



# Ingersoll-Rand®

**Heaterless Desiccant Adsorbent Compressed Air Dryer  
Models TZ730 to TZ1710**

## User Manual

**This dryer configuration includes equipment options as selected (X) below:**

- EMS OPTION
- LDP OPTION
- 3V OPTION

More Than Air. Answers.

Online answers: <http://www.air.irco.com>

Phone : 1-800-526-3615

**Form: APDD 789**  
**CCN: 38019691**  
Z103155 Rev. 08



## **FOREWORD**

Reading this user manual will fully familiarize you with the **Ingersoll-Rand®** adsorption dryer. You will be better able to run this equipment in accordance with its intended use.

This manual contains important information for safe, proper and economic dryer installation, start-up, operation and maintenance. Always keep it within reach where the adsorption dryer is being used.

It is necessary to follow all instructions as written. Careful reading will avert danger, avoid unnecessary downtime and minimize work for yourself and wear on the equipment.

In addition to carefully reading this technical manual in its entirety, you must understand your National, State and local rules and regulations regarding safety in the workplace, their necessary precautions and procedures.

Each person responsible for the set-up, start-up, operation, maintenance or repair of this adsorption dryer must have first read and understood this user manual – including all the safety tips.

***NOTE: Ingersoll-Rand® recommends that installation, start-up and maintenance be carried out by its factory-trained technicians in a regularly scheduled, site-dedicated program. This will ensure the safety of personnel, the integrity of equipment and the surety of warranty coverage.***



## TABLE OF CONTENTS

<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 GENERAL.....	1
1.2 PRODUCT INFORMATION.....	1
1.2.1 Pressure Vessel Regulations.....	2
1.2.2 Airtightness Test.....	2
1.3 SAFETY INSTRUCTIONS.....	2
1.3.1 Identification of Signs and Symbols in this Manual.....	2
1.3.2 General Safety Tips for Assembly, Inspection and Maintenance.....	3
1.4 TECHNICAL DATA SHEET.....	4
1.5 OVERLOADING.....	5
1.6 TRANSPORT.....	5
1.7 STORAGE.....	5
1.8 USE OF A PREFILTER AND AFTERFILTER.....	5
<b>2. INSTALLATION</b> .....	<b>7</b>
2.1 GENERAL.....	7
2.2 ELECTRICAL CONNECTION.....	7
2.3 FILTERS.....	7
2.4 PURGE EXHAUST.....	8
<b>3. EQUIPMENT OPERATION</b> .....	<b>9</b>
3.1 GENERAL OPERATING PRINCIPLES.....	9
3.2 OPERATOR CONTROLS.....	10
3.3 INITIAL START-UP.....	10
3.4 SHORT-TERM SHUT-DOWN.....	11
3.5 SHUT-DOWN IN CASE OF A FAULT OR FOR MAINTENANCE.....	11
3.6 RESTARTING.....	12
<b>4. MAINTENANCE</b> .....	<b>13</b>
4.1 CHECKLIST.....	13
4.1.1 Daily Check.....	13
4.1.2 Weekly Check.....	13
4.1.3 Whichever Is First: After 2,500 Operating Hours or Annually.....	14
4.2 CHANGING THE FILTER ELEMENT.....	14
4.3 REPLACEMENT OF THE DESICCANT.....	14
4.4 CHANGING THE PURGE REGENERATION ORIFICE.....	15
<b>5. SPARE PARTS LIST</b> .....	<b>17</b>
5.1 SPARE PARTS LIST FOR DRYER SERIES TZ730 TO TZ1050.....	17
5.2 SPARE PARTS LIST FOR DRYER SERIES TZ1200 TO TZ1710.....	18
<b>6. FAULTS AND TROUBLESHOOTING</b> .....	<b>19</b>
6.1 DEW POINT TOO HIGH.....	19
6.2 VESSELS DO NOT SWITCH OVER.....	19
<b>7. DRAWINGS</b> .....	<b>21</b>
<b>APPENDIX A – MSDS: ACTIVATED ALUMINA</b> .....	<b>A-1</b>
<b>APPENDIX B – DRYER OPERATING SEQUENCE</b> .....	<b>B-1</b>
<b>APPENDIX C – DRYER FLOW CAPACITY &amp; PURGE ADJUSTMENT</b> .....	<b>C-1</b>



## 1. INTRODUCTION

### 1.1 GENERAL

This adsorption dryer includes the latest technology and safety features. Its use, however, can endanger life and limb and can lead to considerable damage to the equipment and other material assets if:

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

Furthermore, ignorance of its use and proper service can result in the loss of any claim for damage.

This adsorption dryer is designed for neutral media (such as air or nitrogen) which is free of aggressive water, oil and solid elements. **Ingersoll-Rand®** accepts no liability for corrosion damage or malfunctions caused by aggressive media.

Applications other than those mentioned in this manual must be agreed to by **Ingersoll-Rand®** and confirmed in writing.

**Ingersoll-Rand®** reserves the right to make changes at any time as may be necessary for increasing safety or efficiency, or In the interests of further development.

### 1.2 PRODUCT INFORMATION

The adsorption dryer is used for the purpose of drying compressed air and other gases according to its contracted design. Depending on certain conditions at the inlet, it provides pure, dry and oil-free compressed air or gases. The standard model of adsorption dryer is equipped with two desiccant vessels and a prefilter and afterfilter.

This standard model of dryer does not include an Energy Management System (EMS) to provide automatic monitoring and control of the work/regeneration cycle to optimize equipment efficiency. It is optionally available for retrofit if required. This manual also includes references to optionally available Low Dew Point (LDP) and 3V (bypass) systems/assemblies which may or may not be provided. Selected options included with this dryer are indicated on the cover page by an "X" mark in the box.

### 1.2.1 PRESSURE VESSEL REGULATIONS

The pressure vessels are designed and built to meet the American Society of Mechanical Engineers (ASME) standards. They fulfill the test of the certifying procedure and carry the ASME symbols **U** or **UM**.

#### RANGE OF APPLICATION

Design Pressure	Max: 150 psig
Design Temperature	Max: 500 °F (260 °C) Min: -20 °F (-29 °C)

### 1.2.2 AIRTIGHTNESS TEST

Each **Ingersoll-Rand**® adsorption dryer is subjected to, and must pass, an airtightness test prior to shipment.

