Uni•Guard™

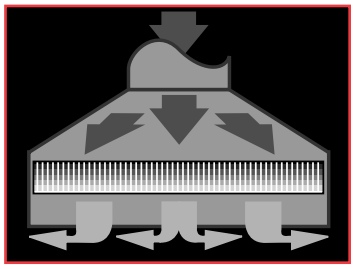
High Efficiency Individual Room Filtration System

INDOOR AIR QUALITY
IAQ

WARREN
TECHNOLOGY

INDOOR ENVIRONMENTAL SOLUTIONS

UNI-GUARD™ HIGH EFFICIENCY INDIVIDUAL ROOM OUTLET FILTRATION SYSTEM



When outside air enters the heating ventilation and air conditioning system, it begins a journey through a variety of equipment components and long stretches of ductwork where it can be exposed to contaminants such as mold, fungi, bacteria, dust mites, fiberglass erosion and construction debris.

Warren's breakthrough Uni•Guard high efficiency filtration system traps micro particles that accumulate inside a building's air ducts through a filter located inside the ceiling air vent. The Uni•Guard system combines Warren's patented Valid Air® high performance ceiling air diffuser with built-in FILTRETE™ technology from 3M to protect building occupants from recirculated airborne contaminants. The Uni•Guard system can provide more effective filtration and application flexibility than conventional air filtration systems.

Uni•Guard is the only filtration system which protects building occupants by filtering microbial contaminants which accumulate inside the building's air ducts before the air is circulated into individual rooms.

What You Can't See Can Hurt You

A recent national study has indicated that these microscopic particles can have an extremely dangerous effect on humans. These fine particles (which are 2.5 microns or less in size and cannot be seen by the naked eye) are the largest health concern because they can be inhaled most deeply into the lungs. The removal efficiencies of these smaller particles in existing filters is of particular concern.

Because of their extremely small size, these infectious microscopic particles are not removed by low efficiency central system filters. The Uni•Guard air filtration system is designed to greatly reduce the level of microbial contaminants in the air you breathe and remove over 90% of all respirable airborne particles.

The main concern about these basic industry facts is that the average electrostatic and disposable panel-type filters used in today's commercial HVAC systems are simply not designed to remove these smaller harmful particles.

Selective Room to Room Filtration

Individual room outlet filtration provided by the Uni•Guard filtration system allows unlimited diversity of filtration strategies from room to room because it allows different parts of the building to have varying levels of filtration. Rooms with higher Indoor Air Quality (IAQ) priority may be serviced by higher efficiency filters than other rooms with lesser requirements on the same central fan system. The filtration efficiency of the entire filtration system is increased proportionately when additional outlet filters are added to an existing system.

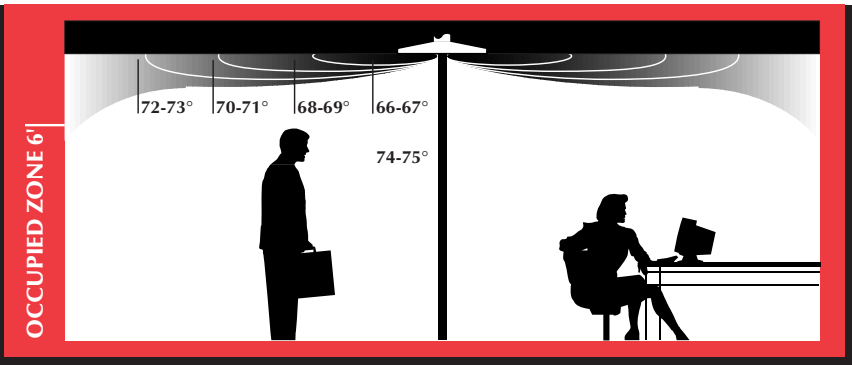
Tenants in multi-purpose office buildings and particularly physicians who lease office space in medical buildings share the same central air conditioning system. Airborne viruses, bacteria or chemical contaminants originating from a single tenant or physician can pose a health risk to other building tenants and occupants. The Uni•Guard filtration system provides a solution to this problem by filtering contaminants inside the supply-air ceiling diffuser before the air enters the room to effectively protect individual tenants and building occupants within a shared air conditioning system.

