



HHL SERIES

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and HHS SERIES

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HEATLESS

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DESICCANT

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COMPRESSED

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AIR DRYERS

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# Hankison HHL and HHS Series Heatless Desiccant Dryers

Sensitive applications requiring clean, dry, compressed air have turned to Hankison International since 1948. Utilizing twin towers with energy-efficient controls and the unique *SensaSorb* adsorbant, Hankison heatless desiccant dryers provide consistent outlet pressure dew points to -100°F (-73°C).

## Consistent Outlet Pressure Dew Points: Industry-leading Desiccant Beds

- Unique SensaSorb desiccant beads with 3.0 mm diameter size (vs industry standard 3.2 mm) offer enhanced surface area and high crush strength which prolongs bed life
- Large SensaSorb desiccant beds ensure 4.8 seconds of contact time....allows wet, saturated air at the dryer inlet to be dried to the required dew point.
- 30% extra desiccant provided to compensate for natural bed aging....ensures top performance over expected 3 to 5 years of SensaSorb desiccant bed life.
- Large flow diffusers ensure even flow distribution through the bed and eliminate channeling
- Towers are sized so that air velocity through the bed won't fluidize the SensaSorb desiccant which prevents bed movement and desiccant dusting
- Upflow drying allows water and heavy contaminants to drop out of the air stream as they enter a tower which protects the bed from contamination. This makes it simple to discharge the contaminants when the tower depressurizes
- Cleanable stainless steel flow diffusers/support screens and separate fill and drain ports for ease of SensaSorb desiccant replacement

## Safety Built to Code

- Pressure vessels are CRN and ASME Certified. Models above 60 scfm are ASME stamped
- Heavy duty mufflers for quiet operation-dryers are shipped with an extra set of mufflers
- NEMA 4 electrical construction is standard
- Pressure relief valves are standard



## Four Dew Point Options per ISO 8573.1 Air Quality Standards

Specifying a pressure dew point is not simple work for an engineer. HHL and HHS Series dryer designs are optimized to match four pressure dew point classes of the ISO 8573.1 Air Quality Standard.

Table 1: Select your Dew Point per ISO 8573.1 Quality Classes

ISO 8573.1 Class	Dew Point	Remaining Moisture **		Cycle Time & Mode	
		ppmw	mg/m <sup>3</sup>	HHL Series	HHS Series*** Energy Savings
1	-100°F (-73°C)*	0.12	0.15	4 min. fixed	--
2	-40°F (-40°C)	10	12	10 min. fixed	Demand
3	-4°F (-20°C)	81	97	16 min. fixed	Demand
4	+38°F (+3°C)	610	730	24 min. fixed	Demand

\* This performance exceeds Quality Class 1 set at -94°F (-70°C)

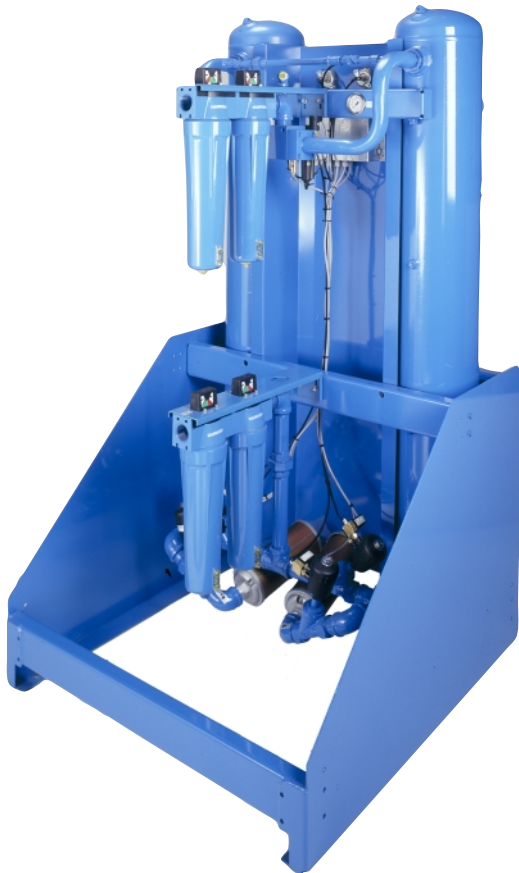
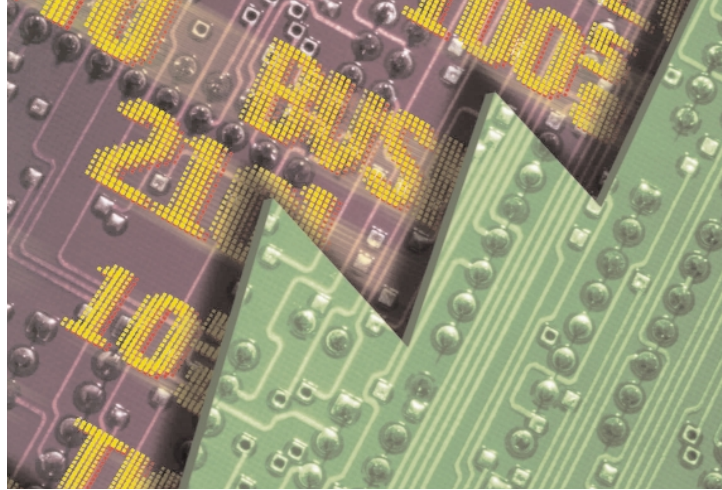
\*\* At 100 psig (7 bar)

