	02250130-243
Pilot light bulb	02250130-203	02250130-203
Relief Valve	02250130-298	02250130-298
Fuse	02250130-237	02250130-237
Alarm Relay *	02250130-240	02250130-240
Pressure Switch *	02250130-191	02250130-191
Probe Line Filter element *	02250106-667-	02250106-667

(\*)      FOR USE ON DDS MODELS ONLY

**SECTION 6**

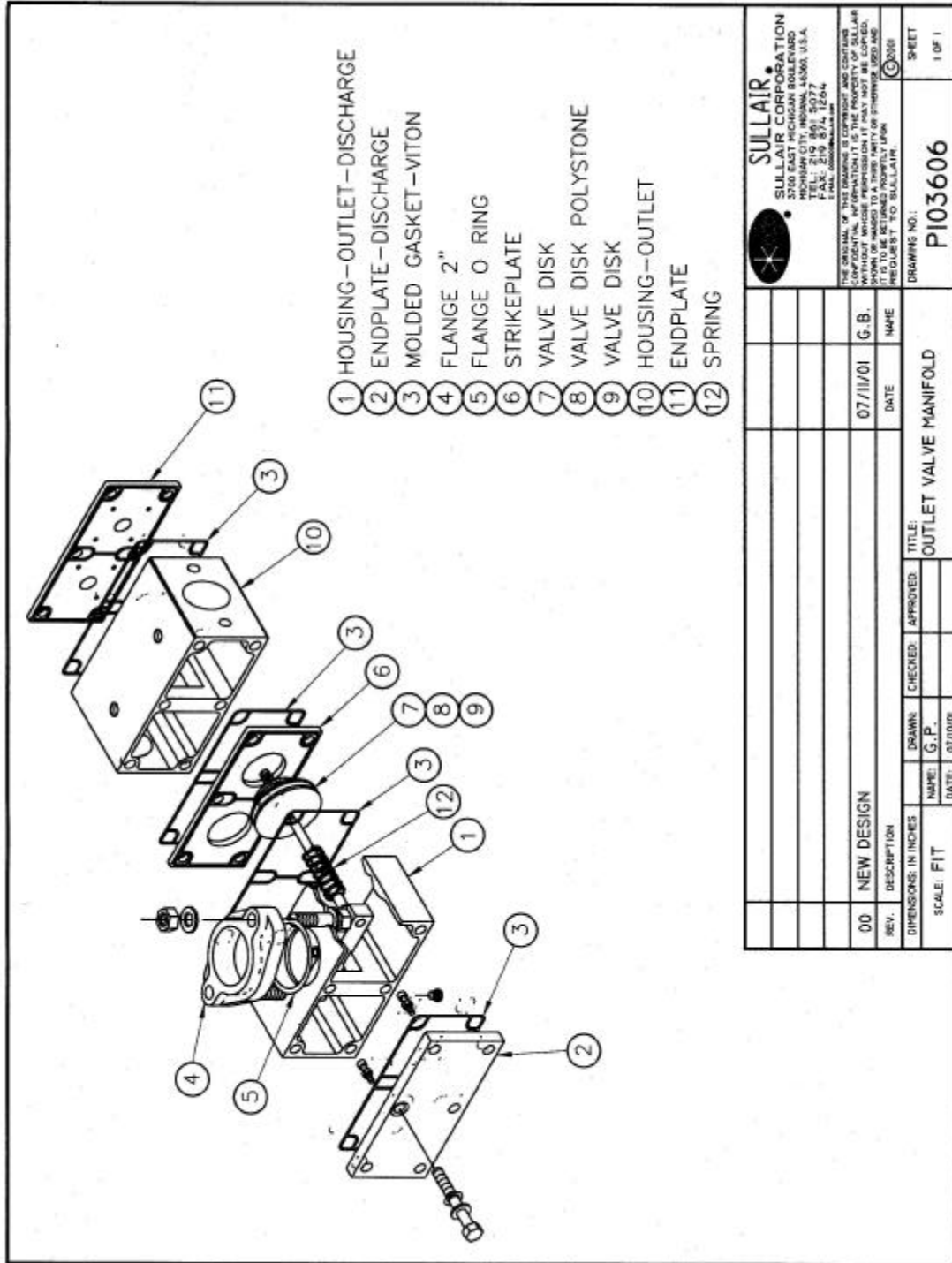
**6.2 INLET-EXHAUST VALVE MANIFOLD**



<p><b>SULLAIR</b>                  SULLAIR CORPORATION                  10000 W. 10TH AVENUE                  BIRMIHGAN CITY, INDIANA 46434 U.S.A.                  TEL: 219 851 5077                  FAX: 219 851 5078                  E-MAIL: SULLAIR@SULLAIR.COM</p>		SHEET 1 OF 1
THE ORIGINAL OF THIS DRAWING IS COPYRIGHT AND CONTAINS CONFIDENTIAL INFORMATION. IT IS THE PROPERTY OF SULLAIR CORPORATION AND IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF SULLAIR CORPORATION. IT IS TO BE RETURNED PROMPTLY UPON REQUEST TO SULLAIR CORPORATION.		DRAWING NO.: <b>P103605</b>
REV. 00 NEW DESIGN	DATE 07/11/01	NAME G.B.
DIMENSIONS IN INCHES SCALE: FIT	DRAWN: G.P. DATE: 07/06/00	CHECKED: [ ] APPROVED: [ ]
TITLE: INLET VALVE MANIFOLD		

**SECTION 6**

**6.2 OUTLET-CHECK VALVE MANIFOLD**



		<b>SULLAIR CORPORATION</b> 3700 EAST MICHIGAN BOULEVARD MICHIGAN CITY, INDIANA 46360, U.S.A. TEL: 219 891 5077 FAX: 219 891 5074 E-MAIL: SULLAIR@SULLAIR.COM	
