INFFUSERS®

IDL20 (2 WAY)
IDS60 (4 WAY)

DADANCO
feel the difference™

BUILT ON INNOVATION

WHAT IS AN INFFUSER?

DADANCO's INFFUSERS are quite simply an 'induction diffuser' that uses special nozzles located in the underside of the air plenum to mix primary air (ducted from the central air handling plant) with secondary air that is Induced from either the ceiling return air plenum (via *External entrainment) or room (via *Internal entrainment) to increase the total amount of air delivered to the space. When INFFUSERS are used in conjunction with low temperature supply air systems that operate with primary air temperatures in the range of 48°F-50°F, the correct selection based on the space design conditions will ensure that the mixed air (primary plus secondary) delivered by the INFFUSER is above the room dew point, without the need for local fans, filters, controls or power supply at the outlet.

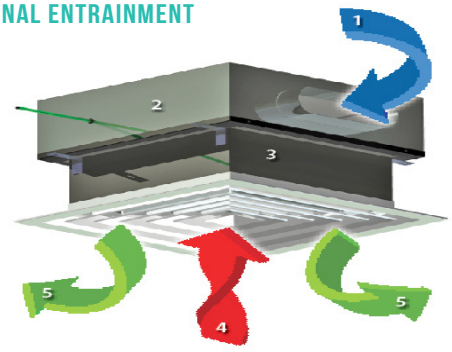
INFFUSERS have been successfully used in conjunction with primary air temperatures as low as 43°F, however such applications must be referred to DADANCO for approval. INFFUSERS are an ideal replacement outlet for conditioned spaces that suffer from poor or inadequate air movement. They are available as either a 4' long or continuous 1 slot 1-way or 2 slot 2–way linear diffuser or as a 2' x 2' 4–way diffuser, all with the option of either *Internal or *External entrainment. DADANCO's technology nozzles rapidly induce secondary air to reduce the momentum and height of the potential core zone, significantly reducing noise generation.

DADANCO INFFUSERS are whisper quiet at inlet static pressures in the range of 0.1 - 0.3" w.c., and are suitable for use in any air distribution system where increased air movement and tempered primary air temperatures would be of benefit.

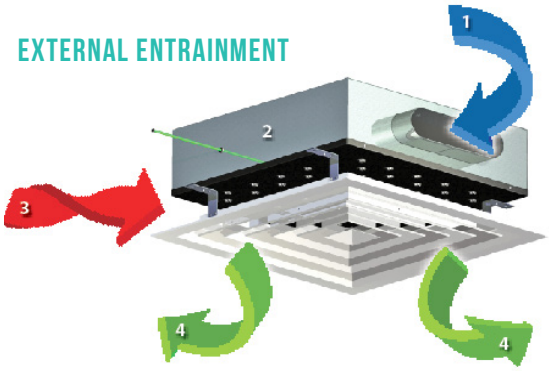
INTERNAL AND EXTERNAL ENTRAINMENT

With Internal entrainment models the conditioned primary air from the central air handling plant (1) is ducted into the INFFUSER plenum (2). This air leaves the plenum through a series of nozzles located in its underside into a sub divided mixing chamber behind the diffuser (3). This process induces secondary room air (4) up through the central area of the diffuser into the Inffuser mixing chamber directly from the room where it's mixed with the primary air. This mixed (and tempered) air (5) is then discharged into the room via the outer areas of the diffuser. With External entrainment models the conditioned primary air from the central air handling plant (1) is ducted into the INFFUSER plenum (2). This air leaves the plenum through a series of nozzles located in its underside. This process induces secondary air from the ceiling return air plenum (3) into the discharge path from the nozzles where it mixes with the primary air. This mixed (and tempered) air (4) is then discharged into the room via the diffuser. In both cases the primary air is tempered by the induced secondary air before the combination is discharged into the room via the diffuser.

