

## MOLECULAR SIEVE Z10-02 FOR AIR PREPURIFICATION

### INTRODUCTION

ZEOCHEM® Z10-02 is a high capacity 13X molecular sieve developed for use in air pre-purification plants where the optimum conditions for the adsorption of moisture and carbon dioxide are required. ZEOCHEM® Z10-02 works in plants using both the older thermal swing technology and the more recent pressure swing technology. The combination of an open crystal structure giving outstanding adsorptive properties, together with excellent physical characteristics marks ZEOCHEM® Z10-02 as a new standard for air-prepurification applications.

### THE COMPANY

Zeochem AG is an established Swiss chemical company, having been in business for over 185 years. We have produced adsorbents for over 50 years, while in molecular sieves, the Zeochem business group of Chemie Uetikon has a wealth of experience stretching back over 30 years. ZEOCHEM® molecular sieves are supplied worldwide from two plants situated in Uetikon Switzerland, and Louisville, Kentucky, USA.

### THE PRODUCT

ZEOCHEM® Z10-02 is a specially developed form of the 13X type crystal structure which is particularly suitable for use in the air-prepurification industry. It is characterised by a high equilibrium capacity for both carbon dioxide and moisture, together with

excellent dynamic characteristics and superb physical properties. ZEOCHEM® Z10-02 is available in a number of bead sizes to suit all customers.

### THE DUTY

Air pre-purification plants work on one of two possible technologies. The older technology is the thermal swing technology where the molecular sieve is regenerated by means of passing hot gas through the bed to desorb the adsorbed moisture and carbon dioxide. This is characterised by longer cycle times and the need for considerable heat energy for regeneration purposes. The more modern technology is the pressure swing technology where regeneration is achieved by reducing the pressure inside the exhausted bed after the adsorption step. The desorbed impurity is then flushed out. The cycle times of pressure swing plants is generally much shorter than that for thermal swing regeneration, and shows savings in capital costs together with important savings in pressure drop and hence energy. ZEOCHEM® Z10-02 is often used in PSA adsorbents in conjunction with activated alumina which has a high capacity for moisture under the standard pressure swing conditions.

### PROVEN PERFORMANCE

Independent testing by major companies working in the industry has already shown that this improvement is there and useable in new and existing plants.

## ADVANTAGES

### 1. High Carbon Dioxide Capacity

The applicable isotherms graph shows carbon dioxide capacity over the customary pressure ranges for standard air separation plants. The higher capacity is important for minimising the size of the molecular sieve bed, and hence the energy usage and size of the plant. Alternatively changing to ZEOCHEM® Z10-02 may also help in getting a greater throughput from an existing plant.

### 2. Good Dynamic Performance

A second important measure of performance in addition to the equilibrium capacity is the rate of adsorption as measured in terms of MTZ or mass transfer zone length. Independent testing has shown that ZEOCHEM® Z10-02 maximises the use of the bed by minimising this lost bed length or MTZ length.

### 3. Low Regeneration Temperatures

Energy is an important consideration in air processing plants, and any means of saving energy usage is welcome. A look at the temperature/capacity graph for ZEOCHEM® Z10-02 shows that regeneration of the adsorbed carbon dioxide can be achieved using temperatures in the range of 150 - 180°C.

### 4. High Strength Beads

The good adsorption performance characteristics mentioned above demand a very open and very pure structure. This has been combined with good durability in terms of crush strength for a longer lifetime.

### 5. Good Attrition Resistance.

Allied to the absolute strength of the particles is the ability to resist the high abrasion forces present in the beds during the many regular pressure changes these beds undergo. As the pressure changes, the release of gas together with the attendant temperature changes, tend to produce attrition between the individual beads. Chemie Uetikon has minimised this attrition.

### 6. Good Flow Distribution

The carefully controlled bead size ranges are narrow and are designed to suit this particular application. Perfectly formed spherical particles within this narrow size range ensure an evenly packed bed, and hence an even flow distribution.

### 7. Long Life

The excellent combination of high attrition resistance and high crush strength ensures that the lifetime of your charge of ZEOCHEM® Z10-02 molecular sieve is maximised for this demanding application.

