

AIR DISTRIBUTION
PRODUCTS



CORE

04

ADVANCING THE SCIENCE OF AIR DISTRIBUTION

DISPLACEMENT
VENTILATION

Rethink what air management systems can be.
Revise your notion of functionality.
Redefine your comfort zone.™



Comfort, Redefined.

Since 1946, Titus has focused on technologically advanced products that create the highest degree of comfort.

We've consistently led the industry by breaking the barriers of expectation and convention when it comes to technology. We've redefined how technology drives, influences and supports air management. And by being first to market with the most innovative approaches to air distribution, we're proud to say that the marketplace has taken notice, and is counting on us to lead the way into the next decade. A challenge we're more than happy to accommodate.

Titus has raised the bar on design, proving that functional can also be beautiful. And we've redefined what it means to be energy efficient, with a collection of smart technology products that optimize the use of natural resources.

Titus has also redefined what it means to work with an air management products partner. We pride ourselves on listening and responding so that we can not only meet expectations, but also exceed them. Service has been, and will always be, our main focus at Titus. And, it's why so many of our customers keep coming back.

Welcome to your new comfort zone. It starts here.

Overview



DVBC & DVRI displacement diffusers installed in the band room of Cedar Ridge High School in Round Rock, Texas.

Displacement Ventilation systems use low velocity cold air to displace warm room air. They are defined by ASHRAE as fully stratified systems. Supply air is introduced low in the occupied space and travels along the floor until it reaches a heat source, such as a person or computer. Natural convection flows cause the supply air to rise around the heat source.

The Displacement Ventilation system is similar to an UnderFloor Air Distribution (UFAD) system in that it uses warmer supply air and lower pressures than a conventional overhead system. As a result, displacement ventilation systems have many of the same benefits of UFAD systems, such as longer economizer periods, potential energy savings from the warmer supply air and lower horsepower fans, and quiet operation. Although many parts of North America need to cool the supply air below 65°F for humidity reasons, all areas should benefit from the increased economizer time.

An additional benefit to Displacement Ventilation systems is that ASHRAE Standard 62.1-2007 Ventilation for Acceptable Indoor Air Quality gives Displacement Ventilation Systems a Ventilation Effectiveness Factor of 1.2. Ventilation Effectiveness is a measure of how effectively the zone air distribution uses its supply air to maintain acceptable air quality in the breathing zone. A Ventilation Effectiveness Factor of 1.2 means that a lower volume of fresh air can be used to meet ASHRAE 62.1 requirements. This makes displacement ventilation systems an effective way to achieve the LEED Increased Ventilation credit.

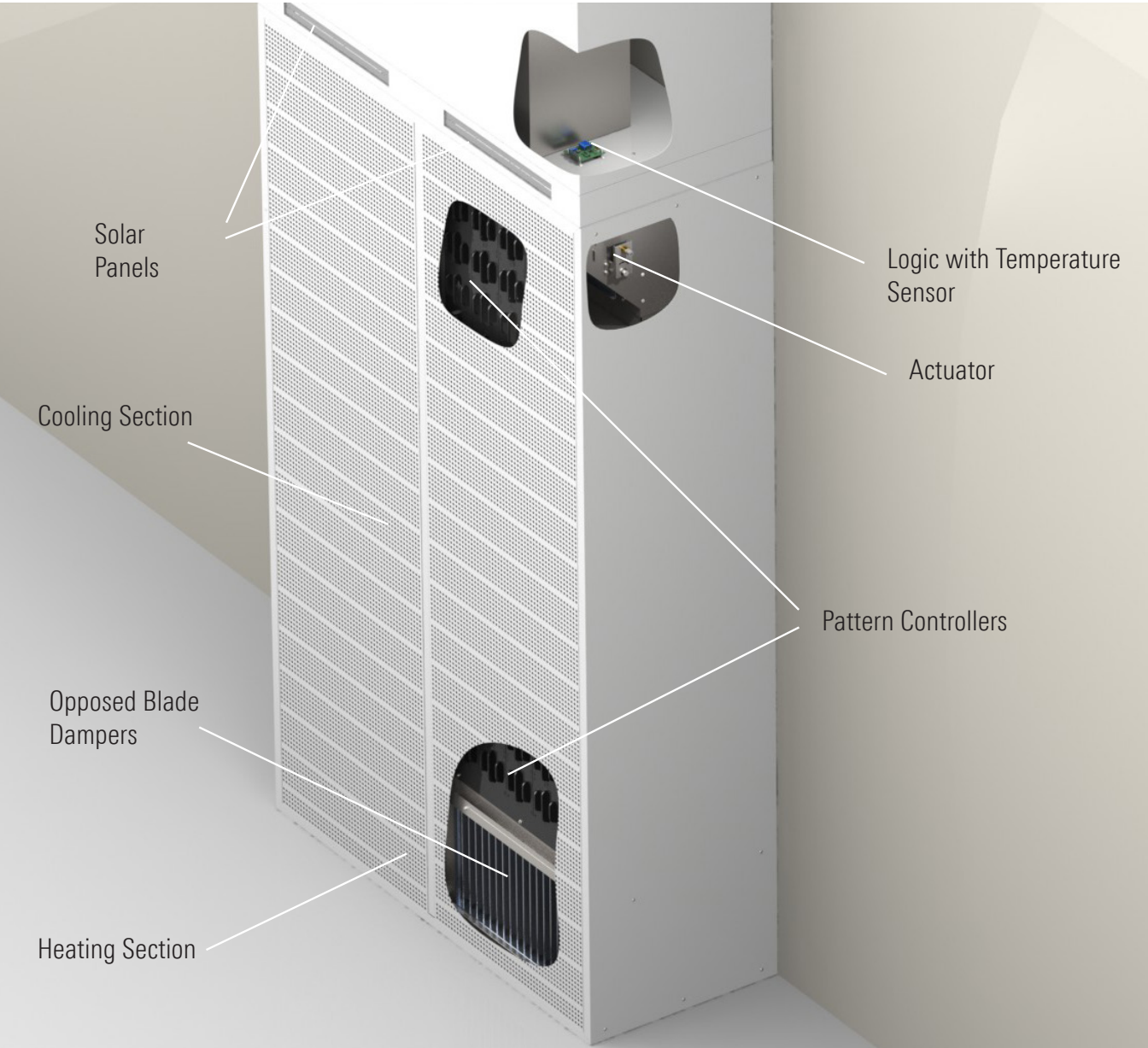
One of the challenges to displacement ventilation is that the diffusers are placed in the occupied zone, typically along the wall. Because displacement diffusers supply air directly into the room, placement of the diffusers is critical to achieving a comfortable space. The ASHRAE Guideline recommends that the air velocity in the occupied zone not exceed 50 fpm.

