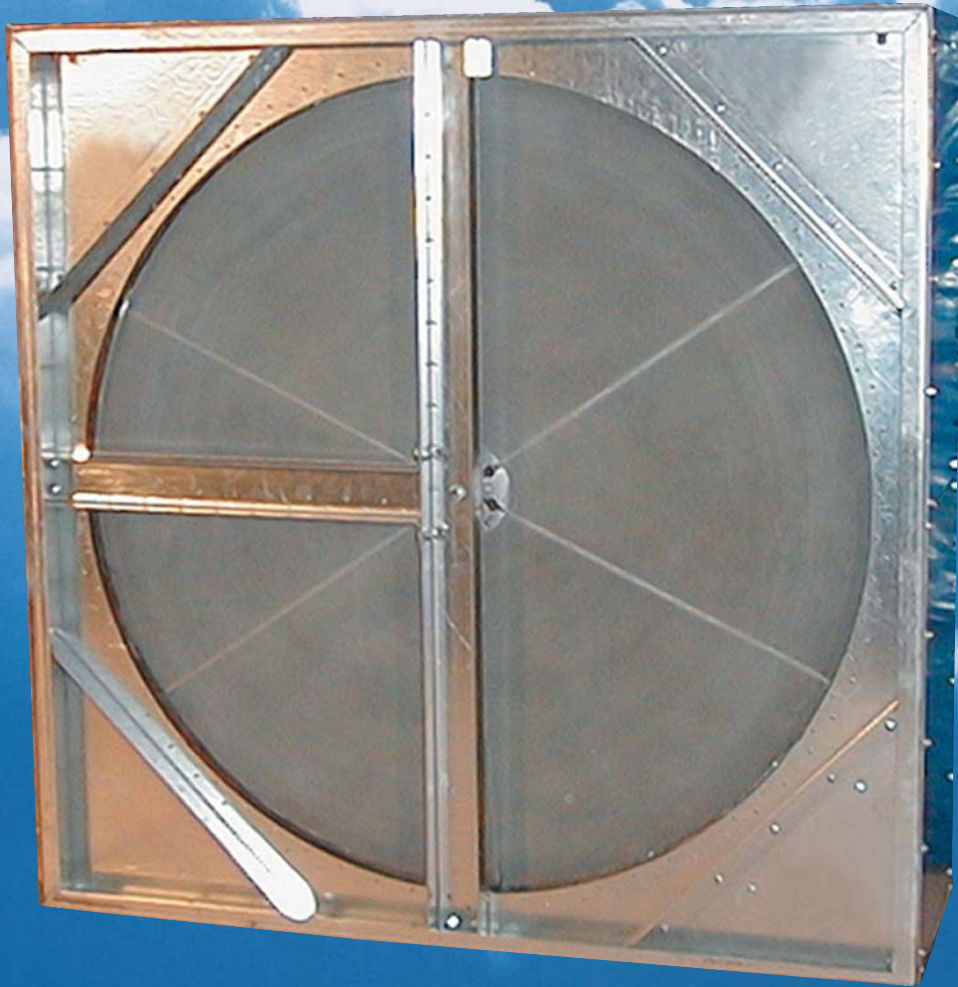


NOVELAIRE TECHNOLOGIES

HEAT & MASS TRANSFER PRODUCTS



DESICCANT DEHUMIDIFICATION WHEEL

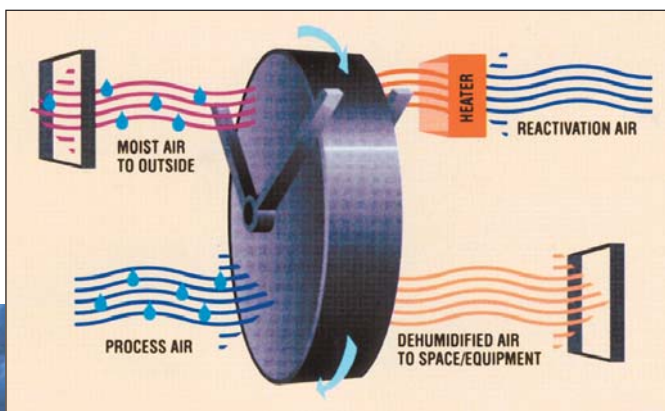
NovelAire Technologies Desiccant Dehumidification Wheel

Desiccant Dehumidification

The NovelAire Technologies Desiccant Dehumidification Wheel is designed to provide maximum moisture removal with a minimum pressure drop for those applications where humidity control is required. A desiccant dehumidification wheel provides the HVAC system designer another tool to control humidity effectively and efficiently particularly in the low humidity ranges. NovelAire Technologies offers a complete line of both high performance silica gel (WSG) and molecular sieve (LT3) desiccant wheels to meet all outlet humidity requirements.