The Uni•Guard individual room outlet filtration system can help create an optimum indoor environment without requiring additional outside air. Improving indoor air quality has been shown to decrease absenteeism, reduce medical costs related to respiratory problems, and improve employee productivity.

Superior Room Air Distribution

Uni•Guard units utilize a unique, patented air distribution design that maximizes filter performance without degrading room air circulation.

Normal neck velocities are reduced to low filter face velocities in the diffuser plenum to provide efficient filtration and then increased to high outlet velocities through the diffuser face by patented dimple-jets. This produces a higher degree of air movement at the point of discharge near the diffuser face, where supply air and room air converge. This higher discharge velocity provides increased room air circulation to effectively entrain and remove airborne contaminants that are generated in the space.



Valid Air® diffusers direct airflow parallel to the ceiling to ensure proper mixing and room air circulation. Temperature differences within the room are minimized to create a comfortable draft-free indoor environment.

Superior room air circulation created by the Valid Air's patented dimple-jet air flow design will ensure that particulates generated in the space remain suspended in the airstream and are exhausted from the room quickly. The contaminated return air is then transported to the central system filter and room outlet filters to assure filtration effectiveness. This also reduces maintenance and housekeeping costs by limiting the amount of dust particles that drop and settle on carpets, draperies, furniture, etc.

Uni•Guard units are made from durable, scratch resistant thermoplastic material that will not rust, chip, stain or fade. These units can be wiped clean easily, with any household cleaner.

Additional Odor Control and Antimicrobial Protection

There are a number of indoor odor sources that can become an indoor air quality problem in today's businesses. A number of indoor odor sources include: smoke from cigarettes and other tobacco products, building materials such as adhesives, paints, processed woods, carpets, caulks, other volatile organic compounds, drapes, upholstery and other furnishings, copiers, printers and fax machines (ozone).

Warren offers a carbon impregnated filter and a zeolite impregnated filter which are both designed to control objectionable odors, noxious gases and other airborne contaminants. It also provides greater efficiency, lower pressure drop and limits the "dusting" effect caused by conventional granular carbon filters. The activated carbon is a form of charcoal that has millions of tiny openings which absorb odorous gas molecules from the air like a molecular magnet. Zeolite is primarily used to control ammonia based odors.

Uni•Guard Provides Total System Filtration

Unacceptable indoor air quality can cost employers money through increased employee absenteeism, higher operational costs, reduced productivity and the threat of personal liability or litigation. Uni•Guard's individual room outlet filtration system will protect building occupants from airborne microorganisms and is a cost effective, practical approach to providing a cleaner, healthier indoor environment.

WARREN UNI-GUARD HIGH EFFICIENCY INDIVIDUAL ROOM OUTLET FILTRATION SYSTEM

Application Information:

Most new or existing HVAC systems can accommodate the Uni•Guard filtration system by considering the following guidelines:

On existing ducted HVAC systems where high efficiency individual room outlet filtration is desired in a limited number of locations, the existing system may in some instances be adequate to provide sufficient local duct static pressure. In some cases additional static pressure will be required to maintain the same amount of flow. This can be accomplished by opening the branch or run-out balancing damper to allow a minimal static pressure increase at the filtered diffuser(s). Typically only a .05" - .10" WC increase is necessary.

Some additional system adjustments may be required in installations near or at the end of the duct runs where static pressures are typically low or marginal.

The following modifications to the existing duct system may be required:

1. The following options are recommended for a given room or area where sufficient static pressure is not available: adjust the balancing dampers upstream of the ceiling diffuser to a more open position or install additional filtered diffusers to reduce the static pressure required.

NOTE:
For constant volume systems or VAV systems serving interior zones with relatively constant loads, discharge velocity will rarely, if ever, require adjustment due to the unique patented dimple-jet air distribution technology.

