

Non-Cycling REFRIGERATED AIR DRYERS 200 to 800 scfm

Point of Manufacture – West Chester, PA, USA

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Cancels: All Previous

NON-CYCLING PRODUCT SPECIFICATION

SCOPE

This specification describes a complete mechanical refrigerated drying system for the removal of moisture, oil aerosols and other contaminants from a compressed air or gas stream. This is accomplished by cooling the gas with a refrigeration unit to a temperature at which the contaminants condense and are separated from the gas stream. The dryer shall be complete in all respects, including integral component equipment, inter-connecting piping, wiring and controls. The dryer shall only require connection to utilities furnished by others.

OPERATING CONDITIONS & PERFORMANCE DATA

The dryer shall be rated for the following conditions:

Inlet Air Flow: XXX SCFM
Inlet Air Pressure: 100 psig
Inlet Air Temperature: 100 °F
Ambient Temperature: 100 °F
Outlet Pressure Dew Point: 39 °F

COMPONENTS AND CONSTRUCTION

Each dryer shall be complete with the following items:

1. Precooler/Reheater exchanger.
2. Air chiller
3. Refrigeration systems equipped with independent fully-hermetic compressor, air-cooled condenser, and refrigeration control devices.
4. Centrifugal air/moisture separator.
5. Solenoid condensate drain valve controlled by on board microprocessor.

6. Microprocessor based control system to monitor system operation.

7. Full cabinet enclosure to protect internal components.

PRECOOLER/REHEATER

Stainless steel heat exchangers precool the incoming compressed air using the exiting chilled, dry air allowing efficient heat exchange in the air to refrigerant circuit. The outgoing air, chilled to 39F, cools this incoming air and, while doing so, warms the exiting air to prevent condensation formation in the compressed air stream.

Air-to-air heat exchangers shall be designed to provide smooth, non-fouling exchange surfaces with minimal associated pressure drop.

The maximum design pressure shall be 300 psig.

Internal and External Air Side Connections

All airside connections are made with 1-1/2" - 3" NPT for 60Hz designs. These connections occur where manifolds connect the precooler and reheater section of the heat exchanger to form inlet/discharge connection points at the point of connection between the compressed air system and the dryer. The piping connecting to the heat exchangers is carbon steel.

NON-CYCLING REFRIGERATED CHILLER

Compressed air that was cooled from the precooler/reheater is delivered to the refrigerated air chiller section comprised of stainless steel heat exchangers. The dew point temperature of the compressed airstream is further reduced to the desired level through heat transfer with an evaporating refrigerant.

REFRIGERATION SYSTEM

The refrigeration system shall be designed to dry the rated amount of compressed air and will consist of one fully-hermetic reciprocating compressor, air-cooled condenser, evaporator section, and refrigeration specialties (including a refrigerant expansion device, filter dryer, & hot gas bypass valve). During part load operating conditions (i.e. reduced air flow rates or lower inlet temperatures); a hot gas valve bypasses the condenser and the expansion device while maintaining a dew point of less than 39F and to maintain a minimum evaporator pressure in order to prevent freeze-up of the air chiller section. Refrigerant 404A shall be used.

Refrigeration System (Components) R404A Refrigerant

Environmentally friendly R404A, a non-ozone depleting refrigerant, is used in this Non-Cycling Dryer. R404A is not on any list for global obsolescence.

Compressor

A hermetically sealed reciprocating compressor is utilized throughout the Ingersoll Rand Non-Cycling design range. All compressors have primary

internal motor overload protection for single phase units or internal motor overload protection for three phase units. The compressor is installed on isolation mounts to reduce noise and vibration.

Piping

To ensure proper oil return to the compressor, all velocities through refrigeration piping meet or exceed the required specification.

Stress relievers have been added throughout the design to increase the refrigeration circuit's structural integrity by minimizing vibration transmissions and allowing for thermal expansion.

All suction-side refrigeration piping is covered with insulation to prevent condensation formation.

CENTRIFUGAL AIR/MOISTURE SEPARATOR

A vertical air/moisture separator shall be located adjacent to the chiller section. Compressed air and water condensed in the chiller section shall be delivered to the separator for the separation and subsequent removal of the water from the compressed air. Separation shall be performed at the coldest point in the system by means of centrifugal acceleration, expansion into an area of low velocity with sump area and change of air flow direction. These separation mechanisms shall provide for separation efficiency in excess of 99%.

TIMED ELECTRIC DRAIN

The condensate collected at the bottom of the separator is discharged by a timed electric solenoid drain that is operated by the unit controller. The timing sequence of the drain can be set by the controller.

MICROPROCESSOR CONTROLS AND INSTRUMENTATION

The refrigeration system shall be controlled and monitored by a fully integrated microprocessor. The standard microprocessor shall incorporate the following features:

1. Chiller Temperature Digital Readout
2. Automatic Dryer Restart

A suction pressure gauge shall be factory installed to allow for monitoring unit operation and field adjustment of refrigeration valves (as required).

PORO

Power Outage Restart Operation (PORO) is standard. PORO will automatically restart the dryer after a power supply interruption.

Enclosure and Baseplate

The fans, fan guards and cabinet form a NEMA 1 / IP 21 rated enclosure.

The cabinet is designed to safely contain components yet offer an aesthetically pleasing appearance and ergonomically planned maintenance access. The sheet metal enclosure is 16 or 18 gauge steel and is painted with electro-statically applied powder coat paint.

The Baseplate is painted black where applicable, while the remaining metal cabinet is IR beige.

Paint specification:

Flexibility: ASTM D522

Adhesion: ASTM D3369 Method B

Hardness: 2H pencil hardness test to ASTM D3363

Impact Resistance: ASTM D2794

Salt spray and humidity resistance: ASTM B117, ASTM D2247

Surface Prep: SSPC-SP8

Dry Film Thickness (DFT): 2.0 - 3.0 MILS (typical)

Control System

The microprocessor shall be factory wired to the unit control panel and complete with all electrical controls required for proper operation. The electrical system shall be designed for single point electrical connection. The electrical enclosure shall be NEMA 1 and the unit is ETL Listed to UL1995 and CAN/CSA C22.2 STD 236. The compressor and fan motors shall be furnished with internal thermal protective devices.

Panel Filter

An industrial grade panel filter comes standard with the dryers to help protect the refrigeration condenser from the ingress of dust.

TESTING

Final package and functional testing is performed on all dryers:

- 100% electrical functionality test
- 100% tracer gas leak test to the refrigeration side
- 100% refrigeration leak test at designed system pressure and vacuum rate of rise leak test.
- 100% Airside pressure leak test at 125Psig /8.6 barg

All heat exchangers are trace gas leak tested at 550 psig / 37 barg.

All heat exchanger assemblies are leak tested at 275 psig / 19 barg and pressure tested under water for air leaks. All heat exchanger assemblies are tested under water at 400 psig / 27 barg for refrigerant leaks.



Conformance Compliance (60Hz)

The following codes shall apply:

- Performance Testing: ISO Guidelines, CAGI ADF-100
- Pressure Vessels: ASME Sec. 8, Div. 1 CRN/CSA (Canada)
- Electrical: NEMA 1 design is ETL Listed to UL1995 and CAN/CSA C22.2 STD 236.
- US/Canada/Mexico Free Trade: General Rule 2, Article 301-NAFTA

WARRANTY

Standard Ingersoll Rand warranty is provided for the Non-Cycling Dryers.