\*\*\* The HHS Series controller also offers fixed cycle settings.

# HHL/HHS Series Space-Saving Design

Models 40-450 scfm

Microelectronics, food packaging, paper, glass, pharmaceutical, powder painting, hospital laboratories: these industries are a small representative sample of industries utilizing desiccant dryers. They all have one thing in common....they need to save space on the factory/laboratory floor.



## Accurate and Durable Valves

- Inlet switching valves are normally open, pneumatically piston actuated, Y-angle poppet valves
- Purge/repressurization valves are normally closed, pneumatically piston actuated, Y-angle poppet valves.
- Three-way pilot solenoid valves are wired to the controller and used to direct pilot air to the actuators of the inlet switching and purge/repressurization valves
- Outlet shuttle valve tested to 1 million cycles with tough desiccant dust challenge
- Purge pressure adjustment valve

## Space-saving Integrated Filtration

- Pre-filter and after-filter packages featuring Hankison HF Series coalescing filters are pre-installed on custom brackets within the dryer's footprint – requiring no additional floor space
- HF Series Grade 9 (3 micron bulk liquid) and Grade 5 (0.008 ppm oil aerosols) pre-filters are recommended for  $-40^{\circ}\text{F}$  to  $+38^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$  to  $+3^{\circ}\text{C}$ ) dew points
- HF Series Grade 7 (1 micron particulate) and Grade 3 (0.0008 ppm oil aerosols) pre-filters are recommended for  $-100^{\circ}\text{F}$  ( $-73^{\circ}\text{C}$ ) dew points
- HF Series Grade 6 (1 micron dry particulate) and Grade 1 (oil vapor) are the recommended after-filters
- Standard pilot air filter and regulator

## Space-saving Piping

- Height of the dryer has been minimized which allows for easier access to upper-floor hospital laboratories and other hard to access areas.
- Achieved by placing the inlet and outlet process flow nozzles in the back of the vessels rather than through the top and bottom.

## Standard Instrumentation

- Left and right tower pressure gauges
- Purge pressure gauge
- Moisture indicator – alerts operator of elevated dew point
- HHL Series or HHS Series electronic control panel