2. Increase the fan static pressure to accommodate multiple filtered diffusers.

   Most existing HVAC systems have provisions to increase fan static pressure by increasing the fan speed and are generally sized so that there is usually a 10% - 20% margin for upward adjustment.

   This margin can often be used to accommodate the additional static pressure requirements of the filtered diffusers. After adjustments have been made to increase the system-wide static pressure, re-balancing of the system may be necessary. For higher static pressure requirements, the fan motor HP could also be increased.

3. An in-line local booster fan or series fan powered variable air volume terminal unit, Warren model FBC, may be used in the branch duct to increase the static pressure for rooms or offices with filtered diffusers. This can also be used to provide auxiliary heat.

Combinations of the above options may be used for both new and existing systems depending upon the degree of filtration required, space limitations, operating costs and budgetary requirements.

For more detailed diffuser application and selection information please refer to WARREN's Valid Air High Performance Air Diffusers specifications and engineering guide.

For complete UNI•GUARD unit selection and order information please see WARREN's Valid Air High Performance Air Diffusers specifications and engineering guide or call 1-800-231-1084

FILTER SELECTION AND INFORMATION ONLY

High Efficiency Particulate Filter

Filter Model	Description	Size	Weight
FSH	3M FILTRETE pleated electrostatic filter	23-3/8" x 23-3/8" x 7/8"	100 grams per sq. meter of media

Odor Control Filter

Filter Model	Description	Size	Weight
FSC	Activated carbon filter (Odor control)	23-3/8" x 23-3/8" x 7/8"	10.5 grams per sq. foot of media
FSZ	Activated Zeolite filter (Ammonia odor control)	23-3/8" x 23-3/8" x 7/8"	15 grams per sq. foot of media

Construction Filter

Filter Model	Description	Size	Weight
FSL	Polyester or synthetic fibers	23-3/8" x 23-3/8" x 7/8"	n/a

Note: Custom model odor control filters are available to control light gases and odors such as formaldehyde to meet specific requirements. (Please consult factory)

PERFORMANCE DATA:

Average Fractional Efficiency

Room Outlet Filter models (2' x 2')	100CFM (25 fpm)	200CFM (50 fpm)	300CFM (75 fpm)	400CFM (100 fpm)	500CFM (125 fpm)
FSH Avg. Fractional efficiency: 0.3 - 3 micron size	96.5%	92.7%	89.9%	87.8%	85.9%
Two stacked FSH filters Avg. Fractional efficiency: 0.3 - 3 micron size	99.1%	98.7%	98.4%	97.3%	96.5%
FSC Avg. Fractional efficiency: 0.3 - 3 micron size	N/A	N/A	N/A	N/A	N/A
FSZ Avg. Fractional efficiency: 0.3 - 3 micron size	N/A	N/A	N/A	N/A	N/A

Special Note: Up to two model FSH filters and/or Model FSC, FSZ filters in any combinations may be stacked to provide additional performance efficiencies. For specific fractional efficiency size ranges consult factory.

Initial Resistance vs. Airflow (in W.C.)

Room Outlet Filter models (2' x 2')	100CFM (25 fpm)	200CFM (50 fpm)	300CFM (75 fpm)	400CFM (100 fpm)	500CFM (125 fpm)
FSH Rated initial resistance (in W.C.)	.017	.037	.060	.084	.111
Two stacked FSH filters Rated initial resistance (in W.C.)	.04	.079	.119	.171	.227
FSC Rated initial resistance (in W.C.)	.005	.010	.019	.031	.044
FSZ Rated initial resistance (in W.C.)	.005	.010	.020	.035	.052

Performance Note: Resistance versus airflow data is based on standard 24" x 24" (610mm x 610mm) filter size. All high efficiency particulate filter testing was conducted by an independent testing laboratory commissioned by 3M. Odor control filter air flow resistance testing was completed at Air Filter Testing Laboratories, Inc.

