HOLDEN & ASSOCIATES

STOCK CATALOG

AUGUSTA • MACON • NORCROSS • SAVANNAH

WHO WE ARE

Our History

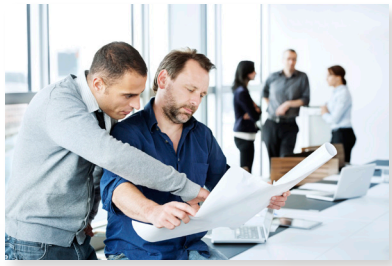
In 1952, George Holden founded Holden and Associates Inc. in Atlanta, GA as a provider of heating, ventilation and air distribution equipment. Holden & Associates was acquired in 1999 by Mingledorff's Inc., a leading distributor of HVAC equipment in the Southeast. This collaboration resulted in a company that has a wealth of knowledge and experience. We are committed to providing our customers systems and service that support the vision and technical requirements of the building owner.

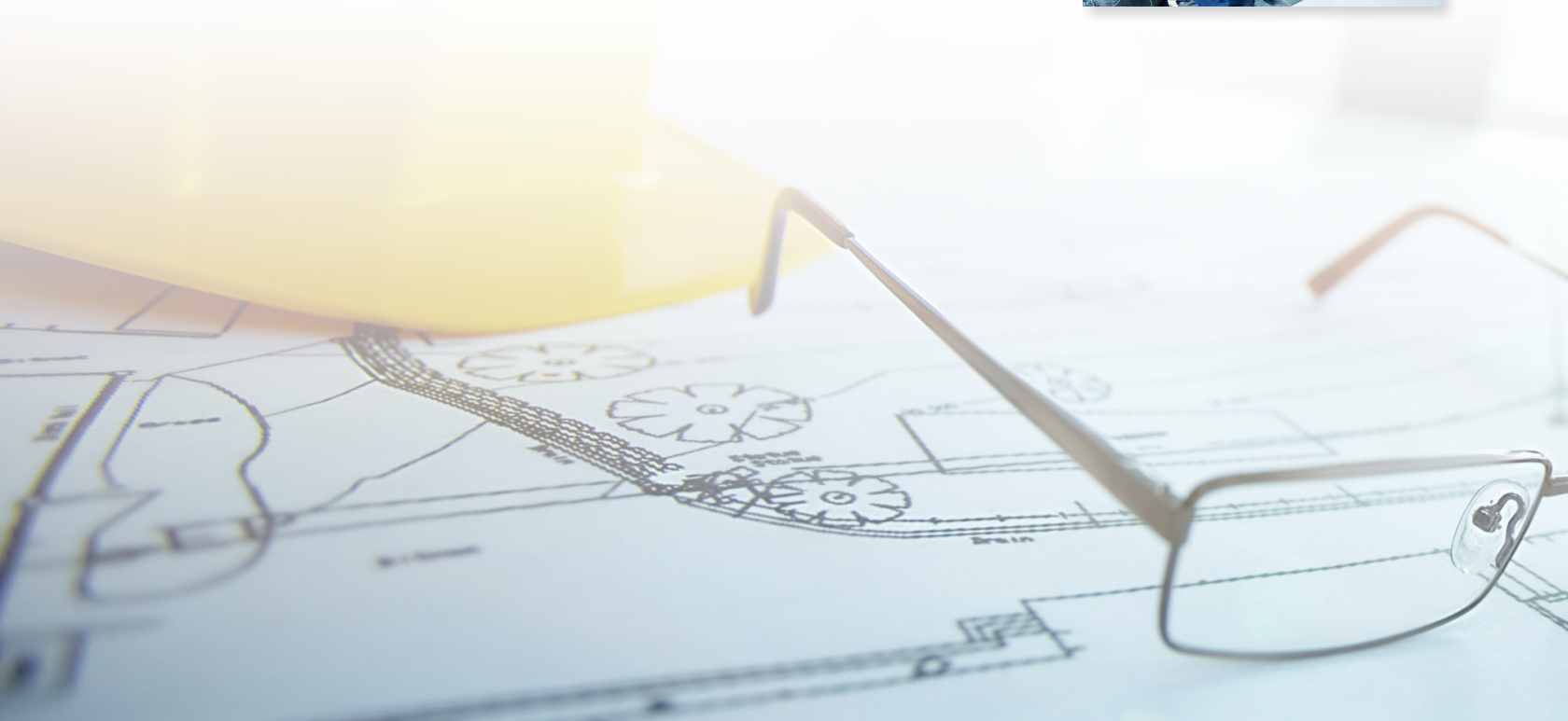
Who We Are

Recognizing that providing green, energy efficient products for offices, schools, industrial and institutional facilities is a growing trend. We support the Leadership in Energy & Environmental Design (LEED) initiative. LEED is a green building tool that addresses the entire building life-cycle from design through construction, maintenance and operation. Our staff of LEED Accredited professionals welcome the opportunity to work with owners, architects, engineers and contractors in choosing the most energy efficiency equipment by quality manufacturers. Our product lines represent the finest manufacturers in the industry including various types of Titus air distribution products, Greenheck ventilation and air control products and electric heat products.

Expertise

We know that information, equipment and supplies are needed quickly and efficiently. The staff at Holden & Associates has the expertise and the air handling products you need, when you need it. Please contact us with any questions or information requests. We look forward to working with you on your existing or future projects.





Exclusive Partners

GREENHECK
Building Value in Air.

Titus
Redefine your comfort zone.™

FRANKLIN
CONTROL SYSTEMS

MacroAir
engineers of air™

ACCUTROL
LLC

Hamlin
sheet metal

prihoda
Tailor-made Air Ducting&Diffusers

SEMCO
A FläktGroup Brand

ACCUREX
ENGINEERED RESTAURANT SYSTEMS

NATIONAL SYSTEMS
OF GARAGE VENTILATION

Ventaire
www.ventaire.com

neptronic

PRECISION AIR
PRODUCTS CO.

VIBRO-ACOUSTICS
A Swegon Group company

QMARK
A Division of Marley Engineered Products

Redd-i

Manufacturer	Description
Accurex	Engineered Restaurant Systems
Accutrol	Airflow Solutions for Critical Environments
Acme Engineering	Gas Detection Monitors: CO, CO^2, NO^2, Ammonia, VOC
ADP	Gas Fired Unit Heaters
Aero / Dyne Co.	Airfoil Air Duct Turning Vanes
Air Maid by Interzon	Advanced Ozone Generators for Industrial and Professional Use
AJ Manufacturing	Door Grilles, Stainless Steel Air Distribution
American Warming and Ventilating	Dampers And Louvers
ATCO (Flex Air Division)	Flexible Duct
Broan	Bathroom Exhaust Fans
Carroll Manufacturing	Commercial Kitchen Exhaust Air Purification Systems
Commercial Acoustics	Sound Attenuators & Acoustical Fan Enclosures
Crown Products	Duct Take Off Fittings & Sheet Metal Accessories
Curbs Plus	Roof Curbs
DuroDyne	Sheet Metal Accessories
Flexmaster	Flexible Duct and Sheet Metal Accessories
Franklin Controls	Leading manufacturer of motor controls for HVAC, pump and industrial markets
Greenheck	Commercial Kitchen Hood Systems (UL Listed & Classified), Dampers & Louvers, Energy Recovery Units Ventilation Fans, Laboratory Fume Exhaust Fan Systems, Gas Fired And Electric Make-Up Air Units
Hamlin Sheet Metal	Spiral And Oval Duct; Single And Double Wall Construction
Kee's	Specialty Air Distribution Products
Mars	Air Doors; Fly Fans
MacroAir	High Volume, Low Speed Fans
National Garage	Garage & Fume Ventilation Systems
Neptronic	Commercial/Industrial Humidification Systems & Electric Duct Heaters
Panasonic	Ceiling and Cabinet Exhaust Fans
Precision Air Products	Ceiling Ventilation Systems for Operating Rooms
Prihoda	Fabric Duct Systems
Q'mark	Electric Heat
Semco	Duct and Acoustical Products
Space Ray	Infrared Gas Heat
Thermaduct	Pr-engineered duct systems incorporating duct, insulation and cladding
Titus HVAC	Air Distribution, Security Grilles, Hospital Operating Room Systems, VAV And Fan Powered Terminal Units; Fan Coil Units, Underfloor Ventilation, Displacement Ventilation Systems & Chilled Beams
Tri-Dim	Air Filtration
Vent Products Inc.	Louvers, Dampers & Penthouses
Ventaire	Vehicle Exhaust Removal and Fume Extraction Systems
Vibro Acoustics	Noise Control Solutions
Vulcan	Electric, Steam & Hot Water Heating Equipment
Ward Industries	Access Doors For Round Duct
Zoo Fans	De-stratification & Parking Garage Ventilation

Welcome!

This catalog represents the products we currently keep in stock and have readily available. If you don't see what you're looking for, please contact your Holden & Associates rep or visit us online at www.holdenassoc.com. We're here to help you find the perfect solutions for all of your projects and look forward to hearing from you soon. From all of us at Holden & Associates, thank you for your business.

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MODEL AD

Access Doors for Round Duct

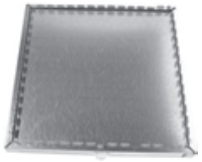
GALVANIZED, INSULATED DOOR, SANDWICH STYLE

Size					
6"	8"	10"	12"	14"	16"

MODEL M

Access Doors for Drywall (exposed flange)

HINGED ACCESS, SCREWDRIVER CAM LATCH



Size		
8" × 8"	10" × 10"	12" × 12"
16" × 16"	18" × 18"	24" × 24"

MODEL CAD

Access Doors for Rectangular/Square Duct

GALVANIZED, INSULATED DOOR, CAM LOCKS

Size		
6" × 6"	8" × 8"	10" × 10"
12" × 12"	14" × 14"	16" × 16"
18" × 18"	20" × 20"	24" × 24"

MODEL F2

Greased Duct Access Doors

GALVANIZED, SANDWHICH STYLE, UP TO 2,300°F

Size		
8" × 4"	12" × 8"	16" × 12"

MODEL DW

Access Doors for Drywall (mud flange)

HINGED ACCESS, SCREWDRIVER CAM LATCH

Size		
12" × 12"	18" × 18"	24" × 24"

MODEL TMS & TMS-IB (insulated back)

Steel Square Cone Diffusers

LAY-IN (FRAME 3), 3 CONE DIFFUSER, WHITE FINISH

Neck	Face
6", 8"	12" × 12"
6", 8", 10", 12", 14", 15"	24" × 24"

MODEL TMSA

Steel Square Cone Adjustable Diffusers

LAY-IN (FRAME 3), 3 CONE DIFFUSER, WHITE FINISH

Neck	Face
6", 8"	12" × 12"
6", 8", 10", 12", 14", 15"	24" × 24"

MODEL TMS-AA

Aluminum Square Cone Diffusers

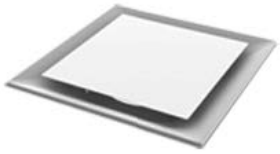
LAY-IN (FRAME 3), 3 CONE DIFFUSER, WHITE FINISH

Neck	Face
6", 8", 10", 12", 14"	24" × 24"

MODEL OMNI

Steel Plaque Diffusers

LAY-IN (FRAME 3), FLAT PLAQUE DIFFUSER, WHITE FINISH

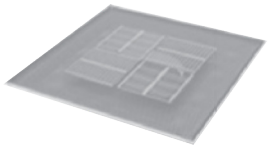


Neck	Face
6", 8"	12" × 12"
6", 8", 10", 12", 14", 15"	24" × 24"

MODEL PAS

Steel Perforated Diffusers – Defectors On Face

LAY-IN (FRAME 3), WHITE FINISH

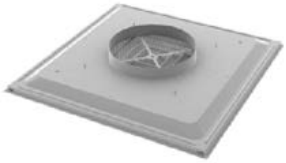


Neck	Face
6"	12" × 12"
6", 8", 10", 12", 14"	24" × 24"

MODEL PSS

Steel Perforated Diffusers – Deflectors in Neck

LAY-IN (FRAME 3), WHITE FINISH



Neck	Face
6"	12" × 12"
6", 8", 10", 12", 14"	24" × 24"

MODEL TMQ

Steel Square Cone Diffusers

LAY-IN (FRAME 3), 4 CONE DIFFUSER, WHITE FINISH

Neck	Face
6", 8", 10", 12", 14"	24" × 24"

MODEL TMR

Steel Round Cone Diffusers

SURFACE MOUNT (FRAME 1), 3 CONE DIFFUSER, WHITE FINISH

Neck	Face
6", 8", 10", 12", 14"	Varies

Our Legacy

A HISTORY OF INNOVATION AND CREATING COMFORTABLE SPACES

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.

Titus
Redefine your comfort zone.™

Redefine your comfort zone. ™ | www.titus-hvac.com

MODEL TDC

Steel Mitered Louvered Diffuser

LAY-IN (FRAME 3), LOUVERED FACE, WHITE FINISH

Neck	Face
8" / 9 "x 9"	12" × 12"
6" / 6" × 6"	24" × 24"
8" / 9" × 9"	24" × 24"
10" / 12" × 12"	24" × 24"
12" / 12" × 12"	24" × 24"
14" / 15" × 15"	24" × 24"
18" × 18" *	24" × 24"

*SQ TO ROUND ADAPTERS AVAILABLE

MODEL TDC-AA

Aluminum Mitered Louvered Diffuser

LAY-IN (FRAME 3), LOUVERED FACE, WHITE FINISH

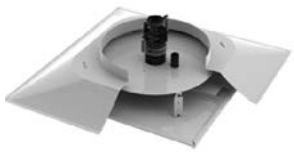
Neck	Face
6" / 6" × 6"	24" × 24"
8" / 9" × 9"	24" × 24"
10" / 12" × 12"	24" × 24"
12" / 12" × 12"	24" × 24"
14" / 15" × 15"	24" × 24"
18" × 18" *	24" × 24"

*SQ TO ROUND ADAPTERS AVAILABLE

MODEL T3SQ

Steel Plaque Thermal Diffusers

LAY-IN (FRAME 3), FLAT PLAQUE HEAT/COOL CHANGEOVER, WHITE FINISH



Neck	Face
6", 8", 10", 12"	24" × 24"

MODEL TDC

Steel Mitered Louvered Diffuser

SURFACE MOUNT (FRAME 6), LOUVERED FACE, WHITE FINISH

Neck	Face
6" × 6" *	11" × 11"
9" × 9" *	14" × 14"
12" × 12" *	17" × 17"
15" × 15" *	20" × 20"
18" × 18" *	23" × 23"

*SQ TO ROUND ADAPTERS AVAILABLE

MODEL TBDI-80

Steel T-bar Slot Diffuser

LAY-IN, 1 OR 2 SLOTS, INSULATED, WHITE CENTER TEE WITH BLACK EDGES

Neck	Description
8"	24" Long – 1 Slot @ 1"
8"	24" Long – 2 Slots @ 1"
8", 10"	48" Long – 2 Slots @ 1"
6", 8"	24" Long – 1 Slot @ 1-½"
8"	24" Long – 2 Slots @ 1-½"
6", 8", 10", 12"	48" Long – 1 Slot @ 1-½"
6", 8", 10", 12"	48" Long – 2 Slots @ 1-½"

MODEL ML

Aluminum Linear Slot

SURFACE MOUNT (FRAME 2A), WHITE FINISH WITH BLACK PATTERN CONTROLLERS

Length	Description
24"	1 Slot @ 1"
48"	1 Slot @ 1"
24"	2 Slots @ 1"
48"	2 Slots @ 1"

MODEL MPI

Steel Insulated Plenums for ML Slot

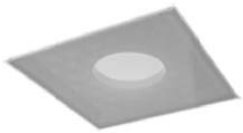
SURFACE MOUNT (FRAME 2A), HEMMED EDGE, INSULATED

Neck	Description
6"	24" Long – 1 Slot @ 1"
8"	48" Long – 1 Slot @ 1"
8"	24" Long – 2 Slots @ 1"
8", 10"	48" Long – 2 Slots @ 1"

MODEL PAR

Steel Perforated Returns

LAY-IN (FRAME 3), ROUND NECK, WHITE FINISH

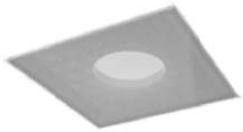


Neck	Face
6"	12" × 12"
6", 8", 10", 12", 14", 16"	24" × 24"

MODEL PAR

Steel Perforated Returns

LAY-IN (FRAME 3), SQUARE NECK, WHITE FINISH

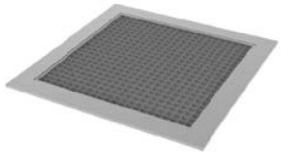


Neck	Face
10" × 10"	12" × 12"
22" × 10"	24" × 12"
22" × 22"	24" × 24"

MODEL 50F

Aluminum Eggcrate Returns

SURFACE MOUNT (FRAME 1), FLANGE FRAME WITH SCREWHOLES, ½" × ½"x ½" CORE, WHITE FINISH



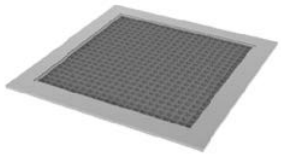
Neck	Face
6" × 6"	8" × 8" *
8" × 8"	10" × 10" *
10" × 10"	12" × 12" *
12" × 12"	14" × 14" *
14" × 14"	16" × 16" *
16" × 16"	18" × 18" *
18" × 18"	20" × 20" *
22" × 10"	24" × 12" *
24" × 12"	26" × 14" *
24" × 24"	26" × 26" *

*ACTUAL FACE SIZE IS ¼" LESS

MODEL 50F

Aluminum Eggcrate Returns

LAY-IN (FRAME 3), FLANGE FRAME, ½" × ½"x ½" CORE, WHITE FINISH

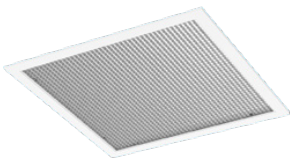


Neck	Face
10" × 10"	12" × 12"
22" × 10"	24" × 12"
22" × 22"	24" × 24"
46" × 22"	48" × 24"

MODEL 45F

Aluminum Eggcrate Sightproof Returns

LAY-IN (FRAME 3), FLANGE FRAME, ½" × ½"x ½" CORE, 45° CORE, WHITE FINISH

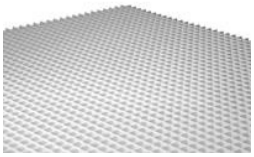


Neck	Face
22" × 10"	24" × 12"
22" × 22"	24" × 24"

MODEL ALC

Aluminum Eggcrate Core Only

LAY-IN, CORE ONLY, ½" × ½"x ½" CORE, WHITE FINISH

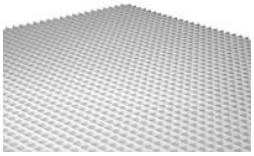


Neck	Face
N/A	24" × 12"
N/A	24" × 24"
N/A	48" × 24"

MODEL EC

Plastic Eggcrate Core Only

LAY-IN, CORE ONLY, ½" × ½"x ½" CORE, WHITE FINISH



Neck	Face
N/A	24" × 12"
N/A	24" × 24"
N/A	48" × 24"

MODEL 50FF

Aluminum Eggcrate Filter Grille

LAY-IN (FRAME 3), FLANGE FRAME, ½" × ½"x ½" CORE, WHITE FINISH

Neck	Face
20" × 20"	24" × 24"

MODEL 350RL

Steel Louvered Return Grilles

SURFACE MOUNT (FRAME 1), FLANGE FRAME, WITH SCREW-HOLES, 35°, WHITE FINISH

Neck	Face
6" × 6"	8" × 8" *
8" × 4"	10" × 6" *
8" × 6"	10" × 8" *
8" × 8"	10" × 10" *
10" × 6"	12" × 8" *
10" × 8"	12" × 10" *
10" × 10"	12" × 12" *
12" × 6"	14" × 8" *
12" × 8"	14" × 10" *
12" × 10"	14 " × 12" *
12" × 12"	14" × 14" *
14" × 6"	16" × 8" *
14" × 8"	16" × 10" *
14" × 10"	16" × 12" *
14" × 12"	16" × 14" *
14" × 14"	16" × 16" *
16" × 6"	18" × 8" *
16" × 8"	18" × 10" *
16" × 12"	18" × 14" *
16" × 16"	18" × 18" *
18" × 6"	20" × 8" *
18" × 8"	20" × 10" *
18" × 12"	20" × 14" *
18" × 18"	20" × 20" *
20" × 20"	22" × 22" *
22" × 10"	24" × 12" *
22" × 22"	24" × 24" *
24" × 6"	26" × 8" *
24" × 8"	26" × 10" *
24" × 12"	26" × 14" *
24" × 18"	26" × 20" *
24" × 24"	26" × 26" *
30" × 12"	32" × 14" *

Continued on next page

MODEL 350RL (cont.)

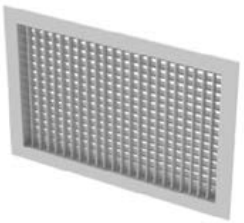
Neck	Face
36" × 12"	38" ×14" *
36" × 18"	38" × 20" *
36" × 24"	38" × 26" *
48" × 24"	50" × 26" *

*ACTUAL FACE SIZE IS ¼" LESS

MODEL 300RS

Steel Double Deflection Supply Registers

SURFACE MOUNT (FRAME 1), FLANGE FRAME, WITH SCREWHOLES, OBD, WHITE FINISH



Neck	Face
6" × 6"	8" × 8" *
8" × 4"	10" × 6" *
8" × 6"	10" × 8" *
8" × 8"	10" × 10" *
10" × 4"	12" × 6" *
10" × 6"	12" × 8" *
10" × 8"	12" × 10" *
10" × 10"	12" × 12" *
12" × 4"	14" × 8" *
12" × 6"	14" × 8" *
12" × 8"	14" × 10" *
12" × 10"	14 " × 12" *
12" × 12"	14" × 14" *
14" × 4"	16" × 6" *
14" × 6"	16" × 8" *
14" × 8"	16" × 10" *
14" × 10"	16" × 12" *
14" × 12"	16" × 14" *
14" × 14"	16" × 16" *
16" × 6"	18" × 8" *
16" × 8"	18" × 10" *
16" × 10"	18" × 12" *
16" × 12"	18" × 14" *
16" × 16"	18" × 18" *
18" × 6"	20" × 8" *
18" × 8"	20" × 10" *

MODEL 300RS (cont.)

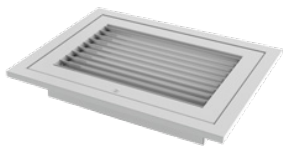
Neck	Face
18" × 10"	20" × 12" *
18" × 12"	20" × 14" *
20" × 6"	22" × 8" *
20" × 8"	22" × 10" *
20" × 10"	22" × 12" *
24" × 6"	26" × 8" *
24" × 8"	26" × 10" *
24" × 10"	26" × 12" *
24" × 12"	26" × 14" *

*ACTUAL FACE SIZE IS ¼" LESS

MODEL 350RLF1

Steel Louvered Filter Return Grille

LAY-IN (FRAME 3), FLANGE FRAME, 35°, WHITE FINISH



Neck	Face
20" × 20"	24" × 24"

MODEL T-700L

Steel Door Grilles

SURFACE MOUNT (FRAME 1),AUXILLARY FRAME, V-BLADE SIGHTPROOF, ALUMINUM FINISH

Neck	Face
12" × 12"	14" × 14"
18" × 12"	20" × 14"
18" × 18"	20" × 20"
24" × 12"	26" × 14"
24" × 24"	26" × 26"

MODEL USVH3

Aluminum Spiral Mount Grilles
SURFACE MOUNT (FRAME 1),FLANGE FRAME WITH SCREWHOLES, AIR SCOOP, WHITE FINISH

Neck	Face
10" × 6"	13 ¼" × 7 ¼"
14" × 6"	17 ¼" × 7 ¼"
18" × 6"	21 ¼" × 7 ¼"

MODEL TRM

Plaster Frames for Diffusers
ALUMINIM, WHITE FINISH

Size			
12" × 12"	24" × 12"	24" × 24"	48" × 24"

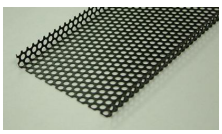
MODEL TBF

Plaster Frames for T-bar Slots
ALUMINUM, WHITE FINISH

Size	
24"	(1) 1" or 1 ½" Slot
	(2) 1" or 1 ½" Slot
48"	(1) 1" or 1 ½" Slot
	(2) 1" or 1 ½" Slot

MODEL PERF

Black Perforated Metal



Size
4' × 4" Wide – 1 Side Flange Up
4' × 5" Wide – 1 Side Flange Up

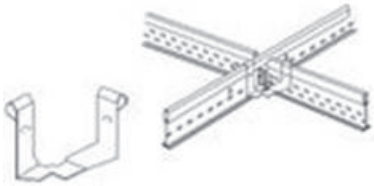
MODEL INSULATED BLANKET

Insulated Back for Lay-in Diffusers

Size
24" × 24"

MODEL LFC

Light Clips for 9⁄16" Flat Tee Ceilings



MODEL SB

Sectorizing Baffle
90° SECTION FOR DIFFUSER NECK

Size					
6"	8"	10"	12"	14"	15"

TOUCH UP PAINT

Plaster Frames for T-bar Slots
ALUMINUM, WHITE FINISH

Color		
White #26	Silver #01	Black #84

MODEL STR

Steel Square to Rounds
UNINSULATED, BLACK INTERIOR

Size	Collar
6" × 6"	4", 6"
8" × 8"	6", 8"
9" × 9"	6", 8"
10" × 10"	6", 8", 10", blank pan
12" × 12"	6", 8", 10", 12"
14" × 14"	8", 10", 12", 14"
15" × 15"	12", 14"
16" × 16"	12", 14", 16"
18" × 18"	6", 8", 10", 12", 14", 16", 18"
20" × 20"	6", 8", 10", 12", 14", 16", 18", 20", blank pan
22" × 10"	6", 8", 10"
22" × 22"	6", 8", 10", 12", 14", 16", 18", 20", blank pan

MODEL FB

Fiberglass Boxes

Size
24" × 12"
24" × 24"

MODEL D-75

Radial Opposed Blade Damper
THREE SETS OF GANG OPERATED BLADES

Size			
6"	8"	10"	12"

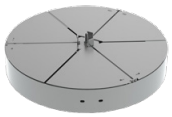
MODEL AG-85

Radial Opposed Blade Damper
BUTTERFLY OPERATED BLADES

Size
15"

MODEL AG-75

Radial Opposed Blade Damper
FOUR SETS OF GANG OPERATED BLADES



Size
16"

MODEL D-100

Sliding Blade Damper
GANG OPERATED FLAT DAMPER (BOW-TIE)

Size				
6"	8"	10"	12"	14"

MODEL AG-15-K

Opposed Blade Dampers
STEEL, OBDS FOR GRILLES, BLACK FINISH

Size				
6" × 6"	8" × 8"	10" × 10"	12" × 12"	14" × 14"
16" × 16"	18" × 18"	20" × 20"	22" × 22"	24" × 24"

MODEL BD

Gravity Dampers

VERTICAL MOUNT
HORIZONTAL AIRFLOW

Size
12" × 12"
18" × 18"
24" × 24"

HORIZONTAL MOUNT
VERTICAL AIRFLOW

Size	
8" × 8"	10" × 10"
12" × 12"	12" × 12"
16" × 16"	18" × 18"
24" × 24"	

MODEL CRD

Ceiling Radiation Dampers

Sizes
6", 8", 10", 12", 14"
24" × 24" insulated blanket

REMOTE CABLE DAMPERS

Options
Loose cable kit for ¼" or ⅜" shaft
Assembled damper w/10ft cable 6",8",10",12"

MODEL FD-150X12

Fire Dampers with 12" Sleeves & Angles

STATIC RATED, CR TYPE, ROUND, HORIZONTAL OR VERTICAL MOUNT

Sizes						
6"	8"	10"	12"	14"	16"	18"

STATIC RATED, A TYPE, HORIZONTAL OR VERTICAL MOUNT

Sizes			
12" × 12"	24" × 12"	24" × 24"	36" × 12"

STATIC RATED, B TYPE, HORIZONTAL OR VERTICAL MOUNT

Sizes				
6" × 6"	8" × 6"	8" × 8"	10" × 8"	10" × 10"
12" × 8"	12" × 10"	12" × 12"	14" × 8"	14" × 10"
14" × 12"	14" × 14"	16" × 10"	16" × 12"	16" × 16"
18" × 12"	18" × 14"	18" × 18"		

REPLACEMENT FIRE DAMPER LINKS

Options	
165°F	212°F

MOTORIZED DAMPER

Round Motorized Damper

24V OR 120V WITH END SWITCH

Size				
6"	8"	10"	12"	14"

Sustainable Airflow for Critical Environments
Distinctly Innovative, Safe, Low Energy

Evolution of Airflow Control Technology

ACCUTROL LLC

www.accutrolllc.com

MODEL 101

Snap Lock Pipe
GALVANIZED

30 GAUGE

Size	Length
4"	5'
6"	
7"	
8"	
10"	
12"	
14"	
16"	3'
18"	
20"	

26 GAUGE

Size	Length
4"	5'
6"	
7"	
8"	
10"	
12"	
14"	
16"	3'
18"	
20"	

MODEL 111

Snap Lock Pipe 90° Elbow
GALVANIZED

30 GAUGE

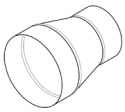
Size
4"
5"
6"
7"
8"
10"

26 GAUGE

Size
4"
5"
6"
7"
8"
10"
12"
14"
16"
18"
20"

MODEL 265

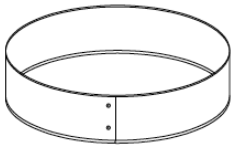
Snap Lock Reducers
GALVANIZED



Size			
6" × 4"	6" × 5"	8" × 6"	8" × 7"
10" × 8"	12" × 10"	14" × 12"	16" × 14"
16" × 15"	18" × 16"	20" × 18"	

MODEL 273

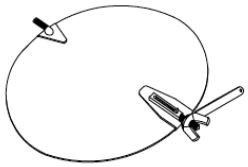
Snap Lock End Caps
GALVANIZED



Size			
4"	5"	6"	7"
8"	10"	12"	14"
16"	18"	20"	

MODEL 275

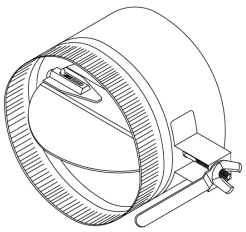
Line Damper
SPIN-IN DAMPER ONLY WITH WING NUT



Size					
6"	8"	10"	12"	14"	16"

MODEL 175-X

Round Damper Sleeve
DAMPER HANDLE AND STANDOFF, GALVANIZED

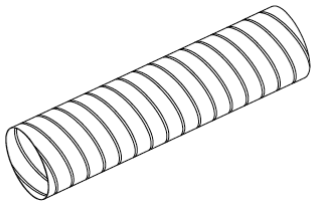


Size
4"
5"
6"
7"
8"
10"
12"
14"
16"
18"
20"

SPIRAL PIPE

Spiral Ductwork

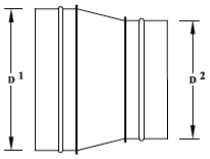
GALVANIZED, 10' SECTIONS



Size			
6"	8"	10"	12"
14"	16"	18"	20"

SPIRAL REDUCER

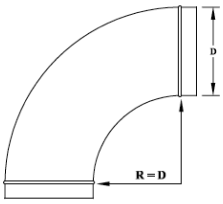
GALVANIZED



Size			
8" × 6"	10" × 6"	10" × 8"	12" × 6"
12" × 8"	12" × 10"	14" × 8"	14" × 10"
14" × 12"	16" × 10"	16" × 12"	16" × 14"
18" × 12"	18" × 14"	18" × 16"	20" × 14"
20" × 16"	20" × 18"		

SPIRAL 90° ELBOW

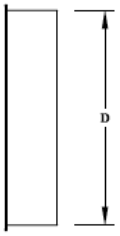
GALVANIZED



Size			
6"	8"	10"	12"
14"	16"	18"	20"

SPIRAL END CAP

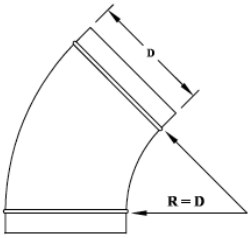
GALVANIZED



Size			
6"	8"	10"	12"
14"	16"	18"	20"

SPIRAL 45° ELBOW

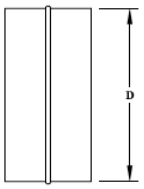
GALVANIZED



Size			
6"	8"	10"	12"
14"	16"	18"	20"

SPIRAL COUPLING

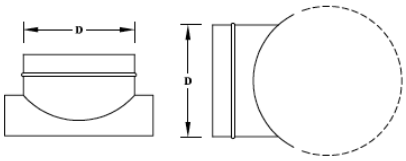
GALVANIZED



Size			
6"	8"	10"	12"
14"	16"	18"	20"

SADDLE TAP

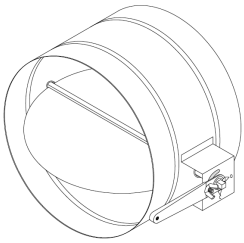
Spiral Saddle Taps
GALVANIZED



Sizes	Spiral Size
6"	8" – 12" pipe
8"	10" – 14" pipe
10"	12" – 18" pipe
12"	14" – 20" pipe
14"	16" – 20" pipe
16"	18" – 20" pipe
18"	20" pipe

SPIRAL DAMPER

GALVANIZED, SLEEVE MOUNTED

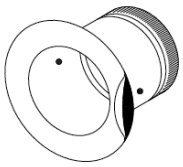


Size			
6"	8"	10"	12"
14"	16"	18"	20"

MODEL 711

Stick-on Takeoff Fittings for Flat Duct

GALVANIZED, ADHESIVE PEEL OFF BACKING, NO DAMPER, NO SCOOP

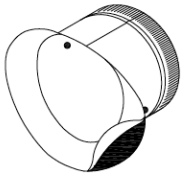


Size									
4"	5"	6"	7"	8"	10"	12"	14"	16"	18"

MODEL 311

Stick-on Takeoff Fittings for Round Duct

GALVANIZED, ADHESIVE PEEL OFF BACKING, NO DAMPER, NO SCOOP

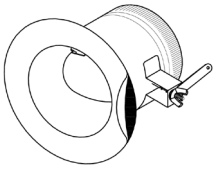


Size									
4"	5"	6"	7"	8"	10"	12"	14"	16"	18"

MODEL 715

Stick-on Takeoff Fittings for Flat Duct

GALVANIZED, ADHESIVE PEEL OFF BACKING, W/DAMPER & STANDOFF

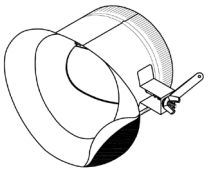


Size									
4"	5"	6"	7"	8"	10"	12"	14"	16"	18"

MODEL 315

Stick-on Takeoff Fittings for Round Duct

GALVANIZED, ADHESIVE PEEL OFF BACKING, W/DAMPER & STANDOFF

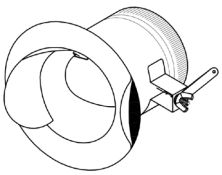


Size									
4"	5"	6"	7"	8"	10"	12"	14"	16"	18"

MODEL 717

Stick-on Takeoff Fittings for Flat Duct

GALVANIZED, ADHESIVE PEEL OFF BACKING, W/SCOOP, DAMPER & STANDC

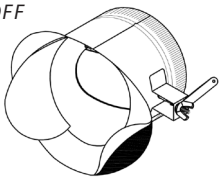


Size									
4"	5"	6"	7"	8"	10"	12"	14"	16"	18"

MODEL 317

Stick-on Takeoff Fittings for Round Duct

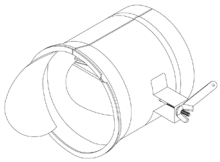
GALVANIZED, ADHESIVE PEEL OFF BACKING, W/SCOOP, DAMPER & STANDOFF



Size									
4"	5"	6"	7"	8"	10"	12"	14"	16"	18"

MODEL 3726

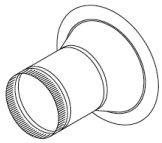
Spin-In Fittings
GALVANIZED, W/SCOOP, DAMPER & STANDOFF



Size							
6"	8"	10"	12"	14"	16"	18"	20"

MODEL 3210

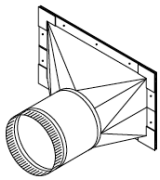
Bellmouth Takeoffs
GALVANIZED, NO DAMPER



Size					
6"	8"	10"	12"	14"	16"

MODEL 3300

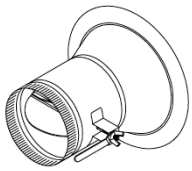
45° Takeoffs
GALVANIZED, NO DAMPER



Size							
6"	8"	10"	12"	14"	16"	18"	20"

MODEL 3210-DS

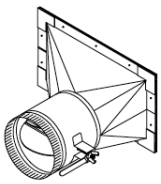
Bellmouth Takeoffs
GALVANIZED, WITH DAMPER & STANDOFF



Size					
6"	8"	10"	12"	14"	16"

MODEL 3300-DS

45° Takeoffs
GALVANIZED, WITH DAMPER & STANDOFF



Size							
6"	8"	10"	12"	14"	16"	18"	20"

MODEL 036

ATCO Flexible Ductwork
SILVER JACKET, DOUBLE LAMINATED POLYESTER CORE, R6 INSULATION

Size			
4"	5"	6"	7"
8"	9"	10"	12"
14"	16"	18"	20"

MODEL 039

ATCO Flexible Ductwork
SILVER JACKET, CPE CORE, R6 INSULATION

Size			
4"	5"	6"	7"
8"	9"	10"	12"
14"	16"	18"	20"

MODEL LS

Quick Release Straps

Sizes			
10"	12"	14"	16"

MODEL 1M

Flexmaster Flexible Ductwork
SILVER JACKET, CPE CORE, R6 INSULATION

Size						
6"	8"	10"	12"	14"	16"	18"

MODEL 018 (8' compressed sections)

ATCO Flexible Ductwork
SILVER JACKET, ALUMINUM CORE, R4.2 INSULATION

Size					
6"	8"	10"	12"	14"	16"

MODEL L-36

Panduit Straps
36" STRAP, 50 PER BAG

MODEL L-48

Panduit Straps
48" STRAP, 50 PER BAG

PANDUIT STRAP TOOL

MODEL FLEXRIGHT

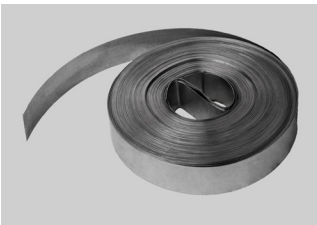
Flexright Elbow for Flexible Ductwork

DYNA-TITE DUCT HANGER

15' Length

DUCT STRAP

1" width



FOIL TAPE

DUCT SEALANT

SCREWS

7 × ½"

10 × ¾

MODEL DTQP

Fan Powered Units with Electric Heat (parallel)

AIRFLOW MONITORING RING, CONTROLS ENCLOSURE, FAN SPEED CONTROLLER, AIRFLOW SWITCH, DOOR INTERLOCK DISCONNECT SWITCH

Sizes				
2006	277/1	3KW - 1 Stage	6" Inlet	14" × 11" Outlet
3008	277/1	3KW - 1 Stage	8" Inlet	14" × 11" Outlet
3008	277/1	6KW - 1 Stage	8" Inlet	14" × 11" Outlet
4010	480/3	9KW - 2 Stage	10" Inlet	14" × 11" Outlet

MODEL DESV

Single Duct Terminal Units

AIRFLOW MONITORING RING, CONTROLS ENCLOSURE, ½" FIBER-FREE LINER

Sizes	
6" Inlet	12" × 8" Outlet
8" Inlet	12" × 10" Outlet
10" Inlet	14" × 12 ½" Outlet
12" Inlet	16" × 15" Outlet
14" Inlet	20" × 17 ½" Outlet
16" Inlet	24" × 18" Outlet

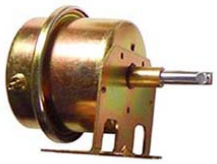
HOT WATER COILS

For Model DESV

Sizes	
6"	1 Row
8"	2 Row
10"	2 Row
12"	2 Row
14"	2 Row
16"	2 Row

PNEUMATIC CONTROLS

For Model DESV



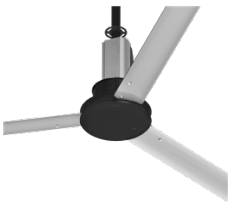
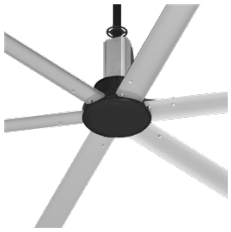
Options
Controller Only
Pneumatic Control Kit (controller, actuator, tubing)

MODEL 3107299

Controls Enclosure Only

HVLS FANS

High Volume Low Speed

Size	Blade Qty	Volt-age	Min Airflow (AMCA Rated)	Max Airflow (AMCA Rated)
12'	6 Blade	277/1	9,100	71,900
16'	6 Blade	480/3	6,700	105000
24'	6 Blade	480/3	38,800	243,000
24'	3 Blade	480/3	5,000	164,900

MODEL SP

Ceiling Cabinet Fans

GRAVITY DAMPER, PLUG DISCONNECT, GRILLE, "A" MODELS INCLUDE INSULATED HOUSING, 115V, SINGLE PHASE

Sizes	
SP-B70	70 CFM @ 0.1 SP
SP-B90	90 CFM @ 0.1 SP
SP-B110	110 CFM @ 0.1 SP
SP-B150	150 CFM @ 0.1 SP
SP-B200	200 CFM @ 0.1 SP
SP-A125	125 CFM @ 0.1 SP
SP-A200	200 CFM @ 0.1 SP
SP-A290	290 CFM @ 0.1 SP
SP-A390	390 CFM @ 0.1 SP
SP-A510	510 CFM @ 0.1 SP
SP-A710	710 CFM @ 0.1 SP
SP-A1050	1,050 CFM @ 0.1 SP

MODEL RDC

Round Transitions for SP Fans

6" OR 8"

SP REPLACEMENT GRILLE

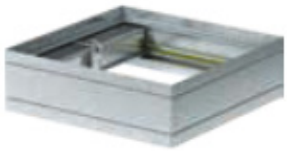
Replacement Grille for SP Fans

B50-B200, A50-A390

MODEL CRD-320

Radiation Damper for SP Fans

B50-B200, A50-A390



MODEL CE-12-DS

Direct Drive Propeller Wall Fan

3-SPEED, GRAVITY DAMPER, JUNCTION BOX, 115V, SINGLE PHASE

Size
560 / 710 / 825 CFM

CONTROLLER

Solid State Speed Controller

5 WATTS OR 10 WATTS

GREENHECK
Building Value in Air.

We don't "value engineer" — we engineer value.

Our innovative engineers continuously explore more cost-effective, value-added product solutions.

Our engineers continuously develop and introduce new product solutions based on the input they receive from more than 175 Greenheck manufacturer representatives around the world who listen carefully to what you need. State-of-the-art computer modeling and extensive prototype testing ensure that our newest products offer more efficient performance and easy, lower-cost installation. Whether it's developing compact, quieter fans with the lowest industry sound levels, the most advanced energy recovery ventilators available, or more effective laboratory exhaust systems, Greenheck engineers always have one goal in mind: deliver value that exceeds your expectations.

We have the world's most comprehensive line of top-quality air movement, control and conditioning products.

