
FANWALL TECHNOLOGY®

Get the FANWALL® Advantage



FANWALL
TECHNOLOGY®

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One of the most innovative and exciting new trends in air handling in the past few decades is to use a multiple fan array to move air versus traditional single or dual fans. Nortek Air Solutions—a recognized leader in custom and mission critical air handling technology, design and manufacturing—was first to invent an “integrated” fan array solution with its FANWALL® system, and continues to be the industry leader in ongoing research and development to further refine its capabilities.

FANWALL TECHNOLOGY is available only from Nortek Air Solutions brands, including: Eaton-Williams®, Governair®, HUNTAIR®, Mammoth®, Temtrol®, Venmar CES™, Ventrol® and Webco™



GOVERN AIR®

HUNTAIR®

Mammoth®

Temtrol®

VENMAR CES™

Ventrol®

Eaton-Williams®

WEBCO™



Get the FANWALL® Advantage

Unlike other fan arrays available today, a FANWALL system is more than off-the-shelf fans and motors arranged in an array. It incorporates FANWALL TECHNOLOGY®—innovated and manufactured specifically for fan array systems—to create an integrated system of state-of-the-art fans, motors, cabinetry, controls, and accessories. These components have been successfully blended to match new construction and retrofit application requirements, while providing:

- Redundancy
- Quiet and vibration-free operation
- Optimized energy efficiency from design minimum to maximum flow
- Low cost maintenance and service

Since 2003, nearly 200,000 FANWALL cubes have been installed and are successfully moving air throughout the world. Applications for FANWALL TECHNOLOGY range from office, education and hospitality facilities, to facilities with critical requirements such as hospitals, data centers and pharmaceutical manufacturing.

Oakwood Southshore Medical Center, Trenton, MI
176,000 cfm



The Pyramid Center, San Francisco, CA
202,000 cfm

FANWALL TECHNOLOGY®—Innovations

Air movement experts from Nortek Air Solutions have optimized FANWALL® systems for redundancy, quiet and vibration-free operation, high efficiency and low maintenance and service.



Expertise in Air Movement

FANWALL TECHNOLOGY originated from fan filter systems used in cleanroom applications. The smaller fans and motors distributed throughout the grid are ideal for providing the even airflow distribution required for a cleanroom environment, a compact footprint for ceiling mounting, as well as redundancy and easy serviceability to minimize revenue risk associated with downtime.

These same benefits can also be applied to any air handler system, particularly where a critical failure would result in significant risk to capital equipment or revenue losses. However, the characteristics and constraints of an air handler cabinet differ from a cleanroom environment, requiring significant R&D before the concept would become the reality of FANWALL TECHNOLOGY. In doing so, air movement experts from Nortek Air Solutions examined every aspect of the individual fan cubes and their interaction together in an array configuration—throwing out the book on conventional fan metrics to design a completely new system optimized for fan array applications, including:

- **Custom fan wheel designs and inlet cones** to optimize airflow efficiency and minimize turbulence. The fan wheels are AMCA certified and designed specifically for a fan cube environment to achieve the industry's highest efficiency in their size range.
- **Multiple fan wheel sizes and motor combinations** to provide flexibility in meeting airflow requirements and create an even piston of air within the constraints of the air handler cabinet dimensions. Fans are available in seven sizes from 10 to 22 inches to closely match airflow requirements. Expanded motor horsepower selections provide the ability to

keep the connected horsepower as close as possible to the design brake horsepower for peak efficiency throughout the operating range of the air handler.

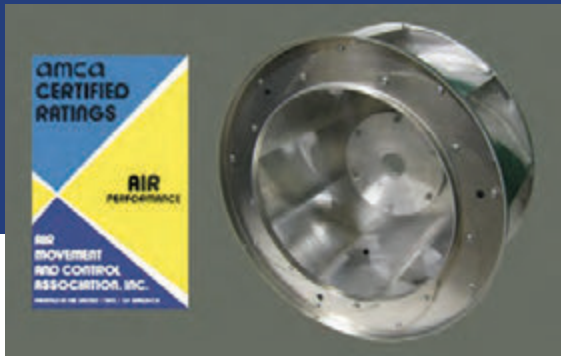
- **A robust cube design and silencing system (called a Coplanar Silencer®)** to minimize sound and vibration.
- **Near zero system effect backdraft damper** selections and block-off plates that prevent the backflow of air in idled cubes.
- **Control algorithms** to optimize performance in variable airflow applications.



