CONDENSATION/HUMIDITY PROBLEMS IN BREWERIES

*Imtech DryGenic systems are specially designed to use low levels of energy and to minimize total energy consumption. No deep cooling and after heating such as required in air handling units. Imtech DryGenic helps the beer industry to produce better quality products in an almost germfree, ultra clean and controlled temperature/humidity environment.*

YOUR PARTNER IN DEHUMIDIFICATION

*Imtech DryGenic have brought over 50 years of desiccant dehumidification experience to the beer industry. Imtech DryGenic equipment delivers cool, dry, sterile air, at the same time eliminating mold growth.*

The absence of moisture in processing and storage translates to less opportunity for contamination and growth of bacteria, mold and fungi. It automatically controls the dew point below the beer tank temperature in the process areas, thus eliminates condensation and possible mold growth, and quickly dries up spaces after periodic wash downs. Simultaneously the Imtech DryGenic system removes up to 97% of all airborne bacteria, mold and fungi from the air stream and kills them.

TANKROOMS / CELLARS:

Dampness in buildings is a serious problem. Water can enter buildings in a number of ways to cause superficial and structural damage. Conditions in a damp environment are often unpleasant, uncomfortable and unhealthy.

One of the most common causes of dampness in buildings is condensation which can often lead to the appearance of mould growth. It is the presence of water condensed on walls, ceilings and other cold surfaces like tanks, which support mould growth. In most cases there is high moisture load in the various departments of the cellars. To avoid condensation, the air must be dehumidified and temperatures must be controlled. In this way the architectural constructions, floor, piping and mechanical constructions, tanks can be protected against aging and oxidation of the steel constructions.
There is also the rapid deterioration of painted surfaces. Although a room may be extremely dry when painted, moisture seepage under the paint can cause sufficient peeling to make a thirty day paint job look years old. This all spoils the general cleanliness and bright appearance of the brewery.

Another main problem in ‘wet’ rooms is mildew, and growth of other micro-organisms. For all above mentioned problems Imtech DryGenic air drying systems offer a proper solution. The intensive way of drying is achieved by the fact that the Imtech DryGenic plant can accomplish a lowest limit value down to dew point of -25°C of the air without freezing of the coolers.

**PROBLEMS:**

Most brewing operations take place in cellars / tank rooms that are maintained at temperatures near freezing.

*Air drying with conventional system* – The air typically must be delivered to the cellars/ tank rooms at subfreezing temperature. This causes frost to build up on the cooling coils. As a result, they must be oversized to compensate for the frost. In addition the must be periodically defrosted. This takes additional energy and requires additional ammonia piping and controls.

*Wet surfaces* – Normal cleaning procedures result in wet floors and equipment. These surfaces take a very long time to dry due to high humidity, and often never dry completely before the next cleaning. This combined with the high humidity, creates an ideal environment for mould and bacteria and spread them all over the cellars through the ductwork.

*High maintenance costs* – The humid environment tends to deteriorate the building structure and equipment as well as instrumentation and controls, increasing maintenance costs. In addition, frequent scrubbing and chemical treatment may be required to keep mould growth under control.

Lithium Chloride equipment solves these problems by continuously supplying cold, dry air to maintain the cellars at ideal temperature and humidity conditions. Cellar humidity in the range 40% to 50% greatly reduces mould and bacteria growth and dries up wet surfaces within a few hours of cleaning operations. Dry surfaces and lower humidities reduce or eliminate the deterioration of the building, equipment and reduces maintenance costs. The liquid desiccant equipment actually delivers air to the cellars at the refrigeration temperature, providing maximum drying capability with minimum airflow. The air is continuously cleaned of airborne organisms, further contributing to cleanliness and sanitation. Mould growth is a rarity in a cellar conditioned with Lithium Chloride equipment.
**DESIGN:**
Energy comparison between Imtech DryGenic and a system with refrigeration and reheat.