- Improved indoor air quality
- Precise humidity control
- Both silica gel (WSG) and molecular sieve (LT3) desiccant wheels available
- Utilizes all types of regeneration energy
- Very low dewpoints achievable

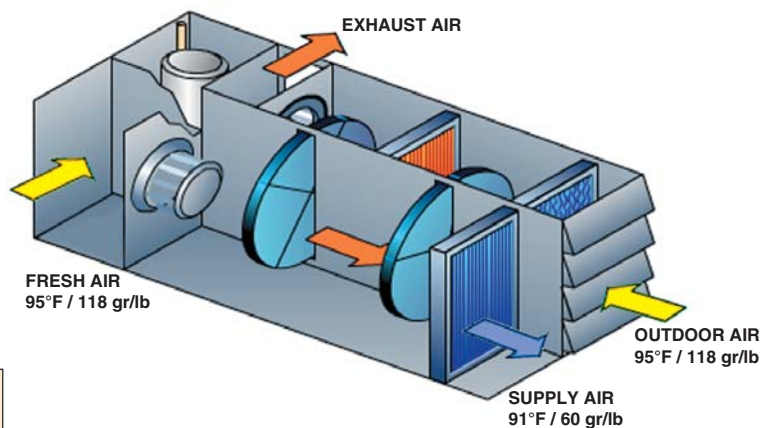
The NovelAire desiccant wheels are used extensively in the well-known industrial markets for corrosion protection and humidity control for many industrial processes. Commercial applications include refrigerated warehouses, ice rinks, schools, supermarkets and hospitals. A residential and light commercial market is developing where small gas fired or hot water regenerated desiccant equipment is used for centralized humidity control. The ability to control home humidity in the 50% RH range improves comfort, saves energy with higher set point temperatures, and prevents the formation of mold and mildew--a potential problem that is of increasing importance to the homeowner.



Desiccant Cooling

The availability of waste heat from distributed generation projects along with the increased ventilation standards for improved IAQ, is revitalizing the desiccant cooling industry. With waste heat, desiccant cooling systems become extremely efficient while providing the additional benefit of independent temperature and humidity control.

The ASHRAE Standard 62-1989 (Ventilation for Acceptable Indoor Air Quality), describes a recommended target ratio of makeup air to return air for a variety of applications and building types. Building codes in the U.S. and abroad are becoming increasingly more comprehensive in addressing ventilation requirements. NovelAire's line of actively regenerated desiccant wheels combined with sensible only wheels, heat pipes, DX coils, and/or indirect evaporative cooling provide the design engineer with many options to deal with the high latent loads associated with increased ventilation requirements.



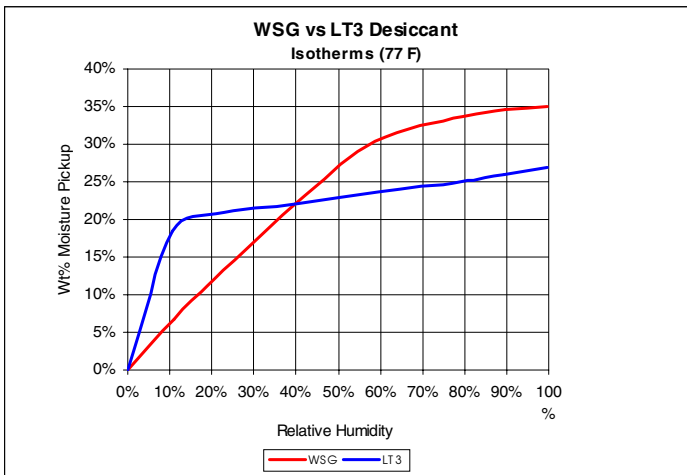
A typical twin wheel system: a desiccant wheel for dehumidification, and a sensible wheel for heat exchange.

Desiccant Types

NovelAire offers both a high performance Silica Gel (**WSG**) desiccant and specialty Molecular Sieve (**LT3**) desiccant to meet the dehumidification needs of most applications. The differences in the desiccant properties are more clearly defined by their respective static adsorption isotherm curves, a measure of the desiccant's ability to adsorb moisture under constant static conditions.