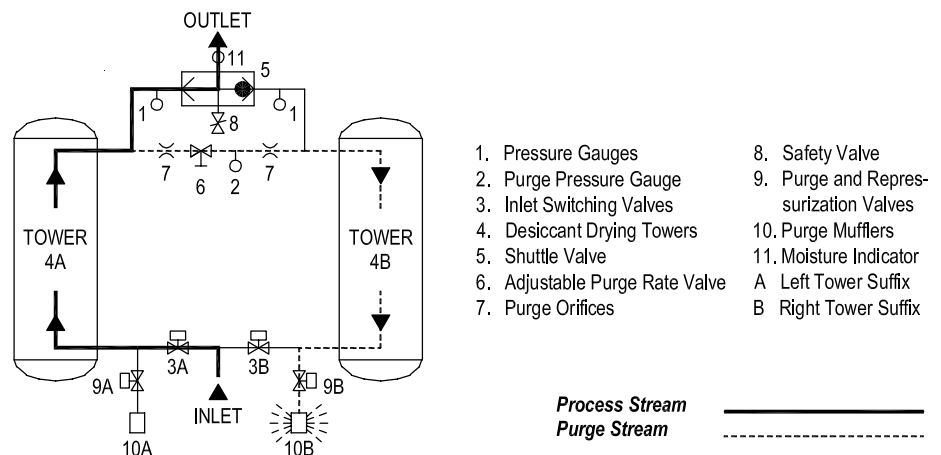


FIGURE 3-1a  
TOWER 4A DRYING  
TOWER 4B REGENERATING

# HHL/HHS Series Reliability for Large Applications

Models 590-5400 scfm

## Premium Quality Valves

- Premium quality inlet switching and purge/repressurization valves. Air operated butterfly valves and dual piston, double acting rack and pinion actuators. Actuators are isolated from the air stream and cannot be contaminated by incoming moisture.
- Purge/repressurization valves include a spring assist to hold them closed prior to start-up and upon loss of pressure-protects desiccant bed from outside contamination and allows easy start-up.
- Single solenoid, four-way pilot valves are wired to the controller and used to direct pilot air to the actuators of the inlet switching and purge/repressurization valves.
- Check valves are soft seated for sure closure and minimal wear. Two mainline outlet and two smaller purge line check valves control the flow of outlet and purge air.
- Throttling globe valve provides highly accurate purge pressure adjustment.



## Standard Instrumentation

- Left and right tower pressure gauges.
- Purge pressure gauge.
- Moisture indicator – alerts operator of elevated dew point.
- Standard pilot air filter and regulator.
- HHL Series or HHS Series electronic control panel.

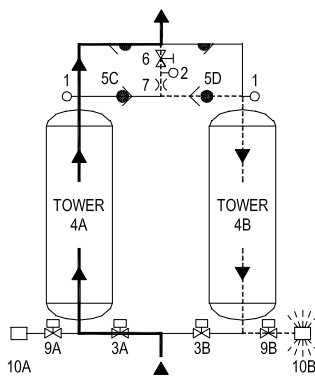
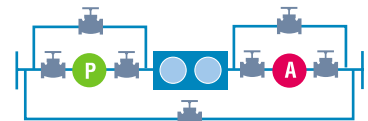
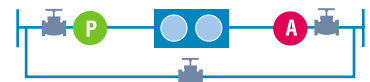


FIGURE 3-2a  
TOWER 4A DRYING  
TOWER 4B REGENERATING

- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Pressure Gauges             | 8. Safety Valves                     |
| 2. Purge Pressure Gauge        | 9. Purge and Repressurization Valves |
| 3. Inlet Switching Valves      | 10. Purge Mufflers                   |
| 4. Desiccant Drying Towers     | 11. Moisture Indicator               |
| 5. Check Valves                | A & C Left Tower Suffixes            |
| 6. Adjustable Purge Rate Valve | B & D Right Tower Suffixes           |
| 7. Purge Orifice               |                                      |

## Filtration Packages with By-pass Piping

Pre-filter **P** and after-filter **A** packages featuring Hankison HF Series coalescing filters can be assembled in many different by-pass arrangements. Basic packages include:



# HHS Series with Sensatherm® Energy Savings

Models 40-5400 scfm

## Sensatherm Energy Savings

- Minimizes purge air usage when operating at reduced loads
- Automatically matches purge air use to the demand on the system

At full load, a tower contains five minutes of drying capacity.

At less than full load, the amount of purge air used may be minimized by keeping a tower on line until its full drying capacity is utilized.

For example, at 50% of load a tower is able to stay on line for 10 minutes (instead of the usual 5), at 33% of load, it is able to stay on line for 15 minutes. By doing this, purge air use is matched to the demand on the system - at 50% of load, 50% of the normal purge air is used; at 33% of load, 33% of the normal purge air is used.

