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FACULTAD DE INGENIERIA MECANICA

"IMPLEMENTACION DE UN SISTEMA DE VENTILACION Y EXTRACCION DE POLVOS EN UNA FABRICA DE TEXTILES DE FIBRA SINTETICA"

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Esta obra dedico con mucho cariño a mis padres: Efraín e Hilda, a mi esposa: Lourdes, y a mis queridas niñas: Fiorella y Paola.

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PRÓLOGO

En el presente trabajo que se presenta a consideración del jurado como testimonio del dominio de algunos temas y conceptos aprendidos como alumno de la facultad y aplicados luego en la vida profesional, se desarrolla un sistema de ventilación para las áreas de trabajo en una Fábrica de Textiles a partir de fibra sintética, utilizándose los criterios, conceptos y metodología de cálculo para la definición de las partes y equipos que conforman el sistema. Comprende además la instalación del Sistema y su Puesta en Marcha.

En el capítulo I se describen la importancia que tiene la ventilación como una alternativa de solución para mejorar las condiciones de operatividad en la fábrica, los antecedentes de ésta, el objetivo del trabajo, sus alcances, y la metodología de cálculo para la definición de sus componentes.

En el capítulo II se describen las características de la zona de producción de la fábrica y su entorno, la maquinaria con que cuenta actualmente, y el proceso de fabricación.

En el capítulo III se menciona las Generalidades sobre la Ventilación en Naves Industriales.

En el capítulo IV se presenta las Consideraciones para el Diseño del Sistema de Ventilación.

En el capítulo V se establece el Cálculo y/o Selección de los Equipos necesarios para el funcionamiento adecuado del sistema.

En el capítulo VI se describen las Especificaciones Técnicas de los equipos, de los conductos y del montaje e instalación.

Finalmente el Capítulo VII trata sobre la Evaluación Económica del sistema, incluyendo la evaluación de la recuperación de la inversión.

Este trabajo refleja los conocimientos adquiridos durante mi formación como estudiante en la Facultad de Ingeniería Mecánica de la Universidad de Ingeniería y constituye un testimonio de la experiencia acumulada durante los años dedicados a la industria textil, me ha tocado vivir situaciones y coyunturas diversas en este ámbito donde el mercado de hoy impone las reglas de juego, es decir la competitividad; y es por ello que mediante este trabajo, pretendo dar una solución técnica a uno de los problemas más comunes que se presentan en los talleres de textiles.

Mi reconocimiento a todos los profesores que han contribuido en mi formación, a mi alma mater que ha permitido forjar mis ideales y a todas las personas que me han brindado su apoyo y me han dado la oportunidad de insertarme en el campo de la industria textil y así contribuir con un granito de arena en el desarrollo del país.

CAPÍTULO I

INTRODUCCIÓN

En los procesos de fabricación de textiles es común la generación de polvos o emisión de calor proveniente de las máquinas, así como la formación de calor en el ambiente por transmisión del calor externo; elementos que alteran las condiciones de productividad o modifican el estado y composición del aire, perjudicando el funcionamiento de las máquinas y atentando contra la salud y bienestar de los trabajadores, y por consiguiente provocar condiciones penosas de trabajo que repercuten en el rendimiento del personal. Siendo éste el caso particular de *REPRESENTACIONES DERCO INDUSTRIAL*, en el presente trabajo se plantea una solución técnica aceptable y económicamente factible.

1.1 IMPORTANCIA DE LA VENTILACIÓN

Uno de los propósitos de la ventilación es la de mantener un estado y composición del aire que resulte adecuado para la salud de los trabajadores, así como aceptable para la conservación de los equipos o que obedezca a exigencias técnicas específicas de algún proceso de fabricación, almacenamiento y acondicionamiento de los productos.

En otras palabras, la finalidad de la ventilación es mantener el aire, libre de impurezas. Así, se denomina *impureza* a toda materia extraña presente en el aire que la hace inadecuada desde el punto de vista de la salud. Las impurezas se pueden clasificar en:

Exceso de vapor de agua

Gases y vapores nocivos

Polvo

Calor excesivo y humedad

El aire es un agente transmisor de todos los contaminantes y del calor de convección, y no interviene en la

transmisión de calor por radiación. En general las impurezas del aire forman mezclas muy diversas.

Las necesidades higiénicas del aire implican la exigencia de mantenerlo bajo condiciones definidas y el aprovisionamiento de aire limpio.

En las fábricas las impurezas se propagan por movimientos y corrientes de aire que son inevitables. Estos movimientos se deben a la presencia de superficies cuyas temperaturas son distintas a la del aire. Los cuerpos con temperaturas mayores a la del aire lo calientan originando corrientes ascendentes, mientras que los cuerpos que lo enfrían originan corrientes descendentes. Los vacíos que son producidos por estas corrientes son suplidos por otro aire nuevo, los que nuevamente son calentados o enfriados sucesivamente. Este proceso de manera indefinida origina las corrientes térmicas.

La ventilación tiene como finalidad el de mantener la pureza y condiciones prescritas del aire de un local, es decir, mantener la temperatura, velocidad y nivel de impurezas entre

ciertos límites. Esto se consigue con la extracción del aire viciado del local (ventilación por aspiración) y la introducción de aire limpio para reemplazarlo (ventilación por impulsión)

1.2 ANTECEDENTES DE LA FÁBRICA

REPRESENTACIONES DERCO INDUSTRIAL es una fábrica que se dedica básicamente a la fabricación de telas a partir de fibra sintética en sus dos denominaciones: poliéster y nylon. La gran variedad de telas que se consigue en sus diferentes diseños y texturas sirve como materia prima para la fabricación de cortinas, vestidos de novia, polos, buzos, etc.

Uno de los inconvenientes que tiene la fábrica en su taller de producción es la generación de calor por parte de las máquinas, a la que se suma la transmisión de calor a través del techo ocasionados en días soleados, efectos que elevan la temperatura interior a valores no recomendados (39 – 42 °C), dificultando de este modo el proceso de fabricación de telas, en tanto que es alterado el régimen de operación de las propias máquinas, y también modifican negativamente las condiciones de trabajo para los operadores de las máquinas.

Por otro lado, en la sección de perchado (proceso que se explica más adelante), se generan partículas de fibras de textiles, que en su deposición debido a las corrientes de aire, se acumulan formando pelusas muy finas que se van diseminando

en el resto del taller, creando problemas de atascamiento de hilos y/o descalibración de las máquinas; lo que incrementa la frecuencia de paralización de las máquinas y mayor número de intervenciones en tareas de mantenimiento, además de contribuir nocivamente en la salud de los operadores de máquinas.

1.3 OBJETIVO DEL TRABAJO

El mercado, cada vez más exigente en nuestros días, impone que las empresas sean más competitivas, y para lograr esto, es necesario que los costos de producción sean mínimos. Existen varias alternativas para contribuir en la disminución de estos costos, mencionamos los más relevantes:

Mejoramiento de las condiciones ambientales de operatividad en el área de producción mediante un sistema de ventilación.

Dotación con maquinarias modernas cada vez más veloces

Automatización del sistema de producción

Como una meta inicial, el objetivo del presente trabajo es diseñar e implementar un Sistema de Ventilación en las áreas de producción para mejorar las condiciones de laborabilidad y disminuir el efecto del calor generado por las máquinas hiladoras, por un lado, y por otro lado la implementación de un sistema de captura de polvos o pelusa fina originados por la máquina Perchadora, al efectuar uno de los procesos finales de la tela velour. Este sistema será instalado en la unidad de Extracción que viene incorporada en la máquina.

1.4 ALCANCE DEL TRABAJO:

El trabajo comprende desde la fase de concepción del Proyecto hasta la instalación del Sistema y Puesta en Marcha de los equipos, pasando por el cálculo y diseño de todas sus partes y componentes.

Para el diseño del sistema, se ha tenido en cuenta las características del local en lo que concierne a la zona de producción de telas. También se han considerado los distintos procesos que se realizan hasta conseguir el producto final, presentándose para una mejor comprensión del proceso un diagrama de flujo. A continuación, se identifica el problema, y

luego las alternativas de solución para afrontar los inconvenientes donde el calor y la presencia de polvos es crítica. Se presentan dos alternativas en la definición del caudal de aire a ser usado, y consiguientemente la Selección de la solución más factible.

Se establecen dos metodologías de cálculo para la definición de las capacidades de los sistemas.

Seguidamente se describe la solución planteada: Un sistema de inyección y extracción del aire, con filtración y con presión positiva.

Para lograr un eficiente barrido en todo el local se ubicarán convenientemente tanto los difusores de aire como las rejillas de aspiración. Asimismo, se ha mantenido la aspiración localizada para la zona de *perchado:* consistente en un sistema de extracción de polvos y pelusas con la incorporación de un sistema de captura de éstos.

1.5 METODOLOGÍA DE CÁLCULO PARA EL DISEÑO

Para la definición de las capacidades de los sistemas, se establecen dos metodologías de cálculo:

a. Considerando un número de renovaciones por hora de acuerdo a lo recomendado por los organismos internacionales, que permite definir el caudal de aire necesario en el ambiente; y

b. Considerando una variación máxima determinada para la temperatura interior, calculando la carga térmica total del local y un caudal de aire que sea necesaria para mantener esta diferencia de temperatura máxima.

CAPÍTULO II

DESCRIPCIÓN DE LA PLANTA

2.1 DESCRIPCIÓN

La fábrica "REPRESENTACIONES DERCO INDUSTRIAL" procesa los filamentos sintéticos para conseguir telas de diversas texturas, colores y espesores. Durante este proceso de fabricación se genera calor y pelusa, cuya eliminación es materia de este trabajo,

La etapa productiva se desarrolla en forma continua durante dos turnos, seis días a la semana. Su producción diaria en promedio llega a aproximadamente 500 kg.

La fábrica está conformada por las siguientes secciones:

a. Sección de Recepción de materia prima
b. Sección de Urdido de las fibras
c. Sección de Tejedoras
d. Sección de Perchado
e. Sección de Embalaje y empaque
f. Sección de Despacho

2.2 PROCESOS DE PRODUCCIÓN

Se describen las características más saltantes de cada sección, donde se lleva a cabo una parte del proceso de producción, como se detalla a continuación:

2.2.1 Sección de Urdido de las fibras

Está conformado por 3 líneas urdidoras: una destinada para trabajar con fibra Poliéster 75/34, con capacidad para tratamiento de 800 filamentos o bobinas; las otras dos destinadas para trabajar con fibra Nylon 40/10, con capacidad para 575 filamentos o bobinas.

Los filamentos de fibra dispuestos en bobinas pequeñas son armados en dispositivos de una estructura, donde se alojan

sobre soportes horizontales en voladizo con el propósito de desenrollar por el extremo libre mientras son conducidos y jalados por un tambor conformando un carrete mayor, que es el utilizado como alimentador de múltiples filamentos en los telares. Los filamentos durante su recorrido son guiados por poleas o filetas, tableros provisto de orificios, peines guiadores etc.

2.2.2 Sección de Tejedoras

Las tejedoras son las encargadas de elaborar las telas a partir de los filamentos enhebrados, se pueden distinguir las siguientes categorías de máquinas tejedoras:

Simples: cuando se elabora un sólo ancho de tela

Dobles: cuando se elabora dos telas a la vez

De dos barras: provisto de dos barras paralelas para la alimentación de los carretes

De cuatro barras: provisto de cuatro barras paralelas para la alimentación de los carretes.

En esta sección las tejedoras traman los filamentos a través de un sistema automatizado, ingresando por un lado los

carretes y saliendo por el otro extremo la tela ya conformada de 2,40 m de ancho, enrollándose para formar rollos de 50 kg

Los rollos ya conformados son empaquetados y almacenados para su despacho o para ser enviado a la tintorería según sea el caso.

2.2.3 Sección de Perchado

En esta sección se hace una modificación a la textura de la tela para algunos propósitos específicos, consiste en crear en su superficie una especie de felpa, mediante un proceso de raspado con una serie de agujas dispuestas sobre polines. Los polines en número de 32 están dispuestos formando un gran tambor, de manera que al girar éste, los polines giran a altísimas revoluciones, en contrasentido cada dos polines, permitiendo de este modo hacer el raspado. La tela es obligada a enrollarse en menos de 360 grados alrededor de este gran tambor, se realiza varias pasadas hasta conseguir la textura deseada.

Debido a este procedimiento de raspado, se produce una considerable cantidad de pelusa de tal modo que ésta es

la zona más crítica de la planta, desde el punto de vista de la pureza del aire.

2.3 EQUIPOS UTILIZADOS

Los equipos utilizados principalmente son:

En la sección de Urdido:

Las tres filas de castillos, donde se disponen las pequeñas bobinas.

Los tambores donde se enrollan los múltiples filamentos sintéticos previamente direccionados conformando los hilos para alimentar al telar.

Se pueden distinguir las siguientes líneas:

1 Urdidora marca textima, de 800 hilos o filamentos

2 Urdidoras marca Karl Mayer de 575 hilos o filamentos

En la sección de Telares:

10 Tejedoras Marca: Textima,

Modelo: Ketten, de dos barras simples

03 Tejedoras Marca: Karl Mayer,

Modelo: Ketten, de dos barras simples

04 Tejedoras Marca: Liba,

Modelo: Ketten, de dos barras dobles

01 Tejedoras Marca: Karl Mayer,

Modelo: Ketten, de dos barras dobles

01 Tejedora Marca: Liba,

Modelo: Ketten, de tres barras dobles

01 Tejedoras Marca: Karl Mayer,

Modelo: Ketten, de tres barras dobles

01 Tejedoras Marca: Textima,

Modelo: Ketten, de tres barras dobles

01 Tejedora Marca: Liba,

Modelo: Ketten, de cuatro barras simples

02 Tejedoras Marca: Karl Mayer,

Modelo: Ketten, de cuatro barras simples

01 Tejedoras Marca: Textima,

Modelo: Ketten, de cuatro barras dobles

En la sección de Perchado:

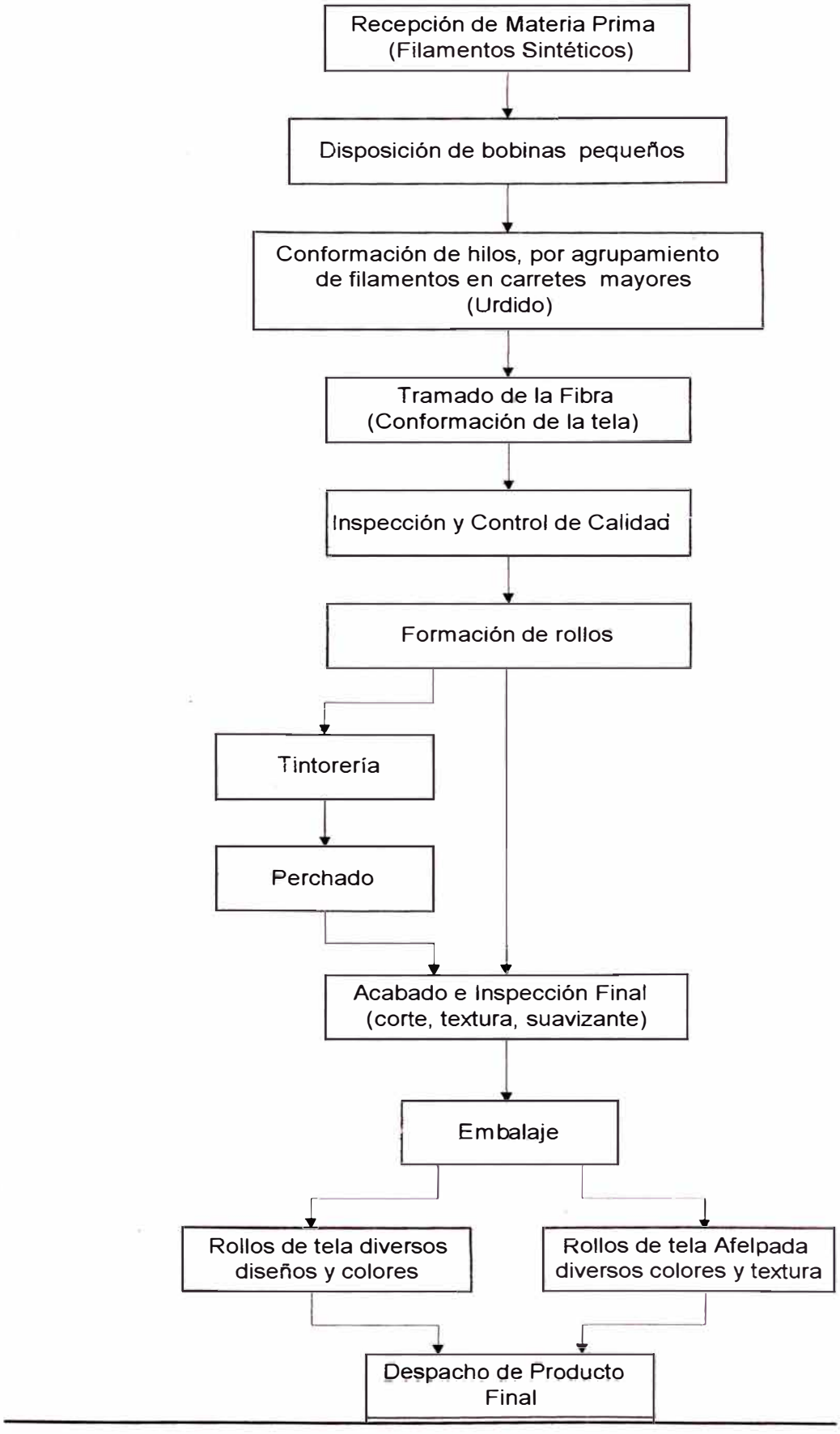
01 perchadora Marca: Franck Muller, de 32 polines

Adicionalmente se utilizan otros equipos complementarios, principalmente para el traslado de la materia prima, del producto terminado, para el embalaje, despacho, etc.

2.4 DIAGRAMA DE FLUJO DEL PROCESO DE PRODUCCIÓN

Para una mejor comprensión del proceso de producción, se presenta el siguiente diagrama:

Diagrama de Flujo del Proceso de Producción



CAPÍTULO III

GENERALIDADES SOBRE LA VENTILACIÓN EN NAVES INDUSTRIALES

3.1 EL AIRE ATMOSFÉRICO

El globo terrestre, en su conjunto, está envuelto en un manto gaseoso que recibe el nombre genérico de atmósfera.

El aire que nos rodea es un gas incoloro, insípido e inodoro. Es una mezcla de diferentes gases y no una composición química. El aire atmosférico normal se compone en un 21% de oxígeno, 78% de Nitrógeno, 1% de Argón y 0,03% de dióxido de Carbono, el resto está conformado por Hidrógeno, Neón, Criptón, Helio, Ozono, Xenón y variadas cantidades de vapor de agua.

El hombre depende del aire para vivir y cualquier diferencia substancial en la composición porcentual del aire normal lo puede hacer indeseable. A presión atmosférica, concentraciones de Oxígeno menores del 12% y concentraciones de dióxido de Carbono mayores que el 5%, aún para períodos cortos, son peligrosas.

El ser humano emplea alrededor de 0,03 m^3 de Oxígeno por hora. Su requerimiento de aire es, por lo tanto, bastante pequeño: 0,15 m^3/h. El dióxido de Carbono producido por los seres humanos, representa, sin embargo, que el aire necesario mínimo para mantener la concentración de dióxido de carbono por debajo del nivel de peligro llega a alrededor de 5 m^3/h, en ambientes cerrados y por individuo. Al proyectar sistemas de ventilación de aire, es suficiente un caudal de aire de renovación de 15 a 20 m^3 por persona y por hora. Sin embargo, es muy común que se necesiten mayores caudales para disipar calor, frío o contaminantes.

La masa total de aire en la atmósfera se calcula en unos: $15,17x10^{17}$ kg. La composición del aire permanece

relativamente constante al menos hasta unos 20 Km. de altura. La densidad del aire en esta capa es de 1,298 kg/m^3.

El aire seco se comporta en la práctica como un gas perfecto entre los límites de presión y temperatura corrientes en los problemas de ventilación. Por lo tanto, se le pueden aplicar las leyes de los gases perfectos estudiados en Física.

Conforme se ha indicado en párrafos anteriores, el aire, en lo que se refiere a la ventilación, contiene vapor de agua, olores, humos, anhídrido carbónico producido en la respiración y combustión, además del polvillo formado por corpúsculos minerales y orgánicos que transportan gran variedad de bacterias y otros microorganismos junto con sus gérmenes, debiendo ser eliminado este aire viciado mediante su renovación y su ventilación.

3.2 TAMAÑO DE PARTÍCULAS

El tamaño de las partículas normalmente se mide en micrones (milésimas de milímetro), cuyo símbolo es: μ. En la atmósfera las partículas pueden medir desde menos de 0,01 μ hasta el tamaño de fibras, hojas e insectos. Sus formas y

configuraciones son innumerables. Los aerosoles de menor tamaño son producto de la condensación o sublimación de humos, en proceso de combustión, o provienen de reacciones gaseosas, en procesos químicos o físicos.

Las partículas de mayor tamaño provienen de la erosión de la superficie de la tierra y son dispersadas por el viento. Pero también pueden originarse por aglomeración de partículas de menor tamaño. Fenómenos similares ocurren en nubes, donde las partículas forman los núcleos de condensación para la formación de gotas de agua.

Las partículas menores de 0,1 μ se comportan como moléculas de gas, efectúan un movimiento Browniano y no tienen una velocidad de caída mesurable. Las partículas cuyo tamaño fluctúa entre 0,1 y 1 μ tienen una velocidad de caída calculable, pero tan baja, que para los fines prácticos es despreciable. Las corrientes de aire tienen mayor influencia sobre los movimientos de dichas partículas que la fuerza de gravedad. Las partículas en el rango de 1 a 10 μ caen con una velocidad constante y calculable en aire quieto (Ley de Stokes). Sin embargo, su mantenimiento en el aire puede

deberse a corrientes del mismo. Las partículas mayores de 10 μ caen rápidamente y pueden mantenerse en el aire cerca de donde se generan y bajo ciertas condiciones. Las excepciones a esta regla incluyen al algodón y a otros materiales livianos, tales como partes de semillas que pueden mantenerse en el aire por largos períodos de tiempo.

3.3 VENTILACIÓN

Ventilar es cambiar, renovar, extraer el aire interior de un recinto y sustituirlo por aire nuevo del exterior a fin de evitar su enrarecimiento, eliminando el calor, el polvo, las pelusas, el vapor, los olores y cuanto elemento perjudicial o impurezas contenga el aire ambiental encerrado dentro del local. De no llevarse a cabo esta renovación, la respiración de los seres vivos que ocupan el local se haría dificultosa y molestosa, siendo un obstáculo para las actividades normales que se desarrollan dentro del recinto.

3.4 RENOVACIONES O CAMBIOS DE AIRE

La cantidad de aire necesaria para efectuar una ventilación puede depender entre otros factores de:

Las dimensiones y características del local

La actividad a que está destinado

El calor a disipar o carga térmica

La granulometría de los sólidos a transportar

Se ha de advertir que la ventilación no modifica en absoluto las cualidades del aire respecto a su temperatura, humedad y demás aspectos que son estudiados en el aire

acondicionado, centrándose en el movimiento del aire y su consiguiente desplazamiento y traslación.

Según la tabla indicativa de las renovaciones que se recomiendan, las renovaciones de aire hasta un número de ocho veces por hora, aseguran la eliminación de las poluciones provocadas por las personas. Los cambios de aire llevados a cabo con frecuencia aseguran la eliminación del calor y el vapor en las zonas calentadas.