For a displacement diffuser, the zone where the velocity exceeds 50 fpm is called the adjacent zone or near zone. Occupants need to be placed outside of the adjacent zone for comfort. A typical displacement diffuser can maintain comfort in a space that is approximately 5-6 times the length of the adjacent zone.

Titus has a full line of displacement ventilation diffusers to accommodate any application. One unique feature of Titus displacement diffusers is the variable air pattern controllers located behind the perforated face. The pattern controllers can be adjusted to change the size and direction of the supply airflow pattern and adjacent zone area. Engineers may not always know the final room layout or furniture location during the design phase. Titus displacement diffusers provide the perfect solution by offering adjustability without the need to move or change the location of the diffuser. This ability to shape and customize the airflow pattern and adjacent zone to match requirements in the occupied space ensures the highest level of thermal comfort for building occupants.

SOLAR PLEXICON

The innovative design of the Solar Plexicon created an energy-efficient HVAC unit that will revolutionize the industry. Cooling and heating that comes from a device that requires no external power source will save building owners hundreds of thousands of dollars over the life cycle of their new or renovated building.





RECTANGULAR DISPLACEMENT

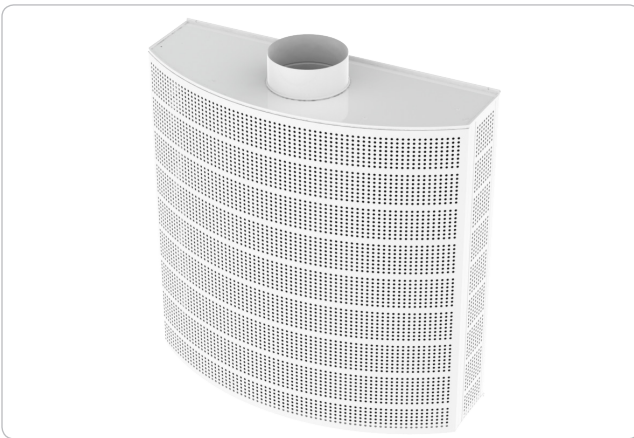
Titus displacement ventilation products can contribute towards achieving the following credits:

- » LEED EA Credit 1: Optimize Energy Performance
- » IEQc2 Credit: Increased Ventilation
- » IEQ Credit7.1: Thermal Comfort - Design

DVBC

CURVED FACE DIFFUSER FOR WALL MOUNT APPLICATIONS

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



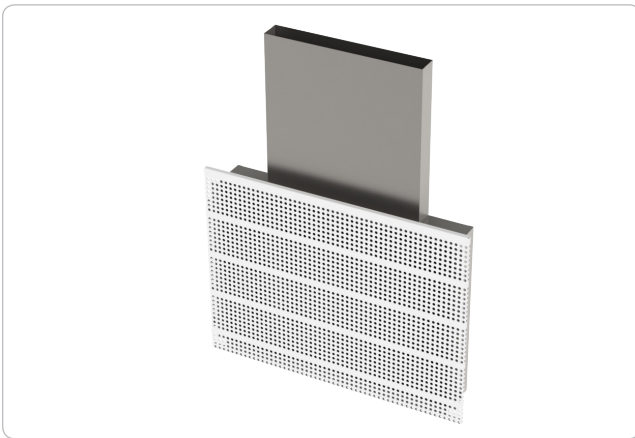
DVBC

The DVBC is a rectangular displacement diffuser with a curved face for wall mount applications. It is designed to supply a large volume of air at low velocities into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVIR

1-WAY DISCHARGE DIFFUSER FOR FLUSH MOUNT APPLICATIONS

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



energy solutions



wood grains

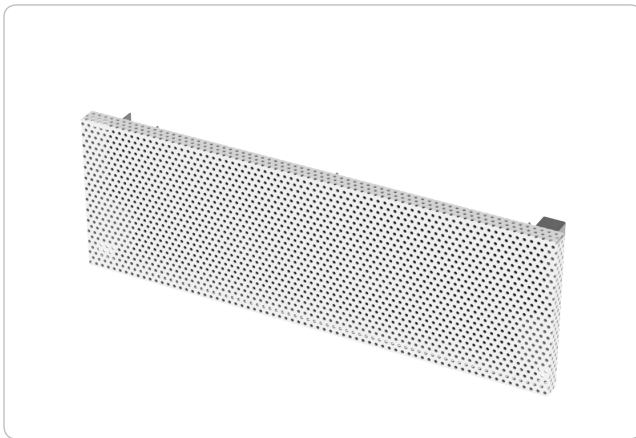
DVIR

The DVIR is a rectangular displacement diffuser with a one-way discharge pattern designed for flush mount applications. Constructed of galvanized steel and aluminum, the DVIR is designed for in-wall applications and supplies a large volume of air at low velocities into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVR1

1-WAY AIR DISCHARGE PATTERN DESIGNED FOR STAIR RISER APPLICATIONS

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



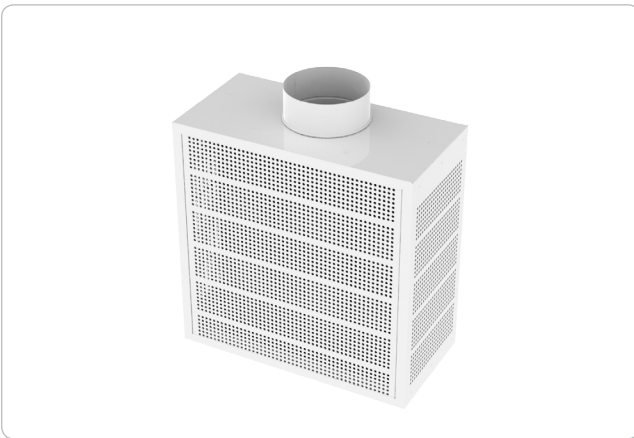
DVR1

The DVR1 is a rectangular displacement diffuser with a one-way discharge pattern designed for stair riser applications. It supplies a large volume of air at low velocities into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVR3

3-WAY AIR DISCHARGE PATTERN DESIGNED FOR FLUSH MOUNT APPLICATIONS

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



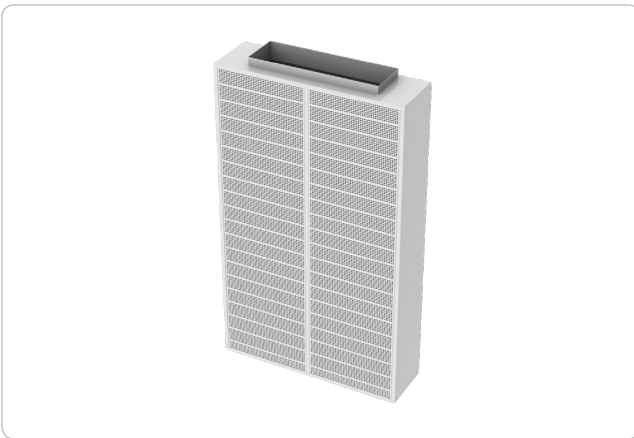
DVR3

The DVR3 is a rectangular displacement diffuser with a three-way discharge pattern designed for flush mount applications. It supplies a large volume of air at low velocities into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVRI

WALL DIFFUSER FOR FLUSH OR SURFACE MOUNT ORIENTATION

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



DVRI

The DVRI is a rectangular displacement diffuser that can be positioned against the wall in a flush or surface mount orientation. It has a one-way air distribution pattern and supplies a large volume of air at low velocities into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.