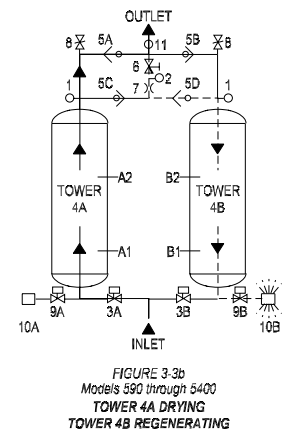
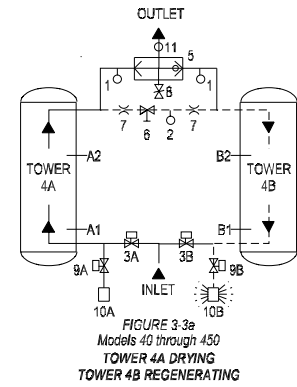
Hankison's patented Sensatherm purge saving system matches purge air use to the demand on the dryer by monitoring the changes in temperature within the desiccant beds. These changes are the result of heat that is released during the drying stage (heat of adsorption) and reabsorbed during the regeneration stage. The degree of temperature change is an indirect measure of the water vapor content in the compressed air system and is used to determine the time a tower stays on line during the drying stage.

## Advantages:

1. Temperature transducers (thermistors) are used as sensing devices - they are simpler, more reliable, and more rugged than the humidity, pressure, and flow transducers used by others.
2. Sensors used on the Sensatherm system require no calibration.
3. The system is based on saving the heat of adsorption - towers switch before heat is lost... maximizing purge air efficiency and minimizing the amount of purge air required.

## Sensatherm Operation

As tower 4B goes off line and begins the regeneration stage, sensor B1 takes a temperature reading. At the end of the regeneration stage, sensor B1 takes another reading. The Sensatherm's microprocessor uses this temperature difference to calculate the temperature rise that will occur during the drying stage as the bed becomes fully loaded. When Tower 4B returns to the drying stage, sensor B2 takes a reading and begins monitoring the temperature rise. When the calculated temperature rise occurs, indicating that the bed is fully loaded, the processor signals the tower to go off-line for regeneration.

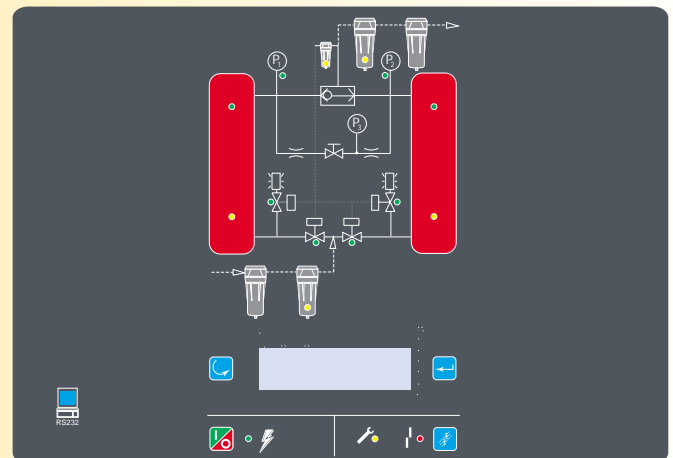


- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Pressure Gauges             | 8. Safety Valve(s)                   |
| 2. Purge Pressure Gauge        | 9. Purge and Repressurization Valves |
| 3. Inlet Switching Valves      | 10. Purge Mufflers                   |
| 4. Desiccant Drying Towers     | 11. Moisture Indicator               |
| 5. Shuttle or Check Valve(s)   | A & C Left Tower Suffix(es)          |
| 6. Adjustable Purge Rate Valve | B & D Right Tower Suffix(es)         |
| 7. Purge Orifice(s)            |                                      |

Process Stream —————  
Purge Stream - - - - -

## HHS Series Controller Features:

- Choice of four operating modes (see page 2 for ISO dew point classes)
- Sensatherm Demand mode
- Switches for On/off, Alarm and Service reminder reset
- Operational LED lights for power-on, tower status, valve status, and tower pressure
- Service reminder LED lights for filters and drains, valves, and desiccant. The user selects between a Normal and a Severe service interval
- Alarm LED for tower switching failure, filter monitor signals, electronic demand drain alarms on filters
- Vacuum fluorescent text display communicates energy savings, operating mode and service reminders
- RS232 communications port is standard. WebAirNet Internet Remote Monitoring is optional



