



HANKISON



DH SERIES

PRESSURE-SWING

DESICCANT

COMPRESSED AIR

DRYERS

Hankison DH Series desiccant dryers

- **Provide pressure dew points of -40°F, -100°F (-40°C, -73°C) and lower**
 - **Eliminate water from systems exposed to sub-freezing temperatures**
 - **Reduce moisture content in critical applications, outlet concentrations of 1 ppb @ 100 psig, (7 kgf/cm²) are possible**
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Principle of Operation

A regenerative desiccant dryer consists of two (dual) towers filled with desiccant. The desiccant (e.g. activated alumina) attracts (adsorbs) water vapor onto its surface. Unlike deliquescent chemicals, which are used up in the process of drying, desiccants can be regenerated and reused.

The two towers are switched on and off-stream, alternating between drying and regeneration

so that dry desiccant is continuously exposed to the air stream.

In pressure-swing (heatless) dryers, desiccant is regenerated by expanding a portion of the dried air (called purge air) to atmospheric pressure and passing it over the off-stream bed. This "swing in pressure" causes the expanded air to become very dry. The dry purge air pulls (desorbs) moisture from the desiccant and carries it out of the dryer.

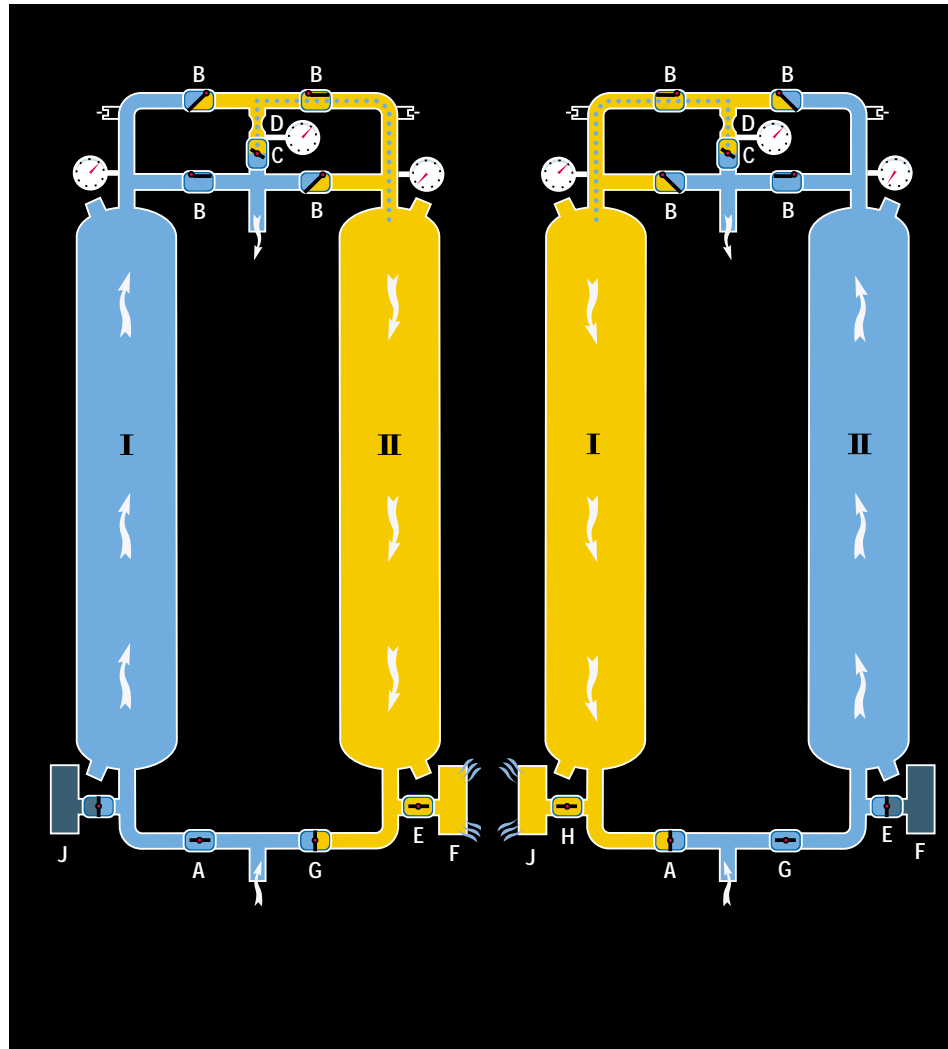
Pressure-swing dryers

- Have a lower initial cost than heated type dryers
- Are simple and reliable - no heaters or blowers to maintain
- Maintain a constant outlet dew point and temperature - no thermal or dew point spikes after tower switchover
- Offer long desiccant life