The isotherm curve for the **WSG** desiccant is more linear and rises to a high capacity at higher relative humidity. Conversely, the **LT3** curve exhibits high desiccant capacities at lower relative humidity and flattens out as %RH increases. Therefore, the **WSG** desiccant wheels are recommended when the inlet %RH is high (>60%) and the primary goal is the removal of the largest quantity of moisture with the most efficient use of the heat input. If the inlet %RH is low (<50%) and the lowest possible outlet dewpoint is desired, then the **LT3** desiccant wheels are preferred. Experience has shown that in many cases, the WSG desiccant wheels adequately meet the requirements of the application.

- > **WSG** wheels used with high inlet %RH (>60%) and when efficient removal of moisture is required.
- > **LT3** wheels preferred with low inlet %RH (<50%) and/or when low dewpoints are required.



Features and Benefits

The NovelAire desiccant wheels are constructed from a unique corrugated high temperature fiber-based media impregnated with a non-migrating water selective desiccant. Unlike other media, the desiccant is uniformly and permanently dispersed throughout the matrix structure in contrast to being coated, bonded, or synthesized onto the matrix, and therefore, is not susceptible to delamination or erosion of the desiccant material.

- > Homogenous media--desiccant is permanently bound to the media.
- > NovelAire desiccant wheels will not dust.
- > Desiccant loading of > 75%.
- > Tough, non-brittle media- resists damage.
- > Wheel is completely water washable.
- > High temperature resistant media for use with regeneration temperatures up to 350°F.
- > Used with direct or indirect fired gas, electric heat, steam, and hot water regeneration.

Cassettes

- > Heavy duty galvanized steel construction with removable side panels.
- > Wheels are center supported, using a fixed shaft and internal maintenance-free bearings on smaller cassettes. Larger cassettes use a rotating shaft with external pillow block or flanged bearings.
- > NovelAire's unique adjustable, full contact silicon bulb seal design prevents air leakage for differential pressures of up to 8" wc.
- > Drive system includes a heavy duty gear motor with chain drive and tensioner that eliminates wheel slippage.
- > Cassette orientation available in a 75/25 or a 50/50 split.

Note: Detailed wheel and cassette specifications, as well as software selection programs, are available for download at www.novelaire.com

Design Considerations and Control Strategies

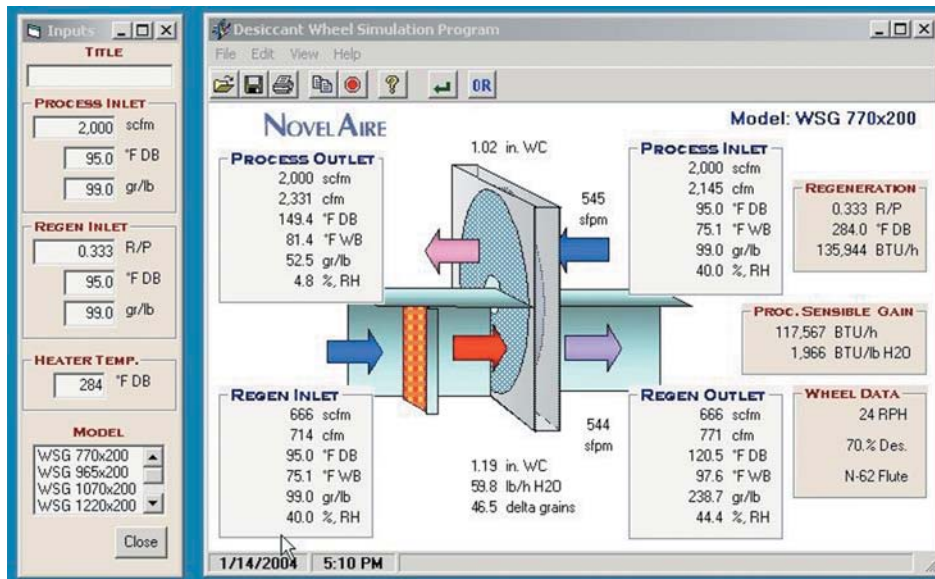
Control of moisture levels in spaces or process air streams is generally accomplished by either regulating reactivation heat or bypassing a portion of the air around the dehumidification wheel. The response time, energy efficiency, and dewpoint bandwidth determine what level of control is required. The degree of control varies from the simplest form of on/off control to maintain a space condition, to the most comprehensive which would include wheel bypass dampers (and perhaps face dampers) plus reactivation heat modulated to control an exit exhaust air temperature.

Humidity sensors vary in type, principle of operation, accuracy, and precision, and need to be chosen to suit the control requirements. Placement of sensors in well-mixed air streams is critical to performance monitoring.