No other manufacturer offers you as many options for air movement, control and conditioning as Greenheck. Specifying engineers and contractors can rely on us for products that stand at the forefront of technology and performance. To maintain your trust, we assign a knowledgeable product manager, a talented group of engineers and an experienced customer service team to each of our product areas:

- Roof Mounted Fans & Gravity Ventilators
- Inline, Ceiling & Sidewall Fans
- Utility, Centrifugal & Radial Blowers
- Fume Exhaust Systems
- Laboratory Exhaust Systems
- Energy Recovery Ventilators
- Make-Up Air
- Packaged Rooftop Units
- Indoor Air Handlers & Fan Coils
- Coils
- Duct Heaters
- Dampers
- Louvers

MODEL SQ

Direct Drive Centrifugal, In-line Fans

NEMA-1 DISCONNECT, ODP MOTOR, 115V, SINGLE PHASE

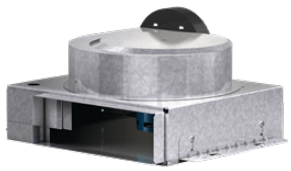
Sizes		HP
SQ-80*	400 CFM @ 0.1 SP	1/12 HP
SQ-90*	670 CFM @ 0.1 SP	1/10 HP
SQ-95*	845 CFM @ 0.1 SP	1/8 HP

**OPTIONAL MODEL BD-330 12 × 12 DAMPER, 6AMP SPEED CONTROLLER*

MODEL CSP

In-line Cabinet Fans

GRAVITY DAMPER, PLUG DISCONNECT, "A" MODELS INCLUDE INSULATED HOUSING, 115V, SINGLE PHASE

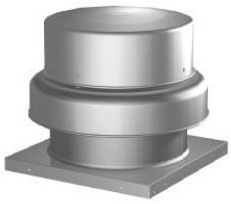


Sizes	
CSP-B110	110 CFM @ 0.1 SP
CSP-B150	150 CFM @ 0.1 SP
CSP-B200	200 CFM @ 0.1 SP
CSP-A110	110 CFM @ 0.1 SP
CSP-A200	200 CFM @ 0.1 SP
CSP-A250	250 CFM @ 0.1 SP
CSP-A290	290 CFM @ 0.1 SP
CSP-A390	390 CFM @ 0.1 SP
CSP-A410	410 CFM @ 0.1 SP
CSP-A510	510 CFM @ 0.1 SP
CSP-A710	710 CFM @ 0.1 SP
CSP-A780	780 CFM @ 0.1 SP
CSP-A1050	1,050 CFM @ 0.1 SP

MODEL GB

Belt Drive Centrifugal Downblast Fans

NEMA-1 DISCONNECT, ODP MOTOR, BIRDSCREEN, 115V, SINGLE PHASE



Sizes		HP	Curb Cap
GB-081*	825 CFM @ 0.1 SP	1/4 HP	19 × 19
GB-091*	1,200 CFM @ 0.1 SP	1/4 HP	19 × 19
GB-101*	1,350 CFM @ 0.1 SP	1/4 HP	19 × 19
GB-121*	1,700 CFM @ 0.1 SP	1/4 HP	19 × 19
GB-141**	2,400 CFM @ 0.1 SP	1/2 HP	22 × 22

**OPTIONAL MODEL BD-100 12 × 12, ** OPTIONAL DAMPER BD-100 16 × 16*

MODEL G

Direct Drive Centrifugal Downblast Fans

NEMA-1 DISCONNECT, ODP MOTOR, BIRDSCREEN, 115V, SINGLE PHASE

Sizes		HP	Curb Cap
G-080*	445 CFM @ 0.1 SP	1/20 HP	17 × 17
G-090*	710 CFM @ 0.1 SP	1/15 HP	17 × 17
G-095*	980 CFM @ 0.1 SP	1/8 HP	17 × 17

**OPTIONAL MODEL BD-100 10 × 10 DAMPER, 6AMP SPEED CONTROLLER*

MODEL CUBE

Belt Drive Centrifugal Upblast Fans (Grease Rated)

NEMA-1 DISCONNECT, ODP MOTOR, UL-762 RATING, 115V, SINGLE PHASE

Sizes		HP	Curb Cap
CUBE-101*	800 CFM @ 0.1 SP	1/4 HP	19 × 19
CUBE-141*	1,300 CFM @ 0.1 SP	1/2 HP	22 × 22
CUBE-181*	2,000 CFM @ 0.1 SP	3/4 HP	30 × 30

**AVAILABLE GREASE TRAP (SHIPPED LOOSE)*

MODEL RBU

Belt Drive Propeller Upblast Fans

BUTTERFLY DAMPERS, ODP MOTOR, 12" HIGH FLAT, 480V, 3 PHASE, GALVANIZED ROOF CURB

Size		HP	Curb Cap
RBU-2L48	36,500 CFM @ 0.1 SP	5HP	58 × 58

MODEL GRS

Roof Gravity Vents

SPUN ALUMINUM, BIRDSCREEN

Size	Curb Cap	Damper Size
8"	19" × 19"	8" × 8"
10"	19" × 19"	10" × 10"
12"	22" × 22"	12" × 12"
16"	26" × 26"	16" × 16"
20"	30" × 30"	18" × 18"
24"	34" × 34"	24" × 24"

**OPTIONAL BDD AVAILABLE*

MODEL ESD-403

Drainable Blade Louvers

EXTRUDED ALUMINUM, BIRDSCREEN, FLANGE FRAME

Sizes
12" × 12"
18" × 18"
24" × 24"

**ACTUAL SIZE IS ¼" LESS*

MODEL BV

Brick Vents

EXTRUDED ALUMINUM, INSECT SCREEN, BOX FRAME, CLEAR ANODIZED FINISH

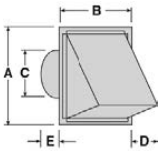
Sizes
8" × 8"
12" × 8"
16" × 8"

**ACTUAL SIZE IS ¼" LESS*

MODEL WC

Round Wall Caps

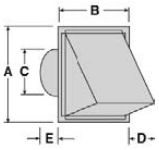
ALUMINUM CONSTRUCTION, BIRDSCREEN, BDD



Sizes			
4"	6"	8"	10"

Rectangular Wall Caps

STEEL CONSTRUCTION WITH BLACK ENAMEL FINISH, BIRDSCREEN, BDD

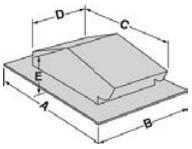


Sizes	
8" × 8"	10" × 3"

MODEL RJ

Roof Jacks

STEEL CONSTRUCTION WITH BLACK ENAMEL FINISH, INTEGRAL FLASHING FLANGE, BIRDSCREEN, BDD

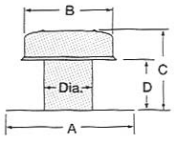


Sizes		
4"	6" × 9"	10" × 10"

MODEL RCC-7

Flange Roof Gravity Cap

STEEL CONSTRUCTION, BIRDSCREEN, FLASHING FLANGE



Curb Cap Size
15" × 15"

MODEL NRC

Roof Curbs

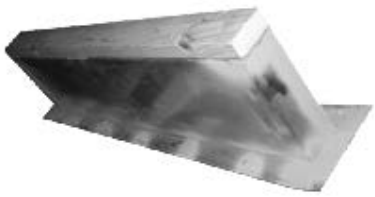
14" HIGH NON-CANTED CURBS, GALVANIZED CONSTRUCTION, 1½" THICK 3LB INSULATION, WOOD NAILER

Size	Actual OD Size
15" × 15"	13.5" × 13.5"
17" × 17"	15.5" × 15.5"
19" × 19"	17.5" × 17.5"
22" × 22"	20.5" × 20.5"
24" × 24"	22.5" × 22.5"
26" × 26"	24.5" × 24.5"
30" × 30"	28.5" × 28.5"
34" × 34"	32.5" × 32.5"
40" × 40"	38.5" × 38.5"
46" × 46"	44.5" × 44.5"
58" × 58"	56.5" × 56.5"

MODEL ES

Equipment Rails

14" HIGH NON-CANTED RAIL, GALVANIZED CONSTRUCTION, 1½" THICK 3LB INSULATION, WOOD NAILER

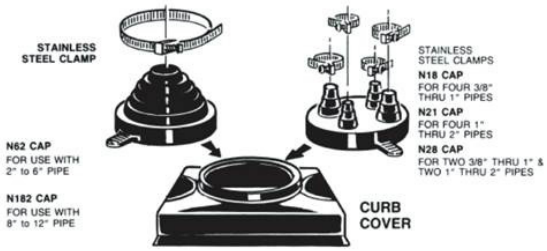


Size
24", 48" Long

MODEL RPS

Pipe Portals

N28 ROOF CAP WITH 11" HIGH CURB



Curb Cap Size
13" × 13"

MODEL ETD5STS

Heat/Cool Thermostat

LINE VOLTAGE THERMOSTAT, 120V – 270V

Redd-i

Electric Wall Heaters

INTEGRAL THERMOSTAT, DISCONNECT

Model	Voltage	KW
E30552T2DWB	120/1	0.75/1.5
AFA220D	208/1	1.5
AFA230D	208/1	3
AFA840D	208/1	4
AFA720D	277/1	2
AFA730D	277/1	3
AFA740D	277/1	4
305EX32	Surface Mount Frame	
AFAEX33	Surface Mount Frame	

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Montreal, Canada

Company Profile

- Private Canadian company founded in 1976
- Designs, manufactures and distributes HVAC products
- Over 250 dedicate employees
- 7,500m2 (80,000 ft2) state of the art facility
- Continued commitment to R&D
- Highly skilled distribution network around the world
- Exports over 70% of its sales
- Recognized worldwide presence and customer base

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Our entire product development, manufacturing process and support services are united under one roof with one common goal to satisfy the ever-evolving needs of our industry and our customers

We strongly believe our vertical integration model ensures proper communication between all departments, provides faster turnaround time, improves product development, enables custom OEM solutions and provides better overall quality control.

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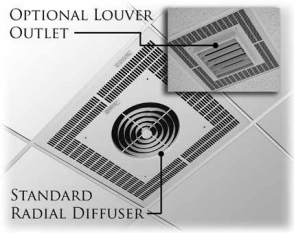
Electric Wall Heaters

INTEGRAL THERMOSTAT, DISCONNECT

Model	Voltage	KW
CWH1151DS	120/1	7.5/1.5
AWH4404	208/1	1.5/3
AWH4407	277/1	2/4
AWH4408	208/1	2/4
AWHSM	Surface Mount Frame	

Electric Ceiling Heaters

INTEGRAL THERMOSTAT, DISCONNECT, TRANSFORMER, LAY-IN



Model	Voltage	KW
71RCH2A1	277/1	2
71RCH3A1	277/1	3
71RCH4A1	277/1	4
81RCH2A1	208/1	2
81RCH3A1	208/1	3
81RCH4A1	208/1	4

Electric Ceiling Heaters

INTEGRAL THERMOSTAT, DISCONNECT, TRANSFORMER, LAY-IN

Model	Voltage	KW
CDF547	277/1	2/3/4
CDF548	208/1 or 3	2/3/4
CDF-RE*	Recessed Lay-in Frame	
CDF-SE*	Surface Mount Frame	
CDF-T*	Thermostat 45 – 95°F	
CDF-DS*	Disconnect Switch	
CDF-TR4*	208/240 Primary Transformer / 24V	
CDF-TR7*	277 Primary Transformer / 24V	

*ALL ACCESSORIES FIELD MOUNTED

Electric Unit Heaters

FORCED AIR UNIT HEATER, DISCHARGE LOUVERS

Model	Voltage	KW
MUH0371	277/1	3
MUH0541	480/3	5
MUH0581	208/1 or 3	5
MUH072	240/1 or 3	7.5
MUH074	480/3	7.5
MUH104	480/3	10
B10*	Mounting Bracket	
MT1	Thermostat 40-85°F	
MPDS25	Disconnect Switch (25A)	

*ALL ACCESSORIES FIELD MOUNTED

FRANKLIN CONTROL SYSTEMS

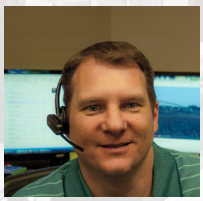
THE BEST RELY ON FRANKLIN CONTROL SYSTEMS

Franklin Control Systems (FCS) is well known throughout not just the HVAC industry, but also the agriculture and manufacturing community for their innovative and reliable motor controls. Located in Portland, Oregon, they sell through an established network of top-end distributors in the United States and Canada that offer superior products and customer service. FCS offers a full line of motor controls from Variable Frequency Drives to components and is currently partnered with several other industry leading OEMs, including Greenheck Fan Company.

BAS Starter Q-Link VFD

Innovative products

Products like the Q-Link VFD with intuitive smartphone operation are on the leading edge of controls technology. The drive was designed from the ground up for HVAC applications and users in that industry, with streamlined start-up, reporting, and support.



Live tech support

When you call FCS, you'll always be directed to a live voice during business hours. After hours, an automated system will connect you with one of our skilled Application Engineers.

FRANKLIN CONTROL SYSTEMS 5 Year Warranty

Industry-leading warranty

Franklin Control Systems stands behind their products with an industry-leading 5-year warranty.

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MODEL BAS

Building Automation Starter
3Ø, 200~600V, ½-30HP

Equipped with advanced I/O including Fireman's Override and damper control, the BAS was designed from the ground up for easy integration with automation systems. With a 200 to 600V input and 1-40A adjustable overload, the BAS is the right starter for almost any job.

MODEL SAS

Standard Automation Starter
3Ø, 200~600V, ½-30HP | 1Ø, 230V, 1/10-7.5HP

Like the BAS, the SAS accepts 200 to 600VAC incoming power, making it a plug and play device. The 1-40A electronic overload ensures you will have the right starter for the job, and Smartstart revolutionary technology protects motors from potentially harmful start-up conditions. The SAS is automation compatible.

MODEL BAS-1P

1Ø Building Automation Starter
1Ø, 110V, 1/10 - 1HP | 1Ø, 240V, 1/10 - 1HP

The BAS-1P protects single phase motors with an adjustable 1-16A class 10 electronic overload. It includes features like run status verification, a concealed Hand/Auto switch, lockable on/off switch, and system override mode (smoke purge). All of this in a compact design that installs on a single junction box.

World Leader in HVAC Noise Control

VIBRO-ACOUSTICS®
A Swegon Group company

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Our wide range of noise control products and services include:

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> Air Cooled Chiller Noise Control

> Cooling tower Noise Control

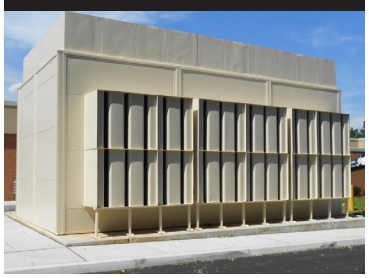
> Generator Noise Control

> RTU Integrated Noise Control Curbs

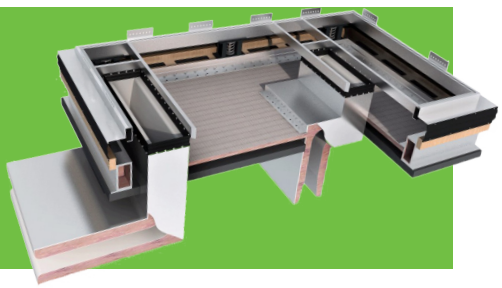
> Garage and tunnel fan exhaust

OVER 55 YEARS IN HVAC NOISE CONTROL.

VIBRO-ACOUSTICS IS A TORONTO, CANADA BASED COMPANY with four manufacturing facilities across North America. Our 15 application engineers can design noise control solutions for anything that creates airborne or structure-borne noise inside or outside a building. Vibro-Acoustics also has a NAVLAP accredited ASTM-E477 testing lab for in-house silencer testing.



Whether its maintaining a proper noise control level inside the building or meeting specific dBA requirements outside at the property line we have you covered.



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MODEL LDS

LDS Rubber Hangers
NEOPRENE

Model	Max Load	Deflection
MODEL HD-A-BLACK	45 LBS	0.35"
MODEL HD-A-GREEN	75 LBS	0.35"
MODEL HD-A-RED	125 LBS	0.35"

MODEL SLFH

Floor Mounted Spring Isolator
WITH BASEPLATE AND LEVELING BOLT

Model	Max Load	Deflection
SLFH-A-75-ORANGE	75 LBS	1.5"
SLFH-A-125-BROWN	125 LBS	1.33"

MODEL HS-X

Spring Hangers

Model	Max Load	Deflection
HS-X-54-WHITE	54 LBS	1.20"
HS-X-113-YELLOW	113 LBS	1.0"
HS-X-175-SILVER	175 LBS	1.0"

MODEL SW

Vibration Isolation Pads
¾" THICK, 0.1" DEFLECTION

Model	Size	Rated Load
SW-R2X2	2" × 2" NEOPRENE PAD	120 LBS
SW-R3X3	3" × 3" NEOPRENE PAD	270 LBS
SW-R18X18	18" × 18" NEOPRENE PAD	9,720 LBS

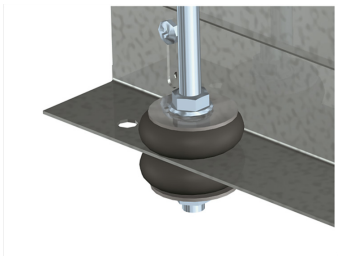
MODEL 30N

Spring & Neoprene Hangers

Model	Max Load	Deflection
30N-X-76-BLACK	76 LBS	1.22"
30N-X-175-SILVER	175 LBS	1.20"

MODEL VI

Neoprene Hangers for SP/CSP Fans



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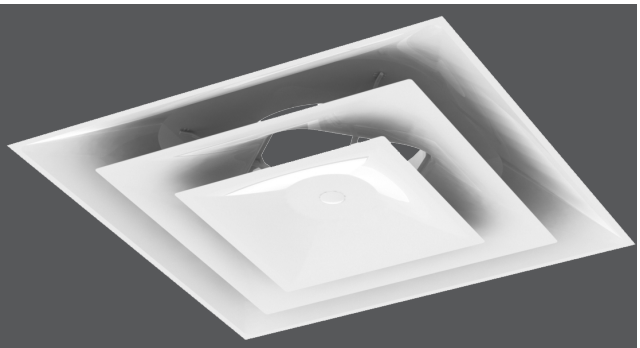
Redefine your comfort zone.™

Square Ceiling Diffusers

TMS / TMS-AA

- Titus Models TMS and TMS-AA square ceiling diffusers deliver supply air in a true 360° pattern. Designed to protect ceilings from streaking and smudging.
- Excellent performance in variable air volume systems. The uniform, nearly horizontal jet from the outer cone maintains effective room air distribution even when the air volume varies over a considerable range.
- All sizes have three cones, giving a uniform appearance where different neck sizes are used in the same area
- Screwdriver adjustment of the optional damper is achieved without removing the inner cone. (See Step 2 in Adjusting Optional Damper, Removing Center Core diagram on page 111)
- Quick removal of the inner cone with a hex key. (See Step 3 in Adjusting Optional Damper, Removing Center Core diagram on page 111)
- All cones are die-stamped, one piece construction. Smooth, clean surfaces with no corner joints.



TMS / TMS-AA

metric sizes | energy solutions | open ceiling

See website for Specifications

AVAILABLE MODELS:

TMS / Steel
TMS-AA / Aluminum

FINISH

Standard Finish - #26 White

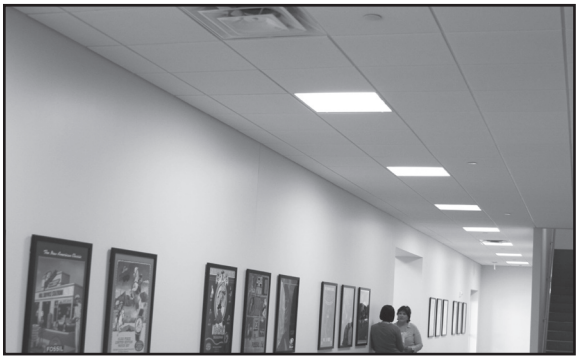
OVERVIEW

High Performance

The TMS is a square ceiling diffuser that delivers supply air in a true 360º pattern with low pressure drop. The uniform, nearly horizontal jet from the outer cone maintains effective room air distribution even when the air volume varies over a considerable range. All sizes have three cones, giving a uniform appearance where different neck sizes are used in the same area.

ADDITIONAL FEATURES

- Optional factory-installed R-6 foil-backed insulation available for 24 x 24" full face models, neck sizes 6-15, borders 1, 2, 3 and 4
- Optional (SB) sectorizing baffle is available. Consult your Titus representative for details.
- Material: all sizes are available in steel (Model TMS). Only the 24 x 24" ceiling module is available in aluminum with steel bar (Model TMS-AA).



TMS diffusers installed in the ceiling of an office building

TMS / SQUARE CEILING / ROUND NECK / HIGH PERFORMANCE

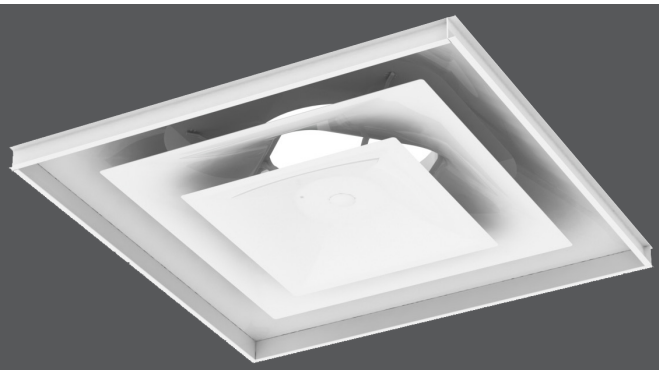
		Neck Velocity	400	500	600	700	800	1000	1200	1400	1600
		Velocity Pressure	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122	0.160
12" x 12" Module Size	4" Dia.	Airflow, cfm	35	44	52	61	70	87	105	122	140
		Total Pressure	0.012	0.018	0.026	0.035	0.046	0.072	0.104	0.141	0.184
		NC (Noise Criteria)	-	-	-	-	12	20	26	31	36
		Throw feet	1-1-3	1-2-4	1-2-4	2-3-5	2-3-6	2-4-7	3-4-7	3-5-8	4-6-8
	5" Dia.	Airflow, cfm	55	68	82	95	109	136	164	191	218
		Total Pressure	0.015	0.023	0.033	0.044	0.058	0.091	0.131	0.178	0.232
		NC (Noise Criteria)	-	-	-	-	15	23	29	34	39
		Throw feet	1-2-4	2-2-5	2-3-6	2-3-7	2-4-7	3-5-8	4-6-9	4-7-10	5-7-10
	6" Dia.	Airflow, cfm	79	98	118	137	157	196	236	275	314
		Total Pressure	0.018	0.028	0.041	0.056	0.073	0.114	0.164	0.223	0.291
		NC (Noise Criteria)	-	-	-	13	18	25	32	37	42
		Throw feet	2-2-5	2-3-6	2-3-7	3-4-8	3-5-9	4-6-10	5-7-11	5-8-12	6-9-13
	7" Dia.	Airflow, cfm	107	134	160	187	214	267	321	374	428
		Total Pressure	0.020	0.031	0.045	0.062	0.081	0.126	0.181	0.247	0.322
		NC (Noise Criteria)	-	-	-	15	20	28	34	39	44
		Throw feet	2-3-5	2-3-7	3-4-8	3-5-9	4-5-10	4-7-12	5-8-13	6-9-14	7-10-15
	8" Dia.	Airflow, cfm	140	175	209	244	279	349	419	489	559
		Total Pressure	0.022	0.035	0.050	0.069	0.090	0.140	0.202	0.275	0.359
		NC (Noise Criteria)	-	-	12	17	22	29	36	41	46
		Throw feet	2-3-6	3-4-8	3-5-9	4-5-11	4-6-12	5-8-13	6-9-14	7-11-16	8-12-17
20" x 20" Module Size	6" Dia.	Airflow, cfm	79	98	118	137	157	196	236	275	
		Total Pressure	0.016	0.025	0.035	0.048	0.063	0.099	0.142	0.193	
		NC (Noise Criteria)	-	-	-	14	18	24	30	34	
		Throw feet	1-1-4	1-2-4	2-3-5	2-3-6	2-4-7	3-4-9	4-5-10	4-6-12	
	8" Dia.	Airflow, cfm	140	175	209	244	279	349	419	489	
		Total Pressure	0.017	0.027	0.038	0.057	0.067	0.105	0.152	0.207	
		NC (Noise Criteria)	-	-	-	13	19	23	29	34	
		Throw feet	2-4-5	2-4-6	3-4-8	4-6-9	5-7-12	5-8-13	5-9-15	5-10-17	
	10" Dia.	Airflow, cfm	218	273	327	382	436	545	654	764	
		Total Pressure	0.020	0.032	0.045	0.062	0.081	0.126	0.180	0.240	
		NC (Noise Criteria)	-	-	17	20	24	31	36	41	
		Throw feet	2-5-7	3-6-10	4-7-11	4-8-14	5-9-15	6-9-18	7-11-19	8-12-21	
24" x 24" Module Size	6" Dia.	Airflow, cfm	79	98	118	137	157	196	236	275	314
		Total Pressure	0.016	0.025	0.035	0.048	0.063	0.099	0.142	0.193	0.252
		NC (Noise Criteria)	-	-	-	12	16	22	28	32	36
		Throw feet	1-2-4	1-2-4	2-3-5	2-3-6	2-4-7	3-4-9	4-5-11	4-6-12	5-7-13
	8" Dia.	Airflow, cfm	140	175	209	244	279	349	419	489	559
		Total Pressure	0.016	0.025	0.036	0.049	0.064	0.101	0.145	0.197	0.257
		NC (Noise Criteria)	-	-	11	15	19	26	31	36	40
		Throw feet	2-3-5	2-3-7	3-4-8	3-5-9	4-5-11	4-7-13	5-8-14	6-9-16	7-11-17
	10" Dia.	Airflow, cfm	218	273	327	382	436	545	654	764	873
		Total Pressure	0.017	0.026	0.037	0.051	0.066	0.103	0.149	0.202	0.264
		NC (Noise Criteria)	-	-	14	18	22	29	34	39	43
		Throw feet	2-4-7	3-5-9	4-5-11	4-6-13	5-7-14	6-9-17	7-11-18	8-13-20	10-14-21
	12" Dia.	Airflow, cfm	314	393	471	550	628	785	942	1100	1257
		Total Pressure	0.017	0.027	0.038	0.052	0.068	0.106	0.153	0.208	0.272
		NC (Noise Criteria)	-	11	16	21	24	31	36	41	45
		Throw feet	3-5-9	4-6-11	5-7-14	5-8-16	6-9-18	8-11-20	9-14-22	11-16-23	12-18-25
	14" Dia.	Airflow, cfm	428	535	641	748	855	1069	1283	1497	1710
		Total Pressure	0.018	0.028	0.040	0.054	0.071	0.110	0.159	0.216	0.282
		NC (Noise Criteria)	-	13	18	22	26	33	38	43	47
		Throw feet	4-5-11	5-7-14	5-8-16	6-10-19	7-11-21	9-14-23	11-16-25	13-19-27	14-21-29
	15" Dia.	Airflow, cfm	491	614	736	859	982	1227	1473	1718	1963
		Total Pressure	0.018	0.028	0.040	0.055	0.072	0.112	0.162	0.220	0.287
		NC (Noise Criteria)	-	13	19	23	27	34	39	44	48
		Throw feet	4-6-12	5-7-15	6-9-18	7-10-21	8-12-22	10-15-25	12-18-27	14-21-29	16-22-31

Performance notes appear at end of performance data

- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- If the diffuser is mounted on an exposed duct, the throw values are 70% of those listed in the table
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions. See the section, Engineering Guidelines, for an explanation of catalog throw data.
- NC values based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Each NC value represents the noise criteria curve which will not be exceeded by the sound pressure in any of the octave bands, 2nd through 7th, with a room absorption of 10 dB, re 10-12 watts
- Dash (-) in space denotes an NC value of less than 10
- All pressures are given in inches of water
- To obtain static pressure, subtract the velocity pressure from the total pressure

TMSA / TMSA-AA

- Titus Models TMSA and TMSA-AA diffusers include adjustable vanes which vary the discharge pattern between vertical and horizontal
- All sizes have three cones, giving a uniform appearance where different neck sizes are used in the same area
- Screwdriver adjustment of the optional damper is achieved without removing the inner cone. (See Step 2 in Adjusting Optional Damper, Removing Center Cone diagram in this section)
- Quick removal of the inner cone with a hex key. (See Step 3 in Adjusting Optional Damper, Removing Center Cone diagram in this section)
- All cones are die-stamped, one piece construction. Smooth, clean surfaces.
- Optional (SB) sectorizing baffle is available. Consult your Titus representative for details.



TMSA / TMSA-AA

metric sizes

open ceiling

See website for Specifications

AVAILABLE MODELS:

TMSA / Steel
TMSA-AA / Aluminum

FINISH

Standard Finish - #26 White

OVERVIEW

High Performance / Horizontal to Vertical Discharge Pattern / Adjustable

Titus Models TMSA and TMSA-AA diffusers feature adjustable vanes which vary the discharge pattern between vertical and horizontal for heating and cooling applications. These diffusers deliver supply air in 360º pattern and are designed to protect ceilings from smudging. All sizes have 3 cones providing a uniform appearance.

ADDITIONAL FEATURES

- Material: all sizes are available in steel (Model TMSA). Only the 24 x 24" ceiling module is available in aluminum with steel support bar (Model TMSA-AA).
- Delivers supply air in 360° pattern. Designed to help protect ceilings from streaking and smudging.

TMSA / SQUARE CEILING / ROUND NECK / HIGH PERFORMANCE / HORIZONTAL TO VERTICAL DISCHARGE

		Neck Velocity		400	500	600	700	800	1000	1200	1400	1600
		Velocity Pressure		0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122	0.160
12" x 12" Module Size	4" Dia.	Airflow, cfm		35	44	52	61	70	87	105	122	140
		Total Pressure	Horizontal	0.012	0.018	0.026	0.036	0.046	0.072	0.104	0.142	0.185
			Vertical	0.013	0.021	0.030	0.041	0.053	0.083	0.120	0.164	0.214
		Throw feet	Horizontal	1-1-2	1-2-3	1-2-4	1-2-4	2-2-5	2-3-6	2-4-7	3-4-8	3-5-8
			Vertical	1-1-2	1-1-2	1-1-3	1-2-3	1-2-3	1-2-3	2-3-4	2-3-4	2-3-4
		NC (Noise Criteria)	Horizontal	-	-	-	-	13	20	25	30	34
			Vertical	-	-	-	-	-	16	21	26	30
	5" Dia.	Airflow, cfm		55	68	82	95	109	136	164	191	218
		Total Pressure	Horizontal	0.018	0.028	0.041	0.056	0.073	0.114	0.164	0.223	0.291
			Vertical	0.022	0.034	0.049	0.066	0.086	0.135	0.194	0.265	0.346
		Throw feet	Horizontal	1-2-3	1-2-4	2-2-5	2-3-5	2-3-6	3-4-8	3-5-9	4-5-10	4-6-10
			Vertical	1-1-2	1-1-3	1-2-3	1-2-3	1-2-4	2-3-4	2-3-5	3-3-5	3-4-5
		NC (Noise Criteria)	Horizontal	-	-	-	14	18	25	31	36	40
			Vertical	-	-	-	12	15	22	27	32	36
	6" Dia.	Airflow, cfm		78	98	118	137	157	196	235	274	314
		Total Pressure	Horizontal	0.026	0.041	0.059	0.080	0.105	0.164	0.236	0.321	0.419
			Vertical	0.032	0.049	0.071	0.097	0.126	0.198	0.284	0.387	0.506
		Throw feet	Horizontal	1-2-4	2-2-5	2-3-6	2-3-7	2-4-7	3-5-9	4-6-11	4-7-12	5-7-13
			Vertical	1-1-3	1-2-3	1-2-4	2-2-4	2-3-4	2-3-5	3-4-5	3-4-6	4-4-6
		NC (Noise Criteria)	Horizontal	-	-	14	19	23	30	36	40	45
			Vertical	-	-	12	17	21	27	32	37	41
	7" Dia.	Airflow, cfm		107	134	160	187	214	267	320	374	427
		Total Pressure	Horizontal	0.036	0.056	0.080	0.110	0.143	0.223	0.322	0.438	0.572
			Vertical	0.044	0.068	0.098	0.133	0.174	0.272	0.392	0.533	0.696
		Throw feet	Horizontal	1-2-4	2-3-5	2-3-7	3-4-8	3-4-9	4-5-11	4-7-13	5-8-14	6-9-15
			Vertical	1-2-3	1-2-4	2-2-4	2-3-5	2-3-5	3-4-6	3-4-6	4-5-7	4-5-7
		NC (Noise Criteria)	Horizontal	-	12	18	23	27	34	40	44	49
			Vertical	-	-	16	21	25	31	37	41	45
	8" Dia.	Airflow, cfm		140	175	209	244	279	349	419	489	558
		Total Pressure	Horizontal	0.047	0.073	0.105	0.143	0.187	0.292	0.421	0.573	0.748
			Vertical	0.057	0.090	0.129	0.175	0.229	0.358	0.516	0.702	0.917
		Throw feet	Horizontal	2-2-5	2-3-6	2-4-7	3-4-9	3-5-10	4-6-12	5-7-14	6-9-16	7-10-17
			Vertical	1-2-4	1-2-4	2-3-5	2-3-6	2-4-6	3-4-7	4-5-7	4-6-8	5-6-8
		NC (Noise Criteria)	Horizontal	-	16	22	26	31	37	43	48	52
			Vertical	-	15	20	25	29	35	41	45	49

- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- If the diffuser is mounted on an exposed duct, the throw values are 70% of those listed in the table
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions. See the section, Engineering Guidelines for the catalog throw data information.
- NC values are based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- All pressures are given in inches of water
- To obtain static pressure, subtract the velocity pressure from the total pressure
- Horizontal throw is along a surface
- Vertical throw is a free jet

TMSA / SQUARE CEILING / ROUND NECK / HIGH PERFORMANCE / HORIZONTAL TO VERTICAL DISCHARGE

		Neck Velocity		400	500	600	700	800	1000	1200	1400	1600
		Velocity Pressure		0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122	0.160
24" x 24" Module Size	6" Dia.	Airflow, cfm		78	98	118	137	157	196	235	274	314
		Total Pressure	Horizontal	0.018	0.028	0.040	0.055	0.072	0.112	0.162	0.220	0.287
			Vertical	0.019	0.030	0.043	0.058	0.076	0.118	0.171	0.232	0.303
		Throw feet	Horizontal	2-3-5	2-3-6	3-4-7	3-5-8	3-6-8	4-7-9	4-7-10	4-7-11	5-8-12
			Vertical	0-1-1	1-1-2	1-1-2	1-1-2	1-1-3	1-1-4	1-2-4	1-2-4	1-2-5
		NC (Noise Criteria)	Horizontal	-	-	-	14	18	25	30	35	39
			Vertical	-	-		13	17	24	29	34	38
	8" Dia.	Airflow, cfm		140	175	209	244	279	349	419	489	558
		Total Pressure	Horizontal	0.018	0.028	0.041	0.056	0.073	0.114	0.164	0.223	0.291
			Vertical	0.022	0.034	0.049	0.067	0.088	0.137	0.197	0.269	0.351
		Throw feet	Horizontal	2 - 3 - 5	2-3-6	3-4-8	3-5-9	3-5-10	4-6-11	5-8-12	6-9-13	7-10-14
			Vertical	0 - 1 - 1	1-1-2	1-1-2	1-1-2	1-1-3	1-2-4	1-2-4	2-2-5	2-3-6
		NC (Noise Criteria)	Horizontal	-	-	12	17	21	28	33	38	42
			Vertical	-	-	12	16	20	27	32	37	41
	10" Dia.	Airflow, cfm		218	273	327	382	436	545	654	763	872
		Total Pressure	Horizontal	0.018	0.029	0.041	0.056	0.073	0.114	0.164	0.224	0.292
			Vertical	0.030	0.047	0.068	0.092	0.120	0.188	0.271	0.369	0.482
		Throw feet	Horizontal	2-3-6	3-4-8	3-5-10	4-6-11	4-6-13	5-8-14	6-10-15	8-11-17	9-13-18
			Vertical	1-1-2	1-1-2	1-1-3	1-2-3	1-2-4	1-2-4	2-3-5	2-3-6	2-4-7
		NC (Noise Criteria)	Horizontal	-	-	15	20	24	31	37	41	45
			Vertical	-	12	18	22	26	33	38	43	47
	12" Dia.	Airflow, cfm		314	393	471	550	628	785	942	1099	1256
		Total Pressure	Horizontal	0.018	0.029	0.041	0.056	0.073	0.114	0.165	0.224	0.293
			Vertical	0.040	0.063	0.090	0.123	0.161	0.251	0.361	0.492	0.642
		Throw feet	Horizontal	3-4-8	3-5-10	4-6-12	5-7-14	5-8-15	6-10-17	8-12-18	9-14-20	10-15-21
			Vertical	1-1-2	1-1-3	1-2-3	1-2-4	1-2-4	2-3-5	2-3-6	2-4-7	3-4-9
		NC (Noise Criteria)	Horizontal	-	12	18	23	27	34	39	44	48
			Vertical	-	17	23	27	31	38	43	48	52
	14" Dia.	Airflow, cfm		428	535	641	748	855	1069	1283	1497	1710
		Total Pressure	Horizontal	0.029	0.045	0.065	0.089	0.116	0.181	0.261	0.355	0.464
			Vertical	0.044	0.068	0.098	0.134	0.175	0.273	0.393	0.535	0.699
		Throw feet	Horizontal	5-8-15	6-10-19	8-11-21	9-13-22	10-15-24	13-19-27	15-21-29	18-22-31	19-24-34
			Vertical	2-5-7	3-6-8	5-6-9	6-7-10	6-7-10	7-8-12	7-9-13	8-10-14	8-10-15
		NC (Noise Criteria)	Horizontal	-	-	12	18	23	32	39	45	50
			Vertical	12	18	23	28	32	38	43	48	51
	15" Dia.	Airflow, cfm		491	614	736	859	982	1227	1472	1718	1963
		Total Pressure	Horizontal	0.031	0.048	0.069	0.094	0.123	0.192	0.277	0.377	0.492
			Vertical	0.041	0.064	0.092	0.125	0.164	0.256	0.369	0.502	0.655
		Throw feet	Horizontal	5-8-16	7-10-20	8-12-22	10-14-24	11-16-25	14-20-28	16-22-31	19-24-34	21-25-36
			Vertical	2-5-8	4-6-9	5-7-10	6-7-10	6-8-11	7-9-12	8-10-14	8-10-15	9-11-16
		NC (Noise Criteria)	Horizontal	-	-	13	19	24	32	39	45	50
			Vertical	-	17	22	27	31	37	42	47	50

- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- If the diffuser is mounted on an exposed duct, the throw values are 70% of those listed in the table
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions. See the section, Engineering Guidelines for the catalog throw data information.
- NC values based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Dash (-) in space denotes an NC value of less than 10
- All pressures are given in inches of water
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- To obtain static pressure, subtract the velocity pressure from the total pressure
- Horizontal throw is along a surface
- Vertical throw is a free jet

OMNI / OMNI-AA

- The Titus OMNI diffuser satisfies architectural as well as engineering criteria. Its strong, clean, unobtrusive lines harmonize with the ceiling system, without sacrificing performance.
- The curvature of the OMNI backpan works with the formed edges of the face panel to deliver a uniform 360° horizontal air pattern, without excessive noise or pressure drop
- The OMNI diffuser is an excellent choice for variable air volume systems. The air pattern remains tight and horizontal for effective room air distribution, even when the volume varies over a wide range.
- The face panel is constructed from 22-gauge steel or heavy gauge aluminum. The edges of the face panel are formed to a radius for a solid, crisp appearance. The formed edges also stiffen the face panel and assure a straight and level surface.

OMNI / OMNI-AA

retrofit | MRI compatible | wood grains | metric sizes

See website for Specifications

MODELS:

OMNI / Steel
OMNI-AA / Aluminum

FINISHES:

Standard Finish - #26 White
Optional Finish - Wood grains (See Wood grains Brochure for Finishes)

OVERVIEW

Square Plaque

The Titus OMNI (steel plaque) & OMNI-AA (all-aluminum plaque) face diffusers that satisfie architectural and engineering criteria. Their strong, clean, unobtrusive lines harmonize with ceiling systems without sacrificing performance. The curvature of the OMNI & OMNI-AA backpans work with the formed edges of the face panel to deliver a uniform 360 degree horizontal air pattern, without excessive noise or pressure drop. They are an excellent selection for variable air volume systems.

Several OMNI diffusers installed in the breakroom of a corporate office

ADDITIONAL FEATURES

- The formed edges of the face panel capture another 22-gauge steel or heavy gauge aluminum panel that the hanger brackets are mechanically fastened to. This process provides the OMNI face with a smooth finish under any lighting conditions.
- The OMNI-AA is entirely constructed of aluminum, perfect for MRI applications
- The face panel is held in place by four hook brackets that positively engage into slots in the backpan. The panel can be removed from the backpan for easy installation of the diffuser or for access to the optional damper.
- The new face panel construction ensures a smooth, clean appearance and easier installation and removal
- Optional factory-insulated R-6 foil-backed insulation available for 24 x 24" full face models, neck sizes 6-15, borders 1, 2, 3 and 4

OMNI / OMNI-AA - ARCHITECTURAL CEILING / SQUARE PLAQUE

		Neck Velocity	400	500	600	700	800	900	1000	1200	1400
		Velocity Pressure	0.010	0.016	0.022	0.031	0.040	0.051	0.062	0.090	0.122
12"x12" Module Size	4" Round Neck	Airflow, cfm	35	44	52	61	70	79	87	105	122
		Total Pressure, Inches WG	0.034	0.053	0.076	0.103	0.134	0.170	0.210	0.303	0.412
		Throw Feet	1-2-3	1-2-4	2-2-5	2-3-6	2-3-6	2-4-7	3-4-8	3-5-10	4-6-11
		NC (Noise Criteria)	-	-	12	17	21	24	27	33	38
	5" Round Neck	Airflow, cfm	55	68	82	95	109	123	136	164	191
		Total Pressure, Inches WG	0.040	0.063	0.091	0.124	0.161	0.204	0.252	0.363	0.494
		Throw Feet	2-2-5	2-3-6	2-3-7	3-4-8	3-5-9	3-5-10	4-6-12	5-7-14	5-8-15
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
	6" Round Neck	Airflow, cfm	78	98	118	137	157	176	196	235	274
		Total Pressure, Inches WG	0.049	0.076	0.109	0.149	0.194	0.246	0.303	0.437	0.594
		Throw Feet	2-3-6	3-4-8	3-5-9	4-5-11	4-6-12	5-7-14	5-8-15	6-9-17	7-11-18
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
	7" Round Neck	Airflow, cfm	107	134	160	187	214	240	267	320	374
		Total Pressure, Inches WG	0.058	0.091	0.131	0.178	0.233	0.295	0.364	0.524	0.714
		Throw Feet	3-4-8	3-5-9	4-6-11	4-7-13	5-8-15	6-9-17	6-9-18	8-11-20	9-13-21
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
	8" Round Neck	Airflow, cfm	140	175	209	244	279	314	349	419	489
		Total Pressure, Inches WG	0.070	0.109	0.156	0.213	0.278	0.352	0.434	0.626	0.852
		Throw Feet	3-5-9	4-6-11	5-7-14	5-8-16	6-9-18	7-10-19	8-11-20	9-14-22	11-16-24
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
20" x 20" Module Size	6" Dia.	Airflow, cfm	78	98	118	137	157	173	196	235	274
		Total Pressure	0.016	0.025	0.036	0.049	0.063	.080	0.100	0.142	0.193
		NC (Noise Criteria)	-	-	-	16	20	24	28	34	39
		Throw feet	1-1-3	1-1-4	1-2-4	1-3-5	1-3-6	2-3-6	2-4-7	3-5-8	3-5-8
	8" Dia.	Airflow, cfm	140	175	209	244	279	314	349	419	489
		Total Pressure	0.019	0.030	0.043	0.058	0.075	.096	0.118	0.169	0.229
		NC (Noise Criteria)	-	-	-	18	22	26	30	36	41
		Throw feet	1-2-4	2-3-6	2-4-6	3-4-7	3-5-7	3-5-8	4-6-8	5-6-9	5-7-10
	10" Dia.	Airflow, cfm	218	273	327	382	436	491	545	654	763
		Total Pressure	0.024	0.038	0.055	0.074	0.096	.123	0.151	0.215	0.292
		NC (Noise Criteria)	-	-	-	18	23	27	31	37	42
		Throw feet	3-4-6	3-4-7	4-5-8	4-6-8	5-6-9	5-7-9	6-7-10	6-8-11	7-9-12
24"x24" Module Size	6" Round Neck	Airflow, cfm	78	98	118	137	157	176	196	235	274
		Total Pressure, Inches WG	0.011	0.017	0.025	0.034	0.044	0.056	0.069	0.099	0.135
		Throw Feet	1-1-4	1-2-4	1-3-5	2-3-6	2-4-7	3-4-8	3-4-9	4-5-11	4-6-11
		NC (Noise Criteria)	-	-	-	-	13	17	21	28	34
	8" Round Neck	Airflow, cfm	140	175	209	244	279	314	349	419	489
		Total Pressure, Inches WG	0.018	0.028	0.040	0.055	0.072	0.091	0.112	0.162	0.220
		Throw Feet	2-3-6	2-4-7	3-4-9	3-5-10	4-6-12	4-6-12	5-7-13	6-9-14	7-10-15
		NC (Noise Criteria)	-	-	-	12	17	21	25	32	38
	10" Round Neck	Airflow, cfm	218	273	327	382	436	491	545	654	763
		Total Pressure, Inches WG	0.027	0.042	0.060	0.082	0.107	0.136	0.168	0.241	0.329
		Throw Feet	3-4-8	3-5-10	4-6-12	5-7-13	5-8-14	6-9-15	7-10-16	8-12-18	10-13-19
		NC (Noise Criteria)	-	-	-	15	20	24	28	35	41
	12" Round Neck	Airflow, cfm	314	393	471	550	628	707	785	942	1099
		Total Pressure, Inches WG	0.038	0.059	0.085	0.115	0.151	0.191	0.235	0.339	0.461
		Throw Feet	4-5-11	5-7-14	5-8-15	6-9-16	7-11-17	8-12-18	9-14-19	11-15-21	13-16-23
		NC (Noise Criteria)	-	-	12	18	23	27	31	38	43
	14" Round Neck	Airflow, cfm	428	535	641	748	855	962	1069	1283	1497
		Total Pressure, Inches WG	0.051	0.079	0.114	0.155	0.202	0.256	0.316	0.455	0.619
		Throw Feet	4-7-13	6-8-16	7-10-17	8-12-19	9-13-20	10-15-21	11-16-23	13-17-25	15-19-27
		NC (Noise Criteria)	-	-	14	20	25	29	33	40	45
	15" Round Neck	Airflow, cfm	491	614	736	859	982	1104	1227	1472	1718
		Total Pressure, Inches WG	0.058	0.090	0.130	0.177	0.231	0.292	0.360	0.519	0.706
		Throw Feet	5-7-15	6-9-17	7-11-19	9-13-20	10-15-22	11-16-23	12-17-24	15-19-26	17-20-29
		NC (Noise Criteria)	-	-	15	21	26	30	34	41	46

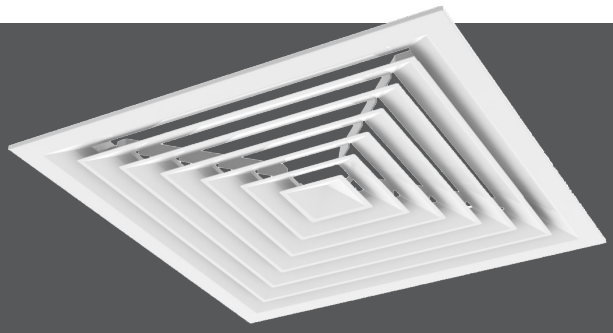
Performance notes appear at end of performance data

- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- If the diffuser is mounted on an exposed duct, the throw values are 70% of those listed in the table
- Throw values are given for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions. See the section, Engineering Guidelines for catalog throw data information.
- NC values based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Dash (-) in space denotes an NC value of less than 10
- Each NC value represents the noise criteria curve which will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts.
- All pressures are given in inches of water
- To obtain static pressure, subtract the velocity pressure from the total pressure

Square and Rectangular Diffusers

TDC / TDCA

- Titus Series TDC diffusers handle an unusually large amount of air for a given pressure drop and noise level
- Pleasing appearance harmonizes with various architectural details - especially modular ceiling systems
- Maintains an unbroken horizontal flow pattern from maximum cfm down to minimum. Excellent performance in variable air volume systems.
- In the TDCA and TDCA-AA models, movable vanes, accessible from the face, adjust the discharge pattern from horizontal to vertical
- Core is easily removable from the face of the diffuser
- Lever operator on the optional Model AG-95 damper allows easy volume adjustment from the face of the diffuser
- Extremely flexible, with cores available for 1-, 2-, 3- or 4-way horizontal flow
- Material is 22-gauge steel or aluminum with miscellaneous steel components



TDC / TDCA

- For a uniform face appearance on all neck sizes, specify an 18 x 18" dimension A size and the desired round neck size. This is available in 24 x 24" lay-in module size only.

