



Displacement Ventilation

PRICE[®]

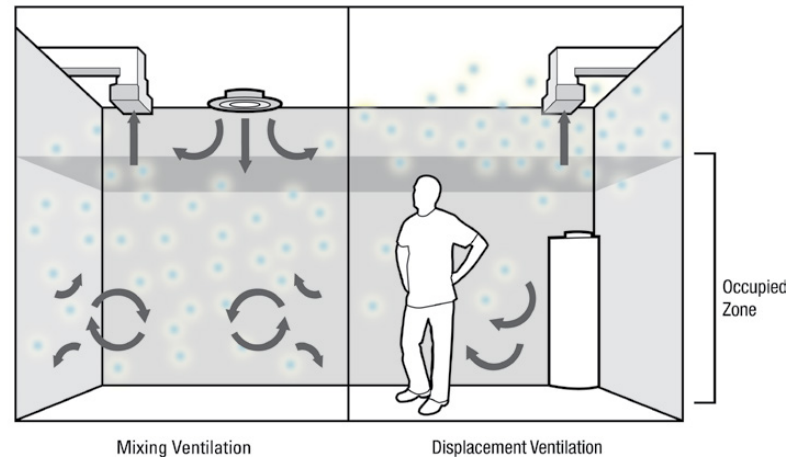
The Science of Comfort[™]

Introduction

Displacement Ventilation (DV) originated in industrial facilities in Europe as an effective way to remove contaminants from the occupied zone. It has since gained popularity in a variety of applications in both Europe and North America due to its superior air quality, thermal comfort, and energy efficiency.

DV provides high temperature, low velocity supply air, relying on the buoyancy forces of air to drive air motion.

The result is high ventilation effectiveness and improved thermal comfort delivered in an energy efficient manner.



Displacement differs from traditional overhead mixing systems in several fundamental ways

Mixing Ventilation	Displacement Ventilation
55°F supply air	65-68°F supply air
Mix the entire space	No mixing in space
Diffusers drive air motion via high velocity supply air	Heat sources drive air motion via thermal plume
Uniform temperature	Stratified temperature
Conditions entire room	Only conditions the occupied zone (the first six feet of a space)
High supply velocity (minimum 150 fpm 1 ft from face)	Low supply velocity (40 fpm average at face)

Advantages

Superior Air Quality

In DV systems, the supply air must pass through the breathing zone before being exhausted, because it travels from a low level to ceiling mounted returns. As it does this, it carries contaminants away from the occupant, leading to a high Ventilation Effectiveness compared to mixing systems.

Energy Efficiency

1. The lower pressure drop associated with displacement ventilation outlets, along with the selection of smaller fan components, may allow for a reduction in fan energy.
2. Since supply air temperatures are higher with DV systems than with overhead air distribution systems, economizer operating hours can be increased to take advantage of free cooling.
3. There is also the potential for a reduction in the air volume required to satisfy room loads, depending on the room type and location.

Thermal Comfort

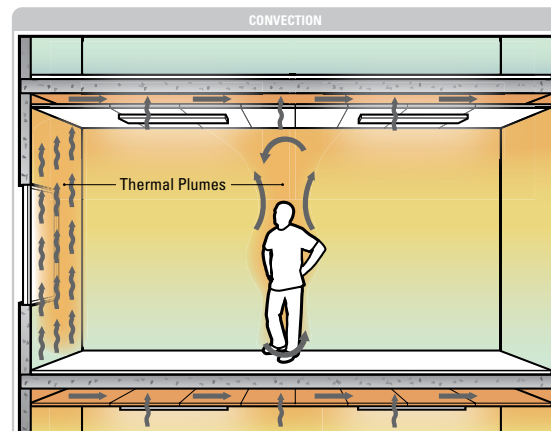
DV delivers supply air at an average of 40 fpm and at a temperature no more than 10°F cooler than the room air. This high temperature, low velocity supply air results in less draft and a lower percentage of people dissatisfied per ASHRAE Standard 55-2004.

Quiet Operation

Displacement diffusers distribute supply air into a room at a very low velocity, resulting in whisper quiet operation.

Mechanical Flexibility

DV diffusers are often floor or wall mounted, accommodating applications where overhead space is limited, or where space for ducting along the walls and ceiling is limited.



Displacement results in a high Ventilation Effectiveness (1.2 or higher) compared to mixing systems (1.0 or below).

Displacement Ventilation and LEED

Displacement systems can contribute LEED points to a building in the following categories.

- Energy & Atmosphere
- Indoor Environmental Quality

Applications



Diffusers in a classroom are typically located in the two interior corners of the classroom. Common products for schools include the DF1C and DR90 corner diffusers.