A continuación se presenta dicha tabla, según su aplicación:

TABLA N° 1: NÚMERO DE RENOVACIONES DE AIRE POR HORA [1]

Naturaleza del Local	Renovaciones de Aire por Hora
Ambientes nocivos	30 - 60
Bancos	2 – 4
Bares de hoteles	4 - 6
Bibliotecas	4 – 5
Cafés y Bares de Cafés	10 – 12
Cantinas	4 – 6
Cocinas comerciales o de escuelas	15 – 20
Discotecas	20 – 30
Fábricas en general	6 – 10
Fundiciones	20 – 30
Garajes	6 – 8
Hospitales	4 – 8
Iglesias	0,5 – 1
Laboratorios	5 – 15
Lavandería	20 – 30
Mataderos	6 – 10
Naves deportivas	4 – 8
Naves industriales	6 – 10
Panadería	20 – 30
Pollería	6 – 10
Quirófanos	8 – 10
Restaurante	6 – 12
Sala de calderos	20 – 40
Sala de máquinas	20 – 30
Sala para clases	4 – 8
Sala de baños	5 – 10
Talleres de Fabricación	6 - 10

[1] Tabla tomada del libro "Ventilación Industrial Cálculo y Aplicaciones" Editorial Paraninfo, Autor: E CARNICER ROYO 2da Ed. 1994.

3.5 MANERAS DE VENTILAR

La ventilación puede llevarse a cabo de las siguientes maneras:

3.5.1 Extracción del aire viciado del local

Esencialmente consiste en disponer a lo largo del local o en lugares estratégicos una serie de ventiladores extractores, cuya misión de éstos es aspirar el aire interior y expulsarlo afuera. Esto sucede así porque en los alrededores de la boca del ventilador se origina una depresión, la cual atrae el aire de las capas superiores del recinto, que está muy viciado, y los arrastra al interior del extractor desde donde son expulsados hacia afuera.

Lógicamente, para que exista corriente a través del ventilador es necesario que en otros puntos del local existan tomas por los que pueda ingresar el aire en mayor cantidad con respecto a los que los extractores eliminan el volumen de aire enrarecido. Estas tomas pueden ser ventanas, puertas o simplemente rendijas.

3.5.2 Impulsión de aire nuevo al local

Bajo esta forma, los ventiladores recogen el aire exterior limpio y lo impulsan hacia el interior del local, creando una sobrepresión dentro del circuito que obliga al aire impuro a salir por las aberturas previstas para tal fin. A su vez la sobrepresión impide que penetre aire del exterior por sitios que no están dentro del planteamiento general de una instalación.

Una de las ventajas de la impulsión consiste en poder dotar al ventilador de unos filtros para retener las partículas microscópicas y demás contaminantes que proliferan por el aire exterior. Además de controlarse la cantidad de aire entrante y repartir más eficazmente el volumen de aire sobre las secciones que necesiten mayor renovación.

3.5.3 Extracción e impulsión de aire

El sistema de extracción – impulsión viene determinado por un estudio de la ubicación de las bocas de entrada y salida del aire así como por la configuración geométrica del local, en virtud de que se usan ventiladores tanto para impulsar el aire limpio, como para extraer el aire viciado, lo cual nos lleva a considerar adecuadamente todas las variables posibles, pues, por un lado, se tendrá depresión (extractores) y, por otro,

sobrepresión (impulsores) siendo conveniente que los impulsores den más aire que el desalojado por los extractores para que dentro del recinto exista sobrepresión y la instalación funcione correctamente, estimándose en un 20%.

3.5.4 Ventilación localizada por aspiración

La extracción de impurezas por aspiración localizada es un método de ventilación muy eficaz. Las impurezas se recogen en la fuente donde se generan, con lo que se impide que puedan contaminar la totalidad del aire del recinto, quedando de este modo una renovación de aire necesaria mínima.

Las impurezas se pueden extraer por aspiración directa o pueden ser dirigidas hacia la salida mediante corrientes de aire convenientemente ubicadas. La aspiración localizada se emplea en toda clase de industrias y para todo tipo de impurezas: polvo (en sus diversas formas), gases, vapores, humedad, calor, etc.

Los sistemas de aspiración localizada constan de un colector o receptor de aire contaminado y un conducto por el que se transporta dicho aire, el cual según la naturaleza y el

grado de polución, se descarga directamente en la atmósfera o se pasa previamente por un sistema de filtración o limpieza antes de ser evacuado al exterior.

3.5.5 Ventilación natural

La renovación natural del aire en un recinto se debe al viento y a la diferencia de densidad entre el aire del interior y del exterior. Cuando no se tiene implementado un sistema de regulación, la entrada natural del aire se produce al azar. En cambio si se han diseñado las entradas y las salidas de aire de modo que se pueda mantener el aire interior bajo las condiciones deseadas para cualquier estado atmosférico, el proceso es con rigor una ventilación.

Factores que se debe tener en cuenta para la ventilación natural:

Diferencia de altura

Diferencia de temperaturas exterior e interior

Diferencia de presiones

Carga térmica

3.5.6 Ventilación espontánea

Es aquella que se realiza a través de rendijas, puertas, ventanas y otros huecos que conectan con el exterior, causados principalmente por las distintas temperaturas que se detectan entre los interiores del local y el exterior, a las que se añade la acción del viento, por cuya comunicación se crean diferencias de presión entre ambos ambientes.

3.5.7 Ventilación mecánica

Cuando la ventilación natural no puede llevarse a cabo o es insuficiente, hay que recurrir a la ventilación por medios mecánicos para conseguir la necesaria renovación del volumen de aire que se concentra en el interior de un recinto cerrado.

La ventilación por medios mecánicos se efectúa por intermedio de ventiladores y extractores de aire que pueden montarse de manera individual en el lugar elegido o bien emplear una instalación colectiva, conformando así alguna de las maneras de ventilar como las descritas anteriormente.

3.6 VENTILADORES

Como sabemos, se define por ventilador un aparato para mover aire y que utiliza un rodete como unidad impulsora. Un ventilador tiene al menos una abertura de aspiración y una abertura de impulsión. Las aberturas pueden tener o no elementos para su conexión al conducto de trabajo.

Los ventiladores pueden dividirse en dos grandes grupos a saber:

3.6.1 Ventiladores Axiales

En los ventiladores axiales o helicoidales el flujo o corriente de fluido gaseoso es esencialmente paralelo al eje longitudinal o eje de giro de la hélice o rodete, y son especialmente apropiados para la impulsión o aspiración de grandes volúmenes de aire a baja presión, entendiéndose como tal, cuando la presión del ventilador es inferior a 80 mm. De columna de agua.

3.6.2 Ventiladores Centrífugos

El ventilador centrífugo consiste esencialmente en una rueda o rodete provisto de una serie de álabes o paletas

radiales, denominada turbina, que gira dentro del interior de una envolvente con figura de espiral, llamada voluta, y éste tiene dos bocas, una de aspiración situada en el eje de la turbina y otra de impulsión abierta tangencialmente con relación al rodete, siendo recomendados para mover caudales pequeños pero a elevada presión.

3.7 APARATOS PARA ELIMINAR EL POLVO

El aire extraído del equipo productor de polvo por medio de aspiración localizada, contiene cantidades considerables de polvo, las cuales alcanzan a menudo cifras de varios gramos por metro cúbico de aire. Con el fin de prevenir una contaminación excesiva de la atmósfera, las normas establecen que la concentración de polvo en el aire que descargan a la atmósfera los sistemas de ventilación, no debe superar 150 mg/m^3. Por lo tanto todo aire viciado que contenga polvo en proporción mayor, debe someterse a purificación.

Los aparatos eliminadores de polvo se pueden clasificar según el principio físico en que se basan:

Cámaras de Sedimentación: En los cuales el polvo se asienta por gravedad.

Ciclones: (sencillos o múltiples), separadores de polvo inerciales, los cuales funcionan aprovechando los efectos inerciales de los cambios de dirección de las corrientes de aire.

Filtros: (de tela, perforados o fibrosos), en los cuales el aire cargado de polvo pasa a través de los medios de filtración.

3.7.1 Cámaras de Sedimentación

Las cámaras de sedimentación son los aparatos más sencillos para extraer las partículas sólidas suspendidas en el aire. Son de larga duración y fáciles. Se usan principalmente para extraer polvos groseros, como es el caso de las pelusas de fibra que se agrupan.

La forma tradicional de las cámaras de sedimentación es un paralelepípedo alargado. Las partículas abandonan la corriente de aire debido a fuerzas gravitacionales. Como no se puede precisar qué partículas son arrastradas lateralmente por la turbulencia, es difícil diseñar una cámara por medio de cálculos teóricos y más bien se diseñan sobre la base de

ensayos. No obstante que es deseable que el movimiento del aire al interior de las cámaras sea laminar, en la práctica todas las cámaras de sedimentación funcionan con régimen turbulento.

3.7.2 Filtración de aire

La filtración de aire es el proceso por el cual se efectúa una limpieza de éste. Según el requerimiento específico se llegarán a diferentes niveles de limpieza.

Los filtros son los elementos que se usan para la limpieza del aire a ser inyectado en sistemas de aire acondicionado o en ventilación y también antes de la emisión de aire contaminado al ambiente exterior.

Los filtros están constituidos por medios fibrosos o porosos con diferentes configuraciones. Características importantes de ellos son la eficiencia de retención, la caída de presión o diferencia de presión estática para un determinado caudal y la capacidad de almacenamiento de polvo, que es la cantidad de polvo retenido en peso, cuando se llega al punto de saturación y recambio del filtro.

Clasificación de filtros

Sin tener en cuenta los filtros de carbón activado, que son usados para la separación de gases y olores por adsorción, los filtros pueden dividirse en tres clases: Prefiltros,

filtros finos, y filtros HEPA (High Efficiency Particulate Absolute). Esta división se basa en las características de los diferentes medios filtrantes, el mecanismo de captación de partículas, su eficiencia filtrante e indirectamente la aplicación del filtro:

- Retención de partículas: La habilidad de un filtro para retener partículas se debe, entre otros, a varios fenómenos físicos como el efecto tamiz, la intercepción directa, la separación por inercia y el efecto de difusión Browniana. Existen además, efectos de atracción electrostática entre las fibras del filtro y las partículas. La concepción es que las partículas son esféricas y resultan atraídas por fuerzas de Van der Waals al tocar los medios filtrantes, y quedan en consecuencia, retenidas por ellos.

- Eficiencia filtrante: las partículas pueden medirse en función del recuento de las mismas, de su peso o del efecto de mancha que producen. Basándose en estas tres maneras de medir concentraciones de partículas en

aire se han generado normas para la determinación de la eficiencia de los filtros.

Los ensayos por peso y por efecto de mancha se encuentran normalizados según el ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Std. 52-76, y el de recuento de partículas por aerosoles de DOP (Di Octil Phtalato), según el Military Std. 282 de USA. El método de ensayo DOP con partículas homogéneas de 0,3 μ es el más reconocido mundialmente como el método por excelencia para definir la eficiencia de los filtros HEPA. La norma ASHRAE 52-76 se aplica en Estados Unidos para los filtros de aire usados en ventilación y aire acondicionado, donde se determina por ensayo gravimétrico (retención) y ensayo de mancha (eficiencia ASHRAE).

CAPÍTULO IV

CONSIDERACIONES PARA EL DISEÑO

4.1 CARACTERÍSTICAS DEL LOCAL

El área de trabajo a considerar para el diseño es un rectángulo de aproximadamente 19x40 metros, muros perimetrales de ladrillos de 4,80 m de alto, con refuerzo estructural de columnas y vigas soleras de concreto armado sobre las que apoyan los tijerales metálicos a dos aguas con 1,40 m de alto en el centro y 0,40 m en el extremo, dispuestos simétricamente y como cobertura, planchas de eternit gris.

4.2 DELIMITACIÓN DE ÁREAS CON PRESIONES DIFERENCIADAS

En general toda la planta tendrá una presión positiva a fin de que permanentemente exista un flujo de aire desde el interior hacia el exterior, lo que significa, que no habrá

posibilidad de ingreso de aire no tratado a través de puertas, ventanas o rendijas. La presión positiva se logra insuflando un caudal mayor de aire tratado con respecto al caudal de aire de extracción. En cambio, en la zona de *Perchado,* donde se generan las pelusas, se hará uso del sistema de aspiración localizada (presión negativa), que viene incorporado con el equipo. La delimitación de zonas o áreas se indica en el plano.

CAPÍTULO V

CÁLCULO Y/O SELECCIÓN DE LOS EQUIPOS

5.1 PARÁMETROS Y CRITERIOS USADOS EN EL CÁLCULO

Se tendrá en cuenta dos Metodologías de Cálculo para la definición del caudal, parámetro que gobierna el diseño de los sistemas:

5.1.1 Definición del caudal de aire a renovar por Ganancia Térmica

Se tendrá en cuenta:

Ganancia térmica principalmente a través del techo, considerando el dato de transmisión global del fabricante de la cobertura.

Una variación de temperatura interior/ exterior no mayor a 3 °C

5.1.2 Definición del caudal de aire a renovar, por Número de cambios/ hora.

Se recomienda entre 6 y 10 cambios de aire a la hora, según lo indicado en la Tabla N° 1.

5.2 CRITERIOS DE SELECCIÓN DE EQUIPOS

La selección de los equipos se hace principalmente atendiendo el nivel de ruido generado tanto en la succión como en la descarga, se recomiendan velocidades no mayores a los 1500 pies/min. En segundo lugar, se debe tener en consideración el caudal de aire a manejar contra la presión estática que debe vencer el equipo a fin de insuflar o extraer a las velocidades que recomiendan los fabricantes de difusores y rejillas para lograr la velocidad terminal adecuada.

5.2.1 Definición de la sección de la red de ductos

Se tendrá en cuenta las siguientes consideraciones:

Velocidades de paso del aire no mayores a 1200 pies/min (según recomendaciones para este tipo de instalaciones)

Se hará uso del método de "Caída de presión constante", considerándose un valor de 0,1" de columna de agua por cada cien pies de longitud del ducto.

5.2.2 Definición de rejillas difusoras de aire y de retorno

Se consideran velocidades de paso que no generen ruidos más allá de 35 NC, valor muy conservador si tenemos en cuenta que se permite hasta 60 NC para este tipo de ambientes de trabajo. Asimismo, el alcance útil del flujo (tiro) sea adecuado de acuerdo a la distancia entre difusores.

5.2.3 Definición del sistema de filtros

Por las características del tipo de trabajo que se realiza en los ambientes comunes, cuya presión es positiva, será suficiente el uso de filtros de 40% de eficiencia del tipo corrugado, y como filtros de sacrificio (pre-filtros), filtros sintéticos de 10 a 25%; en cambio para la zona de Perchado, ambiente de presión negativa, se requiere el uso de filtros con eficiencia de 85% tipo bolsa para la captura de las pelusas.

5.2.4 Definición del sistema de medición de presiones

Con la finalidad de definir el momento de reemplazo del filtro, se ha considerado un manómetro diferencial del tipo de columna inclinada. El reemplazo ocurrirá cuando el filtro se sature.

El momento en que el filtro empieza a saturarse, la lectura en el manómetro diferencial detecta un aumento de presión relativa medido entre puntos situados antes y después del filtro, como consecuencia del paso del aire al interior del ducto dentro de la caja de filtros. El reemplazo se realiza cuando la presión alcanza un valor final de 1" de c.a.

5.2.5 Sistema de control y protección de los motores de los equipos

Cada motor estará provisto en el mismo equipo por un dispositivo de protección contra la elevación de la corriente y corto circuito. Los mandos a distancia estarán centralizados en el área de mantenimiento para su arranque y parada.

5.3 CÁLCULO DEL CAUDAL DE RENOVACIÓN

5.3.1 Cálculo del Caudal de Renovación por Ganancia Térmica

El método consiste en determinar la ganancia térmica total a través del techo, debido al área de exposición considerable, es relativamente despreciable la ganancia térmica por otros medios. No se considera la iluminación, pues de existir trabajo nocturno, no habrá incidencia solar.

Luego de determinar la Ganancia Térmica se calcula el caudal de aire que se necesita ingresar al local para disminuir la temperatura interior en aproximadamente 3 °C ó 5,5 °F.

El cálculo de la Ganancia Térmica por el techo se determina con la siguiente fórmula:

$$Q = U \cdot A \cdot \Delta T$$

donde:

Q : Carga Térmica (BTU/h)

U : Coeficiente de transmisión global del material de la cobertura (BTU/h/m²/°F), proporcionado por el fabricante.

ΔT : Temperatura equivalente (°F), de tablas

U= 8 (BTU/h/m²/°F)

A= 19 mx40 m=760 m²

ΔT = 40 ºF

Q=8x760x40=243200 (BTU/h)

Para el cálculo del caudal de aire necesario para remover este calor, usaremos la siguiente fórmula:

$$C = \frac{Q}{1,08 \times \Delta T}$$

donde:

C : Caudal de aire (pies^3/min)

Q : Carga Térmica (BTU/Hr)

ΔT : Diferencia de temperatura considerada (5,5 °F)

$$C = \frac{243200}{1,08 \times 5,5} = 40942 \cdot pies^3/min$$

Es decir, caudal de aire necesario: 40942 pies^3/min

5.3.2 Cálculo del caudal de renovación por Número de cambios/ hora

Para este método, consideramos como volumen de aire a ser renovado, el que resulta de multiplicar el área de la planta (760 m^2) por la altura a la que se instalarán las bocas de descarga (3,50 m) y de acuerdo a lo recomendado por las tablas, (10 cambios por hora), es decir:

Volumen = 760 m^{2}x3,5 m = 2660 m^3

Caudal de Renovación = 2660 m^{3}x10 cambios /h = 26600 m^3/h

Que equivalen a 15640 pies^3/min

Para el diseño, elegiremos como caudal de aire a renovar, el mayor valor de los dos métodos de cálculo, es decir: 40942 pies^3/min para la inyección y una extracción con 20% menos de caudal para conseguir la presión positiva, según las recomendaciones (Ver pág. 33 "Ventilación Industrial" – Bibliografía)

Es decir, para extracción consideraremos: 40942/1,2 = 34120 pies^3/min

Aprovechando la estructura del techo, colgados de los tijerales se instalará 11 bocas de descarga y otras tantas bocas de succión dispuestas en la parte baja, tal como se muestra en los planos.

Así, tendremos:

Caudal en las bocas de descarga = 40942/11 = 3722 pies^3/min

Equivalente a: 6330 m^3/h

Caudal en las bocas de succión = 34120/11 = 3102 pies^3/min

Equivalente a: 5276 m^3/h

En resumen, tendremos que seleccionar de los catálogos de los fabricantes:

- Un inyector/ extractor centrífugo para 3722 pies^3/min de caudal y una presión estática que resultará de considerar las caídas de presión que se originan en la boca de succión, los filtros, difusor, codos, etc, de acuerdo a lo siguiente:

Accesorio	Caída de presión mm de c.a.	
Boca de succión	3,00	(1)
Filtros	25,4	(2)
Codos y ductos	0,62	(3)
Difusor	0,05	(4)
Total	29,07	

(1) Estimación experimental

(2) Del catálogo KA-294-I, de filtros tipo DP, marca AIRGUARD INDUSTRIES, INC. (USA), página 4, indica

0,28" c.a. de pérdida inicial y como resistencia final: 1" c.a., equivalente a 25,4 mm de c.a.

(3) En codos y ductos, tenemos una longitud equivalente de 24,6 pies, que aplicado a 0,1" de c.a. por cada 100 pies, resulta: 0,0246" c.a., equivalente a 0,62 mm

(4) Según catálogo del fabricante

Del cuadro, consideramos para la selección de los equipos: 30 mm de c.a. ó 1 ¼" de c.a.

5.4 CÁLCULO DE LA SECCIÓN DE DUCTOS

De acuerdo a los criterios señalados antes, para 3,722 pies^3/min. y 0,1" de c.a. por cada 100 pies de longitud equivalente de ducto, la sección resulta:

- 3722/ 1,000=3,72 pies^2.
- Se asume como sección de ducto: 4 pies2 ó 24"x24" de lado, para los sistemas de inyección.

Teniendo en los sistemas de extracción un caudal menor (3102 pies^3/min.), podría considerarse una sección menor, sin embargo, a fin de uniformizar la fabricación, se opta por la misma sección para los ductos de extracción.

5.5 SELECCIÓN DE EQUIPOS

5.5.1 Selección del Inyector de aire

Para la selección del inyector haremos uso del catálogo del fabricante y los siguientes parámetros calculados:

- Caudal: 3722 pies3/min
- Presión estática: 1 ¼" c.a.
- Velocidad de entrada recomendada para no exceder en 35 el criterio de ruido (NC): ≤ 1500 pies/min

Con los que se ha seleccionado el modelo DYNAMO D22 de la marca PENN VENTILATORS, cuyos datos de fábrica se ajustan como sigue:

- Caudal: 3800 pies^3/min
- Presión estática: 1 ¼" c.a.
- Velocidad de entrada: 1375 pies/min
- Potencia de motor: 1,16 HP

5.5.2 Selección del Extractor de aire

Como en el caso anterior, haremos uso de los siguientes parámetros calculados

- Caudal: 3102 pies^3/min
- Presión estática: 1 ¼" c.a.

Con estos datos se ha seleccionado el modelo DYNAMO D20 de la marca PENN VENTILATORS, cuyos datos de fábrica son:

- Caudal: 3250 pies^3/min

  Presión estática: 1 ¼" c.a.

- Velocidad de entrada: 1477 pies/min

  Potencia de motor: 1,03 HP

5.5.3 Selección de Difusores de inyección

Para la selección de los difusores, los criterios a utilizar son:

- Criterio de Ruido, que en este caso el ruido no es relevante, puesto que existe un ruido de fondo generado por las máquinas

  Se tomará en cuenta el alcance del aire a la salida del difusor. Como los difusores están distanciados entre sí 10 metros, el alcance (tiro) mínimo debe ser de 5 metros

En concordancia con el tamaño del ducto y el tipo requerido de difusor (4 vías), se selecciona del catálogo AB-101 de la marca AERONCA el modelo RC-40, que tiene las siguientes características:

- Caudal: 3600 pies^3/min
- Tiro: 38 pies (11,6 m)

  Dimensiones: 24"x24"

5.5.4 Selección de las Rejillas de Retorno

Para la selección de las rejillas de retorno, los criterios a utilizar son más flexibles ya que el ruido generado no es relevante pues ya existe un ruido de fondo generado por las máquinas.

Adecuándose al tamaño del ducto, se considera la rejilla de 24"x24" que determina una velocidad de aproximadamente 1100 pies/min, que resulta aceptable para el caudal que se maneja (3102 pies^3/min), se selecciona del catálogo AB-401B de la marca AERONCA, la rejilla modelo DG de 24"x24".

5.5.5 Selección y definición del número de filtros

En el punto 5.2.3 se definió el tipo de filtros recomendado, la selección se hace con el filtro de 40% de eficiencia tipo corrugado. El dato de entrada a los catálogos del fabricante es el caudal de aire a ser insuflado (3722 pies^3/min).

Del catálogo AKL8-400 de la marca AIRKONTROL para filtros corrugados de 24"x24"x2", se tiene para 2000 pies^3/min, una resistencia inicial de 0,32" de c.a.

Para filtrar adecuadamente los 3722 pies^3/min, seran necesarios dos filtros de estas características, es decir se selecciona dos filtros tipo TP-2-40.