# HHL Series with Purge Economizer Energy Savings

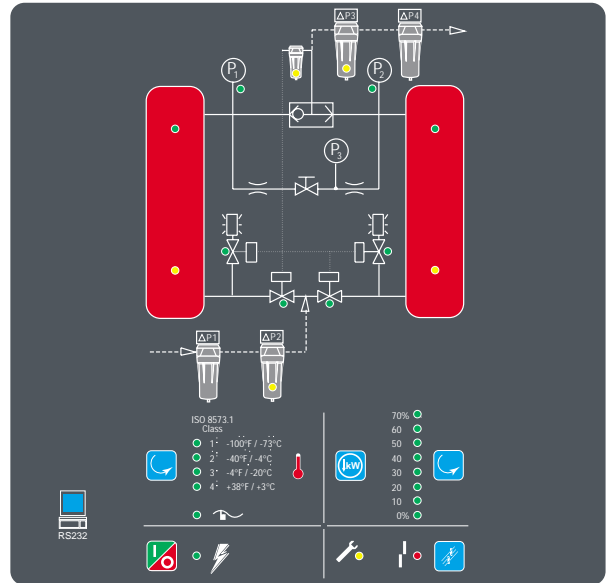
Models 40-5400 scfm

## Purge Economizer Energy Savings

Reducing the amount of time the dryer spends purging in the regeneration cycle can save energy. Eight settings (0% to 70% in 10% increments) are furnished to allow end users to reduce the purge to match reduced air loads on the dryer. Each energy saving setting has an LED which will illuminate when it is selected. Simply use the supplied switch to select the desired energy saving setting.

## HHL Controller Features:

- Choice of four fixed cycle operating modes corresponding to ISO 8573.1 Air Quality Classes (see pg. 1 for ISO dew point classes and cycle times)
- Choice of eight Purge Economizer Energy Savings settings with an energy saving selector switch
- Switches for ISO Class dew point, On/off, Alarm and Service reminder reset
- Operational LED lights for power-on, tower status, valve status, and tower pressure
- Service reminder LED lights for filters and drains, valves, and desiccant. The user selects between a Normal and a Severe service interval



- Alarm LED for valve switching failure
- RS232 communications port is standard. WebAirNet Internet Remote Monitoring is optional



## HHL/HHS Series Engineered-to-Order Options

- Cabinet enclosures for dryers and filters with front panel-mounted Filter Monitors which communicate pre- and after-filter performance
- High dew point alarm which includes light and voltage free contacts for remote alarm
- Dew point monitor which includes digital display, voltage-free contacts and recorder output
- Low ambient packages, epoxy paint, severe environment protection
- Higher pressures to 1500 psig (103 bar)
- Oil-free packages with integrated activated carbon towers

# HHL & HHS Series Specifications

Table 1

Model	Inlet Flow @ 100 psig (7 bar) scfm	Dimensions (in)			Connections (in)	Weight (lbs)
		Height	Width	Depth		
HHL/HHS-40	40	74	26	26	1/2 NPT	365
HHL/HHS-60	60	76	26	26	3/4 NPT	445
HHL/HHS-90	90	76	33	33	3/4 NPT	575
HHL/HHS-115	115	76	33	33	1 NPT	685
HHL/HHS-165	165	76	33	33	1 NPT	685
HHL/HHS-260	260	80	44	44	1 1/2 NPT	1010
HHL/HHS-370	370	81	44	44	1 1/2 NPT	1215
HHL/HHS-450	450	82	44	44	1 1/2 NPT	1350
HHL/HHS-590	590	95	52	48	2 NPT	2205
HHL/HHS-750	750	97	52	48	2 1/2 NPT	2705
HHL/HHS-930	930	102	58	56	2 1/2 NPT	3228
HHL/HHS-1130	1130	104	62	57	3 ANSI Flg.	3740
HHL/HHS-1350	1350	109	63	57	3 ANSI Flg.	4252
HHL/HHS-1550	1550	109	77	68	4 ANSI Flg.	4796
HHL/HHS-2100	2100	106	85	75	4 ANSI Flg.	5100
HHL/HHS-3000	3000	121	80	89	6 ANSI Flg.	8500
HHL/HHS-4100	4100	105	91	85	6 ANSI Flg.	9900
HHL/HHS-5400	5400	122	102	92	6 ANSI Flg.	12000