Operation:

1. Wet air enters the dryer, flows through inlet switching valve (A), Tower I where the air is dried, and a system of check valves to the dryer outlet.
2. A portion of the dried air is diverted through adjustable purge rate valve (C), purge orifice (D) where it is throttled to near atmospheric pressure, and Tower II.
3. This dry, low pressure air, called purge air, regenerates the desiccant in Tower II by carrying off the water collected during the drying stage. The purge air is then exhausted to atmosphere through purge/repressurization valve (E) and purge muffler (F).
4. After regeneration, purge/repressurization valve (E) closes and Tower II fully repressurizes to line pressure.
5. Inlet switching valve (G) then opens, inlet switching valve (A) closes, and purge/repressurization valve (H) opens. Inlet air is now being dried in Tower II while Tower I is being regenerated.

The operation of the inlet switching and purge/repressurization valves is sequenced by either a fixed time controller (adjustable for either a 4 or 10 minute cycle) or the optional Sensatherm® purge saving system which automatically matches purge air use to the demand on the system.



Hankison DH Series dryers produce consistent outlet pressure dew points...with minimum purge air usage...and maximum service life

Consistent outlet pressure dew points

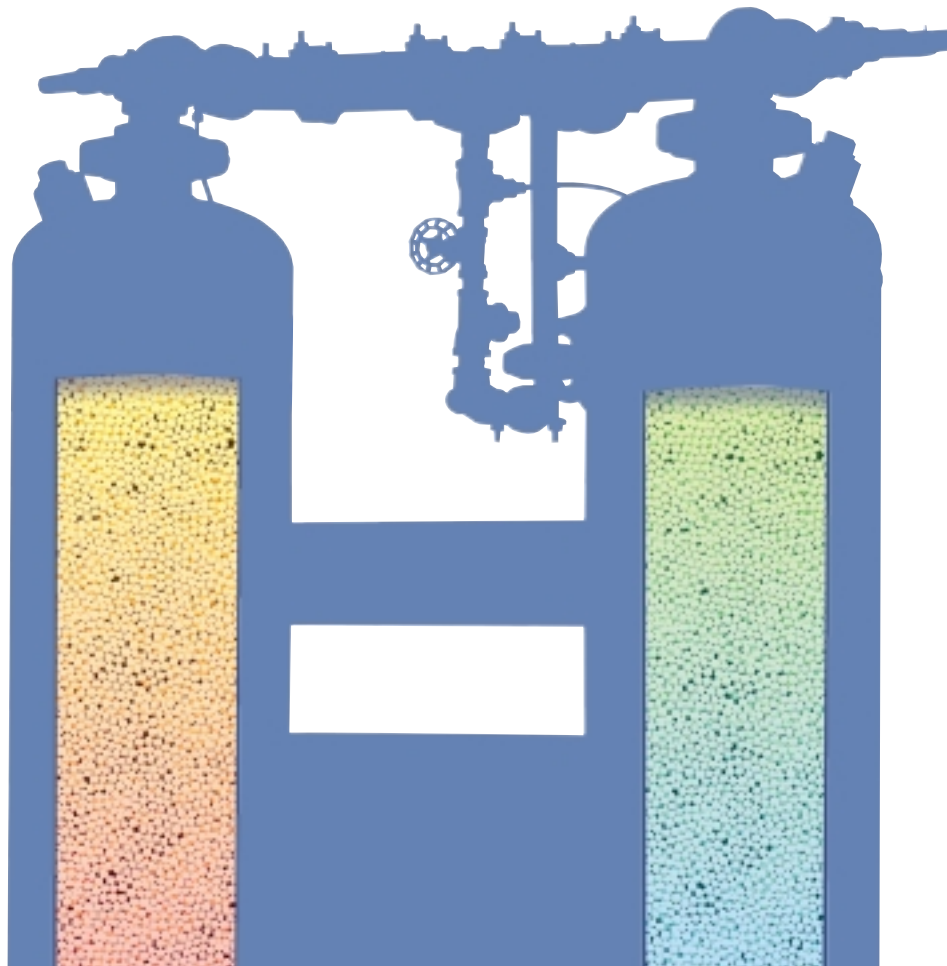
- Large desiccant beds [0.6 lbs (0.27 kg) of desiccant/tower/scfm]
 - Ensures 4.8 second contact time...enough to dry saturated air at the dryer inlet to the desired dew point
 - 30% extra desiccant provided to compensate for natural bed aging...ensures top performance over expected 3 to 5 year desiccant bed life
- Large flow diffusers ensure even flow distribution through bed...eliminates channeling