See website for Specifications

AVAILABLE MODELS:

Steel Models:
TDC / with fixed discharge
TDCA / with adjustable discharge

Aluminum Models:
TDC-AA / with fixed discharge
TDCA-AA / with adjustable discharge

FINISH

Standard Finish - #26 White

OVERVIEW

Louvered Face / High Capacity

Titus Series TDC diffusers handle an unusually large amount of air for a given pressure drop and noise level. Their pleasing appearance harmonizes with various architectural details, especially in modular ceiling systems.

The Titus AR mobile app is available for download on most Android devices and iOS

TDC - ROUND NECK / LOUVERED FACE / SUPPLY / HORIZONTAL BLOW PATTERN

Return Factors -SP = 1.1 TP NC + 1		Total cfm	78		98		117		137		156		176		215	
		Total Pressure	0.058		0.092		0.131		0.179		0.223		0.296		0.442	
		NC	10		16		21		25		28		31		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
6	S1	X	75	5-7-15	98	6-9-18	117	7-11-20	137	9-13-22	156	10-15-25	176	45978	215	14-19-27
x	S2&G2	X & Y	38	3-5-10	50	4-6-13	59	5-7-14	69	6-9-16	78	7-10-17	88	7-11-18	108	9-14-20
6	A3	X	29	3-4-8	37	3-5-9	44	4-6-10	51	5-7-10	59	6-8-11	66	6-8-12	81	7-9-13
6"		Y	20	2-4-7	25	3-5-8	29	4-6-9	34	4-7-9	39	5-7-10	44	6-7-12	54	7-8-12
Round	A4	X & Y	20	2-4-7	25	3-5-8	29	4-6-9	34	4-7-9	39	5-7-10	44	6-7-12	54	7-8-12
Return Factors -SP = 1.1 TP NC + 1		Total cfm	98		117		137		156		176		215		254	
		Total Pressure	0.041		0.058		0.079		0.103		0.131		0.196		0.273	
		NC	10		14		18		21		25		30		34	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
9	S1	X	98	6-9-18	117	7-11-20	137	9-15-22	156	10-15-23	176	11-17-25	215	20-24-34	254	17-21-30
x	S2&G2	X & Y	49	4-6-13	59	5-7-14	69	6-9-16	78	7-10-17	88	7-11-18	108	9-14-20	127	11-15-21
9	A3	X	37	3-5-9	44	4-6-10	51	5-7-10	59	6-8-11	66	6-8-12	81	7-9-13	95	8-10-14
6"		Y	25	3-5-8	29	4-6-9	34	4-7-9	39	5-7-10	44	6-7-11	54	7-8-12	64	7-9-13
Round	A4	X & Y	25	3-5-8	29	4-6-9	34	4-7-9	39	5-7-10	44	6-7-11	54	7-8-12	64	7-9-13
Return Factors -SP = 1.1 TP NC + 1		Total cfm	139		174		209		244		279		314		383	
		Total Pressure	0.046		0.072		0.104		0.142		0.186		0.235		0.350	
		NC	10		16		20		24		27		32		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
9	S1	X	139	7-10-21	174	8-13-24	209	10-15-27	244	12-18-29	279	14-21-31	314	15-23-33	383	19-26-37
x	S2&G2	X & Y	70	4-7-14	87	5-8-17	105	7-10-19	122	8-12-21	140	9-14-22	157	10-15-24	192	12-19-26
9	A3	X	52	4-6-11	66	5-7-12	79	6-9-13	92	7-10-14	105	8-10-14	119	9-11-16	145	10-12-18
8"		Y	35	3-5-9	44	4-7-11	52	5-8-12	61	6-9-13	70	7-9-14	79	8-10-14	96	9-11-16
Round	A4	X & Y	35	3-5-9	44	4-7-11	52	5-8-12	61	6-9-13	70	7-9-14	79	8-10-14	96	9-11-16
Return Factors -SP = 1.1 TP NC + 1		Total cfm	174		209		244		279		314		383		453	
		Total Pressure	0.041		0.059		0.080		0.104		0.132		0.197		0.275	
		NC	11		16		21		25		28		31		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
12	S1	X	174	8-13-24	209	10-15-27	244	12-18-29	279	14-21-31	314	15-23-33	383	19-26-37	453	22-28-40
x	S2&G2	X & Y	87	5-8-17	105	7-10-19	122	8-12-24	140	9-14-22	157	10-15-24	192	12-19-26	227	15-20-29
12	A3	X	66	5-7-12	79	6-9-13	92	7-10-14	105	8-11-15	119	9-11-16	145	10-12-18	171	11-14-19
8"		Y	44	4-7-11	52	5-8-12	61	6-9-13	70	7-9-14	79	8-10-14	96	9-11-16	113	10-12-18
Round	A4	X & Y	44	4-7-11	52	5-8-12	61	6-9-13	70	7-9-14	79	8-10-14	96	9-11-16	113	10-12-18
Return Factors -SP = 1.1 TP NC + 1		Total cfm	218		272		327		381		436		490		599	
		Total Pressure	0.041		0.064		0.092		0.125		0.163		0.206		0.308	
		NC	10		16		21		25		28		31		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
12	S1	X	218	8-13-24	272	11-16-31	327	13-19-34	381	15-23-36	436	17-26-39	490	19-29-41	599	24-32-46
x	S2&G2	X & Y	109	5-8-17	136	7-11-22	164	8-12-24	191	10-15-26	218	11-17-28	245	13-19-30	300	16-23-33
12	A3	X	82	5-7-12	103	6-9-13	123	7-11-16	144	8-12-18	165	10-13-29	185	11-14-20	226	13-16-22
10"		Y	55	4-7-11	68	5-8-12	82	7-10-15	95	8-11-16	109	9-12-17	123	10-13-18	150	11-14-20
Round	A4	X & Y	55	4-7-11	68	5-8-12	82	7-10-15	95	8-11-16	109	9-12-17	123	10-13-18	150	11-14-20
Return Factors -SP = 1.1 TP NC + 1		Total cfm	235		314		392		471		549		628		706	
		Total Pressure	0.033		0.059		0.092		0.132		0.130		0.235		0.298	
		NC	5		13		19		24		28		32		35	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
12	S1	X	235	7-11-23	314	10-15-31	392	13-19-34	471	15-23-36	549	18-27-44	628	21-31-47	706	23-35-40
x	S2&G2	X & Y	118	5-7-15	157	7-10-21	196	8-12-24	236	10-15-26	275	12-18-32	314	13-19-30	353	16-23-33
12	A3	X	89	4-6-13	119	6-10-20	148	7-11-16	178	8-12-18	207	10-15-21	237	11-14-20	267	13-16-24
12"		Y	59	4-6-12	79	5-8-12	98	7-10-15	118	8-11-16	137	9-12-17	157	11-14-21	177	12-15-22
Round	A4	X & Y	59	4-6-12	79	5-8-12	98	7-10-15	118	8-11-16	137	9-12-17	157	11-14-21	177	12-15-22
Return Factors -SP = 1.1 TP NC + 1		Total cfm	314		392		471		549		623		706		863	
		Total Pressure	0.038		0.059		0.085		0.115		0.150		0.190		0.284	
		NC	10		17		22		26		29		32		37	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
15	S1	X	314	10-15-31	392	13-19-37	471	15-23-41	549	18-27-44	623	21-31-47	706	23-35-50	863	29-39-55
x	S2&G2	X & Y	157	7-10-21	196	8-13-26	236	10-15-29	275	12-18-32	312	14-21-34	353	15-23-36	432	19-28-40
15	A3	X	119	6-9-16	148	7-11-18	178	9-13-20	207	10-15-21	235	12-16-23	267	13-17-24	326	15-19-27
12"		Y	79	5-8-14	98	7-10-16	118	8-12-18	137	9-14-21	156	11-14-21	177	12-15-22	216	14-17-24
Round	A4	X & Y	79	5-8-14	98	7-10-16	118	8-12-18	137	9-14-21	156	11-14-21	177	12-15-22	216	14-17-24
Return Factors -SP = 1.1 TP NC + 1		Total cfm	320		427		534		641		748		855		863	
		Total Pressure	0.029		0.051		0.080		0.115		0.157		0.205		0.260	
		NC	-		14		20		25		29		33		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
15	S1	X	320	9-13-27	427	12-18-37	534	15-23-43	641	18-27-47	748	21-32-52	855	24-37-55	863	24-32-46
x	S2&G2	X & Y	160	6-9-18	214	8-12-24	267	10-15-31	321	12-18-34	374	14-27-37	428	16-24-40	432	16-23-39
15	A3	X	121	5-8-16	161	7-10-19	202	9-14-21	242	10-16-23	282	12-18-25	323	14-19-27	326	13-16-22
14"		Y	80	4-7-14	107	6-9-17	134	8-12-19	160	9-14-23	187	11-16-23	214	13-17-24	216	14-18-26
Round	A4	X & Y	80	4-7-14	107	6-9-17	134	8-12-19	160	9-14-23	187	11-16-23	214	13-17-24	216	14-18-26

Performance notes appear at end of performance data

TDC - ROUND NECK / LOUVERED FACE / SUPPLY / HORIZONTAL BLOW PATTERN

Return Factors -SP = 1.1 TP NC + 1		Total cfm	98		117		137		156		176		215		254	
		Total Pressure	0.041		0.058		0.079		0.103		0.131		0.196		0.273	
		NC	-		14		18		21		25		30		34	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
18	S1	X	98	6-9-18	117	7-11-20	137	9-15-22	156	10-15-23	176	11-17-25	215	20-24-34	254	17-21-30
x	S2&G2	X & Y	49	4-6-13	59	5-7-14	69	6-9-16	78	7-10-17	88	7-11-18	108	9-14-20	127	11-15-21
18	A3	X	37	3-5-9	44	4-6-10	51	5-7-10	59	6-8-11	66	6-8-12	81	7-9-13	95	8-10-14
6"		Y	25	3-5-8	29	4-6-9	34	4-7-9	39	5-7-10	44	6-7-11	54	7-8-12	64	7-9-13
Round	A4	X & Y	25	3-5-8	29	4-6-9	34	4-7-9	39	5-7-10	44	6-7-11	54	7-8-12	64	7-9-13
Return Factors -SP = 1.1 TP NC + 1		Total cfm	174		209		244		279		314		383		453	
		Total Pressure	0.041		0.059		0.080		0.104		0.132		0.197		0.275	
		NC	11		16		20		24		27		32		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
18	S1	X	174	8-13-24	209	10-15-27	244	12-18-29	279	14-21-31	314	15-23-33	383	19-26-37	453	22-28-40
x	S2&G2	X & Y	87	5-8-17	105	7-10-19	122	8-12-24	140	9-14-22	157	10-15-24	192	12-19-26	227	15-20-29
18	A3	X	66	5-7-12	79	6-9-13	92	7-10-14	105	8-11-15	119	9-11-16	145	10-12-18	171	11-14-19
8"		Y	44	4-7-11	52	5-8-12	61	6-9-13	70	7-9-14	79	8-10-14	96	9-11-16	113	10-12-18
Round	A4	X & Y	44	4-7-11	52	5-8-12	61	6-9-13	70	7-9-14	79	8-10-14	96	9-11-16	113	10-12-18
Return Factors -SP = 1.1 TP NC + 1		Total cfm	218		272		327		381		436		490		599	
		Total Pressure	0.041		0.064		0.092		0.125		0.163		0.206		0.308	
		NC	10		16		21		25		28		31		36	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
18	S1	X	218	8-13-24	272	11-16-31	327	13-19-34	381	15-23-36	436	17-26-39	490	19-29-41	599	24-32-46
x	S2&G2	X & Y	109	5-8-17	136	7-11-22	164	8-12-24	191	10-15-26	218	11-17-28	245	13-19-30	300	16-23-33
18	A3	X	82	5-7-12	103	6-9-13	123	7-11-16	144	8-12-18	165	10-13-29	185	11-14-20	226	13-16-22
10"		Y	55	4-7-11	68	5-8-12	82	7-10-15	95	8-11-16	109	9-12-17	123	10-13-18	150	11-14-20
Round	A4	X & Y	55	4-7-11	68	5-8-12	82	7-10-15	95	8-11-16	109	9-12-17	123	10-13-18	150	11-14-20
Return Factors -SP = 1.1 TP NC + 1		Total cfm	314		392		471		549		623		706		863	
		Total Pressure	0.038		0.059		0.085		0.115		0.150		0.190		0.284	
		NC	10		17		22		26		29		32		37	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
18	S1	X	314	10-15-31	392	13-19-37	471	15-23-41	549	18-27-44	623	21-31-47	706	23-35-50	863	29-39-55
x	S2&G2	X & Y	157	7-10-21	196	8-13-26	236	10-15-29	275	12-18-32	312	14-21-34	353	15-23-36	432	19-28-40
18	A3	X	119	6-9-16	148	7-11-18	178	9-13-20	207	10-15-21	235	12-16-23	267	13-17-24	326	15-19-27
12"		Y	79	5-8-14	98	7-10-16	118	8-12-18	137	9-14-21	156	11-14-21	177	12-15-22	216	14-17-24
Round	A4	X & Y	79	5-8-14	98	7-10-16	118	8-12-18	137	9-14-21	156	11-14-21	177	12-15-22	216	14-17-24
Return Factors -SP = 1.1 TP NC + 1		Total cfm	427		534		641		748		855		962		1175	
		Total Pressure	0.036		0.056		0.080		0.109		0.142		0.180		0.269	
		NC	12		17		22		26		30		33		38	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
18	S1	X	427	12-18-27	534	15-23-43	641	18-27-47	748	21-32-47	855	27-37-55	962	27-41-58	1175	33-45-64
x	S2&G2	X & Y	214	8-12-24	267	10-15-31	321	12-18-34	374	14-27-37	428	16-24-40	481	18-27-42	588	22-33-47
18	A3	X	161	7-10-19	202	8-13-21	242	10-16-23	282	12-18-25	323	14-19-27	363	16-20-29	444	18-22-32
14"		Y	107	6-9-17	134	8-12-19	160	9-14-21	187	11-16-23	214	13-17-24	241	14-18-26	294	16-20-29
Round	A4	X & Y	107	6-9-17	134	8-12-19	160	9-14-21	187	11-16-23	214	13-17-24	241	14-18-26	294	16-20-29
Return Factors -SP = 1.1 TP NC + 1		Total cfm	418		558		698		837		977		1116		1256	
		Total Pressure	0.020		0.036		0.056		0.080		0.109		0.142		0.180	
		NC	–		12		17		21		29		34		38	
		Side	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw	cfm	Throw
18	S1	X	418	10-15-31	558	14-21-42	698	17-26-49	837	21-31-54	977	24-37-59	1116	28-42-63	1256	31-47-67
x	S2&G2	X & Y	209	7-10-21	279	9-14-28	349	11-17-35	419	14-21-39	489	16-24-42	558	18-28-45	628	21-31-48
18	A3	X	158	6-10-20	211	8-12-22	264	10-15-24	316	12-18-27	369	14-20-29	421	16-22-31	474	18-23-33
16"		Y	105	5-8-17	140	7-11-19	175	9-14-22	209	11-17-24	244	13-18-26	279	15-19-28	314	17-21-29
Round	A4	X & Y	105	5-8-17	140	7-11-19	175	9-14-22	209	11-17-24	244	13-18-26	279	15-19-28	314	17-21-29

Performance notes appear at end of performance data

PERFORMANCE NOTES

Available Models: TDC, TDC-AA, TDCA, TDCA-AA, TDV, TDV-AA

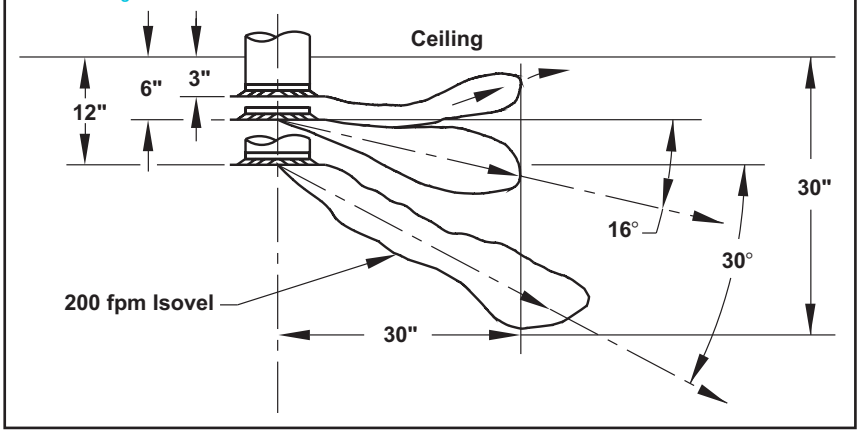
- All pressures are in inches of water. TP is total pressure, - SP is negative static pressure for return units.
- Throw values are given for terminal velocities of 150, 100, and 50 fpm. For an explanation of catalog throw data, see the section, Engineering Guidelines for catalog throw data.
- NC values are based on a room absorption of 10 dB, re 10^{-12} watts, with one diffuser operating.
- If the diffuser is used as a return inlet, the following corrections apply:
  - Negative static pressure: Multiply the factor at the upper left corner of the performance table by the total pressure listed in the table
  - Sound: Add the NC correction at the upper left corner of the performance table to the NC value listed in the table
  - Return Performance Example: 6 x 6 Model TDC handling:
    150 cfm of return air
    –SP = 1.1(-TP).
    Return negative SP = 1.1 x (0.169)
    = - 0.1859 inches wg.
    Return NC = NC Table + 1
    Return NC = 23 + 1 = 24
- These products have been tested per ANSI/ASHRAE 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the section, Engineering Guidelines for additional information.
- Data in the tables apply when the diffuser is mounted nearly flush with the ceiling for maximum ceiling effect. When no ceiling effect is present, the horizontal throw will be about 25% less than shown in the tables. The mounting distance below the ceiling will also affect the downward projection angle as indicated in the diagram at upper right.

MODEL TDCA PERFORMANCE

- For Model TDCA diffusers (adjustable pattern controllers) apply the corrections from the table at the right to the TDC data for square neck, 4-way core styles, as follows:
  - TP = Listed value x correction
  - NC = Listed value + correction
  - Throw = Listed value x correction

Apply the throw factor to the 50 fpm terminal velocity throw only.

9" x 9" Model TDC / 4-Way Diffuser
240 cfm Total
20°F Cooling Differential



RECOMMENDED MAXIMUM AIRFLOW

Ceiling Height, ft.	8	9	10	12	15	20
Airflow, cfm, per Side	200	350	550	900	1500	4000

Note: Although this data is based on a 20°F temperature differential during cooling, it also applies to any differential between 15°F and 25°F

CORRECTIONS FOR MODEL TDCA (ADJUSTABLE PATTERN CONTROLLERS)

Nominal Neck Size	NC (add)		Total Pressure (Multiply)		Vertical Throw (Multiply)		
					Cooling 20 F	Heating, ΔT	
	H	V	H	V		0 F	20 F
6 x 6	3	7	1.3	1.6	1.3	1.1	0.8
9 x 9	3	7	1.5	2.3	1.4	1.2	0.72
12 x 12	3	7	1.5	2.3	1.5	1.25	0.65
15 x 15	3	7	1.5	2.3	1.55	1.27	0.62
18 x 18	3	7	1.5	2.3	1.6	1.3	0.59
21 x 21	3	7	1.5	2.3	1.65	1.35	0.57
24 x 24	3	7	1.5	2.3	1.1	1.1	0.55

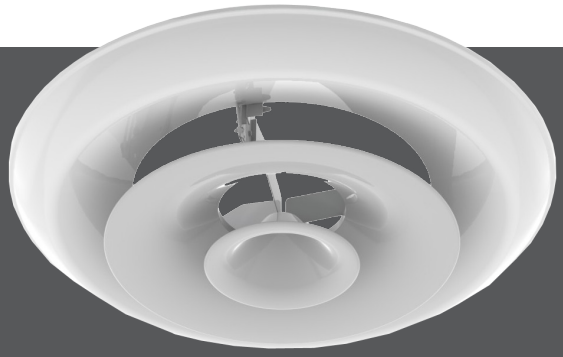
Note: TDC and TDV Performance Data were obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006

- Vertical adjustments are most effective with the above sizes, using an A4 pattern
- Vertical throw will not work with round inlets

Round Ceiling Diffusers

TMR / TMR-AA

- Models TMR and TMR-AA round ceiling diffusers are designed for cooling applications
- All sizes have three cones, giving a uniform appearance where different sizes are used in the same area
- Uniform 360° discharge pattern
- Excellent performance in variable air volume systems
- The two horizontal discharge settings allow the diffuser to be adjusted for two different flow rate conditions. At Position 1, maximum capacity is obtained. At Position 2, induction is increased.
- Adjustment achieved by removing the two inner cones as a unit and repositioning six screws
- Spring lock allows easy removal and replacement of the two inner cones



TMR / TMR-AA

See website for Specifications

AVAILABLE MODELS:

TMR / Steel
TMR-AA / Aluminum

FINISHES

Standard Finish - #26 White
Optional Finish - #01 Aluminum

OVERVIEW

Two Horizontal Discharge Patterns

Models TMR and TMR-AA round ceiling diffusers are designed for both heating and cooling applications. All sizes have three cones, giving a uniform appearance where different sizes are used in the same area. They deliver a uniform 360° discharge pattern and exhibit excellent performance in variable air volume systems.

ADDITIONAL FEATURES

- Retainer cable provided to allow the inner core assembly to hang during maintenance of diffusers with a neck size of 12 inches or greater
- Material is steel (TMR) or aluminum (TMR-AA) with steel screws

TMR diffusers installed in an office environment

TMR / TMR-AA

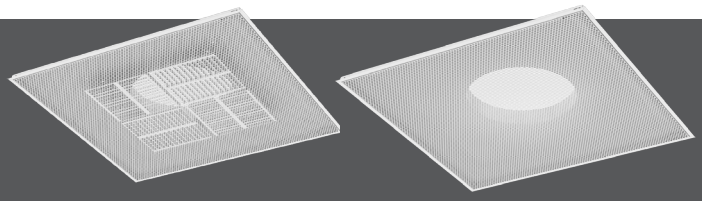
	Neck Velocity	400	500	600	700	800	900	1000	1200	1400
	Velocity Pressure	0.010	0.016	0.022	0.031	0.040	0.051	0.062	0.090	0.122
	Total Pressure, Pos. 1	0.029	0.045	0.065	0.089	0.116	0.146	0.181	0.260	0.354
	Total Pressure, Pos. 2	0.047	0.074	0.106	0.145	0.189	0.239	0.295	0.425	0.578
6" Dia.	Airflow, cfm	80	100	120	140	160	180	200	235	275
	NC, Pos.1	-	-	-	14	19	23	26	32	37
	NC, Pos.2	-	12	18	22	26	29	32	38	42
	Throw feet, Pos. 1	2-2-5	2-3-6	2-4-7	3-4-8	3-5-8	4-6-9	4-6-9	5-7-10	6-7-11
	Throw feet, Pos. 2	2-3-6	2-4-7	3-4-7	3-5-8	4-6-8	4-6-9	5-7-9	6-7-10	6-8-11
8" Dia.	Airflow, cfm	140	175	210	245	280	315	350	420	490
	NC, Pos.1	-	-	12	17	21	25	28	34	39
	NC, Pos.2	-	14	19	24	28	31	34	39	44
	Throw feet, Pos. 1	2-3-7	3-4-8	3-5-9	4-6-10	4-7-11	5-7-11	5-8-12	7-9-13	8-10-14
	Throw feet, Pos. 2	3-4-8	3-5-9	4-6-9	4-7-10	5-8-11	6-8-12	6-9-12	8-9-13	8-10-14
10" Dia.	Airflow, cfm	218	273	327	382	436	491	545	654	763
	NC, Pos.1	-	-	14	19	23	27	30	36	41
	NC, Pos.2	-	15	20	25	29	32	35	41	45
	Throw feet, Pos. 1	3-4-8	3-5-10	4-6-12	5-7-12	5-8-13	6-9-14	7-10-15	8-12-16	10-12-18
	Throw feet, Pos. 2	3-5-9	4-6-11	5-7-12	5-8-13	6-9-14	7-10-14	8-11-15	9-12-17	10-13-18
12" Dia.	Airflow, cfm	315	390	470	550	630	705	785	940	1100
	NC, Pos.1	-	-	16	20	25	29	32	38	43
	NC, Pos.2	-	16	21	26	30	33	36	42	46
	Throw feet, Pos. 1	3-5-10	4-6-12	5-7-14	6-9-15	7-10-16	7-11-17	8-12-18	10-14-20	11-15-21
	Throw feet, Pos. 2	4-6-11	5-7-13	6-8-14	7-10-15	8-11-16	8-12-17	9-13 -18	11-14-20	12-15-22
14" Dia.	Airflow, cfm	425	530	635	745	850	955	1060	1270	1490
	NC, Pos.1	-	11	17	22	26	30	33	39	44
	NC, Pos.2	11	17	22	27	31	34	37	42	47
	Throw feet, Pos. 1	4-6-11	5-7-14	6-8-16	7-10-17	8-11-19	8-13-20	9-14-21	11-16-23	13-17-25
	Throw feet, Pos. 2	4-7-13	5-8-15	7-10-16	8-11-18	9-13-19	10-14-20	11-15-21	13-16-23	14-18-25
16" Dia.	Airflow, cfm	560	700	840	980	1120	1260	1400	1680	1960
	NC, Pos.1	-	12	18	23	27	31	34	40	45
	NC, Pos.2	11	18	23	28	31	35	38	43	48
	Throw feet, Pos. 1	4-7-13	5-8--16	7-10-18	8-11-20	9-13-21	10-15-23	11-16-24	13-18-26	15-20-28
	Throw feet, Pos. 2	5-8-15	6-9-17	8-11-19	9-13-20	10-15-22	11-16-23	13-17-24	15-19-27	17-20-29
18" Dia.	Airflow, cfm	710	885	1060	1240	1420	1590	1770	2120	2480
	NC, Pos.1	-	13	19	24	28	32	35	41	46
	NC, Pos.2	12	18	24	28	32	36	39	44	48
	Throw feet, Pos. 1	5-7-15	6-9-18	7-11-21	9-13-22	10-15-24	11-17- 25	12-18-27	15-21-29	17-22-32
	Throw feet, Pos. 2	6-8--17	7-11-19	8-13-21	10-15-23	11-17-25	13-18-26	14-19-27	17-21-30	19-23-32
20" Dia.	Airflow, cfm	875	1100	1310	1530	1750	1970	2190	2610	3060
	NC, Pos.1	-	14	20	25	29	33	36	42	47
	NC, Pos.2	13	19	24	29	33	36	39	45	49
	Throw feet, Pos. 1	5-8-16	7-10-21	8-12-23	10-14-25	11-16-27	12-18-28	14-20-30	16-23-33	19-25-35
	Throw feet, Pos. 2	6-9-19	8-12-22	9-14-24	11-16-25	13-19-27	14-20-29	16-22-30	19-24-33	21-25-36
24" Dia.	Airflow, cfm	1260	1570	1880	2200	2510	2820	3140	3770	4400
	NC, Pos.1	-	16	22	27	31	35	38	44	49
	NC, Pos.2	14	20	25	30	34	37	40	46	50
	Throw feet, Pos. 1	7-10-20	8-12-24	10-15-28	11-17-30	13-20-32	15-22-34	16-24-36	20-28-39	23-30-42
	Throw feet, Pos. 2	8-11-23	9-14-26	11-17-28	13-20-31	15-23-33	17-24-35	19--26-36	23-28 -40	25-31-43
30" Dia.	Airflow, cfm	1960	2450	2940	3430	3920	4410	4900	5880	6860
	NC, Pos.1	-	18	23	28	33	37	40	46	51
	NC, Pos.2	15	21	27	31	35	38	41	47	51
	Throw feet, Pos. 1	8-12-24	10-15-31	12-18-35	14-21-37	16-24-40	18-27-42	20-31-45	24-35-49	28-37-53
	Throw feet, Pos. 2	9-14-28	12-18-32	14-21-35	16-25-38	19-28-41	21-31-43	23-32-46	28-35-50	31-38-54
36" Dia.	Airflow, cfm	2820	3520	4230	4930	5630	6340	7040	8450	9850
	NC, Pos.1	12	19	25	30	34	38	41	47	52
	NC, Pos.2	16	22	28	32	36	39	43	48	52
	Throw feet, Pos. 1	10-15-29	12-18-37	15-22-41	17-26-45	19-29-48	22-33-51	24-37-53	29-41-59	34-45-63
	Throw feet, Pos. 2	11-17-34	14-21-39	17-25-42	20-29-46	22-34-49	25-37-52	28-39-55	34-42-60	37-46-65

- All pressures given are in inches of water
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions
- To obtain static pressure, subtract the velocity pressure from the total pressure
- If the diffuser is mounted on an exposed duct, the throw values are 70% of those listed in the table and will project downward
- Each NC value represents the noise criteria curve which will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- Diffusers are shipped in Position 2 (cones down)
- Data obtained from tests conducted in accordance with ANSI / ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the section, Engineering Guidelines, for additional information.
- For an explanation of catalog throw data, see the Engineering Guidelines section of this catalog

Perforated Ceiling Diffusers

PAS / PAR / PDS / PDR

- Titus perforated ceiling diffusers are designed for both heating and cooling applications
- Excellent performance in variable air volume systems
- A tight, uniform, horizontal blanket of air protects the ceiling against smudging
- Return models have the same face and border construction as the supply models, for harmonious appearance in the room
- Discharge pattern (supply models) can be adjusted to vertical as well as to 1-, 2-, 3- or 4-way horizontal. Can be adjusted before or after installation.
- Discharge pattern is easily adjusted by unlatching and dropping the perforated face, then rotating the pattern controllers
- Dropping the perforated face also gives access to the optional damper



PAS PAR

metric sizes

See website for Specifications

AVAILABLE MODELS:

Steel Models:
PAS / Supply / Flush Face
PAR / Return / Flush Face
PDS / Supply / Drop Face
PDR / Return / Drop Face

Aluminum Models:
PAS-AA / Supply / Flush Face
PAR-AA / Return / Flush Face

FINISH

Standard Finish - #26 White

OVERVIEW

1-, 2-, 3-, or 4-Way Discharge Pattern

Perforated ceiling diffusers are typically selected to meet architectural demands for air outlets that blend into the ceiling plane. Titus perforated diffusers can be selected for a round pattern to maximize capacity or star pattern to maximize throw.

ADDITIONAL FEATURES

- Perforated face has 3/16" diameter holes on ¼" staggered centers
- Inlet collar (neck) has ample depth for easy duct connection
- Material is heavy gauge steel backpan; steel or aluminum perforated face according to the model selected
- Optional factory-installed R-6 foil-backed insulation available for 24 x 24" full face models, neck sizes 6-16, borders 1, 2, 3 and 4

PAS FLUSH FACE / SUPPLY / STEEL / ADJUSTABLE

		Neck Velocity	300	400	500	600	700	800	1000	1200	1400
		Velocity Pressure	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
12 x 12 Module	6" Dia.	Airflow, cfm	59	79	98	118	137	157	196	236	275
		Total Pressure	0.016	0.028	0.044	0.064	0.087	0.113	0.177	0.255	0.347
		NC (Noise Criteria)	-	-	-	16	21	25	32	38	43
		1-Way - Horizontal Throw	1-2-7	2-4-10	2-6-12	4-7-15	5-9-17	6-10-18	8-12-20	10-15-22	11-17-23
		2-Way - Horizontal Throw	1-2-5	2-4-7	2-4-9	4-5-11	4-6-12	5-7-14	6-9-17	7-11-18	8-12-20
		3-Way - Horizontal Throw	1-2-5	2-3-6	3-4-8	3-5-9	4-5-11	4-6-12	5-8-14	6-9-15	7-11-16
		4-Way - Horizontal Throw	1-2-3	1-2-5	2-3-6	2-3-7	3-4-8	3-5-9	4-6-11	5-7-12	5-8-13
	6 x 6 Neck	Airflow, cfm	75	100	125	150	175	200	250	300	350
		Total Pressure	0.017	0.029	0.046	0.066	0.090	0.118	0.184	0.265	0.360
		NC (Noise Criteria)	-	-	13	19	23	28	35	41	45
		1-Way - Horizontal Throw	1-2-8	2-4-11	3-6-14	4-8-17	5-10-19	7-11-20	9-14-22	11-17-24	13-19-26
		2-Way - Horizontal Throw	1-2-6	2-4-8	3-5-10	4-6-12	5-7-14	5-8-16	7-10-19	8-12-21	9-14-22
		3-Way - Horizontal Throw	1-3-5	2-3-7	3-4-9	3-5-10	4-6-12	5-7-14	6-9-16	7-10-17	8-12-19
		4-Way - Horizontal Throw	1-2-4	1-3-5	2-3-7	3-4-8	3-5-9	3-5-10	4-7-12	5-8-13	6-9-15
24 x 12 Module	6" Dia.	Airflow, cfm	59	79	98	118	137	157	196	236	275
		Total Pressure	0.016	0.028	0.044	0.064	0.087	0.113	0.177	0.255	0.347
		NC (Noise Criteria)	-	-	-	16	21	25	32	38	43
		1-Way - Horizontal Throw	1-2-7	2-4-10	2-6-12	4-7-15	5-9-17	6-10-18	8-12-20	10-15-22	11-17-23
		2-Way - Horizontal Throw	1-2-5	2-4-7	2-4-9	4-5-11	4-6-12	5-7-14	6-9-17	7-11-18	8-12-20
		3-Way - Horizontal Throw	1-2-5	2-3-6	3-4-8	3-5-9	4-5-11	4-6-12	5-8-14	6-9-15	7-11-16
		4-Way - Horizontal Throw	1-2-3	1-2-5	2-3-6	2-3-7	3-4-8	3-5-9	4-6-11	5-7-12	5-8-13
	6 x 6 Neck	Airflow, cfm	75	100	125	150	175	200	250	300	350
		Total Pressure	0.017	0.029	0.046	0.066	0.090	0.118	0.184	0.265	0.360
		NC (Noise Criteria)	-	-	13	19	23	28	35	41	45
		1-Way - Horizontal Throw	1-2-8	2-4-11	3-6-14	4-8-17	5-10-19	7-11-20	9-14-22	11-17-24	13-19-26
		2-Way - Horizontal Throw	1-2-6	2-4-8	3-5-10	4-6-12	5-7-14	5-8-16	7-10-19	8-12-21	9-14-22
		3-Way - Horizontal Throw	1-3-5	2-3-7	3-4-9	3-5-10	4-6-12	5-7-14	6-9-16	7-10-17	8-12-19
		4-Way - Horizontal Throw	1-2-4	1-3-5	2-3-7	3-4-8	3-5-9	3-5-10	4-7-12	5-8-13	6-9-15
16 x 16 Module	6" Dia.	Airflow, cfm	59	79	98	118	137	157	196	236	275
		Total Pressure	0.016	0.028	0.044	0.064	0.087	0.113	0.177	0.255	0.347
		NC (Noise Criteria)	-	-	-	16	21	25	32	38	43
		1-Way - Horizontal Throw	1-2-8	2-4-10	3-7-13	4-8-15	6-9-17	7-10-18	9-13-20	10-15-22	12-17-23
		2-Way - Horizontal Throw	1-2-6	2-4-8	3-5-10	4-6-11	4-7-13	5-8-15	6-10-17	8-11-18	9-13-20
		3-Way - Horizontal Throw	1-2-5	2-3-6	3-4-8	3-5-10	4-6-11	4-6-12	5-8-14	6-10-15	8-11-16
		4-Way - Horizontal Throw	1-2-4	2-2-5	2-3-6	2-4-7	3-4-9	3-5-10	4-6-11	5-7-12	6-9-13
	6 x 6 Neck	Airflow, cfm	75	100	125	150	175	200	250	300	350
		Total Pressure	0.017	0.029	0.046	0.066	0.090	0.118	0.184	0.265	0.360
		NC (Noise Criteria)	-	-	13	19	23	28	35	41	45
		1-Way - Horizontal Throw	1-3-9	2-5-12	3-7-15	5-9-17	7-10-19	8-12-20	10-15-22	12-17-24	14-19-26
		2-Way - Horizontal Throw	1-3-6	2-4-9	3-5-11	4-6-13	5-8-15	6-9-17	7-11-19	9-13-21	10-15-22
		3-Way - Horizontal Throw	1-3-5	2-4-7	3-5-9	4-5-11	4-6-13	5-7-14	6-9-16	7-11-17	9-13-19
		4-Way - Horizontal Throw	1-2-4	2-3-6	2-3-7	3-4-8	3-5-10	4-6-11	5-7-12	6-8-13	7-10-15
	8" Dia.	Airflow, cfm	105	140	175	209	244	279	349	419	489
		Total Pressure	0.018	0.032	0.049	0.071	0.097	0.126	0.197	0.284	0.386
		NC (Noise Criteria)	-	-	16	22	27	31	38	44	49
		1-Way - Horizontal Throw	1-3-10	3-6-14	4-9-17	6-10-20	8-12-22	9-14-24	12-17-26	14-20-29	16-22-31
		2-Way - Horizontal Throw	1-3-8	3-5-10	4-6-13	5-8-15	6-9-18	7-10-20	8-13-22	10-15-25	12-18-27
		3-Way - Horizontal Throw	2-3-6	3-4-9	4-5-11	4-6-13	5-8-15	6-9-17	7-11-18	9-13-20	10-15-22
		4-Way - Horizontal Throw	1-2-5	2-3-7	3-4-8	3-5-10	4-6-12	4-7-13	5-8-15	7-10-16	8-12-17
	8 x 8 Neck	Airflow, cfm	133	178	222	267	311	356	444	533	622
		Total Pressure	0.019	0.034	0.052	0.075	0.103	0.134	0.210	0.302	0.411
		NC (Noise Criteria)	-	12	19	25	29	34	41	47	51
		1-Way - Horizontal Throw	2-4-12	3-7-16	5-10-20	7-12-23	9-14-25	10-16-27	13-20-30	16-23-33	18-25-35
		2-Way - Horizontal Throw	2-4-9	3-6-11	5-7-14	6-9-17	7-10-20	8-11-23	10-14-25	11-17-28	13-20-30
		3-Way - Horizontal Throw	2-4-7	3-5-10	4-6-12	5-7-15	6-9-17	6-10-19	8-12-21	10-15-23	11-17-25
		4-Way - Horizontal Throw	1-3-6	2-4-7	3-5-9	4-6-11	4-7-13	5-7-15	6-9-16	7-11-18	9-13-19
	10" Dia.	Airflow, cfm	164	218	273	327	382	436	545	654	764
		Total Pressure	0.020	0.036	0.056	0.080	0.109	0.143	0.223	0.321	0.437
		NC (Noise Criteria)	-	14	21	27	32	36	43	49	54
		1-Way - Horizontal Throw	2-4-13	3-7-17	5-11-22	7-13-26	10-15-28	12-17-30	15-22-33	17-26-36	20-28-39
		2-Way - Horizontal Throw	2-4-10	3-6-13	5-8-16	6-10-19	7-11-22	8-13-25	11-16-28	13-19-31	15-22-33
		3-Way - Horizontal Throw	2-4-8	4-5-11	4-7-13	5-8-16	6-9-19	7-11-21	9-13-23	11-16-25	13-19-27
		4-Way - Horizontal Throw	1-3-6	3-4-8	3-5-10	4-6-12	5-7-14	5-8-16	7-10-18	8-12-20	10-14-21

