



Air outlets, Grilles and Registers

منافذ الهواء، الشبكات و المنظمات

Outlets should be located to distribute the air as uniformly as possible throughout the room. There are several types of outlets used in practice depending upon

-service required,

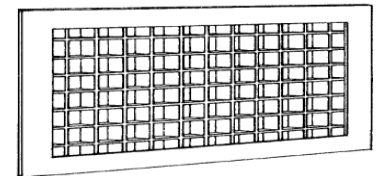
-the type of duct layout,

-the pressure drop

-the outlet velocities.

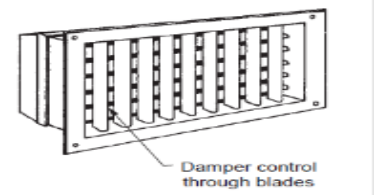
Grille

A grille is a **sidewall-, ceiling- or floor-mounted** louvered or perforated covering for an air opening. Grilles are also available as **fixed bar grille, adjustable bar grille and perforated grille** so the direction, blow (throw), and spread of the supply air stream can be controlled.



Register

A register is a grille with a built-in or attached **damper assembly**. A damper is a device used to regulate airflow by varying the cross-sectional area.



Types of diffusers

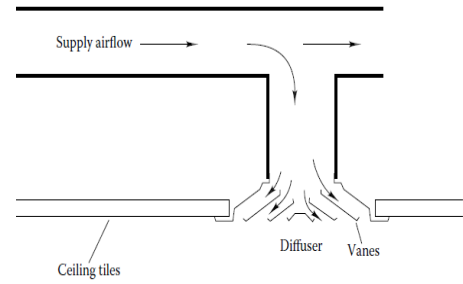
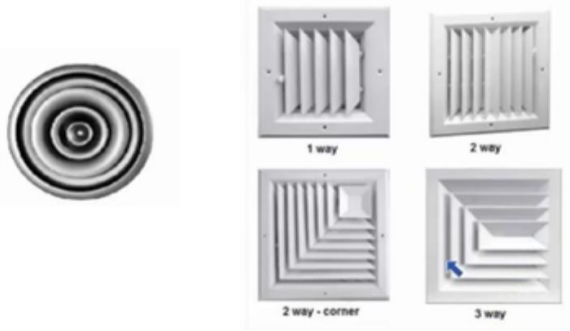
Diffuser

A diffuser is a supply air outlet generally found in the ceiling with various deflectors arranged to promote **mixing of primary air with secondary air**. Types of diffusers are: **round, square, rectangular, linear and light troffers**. Some diffusers have a fixed air flow pattern while others have field-adjusted patterns.



Ceiling Diffuser

A ceiling diffuser is a diffuser which typically provides a horizontal flow pattern that tends to flow along the ceiling producing a high degree of surface effect. **Round** ceiling diffusers deliver air in all directions. Typical **square or rectangular** ceiling diffusers supply air in a **one-, two-, three- or four-way pattern**.



Perforated Face Diffuser

Perforated face diffusers are used with lay-in ceilings and are similar in construction to the standard square ceiling diffuser with an added perforated face plate. They are generally equipped with adjustable vanes to change the flow pattern to a one-, two-, three-, or four-way throw.

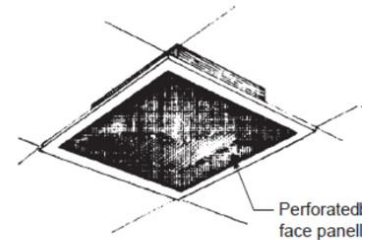
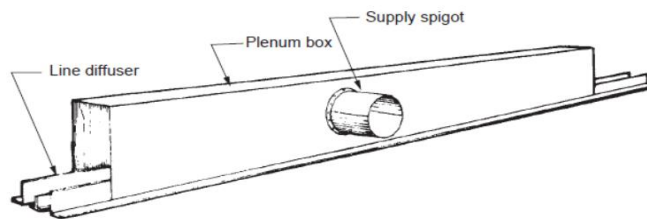


Figure 20.14 Perforated late-type ceiling diffuser

Linear Slot Diffuser

This type of diffuser is manufactured in various lengths and numbers of slots and may be set for different throw patterns.



Swirl ceiling diffusers

Originally used more in industrial applications to introduce large volumes of air, swirl diffusers are now used in many comfort air-conditioning solutions and ranges of smaller diameter diffusers have been developed.



Fig. swirl ceiling diffusers (Trox)

Outlet noise limitations

محددات الضوضاء لمنفذ الهواء

One important criterion affecting the choice of an outlet is its sound level. Table 6-1 shows recommended outlet velocities that result in acceptable sound levels for various types of applications.

APPLICATION	TERMINAL VELOCITY (FPM)
Broadcast studios	300-500
Residences	500-750
Apartments	500-750
Churches	500-750
Hotel bedrooms	500-750
Legitimate theaters	500-750
Private offices, acoustically treated	500-750
Private offices, not treated	500-800
Motion picture theaters	1000
General offices	1000-1250
Dept. stores, upper floors	1500
Dept. stores, main floor	2000

TABLE 1-6 – RECOMMENDED OUTLET VELOCITIES

Selection of outlet

اختيار منفذ الهواء

An important step to efficient space comfort conditioning is the proper selection of air outlets. If the air outlets are improperly selected, the entire system could be considered a failure. In addition noise levels must be acceptable.

The selection of the best number and size of inlet grilles, diffusers and the like, involves a choice the following rules:

- Air velocities produced at head or foot level must not exceed 0.15 m/s (9 m/min).
- The velocity of inlet must not be so high that the air will impinge on the wall opposite, thereby causing undue turbulence. The blow (throw) should be about three quarters of the distance to the point of impingement with a wall, or opposing air stream.
- The distance apart of inlets, particularly in the case of ceiling diffusers, must be such that the streams from two adjacent units do not collide at such a velocity that a strong downward current results.
- The velocity selected for the grille or diffuser must be such that the sound level produced therefrom is below the design standard for the room.
- The blow (throw) must not be directed towards projections that will deflect the air stream from the intended direction.

Dampers

One way of getting even air distribution is through the use of duct dampers. Dampers balance airflow or can shut off or open certain ducts for zone control. Some are located in the grille, and some are in the duct itself. The following three types of dampers are used in air-conditioning ductwork:

- Butterfly
- Multiple blade
- Split damper

