

## **C.I. HAYES**

## **“MOLECU-DRYERS”**

The Hayes series of desiccant "Molecu-Dryers" are designed to produce consistent low dewpoints in a wide variety of gases. The compact units contain two adsorption chambers mounted on a base and encased in a ventilated metallic housing. The units are safe for use in drying flammable gases such as hydrogen, dissociated ammonia, and forming gas without resorting to special construction since electric heaters do not come into contact with the gas. Purge losses are usually less than 1% eliminating the need for a purge recapture system.

### **1.0 PRODUCT PURITY:**

The Hayes "Molecu-Dryer" will produce dewpoints of  $-100^{\circ}\text{F.}$ , or lower, in most gas drying applications. In drying hydrogen from bottles, a Deoxo purifier is added into the gas line ahead of the dryer to combine any oxygen present with the hydrogen to produce water vapor, which is then removed in the dryer. In drying dissociated ammonia, the dryer lowers the dewpoint of the gas from the dissociator (usually  $-50$  to  $-60^{\circ}\text{F.}$ ) to  $-100^{\circ}\text{F.}$ ; in addition, it removes up to 500 ppm of undissociated ammonia down to a concentration of 10 ppm or less. The capacity of the dryer must be cut down when co-adsorbing ammonia.

On exothermic gas, the dryer is operated in conjunction with a refrigeration unit. The latter reducing the dewpoint to about plus  $40^{\circ}\text{F.}$  before the gas enters the dryer. This drying is accomplished without co-adsorbing  $\text{CO}_2$ .

### **2.0 CONSTRUCTION AND DESCRIPTION:**

#### **2.1. Drying Chamber:**

The dryer chambers are constructed of welded carbon steel and designed to operate at their maximum specified pressures. Finned tube is welded into the chambers and facilitates dissipation of heat through the desiccant. Helical wound tubular heating elements are inserted into the open ends of the finned tube, which extend outside the chamber. This permits easy replacement without cutting into the chamber and even while the dryer is in operation.

#### **2.2. Piping:**

The piping consists of a gas inlet diverting valve assembly, outlet check valves, a relief valve, and purge control solenoid valves.

**2.3. Electrical:**

The electrical circuit consists of the heating elements, purge solenoid valves, regeneration indicating lights and the timer.

**2.4. Cycle Timer:**

The cam cycle timer automatically controls the chamber shifting, plus the heating and purging of the regenerated chamber which usually occurs once every 8 hour period.

**2.5. Molecular Seive:**

Linde Molecular Sieve Pellets are used as the desiccant. Under normal operating conditions the expected life of the molecular seive is approximately 2000 cycles. The desiccant bed is designed to take care of the slight loss in desiccant efficiency without a breakthrough in moisture occurring.

**3.0 OPERATION:****3.1 Adsorption:**

The gas enters the inlet valve assembly, passes to one of the desiccant chambers, where it is dried to -100°F. or better, and leaves through a check valve to process. With two chambers, the dryer is capable of continuous operation - while one chamber is adsorbing, the other is regenerated, cooled and made ready for the next adsorption cycle.

**3.2 Regeneration:**

After the inlet stream of gas is shifted from the wet chamber to the dry chamber, the heater inside the wet chamber is energized. Meanwhile, a controlled amount of the dry gas is bled through the bypass control valve and passed into the chamber being heated - counter-current to adsorption flow.

At high temperatures, the sieve loses its affinity for water and the dry gas purges the released water vapor through the purge solenoid valve. Complete regeneration last 8 hours minimum--2 1/2 hours for heating and purging and 5 1/2 hours for cooling (by convection).

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### **HAYES MODEL MSA-30 “MOLECU-DRYER”**

#### **RATING:**

<b>Dimensions:</b>	40" High x 28" Wide x 32" Deep
<b>Pipe Size:</b>	3/4" IPS
<b>Molecular Sieve per Chamber:</b>	30 Pounds
<b>Purge Flow:</b> (approximatley)	30 scfh for 2 1/2 hours heating
<b>Weight:</b>	Approximately 675 lbs.
<b>Connected Load:</b>	3.6 kW, 240 V, 3 Ph, 60 Hz.
<b>Operating Pressure:</b>	15 psig. Maximum
<b>Drying Capacity:</b>	The MSA-30 will dry 1500 scfh of gas at 15 psig from an inlet dewpoint of 25°F to an outlet dewpoint of -100°F or better on an 8 hour adsorption cycle. (If drying dissociated ammonia, it will reduce the concentration of undissociated gas from 250 ppm down to less than 10 ppm in addition to removing water vapor.)
<b>Automatic:</b>	Through a cam type cycle timer the drying chambers are shifted over and the heating and purging solenoid valves are controlled automatically.