Performance notes appear at end of performance data

PAS FLUSH FACE / SUPPLY / STEEL / ADJUSTABLE

		Neck Velocity	300	400	500	600	700	800	1000	1200	1400
		Velocity Pressure	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
24 x 24 Module	6" Dia.	Airflow, cfm	59	79	98	118	137	157	196	236	275
		Total Pressure	0.016	0.028	0.044	0.064	0.087	0.113	0.177	0.255	0.347
		NC (Noise Criteria)	-	-	-	16	21	25	32	38	43
		1-Way - Horizontal Throw	1-2-8	2-4-10	3-7-13	4-8-15	6-9-17	7-10-18	9-13-20	10-15-22	12-17-23
		2-Way - Horizontal Throw	1-2-6	2-4-8	3-5-10	4-6-11	4-7-13	5-8-15	6-10-17	8-11-18	9-13-20
		3-Way - Horizontal Throw	1-2-5	2-3-6	3-4-8	3-5-10	4-6-11	4-6-12	5-8-14	6-10-15	8-11-16
		4-Way - Horizontal Throw	1-2-4	2-2-5	2-3-6	2-4-7	3-4-9	3-5-10	4-6-11	5-7-12	6-9-13
	6 x 6 Neck	Airflow, cfm	75	100	125	150	175	200	250	300	350
		Total Pressure	0.017	0.029	0.046	0.066	0.090	0.118	0.184	0.265	0.360
		NC (Noise Criteria)	-	-	13	19	23	28	35	41	45
		1-Way - Horizontal Throw	1-3-9	2-5-12	3-7-15	5-9-17	7-10-19	8-12-20	10-15-22	12-17-24	14-19-26
		2-Way - Horizontal Throw	1-3-6	2-4-9	3-5-11	4-6-13	5-8-15	6-9-17	7-11-19	9-13-21	10-15-22
		3-Way - Horizontal Throw	1-3-5	2-4-7	3-5-9	4-5-11	4-6-13	5-7-14	6-9-16	7-11-17	9-13-19
		4-Way - Horizontal Throw	1-2-4	2-3-6	2-3-7	3-4-8	3-5-10	4-6-11	5-7-12	6-8-13	7-10-15
	8" Dia.	Airflow, cfm	105	140	175	209	244	279	349	419	489
		Total Pressure	0.018	0.032	0.049	0.071	0.097	0.126	0.197	0.284	0.386
		NC (Noise Criteria)	-	-	16	22	27	31	38	44	49
		1-Way - Horizontal Throw	1-3-10	3-6-14	4-9-17	6-10-20	8-12-22	9-14-24	12-17-26	14-20-29	16-22-31
		2-Way - Horizontal Throw	1-3-8	3-5-10	4-6-13	5-8-15	6-9-18	7-10-20	8-13-22	10-15-25	12-18-27
		3-Way - Horizontal Throw	2-3-6	3-4-9	4-5-11	4-6-13	5-8-15	6-9-17	7-11-18	9-13-20	10-15-22
		4-Way - Horizontal Throw	1-2-5	2-3-7	3-4-8	3-5-10	4-6-12	4-7-13	5-8-15	7-10-16	8-12-17
	8 x 8 Neck	Airflow, cfm	133	178	222	267	311	356	444	533	622
		Total Pressure	0.019	0.034	0.052	0.075	0.103	0.134	0.210	0.302	0.411
		NC (Noise Criteria)	-	12	19	25	29	34	41	47	51
		1-Way - Horizontal Throw	2-4-12	3-7-16	5-10-20	7-12-23	9-14-25	10-16-27	13-20-30	16-23-33	18-25-35
		2-Way - Horizontal Throw	2-4-9	3-6-11	5-7-14	6-9-17	7-10-20	8-11-23	10-14-25	11-17-28	13-20-30
		3-Way - Horizontal Throw	2-4-7	3-5-10	4-6-12	5-7-15	6-9-17	6-10-19	8-12-21	10-15-23	11-17-25
		4-Way - Horizontal Throw	1-3-6	2-4-7	3-5-9	4-6-11	4-7-13	5-7-15	6-9-16	7-11-18	9-13-19
	10" Dia.	Airflow, cfm	164	218	273	327	382	436	545	654	764
		Total Pressure	0.020	0.036	0.056	0.080	0.109	0.143	0.223	0.321	0.437
		NC (Noise Criteria)	-	14	21	27	32	36	43	49	54
		1-Way - Horizontal Throw	2-4-13	3-7-17	5-11-22	7-13-26	10-15-28	12-17-30	15-22-33	17-26-36	20-28-39
		2-Way - Horizontal Throw	2-4-10	3-6-13	5-8-16	6-10-19	7-11-22	8-13-25	11-16-28	13-19-31	15-22-33
		3-Way - Horizontal Throw	2-4-8	4-5-11	4-7-13	5-8-16	6-9-19	7-11-21	9-13-23	11-16-25	13-19-27
		4-Way - Horizontal Throw	1-3-6	3-4-8	3-5-10	4-6-12	5-7-14	5-8-16	7-10-18	8-12-20	10-14-21
	10 x 10 Neck	Airflow, cfm	208	278	347	417	486	556	694	833	972
		Total Pressure	0.022	0.039	0.061	0.087	0.119	0.155	0.243	0.349	0.476
		NC (Noise Criteria)	-	16	23	29	34	38	45	51	56
		1-Way - Horizontal Throw	2-5-15	4-8-20	6-12-25	8-15-29	11-17-31	13-20-33	16-25-37	20-29-41	23-31-44
		2-Way - Horizontal Throw	2-5-11	4-7-14	6-9-18	7-11-21	8-13-25	10-14-28	12-18-32	14-21-35	17-25-37
		3-Way - Horizontal Throw	2-5-9	4-6-12	5-8-15	6-9-18	7-11-21	8-12-23	10-15-26	12-18-29	14-21-31
		4-Way - Horizontal Throw	2-3-7	3-5-9	4-6-12	5-7-14	5-8-16	6-9-18	8-12-20	9-14-22	11-16-24
	12" Dia.	Airflow, cfm	236	314	393	471	550	628	785	942	1100
		Total Pressure	0.032	0.057	0.089	0.128	0.174	0.227	0.355	0.510	0.695
		NC (Noise Criteria)	-	18	25	30	35	40	47	52	57
		1-Way - Horizontal Throw	7-12-22	10-16-25	13-19-28	16-22-31	18-23-33	20-25-35	23-28-40	25-31-43	27-33-47
		2-Way - Horizontal Throw	6-8-17	8-11-21	9-14-24	11-17-26	13-20-28	15-21-30	19-24-34	21-26-37	23-28-40
		3-Way - Horizontal Throw	5-7-14	6-10-18	8-12-20	10-14-21	11-16-23	13-18-25	16-20-28	18-21-30	19-23-33
		4-Way - Horizontal Throw	4-6-11	5-7-14	6-9-15	7-11-17	9-13-18	10-14-19	12-15-22	14-17-24	15-18-26
	12 x 12 Neck	Airflow, cfm	300	400	500	600	700	800	1000	1200	1400
		Total Pressure	0.033	0.059	0.092	0.133	0.181	0.236	0.369	0.531	0.723
		NC (Noise Criteria)	-	20	27	33	38	42	49	55	60
		1-Way - Horizontal Throw	8-13-24	12-18-28	15-22-32	18-24-35	20-26-37	23-28-40	26-32-45	28-35-49	31-37-53
		2-Way - Horizontal Throw	6-10-19	9-13-24	11-16-27	13-19-29	15-22-32	17-24-34	21-27-38	24-29-42	26-32-45
		3-Way - Horizontal Throw	5-8-16	7-11-20	9-14-22	11-16-24	13-19-26	14-20-28	18-22-31	20-24-34	21-26-37
		4-Way - Horizontal Throw	4-6-12	6-8-16	7-10-17	8-12-19	10-15-21	11-16-22	14-17-25	16-19-27	17-21-29
	14" Dia.	Airflow, cfm	321	428	535	641	748	855	1069	1283	1497
		Total Pressure	0.034	0.060	0.093	0.135	0.183	0.239	0.374	0.538	0.733
		NC (Noise Criteria)	12	21	28	34	38	43	50	56	60
		1-Way - Horizontal Throw	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
		2-Way - Horizontal Throw	7-10-20	9-13-25	11-17-28	13-20-30	15-23-33	18-25-35	22-28-39	25-30-43	27-33-47
		3-Way - Horizontal Throw	6-8-17	7-11-20	9-14-23	11-17-25	13-19-27	15-20-29	19-23-32	20-25-35	22-27-38
		4-Way - Horizontal Throw	4-6-13	6-9-16	7-11-18	9-13-20	10-15-21	11-16-23	14-18-25	16-20-28	17-21-30
	16" Dia.	Airflow, cfm	419	559	698	838	977	1117	1396	1676	1955
		Total Pressure	0.036	0.063	0.099	0.143	0.194	0.253	0.396	0.570	0.776
		NC (Noise Criteria)	14	23	31	36	41	45	53	58	63
		1-Way - Horizontal Throw	10-16-29	14-21-33	17-26-37	21-29-41	24-31-44	27-33-47	31-37-53	33-41-58	36-44-63
		2-Way - Horizontal Throw	8-11-23	10-15-28	13-19-32	15-23-35	18-26-38	20-28-40	25-32-45	28-35-49	31-38-53
		3-Way - Horizontal Throw	6-10-19	9-13-23	11-16-26	13-19-29	15-22-31	17-23-33	21-26-37	23-29-41	25-31-44
		4-Way - Horizontal Throw	5-7-15	7-10-18	8-12-21	10-15-23	11-17-24	13-18-26	16-21-29	18-23-32	20-24-34

Performance notes appear at end of performance data

PERFORMANCE DATA

- Data obtained from tests conducted in accordance with ANSI / ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions
- For an explanation of catalog throw data, see the section, Engineering Guidelines
- NC values based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- All pressures are given in inches of water
- To obtain static pressure, subtract the velocity pressure from the total pressure

PAR, PXP, PMR, PXP-DR, PDR PERFORMANCE DATA

PAR, PXP, PMR - FLUSH FACE - RETURN; PXP-DR, PDR - DROP FACE - RETURN

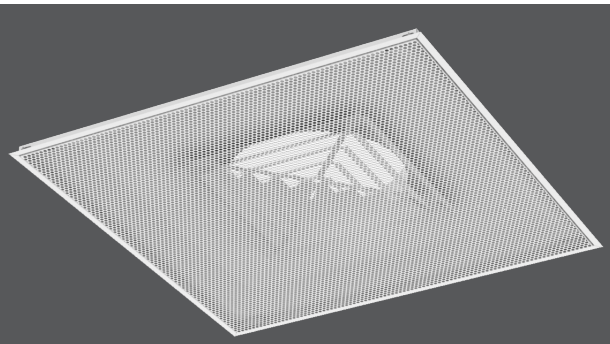
12 x 12 Face	Neck Size	Neck Vel, fpm	300	400	500	600	700	800	1000	1200	1400
		Vp, in. Wg	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.09	0.12
		Ps (-), in. Wg	0.03	0.06	0.09	0.13	0.17	0.23	0.36	0.51	0.70
	6 Dia. *	Flow Rate, cfm	59	78	98	118	137	157	196	235	275
		Room NC	-	-	-	14	18	21	27	32	36
	6 x 6 Neck *	Flow Rate, cfm	75	100	125	150	175	200	250	300	350
		Room NC	-	-	12	17	21	24	30	35	39
	10 x 10 Neck	Flow Rate, cfm	208	278	347	417	486	556	694	833	972
		Room NC	15	23	29	33	37	41	47	51	55
24 x 24 Face	Neck Size	Neck Vel, fpm	300	400	500	600	700	800	1000	1200	1400
		Vp, in. Wg	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.09	0.12
		Ps (-), in. Wg	0.03	0.06	0.09	0.13	0.18	0.24	0.37	0.54	0.73
	6 Dia. *	Flow Rate, cfm	59	78	98	118	137	157	196	235	275
		Room NC	-	-	-	13	17	20	26	31	34
	6 x 6 Neck *	Flow Rate, cfm	75	100	125	150	175	200	250	300	350
		Room NC	-	-	-	14	18	21	27	32	35
	8 Dia. *	Flow Rate, cfm	105	140	174	209	244	279	349	419	488
		Room NC	-	-	13	17	21	24	30	35	38
	8 x 8 Neck *	Flow Rate, cfm	133	178	222	267	311	356	444	533	622
		Room NC	-	-	14	18	22	25	31	36	39
	10 Dia.*	Flow Rate, cfm	164	218	273	327	382	436	545	654	763
		Room NC	-	-	16	20	24	27	33	38	41
	10 x 10 Neck *	Flow Rate, cfm	208	278	347	417	486	556	694	833	972
		Room NC	-	11	17	21	25	28	34	39	42
	12 Dia. *	Flow Rate, cfm	235	314	392	471	549	628	785	942	1099
		Room NC	-	12	17	22	26	29	34	39	43
	12 x 12 Neck *	Flow Rate, cfm	300	400	500	600	700	800	1000	1200	1400
		Room NC	-	14	20	24	28	31	37	42	45
	14 Dia. *	Flow Rate, cfm	320	427	534	641	748	855	1068	1282	1495
		Room NC	-	15	21	25	29	32	38	43	46
	15 x 15 Neck *	Flow Rate, cfm	469	625	781	938	1094	1250	1563	1875	2188
		Room NC	-	16	22	26	30	33	39	44	47
	16 Dia. *	Flow Rate, cfm	419	558	698	837	977	1116	1395	1674	1953
		Room NC	11	18	24	28	32	35	41	46	49
	18 x 18 Neck *	Flow Rate, cfm	675	900	1125	1350	1575	1800	2250	2700	3150
		Room NC	11	18	24	28	32	36	41	46	49
	22 x 22 Neck	Flow Rate, cfm	1008	1344	1681	2017	2353	2689	3361	4033	4706
		Room NC	13	20	26	30	34	37	43	47	51
Other Sizes	Neck Size	Neck Vel, fpm	300	400	500	600	700	800	1000	1200	1400
		Vp, in. Wg	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.09	0.12
		Ps (-), in. Wg	0.03	0.06	0.09	0.13	0.17	0.23	0.36	0.51	0.70
	10 x 22 (12 x 24 Face)	Flow Rate, cfm	458	611	764	917	1069	1222	1528	1833	2139
		Room NC	-	-	-	14	18	21	27	32	36
	14 x 14 (16 x 16 Face)	Flow Rate, cfm	408	544	681	817	953	1089	1361	1633	1906
		Room NC	-	-	12	17	21	24	30	35	39
	18 x 18 (20 x 20 Face)	Flow Rate, cfm	675	900	1125	1350	1575	1800	2250	2700	3150
		Room NC	-	11	17	22	26	29	35	40	44
	22 x 46 (24 x 48 Face)	Flow Rate, cfm	2108	2811	3514	4217	4919	5622	7028	8433	9839
		Room NC	12	20	25	30	34	38	43	48	52

PAR, PXP, PMR, PXP-DR, PDR PERFORMANCE NOTES

- Supply unit with deflectors removed
- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- Noise Criteria (NC) based on a room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006
- These products have been tested per ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field.
- See the section, Engineering Guidelines for additional information

PSS / PSS-DF / PSS-AA

- Titus Series PSS perforated star diffusers generate a high induction air pattern that maximizes throw
- PSS diffusers deliver a horizontal blanket of air that adheres to the ceiling even at varying volumes. An excellent choice for VAV systems.
- Deflector is mounted directly under the neck of the diffuser to generate the long-throw star pattern
- Pressure drop and noise levels are lower than typical curved blade perforated diffusers
- Vertical air pattern can be obtained by turning all deflector blades inward
- Three-way pattern or corner blow can be field adjusted with no increase in pressure drop or sound level
- Available with either side blow or corner blow. Side blow maximizes throw. Corner blow maximizes wall surface coverage in a perimeter installation.



PSS / PSS-DF / PSS-AA

AVAILABLE MODELS:

Steel Models:
PSS / Flush Face
PSS-DF / Drop Face

Aluminum Model:
PSS-AA / Flush Face

FINISH

Standard Finish - #26 White

OVERVIEW

Star Pattern / Adjustable

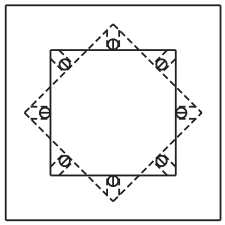
Titus Series PSS perforated star diffusers generate a high induction air pattern that maximizes throw. The deflector is mounted directly under the neck of the diffuser to generate the long-throw star pattern. As a result, pressure drop and noise levels are lower than typical curved blade perforated diffusers.

ADDITIONAL FEATURES

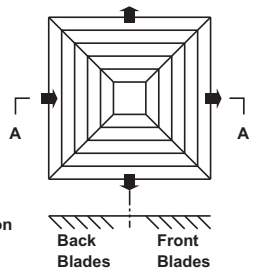
- Can be changed to either side blow or corner blow in the field
- Round neck with deep collar for easy connection to flexible duct
- Perforated face is hinged to allow access to the star deflector. The optional damper is adjustable after removal of the star deflector.
- Perforated face has 3/16" holes on ¼" staggered centers
- Material is heavy gauge steel backpan with steel or aluminum perforated face, according to the model selected
- Optional factory-installed R-6 foil-backed insulation available for 24 x 24" full face models, neck sizes 6-16, borders 1, 2, 3 and 4

See website for Specifications

FIELD ADJUSTMENTS



Pattern can be changed from side blow to corner blow and vice versa by removing four screws, rotating deflector 45 degrees, and replacing screws.



Back blades can be redirected to produce directional adjustment pattern as shown above.

PSS / ADJUSTABLE / SIDE AND CORNER BLOW PATTERN

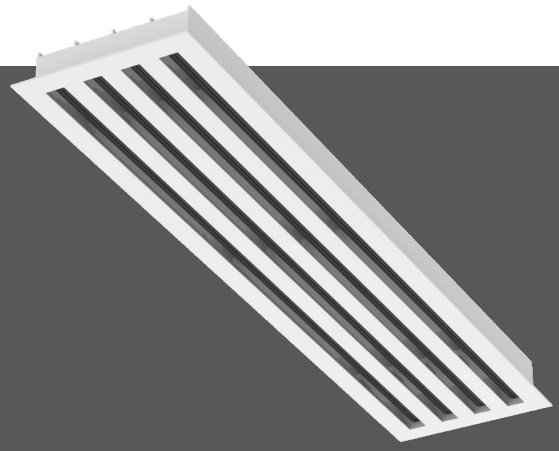
		Neck Velocity	300	400	500	600	700	800	1000	1200	1400
		Velocity Pressure	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
12 x 12 Module	6" Dia.	Airflow, cfm	59	79	98	118	137	157	196	236	275
		Total Pressure	0.022	0.039	0.060	0.087	0.118	0.154	0.241	0.347	0.473
		NC (Noise Criteria)	-	-	16	22	27	32	39	45	50
		Throw	1-2-5	2-3-6	3-4-8	3-5-9	4-6-10	4-6-10	5-8-12	6-9-13	8-10-14
	6 x 6 Neck	Airflow, cfm	75	100	125	150	175	200	250	300	350
		Total Pressure	0.024	0.043	0.067	0.097	0.131	0.172	0.268	0.386	0.525
		NC (Noise Criteria)	-	-	17	23	28	33	40	46	51
		Throw	2-3-6	3-4-8	3-5-9	4-6-10	5-7-11	5-8-12	6-9-13	8-10-14	9-11-15
24 x 24 Module	6" Dia.	Airflow, cfm	59	79	98	118	137	157	196	236	275
		Total Pressure	0.016	0.029	0.045	0.065	0.088	0.115	0.180	0.258	0.352
		NC (Noise Criteria)	-	-	16	22	27	32	39	45	50
		Throw	1-2-5	2-3-6	3-4-8	3-5-9	4-6-10	4-6-10	5-8-12	6-9-13	8-10-14
	6 x 6 Neck	Airflow, cfm	75	100	125	150	175	200	250	300	350
		Total Pressure	0.017	0.030	0.047	0.067	0.091	0.119	0.187	0.269	0.366
		NC (Noise Criteria)	-	-	17	23	28	33	40	46	51
		Throw	2-3-6	3-4-8	3-5-9	4-6-10	5-7-11	5-8-12	6-9-13	8-10-14	9-11-15
	8" Dia.	Airflow, cfm	105	140	175	209	244	279	349	419	489
		Total Pressure	0.018	0.032	0.050	0.072	0.098	0.128	0.200	0.288	0.392
		NC (Noise Criteria)	-	11	19	25	30	34	41	48	53
		Throw	2-4-7	3-5-10	4-6-11	5-7-12	6-9-13	6-10-14	8-11-15	10-12-17	11-13-18
	8 x 8 Neck	Airflow, cfm	133	178	222	267	311	356	444	533	622
		Total Pressure	0.019	0.034	0.053	0.076	0.104	0.136	0.212	0.306	0.416
		NC (Noise Criteria)	-	12	20	26	31	35	42	49	54
		Throw	3-4-9	4-6-11	5-7-12	6-9-14	7-10-15	8-11-16	9-12-17	11-14-19	12-15-21
	10" Dia.	Airflow, cfm	164	218	273	327	382	436	545	654	764
		Total Pressure	0.020	0.036	0.056	0.081	0.111	0.145	0.226	0.325	0.443
		NC (Noise Criteria)	-	13	20	26	32	36	43	49	54
		Throw	3-5-10	4-6-12	5-8-14	6-10-15	8-11-16	9-12-17	11-14-19	12-15-21	13-16-23
	10 x 10 Neck	Airflow, cfm	208	278	347	417	486	556	694	833	972
		Total Pressure	0.022	0.039	0.061	0.088	0.120	0.157	0.246	0.354	0.481
		NC (Noise Criteria)	-	14	21	27	33	37	44	50	55
		Throw	4-6-11	5-8-14	6-9-15	8-11-17	9-13-18	10-14-20	13-15-22	14-17-24	15-18-26
	12" Dia.	Airflow, cfm	236	314	393	471	550	628	785	942	1100
		Total Pressure	0.023	0.041	0.064	0.093	0.126	0.165	0.258	0.371	0.505
		NC (Noise Criteria)	-	15	22	28	33	37	45	51	56
		Throw	4-6-12	5-8-15	7-10-16	8-12-18	9-14-19	11-15-21	13-16-23	15-18-25	16-19-27
	12 x 12 Neck	Airflow, cfm	300	400	500	600	700	800	1000	1200	1400
		Total Pressure	0.021	0.036	0.057	0.082	0.112	0.146	0.228	0.328	0.447
		NC (Noise Criteria)	-	16	23	29	34	38	46	52	57
		Throw	5-7-14	6-9-17	8-12-18	9-14-20	11-15-22	12-17-23	15-18-26	17-20-29	18-22-31
	14" Dia.	Airflow, cfm	321	428	535	641	748	855	1069	1283	1497
		Total Pressure	0.021	0.037	0.057	0.083	0.112	0.147	0.229	0.330	0.449
		NC (Noise Criteria)	-	16	23	29	34	39	46	52	57
		Throw	5-7-15	6-10-17	8-12-19	10-15-21	11-16-23	13-17-24	16-19-27	17-21-30	18-23-32
	16" Dia.	Airflow, cfm	419	559	698	838	977	1117	1396	1676	1955
		Total Pressure	0.021	0.038	0.059	0.085	0.115	0.151	0.235	0.339	0.461
		NC (Noise Criteria)	-	17	24	30	35	40	47	53	58
		Throw	6-8-17	7-11-20	9-14-22	11-17-24	13-18-26	15-20-28	18-22-31	20-24-34	21-26-37

- Data obtained from tests conducted in accordance with ANSI/ ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions
- For an explanation of catalog throw data, see the Engineering Guidelines section of this catalog
- NC values based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- All pressures are given in inches of water
- To obtain static pressure, subtract the velocity pressure from the total pressure

Linear Slot Ceiling Diffusers

ML / MLR / ML-TZ

- Titus modulinear diffusers are designed for variable air volume systems. They project a uniform blanket of air that adheres to the ceiling even at low flow rates.
- Both the direction and volume of the discharge air can be adjusted gradually by moving the pattern controllers (see diagrams below)
- Full 180° pattern controller adjustment means there are no "lefts" or "rights." Specifying, ordering, and installing are simplified.
- Model MLR returns are the same as the Model ML supply diffusers except that the pattern controllers are omitted.
- Choice of borders and mounting frames for various types of installations
- Available with one to eight slots
- Ideal for continuous length applications. Multiple sections are shipped with required alignment strips or pins for field installation.



ML

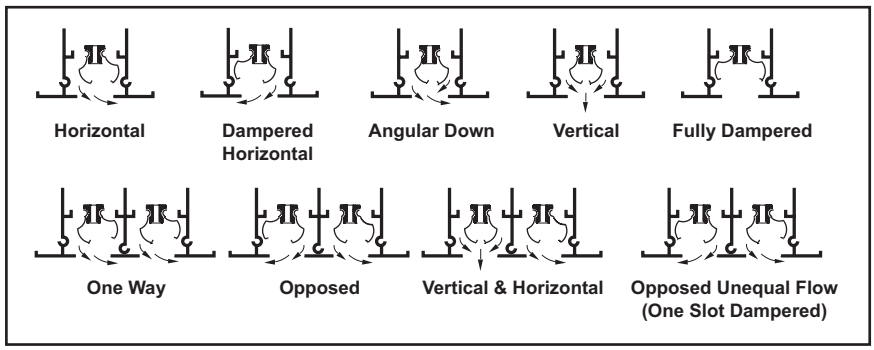
metric sizes | duct mounted | open ceiling

See website for Specifications

AVAILABLE MODELS:

Supply Models:
ML-37 / ½" Slot
ML-38 / ¾" Slot
ML-39 / 1" Slot
ML-40 / 1½" Slot
ML-TZ / ¾" Slot

Return Models:
MLR-37 / ½" Slot
MLR-38 / ¾" Slot
MLR-39 / 1" Slot
MLR-40 / 1½" Slot
MLR-TZ / ¾" Slot



FINISHES

Standard Finish - #26 White border. Black pattern controllers
Optional Finish - Anodized finishes available

OVERVIEW

Modulinear / Aluminum

The Titus ML Modulinear diffuser is a high performance, high quality linear slot diffuser. The unique "ice tong" deflector blades allow both changes in air volume and direction from the face of the diffuser. This diffuser is also available in 1 through 8-slot configurations with the exception of the ML-40, which is available in 1 through 4-slot configurations.

ADDITIONAL FEATURES

- Maximum one piece section is 6 feet. Lengths greater than 6 feet are furnished in multiple sections
- Optional Model MLF and MLRF diffusers are designed for field cutting to length and are furnished in 6-foot sections
- Maximum pattern controller length is 3 feet. Pattern controllers are furnished in multiple sections for a diffuser longer than 3 feet.
- Mounting frames are cut to length and assembled in the field
- Material is extruded aluminum with steel pattern controllers
- Optional curving to a 6-foot minimum radius available for architectural enhancement (fixed blades only)

ML-39 / 1" SLOT SPACING WIDTH / SUPPLY WITH CONTINUOUS PLENUM

1-Slot	Airflow, cfm/ft.	7	13	20	26	33	40	46	53	59
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	-	13	20	26	30	34	37	40
	Horizontal	1-2-6	3-6-16	6-12-21	11-16-24	14-19-27	16-21-29	18-22-32	20-24-34	21-25-36
	Vertical	2	8	12	14	15	17	18	19	20
2-Slot	Airflow, cfm/ft.	13	26	40	53	66	79	92	106	119
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	-	16	23	29	33	37	40	43
	Horizontal	1-3-12	5-12-23	12-17-29	15-23-34	19-27-38	23-29-42	26-32-45	28-34-48	29-36-51
	Vertical	5	11	16	19	22	24	26	28	30
3-Slot	Airflow, cfm/ft.	20	40	59	79	99	119	139	158	178
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	-	18	25	30	35	39	42	45
	Horizontal	2-5-14	8-14-28	14-21-36	19-28-42	23-33-46	28-36-51	32-39-55	34-42-59	36-44-62
	Vertical	7	13	20	24	27	29	32	34	36
4-Slot	Airflow, cfm/ft.	26	53	79	106	132	158	185	211	238
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	-	19	26	32	36	40	43	46
	Horizontal	3-6-16	11-16-33	16-24-42	22-33-48	27-38-54	33-42-59	37-45-63	39-48-68	42-51-72
	Vertical	8	15	23	28	31	34	36	39	42
5-Slot	Airflow, cfm/ft.	33	66	99	132	165	198	231	264	297
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	-	20	27	33	37	41	44	47
	Horizontal	4-8-18	12-18-36	18-27-46	24-36-54	30-42-60	36-46-66	41-50-71	44-54-76	46-57-80
	Vertical	9	17	25	31	34	38	41	43	45
6-Slot	Airflow, cfm/ft.	40	79	119	158	198	238	277	317	356
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	12	21	28	33	38	42	45	48
	Horizontal	5-10-20	13-20-40	20-30-51	27-40-59	33-46-66	40-51-72	45-55-78	48-59-83	51-62-88
	Vertical	9	19	28	34	38	41	45	48	51
7-Slot	Airflow, cfm/ft.	46	92	139	185	231	277	323	370	416
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	12	22	29	34	38	42	45	48
	Horizontal	6-11-22	14-22-43	22-32-55	29-43-63	36-50-71	43-55-78	48-59-84	52-63-90	55-67-95
	Vertical	10	20	30	36	41	45	48	52	55
8-Slot	Airflow, cfm/ft.	53	106	158	211	264	317	370	422	475
	Static Pressure	0.004	0.014	0.032	0.057	0.089	0.128	0.174	0.228	0.288
	NC (Noise Criteria)	-	13	23	29	35	39	43	46	49
	Horizontal	8-12-23	15-23-46	23-35-59	31-46-68	38-54-76	46-59-83	52-63-90	55-68-96	59-72-102
	Vertical	11	22	32	39	43	48	52	55	58

NC corrections for various diffuser lengths

Length	2	4	6	8	10
Supply	-3	0	+2	+3	+5
Return	0	+3	+5	+6	+8

Throw correction multiplier for length

Length	2	4	8	10
Throw Correction	0.72	1.0	1.5	1.7

- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the engineering section of this catalog for additional information.
- Horizontal throw values given are for terminal velocities of 150, 100 and 50 fpm
- Throw values given are for isothermal conditions, and are based on 4-foot active section. For other lengths, see the Throw Correction Table.
- Pressure is given in inches of WG for ML only
- Vertical throw values are given for terminal velocities of 50 fpm
- For divided throw, use the cfm-per-foot value for the number of slots in each direction. For sound, use the NC values for cfm-per-foot for the total number of slots.
- Each NC value represents the noise criteria curve which will not be exceeded by the sound pressure in any of the octave bands, 2nd through 7th, with a room absorption of 10 dB, re 10^{-12} watts
- For vertical throw, deduct 11 NC
- Dash (-) in space denotes an NC value of less than 10
- NC is based on 4-foot lengths; for other lengths use the NC correction table
- Throws listed are for the 1-way pattern. For divided airflow, select the airflow in each direction according to the number of slots aimed in that direction, with the total airflow apportioned between slots. For an explanation of catalog throw data, see the Engineering Guidelines section of the catalog.
- Data obtained using plenums with duct velocities less than 800 fpm. See model MP (pages F34-F45) for data with Titus plenums.
- For continuous lengths it is recommended that maximum active lengths are no longer than 10 feet

RETURN PERFORMANCE DATA FOR PLENUM APPLICATIONS

- All pressures are in inches of water
- NC values are based on a room absorption of 10 dB, re 10^{-12} watts, with a 10-foot active diffuser section (see the table below)
- Dash (—) in space denotes NC value less than 10
- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006
- For continuous lengths it is recommended that maximum active lengths are no longer than 10 feet

NC Correction for Various MLR Lengths

Length (ft.)	2	4	10	15	20
MLR	-7	-4	0	+2	+3

MLR-37

No. of Slots	Negative SP	0.011	0.025	0.045	0.072	0.103	0.180	0.275	0.415
1	cfm per ft.	10	15	20	25	30	40	50	60
	NC	—	—	14	20	25	33	39	44
2	cfm per ft.	20	30	40	50	60	80	100	120
	NC	—	—	17	23	28	36	42	47
3	cfm per ft.	30	45	60	75	90	120	150	180
	NC	—	11	19	25	30	38	44	49
4	cfm per ft.	40	60	80	100	120	160	200	240
	NC	—	12	20	26	31	39	45	50
5	cfm per ft.	50	75	100	125	150	200	250	300
	NC	—	13	21	27	32	40	46	51
6	cfm per ft.	60	90	120	150	180	240	300	360
	NC	—	14	22	28	33	41	47	52
7	cfm per ft.	70	105	140	175	210	280	350	420
	NC	—	15	23	29	34	42	48	53
8	cfm per ft.	80	120	160	200	240	320	400	480
	NC	—	15	23	29	34	42	48	53

MLR-38, -TZ

No. of Slots	Negative SP	0.007	0.028	0.063	0.108	0.170	0.250	0.345	0.450
1	cfm per ft.	10	20	30	40	50	60	70	80
	NC	—	—	18	26	32	37	41	45
2	cfm per ft.	20	40	60	80	100	120	140	160
	NC	—	10	21	29	35	40	44	48
3	cfm per ft.	30	60	90	120	150	180	210	240
	NC	—	12	23	31	37	42	46	50
4	cfm per ft.	40	80	120	160	200	240	280	320
	NC	—	13	24	32	38	43	47	51
5	cfm per ft.	50	100	150	200	250	300	350	400
	NC	—	14	25	33	39	44	48	52
6	cfm per ft.	60	120	180	240	300	360	420	480
	NC	—	15	26	34	40	45	49	53
7	cfm per ft.	70	140	210	280	350	420	490	560
	NC	—	16	27	35	41	46	50	54
8	cfm per ft.	80	160	240	320	400	480	560	640
	NC	—	16	27	35	41	46	50	54

MLR-39

No. of Slots	Negative SP	0.018	0.040	0.070	0.108	0.160	0.215	0.280	0.450
1	cfm per ft.	20	30	40	50	60	70	80	100
	NC	—	11	19	25	30	34	38	44
2	cfm per ft.	40	60	80	100	120	140	160	200
	NC	—	14	22	28	33	37	41	47
3	cfm per ft.	60	90	120	150	180	210	240	300
	NC	—	16	24	30	35	39	43	49
4	cfm per ft.	80	120	160	200	240	280	320	400
	NC	—	17	25	31	36	40	44	50
5	cfm per ft.	100	150	200	250	300	350	400	500
	NC	—	18	26	32	37	41	45	51
6	cfm per ft.	120	180	240	300	360	420	480	600
	NC	—	19	27	33	38	42	46	52
7	cfm per ft.	140	210	280	350	420	490	560	700
	NC	—	20	28	34	39	43	47	53
8	cfm per ft.	160	240	320	400	480	560	640	800
	NC	—	20	28	34	39	43	47	53

TBD-80

- The TBD-80 slot diffuser is outstanding for its flexibility in both installation and performance
- The direction of airflow is adjustable through a full 180° from the face of the diffuser. In addition, the TBD-80 is available with 1 to 4 slots and with three different slot widths, for a broad range of capacities.
- The TBD-80 works with many types of ceiling systems—plaster, splined, and regressed, as well as standard lay-in
- When set for a horizontal discharge, the TBD-80 projects a tight blanket of air across the ceiling from minimum to maximum flow. TBD-80 provides excellent VAV performance.
- An important advantage of this diffuser is in the gasket edged blade. In the horizontal discharge setting, either right or left, the gasket at the top of the pattern controller seats against the inside of the diffuser plenum wall or slot divider, assuring pure horizontal flow. The pattern controller can also be set for vertical flow.

TBD-80

open ceiling

See website for Specifications

MODELS:

TBD-80 / Supply
TBDI-80 / Supply / Insulated

FINISHES:

Standard Finish - #26 White on center T-bars and optional side T-bars
#84 Black on exposed surfaces

OVERVIEW

Gasketed Blade / 1 & 2 Slots, 8" / 3 & 4 Slots, 11"

Titus TBD series plenum slot diffusers provide flexibility, great performance and ease of installation. Their adjustability and streamlined appearance make them the industry standard for plenum slot diffusers. The TBD-80 works with many types of ceiling systems - plaster, splined, regressed, and standard lay-in.

ADVANTAGES

- Standard diffuser heights are 8" for the 1- and 2-slot diffusers; and 11" high for the 3- and 4-slot diffusers
- Double metal thickness at slot face for rigidity and straightness
- Available with seven arrangements of optional factory installed T-bars
- Choice of ¾", 1" or 1½" slot widths
- Choice of one, two, three, or four parallel slots
- Available in nominal lengths of 24", 36", 48" or 60"
- 24" length has one blade per slot. Lengths 36", 48" and 60" have two pattern controllers per slot, end-to-end.
- Optional internal insulation (end caps are not insulated)
- Optional 11" plenum height for 1- and 2-slot units
- Material is steel with miscellaneous aluminum parts

TBD-80 1-SLOT / ADJUSTABLE / GASKETED BLADE

6" Inlet, 1-Slot	¾" Slot Width	2' Long	Airflow, cfm	25	35	45	55	65	75	85
			Total Pressure	0.021	0.041	0.068	0.102	0.142	0.189	0.243
			Static Pressure	0.020	0.039	0.064	0.096	0.134	0.179	0.230
			NC (Noise Criteria)	-	16	23	28	33	37	40
			Throw	3-7-14	6-10-20	9-13-23	10-16-25	14-19-27	14-21-29	16-22-31
		4' Long	Airflow, cfm	30	45	60	75	90	105	120
			Total Pressure	0.014	0.032	0.057	0.090	0.129	0.175	0.229
			Static Pressure	0.013	0.029	0.051	0.079	0.114	0.156	0.203
			NC (Noise Criteria)	-	12	20	26	31	35	39
			Throw	2-5-10	5-8-12	7-10-14	8-11-16	10-12-17	11-13-19	12-14-20
		5' Long	Airflow, cfm	35	55	75	95	115	135	155
			Total Pressure	0.017	0.041	0.077	0.124	0.181	0.250	0.329
			Static Pressure	0.015	0.036	0.067	0.108	0.158	0.217	0.286
			NC (Noise Criteria)	-	14	23	29	34	39	43
			Throw	2-5-9	5-7-12	7-10-13	9-11-15	10-12-17	10-13-18	11-14-19
	1" Slot Width	2' Long	Airflow, cfm	30	45	60	75	90	105	120
			Total Pressure	0.015	0.034	0.060	0.093	0.134	0.182	0.238
			Static Pressure	0.013	0.030	0.053	0.083	0.120	0.163	0.213
			NC (Noise Criteria)	-	11	19	25	30	34	38
			Throw	3-7-15	7-11-22	10-15-26	12-19-29	15-22-32	17-25-35	20-26-37
		4' Long	Airflow, cfm	50	73	95	118	140	163	185
			Total Pressure	0.017	0.036	0.062	0.094	0.134	0.180	0.233
			Static Pressure	0.013	0.026	0.045	0.070	0.099	0.133	0.172
			NC (Noise Criteria)	-	14	21	27	32	36	39
			Throw	4-7-13	7-11-16	9-13-18	11-14-20	13-15-22	14-17-23	14-18-25
		5' Long	Airflow, cfm	70	100	130	160	190	220	250
			Total Pressure	0.028	0.057	0.097	0.146	0.206	0.276	0.357
			Static Pressure	0.019	0.039	0.066	0.101	0.142	0.190	0.245
			NC (Noise Criteria)	-	19	26	32	37	41	44
			Throw	5-8-13	8-11-16	10-13-18	11-14-20	12-15-21	13-16-23	14-17-25
	1½" Slot Width	2' Long	Airflow, cfm	40	58	75	93	110	128	145
			Total Pressure	0.020	0.041	0.070	0.107	0.151	0.203	0.262
			Static Pressure	0.017	0.035	0.060	0.091	0.129	0.174	0.224
			NC (Noise Criteria)	-	17	24	30	35	39	42
			Throw	3-7-16	6-12-23	10-15-29	12-19-33	15-22-36	17-26-38	19-29-41
		4' Long	Airflow, cfm	60	83	105	128	150	173	195
			Total Pressure	0.021	0.040	0.064	0.095	0.131	0.173	0.221
			Static Pressure	0.015	0.027	0.044	0.066	0.091	0.120	0.153
			NC (Noise Criteria)	-	16	23	28	33	36	40
			Throw	3-7-14	6-10-17	8-12-19	10-15-21	12-16-23	14-17-24	15-18-26
		5' Long	Airflow, cfm	80	108	135	163	190	218	245
			Total Pressure	0.032	0.058	0.091	0.132	0.180	0.236	0.300
			Static Pressure	0.021	0.037	0.059	0.085	0.116	0.152	0.193
			NC (Noise Criteria)	12	20	26	31	36	39	43
			Throw	4-8-14	7-10-16	9-13-18	10-14-20	12-15-21	13-16-23	14-17-24
8" Inlet, 1-Slot	¾" Slot Width	2' Long	Airflow, cfm	30	43	55	68	80	93	105
			Total Pressure	0.029	0.058	0.098	0.147	0.207	0.276	0.356
			Static Pressure	0.028	0.057	0.096	0.144	0.202	0.270	0.348
			NC (Noise Criteria)	-	15	22	28	33	37	40
			Throw	5-9-17	8-12-22	10-16-25	13-19-28	15-21-30	18-23-33	20-25-35
		4' Long	Airflow, cfm	45	63	80	98	115	133	150
			Total Pressure	0.020	0.038	0.062	0.092	0.128	0.170	0.218
			Static Pressure	0.018	0.035	0.058	0.086	0.119	0.158	0.202
			NC (Noise Criteria)	-	15	22	27	32	36	39
			Throw	5-8-12	7-10-15	9-12-16	10-13-18	11-14-20	12-15-21	13-16-23
		5' Long	Airflow, cfm	60	83	105	128	150	173	195
			Total Pressure	0.027	0.052	0.084	0.124	0.171	0.227	0.290
			Static Pressure	0.025	0.047	0.076	0.113	0.156	0.206	0.263
			NC (Noise Criteria)	-	19	26	31	36	40	43
			Throw	5-8-12	7-10-14	9-11-16	10-12-18	11-13-19	12-14-20	13-15-22

Performance notes appear at end of performance data

TBD-80 1-SLOT / ADJUSTABLE / GASKETED BLADE

8" Inlet, 1-Slot (continued)	1" Slot Width	2' Long	Airflow, cfm	40	60	80	100	120	140	160
			Total Pressure	0.030	0.068	0.121	0.188	0.271	0.369	0.482
			Static Pressure	0.029	0.065	0.116	0.181	0.261	0.356	0.464
			NC (Noise Criteria)	-	13	21	27	32	37	40
			Throw	5-10-20	10-15-26	13-20-30	16-24-34	20-26-37	23-28-40	25-30-43
		4' Long	Airflow, cfm	55	83	110	138	165	193	220
			Total Pressure	0.014	0.031	0.055	0.085	0.123	0.167	0.219
			Static Pressure	0.012	0.026	0.046	0.072	0.104	0.142	0.185
			NC (Noise Criteria)	-	11	19	25	30	35	38
			Throw	5-8-14	8-12-17	11-14-19	12-15-22	14-17-24	15-18-26	16-19-27
		5' Long	Airflow, cfm	75	110	145	180	215	250	285
			Total Pressure	0.019	0.041	0.071	0.110	0.157	0.212	0.276
			Static Pressure	0.015	0.033	0.057	0.088	0.125	0.169	0.220
			NC (Noise Criteria)	-	16	24	29	34	39	42
			Throw	6-9-13	9-12-16	11-13-19	12-15-21	13-16-23	14-17-25	15-19-26
	1½" Slot Width	2' Long	Airflow, cfm	50	70	90	110	130	150	170
			Total Pressure	0.030	0.060	0.099	0.147	0.206	0.274	0.352
			Static Pressure	0.029	0.056	0.093	0.139	0.194	0.258	0.332
			NC (Noise Criteria)	-	16	23	29	33	37	41
			Throw	5-10-20	9-14-28	12-18-32	15-22-36	17-26-39	20-29-42	23-31-44
		4' Long	Airflow, cfm	75	105	135	165	195	225	255
			Total Pressure	0.020	0.039	0.065	0.097	0.136	0.181	0.232
			Static Pressure	0.016	0.032	0.053	0.078	0.110	0.146	0.187
			NC (Noise Criteria)	-	17	24	29	34	38	41
			Throw	5-9-16	8-12-19	11-15-21	13-17-24	15-18-26	16-20-28	17-21-29
		5' Long	Airflow, cfm	100	140	180	220	260	300	340
			Total Pressure	0.028	0.055	0.091	0.135	0.189	0.252	0.323
			Static Pressure	0.021	0.041	0.068	0.102	0.142	0.190	0.243
			NC (Noise Criteria)	12	21	28	34	38	42	46
			Throw	6-10-16	9-13-18	11-15-21	13-16-23	14-18-25	16-19-27	17-20-29
10" Inlet, 1-Slot	¾" Slot Width	2' Long	Airflow, cfm	30	43	55	68	80	93	105
			Total Pressure	0.038	0.076	0.128	0.193	0.271	0.362	0.466
			Static Pressure	0.038	0.076	0.127	0.191	0.268	0.359	0.462
			NC (Noise Criteria)	-	11	18	24	29	33	36
			Throw	5-9-17	8-12-22	10-16-25	13-19-28	15-21-30	18-23-33	20-25-35
		4' Long	Airflow, cfm	50	73	95	118	140	163	185
			Total Pressure	0.020	0.042	0.073	0.111	0.158	0.212	0.275
			Static Pressure	0.019	0.040	0.069	0.106	0.150	0.203	0.263
			NC (Noise Criteria)	-	15	23	29	33	38	41
			Throw	6-8-13	8-11-16	10-13-18	12-14-20	13-15-22	14-17-23	14-18-25
		5' Long	Airflow, cfm	70	103	135	168	200	233	265
			Total Pressure	0.028	0.061	0.105	0.162	0.231	0.312	0.405
			Static Pressure	0.026	0.057	0.099	0.152	0.216	0.292	0.380
			NC (Noise Criteria)	-	21	29	35	40	44	48
			Throw	6-9-13	9-11-16	10-13-18	12-14-20	13-16-22	14-17-24	15-18-25
	1" Slot Width	2' Long	Airflow, cfm	40	53	65	78	90	103	115
			Total Pressure	0.047	0.081	0.123	0.175	0.237	0.307	0.386
			Static Pressure	0.046	0.080	0.122	0.173	0.234	0.303	0.381
			NC (Noise Criteria)	-	-	11	16	20	24	27
			Throw	5-10-20	9-13-25	11-16-27	13-19-30	15-22-32	17-24-34	19-26-36
		4' Long	Airflow, cfm	60	95	130	165	200	235	270
			Total Pressure	0.015	0.037	0.069	0.111	0.163	0.225	0.298
			Static Pressure	0.013	0.034	0.063	0.101	0.149	0.205	0.271
			NC (Noise Criteria)	-	11	20	27	32	36	40
			Throw	6-9-14	9-13-18	12-15-21	14-17-24	15-18-26	16-20-28	17-21-30
		5' Long	Airflow, cfm	80	135	190	245	300	355	410
			Total Pressure	0.018	0.050	0.099	0.165	0.248	0.347	0.463
			Static Pressure	0.015	0.044	0.086	0.144	0.215	0.301	0.402
			NC (Noise Criteria)	-	18	27	34	40	44	48
			Throw	6-9-14	10-13-18	12-15-21	14-17-24	16-19-27	17-21-29	18-22-31

Performance notes appear at end of performance data

TBD-80 1-SLOT / ADJUSTABLE / GASKETED BLADE

10" Inlet, 1-Slot (continued)	1½" Slot Width	2' Long	Airflow, cfm	60	80	100	120	140	160	180
			Total Pressure	0.058	0.104	0.162	0.233	0.318	0.415	0.525
			Static Pressure	0.057	0.101	0.158	0.228	0.310	0.406	0.513
			NC (Noise Criteria)	-	16	22	27	32	35	38
			Throw	7-12-24	11-16-30	13-20-34	16-24-37	19-28-40	22-30-43	24-32-46
		4' Long	Airflow, cfm	90	120	150	180	210	240	270
			Total Pressure	0.024	0.043	0.067	0.097	0.132	0.172	0.218
			Static Pressure	0.021	0.038	0.059	0.085	0.116	0.151	0.191
			NC (Noise Criteria)	-	17	23	28	32	36	39
			Throw	7-11-17	10-14-20	12-16-23	14-17-25	15-19-27	16-20-28	17-21-30
		5' Long	Airflow, cfm	120	160	200	240	280	320	360
			Total Pressure	0.031	0.055	0.085	0.123	0.167	0.218	0.276
			Static Pressure	0.025	0.045	0.071	0.102	0.139	0.181	0.229
			NC (Noise Criteria)	13	21	27	32	37	40	44
			Throw	8-11-17	10-14-20	13-16-22	14-17-24	15-18-26	16-20-28	17-21-30
12" Inlet, 1-Slot	¾" Slot Width	4' Long	Airflow, cfm	75	100	125	150	175	200	225
			Total Pressure	0.049	0.087	0.135	0.195	0.265	0.346	0.438
			Static Pressure	0.048	0.085	0.133	0.192	0.261	0.341	0.431
			NC (Noise Criteria)	-	18	24	29	34	37	41
			Throw	8-11-16	11-13-18	12-15-21	13-16-23	14-17-24	15-18-26	16-20-28
		5' Long	Airflow, cfm	100	135	170	205	240	275	310
			Total Pressure	0.050	0.091	0.145	0.211	0.289	0.380	0.482
			Static Pressure	0.049	0.089	0.141	0.205	0.281	0.369	0.469
			NC (Noise Criteria)	15	23	29	35	39	43	46
			Throw	9-11-16	10-13-18	12-14-20	13-16-22	14-17-24	15-18-26	16-19-27
	1" Slot Width	4' Long	Airflow, cfm	90	120	150	180	210	240	270
			Total Pressure	0.043	0.077	0.120	0.173	0.236	0.308	0.390
			Static Pressure	0.042	0.075	0.117	0.169	0.230	0.300	0.380
			NC (Noise Criteria)	-	12	18	23	27	31	34
			Throw	9-12-17	12-14-20	13-16-23	14-17-25	15-19-27	16-20-28	17-21-30
		5' Long	Airflow, cfm	130	180	230	280	330	380	430
			Total Pressure	0.149	0.285	0.466	0.690	0.958	1.271	1.627
			Static Pressure	0.146	0.281	0.458	0.679	0.944	1.251	1.602
			NC (Noise Criteria)	-	19	26	32	36	40	44
			Throw	10-13-18	12-15-21	14-17-24	15-18-26	16-20-28	18-21-30	19-23-32
	1½" Slot Width	4' Long	Airflow, cfm	100	140	180	220	260	300	340
			Total Pressure	0.033	0.064	0.106	0.159	0.222	0.295	0.379
			Static Pressure	0.031	0.062	0.102	0.152	0.213	0.283	0.363
			NC (Noise Criteria)	-	15	22	27	32	36	39
			Throw	8-12-18	11-15-22	14-17-25	16-19-27	17-21-30	18-23-32	20-24-34
		5' Long	Airflow, cfm	150	210	270	330	390	450	510
			Total Pressure	0.042	0.083	0.137	0.205	0.286	0.381	0.490
			Static Pressure	0.039	0.077	0.127	0.190	0.266	0.354	0.455
			NC (Noise Criteria)	13	23	30	35	40	44	47
			Throw	10-13-19	13-16-23	15-18-26	16-20-28	18-22-31	19-23-33	20-25-35

1-SLOT PERFORMANCE NOTES

- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions
- All pressures given are in inches of wg
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See section Engineering Guidelines and the topic 'Other Grille and Diffuser Application Factors' for additional information.