Para la selección de los filtros de sacrificio de 15% de eficiencia, se consideran dos filtros de 24"x24"x2" del tipo Fiberglass con un rendimiento de 2000 CFM cada uno, con una capacidad de retención de polvo de 208 gramos.

CAPÍTULO VI

ESPECIFICACIONES TÉCNICAS

6.1 ESPECIFICACIONES TÉCNICAS DE EQUIPOS

6.1.1 Ventilador Centrífugo

Ventilador totalmente equipado en fábrica, listo para funcionar una vez instalado.

El ventilador será del tipo centrífugo, de eje horizontal, con los álabes inclinados hacia delante, de doble boca y encapsulado.

Las características de capacidad, están indicadas en el cuadro general de equipos. La caída de presión exterior indicada en el cuadro de capacidades incluye pérdidas en ductos, rejillas y filtros, (Ver cuadro en planos)

El ventilador será construido y aprobado de acuerdo con las normas internacionales vigentes, tal como AMCA o similar y nacionales vigentes. Construcción de fácil reemplazo de las partes, debiéndose realizar pruebas estrictas en fábrica de acuerdo con las normas.

La unidad de ventilación estará compuesta por un ventilador extractor que incluye impelente y carcasa y una armadura soporte de la unidad provista de tapas de protección, sistema de accionamiento compuesto por el motor eléctrico, poleas, fajas y eje.

El ventilador deberá ser de bajo nivel de sonido operando a una velocidad de descarga que se indica en el cuadro adjunto, será fabricado íntegramente de planchas de acero galvanizado.

El impelente tendrá hojas inclinadas hacia delante y deberá ser balanceado estática y dinámicamente en fábrica.

La carcasa será de diseño aerodinámico, llevará collares integrados a la entrada y salida de aire para una fácil instalación al ducto de entrada y descarga de aire.

Tendrá además perfiles de refuerzo de acero galvanizado, soldados.

El motor eléctrico será construido según norma NEMA, para conectarse a la red de 220 V, 60 Hz, 3 fases ó 1 fase, girando a 1750 rpm. Cuya potencia será mayor al BHP requerido por el ventilador.

El motor deberá ser del tipo abierto con ventilación incorporada, con protección contra goteos y salpicaduras, el aislamiento será clase F para uso tropical.

El accionamiento del rodete será mediante un sistema de poleas acanaladas, de paso regulable para permitir variación del caudal y fajas en "V", seleccionadas de acuerdo a la potencia y velocidad del motor con un factor de seguridad mínima de 1,4

El rodete estará fijado a un eje de acero de alta resistencia y éste estará soportado por dos chumaceras con rodamientos auto - alineantes, de larga duración lubricados con grasa, sellados para evitar contaminaciones.

El extractor estará montado y empernado sobre un bastidor construido de planchas dobladas y perfiles de acero soldadas entre sí.

La base del motor estará soportada por unos rieles ubicados a media altura del bastidor en los cuales se podrá desplazar para efectos de su regulación.

Así mismo las chumaceras descansarán sobre la parte superior del bastidor y estarán fijadas mediante pernos.

El acabado final de las planchas y estructura será con dos manos de pintura anticorrosiva y dos de esmalte final.

Las soldaduras y elementos no galvanizados serán tratados con un proceso de galvanizado en frío con base de zinc- epóxica

Se suministrará un arrancador magnético directo, con contactos auxiliares para mando a distancia, con protección térmica contra sobre carga en las tres fases y botonera de mando arranque- parada en gabinete de acero esmaltado al horno. En capacidades de acuerdo con la capacidad del motor.

Se suministrará asimismo las conexiones eléctricas desde el tablero existente, en conductores THW, y con tubería de fierro galvanizado, que deberán estar conformes con el Código Eléctrico del Perú.

6.2 DUCTOS

Se fabricarán e instalarán de conformidad con los tamaños, recorridos, detalles mostrados en planos, y las especificaciones que se indican más adelante.

Para su construcción de los ductos se emplearán planchas de fierro galvanizado de la mejor calidad, ARMCO tipo zinc- grip o similar.

En general, se seguirán las normas recomendadas por la Sociedad Americana de Ingenieros de Aire Acondicionado y Ventilación (SMACNA)

Para la ejecución de los ductos se seguirán las siguientes instrucciones:

ANCHO DEL DUCTO	CALIBRE	EMPALMES Y REFUERZOS
Hasta 12"	N° 26	Correderas 1" a máx. 2,38 m entre centros.
13" hasta 30"	N°24	Correderas 1" a máx. 2,38 m entre centros.
31" hasta 45"	N°22	Correderas 1" a máx. 2,38 m entre centros.
46" hasta 60"	N°20	Correderas 1 1/2" a máx. 2,38 m entre centros.
Más de 61" 1.1/2" a max. –2,38 m.	N°21	Correderas 1 1/2" a máx. 2,38 m entre centros, con refuerzo ángulo: 1" x 1" x 1/8" entre empalmes.

Todos los ductos se asegurarán firmemente a la estructura metálica del techo o paredes. Los soportes serán de ángulo de fierro negro de 1 1/4" x 1 1/4 x 1/8", con colgadores de fierro negro liso de 3/8", roscado 2" de longitud.

Todos los colgadores y soportes se pintarán con pintura tipo galvanizada en frío.

La unión entre los ductos y los equipos se efectuarán por medio de juntas flexibles de lona de 8 onzas, de por lo menos 10 cm. de largo y asegurada con abrazaderas y empaquetaduras para cierre hermético.

Los codos se construirán con el radio menor igual a los ¾ de la dimensión del ducto en la dirección del giro. Donde por limitaciones de espacio no se puedan instalar codos curvos, se instalarán codos rectangulares con guías de doble espesor.

Las transformaciones se construirán con una pendiente de 25% como máximo.

6.3 DIFUSORES Y REJILLAS:

Los difusores para la impulsión del aire podrán ser de fabricación nacional en plancha galvanizada de 1/40" de espesor y de diseño similar al Tuttle & Bailey tipo ME "Multi-Patter" o de diseño equivalente aceptado, serán cuadrados con empaquetadura de jebe.

Las rejillas de retorno serán similares a los Tuttle & Bailey tipo T70D o de diseño equivalente aceptado, de plancha galvanizada, pintadas con esmalte al horno. Con empaquetaduras de jebe.

Su ubicación será de acuerdo a planos.

6.4 ESPECIFICACIONES DEL SISTEMA DE FILTRACIÓN

Estará conformado por una caja metálica fabricada en plancha galvanizada de espesor 1/27" con tapa hermética desmontable para el cambio o limpieza de los filtros, la caja tendrá el tamaño requerido para alojar la cantidad de filtros y sus prefiltros que garantizan una velocidad de paso del aire de entre 500 a 1000 pies/min.

Los filtros considerados son (según se muestran en los detalles del plano) dos del tipo sintético de 10 a 25% de eficiencia y dos filtros del tipo DP (superficie extendida) de celulosa con 40% de eficiencia.

6.5 ESPECIFICACIONES DE MONTAJE E INSTALACIÓN

Se refiere a las especificaciones que se debe tener en cuenta durante el montaje e instalación de los equipos y será concordante con las indicadas en catálogos y especificaciones de los fabricantes.

6.5.1 Montaje de equipos

Los equipos deberán estar provistos de soportes con dispositivos antivibratorios a fin de no transmitir vibraciones hacia la estructura de la edificación, además se instalarán juntas flexibles de lona para la conexión a la boca de aspiración y descarga con la finalidad de evitar la transmisión de vibraciones al sistema de ductos.

Para la disposición de los equipos se deberá tener en cuenta la ubicación de la tapa de registro del motor y sistema

de transmisión, a fin de que ésta quede en una posición accesible para efectos de mantenimiento.

6.5.2 Montaje de ductos y/o accesorios

Serán de acuerdo a lo recomendado por la Sociedad Americana de Ingenieros de Calefacción y Aire Acondicionado (ASHRAE)

Serán asegurados firmemente a muros o al tijeral con soportes de ángulo de fierro negro de 1 ¼"x1 ¼"x1/8", con colgadores de fierro negro liso de 3/8", roscado 2" de longitud.

6.5.3 Instalación del sistema de filtración

Se deberá tener especial cuidado durante el almacenaje y manipulación de los filtros, la envoltura de protección será retirada solamente al momento de la instalación. Durante su colocación se evitará el contacto con objetos punzantes a fin de preservar intacta la media filtrante.

Se deberá tener en cuenta también el orden de ubicación de los filtros, siendo el de primer contacto con el flujo el de material sintético (filtro primario), y después el filtro de mayor eficiencia.

Para efectos de definir el momento de reemplazo de los filtros, se ha previsto equipar con un manómetro diferencial conectado antes y después de la caja de filtros; la ubicación del manómetro será adosada al muro a una altura de 1,50 m sobre el nivel de piso terminado y alineado debajo de la caja de filtros.

6.5.4 Montaje del sistema de Control y Protección Eléctrica de los Motores

Se instalará un tablero eléctrico de control para las unidades componentes del sistema.

El tablero será del tipo gabinete para adosar con puerta y chapa e interruptores termo magnéticos de acuerdo a la demanda indicada en los planos de cada uno de los motores.

Se instalará además todos los materiales (tuberías, cables, conectores, etc) requeridos para la conexión eléctrica de las unidades, incluyendo protectores térmicos contra sobrecargas y variaciones de tensión, arrancadores y demás elementos que aseguren el perfecto funcionamiento y protección de los motores del sistema.

Para todos los trabajos de instalación se deberán seguir las recomendaciones de la última edición vigente del Código Eléctrico Nacional y el Reglamento Nacional de Construcciones.

6.5.5 Medición y Pruebas del Sistema

Culminada la instalación, se efectuará las pruebas y mediciones al sistema como son:

Mediciones de velocidad en la descarga y aspiración de cada uno de los equipos para evaluar los caudales correspondientes según cada área.

Mediciones de presiones diferenciales en los equipos.

Mediciones del voltaje y amperaje de los motores de cada uno de los equipos a plena carga.

Prueba de aislamiento y Puesta a tierra de los sistemas.

CAPÍTULO VII

EVALUACIÓN ECONÓMICA

7.1 COSTO DEL PROYECTO

Considerando que el precio del mercado para proyectos de este tipo fluctúa entre US $ 0,75 a US $ 1,50 por metro^2 del área a ventilar. Si consideramos el valor promedio de US $ 1,00, tenemos:

Costo Proyecto = 760 m2 x1,00 = 760 dólares americanos.

7.2 COSTO DE ADQUISICIÓN

Están considerados los siguientes:

7.2.1 Equipos

Precio promedio de mercado de equipos nacionales de las capacidades consideradas: US $ 1200,00

Costo del lote de equipos =1200x23 = 27600,00 dólares americanos

7.2.2 Ductos y accesorios

El precio promedio de ductos y accesorios de plancha galvanizada es de US $ 3,00 el kilo, que desagregando corresponden:

Un dólar al costo de la plancha

Un dólar al costo de fabricación y

Un dólar al costo de instalación

Costo de ductos y accesorios = 3,00x1100 = 3300,00 dólares

Cabe precisar que el peso considerado resulta de efectuar un metrado de áreas de los ductos utilizados, castigando con un 30% adicional por la merma de la plancha originado por retazos no utilizables, además de estar considerados en este peso el de los soportes y colgadores.

Considerando que la plancha utilizada es de 1/32" de espesor y que tiene como dimensiones 1,20 m x2,40 m, por

información del fabricante ésta pesa 15 kg. Con estos datos, el metrado de áreas y las consideraciones antes mencionadas definimos el peso considerado.

7.2.3 Sistema de filtrado

Comprende:

Caja portafiltros: US $ 60,00 c/u

Lote de Filtros para cada caja: US $80,00

Costo total de cada Caja = 140,00 dólares

Costo del sistema de filtrado = 140,00x23 = 3220,00 dólares

7.2.4 Sistema de Control y Protección

Comprende:

Tablero de control y protección de c/ motor: US $ 120,00

Tablero general: US $ 1040,00

Costo del Sistema de C. y P. = 120,0

0x23+1040 = 3800,00 dólares

7.3 COSTO DE INSTALACIÓN

Comprende:

De los equipos: US $ 30,00 x23 = 690,00 dólares

Del Sistema de filtrado: US $ 30,00 x23 = 690,00 dólares

Del Sistema de control y protección: US $ 300,00 por lote (estimado)

Pruebas y Puesta en Marcha del Sistema: US $ 400,00 (estimado)

Costo de Instalación = 2080,00 dólares

7.4 COSTO TOTAL DE IMPLEMENTACIÓN DEL PROYECTO

Alcanza la suma US $ 40760,00

CONCLUSIONES:

Con la puesta en operación del sistema implementado, materia del presente trabajo, el aire al interior de la planta se halla en condiciones mucho más limpio, libre de polvo y pelusas, pudiendo confirmarse este hecho, no sólo por simple comparación con las condiciones del aire antes de la implementación del sistema, sino que también al registrar los filtros tanto en la línea de impulsión, como en la de extracción. Se ha encontrado, a dos meses de funcionamiento, una caída de presión adicional en las cajas de filtro (0,20'' de columna de agua), lo que demuestra un grado apreciable de ensuciamiento de los filtros como consecuencia de la captación de polvos y pelusas.

Asimismo, se ha verificado que esta atmósfera limpia, ha permitido un mejor funcionamiento de las máquinas, operando éstas sin las frecuentes interrupciones que se presentaba anteriormente en las líneas de producción.

Por otro lado, la impulsión del aire exterior tratado, así como la expulsión del aire viciado del interior de la planta, han generado una sensible mejora en la calidad del aire, al mantener la temperatura interior estable, debido a la permanente recirculación del mismo.

Además, al generarse corrientes de aire al interior, la sensación térmica percibida por el personal es aceptable.

El impacto ambiental en el medio exterior también ha sido favorecido, puesto que las pelusas que anteriormente se diseminaban en el medio ambiente, en el presente caso son colectadas y eliminadas en condiciones que preservan el medio ambiente.

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APENDICE

TABLAS Y REFERENCIAS:

Tabla de Cantidad de Renovaciones de Aire

Tabla de Selección de los Equipos según el Fabricante.

Tabla de Selección de las Secciones de Ductos

para diferentes caídas de presión.

Tabla de Selección de las Rejillas de Extracción.

Catálogo de Equipos.

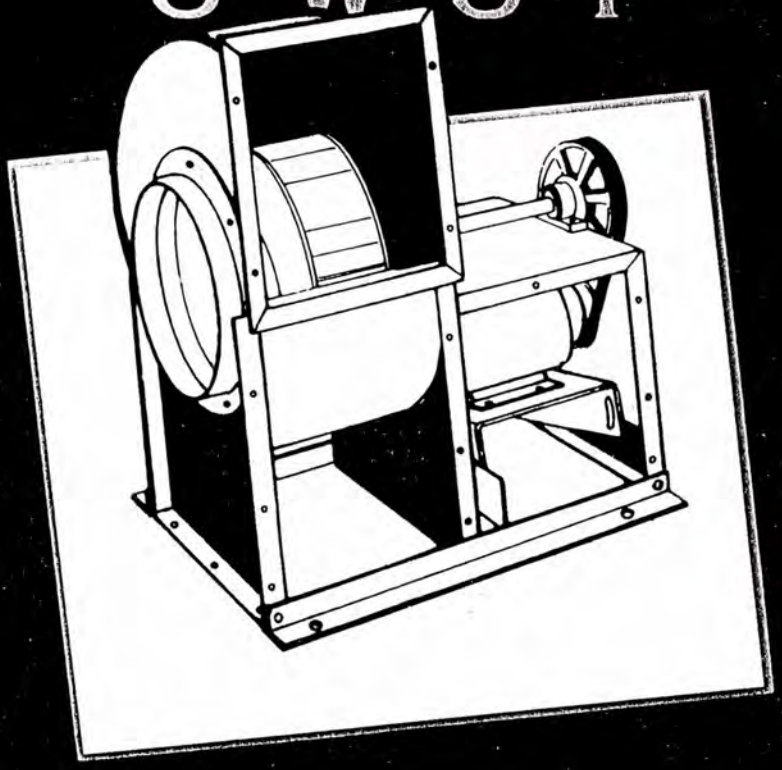
Catálogo de Filtros.

NÚMERO DE RENOVACIONES DE AIRE POR HORA [1]

Naturaleza del Local	Renovaciones de Aire por Hora
Ambientes nocivos	30 - 60
Bancos	2 – 4
Bares de hoteles	4 - 6
Bibliotecas	4 – 5
Cafés y Bares de Cafés	10 – 12
Cantinas	4 – 6
Cocinas comerciales o de escuelas	15 – 20
Discotecas	20 – 30
Fábricas en general	6 – 10
Fundiciones	20 – 30
Garajes	6 – 8
Hospitales	4 – 8
Iglesias	0.5 – 1
Laboratorios	5 – 15
Lavandería	20 – 30
Mataderos	6 – 10
Naves deportivas	4 – 8
Naves industriales	6 – 10
Panadería	20 – 30
Pollería	6 – 10
Quirófanos	8 – 10
Restaurante	6 – 12
Sala de calderos	20 – 40
Sala de máquinas	20 – 30
Sala para clases	4 – 8
Sala de baños	5 – 10
Talleres de Fabricación	6 - 10

[1] Tabla tomada del libro "Ventilación Industrial Cálculo y Aplicaciones" Editorial Paraninfo, Autor: E CARNICER ROYO 2da Ed. 1994.

CLASS I
CENTRIFUGAL FANS
S W S I

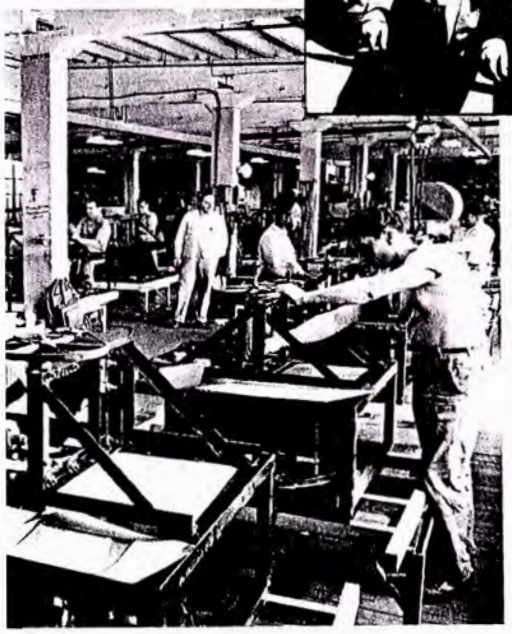


BACKWARD INCLINED
V-BELT DRIVE

DYNAMO

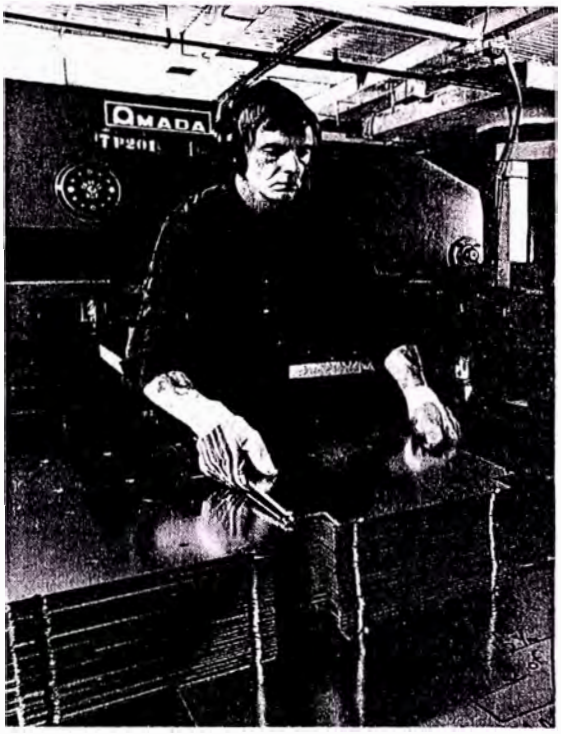
PENN VENTILATOR CO.,

Penn Ventilator



Penn Ventilator Co., Inc. is a leading supplier of air moving and control equipment. Penn's extensive product line includes centrifugal and axial fans for roof, wall or inline mounting, blowers, gravity ventilators, dampers and louvers. These high quality products are sold worldwide through a network of manufacturers representatives, distributors and business agents.

Yet, like all companies, Penn started out as little more than a dream. It was founded by three brothers in 1928—a tiny sheet metal shop above a garage in Philadelphia. It limped through the years of the Great Depression and the metal-scarce war years. And in the post-war boom years it grew and prospered with the proliferation of building across the country.



ıit arliest days, Penn Ventilator sought to understand customers' needs and sla them into products. Penn was the first company to develop and promote / C ıtour centrifugal roof exhauster. Another first was the super quiet Zephyr rifu al ceiling fan.

hi ory of innovation extends beyond products to customer service. Penn was the first pa y in the industry to provide customers with free design s— rom tracing templates d als to computer selection CAD software.

Since 1928 Penn has been recognized for the dependable service and pride that come from family ownership. Penn Ventilator remains family owned and operated with the third generation at the management helm. This management team seeks to preserve the strengths of Penn's heritage within a growing and changing business climate. These strengths include management closeness to the customer, management accessibility to employees, pride in work well done, and individualized concern for all members of Penn's extended internal and external family.

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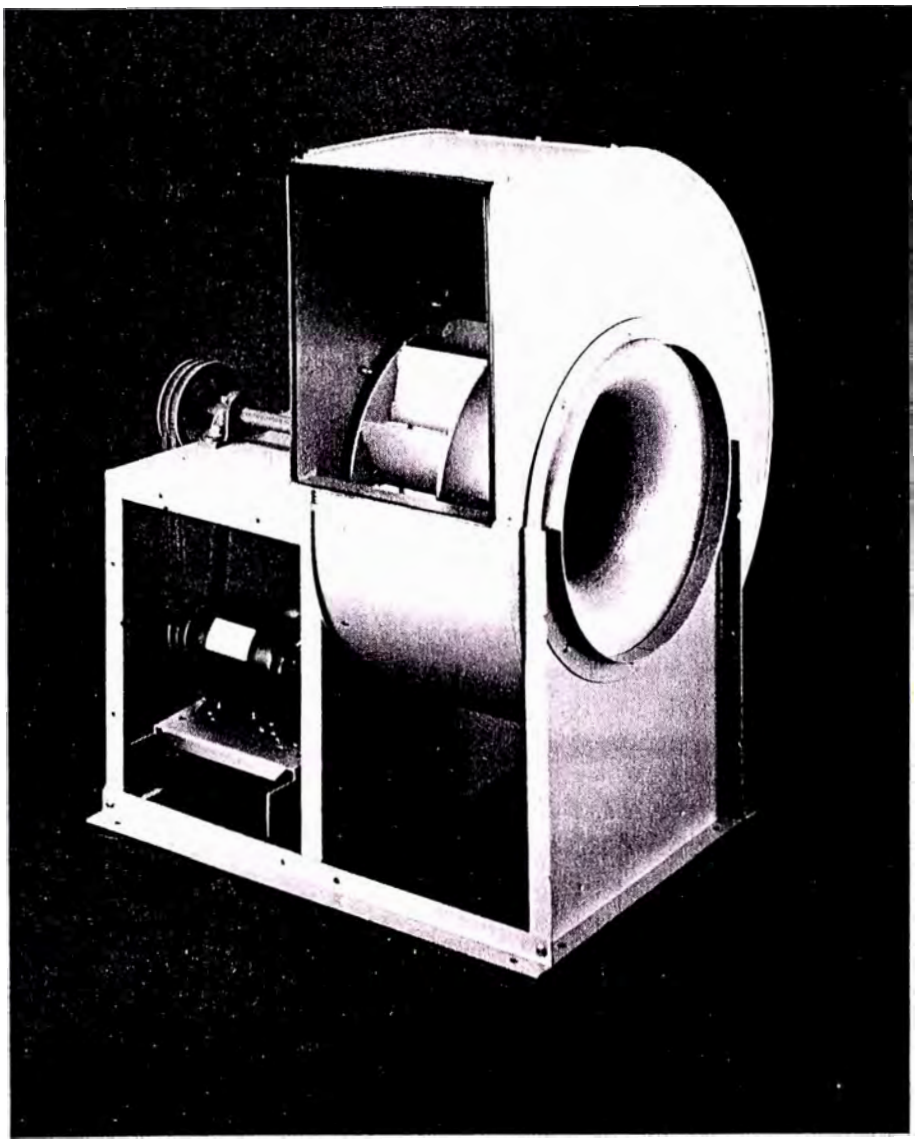
Dynamo



Dynamo centrifugal fans are SWSI, Class I, Arrangement 9 and 10 general purpose air moving devices. They are used for supply or exhaust applications in commercial, institutional and industrial HVAC systems.