## 1.3 SAFETY INSTRUCTIONS

This technical manual contains basic tips which must be followed during set-up, operation and servicing. It is 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. It must always be within reach at the place where the adsorption dryer is being used.

### 1.3.1 IDENTIFICATION OF SIGNS AND SYMBOLS IN THIS MANUAL

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



**Danger! / Attention!**

Safety sign in accordance with DIN 4844 - W9



**Warning – high 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.



### 1.3.2 GENERAL SAFETY TIPS FOR ASSEMBLY, INSPECTION AND MAINTENANCE

The purchaser is to ensure that all assembly, maintenance and inspection work is carried out by personnel qualified to do it.

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



#### **Attention!**

- Never make structural changes to the adsorption dryer
- Only use recommended spare parts as listed in section 5
- Never weld on a pressure vessel or change it in any way
- Carry out maintenance only when the adsorption dryer is OFF, depressurized and disconnected from the electric power supply.



#### **Danger!**

- Refer to the desiccant Material Safety Data Sheet (MSDS) when installing or disposing of desiccant (see Appendix A)
- Wear protective goggles when working with the desiccant
- 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 whenever handling desiccant.

### 1.4 TECHNICAL DATA SHEET

Model	TZ730	TZ820	TZ1050	TZ1200	TZ1450	TZ1710
Medium	Air free of aggressive elements					
Flange (150#) Connection	3 inches	3 inches	3 inches	3 inches	3 inches	4 inches
STD flow capacity ( <sup>1</sup> ) SCFM	730	820	1050	1200	1450	1710
LDP flow capacity ( <sup>1</sup> ) SCFM	511	574	735	840	1015	1197
	Desiccant					
Standard	Input temp from 100°F and dew point ( <sup>2</sup> )-40°F Filled with activated alumina					
LDP Dryers	Input temp from 100°F and dew point ( <sup>2</sup> ) -100°F Filled with activated alumina					
Desiccant Quantity Per Chamber (pounds)	405	460	600	700	800	952
Filter Size	1100	1100	1100	1380	1380	2100
Control	Printed Circuit Board					
	Operating Electrical Power					
Standard	120 Vac / 60 Hz					
Special Voltage	Consult factory					
	Drying Time					
Standard	5 min					
LDP Dryers	2 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 EMS:**

- Standard dryers: EMS Control -40°F (-40°C) / High humidity -35°F (-35°C)
- LDP Dryers: EMS Control -100°F (-74°C) / High humidity -95°F (-69°C)

## 1.5 OVERLOADING



### **Attention!**

#### **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 minimum operating pressure is undercut
- The prefiltration and separation of impurities are not sufficient
- Introduction of oil into the air stream.

## 1.6 TRANSPORT

Immediately upon delivery of the adsorption dryer, it must be checked for any damage that may have occurred during transport. If necessary, the damage must be recorded on the shipping waybill/receipt. Liability for such damage usually rests with the shipper. Contact **Ingersoll-Rand®** to arrange for any required service or replacement parts.



### **Attention!**

For transport within the company, only the skids of the adsorption dryers may be used for lifting. Lifting at any other points on the equipment will void the warranty and damage the equipment.

## 1.7 STORAGE

If the adsorption dryer is to be stored for a long period of time, its place of storage must be dry and free of dust. The ambient temperature cannot go below 33°F (+1°C).

## 1.8 USE OF A PREFILTER AND AFTERFILTER

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

Both filters are equipped with a differential pressure indicator as this ensures a direct display of the degree of contamination of the filter elements.



## 2. INSTALLATION

### 2.1 GENERAL

Ensure that the installation site is free of dust, dirt and litter. The site floor must be level and strong enough to support the equipment. The site itself must ensure that the equipment will not, under any circumstances, freeze.

Ensure that the **Ingersoll-Rand®** adsorption dryer is carried only by its skid base frame. The adsorption dryers must be positioned so that the side from which it is to be operated is easily accessible. The upstream piping is to be connected at a slightly downward slope toward the prefilter. Install shut-off valves on the inlet to the prefilter and outlet of the afterfilter. Also, a bypass pipe with an additional shut-off valve should be mounted onto the adsorption dryer to allow for an uninterrupted supply of compressed air when the adsorption dryer requires maintenance or repair. The bypass assembly is not provided: it is optionally available or can be customer furnished. If vibrations occur at the installation site, the adsorption dryer skid frame must be placed onto vibration dampers to avoid wearing down the desiccant by friction.

### 2.2 ELECTRICAL CONNECTION

Since the adsorption dryer has already been completely internally wired at the factory, the customer only has to connect the power supply cable to the terminal strip according to the supplied wiring diagrams (see section 7).



#### **Warning – high voltage!**

Be sure that power is removed from the line feed before making connection between the site drop and the equipment.

This **Ingersoll-Rand®** adsorption dryer is normally controlled with a printed circuit board. The set times are adjusted at the factory during the test run. **Do not change these adjustments!**

**NOTE: Contact Ingersoll-Rand® at 1 800 526-3615 if you have any questions.**

### 2.3 FILTERS

If not already factory installed, you must install the prefilter and afterfilter assemblies where the air or gas temperature is lowest:

- The piping system must be cleaned.
- The filters must be installed vertically.
- An arrow on the upper part of the housing marks the direction of flow.

- Sufficient free space must be left below the filter housing to allow removal of the filter bowl when changing filter elements.

## **2.4 PURGE EXHAUST**

The purge exhaust may be piped to an open vent. Noise levels at the dryer may be reduced by extending the purge exhaust piping to a remote location. Refer to the purge piping selection chart below to prevent backpressure build-up.

### EXTENDED LENGTH PIPE SIZE REQUIRED

TO 10 FEET	SAME SIZE AS DRYER EXHAUST
TO 25 FEET	1 SIZE LARGER THAN DRYER EXHAUST
TO 50 FEET	2 SIZES LARGER THAN DRYER EXHAUST
TO 100 FEET	3 SIZES LARGER THAN DRYER EXHAUST

Extending purge exhaust piping must not affect the back pressure of a chamber being regenerated. A pressure reading of 3-psig is considered too high for the dryer to regenerate efficiently.

## **3. EQUIPMENT OPERATION**

### **3.1 GENERAL OPERATING PRINCIPLES**

This **Ingersoll-Rand®** dryer has two parallel adsorption chambers filled with desiccant. While the medium is being dried flowing bottom-up in one chamber, regeneration of the desiccant takes place from the top down in the other chamber. The changeover from one chamber to the other is controlled by an Energy Management System (EMS) that monitors desiccant performance by measuring the outlet air dew point. It can operate continuously and is fully automatic.

