



MOLECULAR SIEVE DRYERS

RSI PURIFIERS' MSD Series of molecular sieve dryers takes advantage of the capability of artificial zeolites to absorb and desorb large quantities of water reversibly. Because absorption on sieve material is a physical rather than chemical reaction, complete regeneration is practical and the materials of construction of the MSD have been chosen to allow for vigorous thermal regeneration of the desiccant charge without the need to dump and refill the dryer chamber. MSD dryers can be heated repetitively to temperatures as high as 1000°F (550°C) during regeneration without damaging the sieve material and effecting only the cosmetic aspects of the chamber exterior.

USES: The MSD Series of dryers was originally designed to complement *RSI PURIFIERS'* RCP Series of catalytic hydrogen purifiers, which produce water vapor as a by-product. To be compatible, the MSD dryer had to be capable of matching the high pressure and high flow capabilities of the RCP purifiers as well as the requirement for long uninterrupted runs between regenerations or dryer changes. The MSD chamber and all pads, screen and fittings are 300-series stainless steels, which makes these dryers compatible with most process streams.

The MSD dryer also reversibly absorbs polar molecules such as NH_3 , HCl , H_2S , SO_2 , CO_2 , and some of the smaller organics. It should be noted that water is more strongly absorbed than these other molecules and will displace them. For this reason, breakthrough of the co-absorbed species may occur before breakthrough of water occurs. The MSD dryer is most effective at ambient or lower temperatures. It will operate well at reduced capacities at bed temperatures up to 300°F (150°C)

DRYING CAPABILITIES: Freshly regenerated molecular sieve is capable of reducing water to approximately 35 ppb at 1 atmosphere, a dew point of -140°F. This is a transient phenomenon in that the sieve has relatively little capacity in equilibrium with water at this vapor pressure. Practical water contents of 1 ppm (dew point, -105°F) are easily achieved over long terms with the MSD, capacity being defined in terms of breakthrough at 1 ppm. Further advantages are available if the process streams are dried at the highest pressures appropriate to the MSD and then used at lower pressures. The sieve traps more water in equilibrium with the higher vapor pressures in the feed gas and the effluent dew point is further reduced by expansion.

REGENERATION: The MSD is purged *in situ* to remove the process stream, assuming that the process stream is inflammable, toxic, or otherwise dangerous. The purged MSD may then be removed to an appropriate tube or muffle furnace and heated to 400-600°F (200-300°C). One end of the MSD should be left lightly connected to a source of clean air or safe purge gas. The purge gas should be turned on at 1-2 CFH when there is evidence of vapor leaving the open end of the dryer. Time at temperature while purging should be at least four hours, with overnight regeneration desirable if practical. If temperatures to 1000°F (550°C) are available, absorbed water can be removed to extremely low levels and both the total capacity of the MSD and initial dew points of the process stream improved considerably. The exterior of the dryer will darken during the regeneration process. This is normal and does not impair the function of the dryer.

ORIENTATION: MSD Dryers are intended for operation in the vertical position with the feed gas entering at the top. Up-flow may cause fluidization of the bed and attrition of the sieve material. Use in the horizontal position may cause settling and allow bypassing of the desiccant bed.

rsi purifiers (LLC)

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