Schools

Indoor air quality, silent operation, and thermal comfort are all important design considerations for schools. Displacement ventilation provides all three, resulting in many school districts mandating the use of DV in schools.



DF1W and DF1R diffusers are popular in large public spaces due to their subtle appearance.

Large Public Spaces

Large public spaces often have large, open areas, high ceilings, and varying occupancy levels. Since displacement systems only condition the first six feet of a space, there is potential for large energy savings in spaces with high ceilings.

Additionally, many large public spaces – such as theatres, airports, and places of worship – can have specific architectural designs that the air distribution must accommodate. Price has the custom design capability to provide diffusers that integrate seamlessly into architectural features.



Price has been instrumental in North American research for applying Displacement Ventilation in health care.

Health Care

DV has become an accepted technology in hospital patient rooms and can provide a cleaner, safer, environment for patients, health care providers, and visitors while providing energy savings through a lower air-change requirement.

Price offers several proven configurations for DV in health care, including stainless steel construction and provisions for ease of maintenance.



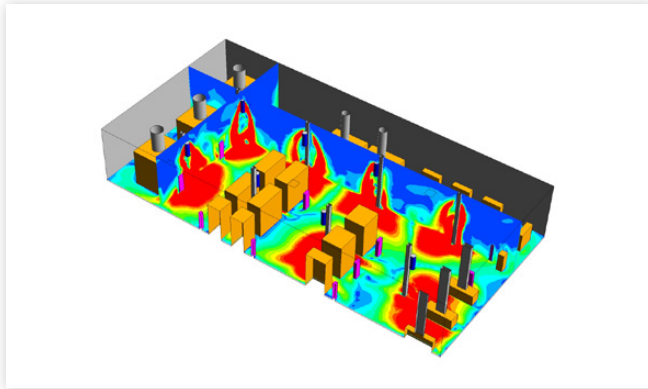
Price offers a complete line of industrial grade displacement diffusers.

Industrial Facilities

Displacement ventilation was originally introduced in Europe to manage the pollutants found in industrial facilities, and is ideally suited for this application.

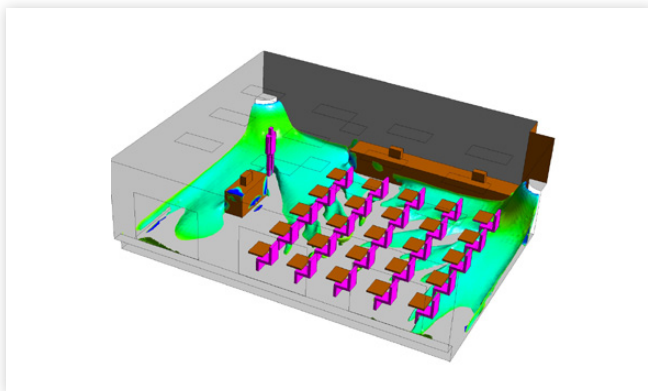
Displacement systems can carry harmful contaminants such as welding and adhesive fumes (when they are lighter than air) up and out of the breathing zone, leaving employees with safe, healthy breathing air.

Resources and Support



Computational Fluid Dynamics Modeling

CFD provides a means to validate design before construction and gives confidence that the system will perform as intended in the field. Price's CFD team is amongst the most experienced and proficient in the industry, and we encourage designers to work with us to validate their designs.

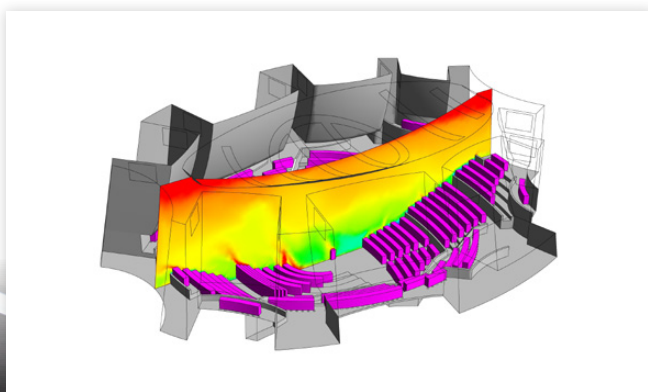


PRCN: Price Research Center North

Price's state-of-the-art research laboratory, Price Research Center North, features the most advance displacement flow visualization chambers, testing facilities, and mock-up rooms in North America.

Flow visualizations and mock-ups allow designers to simulate field conditions and evaluate system performance –providing them with the confidence that their space will perform as expected in the field.

Ask about our mock-up services on your next job, or better yet, visit PRCN yourself and tour the facilities.