INTERNAL ENTRAINMENT



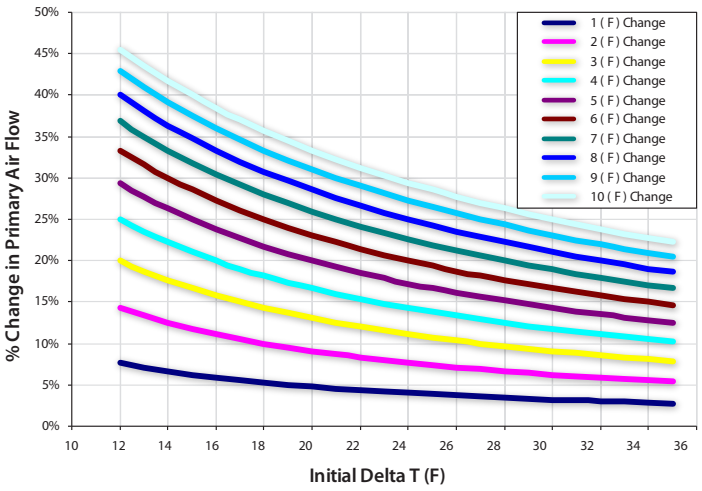
EXTERNAL ENTRAINMENT



WHY INFFUSERS ARE "GREEN"

In an "all-air" system such as VAV, primary air is typically delivered to the room at 55°F. Most designers, striving to reduce energy and save space, never consider the merits of using lower primary air temperature due to their concerns about achieving occupier comfort while delivering colder air.

On a typical building (at sea level) with a space design temperature of 75°F and primary air at 55°F (20 ΔT), for every ton of cooling needed, 553 cfm of primary air has to be conditioned and delivered by the central plant. When the temperature is lowered by 5°F to 50°F (25 ΔT), the air volume is reduced to 443 cfm (approximately 20% less to provide the same amount of sensible cooling). This graph shows the Percentage Change in Primary Air Flow when the air temperature is changed relative to the initial ΔT. When the biggest consumer of energy in the HVAC system is the primary air fan, any reduction in flow provides energy savings and lower operating costs. As lower primary air temperatures tend to be below the space dew point, concerns about condensation forming must be a consideration along with the



diffusers' ability to mix the colder air within the given throw distance in order to avoid drafts and, on VAV systems under part load conditions, the increased potential for the colder air to dump as the air volume decreases.

DADANCO's INFFUSERS use entrainment to temper the primary air and increase the volume delivered (typically 1–2 times the amount of primary & generally in the 60's °F in cooling and 80's °F in heating) meaning that the air is delivered above the dew point, is warmer and as a result, needs less mixing in the room to avoid drafts. Therefore, the possibility for dumping is dramatically reduced, and by correct selection,

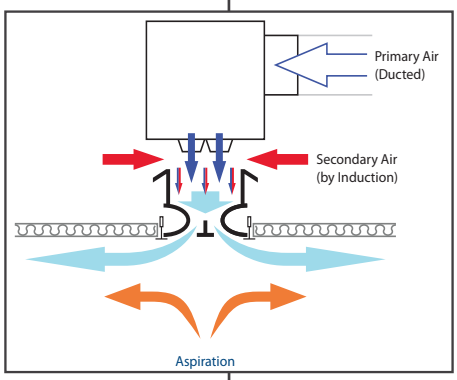
the condensation risk is eliminated. Even with 20% less air volume, the latent cooling capacity of the air at 50°F (95% RH) is over 2 times that of air at 55°F at the same RH, therefore lower primary air temperatures offer significantly better humidity control. So INFFUSERS are 'Green' because they allow you to save energy by reducing the primary air volume needed to cool the building, reducing the size of the central air handler and ductwork, saving operation cost.

Laboratory tests were conducted at varying primary air temperatures and room humidity levels. These test results indicate that, with a room design temperature of 75°F, moisture did not form on the Inffuser faces using 46°F primary air until the room's relative humidity reached 75%. With adequate latent cooling capacity being provided by the primary air, this condition will not occur.