THE ORIGINAL OF THIS DRAWING IS COPYRIGHTED AND CONTAINS CONFIDENTIAL INFORMATION. IT IS THE PROPERTY OF SULLAIR CORPORATION. IT IS TO BE RETURNED PROMPTLY UPON REQUEST TO SULLAIR.		DRAWING NO.: <b>P103606</b> SHEET: 1 OF 1	
00	NEW DESIGN	G.B.	07/11/01
REV.	DESCRIPTION	NAME	DATE
DIMENSIONS: IN INCHES SCALE: FIT		DRAWN: G.P. NAME: G.P. DATE: 07/10/00	CHECKED: APPROVED: TITLE: <b>OUTLET VALVE MANIFOLD</b>

**SECTION 7                    TROUBLE SHOOTING & FAULTS**

**7.1    THE DEW POINT IS TOO HIGH**

Possible cause	Solution
Operating pressure too low, air flow capacity too high	Increase operating pressure, reduce air flow capacity
Air inlet temperature too high	Reduce temperature, or connect an air cooler upstream
Differential pressure at the pre-filter too high	Check filter element for impurities, change if necessary
Condensate drain is not functioning	Check operation of the condensate drain and replace if necessary
Desiccant is soiled or has disintegrated	Check pre-filter for impurities and either change the filter element and change the complete desiccant and dispose of the old desiccant
Volume of regeneration gas too low	Check regeneration orifice for soiling, clean if necessary; check operation of silencer and blow-off valve, replace if necessary.
Back pressure in regenerating vessel	Check if mufflers are clogged or if there is any valve leak.