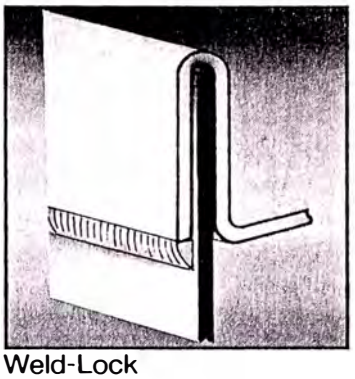
At the heart of the Dynamo is a computer-designed, backward inclined, centrifugal wheel. This heavy duty non-overloading aluminum wheel assures low noise and high efficiency performance. The fan wheel, venturi inlet, housing and frame are engineered to provide maximum performance and reliability.

Fan housings utilize heavy-gauge materials and employ Weld-Lock™ construction. Motors and all drive components have been carefully engineered and tested for durability and performance. A wide range of accessories is available to meet various application requirements.

Dynamo Features

am centrifugal blowers are designed and built to provide end user with a highly efficient and extremely reliable air ing unit. These units offer many features as standard pment that other manufacturers consider options. Each am is fully assembled, factory set at the specified RPM tes un prior to shipment. During this test run an elec- ic vration analysis is recorded, and available upon ues

nda features include the following:



Weld-Lock

Engineered scrolls. Penn's exclusive Weld-Lock™ assembly technique ensures positive air containment with interval lockseam welding. Developed by Penn's engineering staff, Weld-Lock combines the advantages of several proven assembly techniques.

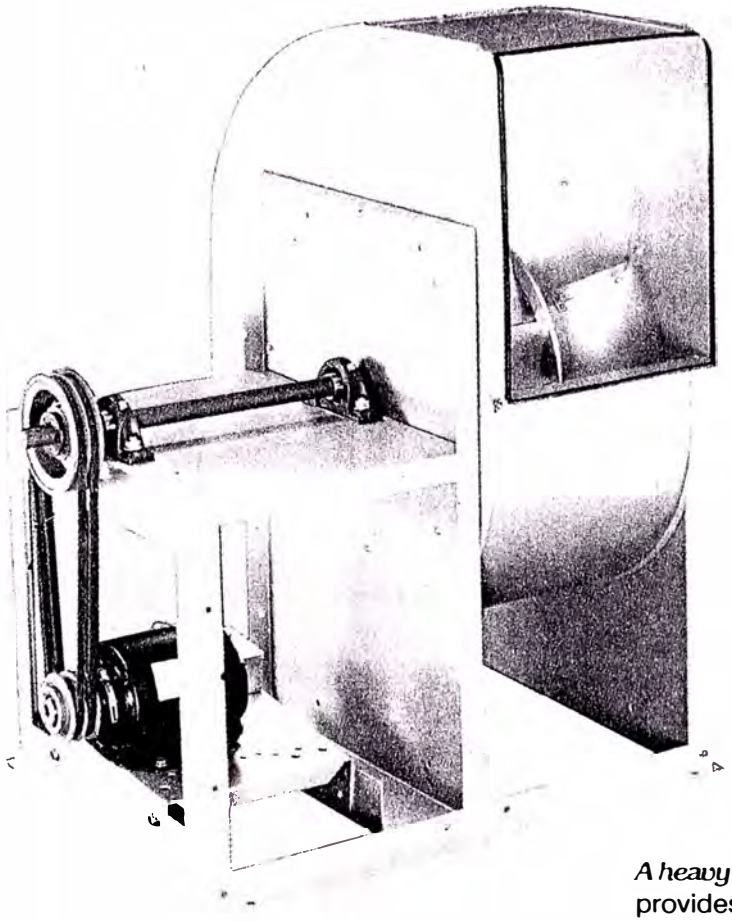
Durable housings. Dynamo blowers are manufactured of heavy gauge zinc coated galvanized steel to insure a long, corrosion resistant life. Galvanized steel resists rust, and will help maintain the unit's integrity even in environments such as coastal regions where salt air will rapidly deteriorate black iron, even when it is painted.

Versatile operation. All unit sizes are field rotatable to any of eight discharge positions. Both clockwise and counter-clockwise rotations are available.

Motors and drives. V-belt drives are pre-set at the factory to the specified RPM. These drives allow for system balancing in the field. All pulleys are sized for at least 165% of driven horsepower.

High quality open drip proof motors are standard. Totally enclosed, explosion proof and two speed motors are available.

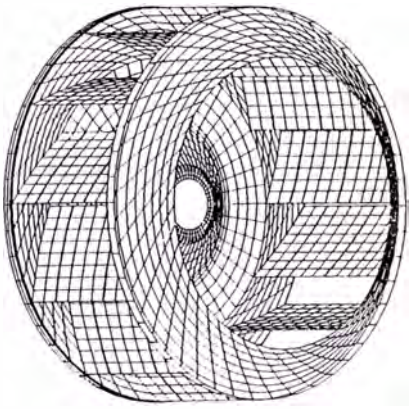
Spark resistant aluminum wheels. Dynamo blowers use Penn's new computer designed aluminum wheel. They are backward inclined and non-overloading, using heavy gauge aluminum to provide AMCA "C" spark resistant construction. AMCA "B" construction is available as a moderate cost option. This new wheel design provides a high level of static efficiency while reducing start-up torque, thus extending drive component life. All wheels are statically and dynamically balanced for quieter operation.



elf gning pillow block bearings. Bearings are sized for mi num L50 life exceeding 200,000 hours of operation. hey equire no maintenance other than periodic lubrication. Stan rd Zerk lube fittings allow for ease of lubrication. Exte ied lube lines are available as an option to facilitate ubri tion when a weather cover is used.

Soli steel shafts. Sized to withstand a minimum of 125% of m imum catalogued operating speed, shafts are precision round, polished and treated for rust resistance.

A heavy duty support frame provides a strong structural foundation for the motor and drive assembly, as well as rigid reinforcement for housing members. A standard *gasketed access door* enables easy maintenance of internal components. *Inlet angle flange* is standard to facilitate connection to the ductwork.

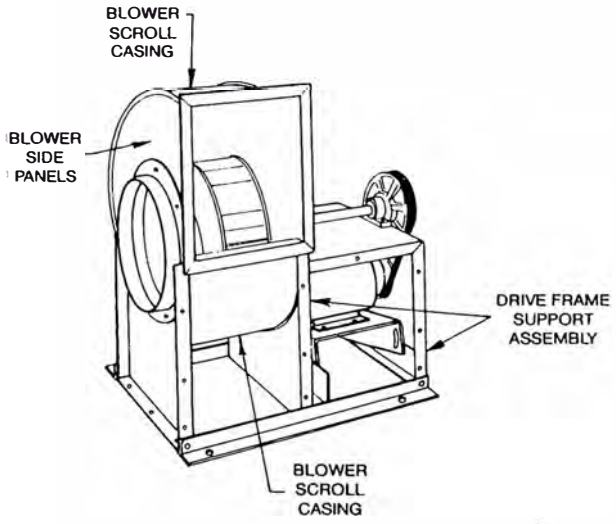


Weld-Lock is a trademark of Penn Ventilator Co., Inc., Philadelphia, PA.

Certified Ratings

Penn Ventilator certifies that the Dynamo models shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

Material Gauges



MATERIAL GAUGES

MODEL	Blower Side Panels	Blower Scroll Casing	Drive Frame Support
D10	16	20	14
D12	16	20	14
D13	16	20	14
D15	14	18	14
D16	14	18	14
D18	14	16	12
D20	12	16	12
D22	12	16	12
D24	12	16	12
D27	10	16	10
D30	10	16	10
D33	10	16	10
D36	10	16	10

Suggested Specifications

Ce
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The
pre
be
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size
spe
The
whe
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form

ugal exhaust or supply blowers shall be Dynamo general purpose, belt
tility fans with non-overloading, backwardly inclined aluminum wheels,
ufactured by Penn Ventilator Co., Inc., Philadelphia, PA 19115. Fans
e single inlet, single width, AMCA arrangement 10 with clockwise (or
otation. Air discharge position shall be THD unless specified otherwise.

using shall be heavy gauge galvanized steel for maximum corrosion
ion, with Weld-Lock™ construction. Housings shall be field rotatable
of eight 45° incremental air discharge positions. Fan scrolls shall be
ed with a bolted, gasketed (quick release if specified) access door for
g and inspection.

uring supports shall be constructed of welded structural steel members to
vibration and rigidly support the shaft and bearings, bearings shall
y duty, self aligning pillow block ball bearings, grease lubricated and
d for minimum life (L50) of 200,000 hours at maximum operating speed.
shall be turned, ground, polished and rust protected. Shafts shall be
o the first critical speed is at least 20% over the maximum operating
Close tolerances shall be maintained along the length of the shaft.

wheel shall be aluminum, non-overloading backward inclined type. The
shall be statically and dynamically balanced. The wheel and inlet
aerodynamically designed and constructed to provide maximum per-
ce and efficiency.

Pulleys shall be adjustable (through 20 HP) cast iron, machined, keyed and securely attached. Belts and pulleys shall be sized for 165% of the installed motor horsepower. Motors shall be heavy duty ball bearing open drip proof (totally enclosed or other type if specified) motors. After assembly the entire unit, with drive train installed and set to specified RPM, shall have a computerized vibration analysis performed. Vibration shall be measured in the horizontal, vertical and axial directions at each bearing to assure quality and smooth operation. The computerized print out shall be filed and made available upon customer request.

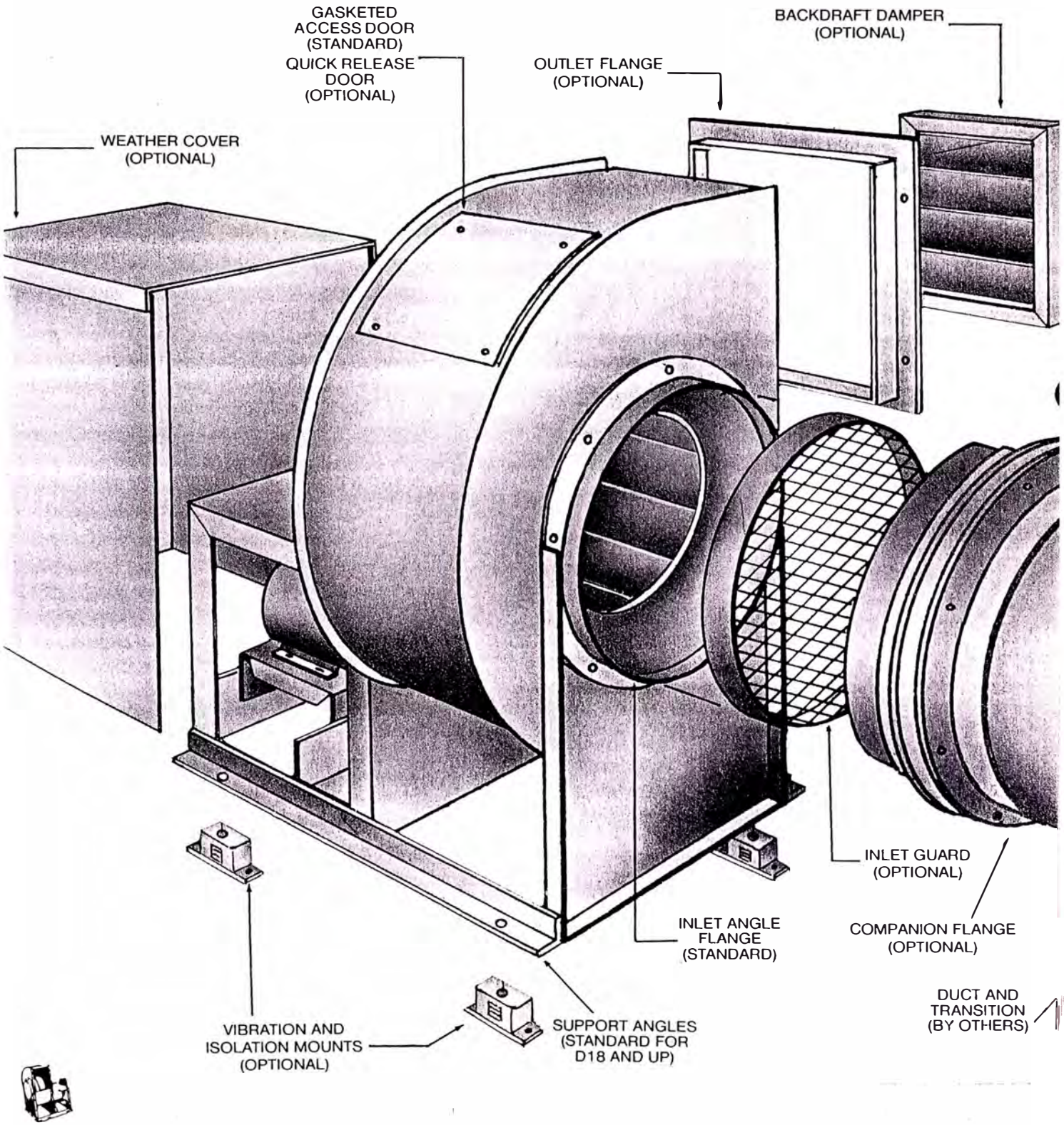
Fans shall be licensed to bear the AMCA Air and Sound Certified Ratings Seal. Fan air performance ratings shall be based on test conducted in an AMCA registered laboratory for AMCA 210 air performance testing. The test standard used shall be ANSI/AMCA Standard 210-85, ANSI/ASHRAE Standard 51-1985 "Laboratory Methods of Testing Fans for Rating". All sizes must be tested, calculations to other sizes not acceptable. Fan sound performance shall be based on tests conducted in an AMCA registered laboratory for AMCA 300 Sound Performance Testing. The test standard 300 "Reverberant Room Method for Sound Testing of Fans". All sizes must be tested, calculations to other sizes are not acceptable. Air or Sound tests results are to be made available upon request.

Accessories

xte sive selection of accessory items to cover various lic on requirements is available at additional cost.

po Angles. Heavy gauge angles, appropriately sized nit nean easy assembly mounting to support surface.

Flanges. Outlet flanges facilitate the connection of ductwork. *Companion flanges* are also available when the Dynamo is connected to ductwork by a transition section. The companion flange fits the fan to the transition and guarantees proper sizing.



ds. ılet and outlet guards provide safety in non- :d ir tallations. Guards are constructed of expanded in a movable frame attached to the fan housing. They ısily emoved by maintenance personnel for cleaning :p ɔn.

· g :ds are also available to protect personnel and as nblies. Drive guards comply with OSHA require- ; a are easily removed for drive inspection and dju ment.

ds .e highly recommended whenever the fan is ıtec vithin 7 feet of occupied space and/or other- unp otected with ductwork. Each application must ɔiet d for OSHA compliance.

ss ɔr. While a *gasketed* access door is standard, an ıal *uick release* type door is available to allow for dic spection and cleaning.

a *weather cover.* Available on Arrangement 10 he eather cover protects the shaft, bearings, motor rive omponents from weather and other detrimental tio Galvanized steel covers are easily removed and alle using ordinary hand tools. On larger sizes, the inc porates a removable end panel for easy access ve mponents without removing the entire cover.

ng: Factory applied, multi-coat enamel paint is avail- or modest charge. In addition, special coatings— ni Epoxy, Aluma-Glas™, Eisenheiss and Heresite— aila le for applications involving corrosive conditions r o er damaging influences. Please contact Penn's offi s with any questions on suggested applications.

c nections. Drains are available with 1" male pipe l w ch is welded to the fan at the lowest point of the A ans can be supplied with drains except bottom- ınta discharge, where it is not required.

Dampers. Dampers can be installed at the discharge outlet to prevent backdrafts when fans are not in operation. Dampers can be used when outlet velocities do not exceed 4000 FPM for all discharge positions. Gravity dampers are not effective for use in top-angular-down, bottom-angular-down or downblast discharge postions.

Variable inlet vanes. Also known as vortex dampers, vanes provide efficient regulation of fan output over all operating ranges with substantial increases in energy efficiency when full fan output e ssary. This accessory is suitable for inlet ra es up to 200° F. (Not available for D10.)

Vibration isolators, hangers and rails. These items are available in both rubber-in-shear and spring-type to mitigate residual vibration transmission. All isolators are properly sized to the unit. *Floor flex pads* are also available.

Safety switches. Switches in housings are available to turn fans on and off for service only. Field wiring is required.

Extended lube lines. Preloaded at the factory, lube lines allow bearing maintenance when a weather cover is installed or when easy access to the bearings is unavailable.

Spark resistant construction. AMCA "C" and "B" construction are available. AMCA standards offer the following definitions and notes concerning spark-resistant construction:

C - The fan shall be so constructed that a shift in the impeller or shaft will not permit two ferrous parts of the fan to rub or strike.

B - The fan shall have a non-ferrous impeller and non-ferrous ring about the opening through which the shaft passes. Ferrous hubs, shafts and hardware are allowed provided construction is such that a shift in impeller or shaft will not permit two ferrous parts of the fan to rub or strike. Steps must also be taken to insure that the impeller, bearings and shaft are adequately attached and/or restrained to prevent a lateral or axial shift in these components.

Notes:

1) No bearings, drive components or electrical components shall be placed in the air or gas stream unless they are constructed or enclosed in such a manner that failure of that component cannot ignite the surrounding gas stream.

2) The user shall electrically ground on all fan parts.

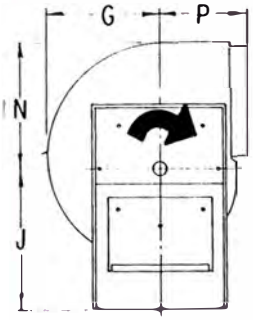
3) For this standard, non-ferrous material shall be any material with less than 5% iron or any other material with demonstrated ability to be spark-resistant.

4) The use of aluminum or aluminum alloys in the presence of steel which has been allowed to rust requires special consideration. Research by the US Bureau of Mines and others has shown that aluminum impellers rubbing on rusty steel may cause high-intensity sparking.

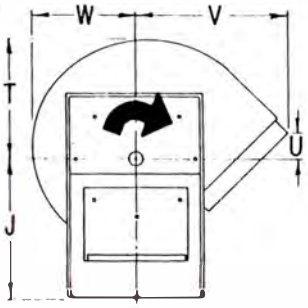
The use of the above standard in no way implies a guarantee of safety for any level of spark resistance. Spark-resistant construction does not protect against ignition of explosive gases caused by catastrophic failure or from any airstream material that may be present in a system.

Discharge Positions

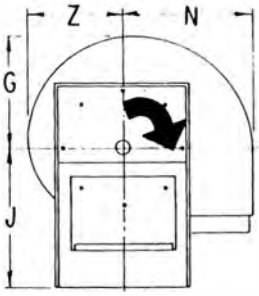
CLOCKWISE ROTATION - CW



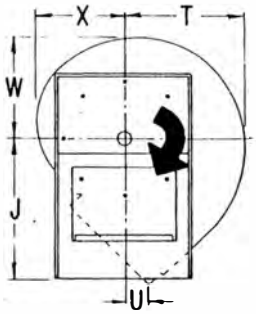
CW(TH)90



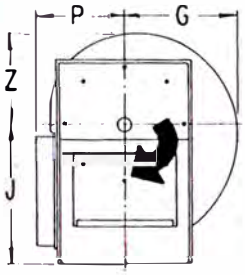
CW(TAD)135



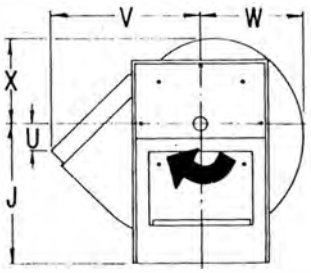
CW(DB)180



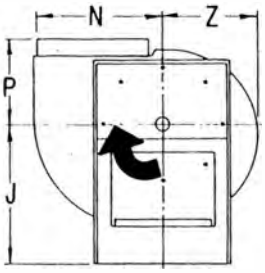
CW(BAD)225



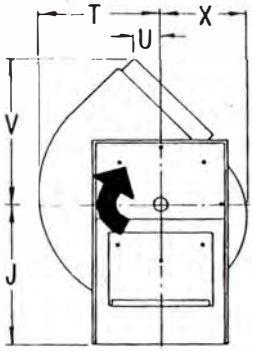
CW(BH)270



CW(BAU)315

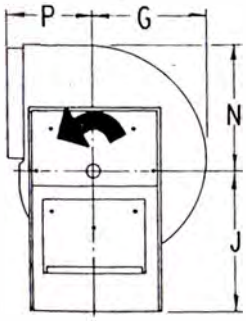


CW(UB)360

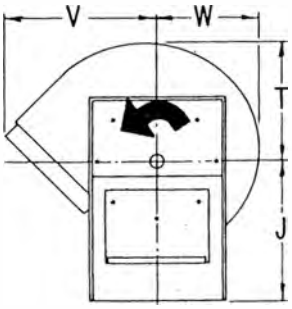


CW(TAU)45

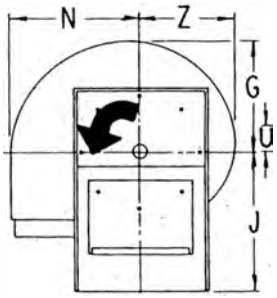
COUNTERCLOCKWISE ROTATION - CCW



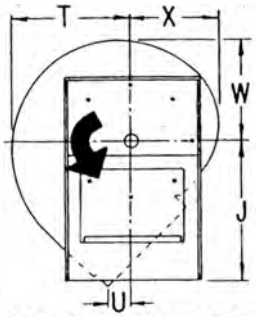
CCW(TH)90



CCW(TAD)135



CCW(DB)180



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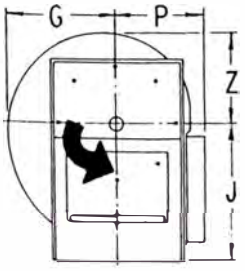
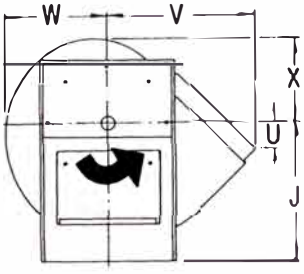


CCW(BH)270



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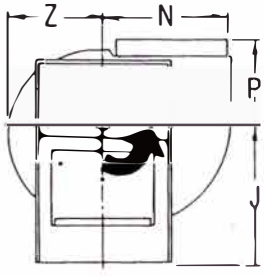