The standard (STD) dryer has a cycle time of 10 minutes. Dryers with the Low Dew Point (LDP) option have a 4-minute cycle time. In each case, half the cycle time is dedicated to air drying work and the other half to desiccant regeneration, with one chamber working to dry the air while the other regenerates. The cycle time affects air flow and air quality. The longer cycle time allows greater saturation of the desiccant, thereby decreasing its drying capacity over the period of the cycle. The faster cycling provided with the LDP option ensures that the desiccant is regenerated more frequently, thereby enhancing its drying performance. The dryer is configured at the factory. The principles of operation are the same for both the STD and the LDP dryer.

Wet air enters the working desiccant chamber (it can be either the left or right) at the inlet switching valve (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 the working chamber, a portion of the dry air (i.e., purge air) is diverted to the regenerating chamber. That purge air, at near atmospheric pressure, will remove previously adsorbed moisture as it flows downward through the desiccant bed and exits through the purge exhaust muffler.

The purge air is controlled by a purge adjusting valve and purge orifices located in the purge line. Purge pressure is indicated on the purge pressure gauge. Refer to Appendix C for instructions on adjusting the purge rate.

Near the end of each half cycle, the chamber being regenerated will be repressurized. For this to occur, the exhaust valve of the chamber being regenerated closes while purge air continues to flow. Repressurizing 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 filter elements.

Chamber switchover takes place when both towers are fully pressurized. This minimizes desiccant movement which, in turn, minimizes creation of dust.

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

This dryer is designed to provide a specific pressure dewpoint performance (generally -40°F (-40°C)) at worst-case operating conditions (maximum flow at lowest pressure and highest inlet temperature). The regeneration purge flow rate required for the dryer is adjusted to achieve that dewpoint based on those 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 EMS controls have been factory programmed to monitor the dryer outlet dewpoint so that regeneration will only begin when low desiccant performance registers.

### 3.2 OPERATOR CONTROLS

The operator electrical control panel features the following indicators/controls:

- Dryer nameplate
- Three-way selector switch:
  - DRYER OFF
  - DRYER ON
  - EMS ON (not functional on standard, non-EMS-equipped dryers)

There are shutoff valves on the prefilter, dryer chambers and afterfilter. They are operated manually. There is another shutoff valve on dryers with the 3V option (i.e., bypass assembly – see paragraph 1.2).

There are two filters. The lower filter (i.e., prefilter) housing has a differential pressure indicator (DPI) and an automatic drain. The upper filter (i.e., afterfilter) housing has a DPI and vent valve.

Each chamber has a chamber relief valve at the top, a pressure gauge and desiccant fill/drain (top/bottom) ports.

### 3.3 INITIAL START-UP



#### **Attention!**

**All pipes and wire connections must 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 prefilter, adsorption dryer, afterfilter and on the bypass line (if installed) should be closed.
- The ambient temperature must not be less than 33°F.



**NOTE: Breakdown resulting from faulty installation does not fall under the Ingersoll-Rand® warranty obligation.**

Perform the following tasks in sequence for the initial start-up:

- Remove purge exhaust mufflers for the initial 1 to 2 hours of operation
- Slowly open the inlet valve and observe the pressure build-up on the chamber pressure gauge of the adsorption dryer. An abrupt pressure build-up is to be avoided
- Turn the switch to the DRYER ON position.
- The adsorption dryer must be powered approximately 3 to 4 hours with the shut-off valve behind the afterfilter closed. This regenerates the desiccant.
- After the regeneration phase, open the shut-off valve behind the afterfilter slowly while observing the chamber pressure gauge. If the shut-off valve is opened abruptly, it could put a stress on the system.

***The adsorption dryer is now ready for operation and functions continuously and fully automatically.***

### 3.4 SHORT-TERM SHUT-DOWN

Follow this sequence when switching off the adsorption dryer:

- First close all the shutoff valves up- and downstream of dryer
- Then immediately switch DRYER OFF.



**Danger!**

Dryer will remain pressurized.

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

Follow this sequence when switching off the adsorption dryer:

- First close all the shutoff valves up- and downstream of the adsorption dryer,
- Depressurize the dryer by using the hand valve mounted at the bottom of the afterfilter,
- Then immediately switch DRYER OFF.



**Danger!**

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

### **3.6 RESTARTING**

- Close the hand valve mounted at the bottom of the afterfilter
- Slowly open the inlet isolation valve and pressurize the adsorption dryer up to the regular operating pressure by keeping closed the shutoff valve mounted behind the afterfilter
- Switch DRYER ON.

**NOTE:** *If the dryer is restarted after a long standstill, proceed as for an initial start-up (see paragraph 3.3).*

## **4. MAINTENANCE**

### **4.1 CHECKLIST**

These checks are to be carried out by the operator during the routine operations cycle.

#### **4.1.1 DAILY CHECK**

- Carry out a general visual check of fittings, listen for a whistle which may identify an air leak, and watch out for changes in indicated values during operation
- Check the silica gel outlet moisture indicator:
  - Blue indicates an approximate dew point of -13°F
  - Pink indicates an approximate dew point of 32°F
  - Transparent indicates an approximate dew point of 59°F.
- Check function by manually operating the automatic condensate drain on the prefilter.

***NOTE: Should the need for spare parts or service arise during work on the adsorption dryer, then the dryer type and its construction must be conveyed to Ingersoll-Rand®. This information is given on the nameplate mounted on the electric cabinet. Telephone 1-800-526-3615 to arrange for maintenance support.***

#### **4.1.2 WEEKLY CHECK**

- Check the differential pressure on the prefilter, which should not exceed 5 psi(d). Values greater than this indicate that the filter must be changed (see paragraph 4.2).
- Check the differential pressure on the afterfilter, which should not exceed 5 psi(d). Values greater than this indicate that the filter must be changed.
- Check the pressure of the regenerating vessel during regeneration after depressurization. Any back pressure caused by blocked exhaust mufflers will show there. Back pressure on the regenerating tower should not exceed 3 psig.
- Drain pilot filter/moisture indicator housing of any condensate.