Applications Support

Price is a service oriented company and has a dedicated Displacement Ventilation applications team devoted to answering your questions quickly, completely, and correctly. We are here to help! Our applications team regularly provides support on:

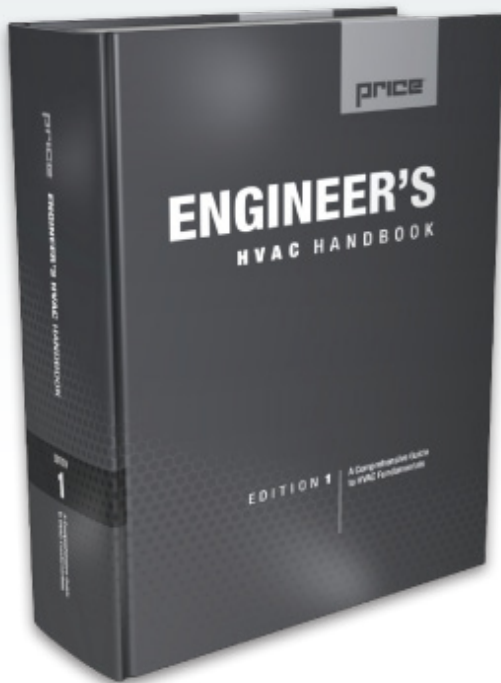
- Model Selection
- Layout Assistance
- Calculation Assistance
- On-site Training
- On-site Performance Validation

Price Training Programs and Webinars

Price Training Programs (PTP) provides Consulting and Design Engineers with the training needed to specify and select air distribution equipment to best meet their design criteria. The displacement course covers everything you need to know about displacement products, including:

- Overview of DV
- Theory and Design Considerations
- Displacement Products
- PRCN and Engineering Support

Our webinars are another excellent way to learn about specific topics while gaining professional development hours. Visit **priceindustries.com** to register today!



Price Engineer's HVAC Handbook

The Most Comprehensive Guide to HVAC Fundamentals

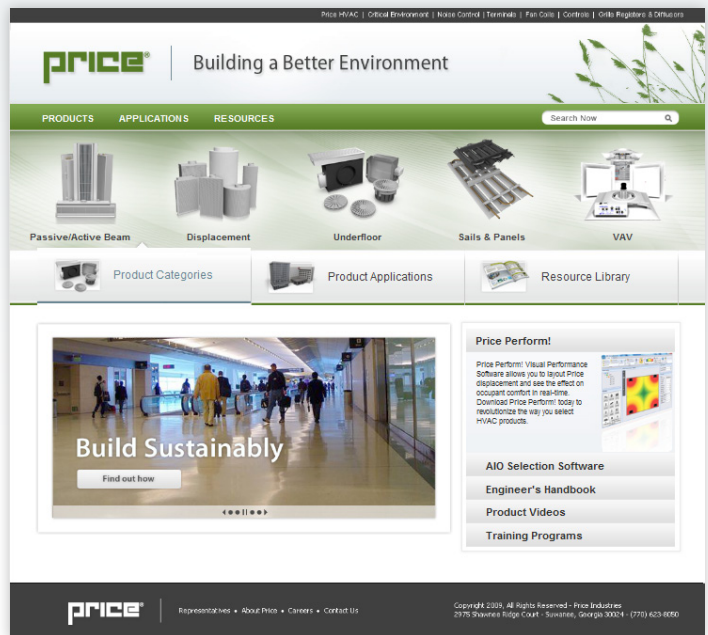
The Price Engineer's HVAC Handbook is a compilation of the engineering knowledge related to the application of air distribution and noise control products and approaches gained at Price over the past 60 years.

The Handbook contains chapters on Displacement Ventilation and its applications which feature liberal use of examples and graphics to help illustrate and explain concepts and systems.

Chapter 15: Displacement Ventilation

Chapter 16: Applications of Displacement Ventilation

Contact your local Price sales representative to reserve your copy.



Price Sustainable Building Website

The Price Sustainable Building Website is the ultimate online resource for those looking to learn more about sustainable HVAC technologies like displacement ventilation.

The site features:

- Product Information
- Research Papers
- Case Studies
- Training Modules
- Smoke Test Videos
- Product Videos

Visit **priceindustries.com** today!

Software Tools

Price offers the best software tools in the HVAC industry for selecting and evaluating displacement ventilation diffusers.

Room Designer for Displacement Ventilation

Our revolutionary Room Designer for Displacement Ventilation allows a designer to select and lay out Price displacement diffusers based on draft risk comfort data.