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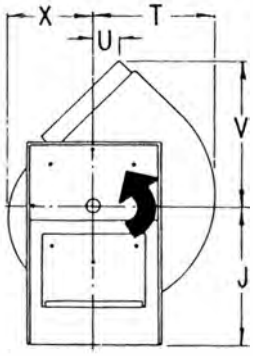
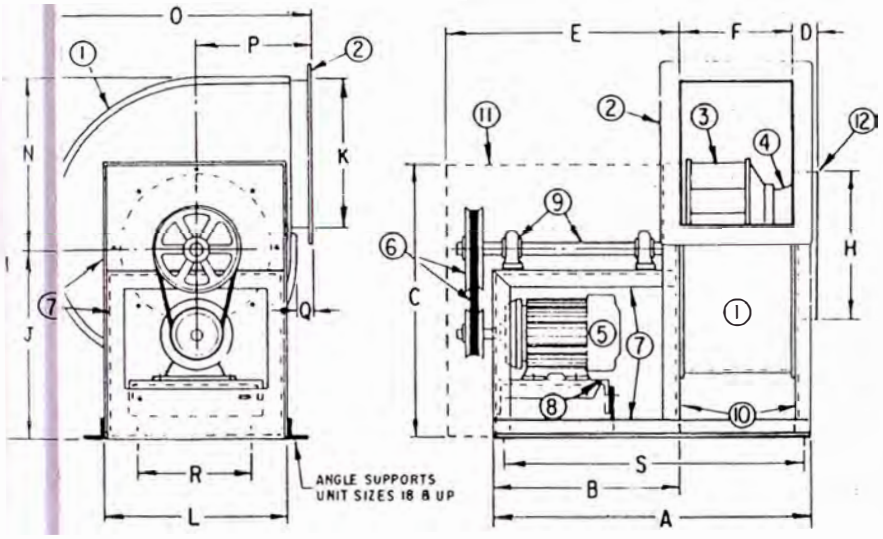


CCW(TAU)45

Dimensional Data



LEGEND

1. Blower Scroll Housing
2. Outlet Duct Flange (optional)
3. Centrifugal Wheel (aluminum non-overloading)
4. Spun Inlet with Cutoff (D16 and up)
5. Ball Bearing Motor
6. V-Belt and Pulleys (Where required twin groove belts and pulleys will be provided.)
7. Drive Frame Support Assembly
8. Adjustable Motor Mounting Plate
9. Fan Shaft and Bearings
10. Support Legs with Mounting Holes
11. Belt and Bearing Enclosure (optional)
12. Inlet Angle Flange

DIMENSIONAL DATA

UNIT SIZE	WHEEL DIA.	SHAFT DIA.	A	B	C	D	E	OUTLET F	OUTLET K	INLET H	J	L	M	N	O	P	Q	R	S	MTG. HOLE DIA.	SHIP WTS.
10	11¼	¾	24	14½	22½	1¼	18½	8¼	11¼	11¼	15½	14	28 11/16	13 3/16	20	8 11/16	1½	10	22¾	½	130
12	12⅞	1	26⅛	14½	25¼	1¼	18½	10⅜	12	13	17	16	31½	14½	21 13/16	9⅜	1½	13	24⅞	½	136
13	13⅝	1	26¼	14½	26½	1¼	18½	10½	14⅜	14	18	17¼	34 1/16	16 1/16	24 1/16	10 5/16	1½	14	25	½	140
15	15⅞	1	30⅜	16	29⅝	1¼	20½	11⅝	15¾	15¾	20	19¼	37⅞	17⅞	26 11/16	11 5/16	1½	15	29⅛	½	176
16	16⅜	1 3/16	30¼	16	32⅜	1¼	20½	12¾	17½	17¼	22	20¾	41⅝	19⅝	29⅛	12 5/16	1½	16	28¾	½	194
18	18½	1 3/16	33½	17⅞	35¼	1½	23½	14⅛	19⅜	19	24	22½	45⅝	21⅝	32⅜	13⅞	1½	18	32	½	274*
20	20	1 3/16	36¼	20	37⅝	1½	28½	14¾	21¾	20½	25½	24¼	48 13/16	23 1/16	34 1/16	14 3/16	1½	20	34¾	⅝	312*
22	22⅞	1 3/16	38½	20	43	1½	28½	17	23 1/16	24	28¾	28	54⅝	25 9/16	37 1/16	16 1/16	1½	24	37	⅝	351
24	24⅝	1 7/16	40½	20	46	1½	28½	19	26	25	31½	29	59 9/16	28 1/16	41 3/16	17¼	1½	24	39	⅝	462*
27	27⅝	1 7/16	48¼	25	52½	1¾	35⅛	21	28 3/16	28½	36	32 15/16	68	32	47½	20⅛	1⅞	28	44¼	⅝	640*
30	30 7/16	1 11/16	50⅜	25	56½	1¾	35⅛	23⅛	31 11/16	31½	38	36 13/16	72 13/16	34 13/16	51½	21 13/16	2	30	46⅜	⅝	875*
33	33⅝	1 11/16	52⅝	25	63½	1¾	35⅛	25⅜	35 1/16	34¾	42½	40¼	81⅝	39⅛	57¾	24¼	2	32	48⅝	⅝	1061
36	36 15/16	2	55½	25	66⅜	1¾	35⅛	28¼	38 7/16	41⅛	44	44¾	82 9/16	38 1/16	59 7/16	25⅞	2⅜	34	51½	⅝	1250

All dimensions in inches. *Shipping weights include standard motors, drives and weather cover. These weights will vary depending on motor selection and accessories used.

ROTATION AND DISCHARGE DIMENSIONS

The direction of rotation is determined from the drive side of the fan. On single inlet fans, drive side is always considered as the side opposite the fan inlet. Direction of discharge is determined per diagrams shown. Angle of discharge is referred to the vertical axis of the fan and designated in degrees.

ROTATIONAL DESIGNATIONS*

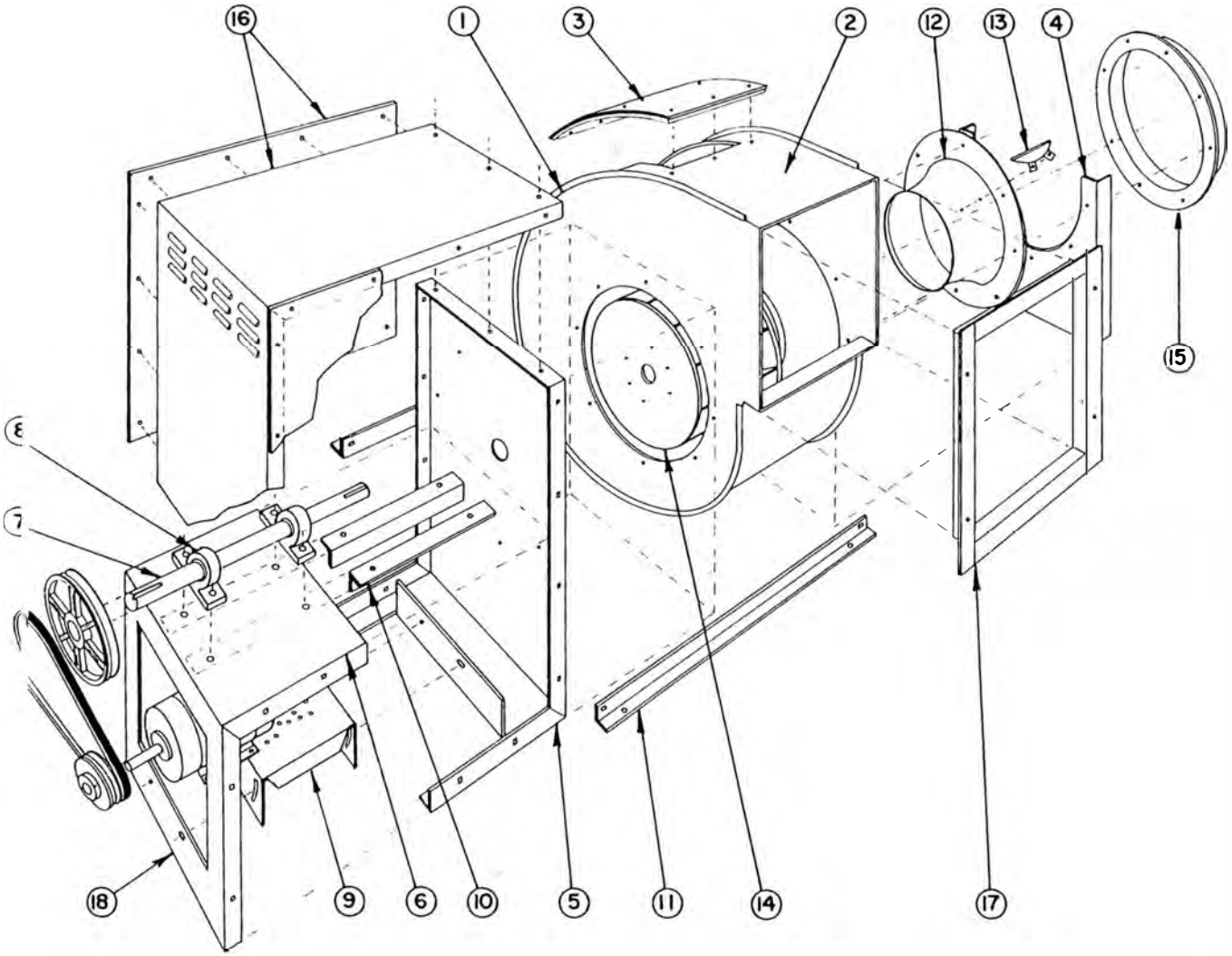
- TH-Top Horizontal
- TAD-Top Angular Down
- DB-Down Blast
- BAD-Bottom Angular Down
- BH-Bottom Horizontal
- UB-Up Blast
- TAU-Top Angular Up
- BAU-Bottom Angular Up

* Units will be supplied in the CW90(TH) position unless otherwise specified.

UNIT SIZE	U	V	W	X	T	G	Z
10	2⅞	15⅛	10⅜	8 9/16	12¼	11 5/16	9 7/16
12	3¼	16 9/16	11⅜	9⅜	13 7/16	12 7/16	10⅜
13	3¾	18 5/16	12⅝	10 5/16	14⅞	13¾	11½
15	4 7/16	20⅜	14 1/16	11½	16⅝	15⅜	12 13/16
16	4⅞	22¼	15 7/16	12⅝	18 3/16	16 11/16	14
18	5 3/16	24¾	17	13⅞	20 1/16	18½	15 7/16
20	5 11/16	26 11/16	18 5/16	15	21⅝	20	16⅝
22	6 7/16	29⅛	20 1/16	16⅜	23 11/16	21⅞	18¼
24	7 5/16	31 11/16	21⅞	17 3/16	26	23 15/16	19⅞
27	8 5/32	36⅝	25 1/32	20 7/16	29⅝	27 3/64	22 23/32
30	8 63/64	39 27/32	27 17/64	22¼	32 17/64	29 49/64	24 49/64
33	10 5/16	44 19/32	30⅝	24 31/32	33¼	33 7/16	27 13/16
36	8¾	45⅜	31	25 31/32	36	33½	28 15/32

All dimensions in inches.

Parts List



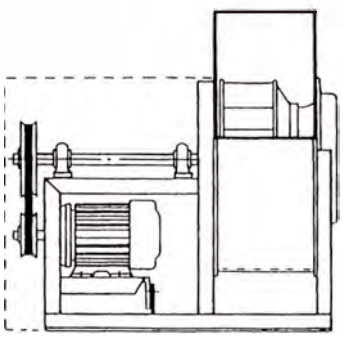
PART	DESCRIPTION
1	Blower Side Panel
2	Blower Scroll Casing
3	Standard Gasketed Access Door
4	Short Vertical Support
5	Long Vertical Support
6	Bearing Support Plate
7	Shaft (ground and polished)
8	Cast Bearings
9	Motor Mounting Plate
10	Bearing Support Angle
11	Support Angle (sizes D18 and up)
12	Spun Inlet
13	Air Cutoff Plate (D16 and up)
14	Wheel — CW or CCW (clockwise rotation shown above)
15	Inlet Angle Flange
16	Weather Cover (optional)
17	Outlet Flange (optional)
18	Vertical Bearing Support

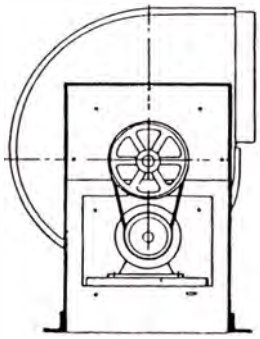
Arrangements

RRANGEMENT 10 SINGLE WIDTH SINGLE INLET

ins e constructed with the motor and bearings out of the rstr m. Motors are mounted inside of the pedestal on an djus ble motor plate. This arrangement allows for the use a w ather cover and can be used in ducted or non-ducted pli tions.

pic applications:
- C tdoor, indoor and/or rooftop applications.
- D st, dirt or moisture laden environments.
- C rrosive conditions (special coatings are available as a option and may be required).

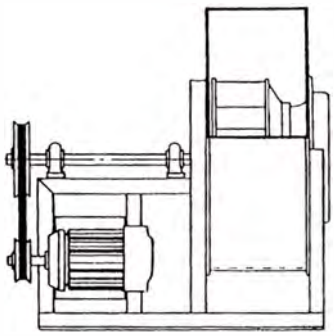


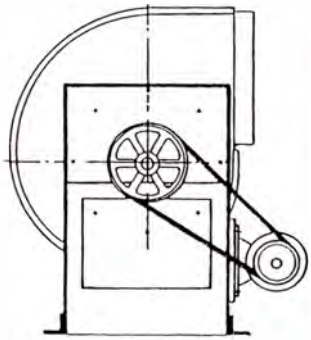


RR NGEMENT 9 SINGLE WIDTH SINGLE INLET

ans e constructed with the motor and bearings out of the rstr m. Motors are mounted on the side of the bearing ede al as shown. This motor mounting arrangment allows r th use of motors that are too large to be mounted inside e p lestal as shown in arrangement 10. This arrangement oes not allow for the installation of a weather cover.

ypic applications:
- I loor installations using larger motors.
- C rrosive conditions (special coatings are available as a option and may be required).





Motor Frame Size

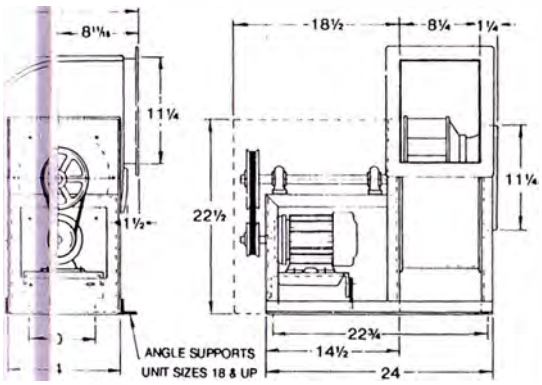
HP	SINGLE PHASE					200V, 230V, 460V OR 575V THREE PHASE			
	OPEN DRIP PROOF		TEFC 115/230	EXPL RESISTANT	2 SPEED 2 WDG	OPEN DRIP PRF	TEFC	EXPL RESISTANT	2 SPEED 2 WDG
	115V	230V							
/6	48	48	48	48	48	48	48	48	—
/4	48	48	48	48	48	48	48	48	—
/3	48	48	56	56	56	56	56	56	—
/2	56	56	56	56	56	56	56	56	—
/4	56	56	56	56	56	56	56	56	—
1	56	56	56	—	—	143T	143T	56	56
1/2	145T	145T	145T	—	—	145T	145T	145T	56
2	182T	182T	182T	—	—	145T	145T	145T	182T
3	—	—	—	—	—	182T	182T	182T	184T
5	—	—	—	—	—	184T	184T	184T	215T
1/2	—	—	—	—	—	213T	213T	213T	254T
10	—	—	—	—	—	215T	215T	215T	256T
15	—	—	—	—	—	254T	254T	254T	256T
20	—	—	—	—	—	256T	256T	256T	284T
25	—	—	—	—	—	284T	284T	284T	286T

380V Ph/50Hz motors are available. On horsepowers less than 1, motor frame sizes may change due to variations in voltage, special features and motor manufacturer. Motors shown are b bearing, continuous duty, 1750 RPM or 1750/1140 RPM for two speed, two winding motors.

D10

- aximum RPM: 3615
- heel Diameter: 11¼"
- aximum BHP: $(\frac{RPM}{2485})^3$
- p Speed: 2.95 × RPM
- utlet Area: 0.65 Sq. Ft.
- aximum Motor Frame Size: 145T

No for fan curve see page 24.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
500	0.250	949	72	69	62	61	55	50	47	44
500	1.000	1429	76	83	75	71	66	61	58	56
700	0.500	1335	75	80	72	70	65	60	56	53
700	1.250	1717	79	84	79	74	71	66	63	60
700	2.000	2017	81	84	82	76	72	70	66	64
900	1.000	1794	79	83	80	75	72	68	64	60
900	2.250	2270	83	83	79	78	72	71	68	66
900	3.500	2657	89	86	83	82	77	75	72	70
1100	0.250	1664	78	83	79	76	73	68	61	57
1100	1.250	2103	81	83	82	79	75	71	68	62
1100	3.000	2674	89	86	83	82	77	75	72	70
1100	5.000	3186	94	89	88	85	82	78	76	74
1400	0.500	2156	81	83	80	81	75	74	72	64
1400	2.000	2669	89	86	83	84	80	75	72	72
1400	3.500	3078	93	88	87	85	82	78	75	74
1400	5.000	3435	96	90	90	86	83	79	78	75
1800	0.250	2598	85	83	79	82	77	74	72	69
1800	2.000	3122	94	89	87	88	84	80	77	76
1800	4.000	3589	97	91	91	89	86	81	79	78
2000	1.000	3074	92	88	85	87	83	79	77	75
2000	2.250	3414	96	91	89	89	87	81	79	78
2000	3.000	3590	97	91	90	90	87	82	79	79
2200	0.500	3203	90	86	83	84	81	76	75	73
2200	1.250	3391	94	89	87	88	85	80	78	77
2200	2.000	3579	97	91	90	90	88	82	80	79
2400	0.250	3422	89	84	83	83	80	75	73	72
2400	1.000	3585	94	88	87	87	85	79	77	76

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

O (FP	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
7	949	0.056	1137	0.089	1293	0.123	1429	0.162								
9	1063	0.076	1232	0.119	1381	0.159	1513	0.199	1627	0.241	1744	0.293				
10	1176	0.100	1335	0.155	1474	0.202	1602	0.248	1717	0.295	1821	0.343	1917	0.393	2017	0.453
12	1291	0.130	1447	0.193	1575	0.251	1694	0.306	1806	0.359	1911	0.412	2007	0.465	2096	0.522
13	1412	0.169	1561	0.237	1681	0.308	1794	0.370	1899	0.431	2000	0.491	2095	0.550	2185	0.611
15	1537	0.219	1674	0.289	1795	0.367	1898	0.445	2000	0.512	2094	0.580	2186	0.647	2274	0.713
16	1664	0.278	1790	0.349	1909	0.434	2010	0.520	2103	0.604	2195	0.677	2282	0.752	2365	0.827
18	1793	0.348	1907	0.418	2022	0.510	2125	0.605	2213	0.698	2298	0.787	2383	0.868	2464	0.950
20	1923	0.429	2030	0.503	2137	0.596	2238	0.698	2328	0.800	2408	0.901	2487	0.998	2565	1.085
21	2055	0.524	2156	0.603	2254	0.693	2351	0.801	2443	0.912	2522	1.020	2596	1.129	2669	1.235
23	2190	0.634	2282	0.716	2372	0.802	2466	0.916	2555	1.034	2639	1.154	2710	1.268	2779	1.385
24	2325	0.759	2410	0.844	2496	0.935	2583	1.045	2669	1.168	2750	1.294	2826	1.420	2894	1.544
26	2461	0.900	2539	0.987	2622	1.085	2701	1.186	2784	1.316	2863	1.448	2939	1.583	3009	1.716
27	2598	1.059	2669	1.147	2748	1.250	2823	1.353	2901	1.479	2978	1.618	3051	1.757	3122	1.900
29	2734	1.234	2799	1.324	2876	1.434	2948	1.542	3019	1.656	3094	1.802	3165	1.947	3235	2.098
30	2871	1.429	2933	1.523	3004	1.635	3074	1.749	3141	1.864	3211	2.002	3281	2.156	3348	2.310
32	3009	1.645	3068	1.743	3133	1.855	3201	1.976	3266	2.096	3329	2.219	3397	2.378	3463	2.540
33	3146	1.880	3203	1.984	3263	2.096	3328	2.222	3391	2.347	3452	2.474	3515	2.621	3579	2.788
35	3284	2.138	3339	2.247	3393	2.358	3456	2.489	3518	2.622	3577	2.754				
36	3422	2.419	3475	2.533	3526	2.647	3585	2.779								

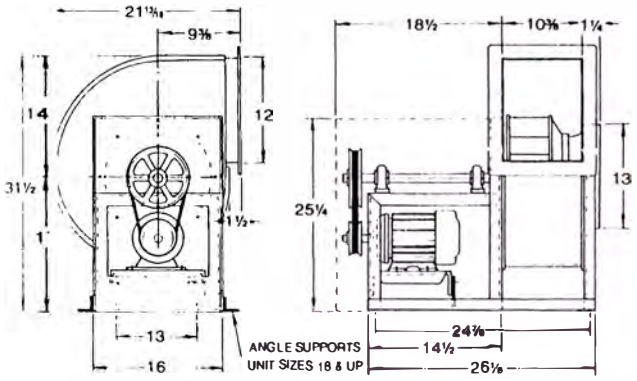
O (FI	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
12	2179	0.579	2265	0.644	2356	0.719										
13	2270	0.671	2348	0.735	2423	0.799	2497	0.867	2657	1.031						
15	2358	0.779	2438	0.846	2514	0.913	2585	0.983	2719	1.125	2857	1.291				
16	2448	0.900	2526	0.972	2602	1.046	2674	1.118	2810	1.268	2935	1.424	3056	1.589	3186	1.785
18	2541	1.032	2617	1.112	2691	1.190	2763	1.270	2899	1.430	3027	1.592	3143	1.759	3255	1.932
20	2641	1.174	2713	1.262	2783	1.351	2853	1.436	2988	1.608	3114	1.780	3234	1.955	3345	2.134
2	2743	1.330	2814	1.424	2882	1.519	2948	1.615	3078	1.801	3203	1.986	3322	2.172	3435	2.359
2	2847	1.502	2916	1.601	2983	1.702	3048	1.804	3172	2.009	3294	2.209	3411	2.406	3523	2.605
2	2958	1.668	3021	1.796	3086	1.902	3150	2.010	3272	2.227	3387	2.445	3502	2.659	3613	2.871
2	3072	1.846	3134	1.981	3193	2.115	3254	2.236	3374	2.465	3487	2.693	3596	2.927		
2	3188	2.041	3248	2.181	3306	2.321	3362	2.462	3477	2.720	3589	2.962				
2	3301	2.247	3364	2.398	3420	2.542	3476	2.692	3582	2.991						
3	3414	2.468	3477	2.626	3536	2.783	3590	2.936								
3	3527	2.704	3589	2.869												

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D12

- **Maximum RPM: 3020**
- **Wheel Diameter: 12⅞″**
- **Maximum BHP: $\left(\frac{RPM}{2065}\right)^3$**
- **Tip Speed: 3.38 × RPM**
- **Outlet Area: 0.87 Sq. Ft.**
- **Maximum Motor Frame Size: 145T**