No Spring Isolation Required

Designed to meet the most stringent requirements and specifications.

FANWALL TECHNOLOGY®—Innovations



High Efficiency Fans

Designed specifically for a fan cube environment to achieve the industry's highest efficiency in their size range. AMCA certified performance.



System Optimization Controls

Automatically model and implement the most efficient system configuration to meet airflow requirements by varying the speed and number of enabled fans and motors at any given point in the operating range.

Patented. Additional patents pending.



Matched Motor Horsepower Selections

More horsepower increments to choose from to more exactly match required brake horsepower and reduce connected load, wire sizing, transformer and switchgear costs for the building.



Coplanar Silencer®

Unique enclosure designed to attenuate motor/fan sound for quiet operation.

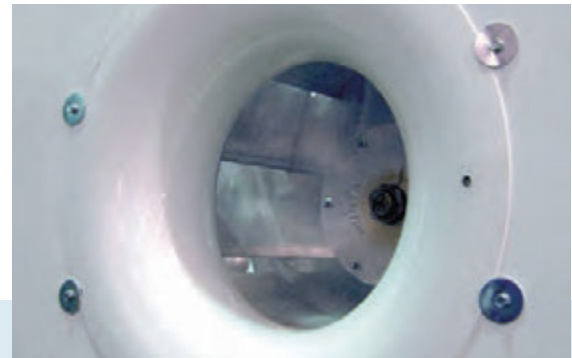
Patented.



Near Zero System Effect Backdraft Damper

FBD backdraft damper prevents re-circulation through disabled fans and motors with near zero net system effect.

Patent pending.



Optimized Inlet Cone Selections

Designed specifically to minimize inlet losses and optimize fan efficiency.

FANWALL TECHNOLOGY®—Advantages

FANWALL TECHNOLOGY saves valuable space. The chart below demonstrates savings in length between four 25,000 cfm air handlers, each designed to the same specification with different fan systems.



Applications Expertise

With FANWALL TECHNOLOGY, you can be assured that the learning curve has been eclipsed and you are receiving the optimum system to match your new construction or retrofit application. Since 2003, nearly 200,000 FANWALL® cubes have been installed and are successfully moving air throughout the world. This degree of experience, expertise, and sole source responsibility in the design, manufacture, and application of fan array components and systems is unmatched in the industry.

Dramatically Shorter Footprint

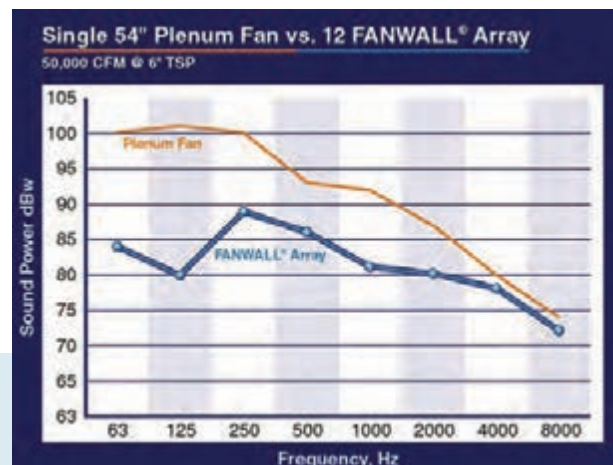
A typical FANWALL section is only 48 to 66 inches in length compared to 120 to 150 inches for a conventional single fan. Overall air handler length can be reduced by 30 to 70 percent using a FANWALL system, providing added benefits for all stakeholders in the building process:

- Designers benefit from an easier fit for space limitations.
- Architects can devote less space to mechanical equipment rooms.
- Owners can have more leasable space to generate revenue.
- Contractors have smaller sections/components to handle and install. For retrofit applications, individual cubes can be navigated through standard 3-foot doors and easily assembled on site.

FANWALL systems have been designed to produce significantly lower sound—often 16 to 18 dB less in lower octave bands—than single fan alternatives. This can eliminate the need for sound attenuators and their associated static pressure penalty.