TBD-80 2-SLOT / ADJUSTABLE / GASKETED BLADE

6" Inlet, 2-Slot	¾" Slot Width	2' Long	Airflow, cfm	40	55	70	85	100	115	130
			Total Pressure	0.025	0.048	0.078	0.115	0.159	0.210	0.269
			Static Pressure	0.023	0.043	0.069	0.102	0.141	0.187	0.239
			NC (Noise Criteria)	-	17	24	29	34	38	41
			Throw	3-7-16	6-11-22	9-14-28	11-17-31	13-20-34	15-23-36	17-26-39
		4' Long	Airflow, cfm	40	65	90	115	140	165	190
			Total Pressure	0.018	0.046	0.089	0.145	0.215	0.298	0.395
			Static Pressure	0.015	0.039	0.074	0.121	0.180	0.249	0.331
			NC (Noise Criteria)	-	11	20	27	33	37	41
			Throw	1-3-10	4-8-15	7-11-17	9-14-20	11-15-22	13-17-24	15-18-25
		5' Long	Airflow, cfm	60	90	120	150	180	210	240
			Total Pressure	0.037	0.082	0.146	0.229	0.329	0.448	0.585
			Static Pressure	0.030	0.068	0.121	0.188	0.271	0.369	0.482
			NC (Noise Criteria)	-	17	25	31	36	40	44
			Throw	2-6-11	6-9-15	8-11-17	10-13-19	11-15-21	13-16-23	16-20-28
	1" Slot Width	2' Long	Airflow, cfm	60	83	105	128	150	173	195
			Total Pressure	0.025	0.046	0.075	0.111	0.153	0.203	0.259
			Static Pressure	0.018	0.034	0.056	0.082	0.113	0.150	0.191
			NC (Noise Criteria)	-	17	24	29	34	38	41
			Throw	4-10-21	8-14-29	12-18-35	15-22-38	17-26-42	20-30-45	23-34-47
		4' Long	Airflow, cfm	75	110	145	180	215	250	285
			Total Pressure	0.025	0.053	0.092	0.142	0.202	0.274	0.356
			Static Pressure	0.015	0.031	0.054	0.084	0.120	0.162	0.211
			NC (Noise Criteria)	-	15	22	28	33	37	41
			Throw	3-7-15	7-11-19	10-15-22	12-17-25	15-19-27	17-21-29	18-22-31
		5' Long	Airflow, cfm	90	138	185	233	280	328	375
			Total Pressure	0.032	0.076	0.137	0.217	0.314	0.430	0.564
			Static Pressure	0.018	0.042	0.076	0.120	0.174	0.238	0.312
			NC (Noise Criteria)	-	17	25	32	37	41	45
			Throw	4-7-15	8-11-18	10-15-21	13-17-24	15-18-26	16-20-28	17-21-30
	1½" Slot Width	2' Long	Airflow, cfm	60	83	105	128	150	173	195
			Total Pressure	0.021	0.040	0.064	0.095	0.131	0.173	0.221
			Static Pressure	0.015	0.027	0.044	0.066	0.091	0.120	0.153
			NC (Noise Criteria)	-	16	23	28	33	36	40
			Throw	2-5-17	4-10-24	7-15-30	11-18-36	14-21-42	16-25-45	19-28-47
		4' Long	Airflow, cfm	70	110	150	190	230	270	310
			Total Pressure	0.019	0.048	0.089	0.144	0.210	0.290	0.382
			Static Pressure	0.011	0.027	0.049	0.079	0.116	0.160	0.210
			NC (Noise Criteria)	-	13	22	28	34	38	42
			Throw	2-3-12	4-9-18	7-13-23	11-16-25	13-19-28	15-21-30	17-23-32
		5' Long	Airflow, cfm	100	157.5	215	272.5	330	387.5	445
			Total Pressure	0.037	0.091	0.170	0.274	0.401	0.553	0.730
			Static Pressure	0.019	0.047	0.088	0.141	0.207	0.285	0.376
			NC (Noise Criteria)	-	20	28	35	40	45	49
			Throw	2-5-14	6-11-20	10-15-23	12-18-26	15-20-28	17-22-31	19-23-33
8" Inlet, 2-Slot	¾" Slot Width	2' Long	Airflow, cfm	30	53	75	98	120	143	165
			Total Pressure	0.009	0.027	0.054	0.092	0.140	0.197	0.264
			Static Pressure	0.008	0.025	0.051	0.086	0.130	0.183	0.245
			NC (Noise Criteria)	-	-	20	27	33	38	42
			Throw	2-4-12	5-11-21	10-15-29	13-20-34	16-24-37	19-29-41	22-31-44
		4' Long	Airflow, cfm	60	90	120	150	180	210	240
			Total Pressure	0.019	0.043	0.076	0.119	0.172	0.234	0.306
			Static Pressure	0.017	0.037	0.066	0.104	0.150	0.204	0.266
			NC (Noise Criteria)	-	15	23	29	34	38	42
			Throw	3-7-14	7-11-17	10-14-20	12-16-23	14-17-25	15-19-27	16-20-28
		5' Long	Airflow, cfm	90	128	165	203	240	278	315
			Total Pressure	0.038	0.076	0.128	0.193	0.271	0.362	0.467
			Static Pressure	0.033	0.065	0.109	0.165	0.231	0.309	0.398
			NC (Noise Criteria)	11	21	28	34	38	42	46
			Throw	6-9-15	8-12-18	11-14-20	13-16-22	14-17-24	15-18-26	16-20-28

Performance notes appear at end of performance data

TBD-80 2-SLOT / ADJUSTABLE / GASKETED BLADE

8" Inlet, 2-Slot (continued)	1" Slot Width	2' Long	Airflow, cfm	75	103	130	158	185	213	240
			Total Pressure	0.025	0.047	0.076	0.112	0.155	0.204	0.260
			Static Pressure	0.022	0.040	0.065	0.095	0.131	0.173	0.221
			NC (Noise Criteria)	-	17	24	29	34	37	41
			Throw	7-13-26	12-18-34	15-23-39	18-28-43	22-32-46	25-35-49	28-37-53
		4' Long	Airflow, cfm	90	133	175	218	260	303	345
			Total Pressure	0.018	0.039	0.068	0.105	0.150	0.203	0.263
			Static Pressure	0.012	0.027	0.047	0.072	0.103	0.139	0.181
			NC (Noise Criteria)	-	14	21	27	32	37	40
			Throw	5-9-17	9-14-21	12-17-24	15-19-27	17-21-30	18-23-32	20-24-34
		5' Long	Airflow, cfm	115	183	250	318	385	453	520
			Total Pressure	0.025	0.064	0.120	0.193	0.284	0.393	0.519
			Static Pressure	0.016	0.041	0.077	0.124	0.182	0.252	0.333
			NC (Noise Criteria)	-	19	28	35	40	44	48
			Throw	6-10-17	10-15-21	14-17-25	16-20-28	18-22-31	19-23-33	20-25-35
	1½" Slot Width	2' Long	Airflow, cfm	75	105	135	165	195	225	255
			Total Pressure	0.020	0.039	0.065	0.097	0.136	0.181	0.232
			Static Pressure	0.016	0.032	0.053	0.078	0.110	0.146	0.187
			NC (Noise Criteria)	-	17	24	29	34	38	41
			Throw	4-8-21	7-15-20	12-19-39	16-24-44	19-28-47	21-32-51	24-36-54
		4' Long	Airflow, cfm	90	135	180	225	270	315	360
			Total Pressure	0.016	0.035	0.063	0.098	0.141	0.192	0.251
			Static Pressure	0.010	0.023	0.040	0.063	0.091	0.124	0.161
			NC (Noise Criteria)	-	13	21	27	32	37	40
			Throw	3-6-15	6-11-21	10-15-25	13-19-28	15-21-30	18-23-33	20-25-35
		5' Long	Airflow, cfm	115	175	235	295	355	415	475
			Total Pressure	0.023	0.052	0.095	0.149	0.216	0.295	0.386
			Static Pressure	0.014	0.031	0.056	0.089	0.129	0.176	0.231
			NC (Noise Criteria)	-	17	25	31	36	41	44
			Throw	3-7-16	7-12-21	11-16-24	13-19-27	16-21-29	18-22-32	20-24-34
10" Inlet, 2-Slot	¾" Slot Width	2' Long	Airflow, cfm	40	65	90	115	140	165	190
			Total Pressure	0.013	0.034	0.065	0.106	0.158	0.219	0.290
			Static Pressure	0.012	0.032	0.062	0.102	0.150	0.209	0.277
			NC (Noise Criteria)	-	12	21	28	33	38	42
			Throw	3-7-16	8-13-26	12-18-32	15-23-36	19-28-40	22-31-44	26-33-47
		4' Long	Airflow, cfm	80	110	140	170	200	230	260
			Total Pressure	0.022	0.042	0.069	0.101	0.140	0.185	0.237
			Static Pressure	0.020	0.038	0.062	0.091	0.126	0.166	0.212
			NC (Noise Criteria)	-	16	23	28	33	37	40
			Throw	6-10-16	9-13-19	11-15-22	13-17-24	15-18-26	16-20-28	17-21-30
		5' Long	Airflow, cfm	120	155	190	225	260	295	330
			Total Pressure	0.043	0.071	0.107	0.150	0.201	0.258	0.323
			Static Pressure	0.038	0.063	0.094	0.132	0.176	0.227	0.284
			NC (Noise Criteria)	15	22	28	33	37	40	43
			Throw	8-11-17	10-14-19	12-15-21	13-17-23	14-18-25	15-19-27	16-20-28
	1" Slot Width	2' Long	Airflow, cfm	90	120	150	180	210	240	270
			Total Pressure	0.033	0.059	0.092	0.132	0.180	0.235	0.298
			Static Pressure	0.030	0.054	0.084	0.121	0.164	0.214	0.271
			NC (Noise Criteria)	-	18	24	29	33	37	40
			Throw	10-16-31	14-21-37	17-26-42	21-31-46	24-35-49	28-37-53	31-39-56
		4' Long	Airflow, cfm	120	170	220	270	320	370	420
			Total Pressure	0.022	0.044	0.074	0.111	0.156	0.209	0.269
			Static Pressure	0.017	0.034	0.056	0.085	0.119	0.159	0.205
			NC (Noise Criteria)	-	17	24	30	34	38	42
			Throw	8-12-20	12-17-24	15-19-27	17-21-30	19-23-33	20-25-35	22-27-38
		5' Long	Airflow, cfm	150	220	290	360	430	500	570
			Total Pressure	0.028	0.061	0.105	0.162	0.232	0.313	0.407
			Static Pressure	0.020	0.043	0.075	0.115	0.165	0.223	0.289
			NC (Noise Criteria)	-	20	28	34	39	43	47
			Throw	8-12-19	12-16-23	15-19-26	17-21-30	19-23-32	20-25-35	21-26-37

Performance notes appear at end of performance data

TBD-80 2-SLOT / ADJUSTABLE / GASKETED BLADE

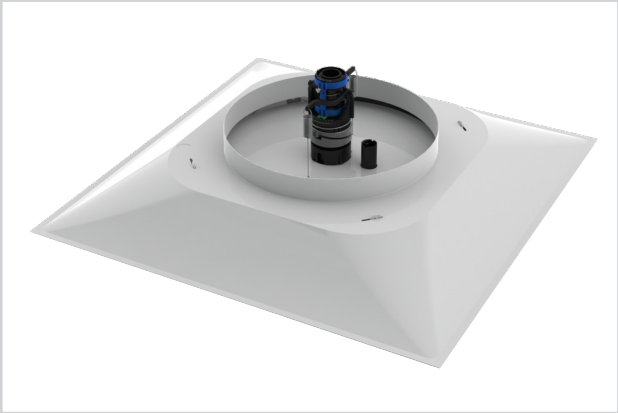
10" Inlet, 2-Slot (continued)	1½" Slot Width	2' Long	Airflow, cfm	90	125	160	195	230	265	300
			Total Pressure	0.024	0.047	0.077	0.114	0.158	0.210	0.269
			Static Pressure	0.021	0.041	0.067	0.100	0.139	0.184	0.236
			NC (Noise Criteria)	-	18	25	30	35	38	42
			Throw	5-12-26	10-18-36	15-23-43	19-28-47	22-33-51	25-38-55	29-42-59
		4' Long	Airflow, cfm	100	155	210	265	320	375	430
			Total Pressure	0.013	0.031	0.057	0.090	0.131	0.181	0.237
			Static Pressure	0.009	0.022	0.041	0.065	0.094	0.130	0.170
			NC (Noise Criteria)	-	13	21	28	33	37	41
			Throw	3-7-17	8-13-23	12-18-27	15-21-30	18-23-33	21-25-36	22-27-38
		5' Long	Airflow, cfm	150	225	300	375	450	525	600
			Total Pressure	0.024	0.055	0.098	0.152	0.220	0.299	0.390
			Static Pressure	0.016	0.037	0.065	0.102	0.146	0.199	0.260
			NC (Noise Criteria)	-	20	28	34	39	43	47
			Throw	5-10-19	10-15-23	14-19-27	17-21-30	19-23-33	21-25-36	22-27-38
12" Inlet, 2-Slot	¾" Slot Width	4' Long	Airflow, cfm	100	140	180	220	260	300	340
			Total Pressure	0.022	0.043	0.072	0.107	0.150	0.200	0.256
			Static Pressure	0.021	0.041	0.067	0.101	0.141	0.187	0.241
			NC (Noise Criteria)	-	17	24	29	34	38	41
			Throw	8-12-18	11-15-22	14-17-25	16-19-27	17-21-30	18-23-32	20-24-34
		5' Long	Airflow, cfm	150	200	250	300	350	400	450
			Total Pressure	0.038	0.068	0.106	0.152	0.207	0.270	0.342
			Static Pressure	0.035	0.062	0.097	0.140	0.190	0.249	0.315
			NC (Noise Criteria)	15	23	29	34	39	42	46
			Throw	10-13-19	13-16-22	14-17-25	16-19-27	17-21-29	18-22-31	19-23-33
	1" Slot Width	4' Long	Airflow, cfm	120	185	250	315	380	445	510
			Total Pressure	0.015	0.036	0.067	0.106	0.154	0.211	0.277
			Static Pressure	0.013	0.032	0.058	0.092	0.134	0.184	0.242
			NC (Noise Criteria)	-	13	21	28	33	37	41
			Throw	5-12-20	13-18-25	17-21-29	19-23-33	21-25-36	22-27-39	24-29-42
		5' Long	Airflow, cfm	180	285	390	495	600	705	810
			Total Pressure	0.025	0.063	0.117	0.189	0.278	0.383	0.506
			Static Pressure	0.021	0.052	0.097	0.156	0.229	0.316	0.417
			NC (Noise Criteria)	-	22	30	37	42	47	50
			Throw	10-15-21	15-19-26	18-22-31	20-24-35	22-27-38	24-29-41	26-31-44
	1½" Slot Width	4' Long	Airflow, cfm	150	210	270	330	390	450	510
			Total Pressure	0.018	0.036	0.060	0.089	0.125	0.166	0.213
			Static Pressure	0.015	0.030	0.050	0.075	0.104	0.139	0.178
			NC (Noise Criteria)	-	15	22	28	32	36	40
			Throw	7-13-23	12-18-27	15-21-30	18-24-33	21-26-36	23-28-39	24-29-42
		5' Long	Airflow, cfm	200	290	380	470	560	650	740
			Total Pressure	0.033	0.069	0.118	0.181	0.257	0.346	0.449
			Static Pressure	0.027	0.058	0.099	0.151	0.215	0.289	0.375
			NC (Noise Criteria)	-	21	28	34	39	43	47
			Throw	9-14-22	13-19-26	17-21-30	19-24-34	21-26-37	23-28-40	24-30-42

2-SLOT PERFORMANCE NOTES

- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions
- All pressures given are in inches of wg
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See section, Engineering Guidelines and the topic 'Other Grille and Diffuser Application Factors' for additional information.
- Throws listed are for the one-way air pattern. For divided airflow, select the airflow in each direction according to the number of slots aimed in that direction, with the total airflow apportioned between slots. See section, Engineering Guidelines and the topic 'Procedure to Obtain Catalog Throw Data' in this catalog for throw information.

T3SQ-4

- The T_3SQ-4 is a thermal variable volume diffuser. The diffuser maintains space temperature by varying the volume of air delivered to the space. The amount of air delivered will depend on the Supply Air Temperature (SAT) (-4 only), the room temperature setpoint, and the room temperature.
- Available in heating/cooling (-4) configuration
- As the volume of air is decreased by the control disc, the velocity of air is increased thereby maintaining the longest throw and best entrainment ensuring superior air distribution at all damper positions
- The curvature of the backpan works with the formed edges of the face panel to deliver a tight horizontal air pattern without excessive noise or pressure drop over the full range of operation
- The T_3SQ-4 uses a center induction plug to accurately measure the room temperature. This eliminates the need for a wall-mounted thermostat or sensor and provides the most accurate way of measuring the room air temperature.
- Adjustment of the room temperature setpoint is achieved by rotating the blue (cooling) only adjustment ring



T3SQ-4

See website for Specifications

MODEL:

T_3SQ-4 / Heating & Cooling

FINISH:

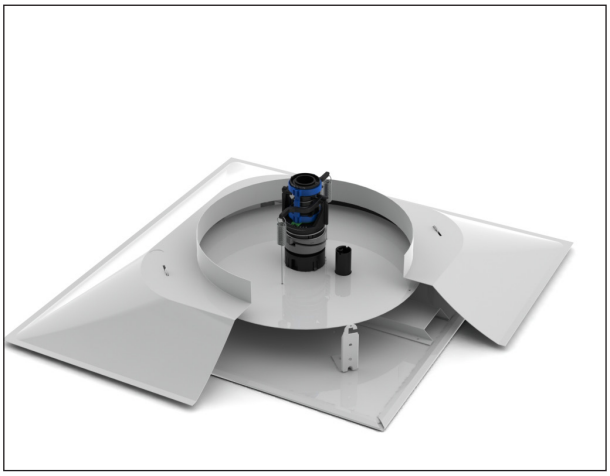
Standard Finish - #26 White

OVERVIEW

The T_3SQ-4 works in both heating and cooling applications. The curvature of the backpan works with the formed edges of the face panel to deliver a tight horizontal air pattern without excessive noise or pressure drop over the full range of operation. As the volume of air is decreased by the control disc, the velocity of air is increased, thus maintaining the longest throw and best entrainment. This ensures superior performance at all damper positions.

ADDITIONAL FEATURES

- Adjustment of the green tab offset creates a temperature deadband for heating and cooling setpoints
- Adjustment of minimum airflow is achieved by rotating the grey minimum airflow adjustment ring
- The face panel and backpan are constructed from 18-gauge steel. The formed outer edge also assures a straight and level surface.



Cutaway view of the T_3SQ-4 diffuser

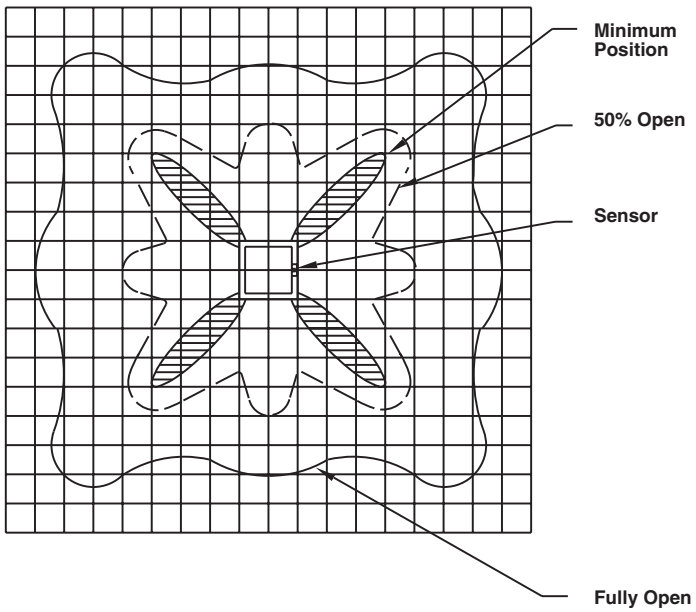
T_3SQ MAXIMUM FLOW SELECTION

Inlet Size	Neck Velocity Velocity Pressure	400 0.010	500 0.016	600 0.022	700 0.031	800 0.040	900 0.050	1000 0.062
6″	Static pressure	0.016	0.024	0.037	0.048	0.064	0.082	0.100
	Total Pressure	0.026	0.040	0.059	0.079	0.104	0.132	0.162
	cfm	79	98	118	137	157	177	196
	NC	5	10	14	17	20	23	25
	Throw, ft	1-2-3	1-2-4	2-3-5	2-3-6	2-3-7	3-4-7	3-4-8
8″	Static pressure	0.021	0.032	0.047	0.063	0.083	0.106	0.130
	Total Pressure	0.031	0.048	0.069	0.094	0.123	0.156	0.192
	cfm	140	175	209	244	279	314	349
	NC	8	13	17	20	23	25	28
	Throw, ft	2-3-5	2-3-7	2-4-8	3-5-9	3-5-10	4-6-10	4-7-11
10″	Static pressure	0.030	0.047	0.069	0.093	0.122	0.155	0.190
	Total Pressure	0.040	0.063	0.091	0.124	0.162	0.205	0.252
	cfm	218	273	327	382	436	491	545
	NC	14	19	23	26	29	31	34
	Throw, ft	3-4-8	4-5-10	4-6-11	5-8-12	6-9-13	6-10-14	7-10-14
12″	Static pressure	0.048	0.075	0.109	0.147	0.192	0.244	0.301
	Total Pressure	0.058	0.091	0.131	0.178	0.232	0.294	0.363
	cfm	314	393	471	550	628	707	785
	NC	24	29	33	36	39	41	44
	Throw, ft	4-6-11	5-8-12	6-9-13	7-10-14	8-11-15	9-11-16	10-12-17

AIR DISTRIBUTION AT VARIOUS DAMPER POSITIONS

The performance of the T_3SQ diffuser is related to supply static pressure and size. If the supply static pressure is held at a constant value and the VAV diffuser damper is throttled to a closed position, the airflow pattern is changed from a square pattern to a star pattern. The isovel in the adjacent illustration demonstrates this pattern change. With the reduction of cfm, throw does not decrease as in standard diffusers. As the damper closes the discharge velocity is slightly increased, minimizing throw reduction. With a fixed inlet pressure, the sound values have very small changes of intensity as the damper is modulated.

Airflow Pattern Changes

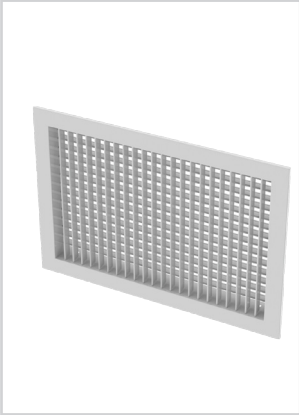


Note: The isovel changes as the diffuser damper modulates from open to close (or any combination between) causing variations to the ariflow pattern

300 / 350 Supply Grilles

301 / 300 (RL / RS)

301RL



300RS

301RS
- ¾" blade spacing
- Single deflection
- Individually adjustable blades
- Blades parallel to the short dimension

301RL
- Same as 301RS with blades parallel to the long dimension

300RS
- ¾" blade spacing
- Double deflection
- Individually adjustable blades
- Front blades parallel to the short dimension

300RL
- Same as 300RS with front blades parallel to the long dimension

metric sizes

See website for Specifications

MODELS:

Single Deflection Models
301RL
301RS

Double Deflection Models
300RL
300RS

FINISH:

Standard Finish - #26 White

OVERVIEW

3/4" Blade Spacing / Steel

Titus' 300 / 350 Series supply grilles define the standard for the industry. With high quality and competitive pricing these grilles form the back bone of a standard offering that will meet any application requirements.

PRODUCTS INCLUDE

- Material: Roll-formed Steel
- Welded Border
- Available Border Types:
  #1 - Surface Mount
- Countersunk Screw Holes
- #8 x 1¼" Long Phillips Flat Head Sheet Metal Screws, Painted White
- Optional Steel-Opposed Blade Damper

MODELS: 300R, 300F, 300R-SS, 300R-HD, 301R, 301F, 301R-SS AND 301R-HD
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)	Core Vel. / Vel. Press. / Total Press.	300	400	500	600	700	800	1000	1200	1400
								NC-20	NC-30		NC-40	
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			Total Press. 0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total Press. 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Total Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
6x6	0.25	0.19	cfm	57	76	95	114	133	152	190	228	266
			NC	-	-	-	15	20	24	31	36	41
			Throw (ft) 0°	5-7-14	7-10-16	8-12-18	10-14-20	12-15-21	13-16-23	15-18-25	16-20-28	17-21-30
			Throw (ft) 22.5°	4-6-11	5-8-12	6-10-14	8-11-15	9-12-16	10-12-18	11-14-20	12-15-22	13-16-23
			Throw (ft) 45°	2-3-6	3-4-7	4-6-8	4-6-9	5-7-10	6-7-10	7-8-11	7-9-12	8-10-13
8x6	0.33	0.26	cfm	78	104	130	156	182	208	260	312	364
			NC	-	-	11	17	21	25	32	38	42
			Throw (ft) 0°	5-9-16	8-12-19	10-15-21	12-16-23	14-18-25	15-19-27	17-21-30	19-23-32	20-25-35
			Throw (ft) 22.5°	4-7-13	6-9-15	8-11-16	9-13-18	11-14-19	12-15-21	13-16-23	15-18-25	16-19-27
			Throw (ft) 45°	2-4-7	3-5-8	4-7-9	5-7-10	6-8-11	7-8-12	8-9-13	8-10-15	9-11-16
10x6	0.42	0.34	cfm	102	136	170	204	238	272	340	408	476
			NC	-	-	12	18	23	27	33	39	43
			Throw (ft) 0°	6-10-19	9-13-21	11-17-24	13-19-26	16-20-28	18-21-30	20-24-34	21-26-37	23-28-40
			Throw (ft) 22.5°	5-8-14	7-10-17	9-13-19	10-14-20	12-16-22	14-17-23	15-19-26	17-20-29	18-22-31
			Throw (ft) 45°	3-4-8	4-6-10	5-7-11	6-8-12	7-9-13	8-10-14	9-11-15	10-12-17	10-13-18
8x8	0.44	0.37	cfm	111	148	185	222	259	296	370	444	518
			NC	-	-	13	18	23	27	34	39	44
			Throw (ft) 0°	6-10-19	9-14-22	12-17-25	14-19-27	16-21-30	18-22-32	20-25-35	22-27-39	24-30-42
			Throw (ft) 22.5°	5-8-15	7-11-17	9-13-19	11-15-21	13-16-23	14-17-25	16-19-27	17-21-30	19-23-32
			Throw (ft) 45°	3-5-9	4-6-10	5-8-11	6-9-12	7-9-13	8-10-14	9-11-16	10-12-17	11-13-19
12x6	0.50	0.41	cfm	123	164	205	246	287	328	410	492	574
			NC	-	-	13	19	23	27	34	39	44
			Throw (ft) 0°	7-11-20	10-15-24	12-18-26	15-20-29	17-22-31	19-24-33	21-26-37	24-29-41	25-31-44
			Throw (ft) 22.5°	5-8-16	8-11-18	9-14-20	11-16-22	13-17-24	15-18-26	17-20-29	18-22-32	20-24-34
			Throw (ft) 45°	3-5-9	4-7-11	5-8-12	7-9-13	8-10-14	9-11-15	10-12-17	11-13-18	11-14-20
14x6	0.58	0.48	cfm	144	192	240	288	336	384	480	576	672
			NC	-	-	14	19	24	28	35	40	45
			Throw (ft) 0°	7-12-22	11-16-25	13-20-28	16-22-31	18-24-34	21-25-36	23-28-40	25-31-44	28-34-48
			Throw (ft) 22.5°	6-9-17	8-12-20	10-15-22	12-17-24	14-18-26	16-20-28	18-22-31	20-24-34	21-26-37
			Throw (ft) 45°	3-5-10	5-7-11	6-9-13	7-10-14	8-11-15	9-11-16	10-13-18	11-14-20	12-15-21
16x6 12x8	0.67	0.57	cfm	171	228	285	342	399	456	570	684	798
			NC	-	-	15	20	25	29	35	41	45
			Throw (ft) 0°	8-13-24	11-17-28	14-22-31	17-24-34	20-26-37	23-28-39	25-31-44	28-34-48	30-37-52
			Throw (ft) 22.5°	6-10-19	9-13-22	11-17-24	13-19-26	16-20-28	18-22-30	20-24-34	22-26-37	23-28-40
			Throw (ft) 45°	4-6-11	5-8-12	6-10-14	8-11-15	9-12-17	10-12-18	11-14-20	12-15-22	13-17-23
10x10	0.69	0.59	cfm	177	236	295	354	413	472	590	708	826
			NC	-	-	15	20	25	29	35	41	46
			Throw (ft) 0°	8-13-24	12-18-28	15-22-32	18-24-35	20-26-37	23-28-40	26-32-45	28-35-49	31-37-53
			Throw (ft) 22.5°	6-10-19	9-14-22	11-17-24	14-19-27	16-20-29	18-22-31	20-24-35	22-27-38	24-29-41
			Throw (ft) 45°	4-6-11	5-8-13	7-10-14	8-11-16	9-12-17	10-13-18	12-14-20	13-16-22	14-17-24
18x6	0.75	0.63	cfm	189	252	315	378	441	504	630	756	882
			NC	-	-	15	20	25	29	36	41	46
			Throw (ft) 0°	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
			Throw (ft) 22.5°	7-11-20	9-14-23	12-18-25	14-20-28	16-21-30	18-23-32	21-25-36	23-28-39	24-30-42
			Throw (ft) 45°	4-6-11	5-8-13	7-10-15	8-11-16	9-12-17	11-13-19	12-15-21	13-16-23	14-17-25
20x6 12x10	0.83	0.72	cfm	216	288	360	432	504	576	720	864	1008
			NC	-	-	16	21	26	30	36	42	46
			Throw (ft) 0°	9-15-27	13-19-31	16-24-35	19-27-38	23-29-41	25-31-44	28-35-49	31-38-54	34-41-58
			Throw (ft) 22.5°	7-11-21	10-15-24	12-19-27	15-21-30	17-23-32	20-24-34	22-27-38	24-30-42	26-32-45
			Throw (ft) 45°	4-7-12	6-9-14	7-11-16	9-12-17	10-13-19	11-14-20	13-16-22	14-17-24	15-19-26
22x6	0.92	0.77	cfm	231	308	385	462	539	616	770	924	1078
			NC	-	-	16	21	26	30	37	42	47
			Throw (ft) 0°	9-15-28	13-20-32	17-25-36	20-28-40	23-30-43	26-32-46	29-36-51	32-40-56	35-43-60
			Throw (ft) 22.5°	7-12-22	10-16-25	13-19-28	16-22-31	18-23-33	20-25-35	23-28-40	25-31-43	27-33-47
			Throw (ft) 45°	4-7-13	6-9-15	8-11-16	9-13-18	11-14-19	12-15-21	13-16-23	15-18-25	16-19-27
24x6 18x8 12x12	1.00	0.88	cfm	264	352	440	528	616	704	880	1056	1232
			NC	-	-	16	22	26	30	37	43	47
			Throw (ft) 0°	10-16-30	14-21-34	18-27-39	21-30-42	25-32-46	28-34-49	31-39-55	34-42-60	37-46-65
			Throw (ft) 22.5°	8-12-23	11-17-27	14-21-30	17-23-33	19-25-35	22-27-38	24-30-42	27-33-46	29-35-50
			Throw (ft) 45°	4-7-13	6-10-16	8-12-17	10-13-19	11-15-21	13-16-22	14-17-25	16-19-27	17-21-29
30x6 18x10	1.25	1.11	cfm	333	444	555	666	777	888	1110	1332	1554
			NC	-	11	17	23	27	31	38	44	48
			Throw (ft) 0°	11-18-34	16-24-39	20-30-43	24-34-47	28-36-51	32-39-55	35-43-61	39-47-67	42-51-72
			Throw (ft) 22.5°	9-14-26	12-19-30	16-23-34	19-26-37	22-28-40	25-30-42	27-34-47	30-37-52	32-40-56
			Throw (ft) 45°	5-8-15	7-11-17	9-14-19	11-15-21	13-16-23	14-17-25	16-19-28	17-21-30	19-23-33

Performance notes appear at end of table

MODELS: 300R, 300F, 300R-SS, 300R-HD, 301R, 301F, 301R-SS AND 301R-HD
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

						NC-20		NC-30		NC-40		NC-50
Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)	Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			Total Press. 0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total Press. 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Total Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
14x14	**1.36**	**1.22**	cfm	366	488	610	732	854	976	1220	1464	1708
			NC	-	11	18	23	28	32	39	44	49
			Throw (ft) 0°	12-19-35	17-25-41	21-31-45	25-35-50	29-38-54	33-41-57	37-45-64	41-50-70	44-54-76
			Throw (ft) 22.5°	9-15-27	13-20-31	16-24-35	20-27-39	23-29-42	26-31-45	29-35-50	31-39-55	34-42-59
			Throw (ft) 45°	5-8-16	8-11-18	9-14-20	11-16-22	13-17-24	15-18-26	17-20-29	18-22-32	20-24-34
36x6 27x8 **18x12**	**1.50**	**1.35**	cfm	405	540	675	810	945	1080	1350	1620	1890
			NC	-	12	18	24	28	32	39	44	49
			Throw (ft) 0°	12-20-37	18-26-43	22-33-48	26-37-52	31-40-57	35-43-60	39-48-68	43-52-74	46-57-80
			Throw (ft) 22.5°	10-15-29	14-21-33	17-26-37	21-29-41	24-31-44	27-33-47	30-37-52	33-41-57	36-44-62
			Throw (ft) 45°	6-9-17	8-12-19	10-15-21	12-17-24	14-18-25	16-19-27	18-21-30	19-24-33	21-25-36
22x10	**1.53**	**1.37**	cfm	411	548	685	822	959	1096	1370	1644	1918
			NC	-	12	18	24	28	32	39	44	49
			Throw (ft) 0°	12-20-37	18-27-43	22-33-48	27-37-53	31-40-57	35-43-61	39-48-68	43-53-75	46-57-81
			Throw (ft) 22.5°	10-16-29	14-21-33	17-26-37	21-29-41	24-31-44	27-33-47	30-37-53	33-41-58	36-44-62
			Throw (ft) 45°	6-9-17	8-12-19	10-15-22	12-17-24	14-18-26	16-19-27	18-22-31	19-24-34	21-26-36
30x8 **24x10**	**1.67**	**1.49**	cfm	447	596	745	894	1043	1192	1490	1788	2086
			NC	-	12	19	24	29	33	39	45	49
			Throw (ft) 0°	13-21-39	19-28-45	23-35-50	28-39-55	32-42-59	37-45-63	41-50-71	45-55-78	48-59-84
			Throw (ft) 22.5°	10-16-30	14-22-35	18-27-39	22-30-43	25-33-46	28-35-49	32-39-55	35-43-60	38-46-65
			Throw (ft) 45°	6-9-17	8-13-20	10-16-23	13-17-25	15-19-27	16-20-29	18-23-32	20-25-35	22-27-38
42x6 **18x14**	**1.75**	**1.59**	cfm	477	636	795	954	1113	1272	1590	1908	2226
			NC	-	12	19	24	29	33	40	45	50
			Throw (ft) 0°	13-22-40	19-29-46	24-36-52	29-40-57	34-43-61	38-46-66	42-52-73	46-57-80	50-61-87
			Throw (ft) 22.5°	10-17-31	15-22-36	19-28-40	22-31-44	26-34-48	29-36-51	33-40-57	36-44-62	39-48-67
			Throw (ft) 45°	6-10-18	9-13-21	11-16-23	13-18-26	15-20-28	17-21-30	19-23-33	21-26-36	23-28-39
16x16	**1.78**	**1.62**	cfm	486	648	810	972	1134	1296	1620	1944	2268
			NC	-	12	19	24	29	33	40	45	50
			Throw (ft) 0°	14-22-41	19-29-47	24-36-52	29-41-57	34-44-62	38-47-66	43-52-74	47-57-81	51-62-88
			Throw (ft) 22.5°	11-17-31	15-22-36	19-28-41	22-31-44	26-34-48	30-36-51	33-41-57	36-44-63	39-48-68
			Throw (ft) 45°	6-10-18	9-13-21	11-16-24	13-18-26	15-20-28	17-21-30	19-24-33	21-26-36	23-28-39
48x6 36x8 **24x12** 18x16	**2.00**	**1.82**	cfm	546	728	910	1092	1274	1456	1820	2184	2548
			NC	-	13	19	25	30	34	40	46	50
			Throw (ft) 0°	14-23-43	20-31-50	26-38-55	31-43-61	36-46-66	41-50-70	45-55-78	50-61-86	54-66-93
			Throw (ft) 22.5°	11-18-33	16-24-38	20-30-43	24-33-47	28-36-51	31-38-54	35-43-61	38-47-67	42-51-72
			Throw (ft) 45°	6-10-19	9-14-22	12-17-25	14-19-27	16-21-30	18-22-32	20-25-35	22-27-39	24-30-42
18x18	**2.25**	**2.07**	cfm	621	828	1035	1242	1449	1656	2070	2484	2898
			NC	-	13	20	25	30	34	41	46	51
			Throw (ft) 0°	15-25-46	22-33-53	27-41-59	33-46-65	38-49-70	43-53-75	48-59-84	53-65-92	57-70-99
			Throw (ft) 22.5°	12-19-36	17-25-41	21-32-46	25-36-50	30-38-54	33-41-58	37-46-65	41-50-71	44-54-77
			Throw (ft) 45°	7-11-21	10-15-24	12-18-27	15-21-29	17-22-31	19-24-34	22-27-38	24-29-41	26-31-45
42x8 **24x14**	**2.33**	**2.14**	cfm	642	856	1070	1284	1498	1712	2140	2568	2996
			NC	-	13	20	26	30	34	41	46	51
			Throw (ft) 0°	16-25-47	22-33-54	28-42-60	33-47-66	39-50-71	44-54-76	49-60-85	54-66-93	58-71-101
			Throw (ft) 22.5°	12-19-36	17-26-42	22-32-47	26-36-51	30-39-55	34-42-59	38-47-66	42-51-72	45-55-78
			Throw (ft) 45°	7-11-21	10-15-24	13-19-27	15-21-30	18-23-32	20-24-34	22-27-38	24-30-42	26-32-45
36x10 **30x12**	**2.50**	**2.29**	cfm	687	916	1145	1374	1603	1832	2290	2748	3206
			NC	-	14	20	26	30	34	41	47	51
			Throw (ft) 0°	16-26-48	23-34-56	29-43-62	34-48-68	40-52-74	45-56-79	51-62-88	56-68-96	60-74-104
			Throw (ft) 22.5°	12-20-37	18-27-43	22-33-48	27-37-53	31-40-57	35-43-61	39-48-68	43-53-75	47-57-81
			Throw (ft) 45°	7-12-22	10-16-25	13-19-28	16-22-31	18-23-33	20-25-35	23-28-40	25-31-43	27-33-47
48x8 **24x16**	**2.67**	**2.46**	cfm	738	984	1230	1476	1722	1968	2460	2952	3444
			NC	-	14	21	26	31	35	41	47	51
			Throw (ft) 0°	17-27-50	24-36-58	30-45-64	36-50-71	42-54-76	47-58-82	53-64-91	58-71-100	62-76-108
			Throw (ft) 22.5°	13-21-39	18-28-45	23-35-50	28-39-55	32-42-59	36-45-63	41-50-71	45-55-77	48-59-84
			Throw (ft) 45°	8-12-22	11-16-26	13-20-29	16-22-32	19-24-34	21-26-37	24-29-41	26-32-45	28-34-49
20x20	**2.78**	**2.57**	cfm	771	1028	1285	1542	1799	2056	2570	3084	3598
			NC	-	14	21	26	31	35	42	47	52
			Throw (ft) 0°	17-27-51	24-37-59	30-46-66	37-51-72	43-55-78	48-59-83	54-66-93	59-72-102	64-78-110
			Throw (ft) 22.5°	13-21-40	19-28-46	24-35-51	28-40-56	33-43-60	37-46-65	42-51-72	46-56-79	49-60-85
			Throw (ft) 45°	8-12-23	11-16-27	14-21-30	16-23-32	19-25-35	22-27-38	24-30-42	27-32-46	29-35-50
36x12 24x18	**3.00**	**2.75**	cfm	825	1100	1375	1650	1925	2200	2750	3300	3850
			NC	-	15	21	27	31	35	42	47	52
			Throw (ft) 0°	18-28-53	25-38-61	31-47-68	38-53-75	44-57-81	50-61-86	56-68-96	61-75-106	66-81-114
			Throw (ft) 22.5°	14-22-41	20-29-47	24-37-53	29-41-58	34-44-63	39-47-67	43-53-75	47-58-82	51-63-88
			Throw (ft) 45°	8-13-24	11-17-27	14-21-31	17-24-34	20-26-36	22-27-39	25-31-43	27-34-48	30-36-51