**7.2    THE ADSORPTION DRYER DOES NOT SWITCH OVER**

Possible cause	Solution
The Inlet valve combination does not open or switch	Check the electrical functioning of the solenoids and replace either the solenoid or the complete valve combination
PLC does not function	Check PLC and the fuse in the control cabinet
The vessel is not pressurized	Check whether the blow-off valves are dirty and replace these if necessary; Check the electrical functioning of the solenoids and replace either the solenoid or the complete valve combination
The regeneration orifice is obstructed	Clean or replace the regeneration orifice
Pressure switch is defective or set at wrong pressure “DDS system only”	Change pressure switch or adjust to correct pressure “DDS system only”

## **SECTION 7**

### **7.3 BACK PRESSURE IS TOO HIGH DURING REGENERATION PHASE**

<b>Possible cause</b>	<b>Solution</b>
Silencer is soiled	Clean or replace silencer
Inlet/exhaust valve cylinders defective	Lubricate cylinder Replace seals if necessary Replace cylinder
Check valve are not sealing	Repair check valve



#### **CAUTION!**

If you are not able to fix a disturbance, call Sullair® Michigan city, IN at once. A service technician will be sent out as soon as possible!

### **7.4 SHORT-TERM SHUT-DOWN**



#### **Advices**

- Wait until dryer is in repress
- Switch off the adsorption dryer.
- Close all the shutoff valves up and down of dryer.



#### **CAUTION!**

**Dryer will remain pressurized.**

## **SECTION 7**

### **7.5 SHUT-DOWN IN CASE OF A FAULT OR FOR MAINTENANCE**



#### **DANGER!**

**Before any kind of maintenance or repair work is done, the adsorption dryer must be depressurized and disconnected from the power source.**

**Apply the general safety regulations!**



#### **Advices**

The following sequence is to be heeded when switching off the adsorption dryer:

1. Wait until dryer is in repress
2. Then switch off
3. Close all the shut off valves up and downstream of the adsorption dryer
4. Depressurize the dryer by using the hand valve mounted at the bottom of the after-filter.

### **7.6 RE-STARTING**

1. Close the hand valve mounted at the bottom of the after-filter.
2. Slowly open the inlet isolation valve and pressurize the adsorption dryer up to the regular operating pressure by keeping the shut off valve mounted behind the after-filter closed
3. Switch on the unit once again
4. If the adsorption dryer is re-started after a long standstill, proceed as in 3.1.



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**SECTION 8**

**ANNEX**

**1.      CHEMICAL PRODUCT AND COMPANY DESCRIPTION**

**Sullair Corporation**

3700 East Michigan Boulevard – Michigan City, Indiana 46360 - USA

**Emergency Phone numbers:**

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT  
CONTACT: (1) (514) 848-1454

**For Product Information:**

Tel: (1) 800-SULLAIR (USA only) or (1) 219-874-1273

Fax Parts: (219) 874-1273 / Fax Service: (219) 874-1805

**Product Use:** DRYING AGENT, CATALYST SUPPORT, GAS PURIFICATION

**Chemical Name or Synonym:** ACTIVATED ALUMINA (GRADES A, D & P)

**Molecular Formula:** Al<sub>2</sub>O<sub>3</sub>

**2.      COMPOSITION / INFORMATION ON INGREDIENTS**

<b>Component</b>	<b>CAS Reg. Number</b>	<b>WHMIS Hazard</b>	<b>Percentage</b>
ALUMINA	1344-28-1	Y	> 93
WATER	7732-18-5	N	Balance

**3.      HAZARDS IDENTIFICATION**

**A.      EMERGENCY OVERVIEW:**

**Physical Appearance and Odour:**

White powder solid, odourless

**Warning Statements:**

DUSTS IN HIGH CONCENTRATIONS MAY CAUSE SKIN, EYE AND RESPIRATORY TRACT IRRITATION.

**B.      POTENTIAL HEALTH EFFECTS:**

**Acute Eye:**

Causes foreign body irritation only.

**3.            HAZARDS IDENTIFICATION (Continued)****B.      POTENTIAL HEALTH EFFECTS: (Continued)****Acute Skin:**

Non-irritating. Skin absorption not likely

**Acute Inhalation:**

Low acute inhalation toxicity. May cause lung irritation, shortness of breath, chest pain.

**Acute Ingestion:**

Low acute oral toxicity. May cause constipation.

**Chronic Effects:**

This product does not contain any ingredient designated by IARC, NTP, ACGIH or OSHA as probable or suspected human carcinogens.