Minimum purge air use...13.7%, the lowest in the industry

- Tower design saves 98% of the heat of adsorption...stored heat maintains purge air temperature during regeneration...maximizing the purge air's ability to carry off moisture...minimizing the amount of purge air required
- Drying and purging in counter flow arrangement...energy not wasted when wet air travels through dry desiccant
- Ability to match purge air use to the demand on the dryer
 - Standard...Purge Economizer
 - Optional...Sensatherm[®] automatic purge saving system

Long desiccant life

- Towers sized so that air velocity through the bed won't fluidize desiccant...prevents movement and excessive desiccant dusting
- Slow and complete repressurization of off-stream tower prevents bed movement and desiccant abrasion...also eliminates downstream pressure fluctuations
- Upflow drying...allows water and heavy contaminants to drop out of the air stream as they enter a tower... protects bed from contamination...allows contaminants to be discharged when tower depressurizes



DH Series Features

Optimally sized towers, offering:

- Performance - large desiccant beds ensure sufficient contact time...produce consistent dew points...includes extra desiccant to compensate for initial desiccant aging
- Efficiency - sized to retain the heat of adsorption...maximizes purge air efficiency...minimizes amount of purge air required
- Reliability - sized to prevent bed fluidization and desiccant deterioration...maximizes desiccant and valve life

Easy operation

Standard instrumentation:

- Tower pressure gauges
- Moisture indicator - alerts operator of elevated dew point
- Purge flow indicator
- **Control panel with:**
 - On/off switch
 - Tower status lights
 - Cycle/mode indicator lights (shows selection of 4 or 10 minute cycle or test mode)
 - Switching failure alarm - indicates if a tower fails to pressurize or depressurize properly
 - Economizer setting indicator lights

All instruments and controls are front mounted for easy visibility and use



DH Series Features

Easy to maintain

- Separate fill and drain ports for ease of desiccant replacement
- Cleanable stainless steel flow diffusers/support screens



Safe

- Pressure relief valves for each tower - mounted after flow diffuser to prevent clogging by desiccant beads
- Heavy duty mufflers for quiet operation - dryers shipped with extra set of inserts - if back pressure increases after start-up, replace inserts - allows start-up of dryers with mufflers in place (Relief valve in mufflers prevents excessive back pressure)
- ASME code constructed (models DH-115 and larger are stamped)
- NEMA 4,4X electrical construction standard

Reliable solid state controller

- Can be field adjusted for: 10 minute cycle [produces -40°F (-40°C) dew point @ 100°F (38°C) inlet] or 4 minute cycle [produces -100° (-73°C) dew point @ 100°F (38°C) inlet]
 - Includes Purge Economizer Switch - allows purge air reduction when dryer operating at reduced loads
 - Test Mode - Allows manual sequencing to verify valve operation
- Optional - Sensatherm® automatic purge saving system



Accurate purge flow control

- Adjustable, highly accurate control valve
- Flow always travels through valve in same direction to ensure consistent flow pattern
- Separate control valve and orifice allow indication of purge flow rate

