

and to provide the desired degree of air motion and cleanliness. The equipment usually comprises preheater, filters, spray or surface dehumidifier, reheaters and by-pass if required, fan, system of distributing ducts, and necessary means of manual or automatic control. See Fig. 3.

Items of equipment in the foregoing may, of course, be replaced with others fulfilling the same purpose. As an example, an absorption type dehydrator with an aftercooler may replace a dehumidifier.

Modifications

All of the general types of central systems may be modified in various ways. These modifications do not affect the functions of the system. In general, these consist of changes in or additions to the normal complement of equipment, or variations in arrangement and design of equipment and distributing ductwork in order to provide better control of conditions, greater flexibility, or improve the over-all economy and performance of the system. Some of these are applicable to certain systems only, while others are applicable to all types. The most commonly encountered modifications are:

1. Zoning.
 - a. Separate equipment.
 - b. Reheating or recooling. (See Figs. 4 and 5).
 - c. Multiple fans with individual by-pass or reheat. (See Figs. 6 and 7).
 - d. Volume control. (See Fig. 8).
 - e. Dual duct system. (See Fig. 9).
2. Induction units. (Low pressure type). (See Fig. 10).
3. Induction units. (High pressure type). (See Fig. 11).
4. Evaporative cooling.
5. Precooling.
6. Sensible cooling with dry coils.
7. The run-around system.

There are many other possible modifications and the special requirements of some installations may warrant consideration of these, but space limitations prevent a discussion of all. The modifications mentioned are discussed further in this chapter.

USE OF CENTRAL SYSTEMS

Several factors must be considered in deciding on whether or not to use a central system and in deciding on the type of central system and modifications required. These factors are:

1. Comparative effectiveness.
2. Characteristics and requirements of the load.
3. Space requirements.
4. Initial cost.
5. Operating costs and maintenance.

The comparative effectiveness of the type of system and modification plays a major part in the choice and is to a large extent affected by the other factors. One great advantage provided by the central system lies in its ability to diffuse odors and smoke which may occur in parts of the system, so that the outside air is determined by the average instead of the sum of the peak requirements. However, caution must be used where odors are apt to be objectionable even if greatly diluted. In such cases a positive exhaust to the outdoors or a separate treatment for the particular locality is recommended. The *averaging ability* both as to odors and

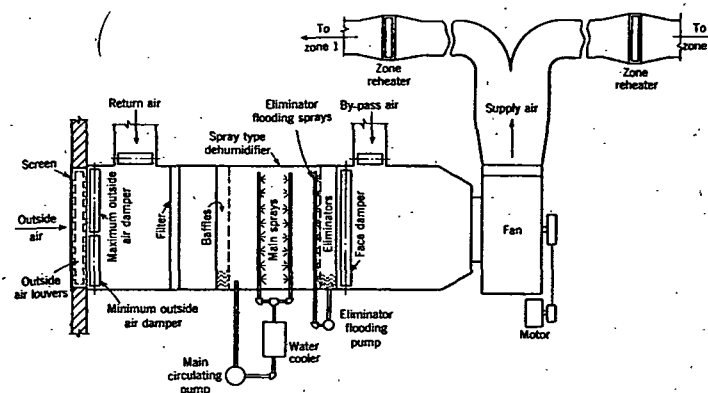


FIG. 4. CENTRAL SYSTEM WITH ZONING BY REHEATING

thermal effects of the system is one item to be considered in studying the comparative effectiveness, particularly where adequate zoning is to be provided. Full advantage of diversity and non-simultaneous peak load requirements can be taken in determining the dehumidified air quantity where adequate zoning is provided.

The characteristics and requirements of the load frequently are the deciding factors. Wide, non-simultaneous variations in load between spaces or parts of the same space indicate the necessity of zoning. Isolated spaces having a short time occupancy or brief load duration may be handled by units advantageously at times. The occurrence of simultaneous heating and cooling requirements in spaces having the same exposure or on the same zone presents a problem to be studied. Ability to maintain conditions during the intermediate seasons without the use of refrigeration must be considered at all times, particularly in those applications where a high internal load exists.

The matter of space requirements may rule out one type of system or another. The avoidance of the use of rentable and usable space for equipment and ductwork, in office buildings, stores, etc., is most im-

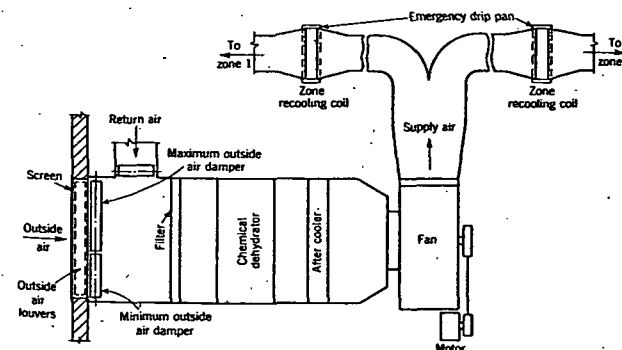


FIG. 5. SUMMER CENTRAL SYSTEM WITH ZONING BY RECOOLING