**4.            FIRST AID MEASURES****FIRST AID MEASURES FOR ACCIDENTAL:****Eye Exposure:**

Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Seek medical attention if irritation develops or persists or if visual changes occur.

**Skin Exposure:**

In case of contact, wash with plenty of soap and water. Seek medical attention if irritation develops or persists.

**Inhalation:**

If respiratory irritation or distress occurs remove victim to fresh air. Seek medical attention if respiratory irritation or distress continues.

**Ingestion:**

No harmful effects expected. If appreciable quantities are swallowed, call a physician or poison control centre. Do not leave victim unattended.

**MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:**

Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis. Skin contact may aggravate existing skin disease.

**NOTES TO PHYSICIAN:** All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Treat symptomatically. No specific antidote available.



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**5      FIRE FIGHTING MEASURES**

**FIRE HAZARD DATA:**

**Flash Point:** Not Applicable

**Extinguishing Media:**

Not combustible. Use extinguishing method suitable for surrounding fire.

**Special Fire Fighting Procedures:**

Fire-fighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

**Unusual Fire and Explosion Hazards:** Not combustible.

**Hazardous Decomposition Materials (Under Fire Conditions):** None known

**6      ACCIDENTAL RELEASE MEASURES**

**Evacuation Procedures and Safety:**

**Containment of Spill:**

Follow procedure described below under Cleanup and Disposal of Spill.

**Cleanup and Disposal of Spill:**

Scrape up and place in appropriate closed container (see Section 7: Handling and Storage)

**Environmental and Regulatory Reporting:**

Do not flush to drain

**7.      HANDLING AND STORAGE**

**Minimum/Maximum Storage Temperatures:** Not available

**Handling:**

Avoid direct or prolonged contact with skin and eyes. Avoid breathing dusts.

Dry powders can build static electricity charges when subjected to the friction of conveying, mixing or sliding. Provide adequate precautions, such as electrical grounding, or inert atmospheres when material is used in the presence of flammable materials to prevent ignition.

**Storage:**

Store in an area that is clean, dry, store in tightly closed containers. Store in original container.



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**8.      EXPOSURE CONTROLS / PERSONAL PROTECTION**

**Introductory Remarks:**

These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. While developing safe handling procedures, do not overlook the need to clean equipment and piping systems for maintenance and repairs. Waste resulting from these procedures should be handled in accordance with Section 13: Disposal Considerations.

Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

**Exposure Guidelines:**

Exposure limits represent regulated or recommended worker breathing zone concentrations measured by validated sampling and analytical methods, meeting the regulatory requirements. The following limits apply to this material, where, if indicated, S= skin and C= ceiling limit:

**ALUMINA**

	<b>Notes</b>	<b>TWA</b>	<b>STEL</b>
ACGIH		10 mg/cu. m	

**Engineering Controls:**

Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures: general area dilution/exhaust ventilation, local exhaust ventilation at the point of generation.

**Respiratory Protection:**

When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

Under normal conditions, in the absence of other airborne contaminants, the following devices should provide protection from this material up to the conditions specified by the appropriate OSHA, WHMIS or ANSI standard(s): Air-purifying (half-mask/full-face) respirator with cartridges/canister approved for use against dusts, mists and fumes.

**Eye/Face Protection**

Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.

It is generally regarded as good practice to wear a minimum of safety glasses with side shields when working in industrial environments.



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**8.                    EXPOSURE CONTROLS / PERSONAL PROTECTION (Continued)**

**Skin Protection**

Skin contact should be minimized through use of gloves and suitable long-sleeved clothing (i.e. shirts and pants). Consideration must be given both to durability as well as permeation resistance.

**Work Practice Controls:**

Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material:

- (1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
- (2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics or using the toilet.
- (3) Wash exposed skin promptly to remove accidental splashes of contact with this material.