### 4.1.3 WHICHEVER IS FIRST: AFTER 2,500 OPERATING HOURS OR ANNUALLY

- Check the desiccant for impurities and change it if necessary (see paragraph 4.3). A brownish/yellowish tone indicates that it has been soiled with oil. The desiccant has a normal lifetime of about 10,000 operating hours.
- Check the outlet desiccant screens installed in the unit and, if necessary, clean them.
- Check the function of the inlet valve assembly by sending electrical control signals.
- Check the seat gaskets on the outlet check valves.
- Replace the dewpoint sensor humidity probe (return the original for calibration).

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

## 4.2 CHANGING THE FILTER ELEMENT

- The filter element within the filter housing must be replaced when a differential pressure of greater than 5 psi(d) has been reached or after one year of operation
- Depressurize the dryer and switch DRYER OFF



### **Danger!**

Change filter elements only when the housing is fully depressurized

- Separate the lower part of the housing from the upper part
- Loosen and remove the element by hand
- Install the new filter and the O-ring gasket, making sure that the filter seats perfectly
- Refit the filter housing.

**NOTE:** *Filter elements cannot be cleaned or reused.*

## 4.3 REPLACEMENT OF THE DESICCANT

Desiccant life is determined by the quality of inlet air. Proper filtering of inlet air will extend the life of the desiccant. In order to ensure trouble-free operation, we recommend replacing the desiccant every 10,000 operating hours, or at least every 3 years.

Refer to paragraph 1.4 to determine the desiccant quantity required for your model of dryer.

- Close dryer inlet/outlet isolation valves
- Depressurize and switch DRYER OFF

**Danger!**

- Wear protective equipment when handling desiccant
  - Understand the danger by studying the Material Safety Data Sheet provided in Appendix A.
- Remove the drain plug and empty the old desiccant into a container

**Danger!**

- Desiccant may contain pollutants.
  - Desiccant is to be disposed of in accordance with National, State and local regulation.
- Screw the plug back in and fill with new desiccant from above (one-half quantity per chamber)
  - Start the dryer in accordance with paragraph 3.3 for initial start-up.

#### **4.4 CHANGING THE PURGE REGENERATION ORIFICE**

- Depressurize and switch DRYER OFF
- The two regeneration orifices 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
- Replace and verify all tubing compression nuts are properly secured.

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



## 5. SPARE PARTS LIST

### 5.1 SPARE PARTS LIST FOR DRYER SERIES TZ730 TO TZ1050

Description	TZ730		TZ820		TZ1050	
	Part #	Qty	Part #	Qty	Part #	Qty
<b>Consumables</b>						
Prefilter ( Element Only )	Consult	1	Consult	1	Consult	1
Afterfilter ( Element Only )	Factory	1	Factory	1	Factory	1
Moisture Indicator	38016713	1	38016713	1	38016713	1
Activated Alumina – Pounds	38335253	810	38335253	920	38335253	1200
Muffler	38328175	2	38328175	2	38328175	2
<b>Inlet Valve</b>						
Inlet Valves Kit	38438875	1	38438875	1	38438875	1
Solenoid Block	38049573	1	38049573	1	38049573	1
Inlet Valve	38438842	2	38438842	2	38438842	2
<b>Outlet Valve</b>						
Check Valve Kit	38436879	1	38436879	1	38436879	1
Gasket, 3-inch	38027769	4	38027769	4	38027769	4
Check Valve	38015673	2	38015673	2	38015673	2
<b>Purge Valve</b>						
Purge Valve Kit	38331708	2	38331708	2	38331708	2
Solenoid Block	38049565	1	38049565	1	38049565	1
Purge Valve	38331690	2	38331690	2	38331690	2
<b>Drains</b>						
Drain Kit	Consult Factory					
<b>3V Bypass Option</b>						
Manual Buitterfly Valve Kit	38049599	3	38049599	3	38049599	3
Gasket, 3-inch	38027769	4	38027769	4	38027769	4
Bypass Valve	38049581	3	38049581	3	38049581	3
<b>Control</b>						
Power Selector Switch	38433819	1	38433819	1	38433819	1
PCB Assembly	38438685	1	38438685	1	38438685	1
<b>Replacement Parts</b>						
Pressure Gauge	38006425	3	38006425	3	38006425	3
Relief Valve	38006532	2	38006532	2	38006532	2
Solenoid Valve Connection Cable	38438669	4	38438669	4	38438669	4

## 5.2 SPARE PARTS LIST FOR DRYER SERIES TZ1200 TO TZ1710

Description	TZ1200		TZ1450		TZ1710	
	Part #	Qty	Part #	Qty	Part #	Qty
<b>Consumables</b>						
Prefilter ( Element Only )	Consult	1	Consult	1	Consult	1
Afterfilter ( Element Only )	Factory	1	Factory	1	Factory	1
Moisture Indicator	38016713	1	38016713	1	38016713	1
Activated Alumina – Pounds	38335253	1400	38335253	1600	38335253	1904
Muffler	38328175	2	38328175	2	38328175	2
<b>Inlet Valve</b>						
Inlet Valves Kit	38438875	1	38438875	1	38438875	1
Solenoid Block	38049573	1	38049573	1	38049573	1
Inlet Valve	38438842	2	38438842	2	38438842	2
<b>Outlet Valve</b>						
Check Valve Kit	38436879	1	38436879	1	38436879	1
Gasket, 3-inch	38027769	4	38027769	4	38027769	4
Check Valve	38015673	2	38015673	2	38015673	2
<b>Purge Valve</b>						
Purge Valve Kit	38331708	2	38331708	2	38331708	2
Solenoid Block	38049565	1	38049565	1	38049565	1
Purge Valve	38331690	2	38331690	2	38331690	2
<b>Drains</b>						
Drain Kit	Consult Factory					
<b>3V Bypass Option</b>						
Manual Buitterfly Valve Kit	38049599	3	38049599	3	38049607	3
Gasket	38027769	4	38027769	4	38329637	4
Bypass Valve	38049581	3	38049581	3	Consult Factory	
<b>Control</b>						
PCB Assembly	38438685	1	38438685	1	38438685	1
Power Selector Switch	38433819	1	38433819	1	38433819	1
<b>Replacement Parts</b>						
Pressure Gauge	38006425	3	38006425	3	38006425	3
Relief Valve	38006532	2	38006532	2	38006532	2
Solenoid Valve Connection Cable	38438669	4	38438669	4	38438669	4



## 6. FAULTS AND TROUBLESHOOTING

### 6.1 DEW POINT TOO HIGH

POSSIBLE CAUSE	SOLUTION
Operating pressure too low, air flow volume 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 prefilter is too high	Replace filter element
Condensate drain is not functioning	Check operation of the condensate drain and replace if necessary
Desiccant is soiled or has disintegrated	Replace the prefilter element and the desiccant. Dispose of the old desiccant. Check the afterfilter



**Danger!**

- Wear protective equipment when handling desiccant
- Understand the danger by studying the Material Safety Data Sheet provided in Appendix A.

