the main brine reservoir for re-pumping. The concentrator operates in the manner of an evaporative condenser, whereby moisture is evaporated from the brine, by the heating coils, into a stream of regeneration air taken from and rejected to the outside atmosphere. Low pressure steam is normally used for heating the brine. When it is desirable or necessary to use gas or electricity, an auxiliary low pressure steam boiler is usually added to the equipment. Concentrators operating on a simple boiler principle have not as yet been commercially practical.

It should be noted that the solution concentration phase is the reverse of the absorption process. During concentration the aqueous vapor pressure of the solution is greater than that of the surrounding air, while during dehumidification, the reverse is the case. Utilization of this principle permits winter humidification, by heating (instead of cooling) the solution pumped to the contactor. Water is thereby evaporated into, instead of being condensed out of, the conditioned air stream. This requires dilution of the brine externally to the contactor, rather than concentration.

Another type of liquid dehumidifier utilizes an integral interchanger

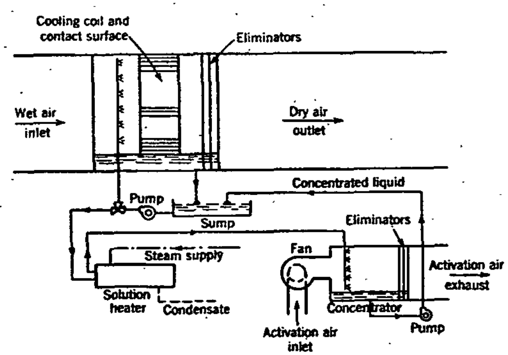

Fig. 6. Liquid Absorbent Equipment in Which Solution Cooler and Contactor are Combined

which employs the same type of solution concentrator as described for the system with the external interchanger. However, the dehumidifying liquid contactor and solution cooler are combined by placing a cooling coil directly in the wet air stream. This coil provides the contacting surface between air and the warm concentrated solution which is sprayed over the cooling surface. By circulating a cooling medium through this coil, control of solution temperature (hence its vapor pressure) is accomplished directly in the air stream.

ESTIMATING LOADS

Where equipment is used which removes sensible and latent heat simultaneously such as a chilled water or direct expansion dehumidifier, the basis of selection is usually the ***maximum total heat load***. The operating characteristics of such equipment normally produce satisfactory dew-points with adequate capacity at other loads, including the maximum latent load which occurs at a less-than-maximum total load. With dehumidification equipment in which moisture removal is achieved independently of sensible cooling, it is necessary that equipment be chosen for

the maximum load of each functional element. The sensible cooler should be selected for the maximum sensible load; the dehumidifier for the maximum latent load. These loads need not occur simultaneously, and in fact, rarely do.

In estimating the maximum latent heat load for comfort applications, it is considered good practice to select an outside design dew-point for the locality which is exceeded on not more than 5 per cent of the days during the season. A smaller percentage, or even the maximum dew-point recorded, may be advisable for rigorous industrial applications.

Special consideration should also be given to moisture seepage through building materials and vapor infiltration through openings which appears to be a more serious factor than would be anticipated from consideration of infiltration in the normal manner. These items 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 AND USE OF EQUIPMENT

Direct or chemical methods of dehumidifying air are frequently employed in conjunction with other equipment installed for the primary purpose of caring for sensible heat removal requirements. They may thus be superimposed upon extensive air conditioning and circulation systems designed to care for independent cooling.

When used in this manner, such equipment may be located to treat outside air only. It is well adapted to this service as it is capable of delivering outside air for ventilation purposes at dry-bulb temperatures close to the normally desired inside temperature, while maintaining a satisfactory humidity condition during those periods when internal sensible heat loads are reduced to a point where no cooling is required.

Because the delivered moisture content of air from all direct dehumidifying devices is materially reduced when the entering air temperature and humidity are lowered, these devices are also frequently applied to the independent dehumidification of mixtures of outside and recirculated air. This practice is advantageous where the moisture removal requirement cannot economically be met by the dehumidification of only the ventilation air component of the total air circulation.

In cases where extremely low dew-point temperatures are required, direct dehumidifying equipment may be located so as to handle air precooled and dehumidified by cooling devices and may also be used in cascade. Solid adsorption equipment is generally favored for such applications because there is no fixed lower limit of operation such as inherently set by the freezing or crystalization temperature of the solution in the absorption system.

In summing up considerations in the location of direct dehumidifying equipment it should be borne in mind that these devices will remove the greatest quantity of moisture from air supplied at the highest working moisture level, but will produce the lowest leaving moisture condition when supplied with air from the lowest working moisture level.

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; and moreover,