INDUCTION VERSUS ASPIRATION

The induction process is significantly different to aspiration. Aspiration occurs when room air mixes with the air being discharged from the terminal outlet, which occurs to a varying extent with all types of diffusers.

The amount of air being induced by the INFFUSERS can be closely controlled and measured by varying the number and size of nozzles within the unit. Induction, as opposed to aspiration, is the process of mixing primary and room air within the INFFUSER before the mixed (and tempered) air is discharged into the room.



The aspiration process relies on mixing the supply and room air within the room, in essence using the room as a mixing chamber.

High aspiration products such as swirl diffusers do not induce air from the room or ceiling return plenum into the product's internal mixing chamber prior to discharging into the room, so when primary air is supplied at 48°F through one of these devices, you have to consider all the inherent issues of delivering low temperature air significantly below the room dew point into the room.

DADANCO INFFUSERS utilize unique nozzle and fluid dynamics technology to provide very high air entrainment ratios at low pressure drops and superior performance at low noise levels. Due to the fact that DADANCO INFFUSERS are an induction device, airflow measurements should not be taken with an air capture hood. The only way to accurately measure the primary air flow into the INFFUSER is by reading the static pressure from the commissioning sampling tube from the INFFUSER plenum. A 'primary air flow vs. static pressure' chart is provided for each unit. Do not utilize static pressure readings in the duct near the INFFUSER inlet and presume it will be the same as that in the unit's primary air plenum for commissioning purposes as this measurement could be significantly different from that measured through the commissioned sampling tube.

COMMON APPLICATIONS

Any air distribution system where an increase in the quantity of supply air delivered to the room at a more temperate temperature is of benefit such as those spaces that suffer from:

- Needing more cooling capacity delivered with existing infrastructure.
- Poor or inadequate air distribution.
- Dumping or draft issues under cooling.
- Stratification problems under heating.

Any air distribution system being designed to save energy or striving to achieve LEED certification and, therefore, the use of low temperature primary air (45-50°F), in order to reduce primary airflow volume by 20-30%, is of benefit such as in spaces where:

- There are building constraints that limit space available for the central air handling plant.
- There are building constraints that limit the space available for supply/return ductwork & terminal outlets.
- The zones have low to medium sensible cooling and heating load densities.
- The zone is running at, or near to, minimum fresh air requirements and tight humidity control is essential.

NEW BUILDING

APPLICATION	SOLUTION
LEED design where lower temperature primary air delivers benefits in fan energy savings and reduced system infrastructure.	Design the system for lower primary air temperatures and air quantities using INFFUSERS to temper the air and deliver higher air circulation rates to the space.
Where internal zone loads are less than 15 Btu/h/sq.ft. and good air circulation and humidity control is required.	Design the system with low temperature (48°F) primary air and flow rate of approximately 0.5 cfm/sq. using INFFUSERS to temper the air and deliver higher air circulation rates to the space.

APPLICATION	SOLUTION
Improve the energy performance of an existing VAV or CAV system.	Reduce primary air temperature and airflow rate leaving the cooling coil to maintain the cooling capacity required. Replace existing diffusers with INFFUSERS to temper the air being delivered to the conditioned space.
Air distribution/movement is inadequate and existing ductwork sizes are not large enough to permit supply air quantities to be increased.	Retain ductwork and replace existing diffusers with INFFUSERS to increase the supply air quantity and air movement being delivered to the conditioned space.
Cooling capacity is inadequate and existing ductwork sizes are not large enough to permit supply air quantities to be increased.	Retain ductwork and reduce the primary air temperature for increased cooling capacity using INFFUSERS to temper the air being delivered to the conditioned space.
Replacement of fan-powered VAV units to eliminate fan energy and VAV terminal maintenance considerations.	Replace fan-powered VAV units with single duct VAV terminals, retain ductwork, replace existing diffusers with INFFUSERS to temper the air being delivered to the conditioned space

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