Volume of regeneration gas too low	Check regeneration orifice for soiling, clean if necessary; check operation of muffler and depressurization valve, replace if necessary.
------------------------------------	--

### 6.2 VESSELS DO NOT SWITCH OVER

POSSIBLE CAUSE	SOLUTION
The inlet valve V1 (V2) does not open	Check the electrical functioning of the solenoids and replace either the solenoid or the complete valve assembly
The printed circuit board (PCB) does not function	Check functioning of the PCB and the fuse in the control cabinet
The vessel is not pressurized	Check whether the depressurization valves are dirty and replace these if necessary; Check the electrical functioning of the solenoids and replace either the solenoid or the complete valve assembly
The regeneration orifice is obstructed	Clean or replace the regeneration orifice

### 6.3 Back Pressure Too High During Regeneration

POSSIBLE CAUSE	SOLUTION
Muffler is soiled	Replace muffler
Inlet valve V3 (V4) cannot be completely opened	Check the depressurization valves, if they are dirty then clean or replace

**Attention!**

If you are not able to repair a fault, call Ingersoll-Rand® (1-800-526-3615) to arrange for service.

## **7. DRAWINGS**



## APPENDIX A – MSDS: ACTIVATED ALUMINA

### MATERIAL SAFETY DATA SHEET

#### ACTIVATED ALUMINA (ALL GRADES), SOLID

#### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Ingersoll-Rand Inc.  
800-A Beaty Street  
Davidson, North Carolina  
28036 - USA

WHMIS Number: 00062014  
Index: HCl0872/01B  
Effective Date: 2003 January 08  
Revision Date: 2003 January 08

#### EMERGENCY TELEPHONE NUMBER

1-514-861-1211

#### PRODUCT IDENTIFICATION

Product Name: Activated Alumina (All Grades), Solid.

Chemical Name: Aluminium Oxide.

Synonyms: Alumina; Aluminum Trioxide; Alumina Feedstock; Alumina Activated; Activated Alumina AA; Alumina 202 HF; Alumina AA-400; Alumina A2; Alumina A2 Dupont; Alumina A201; Alumina A203 CL; Alumina A204-4; Alumina A204-4E; Alumina A206; Alumina ABS; Alumina Bed Support; Alumina CL-750; Alumina D201; Alumina DD PG; Alumina DD2; Alumina DD 431; Alumina DD 432; Alumina DD447-165; Alumina DD450; Alumina DD 831; Alumina F200; Alumina Feedstock; Alumina PX 1; Alumina RF200; Alumina S201; Alumina S400; Alumina S431; Alumina S501; Alumina S2001; Alumina S-100 SR; Alumina Selexb CDO-200; Alumina Selexorb CD; Alumina Selexsorb CDX; Alumina Selexsorb CL-750; Alumina Selexsorb COS; Alumina Selexsorb SPCL; Alumina Spent A2 Dupont; Alumina Support Balls; Alumina T-162 Tabular; Alumina Tab. T-1061; Selexsorb CL-750; Selexsorb COS; A-1; A-2; A-201; A-202HF; A-206; A-300; A-302; A-305CS; 1/2" CBS; D-201; LCPP; S-200; S-201; S-2001; DrySep; A-203 (Cl); S-501, Claus Catalyst; Activated Alumina Grade A & AA; Alumina Desiccant; Catalit Alumina; Adsorbent Alumina; MMS-411-120 Aluminum Oxide.

Chemical Family: Inorganic Oxide.

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

Product Use: Catalyst. Drying agent. Abrasives. Chemical intermediate.

CAS #: 1344-28-1.

WHMIS Classification / Symbol: Not regulated. / Not required.

**READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.**

---

## 2. HAZARDS IDENTIFICATION

---

EMERGENCY OVERVIEW: Activated alumina adsorbs certain gases and liquids. While the alumina itself is principally inert, the bead/powder may exhibit properties of absorbed material. Dust is irritating to respiratory tract. Low hazard for usual industrial or commercial handling. May cause staining, metal fume fever, pulmonary fibrosis and pneumoconiosis. Can decompose at high temperatures forming toxic gases. Contents may develop pressure on prolonged exposure to heat.

---

### POTENTIAL HEALTH EFFECTS

The following health effects data pertains only to Activated Alumina. Activated alumina adsorbs certain gases and liquids. While the alumina itself is principally inert, the bead/powder may exhibit properties of absorbed material. (3)

. Inhalation: Product may be mildly irritating to the nose, throat and respiratory tract and may cause coughing and sneezing. Excessive contact with powder may cause drying of mucous membranes of nose and throat due to absorption of moisture and oils. May cause staining, metal fume fever, pulmonary fibrosis and pneumoconiosis. See "Other Health Effects" Section.

. Skin Contact: This product may cause irritation due to abrasive action. Excessive contact with powder may cause drying of the skin due to absorption of moisture and oils. May cause defatting, drying and cracking of the skin. May cause staining.

. Skin Absorption: Not likely to be absorbed through the skin.

. Eye Contact: This product may cause irritation, redness and possible damage due to abrasiveness. Excessive contact with powder may cause drying of mucous membranes of the eyes due to absorption of moisture and oils.

. Ingestion: This product may cause mild gastrointestinal discomfort. Ingestion of large amounts may cause intestinal obstruction.

Other Health Effects: Effects (irritancy) on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential.

May cause staining, metal fume fever, pulmonary fibrosis and pneumoconiosis. Metal fume fever can be caused by inhalation of fumes formed in the air from welding or heating the metal. Symptoms of metal fume fever occur about 4 to 12 hours after exposure and usually last about 24 hours. Recovery is complete with no apparent permanent disability. The symptoms resemble the "flu" and include: sweating, shivering, headache, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness and tiredness. (4)

A metallic or sweet taste in the mouth, dryness or irritation of the throat and coughing may occur at the time of exposure to the metal fumes. (4)

Some workers develop a short-term immunity so that repeated exposure to the fumes does not cause metal fume fever. This immunity is quickly lost after short absences from work (weekends or vacations). (4) Pneumoconiosis is the deposition of dust in the lungs and the tissue's reaction to its presence. When exposure to the dust is severe or prolonged, the lungs' defenses are overwhelmed.