Performance notes appear at end of table

MODELS: 300R, 300F, 300R-SS, 300R-HD, 301R, 301F, 301R-SS AND 301R-HD
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)		NC-20		NC-30		NC-40		NC-50		
			Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			Total Press. 0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total Press. 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Total Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
48x10 30x16 **24x20**	**3.33**	**3.11**	cfm	933	1244	1555	1866	2177	2488	3110	3732	4354
			NC	-	15	22	27	32	36	42	48	52
			Throw (ft) 0°	19-30-56	27-40-65	33-50-72	40-56-79	47-61-86	53-65-92	59-72-103	65-79-112	70-86-121
			Throw (ft) 22.5°	15-23-44	21-31-50	26-39-56	31-44-62	36-47-66	41-50-71	46-56-79	50-62-87	54-66-94
			Throw (ft) 45°	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
22x22	**3.36**	**3.14**	cfm	942	1256	1570	1884	2198	2512	3140	3768	4396
			NC	-	15	22	27	32	36	42	48	53
			Throw (ft) 0°	19-30-56	27-40-65	34-50-73	40-56-80	47-61-86	53-65-92	59-73-103	65-80-113	70-86-122
			Throw (ft) 22.5°	15-23-44	21-31-50	26-39-56	31-44-62	37-47-67	41-50-71	46-56-80	50-62-87	55-67-94
			Throw (ft) 45°	8-14-25	12-18-29	15-23-33	18-25-36	21-27-39	24-29-41	27-33-46	29-36-51	32-39-55
42x12 36x14	**3.50**	**3.22**	cfm	966	1288	1610	1932	2254	2576	3220	3864	4508
			NC	-	15	22	27	32	36	43	48	53
			Throw (ft) 0°	19-31-57	27-41-66	34-51-74	41-57-81	48-62-87	54-66-93	60-74-104	66-81-114	71-87-123
			Throw (ft) 22.5°	15-24-44	21-32-51	26-40-57	32-44-63	37-48-68	42-51-72	47-57-81	51-63-89	55-68-96
			Throw (ft) 45°	9-14-26	12-18-30	15-23-33	18-26-36	21-28-39	24-30-42	27-33-47	30-36-51	32-39-56
24x22	**3.67**	**3.43**	cfm	1029	1372	1715	2058	2401	2744	3430	4116	4802
			NC	-	15	22	28	32	36	43	48	53
			Throw (ft) 0°	20-32-59	28-42-68	35-53-76	42-59-83	49-64-90	56-68-96	62-76-108	68-83-118	74-90-127
			Throw (ft) 22.5°	15-25-46	22-33-53	27-41-59	33-46-65	38-49-70	43-53-75	48-59-83	53-65-91	57-70-99
			Throw (ft) 45°	9-14-27	13-19-31	16-24-34	19-27-38	22-29-41	25-31-43	28-34-48	31-38-53	33-41-57
30x18	**3.75**	**3.5**	cfm	1050	1400	1750	2100	2450	2800	3500	4200	4900
			NC	-	16	22	28	32	36	43	48	53
			Throw (ft) 0°	20-32-60	28-43-69	36-53-77	43-60-84	50-64-91	56-69-97	63-77-109	69-84-119	74-91-129
			Throw (ft) 22.5°	15-25-46	22-33-53	28-41-60	33-46-65	39-50-71	44-53-75	49-60-84	53-65-92	58-71-100
			Throw (ft) 45°	9-14-27	13-19-31	16-24-35	19-27-38	22-29-41	25-31-44	28-35-49	31-38-54	33-41-58
48x12 36x16 **24x24**	**4.00**	**3.75**	cfm	1125	1500	1875	2250	2625	3000	3750	4500	5250
			NC	-	16	22	28	33	37	43	49	53
			Throw (ft) 0°	21-33-62	29-44-71	37-55-80	44-62-87	51-67-94	58-71-101	65-80-113	71-87-123	77-94-133
			Throw (ft) 22.5°	16-26-48	23-34-55	29-43-62	34-48-68	40-52-73	45-55-78	50-62-87	55-68-96	60-73-103
			Throw (ft) 45°	9-15-28	13-20-32	17-25-36	20-28-39	23-30-42	26-32-45	29-36-51	32-39-55	35-42-60
36x18	**4.50**	**4.22**	cfm	1266	1688	2110	2532	2954	3376	4220	5064	5908
			NC	-	16	23	28	33	37	44	49	54
			Throw (ft) 0°	22-35-65	31-47-76	39-59-84	47-65-93	55-71-100	62-76-107	69-84-119	76-93-131	82-100-141
			Throw (ft) 22.5°	17-27-51	24-36-59	30-45-65	36-51-72	42-55-77	48-59-83	53-65-93	59-72-101	63-77-110
			Throw (ft) 45°	10-16-29	14-21-34	18-26-38	21-29-42	25-32-45	28-34-48	31-38-54	34-42-59	37-45-64
36x20 30x24	**5.00**	**4.71**	cfm	1413	1884	2355	2826	3297	3768	4710	5652	6594
			NC	-	17	23	29	33	37	44	50	54
			Throw (ft) 0°	23-37-69	33-49-80	41-62-89	49-69-98	58-75-106	65-80-113	73-89-126	80-98-138	86-106-149
			Throw (ft) 22.5°	18-29-54	26-38-62	32-48-69	38-54-76	45-58-82	50-62-87	56-69-98	62-76-107	67-82-116
			Throw (ft) 45°	10-17-31	15-22-36	19-28-40	22-31-44	26-34-48	29-36-51	33-40-57	36-44-62	39-48-67
42x18	**5.25**	**4.94**	cfm	1482	1976	2470	2964	3458	3952	4940	5928	6916
			NC	-	17	24	29	34	38	44	50	54
			Throw (ft) 0°	24-38-71	34-51-82	42-63-91	51-71-100	59-76-108	67-82-116	75-91-129	82-100-142	88-108-153
			Throw (ft) 22.5°	18-29-55	26-39-63	33-49-71	39-55-78	46-59-84	52-63-90	58-71-100	63-78-110	68-84-118
			Throw (ft) 45°	11-17-32	15-23-37	19-28-41	23-32-45	27-34-49	30-37-52	34-41-58	37-45-64	40-49-69
28x28	**5.44**	**5.16**	cfm	1548	2064	2580	3096	3612	4128	5160	6192	7224
			NC	-	17	24	29	34	38	45	50	55
			Throw (ft) 0°	24-39-72	35-52-84	43-65-93	52-72-102	60-78-110	68-84-118	76-93-132	84-102-145	90-110-156
			Throw (ft) 22.5°	19-30-56	27-40-65	33-50-72	40-56-79	47-61-86	53-65-92	59-72-102	65-79-112	70-86-121
			Throw (ft) 45°	11-17-33	16-23-38	19-29-42	23-33-46	27-35-50	31-38-53	34-42-59	38-46-65	41-50-70
42x20 30x28	**5.83**	**5.51**	cfm	1653	2204	2755	3306	3857	4408	5510	6612	7714
			NC	-	17	24	30	34	38	45	50	55
			Throw (ft) 0°	25-40-75	36-54-86	45-67-96	54-75-106	62-81-114	70-86-122	79-96-136	86-106-149	93-114-161
			Throw (ft) 22.5°	19-31-58	28-41-67	35-52-75	41-58-82	48-63-88	55-67-95	61-75-106	67-82-116	72-88-125
			Throw (ft) 45°	11-18-34	16-24-39	20-30-43	24-34-48	28-36-51	32-39-55	35-43-61	39-48-67	42-51-73
48x18 36x24	**6.00**	**5.66**	cfm	1698	2264	2830	3396	3962	4528	5660	6792	7924
			NC	-	18	24	30	34	38	45	50	55
			Throw (ft) 0°	25-41-76	36-54-87	45-68-98	54-76-107	63-82-116	71-87-124	80-98-138	87-107-152	94-116-164
			Throw (ft) 22.5°	20-32-59	28-42-68	35-53-76	42-59-83	49-63-90	55-68-96	62-76-107	68-83-117	73-90-127
			Throw (ft) 45°	11-18-34	16-24-39	20-31-44	24-34-48	28-37-52	32-39-56	36-44-62	39-48-68	43-52-74
30x30	**6.25**	**5.94**	cfm	1782	2376	2970	3564	4158	4752	5940	7128	8316
			NC	-	18	24	30	34	38	45	51	55
			Throw (ft) 0°	26-42-78	37-56-90	46-69-100	56-78-110	65-84-119	73-90-127	82-100-142	90-110-155	97-119-168
			Throw (ft) 22.5°	20-32-60	29-43-69	36-54-78	43-60-85	50-65-92	57-69-98	63-78-110	69-85-120	75-92-130
			Throw (ft) 45°	12-19-35	17-25-40	21-31-45	25-35-49	29-38-53	33-40-57	37-45-64	40-49-70	44-53-75

Performance notes appear at end of table

MODELS: 300R, 300F, 300R-SS, 300R-HD, 301R, 301F, 301R-SS AND 301R-HD
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)	Core Vel.	300	400	500	600	700	800	1000	1200	1400
				NC-20		NC-30			NC-40	NC-50		
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			Total Press. 0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total Press. 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Total Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
42x24 36x28	**7.00**	**6.66**	cfm	1998	2664	3330	3996	4662	5328	6660	7992	9324
			NC	-	18	25	30	35	39	46	51	56
			Throw (ft) 0°	28-44-82	39-59-95	49-74-106	59-82-116	69-89-126	77-95-134	87-106-150	95-116-164	102-126-178
			Throw (ft) 22.5°	21-34-64	30-46-74	38-57-82	46-64-90	53-69-97	60-74-104	67-82-116	74-90-127	79-97-138
			Throw (ft) 45°	12-20-37	18-26-43	22-33-48	26-37-52	31-40-56	35-43-60	39-48-68	43-52-74	46-56-80
46x22	**7.03**	**6.68**	cfm	2004	2672	3340	4008	4676	5344	6680	8016	9352
			NC	-	18	25	30	35	39	46	51	56
			Throw (ft) 0°	28-44-82	39-59-95	49-74-106	59-82-116	69-89-126	78-95-134	87-106-150	95-116-165	103-126-178
			Throw (ft) 22.5°	21-34-64	30-46-74	38-57-82	46-64-90	53-69-97	60-74-104	67-82-116	74-90-128	80-97-138
			Throw (ft) 45°	12-20-37	18-27-43	22-33-48	27-37-52	31-40-57	35-43-60	39-48-68	43-52-74	46-57-80
32x32	**7.11**	**6.78**	cfm	2034	2712	3390	4068	4746	5424	6780	8136	9492
			NC	-	18	25	30	35	39	46	51	56
			Throw (ft) 0°	28-45-83	40-59-96	49-74-107	59-83-117	69-90-127	78-96-135	87-107-151	96-117-166	103-127-179
			Throw (ft) 22.5°	22-34-64	31-46-74	38-57-83	46-64-91	54-69-98	61-74-105	68-83-117	74-91-129	80-98-139
			Throw (ft) 45°	12-20-37	18-27-43	22-33-48	27-37-53	31-40-57	35-43-61	39-48-68	43-53-75	47-57-81
36x30	**7.50**	**7.16**	cfm	2148	2864	3580	4296	5012	5728	7160	8592	10024
			NC	-	19	25	31	35	39	46	51	56
			Throw (ft) 0°	29-46-85	41-61-98	51-76-110	61-85-121	71-92-130	80-98-139	90-110-156	98-121-170	106-130-184
			Throw (ft) 22.5°	22-35-66	32-47-76	39-59-85	47-66-93	55-71-101	62-76-108	70-85-121	76-93-132	82-101-143
			Throw (ft) 45°	13-21-38	18-27-44	23-34-50	27-38-54	32-41-59	36-44-63	40-50-70	44-54-77	48-59-83
48x24 36x32	**8.00**	**7.63**	cfm	2289	3052	3815	4578	5341	6104	7630	9156	10682
			NC	-	19	25	31	35	39	46	52	56
			Throw (ft) 0°	29-47-88	42-63-102	52-79-114	63-88-124	73-95-134	83-102-144	93-114-161	102-124-176	110-134-190
			Throw (ft) 22.5°	23-37-68	33-49-79	41-61-88	49-68-96	57-74-104	64-79-111	72-88-124	79-96-136	85-104-147
			Throw (ft) 45°	13-21-40	19-28-46	24-35-51	28-40-56	33-43-60	37-46-65	42-51-72	46-56-79	49-60-86
34x34	**8.03**	**7.68**	cfm	2304	3072	3840	4608	5376	6144	7680	9216	10752
			NC	-	19	25	31	36	40	46	52	56
			Throw (ft) 0°	30-47-88	42-63-102	53-79-114	63-88-125	74-95-135	83-102-144	93-114-161	102-125-176	110-135-191
			Throw (ft) 22.5°	23-37-68	33-49-79	41-61-88	49-68-97	57-74-104	64-79-112	72-88-125	79-97-137	85-104-148
			Throw (ft) 45°	13-21-40	19-28-46	24-36-51	28-40-56	33-43-61	37-46-65	42-51-73	46-56-79	50-61-86
36x34	**8.50**	**8.14**	cfm	2442	3256	4070	4884	5698	6512	8140	9768	11396
			NC	-	19	26	31	36	40	46	52	56
			Throw (ft) 0°	30-49-91	43-65-105	54-81-117	65-91-128	76-98-139	86-105-148	96-117-166	105-128-182	113-139-196
			Throw (ft) 22.5°	24-38-70	34-50-81	42-63-91	50-70-100	59-76-108	66-81-115	74-91-129	81-100-141	88-108-152
			Throw (ft) 45°	14-22-41	20-29-47	24-37-53	29-41-58	34-44-62	39-47-67	43-53-75	47-58-82	51-62-88
42x30	**8.75**	**8.38**	cfm	2514	3352	4190	5028	5866	6704	8380	10056	11732
			NC	11	19	26	31	36	40	47	52	57
			Throw (ft) 0°	31-49-92	44-66-106	55-82-119	66-92-130	77-100-141	87-106-151	97-119-168	106-130-184	115-141-199
			Throw (ft) 22.5°	24-38-71	34-51-82	43-64-92	51-71-101	60-77-109	67-82-117	75-92-130	82-101-143	89-109-154
			Throw (ft) 45°	14-22-41	20-30-48	25-37-54	30-41-59	35-45-63	39-48-68	44-54-76	48-59-83	52-63-90
36x36	**9.00**	**8.63**	cfm	2589	3452	4315	5178	6041	6904	8630	10356	12082
			NC	11	19	26	31	36	40	47	52	57
			Throw (ft) 0°	31-50-94	45-67-108	56-84-121	67-94-132	78-101-143	88-108-153	99-121-171	108-132-187	117-143-202
			Throw (ft) 22.5°	24-39-72	35-52-84	43-65-94	52-72-103	61-78-111	68-84-118	76-94-132	84-103-145	90-111-157
			Throw (ft) 45°	14-23-42	20-30-49	25-38-54	30-42-60	35-45-64	40-49-69	44-54-77	49-60-84	53-64-91
42x34 **48x30**	**10.00**	**9.6**	cfm	2880	3840	4800	5760	6720	7680	9600	11520	13440
			NC	11	20	26	32	36	40	47	53	57
			Throw (ft) 0°	33-53-99	47-71-114	59-88-127	71-99-140	82-107-151	93-114-161	104-127-180	114-140-197	123-151-213
			Throw (ft) 22.5°	26-41-76	36-55-88	46-68-99	55-76-108	64-83-117	72-88-125	81-99-140	88-108-153	95-117-165
			Throw (ft) 45°	15-24-44	21-32-51	26-40-57	32-44-63	37-48-68	42-51-73	47-57-81	51-63-89	55-68-96
38x38	**10.03**	**9.64**	cfm	2892	3856	4820	5784	6748	7712	9640	11568	13496
			NC	11	20	26	32	36	40	47	53	57
			Throw (ft) 0°	33-53-99	47-71-114	59-88-128	71-99-140	83-107-151	93-114-161	104-128-181	114-140-198	123-151-214
			Throw (ft) 22.5°	26-41-77	37-55-88	46-69-99	55-77-108	64-83-117	72-88-125	81-99-140	88-108-153	96-117-166
			Throw (ft) 45°	15-24-44	21-32-51	27-40-57	32-44-63	37-48-68	42-51-73	47-57-81	51-63-89	55-68-96
42x36	**10.50**	**10.1**	cfm	3030	4040	5050	6060	7070	8080	10100	12120	14140
			NC	11	20	27	32	37	41	47	53	57
			Throw (ft) 0°	34-54-101	48-72-117	60-91-131	72-101-143	85-109-155	95-117-165	107-131-185	117-143-202	126-155-219
			Throw (ft) 22.5°	26-42-78	37-56-91	47-70-101	56-78-111	65-85-120	74-91-128	83-101-143	91-111-157	98-120-169
			Throw (ft) 45°	15-24-46	22-33-53	27-41-59	33-46-64	38-49-70	43-53-74	48-59-83	53-64-91	57-70-98
46x34	**10.86**	**10.45**	cfm	3135	4180	5225	6270	7315	8360	10450	12540	14630
			NC	11	20	27	32	37	41	47	53	58
			Throw (ft) 0°	34-55-103	49-74-119	61-92-133	74-103-146	86-111-157	97-119-168	109-133-188	119-146-206	128-157-222
			Throw (ft) 22.5°	27-43-80	38-57-92	48-71-103	57-80-113	67-86-122	75-92-130	84-103-146	92-113-160	99-122-172
			Throw (ft) 45°	16-25-46	22-33-53	28-41-60	33-46-66	39-50-71	44-53-76	49-60-85	53-66-93	58-71-100

Performance notes appear at end of table

MODELS: 300R, 300F, 300R-SS, 300R-HD, 301R, 301F, 301R-SS AND 301R-HD
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

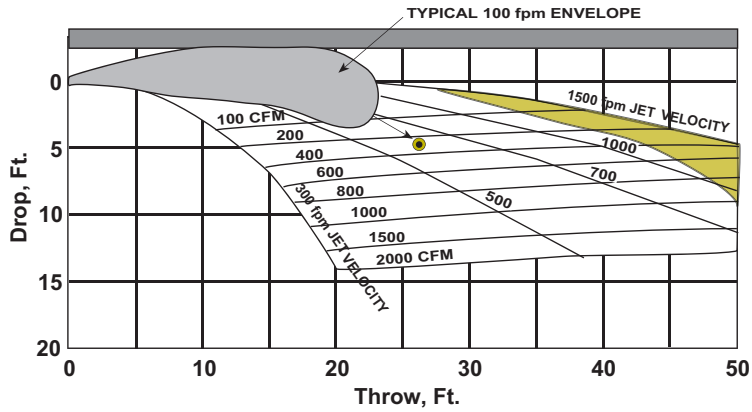
Nom. Duct Size (in.)	Nom. Duct Area (ft²)	Core Area (ft²)		NC-20		NC-30		NC-40		NC-50		
			Core Vel.	300	400	500	600	700	800	1000	1200	1400
			Vel. Press.	0.006	0.010	0.016	0.022	0.031	0.040	0.062	0.090	0.122
			Total Press. 0°	0.016	0.029	0.046	0.066	0.090	0.117	0.183	0.263	0.358
			Total Press. 22.5°	0.018	0.033	0.051	0.074	0.100	0.131	0.204	0.294	0.401
			Total Press. 45°	0.028	0.049	0.077	0.111	0.152	0.198	0.309	0.445	0.606
42x38	11.08	10.67	cfm	3201	4268	5335	6402	7469	8536	10670	12804	14938
			NC	12	20	27	32	37	41	48	53	58
			Throw (ft) 0°	35-56-104	50-74-120	62-93-134	74-104-147	87-112-159	98-120-170	110-134-190	120-147-208	130-159-225
			Throw (ft) 22.5°	27-43-81	38-58-93	48-72-104	58-81-114	67-87-123	76-93-132	85-104-147	93-114-161	101-123-174
			Throw (ft) 45°	16-25-47	22-34-54	28-42-60	34-47-66	39-51-71	44-54-76	49-60-85	54-66-94	58-71-101
40x40	11.11	10.7	cfm	3210	4280	5350	6420	7490	8560	10700	12840	14980
			NC	12	20	27	32	37	41	48	53	58
			Throw (ft) 0°	35-56-104	50-75-120	62-93-134	75-104-147	87-113-159	98-120-170	110-134-190	120-147-208	130-159-225
			Throw (ft) 22.5°	27-43-81	39-58-93	48-72-104	58-81-114	67-87-123	76-93-132	85-104-147	93-114-161	101-123-174
			Throw (ft) 45°	16-25-47	22-34-54	28-42-61	34-47-66	39-51-72	44-54-77	49-61-86	54-66-94	58-72-101
48x36	12.00	11.57	cfm	3471	4628	5785	6942	8099	9256	11570	13884	16198
			NC	12	21	27	33	37	41	48	53	58
			Throw (ft) 0°	36-58-108	52-78-125	65-97-140	78-108-153	90-117-165	102-125-177	114-140-198	125-153-217	135-165-234
			Throw (ft) 22.5°	28-45-84	40-60-97	50-75-108	60-84-119	70-91-128	79-97-137	88-108-153	97-119-168	105-128-181
			Throw (ft) 45°	16-26-49	23-35-56	29-44-63	35-49-69	41-53-74	46-56-80	51-63-89	56-69-97	61-74-105
42x42	12.25	11.82	cfm	3546	4728	5910	7092	8274	9456	11820	14184	16548
			NC	12	21	27	33	37	41	48	53	58
			Throw (ft) 0°	37-59-109	52-78-126	65-98-141	78-109-155	91-118-167	103-126-179	115-141-200	126-155-219	137-167-236
			Throw (ft) 22.5°	28-46-85	40-61-98	51-76-110	61-85-120	71-92-130	80-98-139	89-110-155	98-120-170	106-130-183
			Throw (ft) 45°	16-26-49	24-35-57	29-44-64	35-49-70	41-53-75	46-57-80	52-64-90	57-70-99	61-75-106
44x44	13.44	12.99	cfm	3897	5196	6495	7794	9093	10392	12990	15588	18186
			NC	12	21	28	33	38	42	48	54	58
			Throw (ft) 0°	38-62-115	55-82-133	68-103-148	82-115-162	96-124-175	108-133-187	121-148-210	133-162-230	143-175-248
			Throw (ft) 22.5°	30-48-89	42-64-103	53-80-115	64-89-126	74-96-136	84-103-145	94-115-162	103-126-178	111-136-192
			Throw (ft) 45°	17-28-52	25-37-60	31-46-67	37-52-73	43-56-79	49-60-84	54-67-94	60-73-103	64-79-112
48x42	14.00	13.54	cfm	4062	5416	6770	8124	9478	10832	13540	16248	18956
			NC	13	21	28	33	38	42	49	54	59
			Throw (ft) 0°	39-63-117	56-84-135	70-105-151	84-117-166	98-127-179	110-135-191	124-151-214	135-166-234	146-179-253
			Throw (ft) 22.5°	30-49-91	43-65-105	54-81-117	65-91-128	76-98-139	86-105-148	96-117-166	105-128-182	113-139-196
			Throw (ft) 45°	18-28-53	25-38-61	31-47-68	38-53-75	44-57-81	50-61-86	56-68-96	61-75-105	66-81-114
46x46	14.69	14.22	cfm	4266	5688	7110	8532	9954	11376	14220	17064	19908
			NC	13	21	28	33	38	42	49	54	59
			Throw (ft) 0°	40-64-120	57-86-139	72-107-155	86-120-170	100-130-183	113-139-196	127-155-219	139-170-240	150-183-259
			Throw (ft) 22.5°	31-50-93	44-67-107	56-83-120	67-93-132	78-101-142	88-107-152	98-120-170	107-132-186	116-142-201
			Throw (ft) 45°	18-29-54	26-39-62	32-48-70	39-54-76	45-58-83	51-62-88	57-70-99	62-76-108	67-83-117
48x46	15.33	14.85	cfm	4455	5940	7425	8910	10395	11880	14850	17820	20790
			NC	13	22	28	34	38	42	49	54	59
			Throw (ft) 0°	41-66-123	59-88-142	73-110-158	88-123-174	102-133-187	116-142-200	129-158-224	142-174-245	153-187-265
			Throw (ft) 22.5°	32-51-95	45-68-110	57-85-123	68-95-134	79-103-145	90-110-155	100-123-174	110-134-190	119-145-205
			Throw (ft) 45°	18-30-55	26-40-64	33-49-71	40-55-78	46-60-84	52-64-90	58-71-101	64-78-110	69-84-119
48x48	16.00	15.50	cfm	4650	6200	7750	9300	10850	12400	15500	18600	21700
			NC	13	22	28	34	38	42	49	55	59
			Throw (ft) 0°	42-67-125	60-90-145	75-112-162	90-125-177	105-135-192	118-145-205	132-162-229	145-177-251	156-192-271
			Throw (ft) 22.5°	33-52-97	46-70-112	58-87-125	70-97-137	81-105-148	92-112-159	102-125-177	112-137-194	121-148-210
			Throw (ft) 45°	19-30-56	27-40-65	34-50-73	40-56-80	47-61-86	53-65-92	59-73-103	65-80-113	70-86-122

- 0°, 22.5° & 45° represent blade deflection angles
- Performance data is based on duct sizes in bold, the performance varies slightly for duct sizes not shown in bold
- See the section, Engineering Guidelines, for drop information when selecting larger supply grilles for cooling purposes
- See the "Performance Notes" portion in this section for notes and correction factors
- See the section, Engineering Guidelines, for catalog throw information
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts

PERFORMANCE NOTES

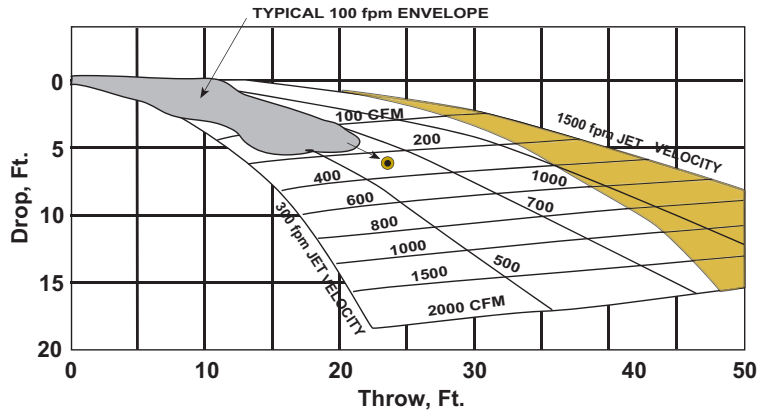
- Performance data includes damper
- Data obtained from tests conducted in accordance with ANSI/ASHRAE Standard 70-2006
- All pressures are in inches of water
- Core velocities are in feet per minute
- Throw values given are for isothermal terminal velocities of 150, 100 and 50 fpm
- Each NC value represents the noise criterion curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7. Each NC value is based on a room absorption of 10 dB, re 10^{-12} watts. Each NC value is further based on grille operating at a 0° deflection. Settings of 22½° or 45°, increase the stated sound levels by 1 or 7 NC, respectively.
- Bold dividing lines on H17-H21 denote ranges of NC values
- The stated deflection settings refer to the horizontal setting of the blade's deflection angle. For a 20° upward deflection, use the throw rating for the 0° setting and the total pressure for the 22½° horizontal setting.
- Dash (—) in space indicates NC value less than 10
- For additional information concerning drop and throw, see the Engineering Guidelines section of this catalog

Drop Versus Throw Showing Ceiling Effect - 20°F ΔT Cooling



(Side view of air jet leaving wall mounted grille)

Drop Versus Throw without Ceiling Effect



(Side view of air jet leaving wall mounted grille)

VARIABLE AIR VOLUME APPLICATIONS

All Titus supply grilles can be applied to variable air volume systems with excellent results. For detailed selection methods, consult your Titus representative or the Engineering Guidelines section of this catalog.

Correction Factors for 300/301 Supply Grilles

Model	Damper	A_k/A_c	Throw	Total Pressure	NC
300R, 300F	With	0.77	1.00	1.00	0
301R, 301F	Without	0.82	0.98	0.88	-2

Note: Throw and total pressure corrections are multipliers. The NC correction is an addition. A_k is the flow factor. A_c is the core area from the main table.

HORIZONTAL DEFLECTION (SPREAD)

SUPPLY GRILLES

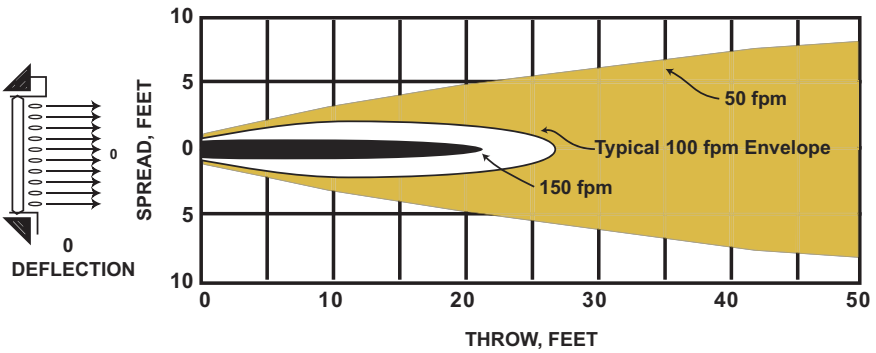
The figures depicting deflection, throw and drop are based on actual tests conducted by Titus. They show the relationship of spread to throw for a typical high side-wall supply outlet selection.

Notice the outer shaded area represents the 50 fpm isovel, the white area, the 100 fpm isovel, and the inner area, the 150 fpm isovel.

The spread angle also affects the airstream drop amount. Always consider for any given temperature, volume and core velocity; the wider spread results in a smaller drop. See section, Engineering Guidelines, for more drop, throw and spread relationship information.

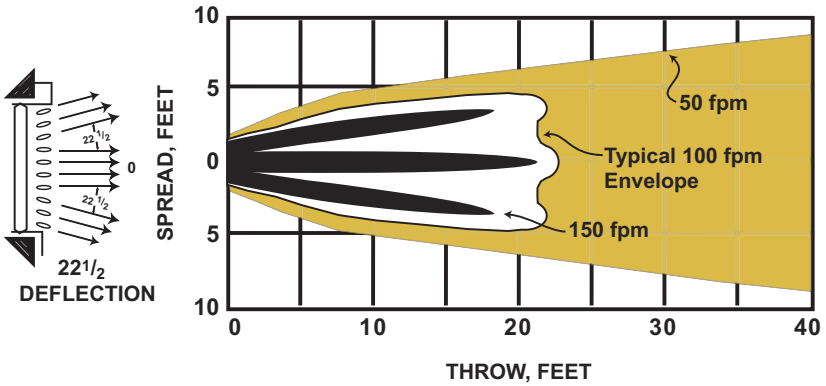
Titus grilles can be selected with a single set of blades for adjusting either horizontal or vertical deflection, or with two sets of blades for adjusting both horizontal and vertical deflections.

0° Horizontal Deflection



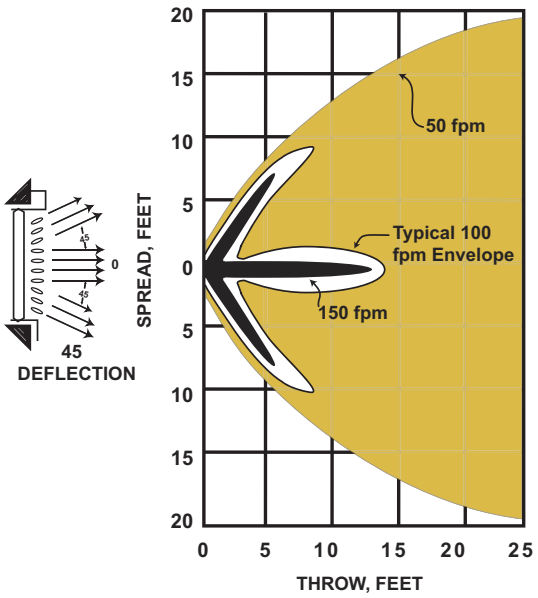
Spread versus throw at 0° horizontal deflection angle (Plan view of air jet leaving wall mounted grille).

22½° Horizontal Deflection



Spread versus throw at 22½° horizontal deflection angle (Plan view of air jet leaving wall mounted grille).

45° Horizontal Deflection



Spread versus throw at 45° horizontal deflection angle (Plan view of air jet leaving wall mounted grille).

300 / 350 Return Grilles

350 (RL-RS / ZRL-ZRS)

350 (RL /RS)

350 (ZRL / ZRS)

350RL
- ¾" blade spacing
- 35° fixed deflection
- Reinforced corners
- Blades parallel to the long dimension

350RS
- Same as 350RL with blades parallel to the short dimension

350ZRL
- ¾" blade spacing
- 0° fixed deflection
- Reinforced corners
- Blades parallel to the long dimension

350ZRS
- Same as 350ZRL with blades parallel to the short dimension

metric sizes

See website for Specifications

MODELS:

35° Deflection Models
350RL
350RS

0° Deflection Models
350ZRL
350ZRS

FINISH:

Standard Finish - #26 White

OVERVIEW

3/4" Blade Spacing / Steel

Titus' 300 / 350 Series return grilles define the standard for the industry. With high quality and competitive pricing these grilles form the back bone of a standard offering that will meet any application requirements.

For Performance Data, refer to page H37 for 350R, and page H39 for 350ZR.

PRODUCTS INCLUDE

- Material: Roll-formed Steel Border and Blades
- Welded Border
- Available Border Types:
  #1 - Surface Mount
  #2 - Snap-In
  #3 - Lay-In
  #4 - Spline
- Countersunk Screw Holes
- #8 x 1¼" Long Phillips Flat Head Sheet Metal Screws, Painted White
- Optional Steel Opposed-Blade Damper

350R, 350F AND 350R-SS
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

NC-20

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	100 0.001 0.002	200 0.002 0.008	300 0.006 0.018	400 0.010 0.032	500 0.016 0.051	600 0.022 0.073	700 0.031 0.099	800 0.040 0.130	900 0.050 0.164
6x6	**0.25**	**0.19**	Airflow, cfm	19	38	57	76	95	114	133	152	171
			NC	-	-	-	-	-	13	19	25	29
8x6	**0.33**	**0.26**	Airflow, cfm	26	52	78	104	130	156	182	208	234
			NC	-	-	-	-	-	15	20	26	30
10x6	**0.42**	**0.34**	Airflow, cfm	34	68	102	136	170	204	238	272	306
			NC	-	-	-	-	-	16	21	28	32
8x8	**0.44**	**0.37**	Airflow, cfm	37	74	111	148	185	222	259	296	333
			NC	-	-	-	-	-	16	22	28	32
12x6	**0.5**	**0.41**	Airflow, cfm	41	82	123	164	205	246	287	328	369
			NC	-	-	-	-	-	17	22	30	34
14x6	**0.58**	**0.48**	Airflow, cfm	48	96	144	192	240	288	336	384	432
			NC	-	-	-	-	-	18	24	30	34
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm	57	114	171	228	285	342	399	456	513
			NC	-	-	-	-	10	19	25	30	35
10x10	**0.69**	**0.59**	Airflow, cfm	59	118	177	236	295	354	413	472	531
			NC	-	-	-	-	10	19	25	31	35
18x6	**0.75**	**0.63**	Airflow, cfm	63	126	189	252	315	378	441	504	567
			NC	-	-	-	-	10	19	25	32	35
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm	72	144	216	288	360	432	504	576	648
			NC	-	-	-	-	11	19	25	30	35
22x6	**0.92**	**0.77**	Airflow, cfm	77	154	231	308	385	462	539	616	693
			NC	-	-	-	-	11	19	25	30	35
24x6 **12x12**	**1**	**0.88**	Airflow, cfm	88	176	264	352	440	528	616	704	792
			NC	-	-	-	-	11	19	25	30	35
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm	111	222	333	444	555	666	777	888	999
			NC	-	-	-	-	12	20	26	32	35
14x14	**1.36**	**1.22**	Airflow, cfm	122	244	366	488	610	732	854	976	1098
			NC	-	-	-	-	12	20	27	32	35
36x6 **18x12**	**1.5**	**1.35**	Airflow, cfm	135	270	405	540	675	810	945	1080	1215
			NC	-	-	-	-	13	20	27	32	35
22x10	**1.53**	**1.37**	Airflow, cfm	137	274	411	548	685	822	959	1096	1233
			NC	-	-	-	-	13	20	27	32	36
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm	149	298	447	596	745	894	1043	1192	1341
			NC	-	-	-	-	14	21	27	33	37
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm	159	318	477	636	795	954	1113	1272	1431
			NC	-	-	-	-	14	21	27	33	37
16x16	**1.78**	**1.62**	Airflow, cfm	162	324	486	648	810	972	1134	1296	1458
			NC	-	-	-	-	14	21	27	33	37
24x12 18x16	**2**	**1.82**	Airflow, cfm	182	364	546	728	910	1092	1274	1456	1638
			NC	-	-	-	-	14	21	28	33	38
18x18	**2.25**	**2.07**	Airflow, cfm	207	414	621	828	1035	1242	1449	1656	1863
			NC	-	-	-	-	14	21	28	33	38
24x14	**2.33**	**2.14**	Airflow, cfm	214	428	642	856	1070	1284	1498	1712	1926
			NC	-	-	-	-	14	22	28	33	38
30x12	**2.5**	**2.29**	Airflow, cfm	229	458	687	916	1145	1374	1603	1832	2061
			NC	-	-	-	-	15	22	28	33	38
24x16	**2.67**	**2.46**	Airflow, cfm	246	492	738	984	1230	1476	1722	1968	2214
			NC	-	-	-	-	15	22	29	34	39
20x20	**2.78**	**2.57**	Airflow, cfm	257	514	771	1028	1285	1542	1799	2056	2313
			NC	-	-	-	-	16	23	29	34	39
36x12	**3**	**2.75**	Airflow, cfm	275	550	825	1100	1375	1650	1925	2200	2475
			NC	-	-	-	-	16	23	29	34	39
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm	311	622	933	1244	1555	1866	2177	2488	2799
			NC	-	-	-	-	17	24	30	35	40
22x22	**3.36**	**3.14**	Airflow, cfm	314	628	942	1256	1570	1884	2198	2512	2826
			NC	-	-	-	-	17	24	30	35	40
42x12 36x14	**3.5**	**3.22**	Airflow, cfm	322	644	966	1288	1610	1932	2254	2576	2898
			NC	-	-	-	-	17	24	30	36	40
24x22	**3.67**	**3.43**	Airflow, cfm	343	686	1029	1372	1715	2058	2401	2744	3087
			NC	-	-	-	-	17	24	30	36	40
30x18	**3.75**	**3.5**	Airflow, cfm	350	700	1050	1400	1750	2100	2450	2800	3150
			NC	-	-	-	-	17	24	30	36	40

NC-30

NC-40

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

350R, 350F AND 350R-SS
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	100 0.001 0.002	200 0.002 0.008	300 0.006 0.018	400 0.010 0.032	500 0.016 0.051	600 0.022 0.073	700 0.031 0.099	800 0.040 0.130	900 0.050 0.164
								NC-20	NC-30		NC-40	
48x12 **24x24**	**4**	**3.75**	Airflow, cfm NC	375 -	750 -	1125 -	1500 -	1875 18	2250 25	2625 37	3000 38	3375 41
36x18	**4.5**	**4.22**	Airflow, cfm NC	422 -	844 -	1266 -	1688 -	2110 18	2532 25	2954 31	3376 38	3798 41
36x20 30x24	**5**	**4.71**	Airflow, cfm NC	471 -	942 -	1413 -	1884 -	2355 18	2826 25	3297 31	3768 38	4239 41
42x18	**5.25**	**4.94**	Airflow, cfm NC	494 -	988 -	1482 -	1976 -	2470 18	2964 25	3458 31	3952 38	4446 41
28x28	**5.44**	**5.16**	Airflow, cfm NC	516 -	1032 -	1548 -	2064 -	2580 18	3096 25	3612 32	4128 38	4644 41
42x20 30x28	**5.83**	**5.51**	Airflow, cfm NC	551 -	1102 -	1653 -	2204 10	2755 18	3306 26	3857 32	4408 38	4959 41
48x18 36x24	**6**	**5.66**	Airflow, cfm NC	566 -	1132 -	1698 -	2264 10	2830 18	3396 26	3962 32	4528 38	5094 41
30x30	**6.25**	**5.94**	Airflow, cfm NC	594 -	1188 -	1782 -	2376 10	2970 18	3564 26	4158 32	4752 38	5346 41
42x24 36x28	**7**	**6.66**	Airflow, cfm NC	666 -	1332 -	1998 -	2664 10	3330 19	3996 26	4662 32	5328 38	5994 41
46x22	**7.03**	**6.68**	Airflow, cfm NC	668 -	1336 -	2004 -	2672 10	3340 19	4008 27	4676 32	5344 38	6012 42
32x32	**7.11**	**6.78**	Airflow, cfm NC	678 -	1356 -	2034 -	2712 10	3390 19	4068 27	4746 32	5424 38	6102 42
36x30	**7.5**	**7.16**	Airflow, cfm NC	716 -	1432 -	2148 -	2864 10	3580 19	4296 27	5012 32	5728 38	6444 42
48x24 36x32	**8**	**7.63**	Airflow, cfm NC	763 -	1526 -	2289 -	3052 10	3815 19	4578 27	5341 32	6104 38	6867 42
34x34	**8.03**	**7.68**	Airflow, cfm NC	768 -	1536 -	2304 -	3072 10	3840 19	4608 27	5376 32	6144 38	6912 42
36x34	**8.5**	**8.14**	Airflow, cfm NC	814 -	1628 -	2442 -	3256 11	4070 19	4884 27	5698 32	6512 38	7326 42
42x30	**8.75**	**8.38**	Airflow, cfm NC	838 -	1676 -	2514 -	3352 11	4190 20	5028 27	5866 32	6704 38	7542 42
36x36	**9**	**8.63**	Airflow, cfm NC	863 -	1726 -	2589 -	3452 11	4315 20	5178 27	6041 33	6904 38	7767 43
42x34 **48x30**	**10**	**9.6**	Airflow, cfm NC	960 -	1920 -	2880 -	3840 11	4800 20	5760 27	6720 33	7680 38	8640 43
38x38	**10.03**	**9.64**	Airflow, cfm NC	964 -	1928 -	2892 -	3856 11	4820 20	5784 27	6748 33	7712 38	8676 43
42x36	**10.5**	**10.1**	Airflow, cfm NC	1010 -	2020 -	3030 -	4040 11	5050 20	6060 27	7070 33	8080 38	9090 43
46x34	**10.86**	**10.45**	Airflow, cfm NC	1045 -	2090 -	3135 -	4180 11	5225 20	6270 27	7315 33	8360 38	9405 43
42x38	**11.08**	**10.67**	Airflow, cfm NC	1067 -	2134 -	3201 -	4268 11	5335 20	6402 27	7469 33	8536 38	9603 43
40x40	**11.11**	**10.7**	Airflow, cfm NC	1070 -	2140 -	3210 -	4280 11	5350 20	6420 27	7490 33	8560 38	9630 43
48x36	**12**	**11.57**	Airflow, cfm NC	1157 -	2314 -	3471 -	4628 11	5785 20	6942 27	8099 33	9256 39	10413 44
42x42	**12.25**	**11.82**	Airflow, cfm NC	1182 -	2364 -	3546 -	4728 11	5910 20	7092 27	8274 33	9456 39	10638 44
44x44	**13.44**	**12.99**	Airflow, cfm NC	1299 -	2598 -	3897 -	5196 12	6495 21	7794 28	9093 34	10392 39	11691 44
48x42	**14**	**13.54**	Airflow, cfm NC	1354 -	2708 -	4062 -	5416 12	6770 21	8124 28	9478 34	10832 40	12186 45
46x46	**14.69**	**14.22**	Airflow, cfm NC	1422 -	2844 -	4266 -	5688 12	7110 21	8532 28	9954 35	11376 40	12798 45
48x46	**15.33**	**14.85**	Airflow, cfm NC	1485 -	2970 -	4455 -	5940 12	7425 22	8910 28	10395 35	11880 40	13365 45
48x48	**16**	**15.5**	Airflow, cfm NC	1550 -	3100 -	4650 -	6200 13	7750 22	9300 29	10850 35	12400 40	13950 45