Note: for fan curve see page 25.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
700	0.250	801	67	65	64	58	52	47	43	37
700	1.000	1276	77	77	74	73	64	59	57	52
900	0.500	1091	73	74	71	69	61	55	52	47
900	1.750	1680	80	78	77	74	68	66	63	59
1100	0.750	1335	77	77	75	74	67	62	58	53
1100	1.500	1667	80	78	78	76	70	67	63	59
1100	2.500	2015	82	80	78	77	70	69	68	63
1300	1.000	1556	79	78	79	76	71	66	62	58
1300	2.250	2019	82	80	80	78	72	70	68	64
1300	3.500	2384	85	83	80	81	75	72	71	67
1500	1.250	1763	80	78	81	78	73	70	65	61
1500	2.750	2262	84	82	80	81	75	72	70	66
1500	4.500	2711	86	85	83	83	78	75	74	70
1900	0.250	1638	76	75	78	74	69	66	61	56
1900	1.750	2141	83	82	83	83	77	74	71	66
1900	3.500	2651	86	84	82	84	79	75	73	69
1900	5.000	2991	88	87	84	86	81	76	76	71
2200	1.500	2219	84	83	84	86	80	76	73	67
2200	2.750	2602	86	84	83	85	80	76	74	69
2200	4.000	2917	87	86	84	85	80	76	75	71
2600	1.000	2374	84	83	84	89	81	77	74	68
2600	2.250	2660	86	86	85	89	84	79	76	71
2600	3.500	2990	88	87	85	87	83	78	76	72
3000	0.750	2615	83	83	83	88	81	77	74	68
3000	2.750	3018	88	88	86	91	87	81	79	73
3200	0.250	2654	81	81	81	86	79	74	72	66
3200	2.000	3013	88	88	87	93	87	82	80	74

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

M	OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼″ RPM	¼″ BHP	½″ RPM	½″ BHP	¾″ RPM	¾″ BHP	1″ RPM	1″ BHP	1¼″ RPM	1¼″ BHP	1½″ RPM	1½″ BHP	1¾″ RPM	1¾″ BHP	2″ RPM	2″ BHP
)0	805	801	0.056	993	0.096	1141	0.139	1276	0.184								
)0	920	848	0.069	1042	0.112	1189	0.163	1314	0.211	1432	0.263						
)0	1034	907	0.083	1091	0.136	1237	0.186	1362	0.244	1472	0.298	1577	0.355	1680	0.416		
)0	1149	972	0.101	1138	0.161	1286	0.213	1410	0.274	1520	0.338	1619	0.398	1713	0.460	1807	0.526
)0	1264	1043	0.123	1184	0.187	1335	0.249	1458	0.306	1567	0.375	1667	0.447	1758	0.512	1843	0.578
)0	1379	1115	0.149	1238	0.214	1383	0.287	1507	0.349	1616	0.416	1715	0.491	1806	0.569	1891	0.641
)0	1494	1187	0.177	1299	0.244	1427	0.324	1556	0.399	1665	0.465	1763	0.539	1854	0.621	1939	0.705
)0	1609	1260	0.210	1364	0.280	1476	0.365	1603	0.449	1713	0.523	1812	0.594	1902	0.677	1987	0.765
)0	1724	1335	0.248	1435	0.322	1535	0.407	1647	0.498	1763	0.588	1860	0.663	1951	0.739	2035	0.829
)0	1839	1410	0.289	1507	0.370	1596	0.453	1696	0.552	1807	0.648	1909	0.737	1999	0.818	2084	0.900
)0	1954	1485	0.334	1579	0.422	1661	0.506	1753	0.607	1853	0.711	1957	0.814	2049	0.905	2132	0.990
)0	2069	1561	0.384	1651	0.479	1731	0.567	1814	0.667	1901	0.778	2000	0.887	2098	0.996	2181	1.087
)0	2184	1638	0.440	1724	0.541	1803	0.636	1876	0.732	1960	0.849	2048	0.965	2141	1.079	2231	1.192
)0	2299	1715	0.502	1797	0.610	1875	0.710	1944	0.808	2021	0.923	2098	1.048	2187	1.168	2275	1.287
)0	2414	1792	0.569	1872	0.685	1946	0.788	2014	0.892	2082	1.002	2158	1.132	2235	1.261	2320	1.388
)0	2529	1870	0.645	1946	0.763	2019	0.875	2086	0.984	2148	1.093	2219	1.222	2290	1.359	2368	1.492
)0	2644	1947	0.726	2022	0.849	2092	0.969	2158	1.083	2218	1.195	2281	1.318	2350	1.458	2417	1.603
)0	2759	2025	0.816	2097	0.940	2165	1.068	2230	1.188	2289	1.305	2346	1.425	2411	1.565	2477	1.714
)0	2874	2103	0.912	2173	1.039	2239	1.176	2302	1.300	2361	1.424	2416	1.546	2473	1.678	2538	1.832
)0	2989	2181	1.016	2250	1.147	2313	1.289	2374	1.419	2433	1.549	2487	1.677	2539	1.805	2599	1.956
)0	3103	2260	1.129	2327	1.262	2388	1.409	2447	1.547	2505	1.683	2559	1.816	2610	1.949	2661	2.088
)0	3218	2338	1.248	2404	1.384	2463	1.536	2521	1.685	2577	1.824	2630	1.962	2680	2.099	2729	2.239
)0	3333	2417	1.377	2481	1.515	2539	1.672	2595	1.831	2650	1.974	2702	2.117	2752	2.261	2799	2.403
)0	3448	2496	1.515	2558	1.654	2615	1.817	2669	1.981	2723	2.134	2774	2.281	2824	2.431	2870	2.577
)0	3563	2575	1.662	2635	1.805	2691	1.970	2744	2.140	2796	2.301	2847	2.456	2896	2.610	2942	2.762
)0	3678	2654	1.819	2713	1.967	2768	2.134	2819	2.307	2870	2.480	2919	2.636	2968	2.798	3013	2.954

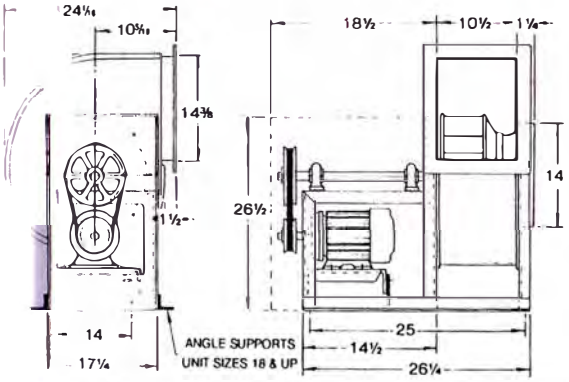
M	OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼″ RPM	2¼″ BHP	2½″ RPM	2½″ BHP	2¾″ RPM	2¾″ BHP	3″ RPM	3″ BHP	3½″ RPM	3½″ BHP	4″ RPM	4″ BHP	4½″ RPM	4½″ BHP	5″ RPM	5″ BHP
)0	1379	1971	0.713	2050	0.789	2128	0.868	2206	0.950								
)0	1494	2019	0.785	2094	0.862	2166	0.941	2240	1.026	2384	1.200						
)0	1609	2067	0.855	2143	0.945	2214	1.027	2283	1.112	2418	1.289	2551	1.474				
)0	1724	2115	0.924	2190	1.019	2262	1.117	2331	1.208	2460	1.388	2586	1.578	2711	1.777		
)0	1839	2163	0.996	2238	1.096	2310	1.199	2379	1.302	2508	1.499	2628	1.691	2746	1.893	2864	2.106
)0	1954	2212	1.077	2287	1.179	2358	1.284	2426	1.391	2556	1.612	2676	1.818	2789	2.022	2900	2.236
)0	2069	2260	1.178	2336	1.271	2407	1.376	2475	1.488	2603	1.714	2724	1.949	2837	2.165	2944	2.382
)0	2184	2309	1.287	2384	1.384	2455	1.479	2523	1.586	2651	1.823	2772	2.067	2885	2.313	2991	2.538
)0	2299	2359	1.404	2433	1.505	2504	1.606	2572	1.707	2700	1.938	2819	2.188	2932	2.444		
)0	2414	2404	1.514	2482	1.632	2553	1.740	2620	1.845	2749	2.058	2868	2.318	2980	2.581		
)0	2529	2448	1.625	2528	1.756	2602	1.880	2669	1.991	2797	2.213	2917	2.452				
)0	2644	2495	1.740	2572	1.879	2649	2.019	2719	2.146	2846	2.379	2965	2.610				
)0	2759	2544	1.863	2618	2.005	2692	2.150	2765	2.295	2895	2.552	3014	2.795				
)0	2874	2599	1.985	2667	2.140	2738	2.290	2809	2.441	2945	2.734						
)0	2989	2660	2.116	2719	2.278	2786	2.435	2854	2.591	2990	2.905						
)0	3103	2721	2.252	2779	2.418	2836	2.589	2903	2.751								
)0	3218	2783	2.396	2840	2.566	2896	2.741	2951	2.914								
)0	3333	2846	2.549	2901	2.721	2956	2.899	3010	3.082								
)0	3448	2916	2.727	2963	2.885	3018	3.070										
)0	3563	2986	2.914														

rmance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D13

Maximum RPM: 2855
Wheel Diameter: 13⅜"
Maximum BHP: $(\frac{RPM}{1885})^3$
Tip Speed: 3.57 × RPM
Outlet Area: 1.05 Sq. Ft.
Maximum Motor Frame Size: 145T

te: for fan curve see page 25.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
900	0.250	832	74	69	64	60	56	51	44	40
900	1.500	1480	82	82	76	74	69	66	61	56
1100	0.750	1229	78	84	74	71	66	63	57	51
1100	2.250	1812	88	84	80	80	74	71	68	63
1300	1.000	1431	82	83	78	75	70	67	62	56
1300	2.000	1804	87	84	80	80	74	71	68	64
1300	3.000	2100	90	88	82	84	78	74	71	67
1500	1.500	1714	84	83	80	79	73	70	67	63
1500	2.750	2105	89	88	83	84	78	74	72	67
1500	4.000	2425	92	91	85	87	81	77	75	70
1900	0.250	1403	78	80	76	72	67	64	58	52
1900	1.750	1972	87	86	82	84	77	74	71	67
1900	3.500	2459	91	91	86	87	82	77	75	70
1900	5.000	2786	94	94	88	89	84	79	77	73
2300	1.000	1897	86	87	83	87	78	75	72	67
2300	3.000	2500	91	91	86	88	83	78	76	72
2300	4.500	2846	94	94	89	89	85	80	78	73
2700	1.500	2269	88	89	85	88	82	78	76	71
2700	2.500	2562	90	91	88	90	85	80	78	74
2700	3.500	2795	92	94	90	90	86	81	79	75
3000	1.000	2309	87	88	84	88	82	77	75	70
3000	2.000	2565	89	91	88	90	85	80	78	74
3000	2.750	2767	90	93	91	91	87	82	79	76
3200	0.750	2373	86	87	84	87	81	77	75	69
3200	2.250	2729	89	92	90	90	86	81	79	75
3400	0.250	2394	83	84	81	84	78	73	71	66
3400	1.750	2711	89	91	89	90	85	80	78	74

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

FM	OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
00	857	832	0 081	1004	0.137	1146	0.200	1267	0 268	1374	0 341	1480	0 418				
00	952	879	0 098	1047	0.158	1187	0.224	1308	0 296	1414	0 372	1509	0.453	1606	0.538		
00	1048	925	0.117	1094	0.182	1229	0.252	1348	0 327	1455	0.406	1551	0.491	1638	0.580	1725	0.672
00	1143	976	0.138	1142	0.208	1272	0.282	1389	0.361	1495	0.445	1592	0.532	1680	0.624	1761	0.720
00	1238	1034	0.163	1189	0.238	1317	0.316	1431	0.399	1536	0.486	1632	0.578	1722	0.673	1804	0.772
00	1333	1094	0.190	1237	0.272	1365	0.354	1475	0 441	1578	0.532	1673	0.627	1761	0.726	1844	0 827
00	1429	1155	0.221	1283	0.309	1413	0.395	1521	0 487	1620	0.581	1714	0.680	1802	0.783	1884	0 889
00	1524	1216	0.257	1329	0.349	1460	0 441	1568	0.536	1664	0.635	1757	0.738	1843	0 844	1925	0.954
00	1619	1278	0.296	1381	0.392	1507	0.491	1616	0.590	1711	0.694	1800	0.800	1885	0.910	1966	1 023
00	1714	1340	0.340	1439	0.440	1554	0.546	1664	0.650	1759	0.758	1845	0.867	1928	0.981	2008	1.098
00	1810	1403	0.389	1498	0.492	1600	0.605	1711	0.714	1807	0 826	1892	0.940	1972	1.057	2051	1.179
00	1905	1466	0.442	1559	0.549	1648	0.668	1758	0.783	1855	0 899	1940	1 018	2019	1.139	2094	1 263
00	2000	1531	0.501	1620	0.611	1702	0.732	1804	0.857	1901	0.978	1988	1.100	2067	1.228	2140	1.354
00	2095	1596	0.565	1681	0.680	1760	0.805	1850	0 935	1949	1 063	2036	1.190	2115	1.321	2188	1.454
00	2190	1662	0.635	1742	0.753	1819	0.882	1897	1.019	1995	1.152	2083	1.286	2163	1.419	2236	1.558
00	2286	1728	0.711	1804	0.834	1879	0.965	1951	1.104	2041	1.248	2130	1 387	2210	1.525	2284	1.667
00	2381	1794	0 793	1867	0.921	1940	1.055	2009	1.200	2087	1.348	2177	1.494	2257	1.638	2332	1.783
00	2476	1860	0.882	1929	1.013	2001	1.150	2067	1.299	2137	1.455	2222	1.606	2304	1.756	2379	1.908
00	2571	1926	0.976	1992	1.112	2062	1.254	2127	1.406	2191	1 563	2269	1.726	2351	1.882	2426	2.038
00	2667	1992	1.078	2055	1.218	2124	1.366	2187	1.519	2249	1.683	2315	1.850	2397	2.014	2473	2.175
00	2762	2059	1.188	2120	1.333	2185	1.483	2248	1.640	2307	1.807	2369	1.979	2443	2.152	2519	2.318
00	2857	2126	1.305	2185	1.454	2248	1.610	2309	1.768	2367	1.940	2424	2.113	2489	2.295	2565	2.469
00	2952	2193	1.429	2250	1.583	2310	1.743	2370	1.905	2427	2.079	2482	2.258	2541	2.445	2611	2.627
00	3048	2260	1.562	2316	1.721	2373	1.885	2432	2.053	2488	2.228	2541	2.412	2595	2.597	2658	2.793
00	3143	2327	1.702	2381	1.865	2436	2.035	2493	2.205	2549	2.384	2601	2.572	2653	2.764	2709	2.963
00	3238	2394	1.851	2447	2.020	2499	2.192	2555	2.368	2610	2.549	2661	2.740	2711	2.937		

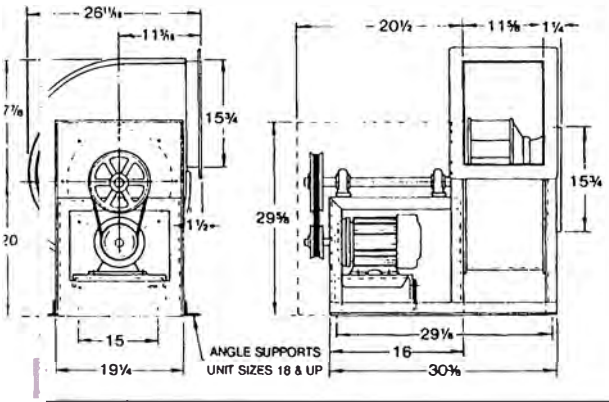
FM	OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
00	1143	1841	0 820	1920	0 921	2000	1.026										
00	1238	1880	0 875	1952	0.982	2026	1.090	2100	1 201								
00	1333	1922	0 933	1994	1 044	2062	1.156	2130	1 272	2267	1 509						
00	1429	1962	0 998	2036	1.109	2105	1 227	2170	1 346	2297	1 593	2425	1 848				
00	1524	2002	1 067	2076	1 183	2146	1.301	2213	1 425	2335	1.678	2454	1 942	2574	2.214		
00	1619	2042	1 139	2116	1 261	2186	1 383	2253	1 508	2378	1 769	2492	2 040	2604	2 321	2717	2 611
00	1714	2083	1 217	2156	1 342	2226	1 469	2293	1 599	2419	1 862	2534	2 141	2642	2 431	2747	2 727
00	1810	2126	1 303	2197	1 428	2266	1.559	2333	1 693	2459	1 967	2577	2 249	2684	2.544	2786	2 851
00	1905	2169	1 393	2240	1 523	2308	1 656	2374	1 794	2499	2 076	2616	2 365	2727	2 664	2828	2 976
00	2000	2212	1 486	2282	1 621	2350	1 759	2415	1 899	2539	2 188	2656	2 487	2767	2 795		
00	2095	2257	1 587	2326	1 727	2393	1 869	2457	2 012	2580	2 307	2696	2 614	2806	2 929		
00	2190	2305	1 698	2371	1 839	2436	1 983	2500	2 131	2622	2 434	2737	2 748	2846	3 070		
00	2286	2352	1 811	2418	1 958	2481	2 106	2543	2 256	2664	2 567	2778	2 886				
00	2381	2400	1 931	2465	2 082	2528	2 236	2588	2 389	2707	2 708	2820	3 035				
00	2476	2449	2 059	2513	2 214	2575	2 372	2635	2 531	2751	2 857						
00	2571	2496	2 194	2562	2 354	2623	2 515	2682	2 678	2795	3 010						
00	2667	2543	2 337	2610	2 500	2671	2 665	2730	2 834								
00	2762	2590	2 487	2656	2 653	2720	2 823	2778	2 996								
00	2857	2637	2 642	2703	2 816	2767	2 992										

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D15

- **Maximum RPM: 2600**
- **Wheel Diameter: 15⅞″**
- **Maximum BHP: $(\frac{RPM}{1446})^3$**
- **Tip Speed: 4.16 × RPM**
- **Outlet Area: 1.30 Sq. Ft.**
- **Maximum Motor Frame Size: 184T**

Note: for fan curve see page 25.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
1150	0.250	663	73	70	63	61	57	49	43	38
1150	1.500	1235	88	86	78	72	69	65	62	58
1450	0.750	987	79	84	74	71	69	62	56	50
1450	2.500	1592	83	83	82	77	73	71	68	65
1750	1.000	1161	88	84	78	73	68	63	60	55
1750	2.250	1540	83	83	82	77	73	71	68	65
1750	3.500	1886	87	87	85	82	78	75	72	69
2050	1.500	1396	90	85	82	77	73	69	65	61
2050	3.000	1782	86	87	85	81	77	75	72	68
2050	4.500	2143	89	89	87	85	81	78	75	71
2650	0.250	1159	87	85	79	73	69	64	59	53
2650	1.750	1633	83	84	86	80	77	74	70	66
2650	3.500	2002	89	89	87	84	80	77	75	71
3400	1.000	1639	81	84	88	82	78	75	71	66
3400	3.000	2118	88	89	89	88	83	79	76	72
3400	5.000	2453	93	93	89	90	85	81	79	75
4000	1.500	1973	85	88	91	87	82	79	75	71
4000	3.000	2303	89	91	89	91	85	81	78	73
4000	4.500	2546	93	93	90	92	86	82	80	75
4450	1.000	1995	84	87	90	87	82	79	75	70
4450	2.250	2299	89	90	90	93	86	82	79	74
4450	3.500	2528	91	93	90	94	87	83	80	75
4900	1.000	2165	85	87	89	89	83	80	76	71
4900	2.750	2536	91	92	91	95	88	84	81	76
5200	0.500	2203	83	85	87	88	81	78	74	69
5200	2.250	2480	90	92	90	95	87	83	80	75

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

CFM	OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼″ RPM	¼″ BHP	½″ RPM	½″ BHP	¾″ RPM	¾″ BHP	1″ RPM	1″ BHP	1¼″ RPM	1¼″ BHP	1½″ RPM	1½″ BHP	1¾″ RPM	1¾″ BHP	2″ RPM	2″ BHP
1150	.858	663	0.090	797	0.151	910	0.217	1025	0.296	1134	0.382	1235	0.473				
1300	1000	710	0.111	839	0.179	945	0.249	1045	0.327	1148	0.417	1245	0.512	1338	0.614	1424	0.718
1450	1115	757	0.137	883	0.211	987	0.288	1078	0.368	1168	0.456	1260	0.555	1349	0.661	1434	0.770
1600	1231	798	0.163	930	0.248	1030	0.331	1119	0.418	1200	0.506	1281	0.603	1364	0.710	1447	0.826
1750	1346	830	0.189	977	0.289	1074	0.379	1161	0.471	1240	0.566	1314	0.664	1389	0.771	1463	0.884
1900	1462	879	0.224	1023	0.334	1120	0.432	1204	0.530	1282	0.632	1354	0.736	1421	0.841	1491	0.957
2050	1577	933	0.264	1070	0.386	1167	0.490	1249	0.596	1325	0.704	1396	0.815	1462	0.927	1524	1.040
2200	1692	988	0.311	1112	0.438	1214	0.556	1295	0.667	1369	0.782	1438	0.898	1504	1.019	1565	1.138
2350	1808	1045	0.365	1148	0.492	1260	0.625	1342	0.746	1414	0.866	1482	0.989	1546	1.114	1607	1.242
2500	1923	1101	0.424	1182	0.547	1307	0.703	1389	0.831	1461	0.959	1526	1.086	1589	1.218	1649	1.351
2650	2038	1159	0.491	1230	0.614	1351	0.783	1436	0.923	1508	1.058	1572	1.192	1633	1.330	1692	1.469
2800	2154	1216	0.564	1283	0.691	1389	0.862	1482	1.021	1554	1.164	1619	1.307	1679	1.451	1736	1.596
2950	2269	1274	0.646	1338	0.778	1421	0.941	1528	1.126	1601	1.279	1666	1.429	1726	1.581	1782	1.733
3100	2385	1333	0.737	1393	0.872	1460	1.030	1570	1.232	1648	1.402	1713	1.561	1773	1.719	1828	1.876
3250	2500	1391	0.834	1450	0.977	1508	1.131	1608	1.340	1694	1.531	1760	1.700	1820	1.867	1875	2.031
3400	2615	1449	0.940	1506	1.089	1561	1.246	1639	1.443	1738	1.665	1806	1.845	1866	2.020	1922	2.194
3550	2731	1508	1.056	1563	1.211	1615	1.371	1677	1.561	1777	1.797	1853	2.003	1913	2.186	1969	2.368
3700	2846	1567	1.182	1620	1.343	1670	1.507	1724	1.693	1811	1.927	1896	2.160	1960	2.361	2016	2.551
3850	2962	1626	1.318	1678	1.486	1726	1.655	1775	1.838	1843	2.061	1937	2.322	2006	2.543	2062	2.741
4000	3077	1685	1.463	1736	1.640	1783	1.816	1829	1.999	1885	2.217	1973	2.480	2049	2.727	2109	2.945
4150	3192	1744	1.620	1794	1.804	1839	1.983	1884	2.173	1932	2.382	2004	2.634	2090	2.915	2154	3.153
4300	3308	1803	1.787	1852	1.979	1896	2.165	1939	2.357	1983	2.563	2038	2.802	2127	3.102	2198	3.368
4450	3423	1863	1.968	1910	2.164	1953	2.357	1995	2.555	2037	2.764	2086	3.005	2158	3.281	2238	3.582
4600	3538	1922	2.158	1969	2.365	2011	2.565	2051	2.765	2091	2.974	2133	3.202	2190	3.470	2274	3.792
4750	3654	1982	2.363	2027	2.575	2068	2.780	2108	2.990	2146	3.200	2186	3.429	2235	3.696	2306	4.001
4900	3769	2042	2.582	2085	2.796	2126	3.012	2165	3.228	2202	3.443	2241	3.677	2283	3.931	2337	4.211
5050	3885	2102	2.813	2144	3.034	2184	3.256	2222	3.478	2258	3.698	2295	3.931	2333	4.179	2381	4.468
5200	4000	2162	3.058	2203	3.286	2242	3.514	2279	3.741	2315	3.971	2350	4.202	2387	4.456	2428	4.732