Durable air control valves for maximum reliability

Inlet and purge/repressurization valves

Models DH-25 thru DH-260

- Top-of-the line ASCO pilot operated solenoid valves

Models DH-370 and larger

- Air operated butterfly valves offer high cycle life
 - Resilient elastomeric seats for leak free service
 - Low profile, nickel plated disks offer low pressure drop
 - Stem bushings ensure smooth operation
 - No field lubrication required
 - Repair kits available - can be serviced in field

Actuators

- Pneumatic actuators combine power and durability
 - Double acting rack and pinion uses air power to both open and close valve
 - Dual pistons offer large control area, high torque, rapid response
 - Position indicator shows if valve is open or closed
- Valves may be operated manually



- Actuators isolated from air stream, can't 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

- Pilot air filtered through one micron in-depth filter and dependably controlled for sure actuation
- NAMUR mount pilot valves with bidirectional seal, balanced spool, and hermetically sealed coil



Check valves

- Soft seated for sure closures and minimal wear
- Won't disintegrate in water (like silica gel)
- High crush strength
- Resistant to abrasion

Hankison DH Series desiccant dryers are completely assembled, piped, and wired at the factory, shipped ready for operation after utility hook-up

- Structural steel frame complete with floor stand
- Shipped with full charge of desiccant
- Lifting lugs for ease of transporting
- Optional factory mounting of pre and afterfilters

Options

- Models for higher working pressures
- Models for severe environments, process industries, drilling rigs, etc.

Filtration:

- Prefilters - eliminate solid and liquid contaminants - prolong the life of the desiccant bed
- Afterfilters - remove desiccant dust (filters for 1 and 0.01 micron available)
- Factory mounting of filter packages

Electrics:

- Choice of 120V/1ph/60Hz, 110V/1ph/50Hz, 240V/1ph/60Hz, 220V/1ph/50Hz, 12 VDC, 24 VDC
- NEMA 7 optional (NEMA 4/4X standard)

Instrumentation:

- High dew point alarm
- Dew point monitor



Standard models are CSA (Canadian Standards Association) certified, attesting conformity to both CSA standard CAN/CSA-C22.2 No. 236 and UL (Underwriters Laboratories) Standard UL 1995.

Sensatherm[®] automatic purge saving system

- 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.

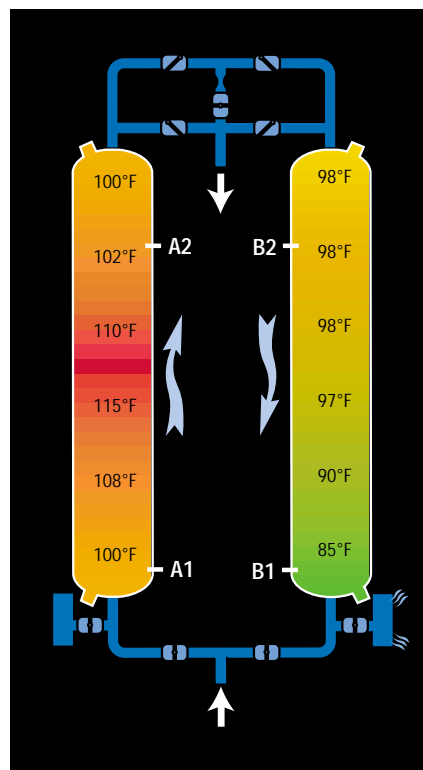
Hankison's patented Sensatherm purge saving system matches purge air use to the demand on the dryer by monitoring the changes in temperature within the desiccant beds. These changes are the result of heat that is released during the drying stage (heat of adsorption) and reabsorbed during the regeneration 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.

Operation:

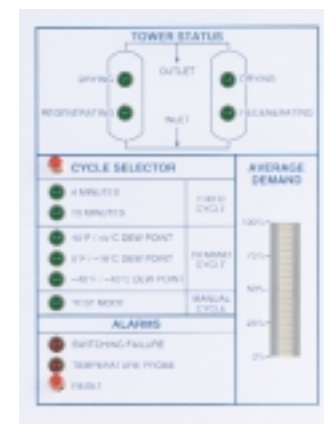


1. As Tower II goes off line and begins the regeneration stage, sensor B1 takes a temperature reading.
2. At the end of the regeneration stage, sensor B1 takes another reading.
3. The Sensatherm's microprocessor uses this temperature difference to calculate the temperature rise that will occur during the drying stage as the bed becomes fully loaded.