CIRCULAR DISPLACEMENT

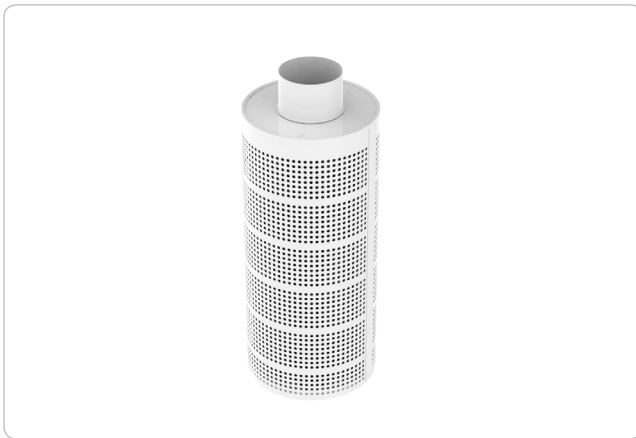
Titus displacement ventilation products can contribute towards achieving the following credits:

- » LEED EA Credit 1: Optimize Energy Performance
- » IEQc2 Credit: Increased Ventilation
- » IEQ Credit7.1: Thermal Comfort - Design

DVCP

DIFFUSER WITH 360 DEGREE AIR DISCHARGE PATTERN

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



DVCP

The DVCP is a round freestanding circular displacement diffuser designed for floor mounted applications. It provides a 360° air distribution discharge pattern. The DVCP is designed to supply a large volume of air at low velocity into the occupied space and works well in lobbies, airports and restaurants. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.



SEMI-CIRCULAR DISPLACEMENT

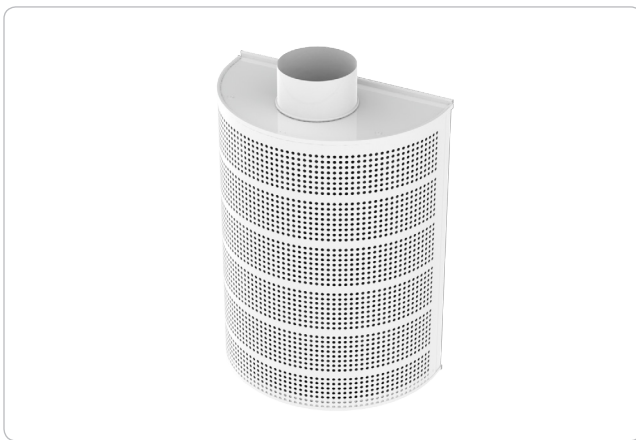
Titus displacement ventilation products can contribute towards achieving the following credits:

- » LEED EA Credit 1: Optimize Energy Performance
- » IEQc2 Credit: Increased Ventilation
- » IEQ Credit7.1: Thermal Comfort - Design

DV180

SEMI-CIRCULAR DISPLACEMENT DIFFUSER WITH A 180 DEGREE AIR DISCHARGE PATTERN

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



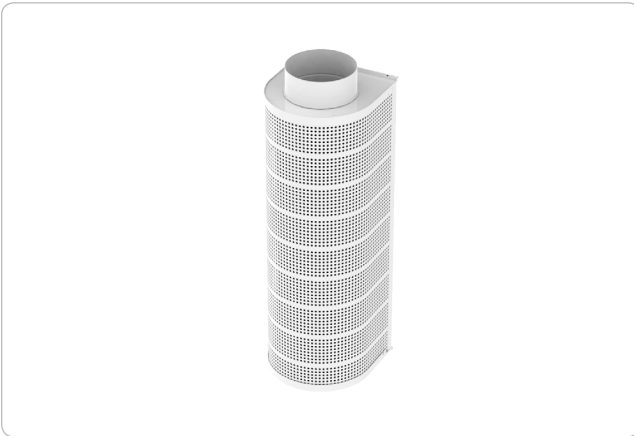
DV180

The DV180 is a semi-circular displacement diffuser with a 180 degree air discharge pattern. It is great for wall or surface mount applications and can be easily integrated into semi-circular building columns. The DV180 can supply a large volume of air at low velocity into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVHC

SEMI-CIRCULAR DISPLACEMENT DIFFUSER WITH A 180 DEGREE AIR DISCHARGE PATTERN

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



energy solutions



wood grains

DVHC

The DVHC is a semi-circular displacement diffuser with a 180 degree air discharge pattern. Utilizing the enhanced pattern controllers, it can supply a large volume of air at low velocity into the occupied zone. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DIFFUSER ADJUSTMENT

All Titus Displacement diffusers feature integral variable air pattern controllers located in the unit behind the perforated face (see illustration 1). These pattern controllers can be removed and repositioned to change the adjacent zone pattern from the diffuser face. To adjust the pattern: (see illustration 2).

- Remove diffuser face
- Remove louvers
- Reposition louvers
- Replace face

This unique feature provides a high level of flexibility for the end user. They can react to changes in the space by adjusting the adjacent zone rather than disconnecting and moving the diffuser.