Reactivation heaters should be equipped with suitable safety devices and interlocks to prevent overheating the wheel. The maximum operating temperature is 350°F. Separate high temperature cutouts should be provided if this temperature could be exceeded during operation. Reactivation airflow should be maintained and proven anytime reactivation heat is energized.

Software Selection Program

For a more comprehensive analysis of performance, NovelAire offers a model selection software program available for download at www.novelaire.com. The program models the performance of a wide array of input parameters to ensure the proper selection of desiccant wheel size and type.



NovelAire Desiccant Wheel Simulation Software

Wheel Performance

NovelAire desiccant wheels are designed to operate with either a 25% area for reactivation and 75% area for process (25/75 split), or with 50% area for reactivation and 50% for process (50/50 split). Generally, the 25/75 split is used for industrial dehumidification, low dewpoint and compact desiccant cooling applications. The 50/50 split is more often used for commercial cooling applications, or application where low temperature waste heat is available for reactivation.

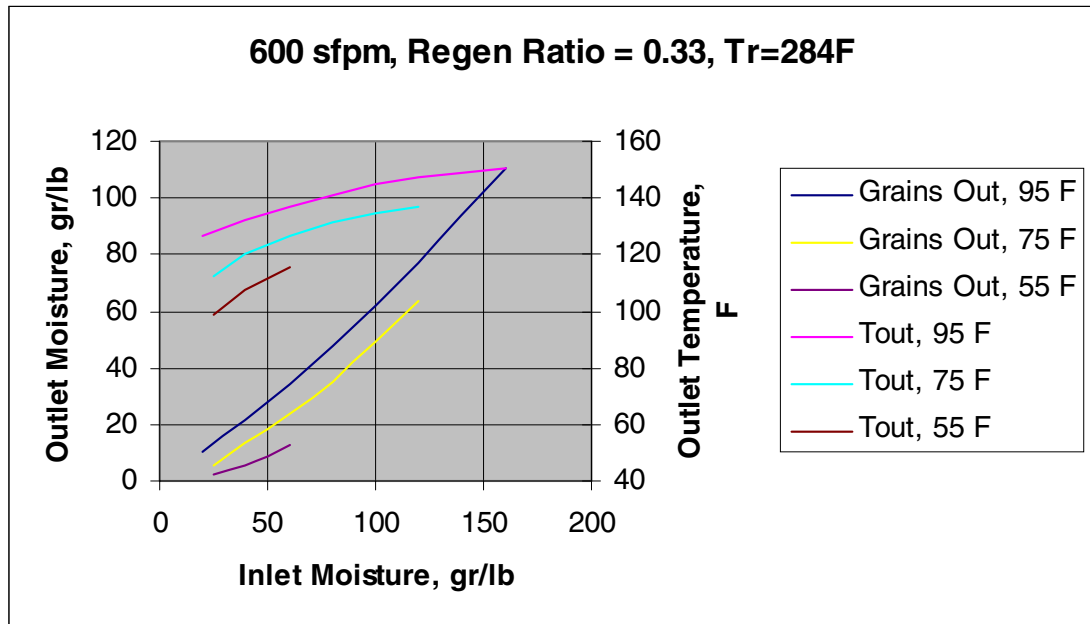
NovelAire desiccant wheels are designed to be reactivated with either electric resistance, (indirect) steam, (indirect) hot water, or direct (or indirect) fired natural (or propane) gas.

Additionally, solar or waste heat sources may be utilized. NovelAire desiccant wheels are designed for regeneration temperatures up to a maximum temperature of 350°F.

In addition to the regeneration temperature and cassette zoning, several other factors influence the performance of the desiccant wheel. Process and regeneration inlet humidity and temperature, regeneration to process flow ratio, face velocity, and wheel rotational speed all has an impact on performance. The following curves show the relationship between some of these parameters on performance for the WSG desiccant wheel.

