HH Series Specifications

40 through 5400 scfm (68 through 9169 nm^3/h)

Heatless Desiccant Compressed Air Dryer

I. General

Vendor shall supply one packaged, fully assembled, piped, and wired pressure-swing (heatless) type regenerative desiccant dryer. Dryer shall be complete with: two pressure vessels (towers) each containing a desiccant bed fully charged with activated alumina; controller and control valves to direct inlet and purge air flows from tower to tower; and a means of regulating purge air usage. All components shall be mounted within a boxed structural steel frame to shield valves, piping, pre-filtration, and after-filtration from accidental impact. Dryer shall be ready for start-up after utility connections are made. Package shall be produced by an ISO 9001 registered manufacturer and, carry agency approvals for CSA®, and CE®.

Dryer design shall incorporate upward gas flow transmission during the compressed air stream dehydration cycle for maximum efficiency and desiccant bed protection and, operate automatically and continuously in producing the required ISO 8573.1 Quality Class levels for Solids, Moisture, and Oil as specified for the site conditions documented herein under the “System Specifications” sub-header. Purge air shall flow downward.

Industry Standard product design typically dictates an ISO Air Quality Class “2” Pressure Dew Point of -40°F (-40°C) at 100 psig (7 bar) with site conditions of 100°F (37.8°C) ambient and, 100°F (37.8°C) inlet air temperature at pressure. Integral package filtration shall be included to afford the Desiccant bed protection from particulate and oleophilic contamination and shall be provided prior to the compressed air ingress portal. At a minimum, ISO Class 2 Filtration shall take the forms of a Particulate (1 micron) Pre-filter and a Coalescing (.008 ppm) Filter. Plant piping shall be protected from desiccant particulate migration by a (1 micron) Desiccant After-filter to be located within the discharge conduit after the dry compressed air egress portal. An RS232 communications port shall be included to allow for remote monitoring capabilities in real-time directly from the manufacturer.

II. Desiccant Tower Design

Dryer shall include two (2) drying towers (pressure vessels) containing the desiccant beds. Towers shall be designed so that compressed air velocity does not exceed 60 feet (18.3 meters) per minute @ 100 psig, (7 bar) through the desiccant bed to ensure bed stability and prevent premature desiccant deterioration. This velocity shall provide each tower with a minimum contact (residence) drying time of 4.8 seconds per measured unit of gas flow to ensure the specified dew point can be delivered and maintained with saturated inlet conditions.

Desiccant bed designs from 40 scfm through 5400 scfm (68 nm^3/h through 9169 nm^3/h) shall achieve maximum adsorption and release rates by incorporating 3mm ball size activated alumina. All sizes shall include tower desiccant surpluses of 30% to neutralize and account for the normal losses to bed efficiency attributed to desiccant aging prior to reaching operational stability. Achieving this shall require that each tower contain a minimum of 0.6 pound (0.27 kg) of activated alumina desiccant for each scfm of rated flow while operating at industry standard conditions. Specified design conditions shall ensure desiccant bed regeneration efficiencies of no less than 98% by reclaiming the heat of adsorption. Resultant specified dew point stabilities will then be achieved under full rated flow conditions. The average purge rate shall not exceed 13.7% at rated flow conditions.

Purge air shall be regulated by an adjustable valve and pressure-reducing orifice. Purge rate shall be indicated by a purge flow indicator. Purge air shall be exhausted through oversized mufflers to minimize backpressure and reduce the noise level as it expands back to atmosphere. Each tower shall have its own muffler. An extra set of muffler inserts shall be included for replacement when excessive backpressure through the muffler (such as might occur on initial start-up after dryer transport) is experienced. Mufflers shall be equipped with a pressure relief device to prevent excessive backpressure.

After the purge process is completed and prior to tower switchover, the tower being purged shall slowly be repressurized to line pressure to prevent bed movement and desiccant abrasion. Minimum acceptable repressurization cycle times per ISO 8573.1 for moisture content shall be as follows for 150 psig models: ISO Class 1 (48 seconds); Class 2 (60 seconds); Class 3 (65 seconds) and, Class 4 (70 seconds.) 250 psig models shall be as follows: ISO Class 1 (72 seconds); Class 2 (120 seconds); Class 3 (140 seconds) and, Class 4 (160 seconds.)