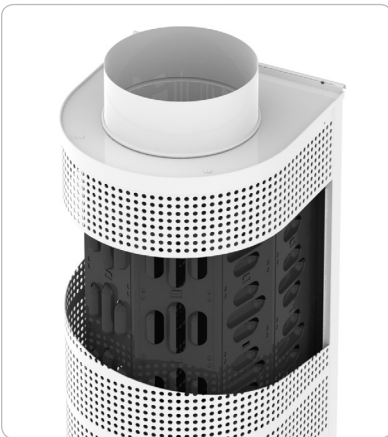


Illustration 1

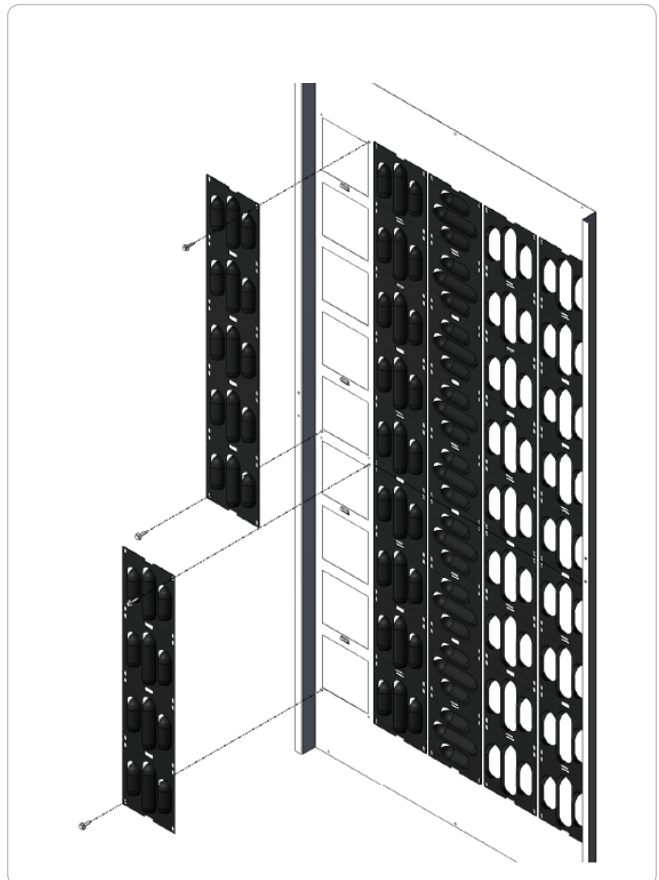


Illustration 2



CORNER MOUNT DISPLACEMENT

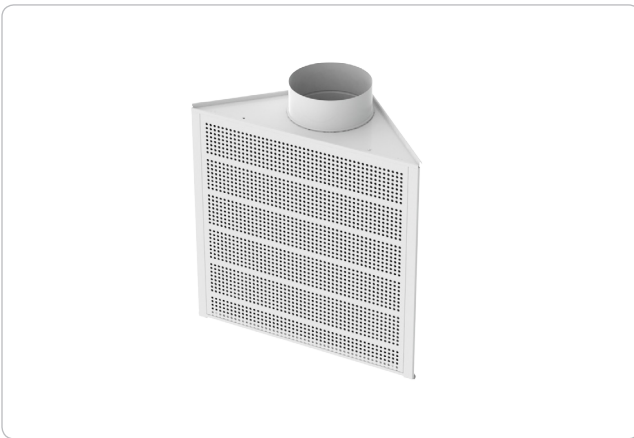
Titus displacement ventilation products can contribute towards achieving the following credits:

- » LEED EA Credit 1: Optimize Energy Performance
- » IEQc2 Credit: Increased Ventilation
- » IEQ Credit7.1: Thermal Comfort - Design

DVC1

90 DEGREE AIR DISCHARGE PATTERN DESIGNED FOR CORNER MOUNT APPLICATIONS

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



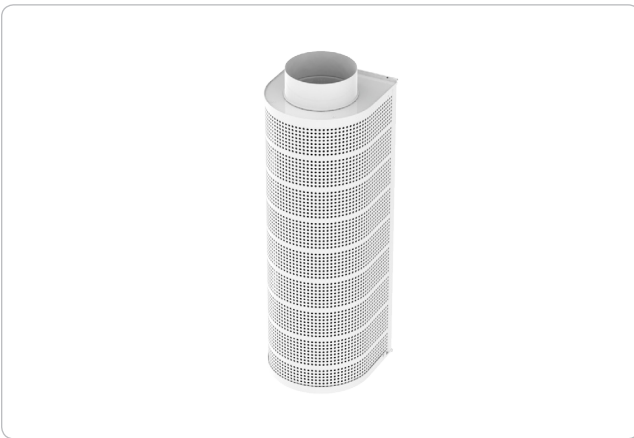
DVC1

The DVC1 is a flat face corner mount displacement diffuser that is designed for corner mounted applications. The unit has a two-way air distribution pattern and easily adapts to different floor layouts. They supply a large volume of air at low velocity to the occupied zone by using newly enhanced pattern controllers. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVVC

90 DEGREE AIR DISCHARGE PATTERN DESIGNED FOR CORNER MOUNT APPLICATIONS

- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



energy solutions



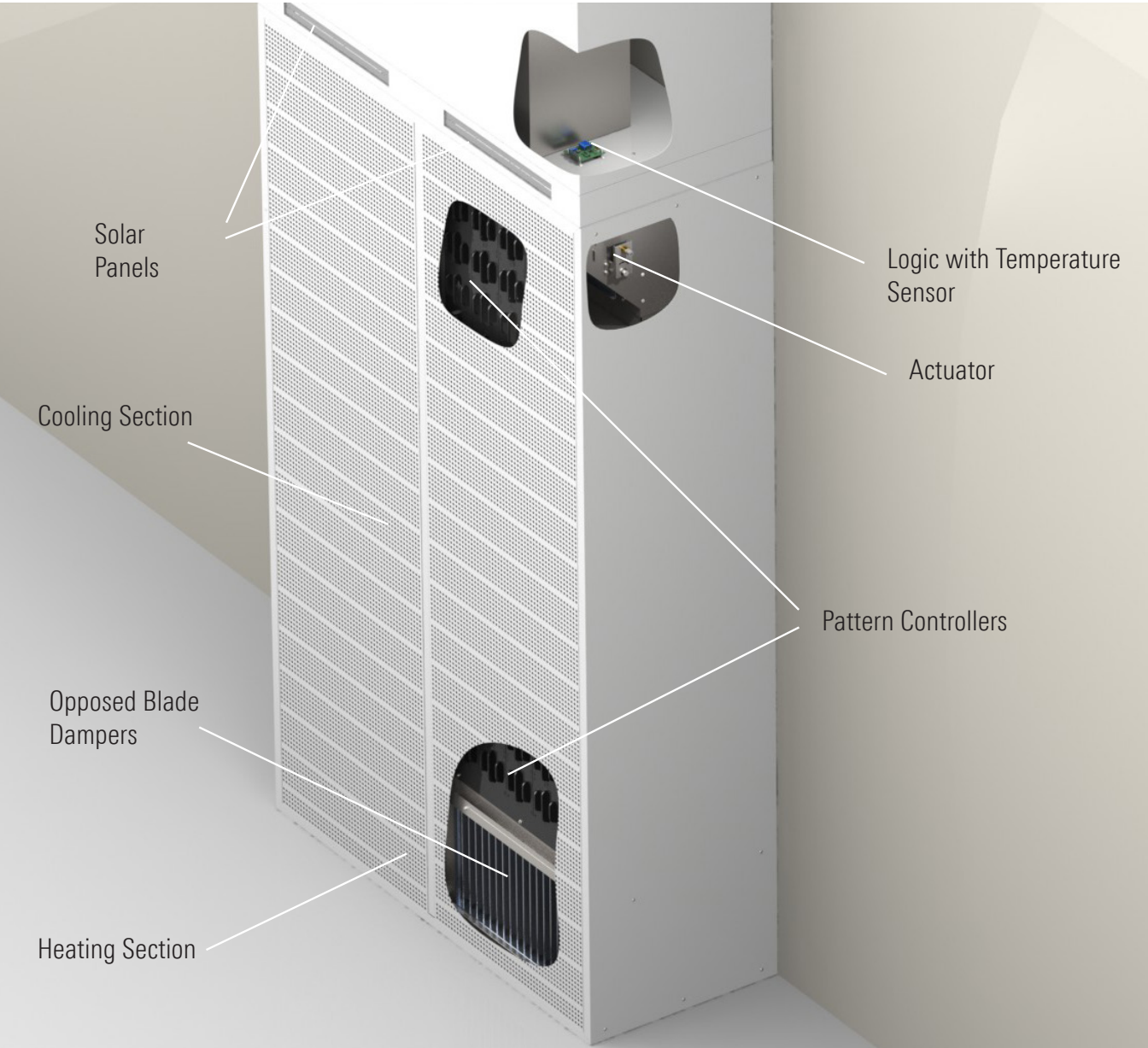
wood grains

DVVC

The DVVC is a corner mount displacement diffuser that is designed for corner mounted applications. The units have a two-way air distribution pattern and easily adapts to different floor layouts. They supply a large volume of air at low velocity to the occupied zone by using newly enhanced pattern controllers. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

SOLAR PLEXICON

The innovative design of the Solar Plexicon created an energy-efficient HVAC unit that will revolutionize the industry. Cooling and heating that comes from a device that requires no external power source will save building owners hundreds of thousands of dollars over the life cycle of their new or renovated building.





HEATING & COOLING DISPLACEMENT

Titus displacement ventilation products can contribute towards achieving the following credits:

- » LEED EA Credit 1: Optimize Energy Performance
- » IEQc2 Credit: Increased Ventilation
- » IEQ Credit 7.1: Thermal Comfort - Design

DVRI-HC

HEATING & COOLING DISPLACEMENT UNIT

- » Heating and cooling from one unit
- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



energy solutions



wood grains



dual-function

DVRI-HC

The DVC1 is a flat face corner mount displacement diffuser that is designed for corner mounted applications. The unit has a two-way air distribution pattern and easily adapts to different floor layouts. They supply a large volume of air at low velocity to the occupied zone by using newly enhanced pattern controllers. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DVRI-HCS

HEATING & COOLING DISPLACEMENT UNIT - SOLAR POWERED

- » Ambient light-powered diffuser that combines heating and cooling from unit
- » Can contribute toward energy savings
- » Easily adjustable air pattern controllers to change airflow spread pattern
- » Standard finish is #26 white (powdercoat)
- » Wood grain finish options available
- » Mounting base and telescopic duct cover are available as accessories



dual-function



energy solutions



wood grains



smart logic



light powered

DVRI-HCS

The DVVC is a corner mount displacement diffuser that is designed for corner mounted applications. The units have a two-way air distribution pattern and easily adapts to different floor layouts. They supply a large volume of air at low velocity to the occupied zone by using newly enhanced pattern controllers. This model can contribute toward achieving LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

DIFFUSER ADJUSTMENT

All Titus Displacement diffusers feature integral variable air pattern controllers located in the unit behind the perforated face (see illustration 1). These pattern controllers can be removed and repositioned to change the adjacent zone pattern from the diffuser face. To adjust the pattern: (see illustration 2).

- Remove diffuser face
- Remove louvers
- Reposition louvers
- Replace face

This unique feature provides a high level of flexibility for the end user. They can react to changes in the space by adjusting the adjacent zone rather than disconnecting and moving the diffuser.

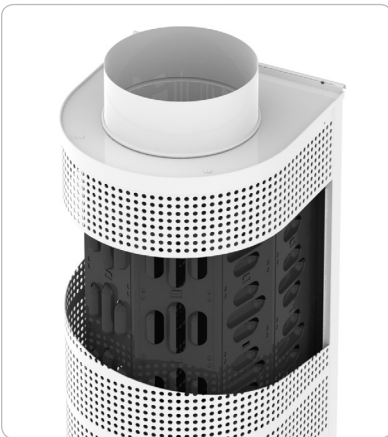


Illustration 1

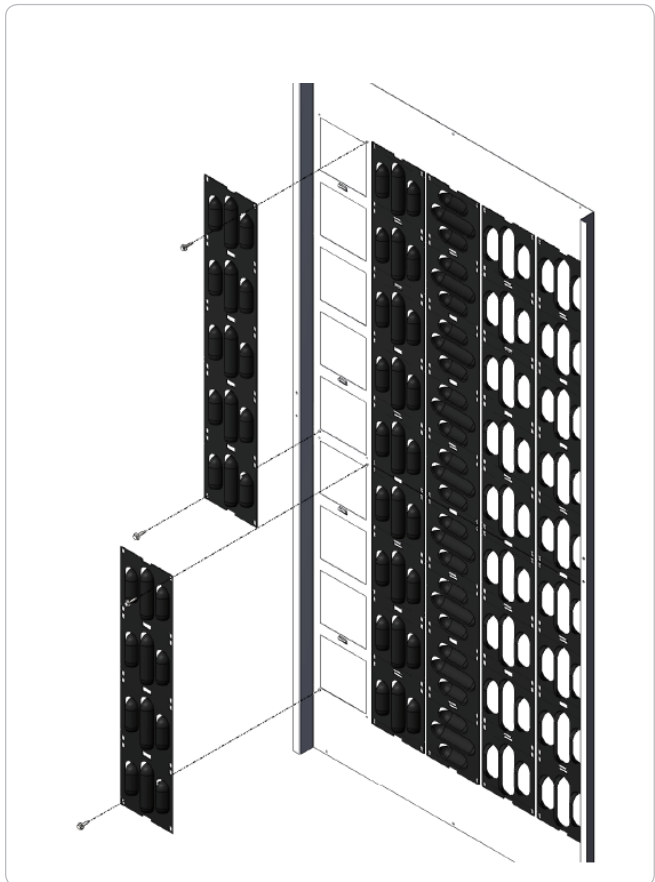


Illustration 2



DISPLACEMENT CASE STUDIES

Titus displacement ventilation products can contribute towards achieving the following credits:

- » LEED EA Credit 1: Optimize Energy Performance
- » IEQc2 Credit: Increased Ventilation
- » IEQ Credit7.1: Thermal Comfort - Design

CASE STUDY

Palo Verde Energy Education Center

Buckeye, Arizona

Client - APS

Representative Office - Norman Wright
Mechanical

Architect - Arrington Watkins Architects

LEED Certification - LEED Gold Certified



ABOUT THE PROJECT

Palo Verde's Energy Education Center (EEC) opened in 2011. The main purpose for this facility is to serve as an emergency base of operations in the event of a crisis at the Palo Verde Nuclear Generating Station (PVNGS), which is conveniently located 22 miles away. During non-emergency times, the center is used as a technical and education facility. Information from the PVNGS is displayed via live data streams and monitored closely by employees at the facility. They are able to communicate instantly with the individuals at the plant and other officials around the world if any issue arises at the nuclear plant.

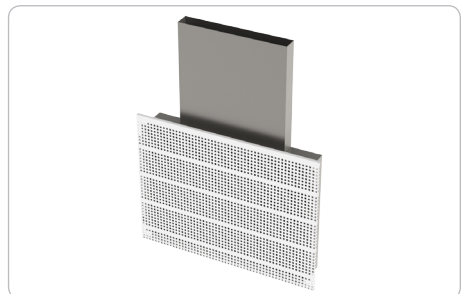
The EEC was designed by Arrington Watkins Architects to be an energy-efficient, state-of-the-art building and incorporates the latest technologies in creating sustainable structures to achieve this goal. Some of the Green Building concepts utilized in this LEED Gold Certified facility are that it uses heavy insulation for the building envelope, has specialized sizing and shading on all the windows installed and the air distribution system.

THE TITUS SOLUTION

The HVAC system in the EEC uses Displacement Ventilation and UnderFloor Air Distribution (UFAD). A Displacement Ventilation system is similar to an UnderFloor system in that it uses warmer supply air



TAF-R



DVIR

and lower pressures than a conventional overhead system. As a result, displacement ventilation systems have many of the same benefits of UFAD systems, such as longer economizer periods, potential energy savings from the warmer supply air and lower horsepower fans, and quiet operation. Both systems allow fresh, conditioned air to distribute properly throughout the center.

The main products featured in the Palo Verde Energy Education Center are the TAF-R UnderFloor diffuser and the DVIR Displacement Ventilation diffuser. The TAF-R is a GreenSpec Listed product available in either standard light gray or black. All components of the unit are constructed of a high-impact polymer material designed to resist damage from heavy foot traffic. Additional colors may be specified to match any building's interior scheme. This model can help contribute toward achieving the following LEED Credits - LEED EA Credit 1: Optimize Energy Performance; IEQ Credit 6.2: Controllability of Systems; Thermal Comfort, IEQ Credit 7.1: Thermal Comfort - Design, and if the building utilizes an existing structure, MR Credit 1.1: Building Reuse.

The DVIR is a rectangular displacement diffuser with a one-way discharge air pattern designed for flush mount applications. Constructed of galvanized steel and aluminum, the DVIR is designed for in-wall applications and supplies a large volume of air at low velocities into the occupied zone. This model can contribute toward achieving the following LEED Credits - LEED EA Credit 1: Optimize Energy Performance; IEQc2: Increased Ventilation; and IEQc7.1: Thermal Comfort - Design.

THE END RESULT

The Palo Verde Energy Education Center is equipped to handle any emergency situation that would arise from the nearby nuclear plant. Plant personnel and government leaders would be able to relay information to news, media and law enforcement officials in the event of any emergency. Having a facility such as this ready to provide assistance at a moments notice will definitely ease the concerns of the surrounding community in the event of a crisis.



CASE STUDY

Cedar Ridge High School

Round Rock, Texas

Client - Round Rock ISD

Representative Office - Texas Air Products

Architect - KAH Architects / Perkins + Will

Engineering Firm - ESA Engineering

Contractors - TDIndustries

LEED Certification - LEED Certified



ABOUT THE PROJECT

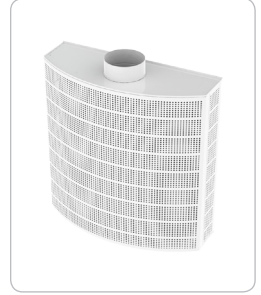
Round Rock ISD envisioned a sleek, modern new campus that would foster growth and development for its students. They wanted a high school capable of unlocking the hidden abilities of their students and one that would aid their teachers in preparing their students for the next chapter of their lives. Cedar Ridge High School is the result.

Cedar Ridge High School is a unique two-story, 375,000 square-foot high school divided into four distinct academies: Academy of International Business and Economics, Academy of Professional Studies, Academy of Science, Technology, Engineering, and Mathematics, and the Academy of Visual and Performing Arts. Each academy houses its own media center, administration suites and planning areas for teachers. The common areas for all students are the cafeteria, the athletic facility and the outdoor courtyard which is considered the heart of campus and is home to several multi-purpose events.

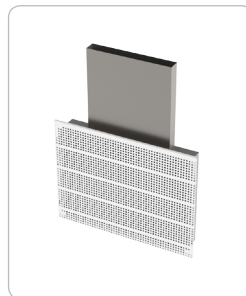
The design team and Round Rock ISD wanted this school to be an environmentally friendly facility. This LEED Certified school has several sustainable elements featured. It uses local limestone materials on the exterior of the buildings and offers an abundance of natural light. All the windows allow natural light to penetrate deep into the occupied spaces.



TMSA



DVBC



DVIR



TRM

THE TITUS SOLUTION

The HVAC system featured in the high school also contributed toward it achieving LEED Certification. Titus has an abundance of products installed that provide energy savings for the school. Several areas in the new high school utilize displacement ventilation, which is a unique alternative for air distribution.

The DVIR and DVBC are rectangular displacement diffusers. The DVIR is a unidirectional discharge diffuser designed for flush mount applications. The DVBC has a curved face and discharges air via a three-way pattern. Both units provide air distribution by supplying large volumes of air at low velocities into the occupied zone. Easily adjustable air pattern controllers inside the units can create different airflow patterns in the space to optimize occupant comfort. Some additional products featured in the school are the TMS diffuser and the TRM mounting frame.