Air volume : 80,000 m³/h  
Air supply conditions : 7°C / 1 g/kg dew point -15°C  
Room condition : 8°C / 2.5 g/kg / 40% RH, dew point -5°C.

**DRYGENIC SYSTEM:**
The Imtech DryGenic system provides optimum humidity conditions continuously day in day out. Air temperature and humidity are simultaneously controlled in the system.

The system utility requirements for cooling are approx. 329 kW and 297 kW of low pressure steam.

**REFRIGERATION AND REHEAT:**
An alternative would be cooling the same 80,000 m³/h to its dew point of -15°C (1 g/kg). This would create a frost problem on the cooling coil and a great increase in refrigeration.

After some time you have to switch to a second cooler so you are able to defrost the first one. Also the energy consumption is much higher.
Table 1 Energy comparison air dryers for brewery applications

<table>
<thead>
<tr>
<th></th>
<th>Imtech DryGenic</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>329 kW</td>
<td>965 kW</td>
</tr>
<tr>
<td>Cooling temperature</td>
<td>0ºC</td>
<td>-20ºC</td>
</tr>
<tr>
<td>Heating, steam</td>
<td>297 kW</td>
<td>625 kW</td>
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</tbody>
</table>

ENERGY & INVESTMENTS COSTS

Using a Imtech DryGenic system for air dehumidification usually results in a substantial saving in the running costs of the plant and the capacity of the refrigeration equipment.

The Imtech DryGenic dehumidification system integrated with alternative energy sources, provides a better environment with energy, space and cost savings. Generally speaking Imtech DryGenic’s energy costs are at least 50% lower than those of a refrigeration coil system.

REMOVAL OF AIR BORN MICRO-ORGANISM

The graph shows the efficiency of the bacterial removal of the Imtech DryGenic system, as well as the dust removal efficiency.

Based on a normal distribution of bacteria in the outside or return air about 97% of the bacteria is washed out of the air and eliminated in the hygroscopic solution.
IMTECH DRYGENIC

Imtech DryGenic unite dehumidification expertise and customer focused service to each application. For over 50 years Imtech DryGenic have manufactured dehumidification systems and is recognized globally for expertise, quality, service and in providing innovative solutions for complex dehumidification processes.

The requirements in, for instance the food, electronic and pharmaceutical industries are frequently adjusted. To serve the changing needs of industrial, institutional and commercial users, new product lines are being continually developed. The Imtech DryGenic systems come in variety of configurations depending upon air volumes, temperature range, available energy and any need for additional biocidal capacity. The systems keep the air at a constant, precise humidity regardless of weather conditions or load variations.

DrySol, air drying with a liquid

The Imtech DryGenic principle is simplicity itself. All the dehumidifying systems of Imtech DryGenic are based on the drying properties of a liquid hygroscopic solution called DrySol. The amount of moisture, which DrySol will take out, is directly related to the concentration and temperature of the solution. DrySol is a non-toxic bactericidal solution, which, when sprayed into an air stream, effectively removes bacteria and specific viruses from the air.

ADVANTAGES IMTECH DRYGENIC SYSTEM

• Reduction of operation costs through lower cooling and lower regeneration heat requirements;
• highest energy efficiency of any desiccant dehumidifier;
• uses relatively cheap coolants, like well water, river and cooling tower water;
• dew-point humidity as low as -7 ºC with 7 ºC chilled water coolant;
• easily accessible, non-toxic desiccant has low replacement costs, is not poisoned by hydrocarbons and is not affected by normal plant environments;
• plastic unit construction yields long equipment life;
• elimination of “wet” coils and potential breeding site for micro organism including bacteria, molds and viruses. Also no “freezing” of the coils;
• temperature and humidity are automatically controlled throughout the year;
• multiple conditioners can be coupled with a single regenerator for system design flexibility, reduction of investment and installation costs;
• operates as a humidifier too;
• remote regenerator can save duct work space and installation costs;
• factory field service support for installation, start-up and training;