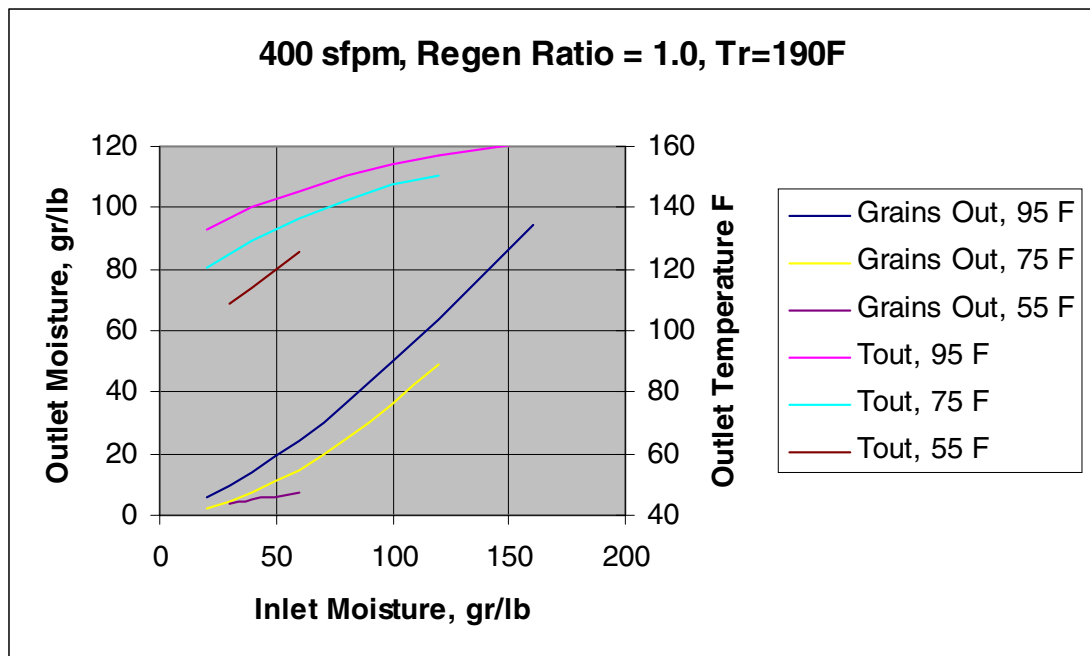
WSG Wheel Performance

600 sfpm
R/P ratio .33
Tr= 284°F



WSG Wheel Performance

400 sfpm
R/P ratio 1.0
Tr= 190°F

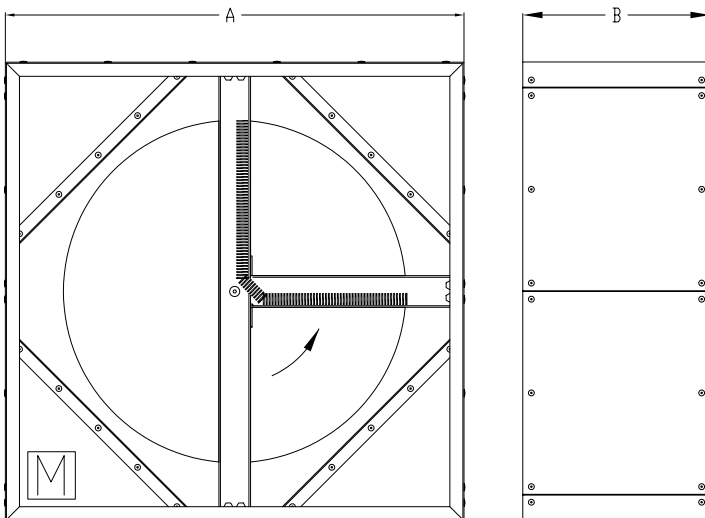


Engineering Detail

WSG High Performance Silica Gel Desiccant
 LT3 Molecular Sieve Desiccant

NovelAire Model No.	Flow Rate (scfm) 75/25	Flow Rate (scfm) 50/50	Wheel Diameter (mm)	Wheel Depth (mm)	Cassette Height/Width A (inches)	Cassette Depth B (inches)	Approx. Total Wt. (pounds)	Drive Motor (Hp)
250	200	150	250	200	21	11.5	90	1/80
370	500	350	370	200	24	12	110	1/80
440	700	500	440	200	26	12	120	1/80
550	1000	750	550	200	29	12	150	1/80
770	2000	1500	770	200	36	12	220	1/80
965	3500	2500	965	200	43	13	290	1/80
1070	4500	3000	1070	200	48	13	330	1/80
1220	6000	4000	1220	200	54	13	410	1/40
1525	8500	6000	1525	200	69	14	790	1/40
1730	11000	7500	1730	200	77	15.5	1020	1/6
1940	14000	10000	1940	200	85	15.5	1370	1/6
2190	18000	12500	2190	200	96	17	1730	1/6
2438	22500	16000	2438	200	106	17	2000	1/6
2743	28000	20000	2743	200	122	18.25	2740	1/6
3050	35000	25000	3050	200	134	18.25	3390	1/6

Note: NovelAire desiccant wheels are offered in a standard depth of 200 mm. Optional 50mm, 100mm, 150mm and 400mm depths are available in some sizes. Please consult the factory for depth options and dimensional tolerances.



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The information contained in this brochure is believed to be accurate by NovelAire Technologies, but is not warranted.