III. Desiccant Tower Construction

Each tower shall be furnished with separate drain and fill ports so that the desiccant can be replaced without disconnecting the piping. Cleanable stainless steel air diffusers shall be removable through 2100 scfm (3566 nm3/h) and internally affixed on larger flow rates. This shall apply to both the upper and lower ports on each tower. Diffusers shall prevent desiccant channeling, reduce dusting and bed attrition caused by bed fluidization, and ensure maximum drying capacity can be extracted from the desiccant. A pressure relief valve and pressure gauge shall be provided for each tower. Pressure relief valves shall be mounted after the flow diffusers to prevent desiccant migration or operational interference with safety function. Pressures vessel diameters in excess of six-inches shall require ASME certification to assure code compliance. Said vessels shall be built and stamped in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

IV. Piping

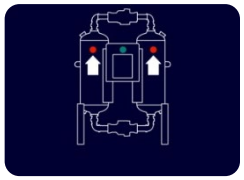
Tower discharge piping on 40 scfm through 450 scfm (68 nm3/h through 764 nm3/h) models shall be constructed of seamless welded piping custom bent into 90-degree long radius elbows built to ensure maximum product elevation does not exceed 89" (2,261 mm) to compensate for low-headroom installations, reduces pressure drop, and drastically reduces the quantity of potential leakage paths. Flow models 590 through 5400 scfm (1002 nm3/h through 9175 nm3/h) shall be threaded, grooved or flanged and properly sealed to prevent leakage.

V. Controllers

HH Series heatless desiccant air dryers are available with three application specific control systems. Each dryer is equipped with 100% repeatable solid state controls shall to sequence operation of inlet and purge/repressurization valves so that one tower is drying the inlet compressed air stream while the other tower is depressurized, regenerated, and repressurized. Controller shall be panel mounted in a NEMA 4, 4X (IP676) rated control box affixed to the front of the package. Said controller shall come complete with user replaceable internal fuse protection.

a. HHE Series -40°F Dew Point Performance

HHE Series presents traditional heatless drying technology. Using a simple timer based controller, the dryer is designed to deliver maximum value to applications that operate at or near full capacity. Automatic time controlled bed regeneration cycles (5 minutes drying/5 minutes regenerating) offer consistent performance and economy of purchase. The time based controls offer consistent dew point performance (-40°F/-40°C) class 2. The ACDE E offers simple reliable fixed cycle operation and provides LED's for the following:



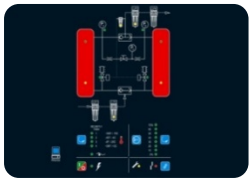
- Power On
- Left Tower Drying
- Right tower drying

b. HHL Series Selectable Purge Economizer Savings

HHL Series provides users selectable energy savings. Economies of operation shall be further achieved with momentary contact, push buttons to manually vary the regeneration time cycle and ensure accurate settings. Said push buttons shall allow the user to save up to seventy percent (70%) of purge air energy by reducing purge air consumption in relation to actual load levels. Savings shall be expressed as an inverse percentage of maximum design flow capacity. Controller cycle time shall be field adjustable providing flexibility of selection from four outlet pressure dew point (pdp) quality class levels per ISO 8573.1.

Instrumentation

HHL controller shall include the following:



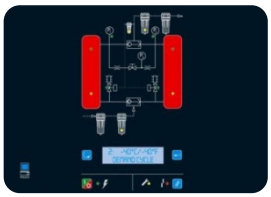
- Soft on/off switch with two power recovery modes
- Tower status LED's (green=drying, yellow-regenerating)
- Process valve status LED's (on=valve open, off=valve closed)
- Operating mode LED's (ISO Class fixed cycle)
- Load Factored Purge Savings LED's (user selectable from 0 to 70%)
- Alarm LED (red)
- Voltage-free alarm contacts, 5A rating
- Alarm reset button/Manual cycle advance
- Service Reminder LED's (Filters & Drains (3), Inlet, Purge & Tower Switching (6), and Desiccant Towers (4)
- RS232 Communications Capabilities
- Moisture Indicator (indicates elevated outlet dew point)
- Tower pressure gauges (indicate pressure in tower)
- Purge rate indicator (indicates pressure of purge air upstream of pressure reducing orifice)
- Switching failure alarm (monitors system and indicates if tower fails to pressurize or depressurize after switchover)