The Titus TMSA is a steel diffuser that features adjustable vanes which vary the discharge pattern between vertical and horizontal for heating and cooling applications. These diffusers deliver supply air in 360° pattern and are designed to protect ceilings from smudging. All sizes have 3 cones providing a uniform appearance. The TRM is an aluminum mounting frame used to make installation of grilles & diffusers and other ceiling components in plaster and sheet rock ceilings as simple as inserting them in a standard T-bar type ceiling. For typical applications, the frame has adjustable fastening clips which adapt to a variety of plaster and sheet rock ceiling thicknesses.

THE END RESULT

There have been numerous studies on the importance of proper ventilation in our schools. Cedar Ridge High School has a state-of-the-art HVAC system that provides superior performance for its students and faculty. The new high school is also a beautiful campus that has created the best learning environment for the students of Round Rock, Texas. The teachers, staff and administration now have a technologically advanced partner that will assist them in molding the future leaders for the next generation.



Icons



contributes toward energy savings by reducing operating costs of air distribution devices

energy solutions



finish options that resemble wood grains, perfect for high-profile architectural applications

wood grains



energy-harvesting & savings feature of an HVAC device powered by ambient light

light powered



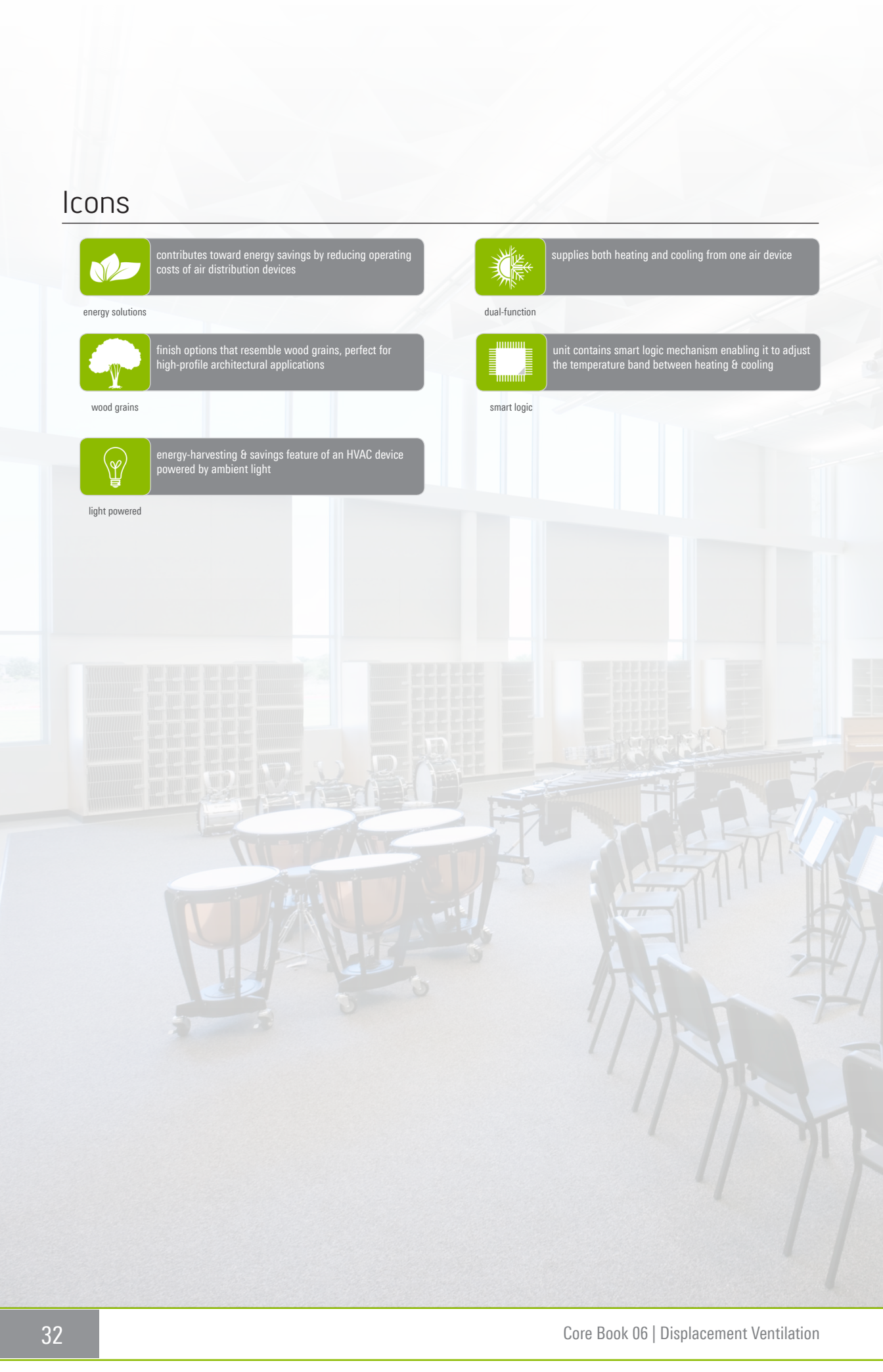
supplies both heating and cooling from one air device