## Inlet flows

Inlet flows capacities are established in accordance with CAGI (Compressed Air and Gas Institute) standard ADF-200: Inlet air pressure 100 psig (7 bar), inlet temperature saturated at 100°F (38°C). To determine inlet flow at pressures other than 100 psig (7 bar), multiply inlet flow at 100 psig (7 bar) from Specifications table by the corresponding multiplier in Table 2

## Electrics

Available voltages:

120V/1ph/60Hz

120V/1ph/50Hz

240V/1ph/60Hz

220V/1ph/50Hz

11.5-28VDC

NEMA 4 standard

## Maximum Working Pressure

150 psig (10.5 bar) standard

250 psig (17.6 bar) optional

Units for higher maximum working pressures are available

## Minimum Operating Pressure

150 psig (10.5 bar) models: 60 psig (4.2 bar) minimum operating pressure

250 psig (17.6 bar) models: 120 psig (8.3 bar) minimum operating pressure

For lower pressures contact factory

Maximum inlet air or ambient air temperature:  
120°F (49°C)

Pressure drop at rated flow less than 5 psi (0.34 bar)

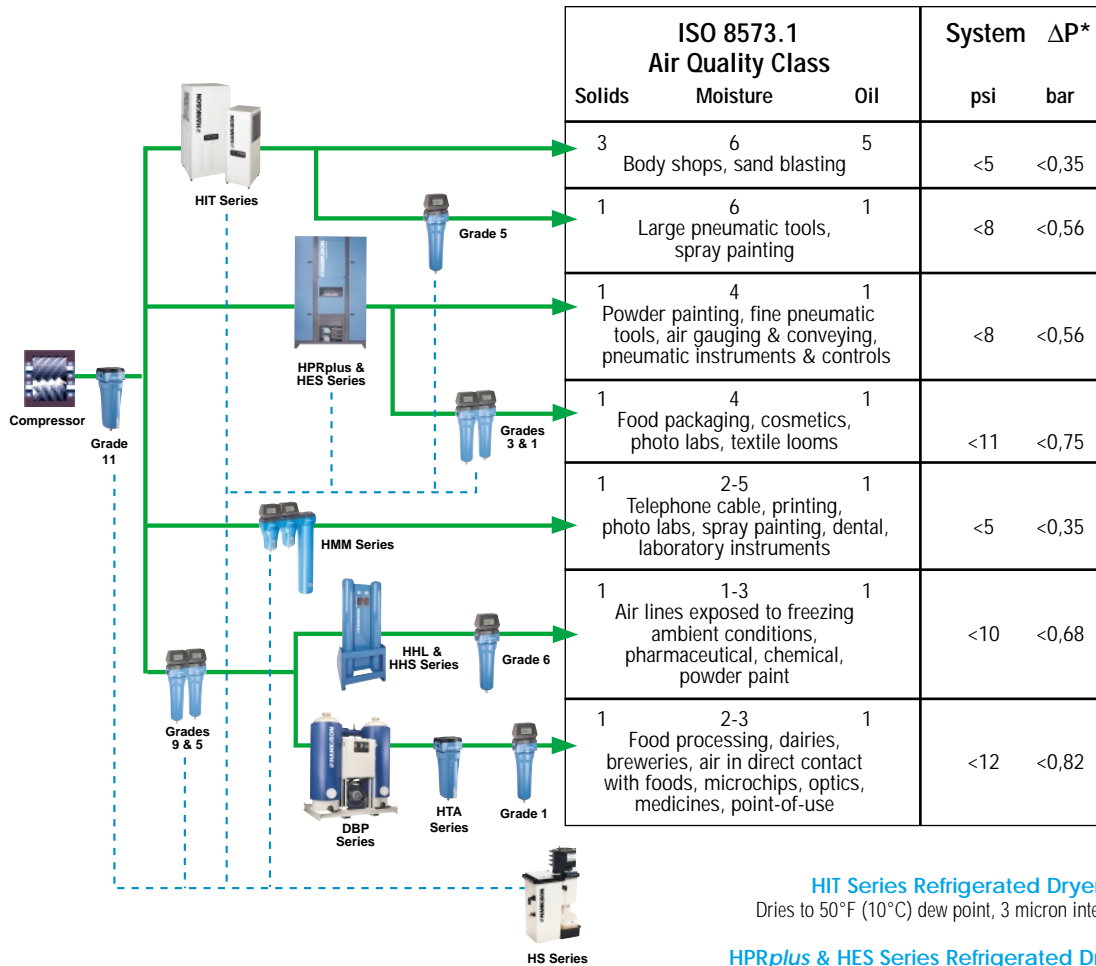
## Regeneration flow rate

The amount of air used during the regeneration phase consists of the amount used while the purge/repressurization valve is open (purge air) plus the volume of air used to repressurize the tower after the purge/repressurization valve closes. Typically the rate shown is averaged over the cycle time. At 100 psig (7 bar), average air use is 14.4% of the inlet flow