c. HHS Series Automatic Energy Savings

HHS Series with automatic energy savings matches purge air use to the demand on the system. The controller features vacuum fluorescent text display that communicates energy savings, operating mode and service reminders. Select from one of the four pressure dew point settings to optimize your savings for each season rapid. Return-on-Investment shall be achieved through the addition of an automatic Energy Saving Purge Control System. The system shall utilize feedback from temperature thermistors to calculate the actual load on the desiccant bed to determine the precise purge time required for efficient tower regeneration. Once regenerated, the off-line tower shall become a repressurized sentinel in preparation for its future drying cycle. Purge air losses shall then be eliminated until the on-line drying tower has achieved optimal desiccant bed saturation levels. Only then, shall the tower switchover sequence be initiated and the process begins anew. Systems that use flow meters or hygrometers instead are not deemed acceptable.

Optional Energy Savings Controller shall carry the following added benefits:

- Automatic, load-matched, purge air Energy Savings
- Vacuum Fluorescent Text Display (complete text communications)
- Demand Sensitive Thermistors (to establish purge requirements)
- High Humidity or Dew Point Alarm
- Filter Monitor Alarm (1 or 2 filters with optional Filter Monitor)
- Electric Drain Alarms (1 or 2 filters with optional Demand Drains)
- Electric Drain Test (1 or 2 filters with optional Demand Drains)



VI. Valves

Standard packages 40 scfm through 450 scfm (68 nm3/h through 764 nm3/h) shall be rated for 150 psig (10 bar) maximum working pressure 250 psig (17 bar) optional. Maximum reliability and repeatability of function shall be achieved by the utilization of high performance shuttle inlet valves (guaranteed to 5 million cycles) and angle seated pneumatically actuated valves for purge/repressurization functions. A unitized shuttle valve shall be used in place of tower dedicated check valves to control and channel the dry processed air through the on-line tower to the egress portal.

Systems nominally rated 590 scfm (1002 nm3/h) and larger shall be rated for 150 psig (10 bar) maximum working pressure 250 psig (17 bar) optional) and supplied with high performance shuttle inlet valves and air operated butterfly type valves for purge/repressurization. Said butterfly type valves shall use dual piston, rack and pinion type actuators that are isolated from the compressed air stream, for the purge function and, dual check valves and purge check valves for the tower inlet air function. Butterfly type air control valves shall possess a manual override mechanism and a visible indicator to show valve position. Non-lubricated solenoid operated valves with hermetically sealed coils shall be used to engage the compressed air power necessary for pneumatic control valve actuation. Said valve engagement air shall be dried and filtered to one micron prior to being deployed to both open and close these control valves.

Valves shall not require field lubrication and, shall be constructed with resilient elastomeric seats to minimize wear and assure seal-tight closures. Purge/repressurization valves shall include a spring assist to hold valves closed prior to start-up and upon loss of air pressure. Valves shall be rebuilt in the field.

VII. Standards Conformity

Dryers shall be certified by the Certification and Testing Division of the Canadian Standards Association to comply with the standards as documented by UL No. 1995 and CAN/CSA-22.2 No. 236-M90.

System Specifications

- Rated Capacity in scfm (nm^3/h) _____
- Maximum working pressure in psig (bar) _____
- System design working pressure in psig (bar) _____
- Maximum Inlet Air Temperature in °F (°C) (saturated): _____
- Maximum Ambient Air Temperature in °F (°C): _____
- Electrical Requirements: _____ V,_____ Ph,_____ Hz
  (Specify - 120 or 240 V, 1 ph, 60 Hz; 110 or 220 V, 1 ph, 50 Hz; 12 or 24 Volt DC)
- NEMA (IP) Rating: _____ *(Specify: Standard - NEMA 4, 4X, Optional NEMA 7)*
- Dew Point Quality Class: _____*(1= -100°F/-73°C; 2= -40°F/-40°C; 3= -4°F/-20°C; 4= +38°F/+3°C)*
- Integral Pre-Filtration Quality Class: _____
  (Class 1 requires 1 micron; Class 2, 3 and 4 require .008 ppm)
- Integral After-Filtration Quality Class: _____
  (Class 1 requires 1 micron filtration; Class 2, 3 and 4 require .008 ppm/w filtration)

Specify Hankison Desiccant Air Dryer Model #_____

HH 40-5400 SPEC Version: 07/2019 Issued: 10/2012