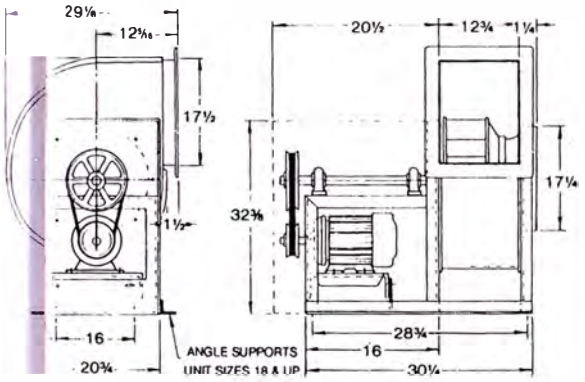
CFM	OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼″ RPM	2¼″ BHP	2½″ RPM	2½″ BHP	2¾″ RPM	2¾″ BHP	3″ RPM	3″ BHP	3½″ RPM	3½″ BHP	4″ RPM	4″ BHP	4½″ RPM	4½″ BHP	5″ RPM	5″ BHP
1600	1231	1526	0.945	1602	1.068	1675	1.194	1744	1.322								
1750	1346	1540	1.008	1614	1.136	1686	1.269	1755	1.403	1886	1.681						
1900	1462	1559	1.077	1630	1.209	1699	1.344	1767	1.485	1896	1.773	2018	2.073				
2050	1577	1589	1.163	1651	1.289	1715	1.424	1782	1.571	1908	1.869	2029	2.182	2143	2.502	2251	2.832
2200	1692	1623	1.258	1683	1.388	1742	1.522	1801	1.662	1923	1.969	2041	2.291	2154	2.625	2262	2.967
2350	1808	1665	1.371	1720	1.500	1775	1.635	1831	1.777	1941	2.074	2055	2.402	2166	2.746	2272	3.099
2500	1923	1707	1.490	1761	1.625	1813	1.761	1864	1.901	1969	2.202	2073	2.523	2181	2.875	2285	3.237
2	2038	1749	1.612	1803	1.756	1855	1.902	1905	2.047	2002	2.345	2101	2.670	2199	3.011	2301	3.383
280	2154	1792	1.744	1846	1.896	1897	2.047	1946	2.199	2040	2.506	2133	2.829	2226	3.172	2319	3.534
295	2269	1836	1.886	1889	2.043	1939	2.198	1988	2.358	2082	2.684	2169	3.006	2258	3.351	2346	3.713
310	2385	1881	2.036	1932	2.197	1982	2.360	2031	2.528	2123	2.864	2210	3.202	2293	3.546	2378	3.911
325	2500	1927	2.196	1977	2.364	2026	2.534	2074	2.706	2166	3.057	2252	3.411	2334	3.765	2412	4.125
340	2615	1974	2.368	2023	2.540	2071	2.717	2118	2.895	2209	3.258	2294	3.623	2376	3.998	2453	4.367
355	2731	2021	2.547	2070	2.728	2117	2.910	2163	3.095	2252	3.468	2337	3.848	2418	4.235	2495	4.623
370	2846	2068	2.739	2117	2.926	2164	3.116	2209	3.305	2295	3.686	2380	4.082	2460	4.480	2537	4.886
385	2962	2115	2.941	2164	3.135	2211	3.332	2256	3.530	2341	3.924	2423	4.326	2503	4.739	2579	5.155
400	3077	2161	3.148	2211	3.356	2258	3.558	2303	3.764	2387	4.171	2467	4.584	2546	5.008		
415	3192	2208	3.371	2258	3.586	2305	3.798	2350	4.009	2434	4.432	2513	4.857				
430	3308	2254	3.601	2304	3.823	2352	4.048	2396	4.263	2481	4.704	2559	5.141				
445	3423	2299	3.840	2351	4.078	2398	4.305	2443	4.533	2528	4.987						
47	3538	2342	4.080	2397	4.339	2445	4.579	2490	4.815								
	3654	2381	4.320	2440	4.600	2491	4.860	2536	5.103								

erfo nce shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D16

Maximum RPM: 2400
Wheel Diameter: 16⅜″
Maximum BHP: $(\frac{RPM}{1359})^3$
Tip Speed: 4.29 × RPM
Outlet Area: 1.50 Sq. Ft.
Maximum Motor Frame Size: 184T

ote: for fan curve see page 26.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
1250	0.250	626	67	67	67	59	56	51	45	41
1550	0.500	830	75	73	74	67	63	60	53	49
1550	1.000	1032	83	76	77	75	68	65	59	54
1850	0.750	1005	83	76	78	75	68	65	59	54
1850	1.500	1255	85	81	81	77	71	69	64	60
2150	1.000	1163	84	79	80	77	71	68	63	58
2150	2.000	1451	85	82	85	78	73	72	68	64
2450	1.250	1311	85	80	83	79	73	71	66	62
2450	2.000	1519	86	82	86	80	75	74	69	66
2450	2.750	1694	89	85	88	83	77	76	72	68
2750	1.500	1452	83	80	86	79	75	73	68	65
2750	2.500	1701	89	85	88	84	78	76	72	68
2750	3.500	1909	91	88	90	88	81	79	75	71
3500	0.250	1332	81	78	82	77	72	69	65	60
3500	1.750	1703	87	84	88	86	79	77	73	68
3500	3.500	2068	93	89	89	91	83	81	78	73
3500	5.000	2314	95	92	90	95	86	84	81	76
4400	1.000	1800	88	85	88	90	81	79	75	70
4400	2.500	2091	92	89	88	92	84	82	78	73
4400	4.000	2350	95	92	90	95	86	83	81	76
5000	1.500	2084	91	88	88	93	84	82	79	73
5000	2.250	2216	94	90	89	95	86	84	81	75
5300	1.000	2086	90	87	87	92	83	81	78	72
5300	2.500	2344	95	91	89	96	87	85	82	77
5600	0.250	2067	87	83	83	88	80	77	74	68
5600	2.000	2353	94	90	88	96	86	84	81	76

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

FM	OV	STATIC PRESSURE IN INCHES W.G. ¼″		½″		¾″		1″		1¼″		1½″		1¾″		2″	
	(FPM)	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
250	833	626	0.098	766	0.171												
400	933	663	0.115	798	0.197	906	0.280										
550	1033	705	0.138	830	0.225	942	0.318	1032	0.411								
700	1133	748	0.165	868	0.260	974	0.357	1066	0.459	1147	0.561						
850	1233	793	0.196	905	0.294	1005	0.399	1101	0.511	1179	0.619	1255	0.733				
000	1333	838	0.229	943	0.332	1041	0.447	1132	0.563	1216	0.685	1286	0.802	1356	0.925		
150	1433	884	0.266	984	0.377	1080	0.501	1163	0.618	1249	0.750	1322	0.878	1386	1.004	1451	1.136
300	1533	931	0.308	1028	0.429	1117	0.553	1200	0.685	1278	0.814	1356	0.957	1423	1.094	1482	1.228
450	1633	979	0.355	1072	0.487	1155	0.610	1239	0.758	1311	0.888	1387	1.035	1457	1.184	1519	1.330
600	1733	1027	0.406	1116	0.546	1196	0.676	1276	0.825	1349	0.974	1417	1.116	1489	1.276	1553	1.432
	1833	1076	0.464	1161	0.611	1239	0.752	1314	0.899	1388	1.065	1452	1.211	1518	1.368	1586	1.539
900	1933	1127	0.529	1207	0.682	1283	0.835	1352	0.977	1425	1.150	1491	1.318	1552	1.474	1615	1.642
050	2033	1177	0.599	1253	0.758	1327	0.922	1395	1.073	1463	1.241	1529	1.423	1589	1.591	1647	1.757
200	2133	1228	0.677	1300	0.840	1372	1.014	1438	1.175	1501	1.338	1567	1.528	1628	1.719	1683	1.887
350	2233	1280	0.763	1348	0.930	1417	1.111	1482	1.287	1542	1.449	1605	1.639	1666	1.839	1722	2.030
500	2333	1332	0.857	1396	1.027	1462	1.215	1526	1.403	1585	1.574	1643	1.755	1703	1.961	1761	2.174
650	2433	1384	0.957	1444	1.130	1508	1.326	1571	1.524	1629	1.709	1684	1.888	1741	2.091	1798	2.310
800	2533	1436	1.066	1492	1.240	1555	1.445	1616	1.651	1673	1.851	1727	2.036	1780	2.231	1836	2.455
950	2633	1489	1.185	1543	1.365	1602	1.570	1661	1.785	1717	1.997	1770	2.192	1821	2.387	1874	2.606
100	2733	1541	1.309	1593	1.495	1650	1.706	1707	1.930	1762	2.149	1814	2.359	1864	2.560	1912	2.764
250	2833	1593	1.442	1644	1.636	1697	1.847	1753	2.080	1807	2.308	1859	2.539	1907	2.741	1954	2.949
400	2933	1646	1.586	1694	1.783	1745	1.998	1800	2.240	1852	2.476	1903	2.713	1951	2.935	1997	3.148
550	3033	1698	1.736	1746	1.946	1794	2.162	1847	2.407	1898	2.655	1948	2.899	1995	3.138	2041	3.361
700	3133	1751	1.899	1797	2.114	1843	2.334	1894	2.583	1944	2.842	1993	3.094	2040	3.347	2085	3.583
850	3233	1803	2.069	1849	2.296	1893	2.519	1942	2.772	1990	3.033	2038	3.297	2084	3.555	2129	3.814
000	3333	1856	2.252	1901	2.488	1944	2.718	1990	2.970	2037	3.238	2084	3.514	2129	3.777	2173	4.047
150	3433	1908	2.442	1953	2.691	1994	2.923	2038	3.178	2085	3.457	2130	3.738	2174	4.009	2218	4.289
300	3533	1961	2.646	2006	2.909	2045	3.143	2086	3.395	2132	3.680	2176	3.967	2220	4.256	2263	4.541
450	3633	2014	2.862	2058	3.134	2096	3.374	2136	3.632	2180	3.919	2223	4.211	2266	4.513	2308	4.802
600	3733	2067	3.089	2110	3.370	2148	3.621	2186	3.879	2228	4.167	2270	4.466	2312	4.775	2353	5.074

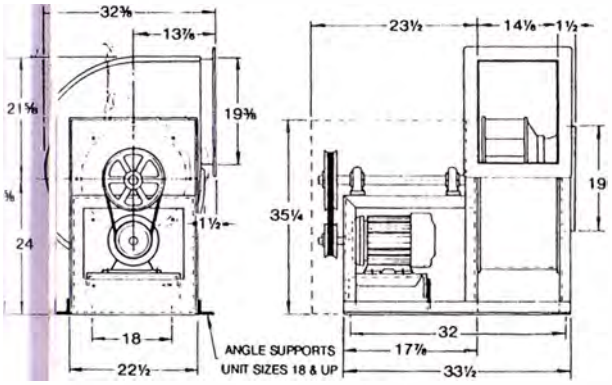
CFM	OV	STATIC PRESSURE IN INCHES W.G. 2¼″		2½″		2¾″		3″		3½″		4″		4½″		5″	
	(FPM)	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2600	1733	1611	1.587	1664	1.740	1717	1.897	1774	2.065								
2750	1833	1646	1.705	1701	1.869	1751	2.029	1800	2.192	1909	2.550						
2900	1933	1679	1.824	1735	1.997	1788	2.172	1835	2.337	1931	2.690						
3050	2033	1708	1.940	1768	2.129	1822	2.313	1872	2.494	1963	2.854	2054	3.224				
3200	2133	1739	2.065	1798	2.260	1855	2.459	1906	2.650	1999	3.028	2083	3.403	2174	3.808		
3350	2233	1774	2.207	1828	2.396	1884	2.600	1939	2.809	2035	3.210	2120	3.604	2201	4.003	2289	4.431
3500	2333	1813	2.366	1863	2.553	1914	2.749	1968	2.963	2068	3.391	2156	3.808	2235	4.217	2314	4.641
3650	2433	1852	2.531	1900	2.721	1949	2.920	1998	3.126	2101	3.580	2191	4.018	2272	4.449	2347	4.878
3800	2533	1889	2.681	1940	2.907	1986	3.105	2033	3.313	2130	3.761	2224	4.228	2308	4.684	2383	5.127
3950	2633	1927	2.841	1977	3.075	2025	3.303	2069	3.509	2160	3.951	2255	4.437	2341	4.916		
4100	2733	1965	3.008	2015	3.251	2063	3.496	2108	3.724	2194	4.163	2284	4.646	2374	5.156		
4250	2833	2003	3.181	2053	3.433	2101	3.687	2147	3.942	2231	4.398	2315	4.869				
4400	2933	2042	3.365	2091	3.621	2138	3.879	2184	4.143	2270	4.648	2350	5.119				
4550	3033	2085	3.583	2129	3.817	2176	4.084	2222	4.356	2309	4.905						
4700	3133	2128	3.809	2170	4.039	2215	4.301	2260	4.577	2346	5.137						
4850	3233	2172	4.050	2213	4.284	2253	4.520	2298	4.805								
5000	3333	2216	4.301	2257	4.544	2296	4.784	2337	5.048								
5150	3433	2260	4.562	2300	4.809	2339	5.058										

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D18

- **Maximum RPM: 2150**
- **Wheel Diameter: 18⅜"**
- **Maximum BHP: $(\frac{RPM}{1067})^3$**
- **Tip Speed: 4.85 × RPM**
- **Outlet Area: 1.90 Sq. Ft.**
- **Maximum Motor Frame Size: 215T**

Note: for fan curve see page 26.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
1400	0.250	488	63	60	51	47	45	39	32	29
1400	2.250	1238	88	85	78	75	67	64	62	59
1850	0.750	778	80	76	72	68	66	63	58	52
1850	2.500	1316	90	87	80	77	69	66	64	61
1850	4.000	1650	92	91	84	81	74	70	68	65
2750	1.000	970	84	81	77	73	70	68	64	58
2750	3.000	1475	93	91	84	81	73	70	68	64
2750	5.000	1866	95	94	88	85	79	74	71	68
3650	0.250	930	78	75	71	67	65	63	59	52
3650	1.750	1285	89	86	83	79	74	72	69	65
3650	3.500	1641	94	93	86	84	77	73	71	67
4550	1.500	1383	89	86	84	80	76	75	72	67
4550	3.000	1655	95	93	87	84	78	74	72	69
4550	5.000	1982	97	97	90	88	82	76	74	71
5225	0.750	1376	86	83	82	78	74	72	70	65
5225	2.750	1701	95	93	88	85	79	76	75	71
5900	1.500	1645	91	89	87	83	79	77	75	70
5900	3.000	1855	96	94	90	86	81	78	76	73
5900	4.500	2066	101	98	93	88	82	77	76	73
6575	0.750	1667	88	86	84	80	76	74	72	68
6575	2.500	1921	95	93	91	86	82	80	78	75
6575	4.000	2098	100	97	93	89	84	80	79	76
6800	0.250	1639	86	84	81	77	73	71	69	65
6800	1.500	1825	92	90	88	84	80	77	75	72
6800	3.000	2026	97	95	92	88	84	81	79	76

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
737	488	0.095	622	0.179	739	0.274	841	0.378	934	0.489	1018	0.604	1095	0.724	1169	0.853
855	521	0.116	648	0.214	754	0.312	853	0.423	944	0.544	1027	0.670	1104	0.799	1176	0.934
974	563	0.145	675	0.248	778	0.360	868	0.473	956	0.600	1038	0.736	1113	0.876	1185	1.022
1092	607	0.180	701	0.284	804	0.412	891	0.535	971	0.663	1050	0.804	1125	0.953	1195	1.108
1211	650	0.220	737	0.330	830	0.463	917	0.606	994	0.740	1066	0.881	1137	1.034	1207	1.198
1329	695	0.268	779	0.386	857	0.518	943	0.672	1020	0.828	1089	0.974	1155	1.129	1219	1.290
1447	740	0.323	822	0.450	892	0.585	970	0.745	1046	0.913	1115	1.079	1179	1.240	1239	1.404
1566	786	0.385	866	0.523	932	0.663	998	0.819	1073	1.001	1141	1.182	1205	1.363	1265	1.538
1684	833	0.456	909	0.603	975	0.754	1034	0.911	1100	1.093	1168	1.287	1231	1.483	1291	1.680
1803	882	0.538	953	0.692	1018	0.853	1074	1.015	1131	1.192	1195	1.397	1258	1.604	1317	1.816
1921	930	0.627	998	0.793	1061	0.961	1117	1.135	1168	1.312	1223	1.507	1285	1.732	1343	1.951
2039	980	0.730	1044	0.906	1105	1.083	1160	1.265	1210	1.450	1259	1.645	1312	1.859	1370	2.096
2158	1029	0.841	1089	1.026	1149	1.215	1203	1.404	1252	1.598	1298	1.796	1346	2.010	1397	2.242
2276	1079	0.965	1136	1.162	1193	1.356	1247	1.559	1295	1.760	1340	1.966	1383	2.178	1429	2.405
2395	1129	1.102	1184	1.310	1239	1.516	1290	1.722	1339	1.937	1383	2.152	1425	2.371	1466	2.596
2513	1179	1.251	1232	1.468	1284	1.685	1335	1.904	1382	2.123	1426	2.349	1467	2.575	1507	2.809
2632	1230	1.417	1281	1.643	1330	1.869	1379	2.095	1426	2.328	1470	2.562	1510	2.796	1549	3.037
2750	1281	1.596	1330	1.831	1376	2.067	1424	2.303	1470	2.545	1513	2.786	1553	3.030	1591	3.277
2868	1331	1.787	1379	2.034	1423	2.279	1470	2.529	1514	2.775	1557	3.031	1597	3.283	1634	3.537
2987	1382	1.996	1428	2.251	1471	2.507	1515	2.764	1559	3.025	1601	3.289	1640	3.548	1678	3.817
3105	1433	2.222	1478	2.488	1520	2.755	1562	3.025	1604	3.290	1645	3.562	1684	3.834	1721	4.105
3224	1485	2.468	1528	2.741	1569	3.019	1608	3.296	1650	3.576	1690	3.856	1728	4.136	1765	4.420
3342	1536	2.728	1578	3.012	1618	3.299	1656	3.589	1695	3.871	1735	4.166	1772	4.453	1808	4.743
3461	1587	3.004	1628	3.299	1667	3.597	1704	3.895	1742	4.197	1780	4.493	1817	4.793	1852	5.090
3579	1639	3.306	1678	3.605	1716	3.912	1752	4.219	1788	4.533	1825	4.836	1862	5.151	1897	5.462

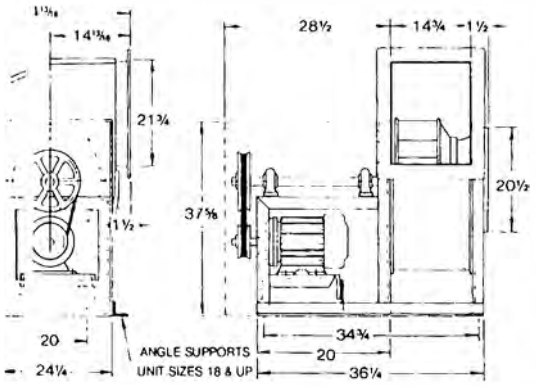
OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
974	1252	1.168	1316	1.321	1377	1.478	1435	1.637	1546	1.973	1650	2.325				
1092	1261	1.267	1325	1.430	1385	1.594	1443	1.763	1553	2.114	1655	2.477	1752	2.857	1845	3.255
1211	1273	1.367	1335	1.538	1394	1.714	1452	1.894	1561	2.261	1663	2.643	1759	3.038	1850	3.445
1329	1285	1.469	1347	1.650	1406	1.835	1463	2.027	1570	2.415	1672	2.817	1767	3.226	1858	3.652
1447	1300	1.582	1359	1.765	1418	1.960	1475	2.161	1581	2.567	1680	2.989	1776	3.423	1866	3.863
1566	1321	1.714	1377	1.901	1431	2.092	1487	2.299	1593	2.724	1692	3.164	1785	3.617	1875	4.083
1684	1347	1.867	1400	2.056	1451	2.248	1503	2.453	1605	2.885	1704	3.344	1797	3.815	1885	4.299
1803	1373	2.027	1425	2.223	1476	2.427	1524	2.629	1620	3.060	1716	3.527	1809	4.018	1897	4.520
1921	1399	2.179	1451	2.402	1502	2.618	1550	2.832	1641	3.267	1731	3.729	1821	4.225	1909	4.746
2039	1425	2.331	1478	2.573	1528	2.816	1576	3.043	1666	3.494	1752	3.964	1837	4.458	1921	4.977
2158	1452	2.494	1504	2.743	1554	2.996	1602	3.254	1692	3.737	1776	4.217	1857	4.715	1937	5.235
2276	1479	2.659	1531	2.924	1581	3.190	1628	3.452	1718	3.990	1802	4.492	1881	5.000	1958	5.529
2395	1510	2.837	1558	3.108	1608	3.390	1655	3.664	1744	4.221	1828	4.778	1907	5.308	1982	5.845
2513	1546	3.045	1589	3.306	1634	3.585	1682	3.884	1771	4.464	1854	5.053	1933	5.627	2008	6.187
2632	1586	3.278	1625	3.536	1665	3.803	1709	4.103	1798	4.715	1881	5.326	1959	5.945	2034	6.540
2750	1628	3.531	1663	3.782	1701	4.056	1740	4.340	1825	4.974	1907	5.599	1986	6.250	2060	6.901
2868	1670	3.796	1705	4.060	1739	4.327	1775	4.609	1851	5.217	1934	5.891	2012	6.554	2086	7.227
2987	1713	4.082	1748	4.358	1781	4.630	1813	4.905	1884	5.510	1961	6.190	2039	6.877	2113	7.573
3105	1756	4.382	1790	4.663	1823	4.948	1855	5.234	1920	5.833	1988	6.470	2066	7.211		
3224	1800	4.704	1833	4.991	1866	5.288	1897	5.578	1958	6.179	2023	6.823	2093	7.537		
3342	1844	5.046	1877	5.342	1909	5.643	1940	5.946	1999	6.552	2059	7.193				
3461	1887	5.399	1921	5.710	1952	6.015	1983	6.330	2041	6.951	2098	7.598				
3579	1931	5.776	1964	6.092	1996	6.412	2026	6.731	2084	7.377						

mance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D20

- Maximum RPM: 2175
- Wheel Diameter: 20¼"
- Maximum BHP: $(\frac{RPM}{992})^3$
- Tip Speed: 5.24 × RPM
- Outlet Area: 2.20 Sq. Ft.
- Maximum Motor Frame Size: 256T