Quiet Operation and Low Vibration

FANWALL systems have been designed to produce significantly lower vibration and sound—often 16 to 18 dB less in lower octave bands—than single fan alternatives. Careful attention to balance in the design and construction of individual low mass fan wheels can eliminate the need for costly concrete inertia bases and spring isolation systems, helping to reduce construction costs and simplify retrofit projects. The smaller direct drive fans and motors, and the patented Coplanar Silencer® that cancels fan and motor noise, provide for quiet operation. In most cases, this eliminates the need for sound attenuators and their associated static pressure penalty.

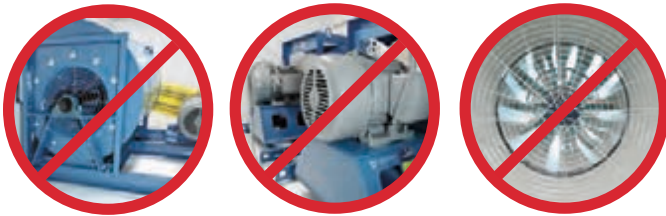


FANWALL TECHNOLOGY®—Advantages

Creating a uniform piston of air to enhance heat transfer and filter loading is one of several ways that FANWALL systems minimize system effect and optimize air handler performance.



= N + 1



FANWALL systems provide redundancy versus conventional fans and allow designers to achieve true N+1 redundancy without the added motor and electrical service cost, and energy penalty resulting from oversizing motors to achieve the same result.

Lower Maintenance Costs

FANWALL systems use direct drive fans with no belts, sheaves, or bearings that require routine maintenance or replacement, and permanently lubricated motors. With the exception of occasional cleaning, there is no required maintenance versus a conventional single fan system. This alone can add up to significant savings over the life cycle of the system.

Components in a FANWALL system are typically significantly smaller, more lightweight and easier to access than the same components for conventional fan systems. For example, a 5 hp motor typically weighs about 150 pounds versus more than 550 pounds for a 40 hp motor. Repair or replacement of components typically does not require mechanical lifts.



FANWALL systems require no belt, sheave or bearing maintenance. Components can typically be removed and replaced by one or two maintenance personnel without requiring mechanical lifts.

Optimize Performance and Efficiency

FANWALL® systems optimize air handler performance in four ways when compared with conventional fan systems:

- Create a uniform piston of air by using multiple sources of airflow proportionally targeted at each section of the coil to enhance heat transfer and promote more even filter loading.
- Eliminate belts, sheaves, and bearings that require routine maintenance and will degrade performance over time.
- Can eliminate the need for sound attenuators and other ancillary components that create a static pressure penalty within the air handler.
- System optimization controls allow on/off control of individual fan cubes to closely match requirements in variable airflow applications with the optimum number of fans and motors operating at peak efficiency.

These factors create a high efficiency system that, along with all other benefits, make FANWALL systems an ideal choice for new or retrofit applications.

Redundancy

Protecting critical assets and minimizing downtime exposure for revenue generating processes is a primary benefit of FANWALL systems. With conventional single fan and motor systems, a failure of either component shuts down the entire air handler system. This creates a critical path failure that requires immediate, costly action to restore function and minimize revenue and profit losses. When a fan or motor failure occurs in a FANWALL system, the remaining operating fans can compensate to maintain airflow and static pressure until such time that the failed component(s) can be repaired or replaced.

In addition to “peace of mind”, owners can benefit from the reliability of FANWALL systems in other ways:

- Can eliminate the necessity and cost of having a standby unit to provide comparable redundancy.
- Where true N+1 redundancy is desired, the configurability of a FANWALL system—including the tremendous number of fan and motor sizes and combinations—allows designers to achieve it at the lowest connected load. This avoids the added motor and electrical service costs, and the energy penalty resulting from oversizing motors to achieve the same result.

FANWALL TECHNOLOGY®—Ideal for Retrofits

A FANWALL system can be the most cost effective solution for upgrading an end-of-life air handler. The resulting energy savings can be 40% or more.



FANWALL® Retrofits—A Fast Track to Energy Savings

Using a FANWALL system to replace older, end of life fans in existing air handlers can be the most cost effective solution for avoiding the cost and business disruption of an air handler failure. The resulting energy savings can be 40% or more.

Retrofits using a FANWALL system have occurred in applications ranging from offices, education and hospitality facilities, to facilities with critical requirements such as hospitals, data centers and pharmaceutical manufacturing.