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

350ZR AND 350ZF
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

							NC-10	NC-20		NC-30		NC-40
Nominal Duct Size (in.)	**Nominal Duct Area (ft²)**	**Core Area (ft²)**	**Core Velocity Velocity Pressure Neg. Static Pressure**	**300 0.006 0.012**	**400 0.010 0.022**	**500 0.016 0.034**	**600 0.022 0.049**	**700 0.031 0.067**	**900 0.050 0.111**	**1100 0.075 0.165**	**1300 0.105 0.231**	**1500 0.140 0.307**
6x6	**0.25**	**0.19**	Airflow, cfm NC	57 -	76 -	95 -	114 -	133 13	171 20	209 26	247 31	285 35
8x6	**0.33**	**0.26**	Airflow, cfm NC	78 -	104 -	130 -	156 -	182 14	234 22	286 27	338 32	390 36
10x6	**0.42**	**0.34**	Airflow, cfm NC	102 -	136 -	170 -	204 11	238 16	306 23	374 28	442 33	510 37
8x8	**0.44**	**0.37**	Airflow, cfm NC	111 -	148 -	185 -	222 12	259 16	333 23	407 29	481 34	555 38
12x6	**0.5**	**0.41**	Airflow, cfm NC	123 -	164 -	205 -	246 12	287 16	369 24	451 29	533 34	615 38
14x6	**0.58**	**0.48**	Airflow, cfm NC	144 -	192 -	240 -	288 13	336 17	432 24	528 30	624 35	720 39
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm NC	171 -	228 -	285 -	342 13	399 18	513 25	627 31	741 36	855 40
10x10	**0.69**	**0.59**	Airflow, cfm NC	177 -	236 -	295 -	354 14	413 18	531 25	649 31	767 36	885 40
18x6	**0.75**	**0.63**	Airflow, cfm NC	189 -	252 -	315 -	378 14	441 18	567 25	693 31	819 36	945 40
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm NC	216 -	288 -	360 -	432 14	504 19	648 26	792 32	936 37	1080 41
22x6	**0.92**	**0.77**	Airflow, cfm NC	231 -	308 -	385 -	462 15	539 19	693 26	847 32	1001 37	1155 41
24x6 **12x12**	**1**	**0.88**	Airflow, cfm NC	264 -	352 -	440 -	528 15	616 20	792 27	968 33	1144 37	1320 42
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm NC	333 -	444 -	555 11	666 16	777 21	999 28	1221 34	1443 38	1665 43
14x14	**1.36**	**1.22**	Airflow, cfm NC	366 -	488 -	610 11	732 17	854 21	1098 28	1342 34	1586 39	1830 43
36x6 **18x12**	**1.5**	**1.35**	Airflow, cfm NC	405 -	540 -	675 12	810 17	945 22	1215 29	1485 35	1755 39	2025 43
22x10	**1.53**	**1.37**	Airflow, cfm NC	411 -	548 -	685 12	822 17	959 22	1233 29	1507 35	1781 39	2055 43
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm NC	447 -	596 -	745 12	894 18	1043 22	1341 29	1639 35	1937 40	2235 44
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm NC	477 -	636 -	795 13	954 18	1113 22	1431 29	1749 35	2067 40	2385 44
16x16	**1.78**	**1.62**	Airflow, cfm NC	486 -	648 -	810 13	972 18	1134 22	1458 30	1782 35	2106 40	2430 44
24x12 18x16	**2**	**1.82**	Airflow, cfm NC	546 -	728 -	910 13	1092 18	1274 23	1638 30	2002 36	2366 41	2730 45
18x18	**2.25**	**2.07**	Airflow, cfm NC	621 -	828 -	1035 14	1242 19	1449 23	1863 31	2277 36	2691 41	3105 45
24x14	**2.33**	**2.14**	Airflow, cfm NC	642 -	856 -	1070 14	1284 19	1498 24	1926 31	2354 37	2782 41	3210 45
30x12	**2.5**	**2.29**	Airflow, cfm NC	687 -	916 -	1145 14	1374 19	1603 24	2061 31	2519 37	2977 42	3435 46
24x16	**2.67**	**2.46**	Airflow, cfm NC	738 -	984 -	1230 15	1476 20	1722 24	2214 31	2706 37	3198 42	3690 46
20x20	**2.78**	**2.57**	Airflow, cfm NC	771 -	1028 -	1285 15	1542 20	1799 24	2313 32	2827 37	3341 42	3855 46
36x12	**3**	**2.75**	Airflow, cfm NC	825 -	1100 -	1375 15	1650 20	1925 25	2475 32	3025 38	3575 42	4125 47
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm NC	933 -	1244 -	1555 16	1866 21	2177 25	2799 32	3421 38	4043 43	4665 47
22x22	**3.36**	**3.14**	Airflow, cfm NC	942 -	1256 -	1570 16	1884 21	2198 25	2826 32	3454 38	4082 43	4710 47
42x12 36x14	**3.5**	**3.22**	Airflow, cfm NC	966 -	1288 -	1610 16	1932 21	2254 25	2898 33	3542 38	4186 43	4830 47
24x22	**3.67**	**3.43**	Airflow, cfm NC	1029 -	1372 -	1715 16	2058 21	2401 26	3087 33	3773 39	4459 43	5145 47
30x18	**3.75**	**3.5**	Airflow, cfm NC	1050 -	1400 -	1750 16	2100 21	2450 26	3150 33	3850 39	4550 43	5250 48

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

350ZR AND 350ZF
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity / Velocity Pressure / Neg. Static Pressure	300 0.006 0.012	400 0.010 0.022	500 0.016 0.034	600 0.022 0.049	700 0.031 0.067	900 0.050 0.111	1100 0.075 0.165	1300 0.105 0.231	1500 0.140 0.307
					NC-10		NC-20	NC-30		NC-40		
48x12 **24x24**	**4**	**3.75**	Airflow, cfm	1125	1500	1875	2250	2625	3375	4125	4875	5625
			NC	-	-	16	22	26	33	39	44	48
36x18	**4.5**	**4.22**	Airflow, cfm	1266	1688	2110	2532	2954	3798	4642	5486	6330
			NC	-	-	17	22	27	34	39	44	48
36x20 30x24	**5**	**4.71**	Airflow, cfm	1413	1884	2355	2826	3297	4239	5181	6123	7065
			NC	-	11	17	23	27	34	40	45	49
42x18	**5.25**	**4.94**	Airflow, cfm	1482	1976	2470	2964	3458	4446	5434	6422	7410
			NC	-	11	18	23	27	34	40	45	49
28x28	**5.44**	**5.16**	Airflow, cfm	1548	2064	2580	3096	3612	4644	5676	6708	7740
			NC	-	11	18	23	27	35	40	45	49
42x20 30x28	**5.83**	**5.51**	Airflow, cfm	1653	2204	2755	3306	3857	4959	6061	7163	8265
			NC	-	12	18	23	28	35	41	45	50
48x18 36x24	**6**	**5.66**	Airflow, cfm	1698	2264	2830	3396	3962	5094	6226	7358	8490
			NC	-	12	18	23	28	35	41	46	50
30x30	**6.25**	**5.94**	Airflow, cfm	1782	2376	2970	3564	4158	5346	6534	7722	8910
			NC	-	12	18	24	28	35	41	46	50
42x24 36x28	**7**	**6.66**	Airflow, cfm	1998	2664	3330	3996	4662	5994	7326	8658	9990
			NC	-	12	19	24	28	36	41	46	50
46x22	**7.03**	**6.68**	Airflow, cfm	2004	2672	3340	4008	4676	6012	7348	8684	10020
			NC	-	12	19	24	29	36	41	46	50
32x32	**7.11**	**6.78**	Airflow, cfm	2034	2712	3390	4068	4746	6102	7458	8814	10170
			NC	-	13	19	24	29	36	42	46	50
36x30	**7.5**	**7.16**	Airflow, cfm	2148	2864	3580	4296	5012	6444	7876	9308	10740
			NC	-	13	19	24	29	36	42	47	51
48x24 36x32	**8**	**7.63**	Airflow, cfm	2289	3052	3815	4578	5341	6867	8393	9919	11445
			NC	-	13	19	25	29	36	42	47	51
34x34	**8.03**	**7.68**	Airflow, cfm	2304	3072	3840	4608	5376	6912	8448	9984	11520
			NC	-	13	19	25	29	36	42	47	51
36x34	**8.5**	**8.14**	Airflow, cfm	2442	3256	4070	4884	5698	7326	8954	10582	12210
			NC	-	13	20	25	29	37	42	47	51
42x30	**8.75**	**8.38**	Airflow, cfm	2514	3352	4190	5028	5866	7542	9218	10894	12570
			NC	-	13	20	25	29	37	42	47	51
36x36	**9**	**8.63**	Airflow, cfm	2589	3452	4315	5178	6041	7767	9493	11219	12945
			NC	-	14	20	25	30	37	43	47	51
42x34 **48x30**	**10**	**9.6**	Airflow, cfm	2880	3840	4800	5760	6720	8640	10560	12480	14400
			NC	-	14	20	26	30	37	43	48	52
38x38	**10.03**	**9.64**	Airflow, cfm	2892	3856	4820	5784	6748	8676	10604	12532	14460
			NC	-	14	20	26	30	37	43	48	52
42x36	**10.5**	**10.1**	Airflow, cfm	3030	4040	5050	6060	7070	9090	11110	13130	15150
			NC	-	14	21	26	30	38	43	48	52
46x34	**10.86**	**10.45**	Airflow, cfm	3135	4180	5225	6270	7315	9405	11495	13585	15675
			NC	-	14	21	26	30	38	43	48	52
42x38	**11.08**	**10.67**	Airflow, cfm	3201	4268	5335	6402	7469	9603	11737	13871	16005
			NC	-	14	21	26	31	38	44	48	52
40x40	**11.11**	**10.7**	Airflow, cfm	3210	4280	5350	6420	7490	9630	11770	13910	16050
			NC	-	15	21	26	31	38	44	48	52
48x36	**12**	**11.57**	Airflow, cfm	3471	4628	5785	6942	8099	10413	12727	15041	17355
			NC	-	15	21	26	31	38	44	49	53
42x42	**12.25**	**11.82**	Airflow, cfm	3546	4728	5910	7092	8274	10638	13002	15366	17730
			NC	-	15	21	27	31	38	44	49	53
44x44	**13.44**	**12.99**	Airflow, cfm	3897	5196	6495	7794	9093	11691	14289	16887	19485
			NC	-	15	22	27	31	39	44	49	53
48x42	**14**	**13.54**	Airflow, cfm	4062	5416	6770	8124	9478	12186	14894	17602	20310
			NC	-	16	22	27	32	39	45	49	53
46x46	**14.69**	**14.22**	Airflow, cfm	4266	5688	7110	8532	9954	12798	15642	18486	21330
			NC	-	16	22	27	32	39	45	50	54
48x46	**15.33**	**14.85**	Airflow, cfm	4455	5940	7425	8910	10395	13365	16335	19305	22275
			NC	-	16	22	28	32	39	45	50	54
48x48	**16**	**15.5**	Airflow, cfm	4650	6200	7750	9300	10850	13950	17050	20150	23250
			NC	-	16	23	28	32	39	45	50	54
										NC-50		

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

355R AND 355F
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

NC-20 NC-30

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	100 0.001 0.003	200 0.002 0.011	300 0.006 0.026	400 0.010 0.045	500 0.016 0.071	600 0.022 0.102	700 0.031 0.139	800 0.040 0.182	900 0.050 0.230
6x6	**0.25**	**0.19**	Airflow, cfm NC	19 -	38 -	57 -	76 -	95 10	114 18	133 25	152 29	171 33
8x6	**0.33**	**0.26**	Airflow, cfm NC	26 -	52 -	78 -	104 -	130 11	156 19	182 25	208 30	234 35
10x6	**0.42**	**0.34**	Airflow, cfm NC	34 -	68 -	102 -	136 -	170 12	204 20	238 26	272 31	306 36
8x8	**0.44**	**0.37**	Airflow, cfm NC	37 -	74 -	111 -	148 -	185 12	222 20	259 26	296 31	333 36
12x6	**0.5**	**0.41**	Airflow, cfm NC	41 -	82 -	123 -	164 -	205 12	246 20	287 26	328 32	369 36
14x6	**0.58**	**0.48**	Airflow, cfm NC	48 -	96 -	144 -	192 -	240 12	288 20	336 26	384 32	432 37
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm NC	57 -	114 -	171 -	228 -	285 13	342 21	399 27	456 32	513 38
10x10	**0.69**	**0.59**	Airflow, cfm NC	59 -	118 -	177 -	236 -	295 13	354 21	413 27	472 32	531 38
18x6	**0.75**	**0.63**	Airflow, cfm NC	63 -	126 -	189 -	252 -	315 14	378 22	441 28	504 33	567 38
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm NC	72 -	144 -	216 -	288 -	360 14	432 22	504 28	576 33	648 38
22x6	**0.92**	**0.77**	Airflow, cfm NC	77 -	154 -	231 -	308 -	385 14	462 22	539 28	616 34	693 38
24x6 **12x12**	**1**	**0.88**	Airflow, cfm NC	88 -	176 -	264 -	352 -	440 15	528 22	616 28	704 34	792 39
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm NC	111 -	222 -	333 -	444 -	555 15	666 22	777 28	888 34	999 39
14x14	**1.36**	**1.22**	Airflow, cfm NC	122 -	244 -	366 -	488 -	610 16	732 23	854 29	976 34	1098 39
36x6 **18x12**	**1.5**	**1.35**	Airflow, cfm NC	135 -	270 -	405 -	540 -	675 16	810 24	945 29	1080 34	1215 39
22x10	**1.53**	**1.37**	Airflow, cfm NC	137 -	274 -	411 -	548 -	685 16	822 24	959 30	1096 35	1233 39
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm NC	149 -	298 -	447 -	596 -	745 16	894 24	1043 30	1192 35	1341 39
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm NC	159 -	318 -	477 -	636 -	795 17	954 24	1113 30	1272 35	1431 39
16x16	**1.78**	**1.62**	Airflow, cfm NC	162 -	324 -	486 -	648 -	810 17	972 24	1134 30	1296 35	1458 39
24x12 18x16	**2**	**1.82**	Airflow, cfm NC	182 -	364 -	546 -	728 -	910 17	1092 24	1274 30	1456 35	1638 39
18x18	**2.25**	**2.07**	Airflow, cfm NC	207 -	414 -	621 -	828 -	1035 18	1242 25	1449 31	1656 35	1863 40
24x14	**2.33**	**2.14**	Airflow, cfm NC	214 -	428 -	642 -	856 -	1070 18	1284 25	1498 31	1712 35	1926 40
30x12	**2.5**	**2.29**	Airflow, cfm NC	229 -	458 -	687 -	916 -	1145 18	1374 25	1603 31	1832 35	2061 40
24x16	**2.67**	**2.46**	Airflow, cfm NC	246 -	492 -	738 -	984 10	1230 18	1476 25	1722 32	1968 36	2214 39
20x20	**2.78**	**2.57**	Airflow, cfm NC	257 -	514 -	771 -	1028 10	1285 18	1542 25	1799 32	2056 36	2313 40
36x12	**3**	**2.75**	Airflow, cfm NC	275 -	550 -	825 -	1100 10	1375 19	1650 26	1925 32	2200 37	2475 42
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm NC	311 -	622 -	933 -	1244 10	1555 19	1866 26	2177 32	2488 37	2799 42
22x22	**3.36**	**3.14**	Airflow, cfm NC	314 -	628 -	942 -	1256 10	1570 19	1884 26	2198 33	2512 38	2826 42
42x12 36x14	**3.5**	**3.22**	Airflow, cfm NC	322 -	644 -	966 -	1288 10	1610 19	1932 26	2254 33	2576 38	2898 43
24x22	**3.67**	**3.43**	Airflow, cfm NC	343 -	686 -	1029 -	1372 10	1715 19	2058 26	2401 33	2744 38	3087 43
30x18	**3.75**	**3.5**	Airflow, cfm NC	350 -	700 -	1050 -	1400 10	1750 19	2100 26	2450 33	2800 38	3150 43

NC-40

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

355R AND 355F
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	100 0.001 0.003	200 0.002 0.011	300 0.006 0.026	400 0.010 0.045	500 0.016 0.071	600 0.022 0.102	700 0.031 0.139	800 0.040 0.182	900 0.050 0.230
								NC-20	NC-30		NC-40	
48x12 **24x24**	**4**	**3.75**	Airflow, cfm NC	375 -	750 -	1125 -	1500 10	1875 19	2250 26	2625 33	3000 39	3375 43
36x18	**4.5**	**4.22**	Airflow, cfm NC	422 -	844 -	1266 -	1688 10	2110 19	2532 26	2954 33	3376 39	3798 43
36x20 30x24	**5**	**4.71**	Airflow, cfm NC	471 -	942 -	1413 -	1884 11	2355 19	2826 27	3297 33	3768 38	4239 43
42x18	**5.25**	**4.94**	Airflow, cfm NC	494 -	988 -	1482 -	1976 12	2470 20	2964 28	3458 34	3952 39	4446 44
28x28	**5.44**	**5.16**	Airflow, cfm NC	516 -	1032 -	1548 -	2064 12	2580 21	3096 28	3612 34	4128 40	4644 44
42x20 30x28	**5.83**	**5.51**	Airflow, cfm NC	551 -	1102 -	1653 -	2204 12	2755 21	3306 28	3857 34	4408 40	4959 44
48x18 36x24	**6**	**5.66**	Airflow, cfm NC	566 -	1132 -	1698 -	2264 12	2830 21	3396 28	3962 35	4528 40	5094 44
30x30	**6.25**	**5.94**	Airflow, cfm NC	594 -	1188 -	1782 -	2376 12	2970 21	3564 28	4158 35	4752 40	5346 44
42x24 36x28	**7**	**6.66**	Airflow, cfm NC	666 -	1332 -	1998 -	2664 13	3330 22	3996 29	4662 35	5328 40	5994 45
46x22	**7.03**	**6.68**	Airflow, cfm NC	668 -	1336 -	2004 -	2672 13	3340 22	4008 29	4676 35	5344 40	6012 45
32x32	**7.11**	**6.78**	Airflow, cfm NC	678 -	1356 -	2034 -	2712 13	3390 22	4068 29	4746 35	5424 40	6102 45
36x30	**7.5**	**7.16**	Airflow, cfm NC	716 -	1432 -	2148 -	2864 14	3580 23	4296 30	5012 36	5728 41	6444 46
48x24 36x32	**8**	**7.63**	Airflow, cfm NC	763 -	1526 -	2289 -	3052 14	3815 23	4578 30	5341 36	6104 41	6867 46
34x34	**8.03**	**7.68**	Airflow, cfm NC	768 -	1536 -	2304 -	3072 14	3840 23	4608 30	5376 36	6144 41	6912 46
36x34	**8.5**	**8.14**	Airflow, cfm NC	814 -	1628 -	2442 -	3256 14	4070 23	4884 30	5698 36	6512 41	7326 46
42x30	**8.75**	**8.38**	Airflow, cfm NC	838 -	1676 -	2514 -	3352 14	4190 23	5028 30	5866 36	6704 41	7542 46
36x36	**9**	**8.63**	Airflow, cfm NC	863 -	1726 -	2589 -	3452 14	4315 23	5178 30	6041 36	6904 41	7767 46
42x34 **48x30**	**10**	**9.6**	Airflow, cfm NC	960 -	1920 -	2880 -	3840 14	4800 23	5760 30	6720 36	7680 41	8640 46
38x38	**10.03**	**9.64**	Airflow, cfm NC	964 -	1928 -	2892 -	3856 14	4820 23	5784 30	6748 36	7712 41	8676 46
42x36	**10.5**	**10.1**	Airflow, cfm NC	1010 -	2020 -	3030 -	4040 15	5050 23	6060 31	7070 37	8080 42	9090 47
46x34	**10.86**	**10.45**	Airflow, cfm NC	1045 -	2090 -	3135 -	4180 15	5225 23	6270 31	7315 37	8360 42	9405 47
42x38	**11.08**	**10.67**	Airflow, cfm NC	1067 -	2134 -	3201 -	4268 15	5335 23	6402 31	7469 37	8536 42	9603 47
40x40	**11.11**	**10.7**	Airflow, cfm NC	1070 -	2140 -	3210 -	4280 15	5350 23	6420 31	7490 37	8560 42	9630 47
48x36	**12**	**11.57**	Airflow, cfm NC	1157 -	2314 -	3471 -	4628 15	5785 23	6942 31	8099 37	9256 42	10413 47
42x42	**12.25**	**11.82**	Airflow, cfm NC	1182 -	2364 -	3546 -	4728 15	5910 24	7092 31	8274 37	9456 42	10638 47
44x44	**13.44**	**12.99**	Airflow, cfm NC	1299 -	2598 -	3897 -	5196 15	6495 24	7794 32	9093 38	10392 43	11691 48
48x42	**14**	**13.54**	Airflow, cfm NC	1354 -	2708 -	4062 -	5416 16	6770 24	8124 32	9478 38	10832 43	12186 48
46x46	**14.69**	**14.22**	Airflow, cfm NC	1422 -	2844 -	4266 -	5688 16	7110 25	8532 32	9954 39	11376 44	12798 48
48x46	**15.33**	**14.85**	Airflow, cfm NC	1485 -	2970 -	4455 -	5940 16	7425 25	8910 32	10395 39	11880 44	13365 48
48x48	**16**	**15.5**	Airflow, cfm NC	1550 -	3100 -	4650 -	6200 16	7750 25	9300 32	10850 39	12400 44	13950 48

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

355ZR AND 355ZF
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nominal Duct Size (in.)	Nominal Duct Area (ft²)	Core Area (ft²)	Core Velocity Velocity Pressure Neg. Static Pressure	300 0.006 0.013	400 0.010 0.022	500 0.016 0.035	600 0.022 0.050	700 0.031 0.068	800 0.040 0.089	900 0.050 0.113	1000 0.062 0.140	1100 0.075 0.169
						NC-10		NC-20				NC-30
6x6	**0.25**	**0.19**	Airflow, cfm NC	57 -	76 -	95 -	114 12	133 16	152 20	171 23	190 25	209 28
8x6	**0.33**	**0.26**	Airflow, cfm NC	78 -	104 -	130 -	156 13	182 17	208 21	234 24	260 27	286 29
10x6	**0.42**	**0.34**	Airflow, cfm NC	102 -	136 -	170 -	204 15	238 19	272 22	306 24	340 28	374 31
8x8	**0.44**	**0.37**	Airflow, cfm NC	111 -	148 -	185 -	222 15	259 19	296 23	333 26	370 28	407 31
12x6	**0.5**	**0.41**	Airflow, cfm NC	123 -	164 -	205 11	246 15	287 19	328 23	369 26	410 29	451 31
14x6	**0.58**	**0.48**	Airflow, cfm NC	144 -	192 -	240 11	288 16	336 20	384 24	432 27	480 30	528 32
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm NC	171 -	228 -	285 12	342 17	399 21	456 24	513 27	570 30	627 33
10x10	**0.69**	**0.59**	Airflow, cfm NC	177 -	236 -	295 12	354 17	413 21	472 25	531 28	590 30	649 33
18x6	**0.75**	**0.63**	Airflow, cfm NC	189 -	252 -	315 12	378 17	441 21	504 25	567 28	630 31	693 33
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm NC	216 -	288 -	360 13	432 18	504 22	576 25	648 29	720 31	792 34
22x6	**0.92**	**0.77**	Airflow, cfm NC	231 -	308 -	385 13	462 18	539 22	616 26	693 29	770 32	847 34
24x6 **12x12**	**1**	**0.88**	Airflow, cfm NC	264 -	352 -	440 14	528 19	616 23	704 26	792 29	880 32	968 35
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm NC	333 -	444 -	555 15	666 20	777 24	888 27	999 30	1110 33	1221 36
14x14	**1.36**	**1.22**	Airflow, cfm NC	366 -	488 -	610 15	732 20	854 24	976 28	1098 31	1220 34	1342 36
36x6 **18x12**	**1.5**	**1.35**	Airflow, cfm NC	405 -	540 -	675 16	810 21	945 25	1080 28	1215 31	1350 34	1485 37
22x10	**1.53**	**1.37**	Airflow, cfm NC	411 -	548 -	685 16	822 21	959 25	1096 28	1233 31	1370 34	1507 37
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm NC	447 -	596 -	745 16	894 21	1043 25	1192 29	1341 32	1490 34	1639 37
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm NC	477 -	636 11	795 17	954 21	1113 25	1272 29	1431 32	1590 35	1749 37
16x16	**1.78**	**1.62**	Airflow, cfm NC	486 -	648 11	810 17	972 21	1134 25	1296 29	1458 32	1620 35	1782 37
24x12 18x16	**2**	**1.82**	Airflow, cfm NC	546 -	728 11	910 17	1092 22	1274 26	1456 29	1638 33	1820 35	2002 38
18x18	**2.25**	**2.07**	Airflow, cfm NC	621 -	828 12	1035 18	1242 22	1449 26	1656 30	1863 33	2070 36	2277 38
24x14	**2.33**	**2.14**	Airflow, cfm NC	642 -	856 12	1070 18	1284 23	1498 27	1712 30	1926 33	2140 36	2354 39
30x12	**2.5**	**2.29**	Airflow, cfm NC	687 -	916 12	1145 18	1374 23	1603 27	1832 30	2061 34	2290 36	2519 39
24x16	**2.67**	**2.46**	Airflow, cfm NC	738 -	984 13	1230 18	1476 23	1722 27	1968 31	2214 34	2460 37	2706 39
20x20	**2.78**	**2.57**	Airflow, cfm NC	771 -	1028 13	1285 19	1542 23	1799 27	2056 31	2313 34	2570 37	2827 39
36x12	**3**	**2.75**	Airflow, cfm NC	825 -	1100 13	1375 19	1650 24	1925 28	2200 31	2475 34	2750 37	3025 40
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm NC	933 -	1244 14	1555 19	1866 24	2177 28	2488 32	2799 35	3110 38	3421 40
22x22	**3.36**	3.14	Airflow, cfm NC	942 -	1256 14	1570 19	1884 24	2198 28	2512 32	2826 35	3140 38	3454 40
42x12 36x14	**3.5**	3.22	Airflow, cfm NC	966 -	1288 14	1610 20	1932 24	2254 28	2576 32	2898 35	3220 38	3542 40
24x22	**3.67**	**3.43**	Airflow, cfm NC	1029 -	1372 14	1715 20	2058 25	2401 29	2744 32	3087 35	3430 38	3773 41
30x18	**3.75**	**3.5**	Airflow, cfm NC	1050 -	1400 14	1750 20	2100 25	2450 29	2800 32	3150 35	3500 38	3850 41
												NC-40

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006.
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006.

355ZR AND 355ZF
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

				NC-10	NC-20		NC-30			NC-40		
Nominal Duct Size (in.)	**Nominal Duct Area (ft²)**	**Core Area (ft²)**	**Core Velocity Velocity Pressure Neg. Static Pressure**	**300 0.006 0.013**	**400 0.010 0.022**	**500 0.016 0.035**	**600 0.022 0.050**	**700 0.031 0.068**	**800 0.040 0.089**	**900 0.050 0.113**	**1000 0.062 0.140**	**1100 0.075 0.169**
42x18	**5.25**	**4.94**	Airflow, cfm	1482	1976	2470	2964	3458	3952	4446	4940	5434
			NC	-	16	21	26	30	34	37	40	42
28x28	**5.44**	**5.16**	Airflow, cfm	1548	2064	2580	3096	3612	4128	4644	5160	5676
			NC	-	16	22	26	30	34	37	40	42
42x20 30x28	**5.83**	**5.51**	Airflow, cfm	1653	2204	2755	3306	3857	4408	4959	5510	6061
			NC	-	16	22	27	31	34	37	40	43
48x18 36x24	**6**	**5.66**	Airflow, cfm	1698	2264	2830	3396	3962	4528	5094	5660	6226
			NC	-	16	22	27	31	34	37	40	43
30x30	**6.25**	**5.94**	Airflow, cfm	1782	2376	2970	3564	4158	4752	5346	5940	6534
			NC	-	16	22	27	31	35	38	40	43
42x24 36x28	**7**	**6.66**	Airflow, cfm	1998	2664	3330	3996	4662	5328	5994	6660	7326
			NC	-	17	23	28	32	35	38	41	43
46x22	**7.03**	**6.68**	Airflow, cfm	2004	2672	3340	4008	4676	5344	6012	6680	7348
			NC	-	17	23	28	32	35	38	41	43
32x32	**7.11**	6.78	Airflow, cfm	2034	2712	3390	4068	4746	5424	6102	6780	7458
			NC	-	17	23	28	32	35	38	41	44
36x30	**7.5**	7.16	Airflow, cfm	2148	2864	3580	4296	5012	5728	6444	7160	7876
			NC	-	17	23	28	32	35	38	41	44
48x24 36x32	**8**	7.63	Airflow, cfm	2289	3052	3815	4578	5341	6104	6867	7630	8393
			NC	-	17	23	28	32	36	39	42	44
34x34	**8.03**	7.68	Airflow, cfm	2304	3072	3840	4608	5376	6144	6912	7680	8448
			NC	-	18	23	28	32	36	39	42	44
36x34	**8.5**	**8.14**	Airflow, cfm	2442	3256	4070	4884	5698	6512	7326	8140	8954
			NC	-	18	24	28	32	36	39	42	44
42x30	**8.75**	**8.38**	Airflow, cfm	2514	3352	4190	5028	5866	6704	7542	8380	9218
			NC	-	18	24	29	33	36	39	42	44
36x36	**9**	**8.63**	Airflow, cfm	2589	3452	4315	5178	6041	6904	7767	8630	9493
			NC	-	18	24	29	33	36	39	42	45
42x34 **48x30**	**10**	**9.6**	Airflow, cfm	2880	3840	4800	5760	6720	7680	8640	9600	10560
			NC	11	18	24	29	33	37	40	43	45
38x38	**10.03**	**9.64**	Airflow, cfm	2892	3856	4820	5784	6748	7712	8676	9640	10604
			NC	11	18	24	29	33	37	40	43	45
42x36	**10.5**	**10.1**	Airflow, cfm	3030	4040	5050	6060	7070	8080	9090	10100	11110
			NC	11	19	25	29	33	37	40	43	45
46x34	**10.86**	**10.45**	Airflow, cfm	3135	4180	5225	6270	7315	8360	9405	10450	11495
			NC	11	19	25	29	34	37	40	43	45
42x38	**11.08**	**10.67**	Airflow, cfm	3201	4268	5335	6402	7469	8536	9603	10670	11737
			NC	11	19	25	30	34	37	40	43	45
40x40	**11.11**	**10.7**	Airflow, cfm	3210	4280	5350	6420	7490	8560	9630	10700	11770
			NC	11	19	25	30	34	37	40	43	45
48x36	**12**	**11.57**	Airflow, cfm	3471	4628	5785	6942	8099	9256	10413	11570	12727
			NC	12	19	25	30	34	37	41	43	46
42x42	**12.25**	**11.82**	Airflow, cfm	3546	4728	5910	7092	8274	9456	10638	11820	13002
			NC	12	19	25	30	34	38	41	43	46
44x44	**13.44**	**12.99**	Airflow, cfm	3897	5196	6495	7794	9093	10392	11691	12990	14289
			NC	12	20	26	30	34	38	41	44	46
48x42	**14**	**13.54**	Airflow, cfm	4062	5416	6770	8124	9478	10832	12186	13540	14894
			NC	12	20	26	31	35	38	41	44	47
46x46	**14.69**	**14.22**	Airflow, cfm	4266	5688	7110	8532	9954	11376	12798	14220	15642
			NC	13	20	26	31	35	38	41	44	47
48x46	**15.33**	**14.85**	Airflow, cfm	4455	5940	7425	8910	10395	11880	13365	14850	16335
			NC	13	20	26	31	35	39	42	44	47
48x48	**16**	**15.5**	Airflow, cfm	4650	6200	7750	9300	10850	12400	13950	15500	17050
			NC	13	21	26	31	35	39	42	45	47

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Eggcrate Return Grilles

50F / 50F-NT / 50R

50F

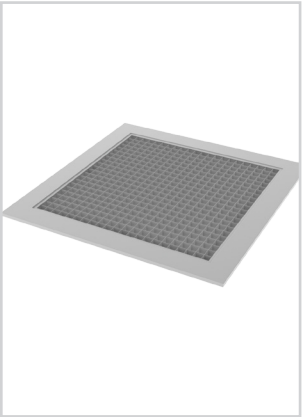
- Aluminum border
- ½ x ½ x ½" aluminum core
- High free area core
- Minimized pressure drop
- Matches general appearance of parabolic lighting fixtures
- MRI compatible

50R

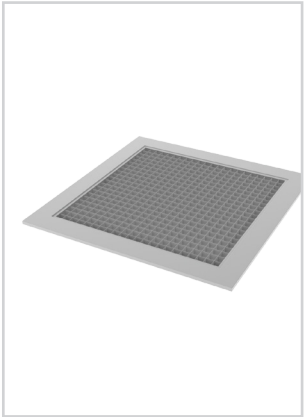
- Steel border
- ½ x ½ x ½" aluminum core
- Can be used in fire-rated applications

50F-NT

- Same as 50F but designed to fit in Narrow Tee Ceiling Grids



50F / 50F-NT



50R

metric sizes MRI compatible

See website for Specifications

MODELS:

50F / Aluminum Border & Core
50F-NT / Aluminum Border & Core / Narrow Tee
50R / Steel Border with Aluminum Core

FINISH:

Standard Finish - #26 White

OVERVIEW

Titus Eggcrate grilles have the highest free area of any return grille. These grilles are available with aluminum border and aluminum grid; steel border and aluminum grid; or entirely stainless steel construction. Offered in ½ x ½ x ½", ½ x ½ x 1", or 1 x 1 x 1" core sizes. Also available as a filtered return.

PRODUCTS INCLUDE

- Standard Core
  ½ x ½ x ½ inch
- Optional Cores: (50F, 50F-NT)
  ½ x ½ x 1 inch
  1 x 1 x 1inch
- Countersunk Screw Holes
- #8 x 1¼" long Phillips Flat Head Sheet Metal Screws, Painted White
- Optional Border Types:
  #1 - Surface Mount
  #3 - Lay-In
  #7 - Channel Frame (50F only)
  #8 - Core Only (50F only)
- Optional Steel or Aluminum Opposed-Blade Damper

MODELS: 50F, 50F-NT, 50R, 50R-SS AND 50FF
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

								NC 20	NC 30		NC 40	
Nominal Duct Size (in.)	**Nominal Duct Area sq. ft**	**Core Area sq. ft**	**Core Velocity Velocity Pressure 1x1x1 Neg. Ps ½x½x½ Neg. Ps**	**300 0.006 0.013 0.013**	**400 0.01 0.024 0.024**	**500 0.016 0.037 0.037**	**600 0.022 0.054 0.053**	**700 0.031 0.073 0.073**	**800 0.04 0.096 0.095**	**1000 0.062 0.15 0.148**	**1200 0.09 0.216 0.213**	**1400 0.122 0.294 0.29**
6x6	0.25	0.19	Airflow, cfm NC	57 -	76 -	95 -	114 10	133 17	152 22	190 31	228 39	266 45
8x6	0.33	0.26	Airflow, cfm NC	78 -	104 -	130 -	156 10	182 17	208 22	260 31	312 39	364 45
10x6	0.42	0.34	Airflow, cfm NC	102 -	136 -	170 -	204 11	238 17	272 23	340 32	408 39	476 46
8x8	0.44	0.37	Airflow, cfm NC	111 -	148 -	185 -	222 11	259 17	296 23	370 32	444 39	518 46
12x6	0.50	0.41	Airflow, cfm NC	123 -	164 -	205 -	246 11	287 18	328 23	410 32	492 40	574 46
14x6	0.58	0.48	Airflow, cfm NC	144 -	192 -	240 -	288 11	336 18	384 23	480 32	576 40	672 46
16x6 **12x8**	0.67	0.57	Airflow, cfm NC	171 -	228 -	285 -	342 12	399 18	456 23	570 32	684 40	798 46
10x10	0.69	0.59	Airflow, cfm NC	177 -	236 -	295 -	354 12	413 18	472 23	590 33	708 40	826 46
18x6	0.75	0.63	Airflow, cfm NC	189 -	252 -	315 -	378 12	441 18	504 24	630 33	756 40	882 46
20x6 **12x10**	0.83	0.72	Airflow, cfm NC	216 -	288 -	360 -	432 12	504 18	576 24	720 33	864 40	1008 46
22x6	0.92	0.77	Airflow, cfm NC	231 -	308 -	385 -	462 12	539 18	616 24	770 33	924 40	1078 47
24x6 **12x12**	1.00	0.88	Airflow, cfm NC	264 -	352 -	440 -	528 12	616 18	704 24	880 33	1056 40	1232 47
30x6 **18x10**	1.25	1.11	Airflow, cfm NC	333 -	444 -	555 -	666 13	777 19	888 24	1110 34	1332 41	1554 47
14x14	1.36	1.22	Airflow, cfm NC	366 -	488 -	610 -	732 13	854 19	976 24	1220 34	1464 41	1708 47
36x6 **18x12**	1.50	1.35	Airflow, cfm NC	405 -	540 -	675 -	810 13	945 19	1080 24	1350 34	1620 41	1890 47
22x10	1.53	1.37	Airflow, cfm NC	411 -	548 -	685 -	822 13	959 19	1096 25	1370 34	1644 41	1918 47
30x8 **24x10**	1.67	1.49	Airflow, cfm NC	447 -	596 -	745 -	894 13	1043 19	1192 25	1490 34	1788 41	2086 47
42x6 **18x14**	1.75	1.59	Airflow, cfm NC	477 -	636 -	795 -	954 13	1113 19	1272 25	1590 34	1908 41	2226 47
16x16	1.78	1.62	Airflow, cfm NC	486 -	648 -	810 -	972 13	1134 19	1296 25	1620 34	1944 41	2268 48
24x12 18x16	2.00	1.82	Airflow, cfm NC	546 -	728 -	910 -	1092 13	1274 19	1456 25	1820 34	2184 41	2548 48
18x18	2.25	2.07	Airflow, cfm NC	621 -	828 -	1035 -	1242 13	1449 19	1656 25	2070 34	2484 41	2898 48
24x14	2.33	2.14	Airflow, cfm NC	642 -	856 -	1070 -	1284 13	1498 20	1712 25	2140 34	2568 42	2996 48
30x12	2.50	2.29	Airflow, cfm NC	687 -	916 -	1145 -	1374 13	1603 20	1832 25	2290 34	2748 42	3206 48
24x16	2.67	2.46	Airflow, cfm NC	738 -	984 -	1230 -	1476 13	1722 20	1968 25	2460 34	2952 42	3444 48
20x20	2.78	2.57	Airflow, cfm NC	771 -	1028 -	1285 -	1542 13	1799 20	2056 25	2570 34	3084 42	3598 48
36x12	3.00	2.75	Airflow, cfm NC	825 -	1100 -	1375 -	1650 14	1925 20	2200 25	2750 34	3300 42	3850 48
30x16 **24x20**	3.33	3.11	Airflow, cfm NC	933 -	1244 -	1555 -	1866 14	2177 20	2488 25	3110 35	3732 42	4354 48
22x22	3.36	3.14	Airflow, cfm NC	942 -	1256 -	1570 -	1884 14	2198 20	2512 25	3140 35	3768 42	4396 48
42x12 36x14	3.50	3.22	Airflow, cfm NC	966 -	1288 -	1610 -	1932 14	2254 20	2576 26	3220 35	3864 42	4508 48
24x22	3.67	3.43	Airflow, cfm NC	1029 -	1372 -	1715 -	2058 14	2401 20	2744 26	3430 35	4116 42	4802 48
30x18	3.75	3.50	Airflow, cfm NC	1050 -	1400 -	1750 -	2100 14	2450 20	2800 26	3500 35	4200 42	4900 48

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

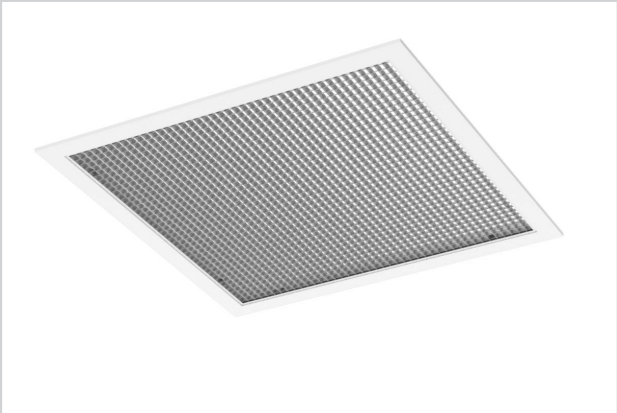
MODELS: 50F, 50F-NT, 50R, 50R-SS AND 50FF
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

								NC 20	NC 30	NC 40		
Nominal Duct Size (in.)	**Nominal Duct Area sq. ft**	**Core Area sq. ft**	**Core Velocity Velocity Pressure 1x1x1 Neg. Ps ½x½x½ Neg. Ps**	**300 0.006 0.013 0.013**	**400 0.01 0.024 0.024**	**500 0.016 0.037 0.037**	**600 0.022 0.054 0.053**	**700 0.031 0.073 0.073**	**800 0.04 0.096 0.095**	**1000 0.062 0.15 0.148**	**1200 0.09 0.216 0.213**	**1400 0.122 0.294 0.29**
48x12 **24x24**	4.00	3.75	Airflow, cfm NC	1125 -	1500 -	1875 -	2250 14	2625 20	3000 26	3750 35	4500 42	5250 49
36x18	4.50	4.22	Airflow, cfm NC	1266 -	1688 -	2110 -	2532 14	2954 20	3376 26	4220 35	5064 42	5908 49
36x20 30x24	5.00	4.71	Airflow, cfm NC	1413 -	1884 -	2355 -	2826 14	3297 21	3768 26	4710 35	5652 43	6594 49
42x18	5.25	4.94	Airflow, cfm NC	1482 -	1976 -	2470 -	2964 14	3458 21	3952 26	4940 35	5928 43	6916 49
28x28	5.44	5.16	Airflow, cfm NC	1548 -	2064 -	2580 -	3096 14	3612 21	4128 26	5160 35	6192 43	7224 49
42x20 30x28	5.83	5.51	Airflow, cfm NC	1653 -	2204 -	2755 -	3306 14	3857 21	4408 26	5510 35	6612 43	7714 49
48x18 36x24	6.00	5.66	Airflow, cfm NC	1698 -	2264 -	2830 -	3396 14	3962 21	4528 26	5660 35	6792 43	7924 49
30x30	6.25	5.94	Airflow, cfm NC	1782 -	2376 -	2970 -	3564 15	4158 21	4752 26	5940 35	7128 43	8316 49
42x24 36x28	7.00	6.66	Airflow, cfm NC	1998 -	2664 -	3330 -	3996 15	4662 21	5328 26	6660 36	7992 43	9324 49
46x22	7.03	6.68	Airflow, cfm NC	2004 -	2672 -	3340 -	4008 15	4676 21	5344 26	6680 36	8016 43	9352 49
32x32	7.11	6.78	Airflow, cfm NC	2034 -	2712 -	3390 -	4068 15	4746 21	5424 27	6780 36	8136 43	9492 49
36x30	7.50	7.16	Airflow, cfm NC	2148 -	2864 -	3580 -	4296 15	5012 21	5728 27	7160 36	8592 43	10024 49
48x24 36x32	8.00	7.63	Airflow, cfm NC	2289 -	3052 -	3815 -	4578 15	5341 21	6104 27	7630 36	9156 43	10682 49
34x34	8.03	7.68	Airflow, cfm NC	2304 -	3072 -	3840 -	4608 15	5376 21	6144 27	7680 36	9216 43	10752 49
36x34	8.50	8.14	Airflow, cfm NC	2442 -	3256 -	4070 -	4884 15	5698 21	6512 27	8140 36	9768 43	11396 50
42x30	8.75	8.38	Airflow, cfm NC	2514 -	3352 -	4190 -	5028 15	5866 21	6704 27	8380 36	10056 43	11732 50
36x36	9.00	8.63	Airflow, cfm NC	2589 -	3452 -	4315 -	5178 15	6041 21	6904 27	8630 36	10356 43	12082 50
42x34 **48x30**	10.00	9.60	Airflow, cfm NC	2880 -	3840 -	4800 -	5760 15	6720 21	7680 27	9600 36	11520 43	13440 50
38x38	10.03	9.64	Airflow, cfm NC	2892 -	3856 -	4820 -	5784 15	6748 21	7712 27	9640 36	11568 43	13496 50
42x36	10.50	10.10	Airflow, cfm NC	3030 -	4040 -	5050 -	6060 15	7070 22	8080 27	10100 36	12120 44	14140 50
46x34	10.86	10.45	Airflow, cfm NC	3135 -	4180 -	5225 -	6270 15	7315 22	8360 27	10450 36	12540 44	14630 50
42x38	11.08	10.67	Airflow, cfm NC	3201 -	4268 -	5335 -	6402 15	7469 22	8536 27	10670 36	12804 44	14938 50
40x40	11.11	10.70	Airflow, cfm NC	3210 -	4280 -	5350 -	6420 15	7490 22	8560 27	10700 36	12840 44	14980 50
48x36	12.00	11.57	Airflow, cfm NC	3471 -	4628 -	5785 -	6942 15	8099 22	9256 27	11570 36	13884 44	16198 50
42x42	12.25	11.82	Airflow, cfm NC	3546 -	4728 -	5910 -	7092 15	8274 22	9456 27	11820 36	14184 44	16548 50
44x44	13.44	12.99	Airflow, cfm NC	3897 -	5196 -	6495 -	7794 16	9093 22	10392 27	12990 36	15588 44	18186 50
48x42	14.00	13.54	Airflow, cfm NC	4062 -	5416 -	6770 -	8124 16	9478 22	10832 27	13540 37	16248 44	18956 50
46x46	14.69	14.22	Airflow, cfm NC	4266 -	5688 -	7110 -	8532 16	9954 22	11376 27	14220 37	17064 44	19908 50
48x46	15.33	14.85	Airflow, cfm NC	4455 -	5940 -	7425 -	8910 16	10395 22	11880 27	14850 37	17820 44	20790 50
48x48	16.00	15.50	Airflow, cfm NC	4650 -	6200 -	7750 -	9300 16	10850 22	12400 28	15500 37	18600 44	21700 50

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

45F

- Sight proof design
- Aluminum border
- ½ x ½ x ½" aluminum core
- 45° Deflection
- High free area core
- Matches general appearance of parabolic lighting fixtures
- MRI compatible



45F

metric sizes sight proof design MRI compatible

See website for Specifications

MODEL:

45F / Aluminum Border & Core

FINISH:

Standard Finish - #26 White

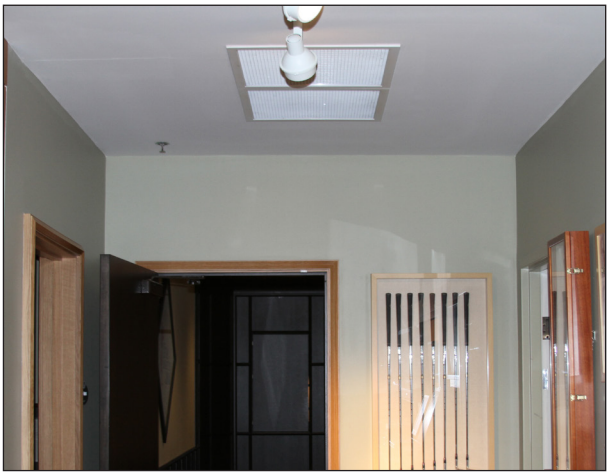
OVERVIEW

The 45F is an all aluminum return grille with an eggcrate core at a 45 degree deflection angle that prevents line of sight through the grille. Get the benefit of an attractive look which hides the plenum or the duct behind it without the use of a light shield or plenum.