dual-function

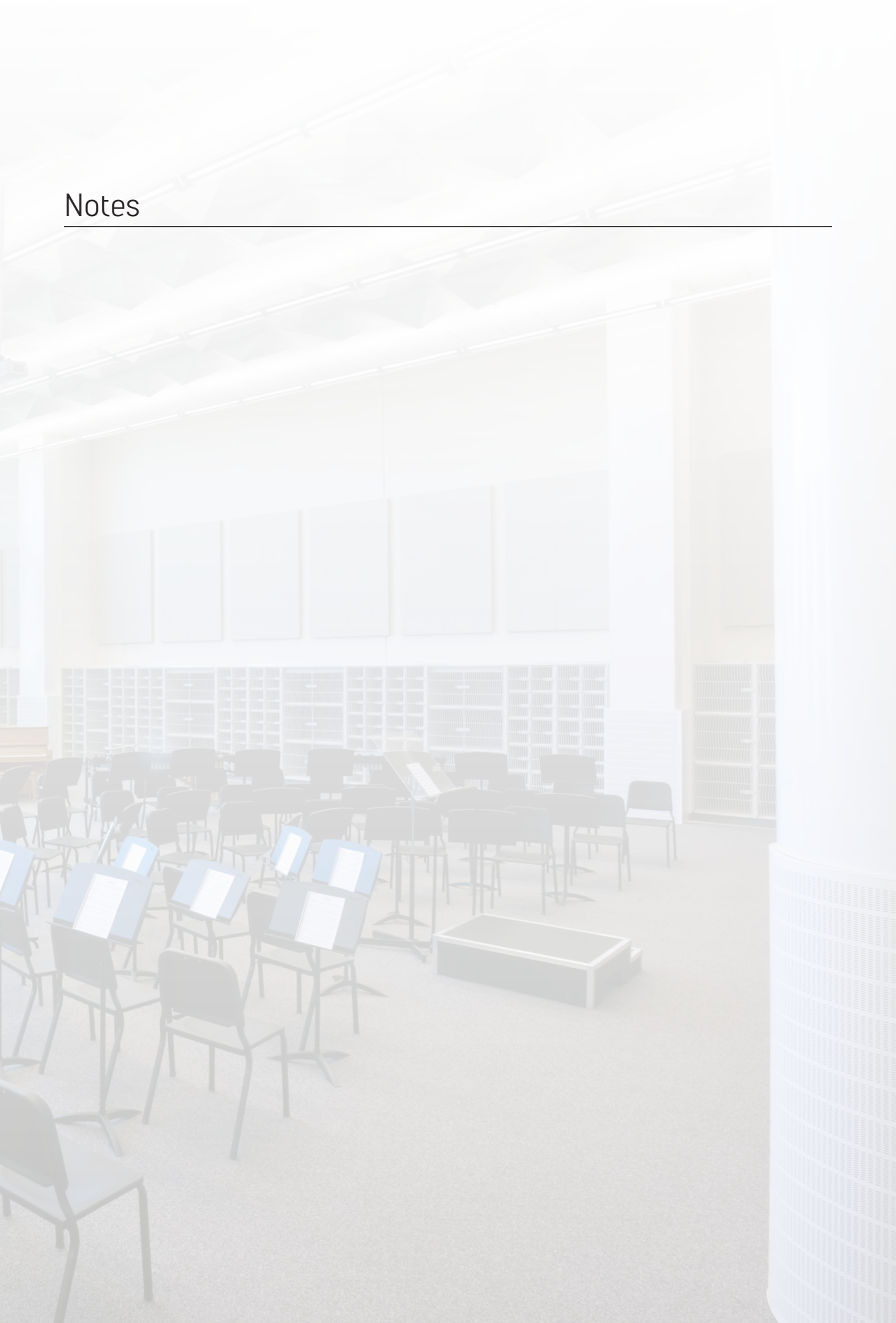


unit contains smart logic mechanism enabling it to adjust the temperature band between heating & cooling

smart logic



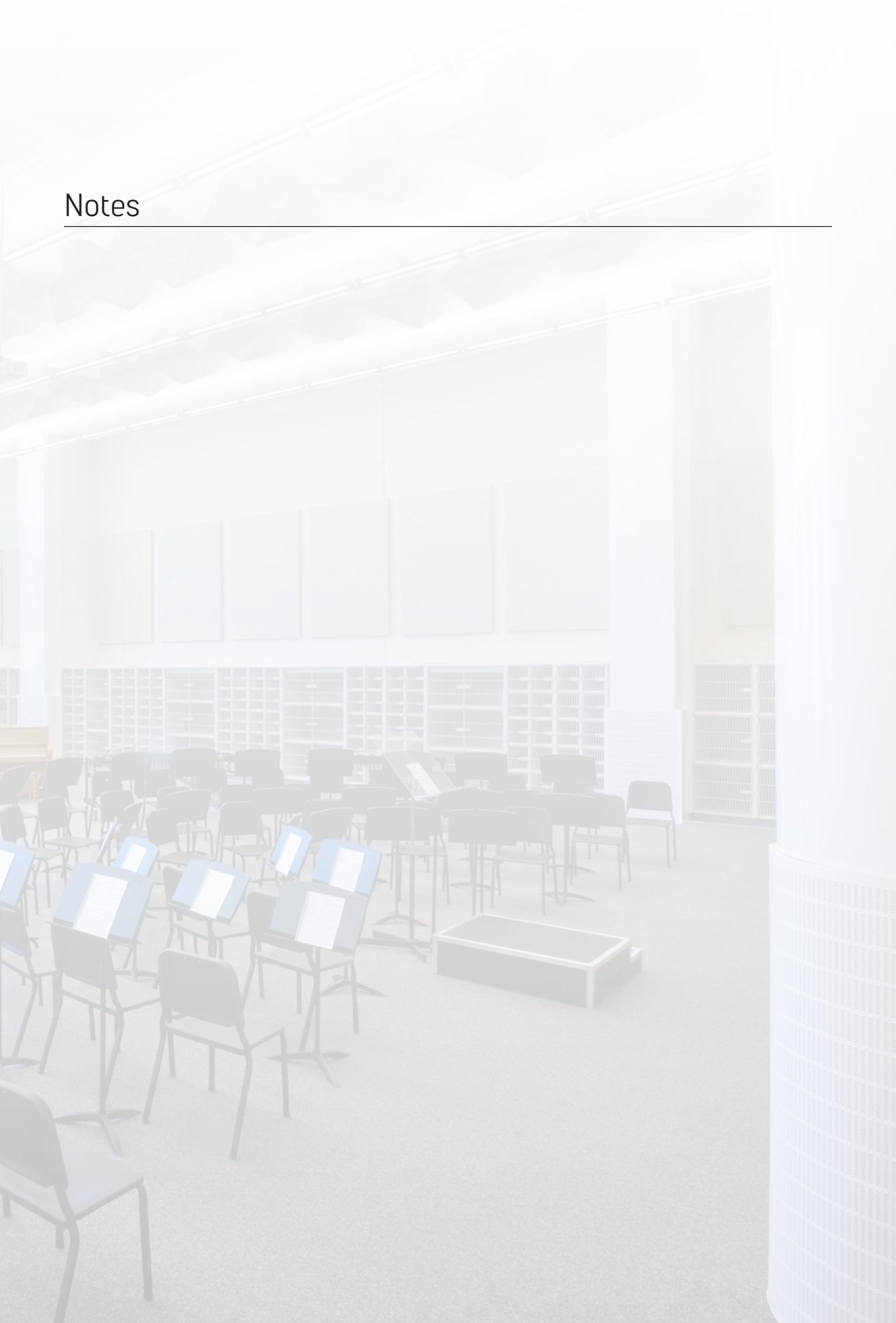
Notes



Notes



Notes



AIR DISTRIBUTION
PRODUCTS



ADVANCING THE SCIENCE OF AIR DISTRIBUTION

605 Shiloh Rd.
Plano, Texas 75074
(ofc): 972.212.4800
(fax): 972.212.4884
(web): www.titus-hvac.com