MAINTENANCE SCHEDULE

FSH electrostatic disposable filters have an average operating life expectancy of twelve to eighteen months. Recommended filter changes varies depending upon the application. FSC and FSZ model carbon or zeolite activated filters shall be changed as odors re-surface and have an average operating life expectancy of twelve to eighteen months or as odors reoccur.

Note: Final room outlet filter operating life expectancy figures are subjective and are based upon normal building operating conditions and a minimum 20% ASHRAE (52.1) efficient pre-filter. The pre-filter is used to protect the mechanical equipment and will extend the life of the final room outlet filters. Final room outlet filter operating life expectancy will vary from building to building depending upon the use of the building, new construction processes, existing condition of the ventilation system, smoking policies, etc. All filters are disposable and are not designed to be reused.

PHYSICAL DATA

Filter Model FSH

Type:	High efficiency 1" thick pleated 3M Filtrete electrostatic filters offer submicron filtration and longer life.
Frame:	Moisture-resistant beverage board
Dimensions:	23 3/8" x 23 3/8" x 7/8"
Media:	100 grams per sq. meter, polypropylene split fibers
Media Area:	12 pleats per linear ft., 6.4 sq. ft. effective filter area
Media Support:	Diamond shaped expanded metal
Pleat Design:	Aerodynamic radial "V" Shape
Efficiency:	Average fractional efficiency 0.3 - 3 micron size 92.7% (50 FPM)
Rating:	UL Class 1 Listed

Filter Model FSC

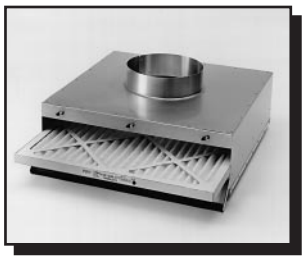
Type:	1" thick activated carbon filter will adsorb odorous gas molecules and pollutants from the air.
Frame:	Moisture resistant beverage board
Dimensions:	23 3/8" x 23 3/8" x 7/8"
Media:	10.5 grams sq. ft. activated carbon
Media Area:	12 pleats per sq. ft, 6.1 sq. ft. effective filter area
Media Support:	Diamond shaped expanded metal
Pleat Design:	Aerodynamic radial "V" shape
Efficiency:	Average efficiency less than 20% (ASHRAE Test Standard 52.1-92)
Rating:	UL900 Class 2 Listed

Filter Model FSZ

Type:	1" thick activated zeolite filter will adsorb ammonia base odorous gas molecules and pollutants form the air.
Frame:	Moisture resistant beverage board
Dimensions:	23 3/8" x 23 3/8" x 7/8"
Media:	15 grams sq. ft. activated zeolite
Media Area:	12 pleats per sq. ft., 6.1 sq. ft. effective filter area
Media Support:	Diamond shaped expanded metal
Pleat Design:	Aerodynamic radial "V" shape
Efficiency:	Average efficiency less than 20% (ASHRAE Test Standard 52.1-92)
Rating:	UL900 Class 2 Listed

Uni•Guard Unit Dimensions

Basic 2' x 2' Valid Air Diffuser dimensions are 23 3/4" x 23 3/4" x 6" (w x l x h). For complete UNI•GUARD unit selection and order information please see WARREN's Valid Air High Performance Air Diffusers specifications and engineering guide, or call 1-800-231-1084.



SPECIFICATIONS

General Description:
Individual room outlet high efficiency particulate filters shall be filter model FSH provided by Warren Technology. Odor control final room outlet filters shall be filter model FSC and/or FSZ as provided by Warren Technology. Filter sizes shall be as specified on the schedule. Filters shall be UL900 Class 1 or 2 as listed.

High efficiency individual room outlet filters shall be installed and mounted at the factory in Valid Air high performance diffusers and/or Leopard Intellivent personal VAV diffusers manufactured by Warren Technology (for diffuser specification and performance data please refer to Valid Air High Performance Diffusers and Leopard Intellivent specifications and engineering guide published by Warren Technology 1-800-231-1084). A filter slide track shall be built into the diffuser plenum to house the filter. Filter access shall be from the side of the square or wedge-shaped plenum through a gasketed, hinged aluminum access plate. A sliding thumb latch shall be used to open and lock the filter access door in place.