For Performance Data, refer to page I24

PRODUCTS INCLUDE

- Standard Core
  ½ x ½ x ½ inch
- 45° Deflection
- Countersunk Screw Holes
- #8 x 1¼" long Phillips Flat Head Sheet Metal Screws, Painted White
- Optional Border Types:
  #1 - Surface Mount
  #3 - Lay-In
- Optional Steel or Aluminum Opposed-Blade Damper



45F grilles installed in the ceiling of a gift shop

MODELS: 45F / 45R-SS

Nominal Duct Size (inches)	Nominal Duct Area (Sq. Ft.)	Core Area (Sq. Ft.)	Duct Velocity Velocity Pressure ½ x ½ x ½ Neg. Ps.	200 0.002 0.016	250 0.004 0.025	300 0.006 0.037	350 0.008 0.05	400 0.010 0.065	450 0.013 0.082	500 0.016 0.102	550 0.019 0.123	600 0.022 0.146	650 0.026 0.172
6 x 6	0.25	0.19	Airflow, cfm	50	63	75	88	100	113	125	138	150	163
			NC	-	-	15	19	22	26	28	31	33	35
8 x 8	0.44	0.34	Airflow, cfm	89	111	133	156	178	200	222	244	267	289
			NC	-	-	15	19	23	26	29	32	34	36
10 x 10	0.69	0.53	Airflow, cfm	139	174	208	243	278	313	347	382	417	451
			NC	-	-	16	20	24	27	30	33	35	37
12 x 12	1.00	0.76	Airflow, cfm	200	250	300	350	400	450	500	550	600	650
			NC	-	-	17	21	25	28	31	34	36	38
14 x 14	1.36	1.03	Airflow, cfm	272	340	408	476	544	613	681	749	817	885
			NC	-	-	17	22	26	29	32	35	38	40
10 x 22	1.53	1.16	Airflow, cfm	306	382	458	535	611	688	764	840	917	993
			NC	-	-	18	22	26	30	33	36	38	41
16 x 16	1.78	1.35	Airflow, cfm	356	444	533	622	711	800	889	978	1067	1156
			NC	-	-	18	23	27	30	34	36	39	41
18 x 18	2.25	1.71	Airflow, cfm	450	563	675	788	900	1013	1125	1238	1350	1463
			NC	-	-	19	24	28	32	35	38	41	43
20 x 20	2.78	2.11	Airflow, cfm	556	694	833	972	1111	1250	1389	1528	1667	1806
			NC	-	15	20	25	29	33	36	39	42	45
22 x 22	3.36	2.55	Airflow, cfm	672	840	1008	1176	1344	1513	1681	1849	2017	2185
			NC	-	16	22	27	31	34	38	41	43	46
30 x 18	3.75	2.85	Airflow, cfm	750	938	1125	1313	1500	1688	1875	2063	2250	2438
			NC	-	17	23	27	32	35	39	42	44	47
36 x 20	5.00	3.80	Airflow, cfm	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250
			NC	-	20	25	30	34	38	41	44	46	49
42 x 20	5.83	4.43	Airflow, cfm	1167	1458	1750	2042	2333	2625	2917	3208	3500	3792
			NC	16	22	27	32	35	39	42	44	47	49
30 x 30	6.25	4.75	Airflow, cfm	1250	1563	1875	2188	2500	2813	3125	3438	3750	4063
			NC	18	24	28	33	36	39	42	45	47	49
46 x 22	7.03	5.34	Airflow, cfm	1406	1757	2108	2460	2811	3163	3514	3865	4217	4568
			NC	21	26	30	34	37	40	42	45	47	49

AVAILABLE SIZES (D" X D")

TYPE 1 SURFACE MOUNT FRAME				
NOMINAL SIZE	10 x 10	22 X10	22 X 22	46 X 22

TYPE 3 LAY-IN FRAME	MODULE SIZE			
	12 X12	24 X12	24 X 24	48 X 24
NOMINAL SIZE(S)	10 X 10		10 X 10	10 X 10
		10 X 10		22 X 10
		22 X 10	22 X 10	22 X 22
			22 X 22	46 X 22

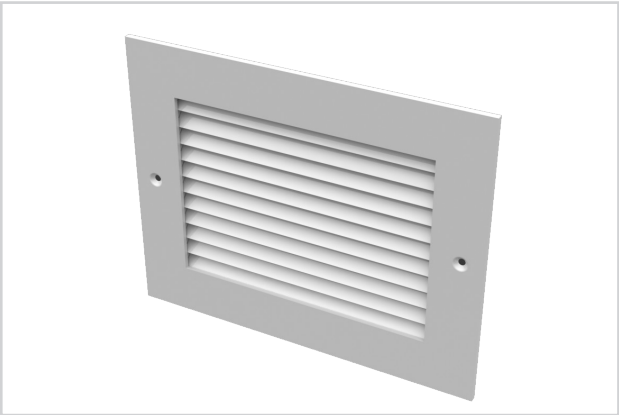
T-700 (L / S)

T-700L

- Sight proof
- Used in doors and partitions
- Included v-blades block vision and provide extra strength
- 20-gauge steel blades
- Blades parallel to the long dimension

T-700S

- Same as T-700L with blades parallel to the short dimension



T-700 (L / S)

metric sizes doors / partitions sight proof design

See website for Specifications

MODELS:

T-700L
T-700S

FINISH:

Standard Finish - #26 White

OVERVIEW

Steel

Titus Door return grilles are great for use in doors and partitions. They offer a large free are for great performance yet have a sight proof design. Options include steel or aluminum construction and an auxiliary frame for the reverse side.

PRODUCTS INCLUDE

- Available Border Types:
  #1 - Surface Mount
  #7 - Channel Frame
- Countersunk Screw Holes
- #8 x 1¼" long Phillips Flat Head Sheet Metal Screws, Painted White

T-700 AND CT-700 DOOR GRILLES
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

Nominal Duct Size (in)	Nominal Duct Area sq. ft	Core Area sq. ft	Core Velocity Velocity Pressure CT-700 Static Pressure T-700 Static Pressure	200 0.003 0.028 0.027	250 0.004 0.044 0.043	300 0.006 0.063 0.062	350 0.008 0.086 0.084	400 0.010 0.113 0.110	450 0.013 0.143 0.139	500 0.016 0.176 0.172	550 0.019 0.213 0.208	600 0.022 0.254 0.247
				NC 20			NC 30					NC 40
6x6	**0.25**	**0.19**	Airflow, cfm	38	48	57	67	76	86	95	105	114
			NC (Noise Criteria)	15	20	24	27	30	32	34	36	38
8x6	**0.33**	**0.26**	Airflow, cfm	52	65	78	91	104	117	160	143	156
			NC (Noise Criteria)	16	21	25	28	31	33	36	38	39
10x6	**0.42**	**0.34**	Airflow, cfm	68	85	102	119	136	153	170	187	204
			NC (Noise Criteria)	18	22	26	29	32	35	37	39	41
8x8	**0.44**	**0.37**	Airflow, cfm	74	93	111	130	148	167	185	204	222
			NC (Noise Criteria)	18	23	26	30	32	35	37	39	41
12x6	**0.50**	**0.41**	Airflow, cfm	82	103	123	144	164	185	205	226	246
			NC (Noise Criteria)	18	23	27	30	33	35	38	40	41
14x6	**0.58**	**0.48**	Airflow, cfm	96	120	144	168	192	216	240	264	288
			NC (Noise Criteria)	19	24	28	32	34	37	39	41	43
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm	114	143	171	200	228	257	285	314	342
			NC (Noise Criteria)	20	24	28	31	34	36	38	40	42
10x10	**0.69**	**0.59**	Airflow, cfm	118	148	177	207	236	266	295	325	354
			NC (Noise Criteria)	20	25	28	32	34	37	39	41	43
18x6	**0.75**	**0.63**	Airflow, cfm	126	158	189	221	252	284	315	347	378
			NC (Noise Criteria)	20	25	29	32	35	37	39	41	43
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm	144	180	216	252	288	324	360	396	432
			NC (Noise Criteria)	21	25	29	33	35	38	40	42	44
22x6	**0.92**	**0.77**	Airflow, cfm	154	193	231	270	308	347	385	424	462
			NC (Noise Criteria)	21	26	30	33	36	38	40	42	44
24x6 **12x12**	**1.00**	**0.88**	Airflow, cfm	176	220	264	308	352	396	440	484	528
			NC (Noise Criteria)	22	26	30	33	36	39	41	43	45
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm	222	278	333	389	444	500	555	611	666
			NC (Noise Criteria)	23	27	31	34	37	40	42	44	46
14x14	**1.36**	**1.22**	Airflow, cfm	244	305	366	437	488	549	610	671	732
			NC (Noise Criteria)	23	28	32	358	38	40	42	44	46
18x12	**1.50**	**1.35**	Airflow, cfm	270	338	405	473	540	608	675	743	810
			NC (Noise Criteria)	24	28	32	35	38	41	43	45	47
22x10	**1.53**	**1.37**	Airflow, cfm	274	343	411	480	548	617	685	754	822
			NC (Noise Criteria)	24	28	32	35	38	41	43	45	47
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm	298	373	447	522	596	671	745	820	894
			NC (Noise Criteria)	24	28	32	35	38	41	43	45	47
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm	318	398	477	557	636	716	795	875	954
			NC (Noise Criteria)	24	29	33	36	39	41	43	45	47
16x16	**1.78**	**1.62**	Airflow, cfm	324	405	486	567	648	729	810	891	972
			NC (Noise Criteria)	24	29	33	36	39	41	44	46	47
24x12 18x16	**2.00**	**1.82**	Airflow, cfm	364	455	546	637	728	819	910	1001	1092
			NC (Noise Criteria)	25	30	33	37	39	42	44	46	48
18x18	**2.25**	**2.07**	Airflow, cfm	414	518	621	725	828	932	1035	1139	1242
			NC (Noise Criteria)	25	30	34	37	40	42	45	47	48
24x14	**2.33**	**2.14**	Airflow, cfm	428	535	642	749	856	963	1070	1177	1284
			NC (Noise Criteria)	26	30	34	37	40	42	45	47	49
30x12	**2.50**	**2.29**	Airflow, cfm	458	573	687	802	916	1031	1145	1260	1374
			NC (Noise Criteria)	26	31	34	38	40	43	45	47	49
24x16	**2.67**	**2.46**	Airflow, cfm	493	615	738	861	984	1107	1230	1353	1476
			NC (Noise Criteria)	26	31	35	38	41	43	45	47	49
20x20	**2.78**	**2.57**	Airflow, cfm	514	643	771	900	1028	1157	1258	1414	1542
			NC (Noise Criteria)	26	31	35	38	41	43	46	48	49
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm	622	778	933	1089	1244	1400	1555	1711	1866
			NC (Noise Criteria)	27	32	36	39	42	44	46	48	50
22x22	**3.36**	3.14	Airflow, cfm	628	785	942	1099	1256	1413	1570	1727	1884
			NC (Noise Criteria)	27	32	36	39	42	44	46	48	50
24x22	**3.67**	**3.43**	Airflow, cfm	686	858	1029	1201	1372	1544	1715	1887	2058
			NC (Noise Criteria)	28	32	36	39	42	45	47	49	51
30x18	**3.75**	**3.50**	Airflow, cfm	700	875	1050	1225	1400	1575	1750	1925	2100
			NC (Noise Criteria)	28	32	36	39	42	45	47	49	51
24x24	**4.00**	**3.75**	Airflow, cfm	750	938	1125	1313	1500	1688	1875	2063	2250
			NC (Noise Criteria)	28	33	36	40	43	45	47	49	51
30x24	**5.00**	**4.71**	Airflow, cfm	942	1178	1413	1649	1884	2120	2355	2591	2826
			NC (Noise Criteria)	29	34	37	41	43	46	48	50	52
28x28	**5.44**	**5.16**	Airflow, cfm	1032	1290	1548	1806	2064	2322	2580	2838	2096
			NC (Noise Criteria)	29	34	38	41	44	46	49	51	52
30x28	**5.83**	**5.51**	Airflow, cfm	1102	1378	1653	1929	2204	2480	2755	3031	3306
			NC (Noise Criteria)	30	34	38	41	44	47	49	51	53
30x30	**6.25**	**5.94**	Airflow, cfm	1188	1485	1782	2079	2376	2673	2970	3267	3564
			NC (Noise Criteria)	30	35	38	42	44	47	49	51	53
										NC 50		

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

Hart&Cooley
install confidence

SV and SVH Spiral Diffusers
USV, USVH Universal Spiral Diffusers

Face Velocity		300	400	500	600	700	800	1000	1200
Total Pressure		.016	.029	.046	.066	.090	.117	.183	.263
10 x 3 Ak .14	CFM	42	56	70	84	98	112	140	168
	Horizontal Throw	7-3	8-4	9-5	10-6	11-7	12-8	13-9	14-10
	Noise Criteria	-	-	-	-	-	23	29	35
12 x 3 Ak .18	CFM	54	72	90	108	126	144	180	216
	Horizontal Throw	8-5	9-6	10-7	11-8	12-8	13-9	14-10	16-11
	Noise Criteria	-	-	-	-	20	24	31	36
10 x 4 14 x 3 Ak .21	CFM	63	84	105	126	147	168	210	252
	Horizontal Throw	8-5	10-7	11-8	12-8	13-9	14-10	16-11	17-12
	Noise Criteria	-	-	-	-	21	25	31	37
16 x 3 12 x 4 Ak .25	CFM	75	100	125	150	175	200	250	300
	Horizontal Throw	9-5	11-7	12-8	13-9	14-10	15-11	17-12	19-13
	Noise Criteria	-	-	-	-	21	25	32	37
24 x 3 12 x 6 Ak .39	CFM	117	156	195	234	273	312	390	468
	Horizontal Throw	12-7	13-9	15-10	17-11	18-12	19-13	21-15	24-16
	Noise Criteria	-	-	-	-	23	27	34	39
24 x 4 16 x 6 Ak .52	CFM	156	208	260	312	364	416	520	624
	Horizontal Throw	13-8	16-11	18-12	19-13	21-14	22-15	25-17	27-19
	Noise Criteria	-	-	-	20	24	28	35	40
14 x 8 18 x 6 Ak .63	CFM	189	252	315	378	441	504	630	756
	Horizontal Throw	15-8	17-12	19-13	21-14	23-16	24-17	27-19	30-20
	Noise Criteria	-	-	-	20	25	29	36	41
20 x 6 Ak .66	CFM	198	264	330	396	462	528	660	792
	Horizontal Throw	15-9	18-12	20-13	22-15	24-16	25-17	28-19	31-21
	Noise Criteria	-	-	-	21	25	29	36	41
16 x 8 Ak .71	CFM	213	284	355	426	497	568	710	852
	Horizontal Throw	16-9	18-13	20-14	23-15	24-17	26-18	30-20	35-22
	Noise Criteria	-	-	-	21	26	30	36	42
24 x 6 18 x 8 Ak .88	CFM	264	352	440	528	616	704	880	1056
	Horizontal Throw	18-10	20-14	23-16	25-17	27-18	29-20	32-22	36-24
	Noise Criteria	-	-	-	22	26	30	37	43
20 x 8 16 x 10 Ak .98	CFM	294	392	490	588	686	784	980	1176
	Horizontal Throw	19-10	21-15	24-17	26-18	28-19	30-21	34-23	38-25
	Noise Criteria	-	-	-	23	27	31	38	44
18 x 10 Ak 1.11	CFM	333	444	555	666	777	888	1110	1332
	Horizontal Throw	20-11	23-16	25-18	28-19	30-21	32-22	36-25	40-27
	Noise Criteria	-	-	-	23	27	31	38	44
36 x 6 18 x 12 Ak 1.35	CFM	405	540	675	810	945	1080	1350	1620
	Horizontal Throw	22-12	25-17	28-19	31-21	34-23	36-24	40-27	44-30
	Noise Criteria	-	-	-	24	28	32	39	44
24 x 10 20 x 12 Ak 1.49	CFM	447	596	745	894	1043	1192	1490	1788
	Horizontal Throw	23-13	26-18	30-20	32-22	35-24	37-26	42-29	46-31
	Noise Criteria	-	-	-	24	29	33	39	45
24 x 12 Ak 1.82	CFM	546	728	910	1092	1274	1456	1820	2184
	Horizontal Throw	25-14	30-20	33-22	36-25	39-27	42-28	47-32	51-35
	Noise Criteria	-	-	-	25	30	34	40	46
36 x 10 30 x 12 Ak 2.29	CFM	687	916	1145	1374	1603	1832	2290	2748
	Horizontal Throw	29-16	33-22	37-25	41-28	44-30	47-32	53-36	61-42
	Noise Criteria	-	-	20	26	30	34	41	47
36 x 12 Ak 2.75	CFM	825	1100	1375	1650	1925	2200	2750	3300
	Horizontal Throw	31-18	36-25	41-28	44-30	48-33	51-35	57-39	63-43
	Noise Criteria	-	-	21	27	31	35	42	47

Terminal Velocity of 75 and 150 FPM, respectively

NOTES:
1. Total Pressure in inches water column.
2. Throw data are in feet at terminal velocities of 75 and 150 FPM, respectively.
3. Noice Criteria based on a 10 dB room attenuation (Re: 10^{-12} watts).

MAX FAN RPM

The Importance of Proper Fan Scheduling

OUR ADVICE

The engineering community has many different formats and criteria when it comes to scheduling fan performance. Several items are consistent: CFM, External Static Pressure, Horsepower, and Voltage. Within these criteria lies a large number of possible fans that could be provided on the job.
Listing MAXIMUM FAN RPM is an excellent way to ensure you get the proper fan for the job. Fan RPM (FRPM) has proven to be an excellent single value indicator of overall performance including efficiency, operating cost, and sound. Below are examples of a fan scheduling "best practice" that will help get your intended equipment on the project.

EXAMPLE

Selecting and Scheduling a Mixed Flow Fan at 60,000 cfm @ 3" of ESP
Below are the Greenheck fans that meet this performance.

QEI Mixed Flow Fan 60,000cfm @ 3.0" esp								
Model	Relative Cost	BHP	Estimated Operating Cost/Yr	Wheel Diameter	Inlet dba	Outlet dba	Radiated dba	FRPM
QEI-49-II	1.00	47	$9,256	60	87	90.0	75	1653
QEI-54-I	1.05	41.5	$8,167	66	80	84.0	69	1492
QEI-60-I	1.18	41.4	$8,159	73	77	80.0	67	1155

A typical schedule, similar to the one below, would allow for multiple possible fan sizes from different manufacturers to be provided. All of the fans above would be supplied with a 50 HP motor and would met the scheduled performance. However, if the QEI-60-I was your preferred option because it is half as loud with an operating cost of over $1,000/yr less than the QEI-49-II, the schedule below would not lock down that performance.

Exhaust Fan Schedule								
Tag	CFM	ESP	Drive	HP	Wheel Type	Electrical	Notes	Model
EF-1	60,000	3"	Belt	50	Mixed	460/3	1,2,3	QEI

By scheduling the Max FRPM, you will require all manufacturers to provide the same approximate fan housing size with similar energy <u>and</u> sound performance.

Exhaust Fan Schedule									
Tag	CFM	ESP	Drive	HP	Wheel Type	Max FRPM	Electrical	Notes	Model
EF-1	60,000	3"	Belt	50	Mixed	1155	460/3	1,2,3	QEI

EXAMPLE

Selecting and Scheduling a G Fan at 1,000 cfm @ 0.5" of ESP

Below are the Greenheck fans that meet this performance.

G Fan 1,000cfm @ 0.5" esp						
Model	Relative Cost	BHP	Wheel Diameter	Inlet dBA	Inlet Sones	FRPM
G-099-A	1.00	0.21	11.188	62	12.0	1653
G-103-A	1.11	0.18	11.125	57	8.4	1492
G-123-A	1.21	0.14	13.062	56	8.2	1155
G-133-A	1.32	0.13	13.125	56	7.7	1061
G-143-B	1.49	0.16	14.625	52	6.5	942

Let us also assume you select G-103-A because there was a 10.0 sone maximum requirement for the application, but you do not note the FRPM or sones on the schedule.

Exhaust Fan Schedule							
Tag	CFM	ESP	Drive	HP	Motor RPM	Electrical	Notes
EF-1	1000	0.5"	Direct	0.25	1725	115/1	1,2,3

With the above schedule, the equipment provider will bid and provide the smaller housing fan, spinning with a faster FRPM resulting in the fan being slightly louder. The logical solution would be to list the model number to ensure the proper fan is priced and supplied as shown below, right?

Exhaust Fan Schedule								
Tag	CFM	ESP	Drive	HP	Motor RPM	Electrical	Notes	Model
EF-1	1000	0.5"	Direct	0.25	1725	115/1	1,2,3	G-103-A

Unfortunately, by listing the basis of design fan as shown above, you are actually placing the BOD fan at a disadvantage at bid time. The BOD manufacturer will bid the model as listed on the schedule. Competitive manufacturers will bid the smaller, cheaper, faster, louder fan because they meet to scheduled performance.

By scheduling the Max FRPM, you will require all manufacturers to provide the same approximate fan housing size with similar energy and sound performance.

Exhaust Fan Schedule								
Tag	CFM	ESP	Drive	HP	Max FRPM	Electrical	Notes	Model
EF-1	1000	0.5"	Direct	0.25	1492	115/1	1,2,3	G-103-A

BASIC FAN LAWS

a = NEW
b = OLD

$CFM_a = CFM_b \times \frac{RPM_a}{RPM_b}$

$RPM_a = RPM_b \times \frac{CFM_a}{CFM_b}$

$SP_a = SP_b \times \left(\frac{RPM_a}{RPM_b}\right)^2$

$HP_a = HP_b \times \left(\frac{RPM_a}{RPM_b}\right)^3$

Friction Loss per 100 ft. $= \frac{\text{System design pressure} \times 100}{\text{Total equiv. length of duct}}$

BASIC AIR CONDITIONING FORMULAS

COOLING	HEATING and/or HUMIDIFYING
$H_S = CFM_T \times 1.08 \times (T_1 - T_2)$	$H_S = CFM_T \times 1.08 \times (T_2 - T_1)$
$H_L = CFM_T \times .68 \times (W_1 - W_2)$	$H_L = CFM_T \times .68 \times (W_2 - W_1)$
$H_T = CFM_T \times 4.5 \times (h_1 - h_2)$	$H_T = CFM_T \times 4.5 \times (h_2 - h_1)$
$T_1 = t_1 + \frac{CFM_O}{CFM_T} \times (t_2 - t_1)$ (1)	$T_1 = t_1 - \frac{CFM_O}{CFM_T} \times (t_1 - t_2)$ (2)
(1) If duct heat gain is a factor, add to T_1: $\frac{\text{Duct Heat Gain (Btuh)}}{CFM_T \times 1.08}$	(2) If duct heat loss is a factor, subtract from T_1: $\frac{\text{Duct Heat Loss (Btuh)}}{CFM_T \times 1.08}$
$T_2 = T_1 - \frac{H_S}{CFM_T \times 1.08}$	$T_2 = T_1 + \frac{H_S}{CFM_T \times 1.08}$
$CFM_T = \frac{H_S \text{ (total)}}{1.08 \times (T_1 - T_2)}$ OR $CFM_T = \frac{H_S \text{ (internal)}}{1.08 \times (t_1 - T_2)}$ (3)	$CFM_T = \frac{H_S}{1.08 \times (T_2 - T_1)}$
	(3) Sensible load of outside air not included.
[1] $h_2 = h_1 - \frac{H_T}{CFM_T \times 4.5}$	[2] $h_2 = h_1 + \frac{H_T}{CFM_T \times 4.5}$

Leaving Air W.B. Temperature: Refer to Enthalpy Table and read W.B. temperature corresponding to enthalpy of leaving air (h_2).
For Cooling see [1] For Heating see [2]

FOLLOWING FORMULA APPLY FOR EITHER COOLING OR HEATING and/or HUMIDIFYING

$CFM_T = \frac{N_T V}{60 \text{ min/hr}}$	$N_T = \frac{CFM_T \text{ (60 min/hr)}}{V}$
$CFM_O = \frac{N_O V}{60 \text{ min/hr}}$	$N_O = \frac{CFM_O \text{ (60 min/hr)}}{V}$

SUGGESTED LIMITS FOR ROOM LOUDNESS

Sones	DBA	Areas
1.3 - 4	32 - 48	Private homes (rural and suburban)
1.7 - 5	36 - 51	Conference rooms
2 - 6	38 - 54	Hotel rooms, libraries, movie theaters, executive offices
2.5 - 8	41 - 58	Schools and classrooms, hospital wards, and operating rooms
3 - 9	44 - 60	Court rooms, museums, apartments, private homes (urban)
4 - 12	48 - 64	Restaurants, lobbies, general open offices, banks
5 - 15	51 - 67	Corridors and halls, cocktail lounges, washrooms and toilets
7 - 21	56 - 72	Hotel kitchens and laundries, supermarkets
12 - 36	64 - 80	Light machinery, assembly lines
15 - 50	67 - 84	Machine shops
25 - 60	74 - 87	Heavy machinery

From AMCA Publication 302 (Application of Sone Ratings for Non Ducted Air Moving Devices with Room-Sone-dBA correlations).

SUGGESTED AIR CHANGES FOR PROPER VENTILATION

$CFM = \frac{\text{Room Volume}}{\text{min/chg}}$

Room Volume = L x W x H (of room)

Min/Chg	Areas
3 - 10	Assembly Hall
2 - 4	Attic
3 - 10	Auditorium
2 - 3	Bakery
2 - 4	Bar
12 - 18	Barn
1 - 3	Boiler Room
3 - 7	Bowling Alley
3 - 5	Cafeteria
4 - 10	Church
4 - 6	Classroom
3 - 7	Club Room
3 - 7	Dance Hall
4 - 8	Dining Room
2 - 5	Dry Cleaner
1 - 3	Engine Room
2 - 7	Factory
1 - 5	Foundry
2 - 10	Garage
2 - 5	Generator Room
3 - 8	Gymnasium
1 - 5	Kitchen
2 - 5	Laboratory
2 - 4	Laundry
3 - 6	Machine Shop
3 - 8	Mill
2 - 8	Office
2 - 5	Packing House
1 - 2	Projection Room
2 - 8	Recreation Room
2 - 6	Residence
5 - 10	Restaurant
5	Rest Room
3 - 7	Store
1 - 5	Transfer Room
3 - 10	Warehouse

LEGEND FOR FORMULAS

CFM_T = Total airflow cu. ft./min.
CFM_O = Outdoor air cu. ft./min.
N_T = Total air changes/hr.
N_O = Outdoor air changes/hr.
V = Volume of space cubic feet
H_T = Total heat Btuh
H_S = Sensible heat Btuh
H_L = Latent heat Btuh
*h_1 = {Enthalpy or total heat of} - entering air Btu/lb.
*h_2 = {Enthalpy or total heat of} - lvg. air Btu/lb. dry air
T_1 = Temperature of entering air °F.D.B.
T_2 = Temperature of leaving air °F.D.B.
t_1 = Indoor design temperature °F.D.B.
t_2 = Outdoor design temperature °F.D.B.
W_1 = {Grains of water per lb. of dry air} @ entering cond.
W_2 = {Grains of water per lb. of dry air} @ leaving cond.

* See Enthalpy of air (Total Heat Content of Air) Table for exact values.

DERIVATIONS OF AIR CONSTANTS

Air constants below apply to Std. Dry Air at 70°F and 14.7 P.S.I.A. (29.92 in. mercury column). They may be used in most cooling calculations unless extremely precise results are desired.

4.5 (to convert CFM to lbs./hr.)

$4.5 = \frac{60 \text{ Min./hr.}}{13.33}$ or 60 x .075

where 13.33 is the specific volume of std. air (cu. ft./lb.) and .075 = density (lbs./cu. ft.)

$1.08 = \frac{.24 \times 60}{13.33}$ or .24 x 4.5

.24 Btu = specific heat of std. air (BTU/LB/°F)

$.68 = \frac{60}{13.33} \times \frac{1060}{7000}$ or $4.5 \times \frac{1060}{7000}$

Where: 1060 = Avg. Latent Heat of water vapor (BTU/LB)
7000 = Grains per lb.

RECOMMENDED AND MAXIMUM DUCT VELOCITIES

(MAXIMUM VELOCITIES SHOWN IN PARENTHESES)

DESIGNATION	RESIDENCES		SCHOOLS, THEATERS, PUBLIC BUILDINGS		INDUSTRIAL BUILDINGS	
	THESE VELOCITIES ARE FOR TOTAL FACE AREA					
Filters	250	(300)	300	(350)	350	(350)
Heating Coils	450	(500)	500	(700)	600	(700)
Cooling Coils	450	(450)	500	(600)	600	(600)
Air Washers	500	(500)	500	(500)	500	(500)
	THE FOLLOWING VELOCITIES ARE FOR NET FREE AREA					
Fan Outlets	1000-1600	(1700)	1300-2000	(1500-2200)	1600-2400	(1700-2800)
Main Ducts	700-900	(800-1200)	1000-1300	(1100-1600)	1200-1800	(1300-2200)
Branch Ducts	600	(700-1000)	600-900	(800-1300)	800-1000	(1000-1800)
Branch Risers	500	(650-800)	600-700	(800-1200)	800	(1000-1600)

Terms and Conditions of Sale

1. GENERAL.
These Terms and Conditions of Sale (these "Terms") govern Customer's purchase of any heating, ventilation, air conditioning and plumbing equipment and related parts and materials and any ancillary services (the "Goods") from Mingledorff's, Inc. and its subsidiary George Holden & Associates, Inc. (collectively and each a "Seller"). If these Terms are first tendered to Customer before Customer tenders a purchase order or similar document to Seller, these Terms are in lieu of any terms later submitted by Customer and Seller rejects all additional or different terms and conditions of Customer, whether confirmatory or otherwise. If Seller tenders these terms after the tender by Customer of other terms, whether as part of a purchase order or otherwise, then Seller's acceptance of any offer by Customer associated with Customer's terms is expressly conditioned upon Customer's acceptance of these Terms exclusively and to the exclusion of any proffered Customer terms or conditions, regardless of whether these Terms contain any terms additional to, or different from, any terms proffered by Customer. Customer's performance, or acceptance of, or payment for, any products from Seller will constitute Customer's acceptance of these Terms exclusively. If there is proposal, quotation or an executed written sales agreement in effect between the parties (each a "Sales Agreement"), these Terms form a part thereof. Waiver by Seller of any breach, remedy or provision of these Terms shall not be construed to be a waiver of any succeeding breach or any other provision or legal remedy of Seller.

2. PRICE AND PAYMENT.
Orders are not binding upon Seller until accepted by Seller in its sole discretion. No order shall be deemed accepted by Seller unless and until either confirmed in writing by Seller or by delivery of the Good specified in the order, and then only on these Terms. Unless otherwise agreed to in writing by both parties, all accepted orders of the Goods will be invoiced at Seller's prices in effect on the date of shipment, which prices are subject to change from time to time. Customer may not withhold payment of any amounts due and payable as a set-off of any claim or dispute with Seller, regardless of whether relating to Seller's breach, bankruptcy or otherwise. Credit is extended at the sole discretion of Seller. Any discounts given to Customer by Seller in relation to the price of the Goods are conditional upon payment for the Goods being made strictly in accordance with the Sales Agreement and these Terms and to Customer's entire account for all products purchased from Seller being current. Unless otherwise agreed to by Seller in writing, Customer agrees to pay all amounts due to Seller within thirty (30) days from the date of invoice. Customer shall pay interest and service charges on overdue invoices from the due date until paid at a rate of 1.5% per month or the maximum legal rate, whichever is less, and any collection costs of Seller, including court costs and reasonable attorney fees. NON-PAYMENT VOIDS ANY WARRANTY.

3. FINANCIAL RESPONSIBILITY OF CUSTOMER.
Customer's solvency is a condition of Seller's performance and Seller may, at any time, in its sole discretion for credit reasons (including a good faith belief that a current or future payment is or may be impaired) or because of Customer's breach of this or any other agreement with Seller, suspend or change credit terms, fix a limit on credit, require progress payments, demand payment in full of any outstanding balance, accelerate all unpaid amounts owed by Customer, withhold shipments, demand COD or request other assurances of payment, cancel or terminate any order or agreement, or repossess all Goods previously delivered, which Goods shall become the absolute property of Seller subject to credit therefore. Customer grants to Seller a security interest in Goods delivered hereunder to secure Customer's obligations under these Terms and any Sales Agreement and grants to Seller the right to execute, deliver, and/or file any financing statement or do any other thing reasonably necessary to perfect Seller's security interest. Notwithstanding any other provision of these Terms, Seller reserves the right in its absolute discretion from time to time to require payment in full of the price of the Goods before delivery of all or any of the Goods. Seller may terminate any order or Sales Agreement by written notice to Customer if (i) a receiver or trustee is appointed for any of Customer's property; (ii) Customer is adjudicated or voluntarily becomes bankrupt or a debtor under any bankruptcy, dissolution or reorganization laws or similar law; (iii) Customer becomes insolvent or makes an assignment for the benefit of creditors; (iv) an execution is issued pursuant to a judgment rendered against Customer; or (v) Customer is unable or refuses to make payment to Seller. If any order or Sales Agreement is terminated by Seller pursuant to this section, Seller shall be relieved of any further obligation to Customer and Customer shall reimburse Seller for its termination costs and expenses and a reasonable allowance for profit.

4. DELIVERY.
Title to and risk of loss of the Goods shall pass to Customer upon tender of such Goods to Customer at Seller's designated facility. Unless otherwise agreed by Seller in writing, shipping terms shall be FOB, Seller's designated facility – freight prepaid and allowed to the first destination in the continental USA. Any shipping date provided by Seller is the Seller's best estimate and will not operate to bind Seller to ship or make deliveries on such date. If Customer fails to accept delivery of any Good delivered timely then Customer shall be liable for all costs and expenses arising out of such failure, including a reasonable storage fee. Customer must thoroughly inspect the Goods at the time of receipt for signs of damage, discrepancies or a shortage. Inspections of the Goods at the time of delivery shall be commenced in the presence of the carrier's driver and Customer shall note on the freight bill any shortages, discrepancies or damages of any Good received on the carrier's receipt. If concealed loss or damage is discovered, Customer must report it to the carrier within 15 days from the date of receipt. Claims for Goods damaged during shipment shall be made by Customer to the carrier and are not covered under the warranty provisions stated herein.

5. CANCELLATION. CHANGES AND RETURNS.
Orders are not subject to cancellation, change or return unless agreed to in writing by an authorized representative of Seller. Seller's consent may be subject to, in Seller's sole discretion, a revision in prices and/or delivery dates and Customer's payment of any costs and expenses incurred by Seller (including stocking and transportation fees) resulting from such approved cancellation, change or return. Customer shall only receive credit for approved returns and the material must be standard stock and in good condition. Such credit shall be the invoice price less a restocking fee on acceptable goods, and less all shipping and handling charges.

6. PERFORMANCE AND EXCUSABLE DELAY.
Company shall be obligated to furnish only the Goods described in the Sales Agreement and in submittal data (if such data is issued in connection with the order). Acceptance of the Sales Agreement or the submittal data shall be deemed as acceptance of the suitability of the Goods for the particular project or location. Unless specifically stated in the Sales Agreement, compliance with any local building codes or other laws or regulations relating to specifications or the location, use, installation or operation of the Goods is the sole responsibility of Customer. Customer agrees to use and install all equipment in accordance with all local, state and federal requirements, including without limitation, all applicable Regional Efficiency

Standards. Seller shall not be liable for any expense, loss or damage resulting from delay in delivery or prevention of performance caused by fires, floods, acts of God, strikes, labor disputes, labor shortages, lack of or inability to obtain materials, delays of manufacturers or vendors, fuels, supplies or equipment, riots, accidents, transportation delays, acts or failures to act of any government or of Customer, or any other cause whatsoever, provided that such cause is beyond the reasonable control of Seller; and Seller shall have such additional time for performance as may be reasonably necessary under the circumstances and may adjust the price to reflect increases occasioned by such delay.

7. DEFERRED DELIVERY.
Seller shall be entitled to an adjustment in price commensurate with any increase in the cost of production and any other losses and expenses incurred by Seller attributable to delays due to Customer, including its delay in approving the submittals. Any deferred delivery request by Customer shall be subject to Seller's written approval. If such approval is given, Seller shall have the right to charge Customer for the completed portion of the order and to warehouse all completed Goods at Customer's expense and risk of loss. Seller also reserves the right, at its option, to cancel said uncompleted portion in accordance with Section 6 above, or to revise its prices and delivery schedules on the portion not completed to reflect its increased costs and expenses attributable to the delay.

8. LIMITED WARRANTY AND DISCLAIMERS.
Customer acknowledges that Seller is the distributor, not the manufacturer, of the Goods and as such, Seller makes no warranties with respect to the Goods whatsoever. Seller will provide Customer the express limited warranty provided by each manufacturer, if any, of the Goods. Customer agrees to cooperate with Seller in processing all warranty claims for Goods with the manufacturer. Any claims relating to the Goods shall be deemed waived by Customer unless submitted to Seller in writing within ten (10) days from the date Customer discovered, or should have discovered, the issue. Customer acknowledges that manufacturers' warranties typically contain sole and exclusive remedies limited to the replacement of nonconforming parts or refund of the purchase price paid for the non-conforming Good. No warranty shall apply to any Good that was altered or was otherwise subject to abuse, neglect or improper use by Customer or improper storage, maintenance or application. EXCEPT FOR THE SPECIFIC WARRANTIES SET FORTH IN THIS SECTION, SELLER MAKES NO OTHER WARRANTIES WHATSOEVER, EXPRESS OR IMPLIED, REGARDING THE GOODS, WORK, SERVICES OR PERFORMANCE OF ITS OBLIGATIONS HEREUNDER, AND SPECIFICALLY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

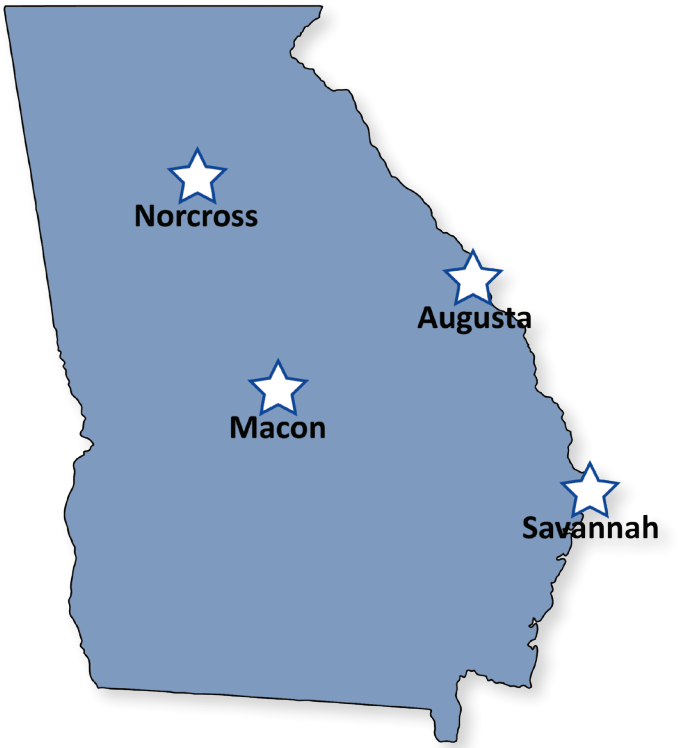
9. LIMITATION OF LAIBILITY.
IN NO EVENT SHALL SELLER BE LIABLE TO CUSTOMER OR ITS CUSTOMERS FOR ANY PUNITIVE, SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF DIRECT OR INDIRECT PROFITS, REVENUE, USE, OR BACK CHARGES, WHETHER ARISING IN CONTRACT, TORT, OR OTHERWISE, EVEN IF CUSTOMER OR ANY OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL SELLER'S AGGREGATE LIABILITY TO CUSTOMER EXCEED ALL AMOUNTS ACTUALLY PAID BY CUSTOMER TO SELLER. SELLER SHALL NOT BE LIABLE FOR AND CUSTOMER AGREES TO INDEMNIFY SELLER FOR ALL PERSONAL INJURY, PROPERTY DAMAGE OR OTHER LIABILITY RESULTING IN WHOLE OR IN PART FROM THE NEGLIGENCE OR WILLFUL MISCONDUCT OF CUSTOMER. In no event shall Seller be liable or responsible for the actions or omissions of Customer, its other contractors or third parties outside of Seller's control. It is the sole and exclusive responsibility for the Customer or its designee to verify and approve the submittals for the project.

10. CONTROLLING LAW.
These Terms and all accepted orders shall be construed in accordance with the laws of the State of Georgia, without regard to its conflict of law principles. Customer agrees that any and all disputes with Seller, including contract and tort claims, shall be resolved in the state and federal courts situated in Georgia, and that these courts shall have the exclusive jurisdiction over all such disputes and Customer consents to the personal jurisdiction in these courts. Any action brought by Customer against Seller shall be within one (1) year after the cause of action arises or it shall be deemed forever waived.

11. TAXES.
Seller's prices do not include sales, use, excise or other similar taxes (unless expressly stated or itemized by Seller in writing as part of Seller's prices). Consequently, in addition to the price specified herein, the amount of any present or future such tax shall be paid by Customer, or in lieu thereof, Customer shall provide Seller with all tax-exemption certificates required by the taxing authorities, at the time of sale.

12. CONFIDENTIALITY.
Customer will not disclose to third persons any proprietary or confidential information of Seller concerning its business and operations, including without limitation, pricing information, for a period of five (5) years from the date such confidential information was learned or for confidential information meeting the definition of "trade secret" under applicable law, until such information is no longer a "trade secret." The obligations of confidentiality in this Section 12 do not apply to Confidential Information to the extent that the Confidential Information becomes readily ascertainable by proper means by the public other than through breach of this Section 12 by Customer.

13. ADDITIONAL TERMS.
The provisions of these Terms and the Sales Agreement, if any, constitute the entire agreement between Customer and Seller with respect to the matter contained herein and supersedes any prior oral or written communications, understanding, representations, proposals or agreements with respect to such subject matter. Seller may revise these Terms from time to time. These Terms may not be amended or modified by the Customer except upon the execution of a written agreement signed by both parties indicating an intent to modify these Terms. Customer may not assign any of its rights or obligations hereunder or under any order. If any provision of these Terms or a Sale Agreement is invalid, unenforceable or in conflict with any law, such provision shall be deemed severed from these Terms and/or the Sale Agreement and the validity of the remainder of these Terms and/or the Sale Agreement shall not be affected thereby. The provisions of these Terms that by their nature are reasonably intended by the parties to survive the expiration or termination of the Terms or any accepted order, shall survive the expiration or termination of the Terms or any accepted order.



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Savannah, GA 31405
(912) 944-3917

Titus Consulting Engineer Seminars – Plano, TX

Attendees have the opportunity to learn about the basics of air distribution, energy solutions, ASHRAE Standards and LEED credits, innovative product solutions, and how to apply these principles to projects/applications. Topics include GRD Air Distribution, terminal units, fan coils, displacement ventilation, and chilled beams.

Greenheck HVAC University – Schofield, WI

Achieve your potential.

Attendees are educated on current topics of interest in HVAC application, energy efficiency, codes, standards, and industry trends. Professional Development Hour certificates are issued for the courses completed. As an approved Continuing Education provider in all 50 states, Greenheck's HVAC University offers the ability to earn 10 PDH credits or more in two days. Topics Include Electronically Commutated Motors & Controls, Fan System Effect, Fan Application & Selection, Laboratory Fume Exhaust, Dampers (Life Safety, back draft, heavy duty/industrial), Kitchen Ventilation Design, Louvers, Energy Recovery & Dedicated Outdoor Air Systems, Make-up Air Ventilation.

Holden Engineering Trips to Greenheck

Take a trip to Greenheck in Schofield, WI led by a Holden & Associates Sales Engineer. Attendees can participate in factory tours and product demos while earning at least 6 PDHs (Professional Development Hours).

Contact your Holden & Associates Engineering Rep for dates and availability.

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Stock Catalog REV:061819