**9.                    PHYSICAL AND CHEMICAL PROPERTIES**

Physical and chemical properties here represent typical properties of this product. Contact the business area using the Product Information phone number in Section 1 for its exact specifications.

**Physical Appearance:**

White powder solid

**Odour:** Odourless

**pH:** Not Applicable

**Specific Gravity:** Not Available

**Density:**

3.3 g/ml at 25°C (77°F).

**Water Solubility:** Insoluble

**Melting Point Range:**

2050°C (3722°F)

**Boiling Point Range:** Not Available

**Vapor Pressure:**

1 mmHg at 2158°C (3916°F)

**Vapor Density:** Not Available

**Molecular Weight:** 101.96



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**10.      STABILITY AND REACTIVITY**

**Chemical Stability:**

This material is stable under normal handling and storage conditions described in Section 7.

**Conditions to be avoided:**

Dusting conditions

**Materials/Chemicals to be avoided:**

Strong bases

Strong acids

**The Following Hazardous Decomposition Products Might Be Expected:**

**Decomposition Type:** thermal - None known

**Hazardous Polymerization Will Not Occur.**

**Avoid the Following to Inhibit Hazardous Polymerization:** not applicable

**11.      TOXICOLOGICAL INFORMATION**

**Acute Eye Irritation:** No test data found for product.

**Acute Skin Irritation:** No test data found for product.

**Acute Dermal Toxicity:** No test data found for product.

**Acute Respiratory Irritation:** No test data found for product.

**Acute Inhalation Toxicity:** No test data found for product.

**Acute Oral Toxicity:** No test data found for product.

**Chronic Toxicity:**

This product does not contain any substances that are considered by OSHA, NTP, IARC, or ACGIH to be "probable" or "suspected" human carcinogens.

No additional test data found for product.

**12.      ECOLOGICAL INFORMATION**

**Ecotoxicological Information:** No data found for product.

**Chemical Fate Information:** No data found for product.



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**13.      DISPOSAL CONSIDERATIONS**

Waste Disposal Method:

Waste Management options should first consider possible re-use or recycling opportunities. Some provinces have active "Waste Exchange" networks for re-use and recycling of wastes. Contact your local waste management companies to explore available options. All waste management activities must obey local, provincial and federal regulations. Possible disposal methods include the following:

Stabilize and solidify this material with compatible binders. Then place in a secure landfill.

**Container Handling and Disposal:**

Rinse containers before disposal.

**14.      TRANSPORTATION INFORMATION**

**Transportation Status:**

The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

**TDG Status:**

Shipping Name: NON DANGEROUS

**IMO Status:**

Shipping Name: NOT REGULATED

**IATA Status:**

Shipping Name: NOT REGULATED

**15.      REGULATORY INFORMATION**

**Inventory Status**

<b>Inventory</b>	<b>Status</b>
CANADA (DSL)	Y

**WHMIS Classification:** NOT CONTROLLED

This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and the MSDS contains all the information required by the CPR.



**ACTIVATED ALUMINA (GRADES A, D & P)**

**Material Safety Data Sheet      Date Prepared: Oct/22/97 - Supersedes Date: Feb/06/95**

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**16.      OTHER INFORMATION**

**National Fire Protection Association Hazard Ratings - NFPA (R):**

- 0      Health Hazard Rating -- Minimal
- 0      Flammability Rating -- Minimal
- 0      Reactivity Rating -- Minimal

**National Paint & Coating Hazardous Materials Identification System - HMIS (R):**

- 0      Health Hazard Rating -- Minimal
- 0      Flammability Rating -- Minimal
- 0      Reactivity Rating -- Minimal

**Key Legend Information:**

- ACGIH -      American Conference of Governmental Industrial Hygienists
- OSHA -      Occupational Safety and Health Administration
- TLV -      Threshold Limit Value
- PEL -      Permissible Exposure Limit
- TWA -      Time Weighted Average
- STEL -      Short Term Exposure Limit
- NTP -      National Toxicology Program
- IARC -      International Agency for Research on Cancer

**Disclaimer:**

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End of page 8

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