A severe scarring of the lungs (fibrosis), referred to as Shaver's disease, has been associated with production of corundum abrasives which involved exposure to the fine airborne fumes of Aluminum Oxide and Silica. This disease worsens even after exposure has stopped and has caused death in serious cases. Exposure to Crystalline Silica or to the mixed dust is believed to be responsible. Early symptoms of the disease include cough, excessive mucous productions and shortness of breath upon exertion. Modern exposure controls have almost removed the threat of this disease. (4)

Evidence of scarring of the lungs (pulmonary fibrosis) has been reported among workers exposed to Aluminum Oxide dust or fume has, in some cases, been attributed to Aluminum Oxide exposure. However, some of the reports were individual cases, the exposure was usually mixed and other studies have failed to show similar effects. (4)

Some changes in the lung function and chest X-rays have also been observed in workers exposed to aluminum oxide. However, these changes have been attributed to chronic bronchitis related to excessive dust exposure and not specifically to Aluminum Oxide. (4)

Prolonged and repeated exposure to Aluminum may cause pulmonary fibrosis, numbness of the fingers and encephalopathy (a degenerative disease of the brain).

There may be a relationship between aluminum exposure and a brain disease which causes early senility (Alzheimer's Disease) but, at present, this is unproven and controversial. Asthma-like symptoms have been reported in refining aluminum materials and fumes from aluminum soldering. (4)

Ingestion of large amounts of Aluminum salts over a prolonged period of time may lead to phosphate deficiency, based on animal and human information. Prolonged ingestion of vary large amounts (several grams/day) may result in osteomalacia (softening and bending of the bones). (4)

---

### 3. COMPOSITION, INFORMATION ON INGREDIENTS

---

Hazardous Ingredients: : None according to Controlled Products Regulations.

---

<b>Non-Hazardous Ingredients</b>	<b>CAS No.</b>	<b>ACGIH TLV</b>	<b>%</b>
Aluminium Oxide	001344-28-1	10 mg/M3 as Al *A4	85 - 95
Calcium Oxide (Lime)	001305-78-8	2 mg/M3	5 - 10
Sodium Oxide	001313-59-3	Not Listed.	1 - 5
Water	007732-18-5	Not Listed.	Balance.

A4 = Not classifiable as a human carcinogen. (ACGIH-A4)

---

#### 4. FIRST AID MEASURES

---

##### FIRST AID PROCEDURES

The following recommendations pertain only to Activated Alumina.

. Inhalation: If respiratory problems arise, move the victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical advice IMMEDIATELY.

. Skin Contact: Start flushing while removing contaminated clothing. Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists and obtain medical advice.

. Eye Contact: Immediately flush eyes thoroughly for 5 minutes with running water. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention.

. Ingestion: Do not attempt to give anything by mouth to an unconscious person. If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomits, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.

Note to Physicians: Treat symptomatically. Medical conditions that may be aggravated by exposure to this product include diseases of the skin, eyes or respiratory tract.

---

#### 5. FIRE FIGHTING MEASURES

---

##### FLAMMABLE PROPERTIES

Flammability Class (WHMIS): Not regulated.

Flash Point (TCC, Deg. Celsius): Non-combustible (does not burn).

Autoignition Temperature (Deg. Celsius): Not applicable.

Flammability Limits in Air (%): LEL: Not applicable. UEL: Not applicable.

Hazardous Combustion Products: Thermal decomposition products are toxic and may include oxides of aluminum, calcium and irritating gases.

Unusual Fire or Explosion Hazards: Minimize air borne spreading of dust. Closed containers exposed to heat may explode. Spilled material may cause floors and contact surfaces to become slippery.

Sensitivity to Mechanical Impact: Not expected to be sensitive to mechanical impact.

Rate of Burning: Not available.

Explosive Power: Not available.

Sensitivity to Static Discharge: Not expected to be sensitive to static discharge.



#### EXTINGUISHING MEDIA

Fire Extinguishing Media: Use media appropriate for surrounding fire and/or materials.

#### FIRE FIGHTING INSTRUCTIONS

Instructions to the Fire Fighters: Spilled material may cause floors and contact surfaces to become slippery.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and protective clothing.

---

#### 6. ACCIDENTAL RELEASE MEASURES

---

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: Minimize air borne spreading of dust. Wear respirator, protective clothing and gloves. Avoid dry sweeping. Do not use compressed air to clean surfaces. Vacuuming or wet sweeping is preferred. Return all material possible to container for proper disposal. Do not allow to enter sewers or watercourses.

Any recovered product can be used for the usual purpose, depending on the extent and kind of contamination. Where a package (drum or bag) is damaged and / or leaking, repair it, or place it into an over-pack drum immediately so as to avoid or minimize material loss and contamination of surrounding environment. Replace damaged containers immediately to avoid loss of material and contamination of surrounding atmosphere.

Collect product for recovery or disposal. For release to land, or storm water runoff, contain discharge by constructing dykes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination. Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment. See Section 13, "Disposal Considerations".

---

#### 7. HANDLING AND STORAGE

---

##### HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices.

Minimize air borne spreading of dust. Sweep up immediately to eliminate slipping hazard.

Ventilation Requirements: See Section 8, "Engineering Controls".

Other Precautions: Use only with adequate ventilation and avoid breathing dusts. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

#### STORAGE

Storage Temperature (Deg Celsius): See below.

Ventilation Requirements: General exhaust is acceptable.

Storage Requirements: Store in a cool, dry and well-ventilated area. Keep away from heat, sparks and flames. Keep containers closed. Avoid moisture contamination. Prolonged storage may result in lumping or caking. Protect from direct sunlight. Protect against physical damage.

Special Materials to be Used for Packaging or Containers: Confirm suitability of any material before using.

---

#### 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

---

Recommendations listed in this section indicate the type of equipment which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

##### ENGINEERING CONTROLS

Engineering Controls: General exhaust is acceptable. Local exhaust ventilation preferred. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense dust may collect.

##### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye Protection: Safety glasses with side shields are recommended to prevent eye contact. Use chemical safety goggles when there is potential for eye contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from cotton, canvas, rubber or plastic should be impervious under conditions of use. Prior to use, user should confirm impermeability. Discard contaminated gloves.

Respiratory Protection: No specific guidelines available. A NIOSH/MSHA approved dust mask for concentrations of nuisance dust up to 100 mg/M3 particulate. An air-supplied respirator if concentrations are higher or unknown.

If, while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace

the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (4)

Other Personal Protective Equipment: Wear regular work clothing. The use of coveralls is recommended. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact.

#### EXPOSURE GUIDELINES

Recommended Exposure Limit: None established for this product.

	ACGIH TLV (STE)	OSHA PEL (TWA) (STEL)	NIOSH REL (TWA) (STEL)
Aluminum Oxide	----	15 mg/M3 as Al (Total dust)	----
Calcium Oxide (Lime)	----	5 mg/M3	2 mg/M3

#### 9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended for use as a Specification Sheet)

Physical State: Solid.  
Appearance and Odour: Dry, white granules: fine sized, beads pucks, or powder. Odorless.  
Odour Threshold (ppm): Not applicable.  
Boiling Range (Deg Celsius): 2,980.  
Melting/Freezing Point (Deg Celsius): 2,045 to 2,072.  
Vapour Pressure (mm Hg at 20 Deg. Celsius): Not applicable.  
Vapour Density (Air = 1.0): Not applicable.  
Relative Density (g/cc): 3.0 to 3.7.  
Bulk Density: 640 to 691 Kg/M3; 40 to 60 lb/ft3.  
Viscosity: Not applicable.  
Evaporation Rate (Butyl Acetate = 1.0): Not applicable.  
Solubility: Not soluble in water.  
% Volatile by Volume: 0 %.  
pH: Not available.  
Coefficient of Water/Oil Distribution: Not available.  
Volatile Organic Compounds (VOC): Not applicable.

#### 10. STABILITY AND REACTIVITY

##### CHEMICAL STABILITY

Under Normal Conditions: Stable.  
Under Fire Conditions: Not flammable.  
Hazardous Polymerization: Will not occur.

Conditions to Avoid: High temperatures, sparks, open flames and all other sources of ignition. Minimize air borne spreading of dust. Sweep up immediately to eliminate slipping hazard.

Materials to Avoid: Strong oxidizers. Lewis or mineral acids. Chlorine trifluoride. Ethylene Oxide. Vinyl Acetate.

Activated alumina adsorbs certain gases and liquids. While the alumina itself is principally inert, the bead/powder may exhibit properties of absorbed material. (3)

Decomposition or Combustion Products: Thermal decomposition products are toxic and may include oxides of aluminum, calcium and irritating gases.

---

## 11. TOXICOLOGICAL INFORMATION

---

Toxicological Data: None established for this product.

Aluminium Oxide                      Meaningful toxicological test data could not be found for this substance.

Calcium Oxide                         Meaningful toxicological test data could not be found for this substance.

Carcinogenicity Data: The ingredient(s) of this product is (are) not classed as carcinogenic by ACGIH, IARC, OSHA or NTP. See "Other Studies Relevant to Material".

Reproductive Data: No adverse reproductive effects are anticipated.

Mutagenicity Data: No adverse mutagenic effects are anticipated.

Teratogenicity Data: No adverse teratogenic effects are anticipated.

Respiratory / Skin Sensitization Data: None known.

Synergistic Materials: None known.

Other Studies Relevant to Material: In animal studies, another insoluble Aluminum compound (Aluminum Hydroxide) was not embryotoxic or fetotoxic, unless administered in the presence of citric acid, lactic acid or ascorbic acid. In these cases, there was also maternal toxicity. Very high oral exposure of rats to soluble Aluminum compounds has caused fetotoxicity, in the absence of maternal toxicity. It is not known if Aluminum or its insoluble compounds would have a similar effect. (4)

An insoluble Aluminum compound (Aluminum Hydroxide) produced no evidence of embryo or fetotoxicity when administered orally to mice. However, when it was administered with common dietary constituents, such as citric acid, lactic acid and ascorbic acid, fetotoxicity was observed in the presence of maternal toxicity. These studies indicate that Aluminum absorption may be greatly enhanced by certain dietary constituents. Other reports have indicated that very high oral doses of soluble Aluminum compounds during lactation have caused fetotoxicity, in the absence of maternal toxicity. It is not known if Aluminum or its insoluble compounds would have a similar effect. (4)

Application of a compound containing 96.7 % atomized Aluminum caused irritation to the eyes, but no corneal opacity and cleared up within seven days. Slight inflammation and small lens opacity have been observed following implantation of Aluminum particles into the eye. No irritation was observed

after application of a compound containing 96.7% atomized Aluminum to intact or abraded skin. (4)

---

## 12. ECOLOGICAL INFORMATION

---

Ecotoxicity: Not available. May be harmful to aquatic life.

Environmental Fate: Not available. Can be dangerous if allowed to enter drinking water intakes. Product has an unaesthetic appearance and can be a nuisance. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers.

---

## 13. DISPOSAL CONSIDERATIONS

---

This information applies to the material as manufactured. Processing, use or contamination may make the information inappropriate, inaccurate or incomplete. The responsibility for proper waste disposal lies with the owner of the waste.

Deactivating Chemicals: None required.

Waste Disposal Methods: Revaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Small quantities (less than 25 Kg) of unused portions of this product may be discarded with normal, non-hazardous industrial wastes. Large quantities (25 Kg or more) of unused portions of this product may be discarded with normal, non-hazardous wastes, however such disposal should be cleared with the intended recipient. Disposal of post-service material must be done in accordance with local regulations.

The product may pose new hazards as a result of its use. It may be necessary to test the post-service flash point and/or leachable heavy materials, and/or benzene, toluene, ethylbenzene and xylene (BTEX) as well as total extractable hydrocarbons (TEH) and mineral oil and grease (MOG). Disposal may be dependent upon whether or not it meets regulatory criteria for control as a hazardous waste. The intended recipient should be consulted prior to initiating disposal.

Safe Handling of Residues: See "Waste Disposal Methods".

Disposal of Packaging: Empty containers retain product residue. Empty drums should be completely drained, properly bunged and promptly returned to a drum recycler. Do not expose such containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. Do not dispose of package until thoroughly washed out.

