become important at dew-points below 50 F and have an extreme effect upon load and equipment selection at dew-points below 35 F.

LOCATION OF EQUIPMENT

All types of dehydration equipment are, in general, applicable in one of several possible locations in the system air flow diagram. The choice of the type of equipment and its location is dependent upon the work to be performed, the capacity of the dehydration equipment to remove moisture and the type of energy available for activation or regeneration.

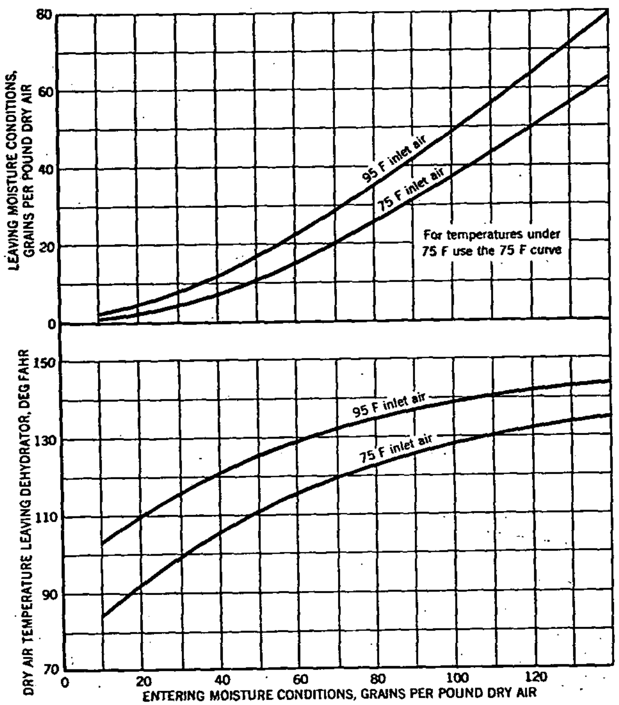

FIG. 7. SILICA GEL DEHYDRATOR PERFORMANCE DATA

Dehydration apparatus may be located: (*a*) to treat outside air only, (*b*) to treat return air only, or (*c*) to treat a mixture of outside and return air.

EQUIPMENT AUXILIARIES

Precoolers. When cold water is available, it is generally economical to use this water in a precooling coil in the outside air stream. The dehumidifying accomplished by this coil reduces the load on the dehydrator; and moreover, lowering the temperature of the inlet air to the dehydrator results in a higher dehydrator moisture removal efficiency.

Dry Air Coolers. Particularly with the solid adsorbent process, and to a lesser extent with liquid absorbents, a dry air cooler is employed to remove sensible heat from the dehydrated air whenever it leaves the dehydrator at an elevated temperature. A cooling coil using city water is usual practice, and is considered economical whenever the difference between effluent air and entering water temperatures is greater than 15 F.

Sensible Heat Coolers. Since the normal conditioning system requires sensible heat removal, auxiliary equipment may be needed for this function. This is almost always in the form of cooling surface using water, brine or direct expansion refrigerant. It is located on the leaving side of the dehydrator, but frequently treats in addition a large volume of room air which is not circulated through the dehydrator for moisture reduction.

CONTROLS

The use of dehydration equipment makes possible the use of a relatively simple control system with a humidistat or, alternatively, a wet-bulb controller, to regulate the operation of the dehydrator, and a thermostat

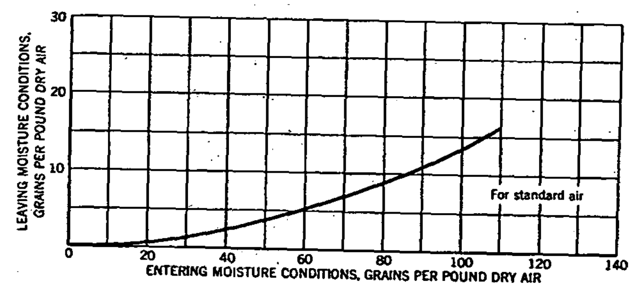

FIG. 8. ACTIVATED ALUMINA DEHYDRATOR PERFORMANCE DATA

to control the sensible cooling apparatus. Functionally, the relative humidity control may consist of one of the following:

1. *Stop—Start*—Where the humidistat starts the dehydrator on rising humidity and stops it on falling humidity.
2. *Bypass*—Where the humidistat modulates face and bypass dampers located at the wet air inlet of the dehydrator. Thus the quantity of air passing through the dehydrator is proportioned in accordance with the change in latent heat load.
3. *Vapor Pressure Control* (used with liquid absorbents)—Where the humidistat directly controls the temperature or concentration of the contacting solution, thereby matching the latent heat removal to the load requirement.

EQUIPMENT PERFORMANCE

It is recognized that, whereas the curves relating temperature and vapor pressure of the several dehydration agents (Figs. 1, 2 and 3) accurately define the equilibrium limits for these materials, these curves cannot be used for predicting performance of available equipment. This is because (*a*) the materials themselves can only be utilized efficiently within certain ranges of moisture concentration, and (*b*) the degree to