In many cases, access limitations are a barrier to a fan or air handler replacement because it cannot be accomplished without the time and expense of a major tear-out and reconstruction project. A FANWALL system can minimize these barriers:

- Many times an air handler cabinet retains its integrity well beyond fans, coils and other components, allowing it to be retained with a new FANWALL system.
- The modular design of a FANWALL system allows individual cubes to be navigated through a standard 3-foot door and assembled inside the existing air handler cabinet.
- There is no need to have a crane on site as is often the case with larger, more conventional fans.

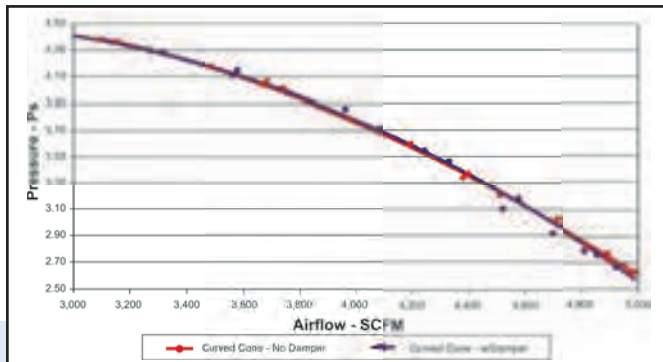
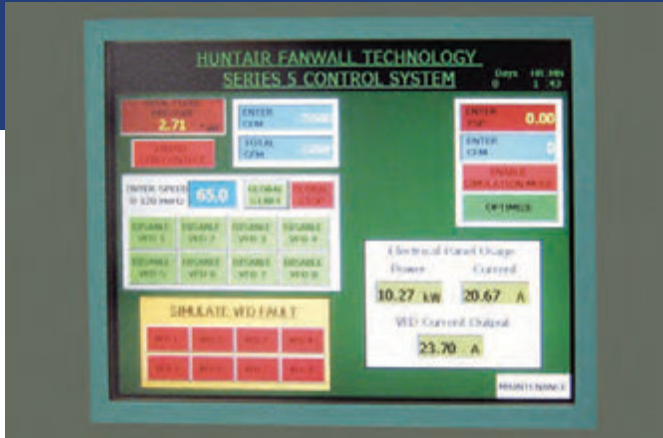
- The performance of this new system can be upgraded to better match actual capacity and airflow requirements.
- Ancillary components such as sound attenuators and air blenders that created static pressure penalties in the old system can be removed.
- Design flaws and other maintenance concerns, such as component access issues and corrosion can also be addressed, essentially resulting in a new, more efficient air handler in an old skin.
- **All of this often can occur over a weekend or during unoccupied time frames to minimize downtime or disruption to normal business.**

Sutter-Roseville Hospital, Roseville, CA replaced a single 139,000 cfm vaneaxial fan serving one wing of the hospital that included 170 patient rooms. The new FANWALL system provides the added peace of mind of redundancy in addition to 43% energy savings.



Unique Innovations

System Optimization Controls enhance the ability to provide individual on/off control to maintain peak efficiency and static pressure over the operating range of an air handler.



Airflow With and Without FBD Backdraft Damper

The new FBD backdraft damper optimizes fan on/off controls by preventing backflow in idled cubes while imposing near zero system effect and low leakage when compared to conventional damper devices.

An important differentiator between FANWALL® systems and other fan array systems available today is the ability to provide on/off control of fans to maintain peak energy efficiency and static pressure over the airflow range of an air handler. This capability is enhanced with three offerings available with FANWALL systems.

System Optimization Controls

System Optimization Controls for FANWALL systems optimize the ability to automatically reconfigure the number of active fans while controlling the speed of enabled fans to optimize efficiency over the range of system loading of an air handler. Controls include algorithms, a standalone or BAS interface, an individual VFD for each fan/motor combination and the model FBD backdraft damper with near zero system effect.

The controller provides a means to indicate fan and motor status, operating mode, system flow rate and fan total static pressure, as well as connected and required hp at the current system flow and pressure conditions. This information can be displayed on a standalone interface at the control panel, or remotely through a BAS interface.

A dedicated VFD for each fan and motor combination provides the electrical means for on/off fan and motor speed control. In addition to refining control, the individual VFD's eliminate the need for a bypass VFD and reduce wiring requirements and the overall size of the control panel required for a FANWALL system.