4. When Tower II returns to the drying stage, sensor B2 takes a reading and begins monitoring the temperature rise.
5. When the calculated temperature rise occurs, indicating that the bed is fully loaded, the processor signals the Tower to go off-line for regeneration.

Features:

- Choice of operating modes
 - Two fixed cycle times - 10 minute cycle for -40°F (-40°C) outlet dew point or 4 minute cycle for -100° (-73°C) outlet dew point
 - Choice of -40°F, 0°F, or +40°F (-40°C, -17.8°C or + 4.4°C) outlet dew point in the demand mode
- Tower Status Lights
- Demand meter - indicates average demand on the dryer
- Alarms for switching or temperature probe failure
- Diagnostic mode - A complete maintenance tool - permits manual sequencing through dryer operation to verify condition of valves and temperature probes



Prefilter/Afterfilter packages

Hankison integrally mounted pre-filter/afterfilter packages include a high efficiency oil removal filter piped to the inlet of the dryer and a one micron particulate filter piped to the outlet of the dryer.

Prefilter

A Hankison coalescing type oil removal filter prefilters the inlet air and protects the desiccant bed from oil contamination.

- Removes particles to 0.01 micron for virtually oil free air
- Patented design maintains high oil removal efficiency for the life of the element
- Includes automatic condensate drain and differential pressure gauge

Afterfilter

Hankison one micron filter prevents desiccant dust (fines) from traveling downstream

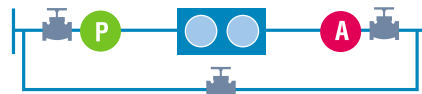
- Removes 100% of all solid particles one micron and larger
- Two in-depth filter beds offer superior performance and extended element life
- Includes differential pressure gauge

Basic packages include:

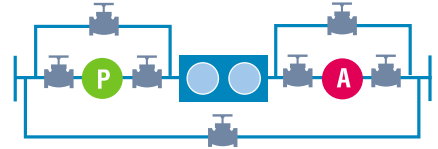
Package 1 - Prefilter and afterfilter mounted to dryer with inter-connecting piping



Package 2 - Prefilter and afterfilter mounted to dryer with inter-connecting piping and three valve system block and by-pass



Package 3 - Prefilter and afterfilter mounted to dryer with inter-connecting piping, individual block and by-pass for each filter, and three valve system block and by-pass



Specifications

Table 1

Model	Inlet Flow @ 100 psig, 7 kgf/cm ²		Dimensions						Inlet/Outlet Connections	Weight	
			Height		Width		Depth				
	scfm	m ³ /min	in	mm	in	mm	in	mm		lb	kg
DH-25	25	0.72	75	1905	25	635	24	610	1/2" threaded*	265	120
DH-45	45	1.29	75	1905	25	635	24	610	1/2" threaded*	265	120
DH-60	60	1.72	76	1930	25	635	24	610	3/4" threaded*	324	147
DH-80	80	2.3	82	2083	30	762	30	762	1" threaded*	529	240
DH-115	115	3.3	87	2210	32	813	30	762	1" threaded*	563	255
DH-165	165	4.7	87	2210	33	838	31	787	1 1/2" threaded*	583	265
DH-260	260	7.4	90	2286	35	889	42	1067	1 1/2" threaded*	782	355
DH-370	370	11	89	2261	45	1143	42	1067	2" threaded*	997	453
DH-450	450	13	92	2337	45	1143	42	1067	2" threaded*	1313	597
DH-590	590	17	95	2413	52	1321	48	1219	2" threaded*	2205	1002
DH-750	750	21	97	2464	52	1321	48	1219	2 1/2" threaded*	2705	1230
DH-930	930	27	102	2591	58	1473	56	1422	2 1/2" threaded*	3228	1466
DH-1130	1130	32	104	2642	62	1575	57	1488	3" ANSI or DN 80 flg	3740	1698
DH-1350	1350	39	109	2769	63	1600	57	1448	3" ANSI or DN 80 flg	4252	1930
DH-1550	1550	44	109	2769	77	1956	68	1727	4" ANSI or DN 100 flg	4796	2177
DH-2100	2100	60	106	2692	85	2159	75	1905	4" ANSI or DN 100 flg	5100	2315
DH-3000	3000	86	121	3073	80	2032	89	2261	6" ANSI or DN 150 flg	8500	3856
DH-4100	4100	117	105	2667	91	2311	85	2159	6" ANSI or DN 150 flg	9900	4500
DH-5400	5400	155	122	3099	102	2591	92	2337	6" ANSI or DN 150 flg	12000	5445

* Available with NPT or BSP threads

Dimensions and weights are for reference only. Request certified drawings for construction purposes.