Individual room outlet high efficiency particulate filter construction:
Filter medial shall be constructed of permanently charged rectangular polypropylene split fibers. The effective media area shall not be less than 1.6 square feet per 1.0 square foot of face area and will contain not less than 12 pleats per linear foot. (Filter Model FSH)

The media shall be bonded to a diamond shaped expanded metal which will be pleated together with the media to assure against fluctuation and pull away. Pleats shall be radial in configuration to achieve maximum aerodynamic performance and decrease pressure drop. Frame shall be constructed of a rigid, moisture-resistant beverage board. Die cut support members shall be an integral part of the frame and shall be bonded on each side to the lead edge of the pleats to provide additional pleat stability and maintain spacing.

Performance
Initial resistance shall not exceed _____ w.g. at _____ fpm. Media area must equal or exceed that of the specified filter. The filter media shall have a fractional efficiency of _____ % at _____ micron size at _____ FPM as determined by a particle size removal efficiency test using neutralized potassium chloride (KCI) certified by a recognized testing laboratory.

Individual room outlet odor control filter construction:
Filter media shall be constructed of activated carbon or zeolite impregnated, non-woven polyester impregnated with 150% carbon or zeolite add-on. Carbon filter media shall contain no less than 10.5 grams of carbon per square foot of media area. Zeolite filter media shall contain no less than 15 grams of zeolite per square foot of media area. Effective media area shall not be less than 1.525 square feet per 1.0 square foot of face area and will contain not less than 12 pleats per foot. (Filter Model FSC - carbon and Filter Model FSZ - zeolite) Optional: Filter will be treated with an EPA registered antimicrobial agent.

The media shall be bonded to a diamond shaped expanded metal which will be pleated together with the media to assure against fluctuation and pull away. Pleats shall be radial in configuration to achieve maximum aerodynamic performance and decrease pressure drop. Frame shall be constructed of a rigid, moisture-resistant beverage board. Die cut support members shall be an integral part of the frame and shall be bonded on each side to the lead edge of the pleats to provide additional pleat stability and maintain spacing.

Performance:
Initial resistance of odor control filter shall not exceed _____ w.g at _____ fpm. Media area must equal or exceed that of the specified filter.

Spare Filters:
Two complete sets of filters shall be supplied for use during the construction and testing and balance period. A low efficiency filter shall be installed prior to equipment start up to capture larger particles that may blow through the system and into the space.

Notes to performance data:
Efficiency of Filtrete media in the particle range of 0.3 to 3 microns is determined at face velocities of 25, 50, 75 and 100 fpm. Efficiency of filter media measured using neutralized potassium chloride (KCI) aerosol to challenge the filter media in a test duct. A laser particle counter is used to measure the particle concentrations before and after the filter media. Efficiency and pressure drop were automatically calculated.

WARREN TECHNOLOGY
PRODUCTS & SYSTEMS

Warren Technology designs, develops, and manufactures quality products for the heating, ventilation and air-conditioning industry.

Our mission is to provide indoor environmental solutions that enhance personal comfort, improve indoor air quality, and increase energy savings.

Advanced computer-aided design and integrated flexible manufacturing systems developed during the past 35 years enable Warren to respond rapidly to changing customer requirements.

Warren's Uni•VAV® Individual Room Comfort System provides individual temperature control for buildings with almost any type of forced air HVAC system.

Air handling systems for any building, large or small, may be upgraded to achieve greater energy efficiency while providing for the individual temperature needs of each occupant.

The Uni•VAV®, and UNI•GUARD™ systems are designed to improve individual comfort control, productivity and indoor air quality.