New Near Zero System Effect Backdraft Damper

An integral part of System Optimization Controls for FANWALL systems is the FBD backdraft damper. Disabling a fan or fans in a FANWALL system requires a means to prevent backflow of air through the idled cube. Traditional dampers, while capable of performing this function, were not designed for a fan array application and impose unwanted airflow and static pressure losses (system effect), in addition to adding to acoustic and leakage concerns.

The patent pending FBD backdraft damper has a revolutionary new blade profile that actually improves flow characteristics. In testing, this revolutionary new damper has been shown to impose near zero system effect (see graph) with reduced acoustic impact.

In addition, the FBD backdraft damper has a low leakage rate of only 2 cfm/sq. ft. at one-inch of static pressure. This far exceeds requirements for a 1A class rating for control dampers and is nearly nine times less than the industry standard backdraft damper, which has a reported leakage of 17.5 cfm/sq. ft. at the same static pressure!

Unique Innovations



Matched Motor Horsepower Selections

One of the hallmarks of FANWALL TECHNOLOGY® is the use of smaller motor sizes, typically less than 10 horsepower. This design principle keeps the fan and motor components to a manageable size for service, reduces residual imbalance, reduces system effect and lowers the fan acoustical signature. Incremental horsepower motors support this design principle by allowing expanded motor selections within a given horsepower range versus what is traditionally available from motor manufacturers (see chart).

For example, if the design fan brake horsepower for an application is 5.13 bhp, a designer would traditionally be required to select a nominal 7.5 hp motor for the fan according to the chart shown on the right. While the fan would only consume 5.13 bhp at design, both the motor and the building's electrical system (wiring, VFDs, and electrical components) would be sized for 7.5 hp. As motors get larger, the gap between traditional selections becomes greater, leaving more potential for oversizing.

Expanded horsepower motor selections would allow a designer to select a 5.5 hp motor—much closer to the design fan brake horsepower—and reduce the connected load, wiring and switchgear costs for the building.

Availability of incremental horsepower motors is the same as standard motor selections because they are a standard product for motor manufacturers. They are NEMA motors that have been re-rated, nameplated and fully warranted based on their use in a FANWALL® cube.

Incremental motor selections available with a FANWALL system allow designers to more closely match brake horsepower requirements and can reduce electrical and switchgear costs.

Motor Frame Size	Typical Motor Horsepower Selections	Expanded Motor Horsepower Selections
143T	1.0	1.0
145T	1.5	1.5
		2.0
		2.5
182T	3.0	3.3
		3.5
		4.0
		4.5
184T	5.0	5.0
		5.5
		6.0
		6.5
		7.0
213T	7.5	7.5
		8.0
		8.5
		9.0
		9.5
215T	10.0	10.0
		10.5
		11.0
		11.5
		12.0
254T	15.0	15.0

What makes this possible is the unique airflow pattern in a FANWALL cube, and the Coplanar Silencer® that encases that airflow while providing acoustic benefits. These serve to force more air over the motor fins for cooling, which is important to improving the capacity of a motor. In regular open plenum fan type arrangements, airflow is not directed over a standard motor—so the added efficiency is not realized.

Customer Solutions

The use of FANWALL systems has expanded to include virtually any facility desiring redundancy to avoid a critical system failure and to upgrade existing systems with access barriers.



Columbia Hospital—West Palm Beach, FL



Rice University, Lovett Hall—Houston, TX



Pacific Garden Mission—Chicago, IL

FANWALL® systems are the most widely installed and successful fan array solution available today. The list of applications served by FANWALL systems continues to grow to include virtually any facility desiring redundancy to avoid a critical system failure and to upgrade existing systems with access barriers that would otherwise require a costly, time-consuming tear-out and rebuild process. Applications include:

- Hospitals and healthcare
- High tech and manufacturing
- Education
- Lab and research
- Public
- Recreation and hospitality
- Food processing
- Utilities
- Religious
- Retail
- Residential facilities



The Joint and The Hard Rock Cafe—Las Vegas, NV

FANWALL TECHNOLOGY®—Available Only From Nortek Air Solutions



Custom Air Handler Systems



Packaged DX and Penthouse Systems



Energy and Heat Recovery Ventilators



Air Handler Replacements



Fan and Coil Replacements



Water Source Heat Pumps



Data Center and Server Room Systems



Cleanroom Systems

Contact your local Nortek Air Solutions representative for more information about getting the FANWALL® advantage for your next new construction or retrofit project. To locate your Representative, visit www.nortekair.com.

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