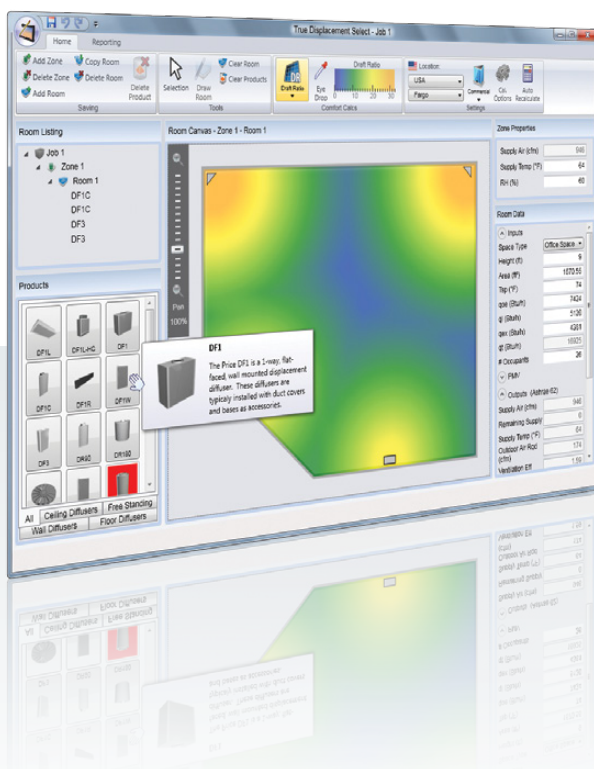
The software calculates comfort using ASHRAE formulae based on local air temperature and local air velocity, responding in real-time to diffuser placement.

Visit priceindustries.com/resources/type/software to download Room Designer today!

All-In-One Selection Software

Price's All-In-One Selection and Pricing software allows an engineer to perform air volume calculations, evaluate system performance and select products, including displacement ventilation diffusers, with speed and accuracy.

Visit priceindustries.com/resources/type/software to download All-In-One today!





Custom Diffusers

Price is the world leader at providing custom displacement diffusers. In fact, nearly 80% of the Displacement Ventilation diffusers produced for Price are for custom applications.

Price can provide diffusers with a variety of customized options, including:

- Color
- Architectural Coverings
- Perforation
- Shapes
- Pattern
- Materials

Our diffusers have the unique ability to be integrated into the architectural features of a space.

Price diffusers can be integrated into:

- Stair Risers
- Bookcases
- Walls
- Cabinets
- Planters
- Structural Elements
- Benches



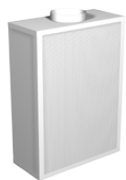
Custom Price Diffusers

The design capabilities of Price's displacement team are limited only by your imagination. We invite your custom design challenge.

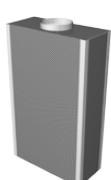
Product List

DF Series

Displacement Flat-Faced Series



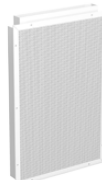
DF1
Rectangular
Flow



DF3
Rectangular
Flow



DF1C
Corner



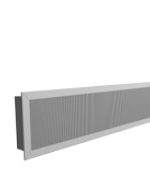
DF1W
In-Wall



Puraflow
Health Care
Diffuser



DF1R
Recessed



DF1L
Lay-In



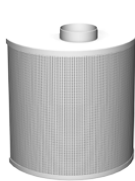
DF1L-HC
Lay-in w/Heat

DR Series

Displacement Round Series



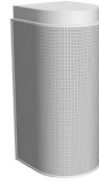
DR90
90° Air Pattern



DR180
180° Air Pattern



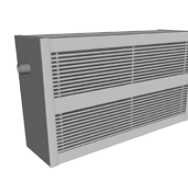
DR360
360° Air Pattern



DR180U
U-Shaped Radial



DLE
Linear Enclosure



DLE-H
Linear Enclosure
w/Heat

DLE Series

Displacement Linear Enclosure Series

Industrial Displacement Diffusers



DRPBi-HC
Round Radial
Paint Booth



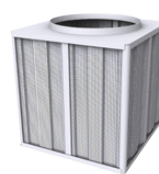
DRNi-HC
Round Radial
Nozzle Heat/Cool



DDiA
Drum Diffuser
Industrial
Adjustable



DR360i-HC
Circular Industrial

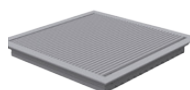


DFXi
Rectangular
Industrial
(1,2,3, or 4 way)

Floor Mounted Diffusers



RFDD/ARFHD
Round Floor



DFG
Floor Grille

Custom Diffusers

Don't see what you're looking for? Give us a call and we will design a diffuser to fit your specifications.

priceindustries.com

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