UNI•VAV®
- Individual Zone Control
- Energy-Saving Diversification
- System Design Flexibility

Leopard Intellivent®
Personal VAV Diffusers
- Individual Temperature Control
- Easy to Install and Relocate

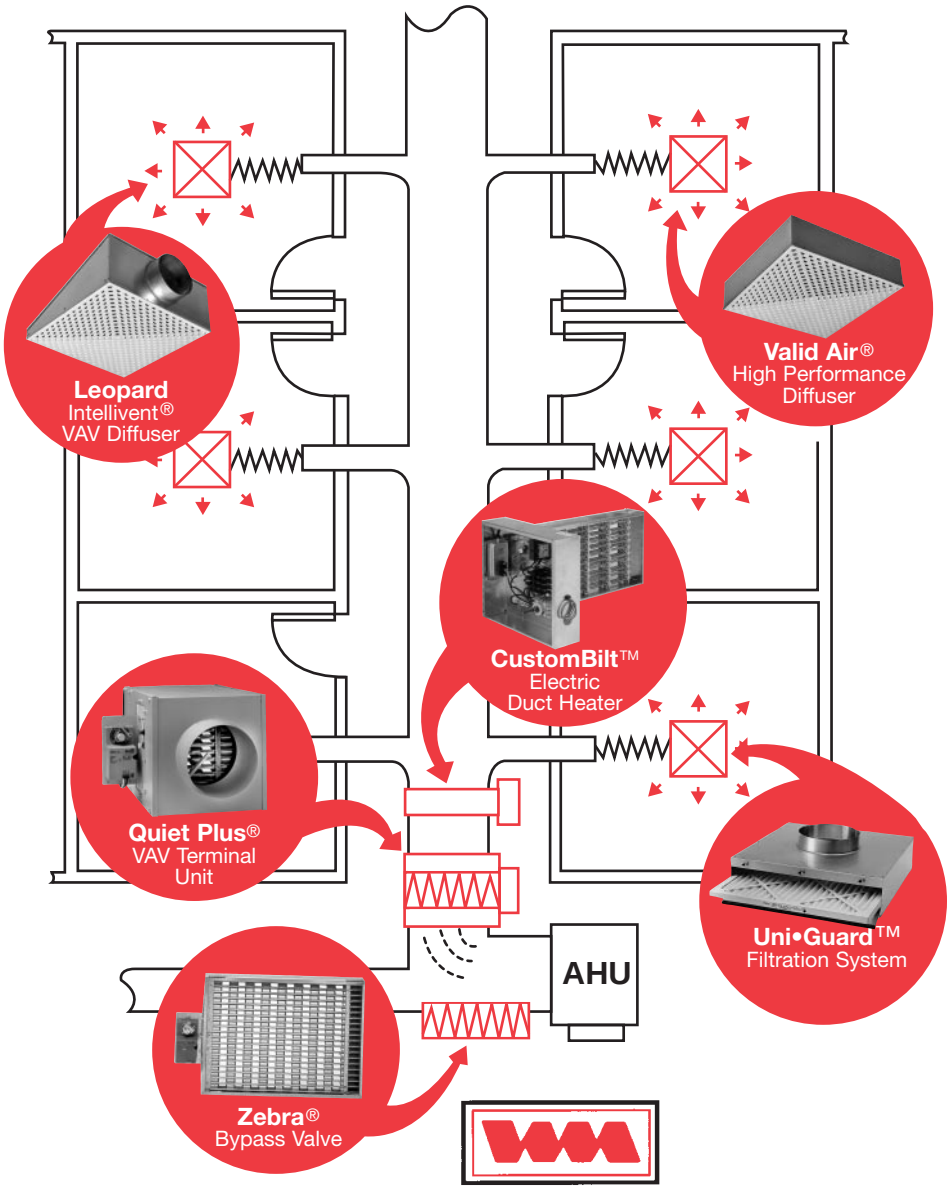
Valid Air®
High Performance Diffusers
- Increased Air Circulation
- Draft-Free, Dump-Proof Air Flow

Custombuilt™
Electric Duct Heaters
- Safety Tested, Economical

Quiet Plus®
VAV Terminal Units
- Ultra Quiet Operation
- Precise Control

Zebra®
Precision Air Valves
- Laminar Air Flow
- Low Noise Levels

UNI•GUARD™
Individual Room Filtration System
- Improved IAQ



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