---

## 14. TRANSPORTATION INFORMATION

---

CANADIAN TDG ACT SHIPPING DESCRIPTION: Not regulated.

U.S. DOT CLASSIFICATION: Not regulated.

---

#### 15. REGULATORY INFORMATION

---

##### CANADA

CEPA - NSNR: All constituents of this product are included on the DSL.

CEPA - NPRI: Aluminium Oxide.

Controlled Products Regulations Classification (WHMIS): Not regulated.

##### USA

Environmental Protection Act: All constituents of this product are included on the TSCA inventory.

OSHA Hazard Communication (29CFR 1910.1200) Classification: Not regulated.

HMIS: 1 Health, 0 Fire, 0 Reactivity. (3)

NFPA: 1 Health, 0 Fire, 0 Reactivity. (3)

INTERNATIONAL: Aluminium Oxide is found on the following inventories: EINECS (European Inventory of Existing Commercial Chemical Substances), ACOIN (Australia), MITI (Japan) and Korea.

---

#### 16. OTHER INFORMATION

---

##### ADDITIONAL INFORMATION AND SOURCES USED

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.

2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.

3. Supplier's Material Safety Data Sheet(s).

4. "CHEMINFO", through "CCINFOdisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.

5. Guide to Occupational Exposure Values, 1999, American Conference of Governmental Industrial Hygienists, Cincinnati, 1999.

---

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and the manufacturer will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

---

To obtain revised copies of this or other Material Safety Data Sheets, contact the **Ingersoll-Rand®** office.

## APPENDIX B – DRYER OPERATING SEQUENCE

This Ingersoll-Rand® dryer uses a printed circuit board as its standard controller. In the event of a power failure, the inlet valves will open and the dryer will pressurize both chambers. Since this control panel uses retentive programming, the dryer will return to the step in the cycle where dryer was before power was removed.

**NOTE: If power failure occurs to the dryer or unit is turned off, both exhaust valves will close. Both inlet valves will remain open.**

Set switch to DRYER ON. The electrical circuit is energized. Table B-1 presents the dryer operating logic.

### TABLE B-1 DRYER STEP SEQUENCE

STEP	FUNCTION	PROCESS
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 next step.
2	DEPRESSURIZE RIGHT CHAMBER	Keep EV-1L energized. If in DRYER ON mode: <ul style="list-style-type: none"> <li>• Energize EV-2R opening right chamber dump/exhaust valve.</li> </ul> When regeneration time has passed, go next step.
3	REPRESSURIZE RIGHT CHAMBER	Keep EV-1L energized. De-energize EV-2R: close right chamber dump/exhaust valve. The repressurization timer begins a countdown of 40 seconds. Inlet valve remains in current position. When repressurization time has passed, go to next step
<p><b>NOTE: EV-3 and repressurization valves may be used if dryer is operating at pressure above 125 psig and/or dryer is operating on a timing cycle other than the 10-minute cycle. Refer to paragraph 1.4 in this manual or to section 7, the flow schematic.</b></p>		
4	DRY RIGHT CHAMBER	De-energize solenoid EV-1L. Energize solenoid EV-1R. Position inlet valve for right chamber drying. When 3 seconds have passed, go to next step.

5	DEPRESSURIZE LEFT CHAMBER	<p>Keep EV-1R energized. If in DRYER ON mode:</p> <ul style="list-style-type: none"> <li>• Energize EV-2L opening left chamber dump/exhaust valve.</li> </ul> <p>When regeneration time has passed, go next step.</p>
6	REPRESSURIZE LEFT CHAMBER	<p>Keep EV-1R energized. De-energize EV-2L: close left chamber dump/exhaust valve. The repressurization timer begins a countdown of 40 seconds. Inlet valve remains in current position.</p>

**NOTE:** *The actual timer setting may differ from the previously noted sequence. Example: A dryer requiring 30 seconds to repressurize 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.*

**The regeneration and repressurization times shall be adjusted by Ingersoll-Rand trained personnel only. Changing the factory settings will result in loss of dew point and/or failure to repressurize before changeover.**



## APPENDIX C – DRYER FLOW CAPACITY & PURGE ADJUSTMENT

### 1. DRYER FLOW CAPACITY

The specific size/model of your dryer was selected to meet performance requirements based on an analysis of air supply and demand capacities. The model selection chart provided following should confirm that this dryer remains suitable for its intended use.

#### MODEL SELECTION CHART

MODEL	Design 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
TZ730	150	570	655	730	790	855	920	985
TZ820	150	640	735	820	890	960	1035	1105
TZ1050	150	830	960	1050	1215	1325	1410	1590
TZ1200	150	980	1095	1200	1305	1415	1520	1615
TZ1450	150	1110	1280	1450	1510	1700	1825	1950
TZ1710	150	1325	1515	1710	1810	1945	2080	2230

**NOTE:** Higher pressures available as an option. Consult factory

### 2. CORRECTION FACTOR FOR INLET TEMPERATURE

TEMP 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.

**Example:** To size for an inlet flow of 950 scfm @ 105°F and 110 psig.

- Select models that produce at least 950 scfm at 110 psig. This case would be the TZ1050 which can dry 1215 scfm.
- Multiply pressure-corrected flow by the temperature correction factor to obtain the flow of the dryer corrected for pressure and temperature:
- $1215 \times (0.83) = 1008$  scfm
- Confirm model selection. Model TZ1050 can flow 1008 scfm at the inlet conditions specified. The requirement of 950 scfm is less, so model TZ1050 is correct.

### 3. PURGE ADJUSTMENT

To adjust the purge pressure, the following steps are to be followed. Refer also to the flow schematics provided in section 7.

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

	<b>TZ730</b>	<b>TZ820</b>	<b>TZ1050</b>	<b>TZ1200</b>	<b>TZ1450</b>	<b>TZ1710</b>
<b>P1</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>	<b>P2</b>
80	83	76	CF	80	74	80
90	85	80	90	82	78	82
100	86	81	90	82	81	85
110	86	81	97	82	77	82
120	88	CF	98	CF	CF	CF

**NOTE:** P1 = dryer inlet pressure (psig), P2 = dryer purge pressure (psig) based on dryer inlet temperature (100°F), CF = consult factory.





Ingersoll-Rand Company, 800-A Beatty Street, Davidson, North Carolina, 28036 – USA  
Tel: (704) 896-4000 / Fax: (704) 896-4648  
[www.air.irco.com](http://www.air.irco.com)