capacity (13.7% for purge and +0.7% for repressurization) for dryers operating on a 10 minute cycle; 15.5% (13.7% for purge +1.8% for repressurization) for dryers operating on a 4 minute cycle. Instantaneous flow rate (air flowing while the purge/repressurization valve is open) varies with cycle selection, Energy Savings setting, and inlet pressure.

Table 2

Operating Pressure	psig	60	70	80	90	100	110	120	130	140	150	175	200	225	250
	bar	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.1	9.8	10.5	12.3	14.1	15.8	17.6
Multiplier		0.65	0.74	0.83	0.91	1.00	1.04	1.08	1.12	1.16	1.20	1.29	1.37	1.45	1.52



ISO 8573.1 Air Quality Class			System ΔP*	
Solids	Moisture	Oil	psi	bar
3	6	5	<5	<0,35
Body shops, sand blasting				
1	6	1	<8	<0,56
Large pneumatic tools, spray painting				
1	4	1	<8	<0,56
Powder painting, fine pneumatic tools, air gauging & conveying, pneumatic instruments & controls				
1	4	1	<11	<0,75
Food packaging, cosmetics, photo labs, textile looms				
1	2-5	1	<5	<0,35
Telephone cable, printing, photo labs, spray painting, dental, laboratory instruments				
1	1-3	1	<10	<0,68
Air lines exposed to freezing ambient conditions, pharmaceutical, chemical, powder paint				
1	2-3	1	<12	<0,82
Food processing, dairies, breweries, air in direct contact with foods, microchips, optics, medicines, point-of-use				

### ISO 8573.1 Quality Classes

Quality Classes	Solids max. particle size in microns	Moisture Dew Point		Oil Liquid & Gas	
		°C	°F	mg/m <sup>3</sup>	ppm <sub>w/w</sub>
0	as specified	as specified		as specified	
1	0.1	-70	-94	0,01	0.008
2	1	-40	-40	0,1	0.08
3	5	-20	-4	1	0.8
4	15	3	38	5	4
5	40	7	45	>5	>4
6	-	10	50	-	-

#### HIT Series Refrigerated Dryers

Dries to 50°F (10°C) dew point, 3 micron integral filter

#### HPRplus & HES Series Refrigerated Dryers - Air Treatment Stations

Dries to 38°F (3°C) dew point, 3 micron integral filter and optional 0.008 ppm (0,01 mg/m<sup>3</sup>) oil removal filter

#### HMM Series Membrane Dryers

Dries from 50°F (10°C) to -40°F (-40°C) dew point  
No Oxygen Loss

#### HHL & HHS Series Heatless Desiccant Dryers

Dries to -100°F (-73°C) dew point

#### DBP Series Heated Blower Purge Desiccant Dryers

Dries to -40°F (-40°C) dew point, 0% purge

#### HS Series Oil Water Separator

Separates to 10 ppm (10 mg per liter)

#### HF Series Filters

- Grade 11 – 99% bulk water removal
- Grade 9 – 99% bulk water removal, 3 micron particulate
- Grade 7 – 1 micron particulate
- Grade 6 – 1 micron desiccant afterfilter
- Grade 5 – 0.008 ppm (0,01 mg/m<sup>3</sup>) oil removal
- Grade 3 – 0.0008 ppm (0,001 mg/m<sup>3</sup>) oil removal
- Grade 1 – oil vapor and 0.003 ppm (0,004 mg/m<sup>3</sup>) oil removal
- HTA – 1 micron particulate, high temperature filter

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Division of Hansen Inc.  
Canonsburg, PA 15317-1700 U.S.A.  
Tel 724-745-1555 Fax 724-745-6040

MEETING GLOBAL STANDARDS