Table 2

Operating Pressure	psig	60	70	80	90	100	110	120	130	140	150	175	200	225	250
	kgf/cm ²	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

Inlet, purge and outlet flows

Inlet flow

Inlet flows are established in accordance with CAGI (Compressed Air and Gas Institute) standard ADF-200: Dual Stage Regenerative Desiccant Compressed Air Dryers - Methods for Testing and Rating. Conditions for rating dryers are: inlet pressure - 100 psig (7 kgf/cm²); inlet temperature - saturated at 100°F (38°C).

To determine inlet flow at pressures other than 100 psig (7 kgf/cm²) - multiply inlet flow @ 100 psig (7 kgf/cm²) from Table 1 by the multiplier that corresponds to your operating pressure from Table 2.

Average purge flow rate

Average purge flow rate is the amount of purge air used during the regeneration portion of the purge cycle (purge/repressurization valve open) plus the volume of air used to repressurize the tower after the purge/repressurization valve closes averaged over the cycle time. At 100 psig (7 kgf/cm²), the average purge flow rate is: 14.4% (13.7% for regeneration + 0.7% for repressurization) of rated inlet flow for dryers operating on a 10 minute cycle; 15.5% (13.7% for regeneration + 1.8% for repressurization) for dryers operating on a 4 minute cycle.

Outlet flow

To determine flow of air available at outlet of dryer, subtract purge flow from inlet flow.

Electrics

Available voltages

120V/1ph/60Hz,
110V/1ph/50Hz

240V/1ph/60Hz,
220V/1ph/50Hz

12VDC, 24VDC

NEMA 4, 4X standard,
NEMA 7 available

Maximum working pressure

150 psig (10.5 kgf/cm²) standard

250 psig (17.6 kgf/cm²) optional

Units for higher maximum working pressures are available; contact factory.

Minimum operating pressure

150 psig (10.5 kgf/cm²)
MWP models

60 psig (4.2 kgf/cm²)
on a 10 min cycle

80 psig (5.6 kgf/cm²)
on a 4 min cycle

250 psig (17.6 kgf/cm²)
MWP models

125 psig (8.8 kgf/cm²)
on a 10 min cycle

150 psig (10.5 kgf/cm²)
on a 4 min cycle

For lower pressures contact factory.

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

Pressure drop at rated flow: 3 psi (0.21 kgf/cm²)



Hankison International - For over fifty years a leader in products to clean and dry compressed air

Hankison® products are lowering operating costs, reducing downtime, and helping to ensure product quality by providing cool, clean, dry compressed air in thousands of installations throughout the world.

Hankison products can be found in large and small manufacturing plants, in a variety of installations such as steel and textile mills, automotive and appliance assembly plants, and food, chemical and petro-

leum processing facilities. They can also be found supplying clean, dry air in mines, hospitals and ships.

Hankison small refrigerated dryers are the standard in the HVAC industry. Wherever compressed air is used, Hankison air treatment equipment can improve air system productivity.

Since 1948, Hankison has invested in new product development and modern manufacturing techniques and equipment. These efforts have

resulted in innovative products and in the ability to manufacture to the highest standards.

Hankison International offers you not only products "designed for performance and built to last"...but technical assistance before the sale...ensuring that the right products are selected...and service support after the sale...allowing years of trouble-free operation.

Excellence in Design



Excellence in Manufacturing



Service Excellence



Production Facilities

- Washington, PA
- Newport, NC
- Dallas, TX
- Moers, Germany
- Seoul, Korea

MEMBER OF



MEETING GLOBAL STANDARDS



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