NOTE: for fan curve see page 26.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
2500	0.250	590	73	70	65	60	58	54	49	46
2500	1.000	874	81	80	75	70	66	64	59	55
3500	0.500	830	79	79	76	71	67	65	60	56
3500	1.500	1099	84	82	82	77	71	69	66	62
3500	2.000	1234	88	83	85	79	73	69	67	65
4500	0.750	1048	82	80	84	77	72	70	66	62
4500	2.000	1322	87	84	87	81	75	72	70	67
4500	3.000	1520	89	91	89	84	79	75	72	70
5500	0.250	1098	80	78	83	76	71	69	65	61
5500	1.000	1256	86	82	89	81	76	74	70	67
5500	2.250	1490	86	89	89	84	78	75	73	69
5500	3.500	1696	91	93	91	88	82	77	75	72
5500	5.000	1950	94	96	92	92	85	80	77	75
6500	1.250	1459	85	88	91	85	80	77	74	70
6500	2.000	1585	86	90	92	86	81	77	75	71
6500	3.000	1740	89	92	91	88	83	78	76	73
6500	5.000	2018	96	98	93	94	87	81	78	76
7500	0.250	1469	82	85	88	82	77	74	71	67
7500	1.000	1575	85	90	93	87	81	78	75	71
7500	2.250	1771	88	92	92	90	84	80	78	74
7500	4.000	2008	93	96	92	94	86	81	78	76
8500	0.750	1715	85	89	91	88	82	78	76	72
8500	2.000	1889	89	93	92	94	86	82	79	76
8500	3.500	2082	92	96	92	95	88	83	80	78
9750	0.250	1891	84	88	87	89	81	77	74	71
9750	1.250	1993	88	93	90	94	85	81	79	75
9750	2.000	2088	91	95	92	97	88	84	81	78

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

(M)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
6	590	0.204	691	0.337	780	0.478	874	0.648								
0	628	0.244	723	0.385	809	0.540	887	0.692	975	0.895						
4	667	0.290	757	0.437	839	0.604	913	0.774	986	0.944	1067	1.172				
7	707	0.342	793	0.498	870	0.674	943	0.855	1009	1.037	1079	1.234	1153	1.480		
1	747	0.401	830	0.568	904	0.749	973	0.942	1038	1.139	1099	1.334	1165	1.553	1234	1.818
5	788	0.468	867	0.644	938	0.829	1004	1.036	1068	1.244	1127	1.457	1183	1.661	1245	1.896
8	829	0.543	906	0.730	974	0.922	1038	1.135	1099	1.358	1157	1.580	1212	1.812	1264	2.025
2	872	0.628	945	0.823	1011	1.027	1072	1.241	1130	1.474	1187	1.709	1241	1.949	1292	2.194
5	917	0.724	984	0.924	1048	1.139	1107	1.357	1164	1.600	1218	1.850	1271	2.097	1322	2.355
9	962	0.830	1024	1.035	1086	1.262	1143	1.488	1198	1.732	1251	1.995	1302	2.258	1352	2.523
3	1007	0.946	1064	1.157	1125	1.395	1181	1.635	1233	1.876	1285	2.148	1333	2.422	1382	2.699
6	1053	1.075	1105	1.292	1164	1.537	1218	1.787	1269	2.038	1319	2.309	1367	2.596	1413	2.890
0	1098	1.213	1146	1.437	1203	1.688	1256	1.952	1307	2.218	1354	2.483	1401	2.778	1446	3.080
4	1144	1.366	1188	1.596	1243	1.854	1295	2.129	1344	2.404	1390	2.678	1436	2.974	1480	3.284
7	1190	1.531	1231	1.768	1283	2.031	1334	2.316	1382	2.606	1428	2.894	1471	3.182	1514	3.496
1	1236	1.709	1276	1.957	1324	2.226	1374	2.520	1420	2.816	1465	3.116	1508	3.418	1549	3.725
5	1283	1.906	1321	2.159	1365	2.433	1413	2.729	1459	3.041	1503	3.355	1545	3.665	1585	3.977
8	1329	2.112	1366	2.375	1406	2.653	1453	2.957	1498	3.278	1541	3.605	1582	3.923	1622	4.249
2	1376	2.338	1411	2.606	1448	2.891	1494	3.205	1538	3.533	1580	3.869	1620	4.202	1659	4.535
5	1422	2.576	1457	2.857	1490	3.142	1534	3.461	1577	3.795	1619	4.147	1658	4.493	1697	4.841
9	1469	2.836	1502	3.118	1535	3.417	1575	3.738	1617	4.077	1658	4.437	1697	4.799	1734	5.152
3	1515	3.106	1548	3.401	1580	3.709	1616	4.029	1658	4.384	1697	4.741	1736	5.118	1772	5.485
6	1562	3.400	1594	3.701	1625	4.017	1658	4.343	1698	4.699	1737	5.068	1775	5.452	1811	5.834
0	1609	3.712	1640	4.018	1670	4.342	1699	4.665	1739	5.037	1777	5.409	1814	5.800	1850	6.197
4	1656	4.043	1686	4.354	1715	4.684	1743	5.017	1780	5.391	1817	5.769	1854	6.173	1889	6.575
7	1703	4.393	1732	4.708	1761	5.053	1788	5.392	1821	5.762	1858	6.156	1894	6.561	1928	6.969
1	1750	4.762	1778	5.081	1806	5.432	1833	5.786	1863	6.159	1899	6.561	1934	6.967	1968	7.390
5	1797	5.152	1825	5.482	1852	5.840	1878	6.199	1904	6.565	1940	6.982	1974	7.394	2008	7.828
8	1844	5.563	1871	5.895	1898	6.268	1923	6.631	1949	7.015	1981	7.422	2015	7.850	2048	8.283
2	1891	5.995	1918	6.338	1943	6.706	1969	7.095	1993	7.472	2023	7.892	2056	8.325	2088	8.759

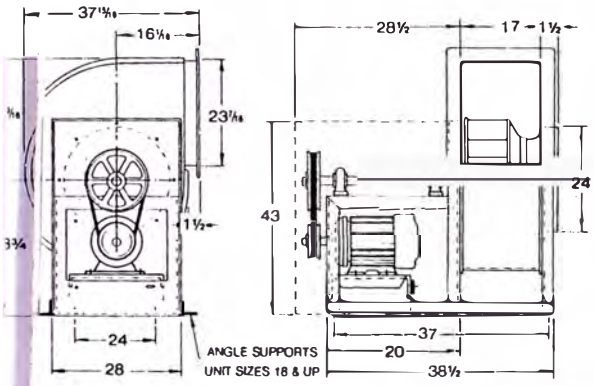
(M)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
45	1370	2.616	1416	2.851	1466	3.109	1520	3.438								
59	1399	2.790	1445	3.070	1489	3.321	1535	3.585	1637	4.273						
73	1429	2.979	1474	3.264	1517	3.552	1560	3.827	1649	4.412	1747	5.172				
86	1460	3.182	1504	3.472	1547	3.773	1588	4.075	1668	4.642	1758	5.329	1851	6.135		
00	1490	3.387	1534	3.690	1577	4.003	1618	4.317	1696	4.942	1774	5.539	1862	6.318	1950	7.161
14	1523	3.606	1565	3.924	1607	4.242	1648	4.568	1725	5.226	1798	5.853	1875	6.503	1960	7.358
27	1557	3.831	1597	4.163	1638	4.498	1678	4.829	1754	5.502	1826	6.194	1896	6.833	1973	7.562
41	1591	4.067	1631	4.411	1669	4.756	1708	5.099	1784	5.796	1856	6.513	1924	7.219	1991	7.882
55	1625	4.312	1665	4.669	1703	5.027	1740	5.392	1815	6.111	1886	6.842	1953	7.583	2018	8.300
68	1660	4.576	1699	4.637	1737	5.308	1773	5.677	1845	6.427	1916	7.183	1983	7.948	2047	8.728
82	1697	4.875	1734	5.225	1771	5.600	1807	5.981	1876	6.760	1946	7.534	2013	8.324	2076	9.115
95	1734	5.187	1770	5.539	1805	5.902	1841	6.297	1910	7.102	1977	7.909	2043	8.711	2106	9.526
09	1771	5.512	1806	5.869	1841	6.239	1876	6.634	1944	7.455	2008	8.287	2073	9.111	2136	9.950
23	1809	5.861	1844	6.232	1878	6.606	1910	6.973	1978	7.820	2042	8.679	2104	9.535	2167	10.400
36	1846	6.214	1881	6.599	1914	6.977	1947	7.368	2012	8.198	2075	9.069	2136	9.968		
50	1885	6.600	1919	6.992	1952	7.384	1984	7.778	2047	8.599	2109	9.485	2169	10.396		
64	1923	6.983	1956	7.388	1989	7.795	2021	8.203	2082	9.021	2144	9.927				
77	1962	7.392	1995	7.818	2027	8.233	2058	8.644	2119	9.489						
91	2001	7.817	2033	8.247	2065	8.688	2096	9.113	2156	9.974						
05	2041	8.271	2072	8.703	2103	9.149	2134	9.599								

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D22

- **Maximum RPM: 1865**
- **Wheel Diameter: 22⅞"**
- **Maximum BHP: $(\frac{RPM}{806})^3$**
- **Tip Speed: 5.99 × RPM**
- **Outlet Area: 2.80 Sq. Ft.**
- **Maximum Motor Frame Size: 256T**

Note: for fan curve see page 27.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
2900	0.250	496	78	74	66	62	57	50	44	38
2900	1.000	745	81	78	75	67	62	59	55	51
4100	0.500	701	79	81	75	68	65	61	54	50
4100	1.250	875	82	84	82	75	69	65	61	57
4100	2.250	1110	83	82	87	79	74	71	67	64
5300	0.750	890	81	84	83	76	70	67	62	57
5300	1.750	1072	84	84	89	80	75	71	67	63
5300	3.500	1390	86	87	93	85	81	78	74	71
6500	0.250	932	79	82	82	75	69	66	60	56
6500	1.000	1070	83	85	89	81	76	72	67	63
6500	2.250	1262	85	85	94	83	79	75	71	68
6500	5.000	1667	90	92	97	94	87	84	80	75
7700	0.750	1169	85	86	91	84	80	77	71	68
7700	1.750	1315	86	87	94	85	81	77	73	69
7700	3.500	1536	88	91	97	90	85	81	77	73
8900	0.500	1281	84	86	91	84	80	78	71	68
8900	1.500	1418	87	90	95	88	83	80	75	71
8900	2.750	1570	88	91	97	90	85	82	77	73
8900	5.000	1807	92	95	98	98	90	87	82	78
10400	0.250	1445	83	86	90	84	80	77	72	68
10400	1.250	1566	88	90	95	90	85	82	77	73
10400	2.500	1706	90	92	97	94	88	84	80	75
10400	4.000	1858	92	94	98	98	90	86	82	77
11900	0.250	1644	84	87	91	87	81	79	73	69
11900	1.250	1751	88	90	94	93	86	83	78	74
11900	2.250	1853	90	93	97	96	88	85	80	76

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

CF	OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
29	1036	496	0.226	580	0.370	661	0.536	745	0.746								
32	1143	529	0.271	608	0.429	679	0.589	757	0.798	832	1.035						
35	1250	563	0.323	639	0.493	705	0.664	771	0.857	843	1.098	911	1.358				
38	1357	598	0.383	670	0.563	733	0.751	793	0.941	856	1.167	923	1.439	985	1.719		
41	1464	633	0.449	701	0.639	763	0.843	819	1.043	875	1.260	935	1.517	996	1.808	1054	2.113
44	1571	670	0.527	735	0.730	794	0.942	848	1.162	899	1.376	952	1.619	1009	1.904	1066	2.218
47	1679	706	0.610	768	0.825	825	1.049	878	1.285	927	1.514	975	1.751	1024	2.012	1078	2.322
50	1786	743	0.704	803	0.935	857	1.168	908	1.412	956	1.667	1002	1.909	1047	2.165	1093	2.445
53	1893	780	0.808	837	1.052	890	1.298	939	1.551	986	1.819	1030	2.081	1072	2.335	1115	2.613
56	2000	818	0.926	872	1.182	923	1.437	971	1.705	1017	1.983	1059	2.263	1101	2.538	1140	2.806
59	2107	856	1.055	908	1.323	957	1.591	1003	1.868	1048	2.157	1090	2.452	1129	2.745	1169	3.035
62	2214	894	1.195	944	1.474	992	1.761	1036	2.044	1079	2.341	1120	2.645	1159	2.958	1197	3.268
66	2321	932	1.347	981	1.642	1026	1.937	1070	2.237	1111	2.543	1152	2.863	1190	3.184	1227	3.517
69	2429	971	1.516	1018	1.822	1061	2.131	1104	2.443	1144	2.759	1183	3.085	1221	3.422	1257	3.762
72	2536	1010	1.699	1055	2.015	1097	2.339	1138	2.661	1177	2.987	1215	3.327	1252	3.671	1288	4.027
75	2643	1049	1.897	1092	2.222	1133	2.559	1173	2.899	1211	3.236	1248	3.586	1284	3.942	1319	4.305
78	2750	1088	2.110	1129	2.443	1169	2.792	1208	3.152	1245	3.498	1281	3.857	1315	4.216	1350	4.595
81	2857	1128	2.344	1167	2.685	1206	3.048	1243	3.418	1280	3.783	1315	4.150	1348	4.518	1382	4.909
84	2964	1167	2.589	1205	2.943	1243	3.318	1279	3.700	1314	4.074	1349	4.459	1382	4.844	1414	5.237
87	3071	1206	2.850	1243	3.218	1280	3.605	1315	3.997	1349	4.389	1383	4.783	1416	5.185	1447	5.584
90	3179	1246	3.137	1281	3.509	1317	3.908	1351	4.310	1384	4.721	1418	5.133	1450	5.542	1480	5.947
93	3286	1286	3.442	1319	3.817	1354	4.227	1388	4.649	1420	5.071	1452	5.489	1484	5.916	1514	6.337
96	3393	1325	3.757	1358	4.153	1392	4.575	1425	5.006	1456	5.436	1487	5.873	1518	6.307	1548	6.745
99	3500	1365	4.101	1397	4.507	1429	4.930	1462	5.381	1493	5.831	1522	6.275	1553	6.727	1582	7.171
102	3607	1405	4.465	1436	4.882	1467	5.315	1499	5.776	1529	6.232	1558	6.695	1588	7.167	1617	7.628
105	3714	1445	4.851	1475	5.277	1505	5.720	1536	6.189	1566	6.665	1594	7.134	1623	7.625	1651	8.090
108	3821	1484	5.247	1514	5.693	1543	6.145	1573	6.622	1603	7.118	1631	7.606	1658	8.096	1686	8.586
111	3929	1524	5.676	1553	6.131	1581	6.591	1611	7.089	1639	7.578	1667	8.084	1694	8.593	1721	9.102
114	4036	1564	6.128	1593	6.603	1620	7.071	1649	7.577	1677	8.086	1704	8.598	1730	9.111	1756	9.639
117	4143	1604	6.603	1632	7.087	1659	7.573	1686	8.073	1714	8.602	1741	9.134	1767	9.666	1792	10.197
120	4250	1644	7.103	1672	7.607	1698	8.100	1724	8.606	1751	9.141	1777	9.675	1803	10.226	1828	10.776

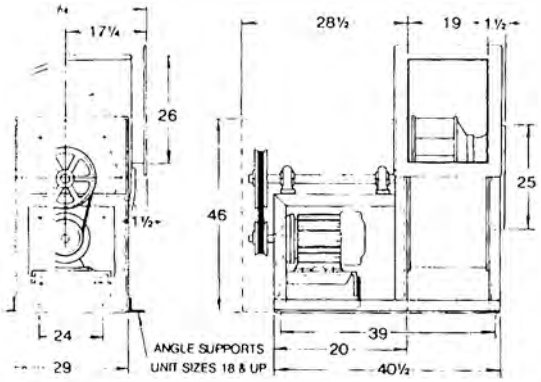
CF	OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
70	1786	1145	2.784	1195	3.134	1243	3.497	1290	3.868								
70	1893	1160	2.923	1208	3.273	1256	3.646	1302	4.030	1390	4.810						
80	2000	1181	3.104	1223	3.427	1268	3.790	1314	4.184	1401	5.001	1484	5.831				
90	2107	1206	3.321	1245	3.636	1285	3.977	1327	4.351	1413	5.179	1494	6.050	1573	6.929		
00	2214	1234	3.568	1269	3.868	1307	4.207	1345	4.563	1426	5.372	1506	6.251	1582	7.163	1657	8.092
00	2321	1262	3.827	1297	4.142	1331	4.463	1367	4.816	1439	5.569	1519	6.470	1594	7.397	1667	8.365
00	2429	1291	4.103	1326	4.438	1359	4.764	1391	5.095	1459	5.835	1532	6.693	1607	7.641	1679	8.633
00	2536	1322	4.384	1355	4.747	1387	5.077	1419	5.423	1483	6.155	1548	6.951	1620	7.891	1691	8.888
00	2643	1352	4.667	1385	5.048	1416	5.416	1448	5.777	1508	6.495	1570	7.286	1633	8.143	1704	9.164
00	2750	1383	4.973	1415	5.358	1446	5.750	1476	6.132	1536	6.880	1594	7.653	1654	8.500	1717	9.444
00	2857	1414	5.292	1446	5.693	1477	6.101	1506	6.500	1564	7.279	1620	8.058	1677	8.895	1735	9.795
00	2964	1446	5.637	1477	6.042	1507	6.453	1537	6.860	1593	7.709	1648	8.501	1701	9.315	1757	10.215
00	3071	1478	5.996	1508	6.405	1538	6.831	1567	7.261	1623	8.140	1677	8.977	1729	9.804	1781	10.674
00	1379	1510	6.368	1540	6.796	1570	7.239	1598	7.671	1653	8.565	1706	9.470	1758	10.326	1807	11.179
00	3286	1543	6.763	1572	7.203	1601	7.648	1629	8.095	1684	9.022	1735	9.943	1786	10.849	1835	11.730
00	3393	1577	7.188	1605	7.633	1633	8.088	1661	8.551	1714	9.478	1766	10.447	1815	11.408	1864	12.318
00	3500	1611	7.631	1638	8.079	1665	8.542	1692	9.009	1746	9.984	1796	10.949	1845	11.951		
00	3607	1645	8.092	1672	8.557	1698	9.022	1724	9.499	1777	10.489	1827	11.486				
00	3714	1679	8.572	1706	9.054	1732	9.535	1757	10.015	1808	11.013	1858	12.041				

ormance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D24

- Maximum RPM: 1575
- Wheel Diameter: 24⅞"
- Maximum BHP: $(\frac{RPM}{706})^3$
- Tip Speed: 6.45 × RPM
- Outlet Area: 3.40 Sq. Ft.
- Maximum Motor Frame Size: 256T

Note: for fan curve see page 27.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
2900	0.250	408	75	71	69	65	63	54	47	40
2900	1.250	741	84	81	76	72	72	67	62	57
2900	2.250	972	74	79	84	77	75	72	67	64
4025	0.500	572	80	80	76	73	70	63	57	50
4025	2.500	1046	77	80	86	79	78	75	70	66
4025	5.000	1444	82	83	90	84	83	81	77	72
5150	1.000	772	85	83	79	75	73	68	65	57
5150	2.750	1120	79	81	87	81	80	77	72	69
5150	5.000	1467	84	84	91	85	84	82	78	73
6650	1.500	969	77	83	87	81	79	75	69	65
6650	3.000	1206	82	82	91	83	82	80	75	71
6650	5.000	1506	85	85	93	86	85	83	79	74
8150	0.500	935	78	84	84	80	79	76	68	63
8150	2.250	1187	83	84	92	84	84	81	75	70
8150	5.000	1539	86	86	94	87	86	84	81	75
9650	1.250	1180	86	86	93	86	87	84	77	71
9650	2.250	1297	85	86	94	87	87	84	78	72
9650	4.000	1501	87	87	95	88	88	86	82	76
10775	1.000	1251	86	85	94	86	87	84	78	71
10775	2.000	1366	88	88	95	89	89	87	81	74
10775	3.000	1466	89	88	96	89	89	87	83	76
11525	0.750	1293	85	85	92	85	86	84	77	70
11525	1.750	1406	89	89	96	89	90	88	82	75
11525	2.500	1482	90	89	96	90	90	88	83	76
13025	0.250	1387	83	83	90	84	84	82	76	69
13025	1.250	1491	89	88	95	89	89	87	82	74
13025	2.000	1556	91	90	97	91	92	90	85	77

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

(F	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
	408	0.191	500	0.344	588	0.534	671	0.748	741	0.953	805	1.165	864	1.385	919	1.612
	437	0.233	522	0.400	601	0.590	678	0.812	751	1.053	814	1.283	873	1.520	928	1.764
1	469	0.286	546	0.461	618	0.653	688	0.878	758	1.133	825	1.408	883	1.663	937	1.921
1	502	0.348	572	0.527	641	0.741	704	0.958	768	1.216	831	1.497	892	1.795	947	2.083
1	535	0.415	599	0.601	664	0.831	725	1.062	783	1.313	841	1.595	898	1.899	956	2.230
1	569	0.493	630	0.696	690	0.927	748	1.183	802	1.431	856	1.713	909	2.017	962	2.346
1	604	0.583	662	0.803	716	1.030	772	1.305	824	1.572	874	1.847	924	2.154	973	2.481
1	638	0.680	695	0.925	745	1.155	798	1.434	847	1.727	896	2.014	942	2.310	989	2.642
1	674	0.795	728	1.057	776	1.299	824	1.571	873	1.883	919	2.197	964	2.503	1006	2.813
1	710	0.921	762	1.199	808	1.461	851	1.723	899	2.048	943	2.379	986	2.706	1028	3.033
1	746	1.059	796	1.353	841	1.641	883	1.917	925	2.221	969	2.570	1010	2.926	1051	3.273
2	783	1.216	830	1.521	874	1.836	914	2.119	952	2.412	995	2.772	1035	3.137	1074	3.522
2	820	1.389	864	1.702	907	2.035	947	2.349	984	2.654	1021	2.984	1061	3.367	1099	3.759
2	857	1.576	899	1.904	941	2.253	979	2.587	1016	2.912	1050	3.234	1088	3.618	1125	4.018
	894	1.781	935	2.129	975	2.487	1012	2.849	1048	3.186	1081	3.518	1114	3.871	1151	4.289
	931	2.003	970	2.362	1009	2.736	1046	3.122	1080	3.477	1113	3.828	1145	4.190	1178	4.584
	969	2.250	1006	2.618	1044	3.011	1079	3.402	1113	3.795	1145	4.156	1176	4.526	1206	4.904
	1006	2.510	1043	2.901	1078	3.295	1113	3.708	1146	4.126	1178	4.514	1208	4.892	1237	5.276
	1044	2.798	1079	3.195	1113	3.607	1147	4.032	1180	4.473	1211	4.892	1240	5.277	1269	5.681
	1082	3.107	1116	3.518	1149	3.948	1182	4.386	1213	4.827	1244	5.291	1273	5.696	1301	6.106
	1120	3.438	1153	3.863	1184	4.298	1216	4.750	1247	5.212	1277	5.685	1306	6.137	1333	6.552
	1158	3.792	1190	4.230	1220	4.677	1251	5.145	1282	5.631	1311	6.114	1339	6.600	1366	7.036
	1196	4.170	1227	4.620	1257	5.091	1286	5.563	1316	6.059	1344	6.549	1372	7.060	1399	7.542
	1234	4.572	1264	5.034	1293	5.516	1322	6.017	1351	6.522	1379	7.035	1406	7.554	1432	8.072
	1272	5.000	1301	5.472	1330	5.978	1357	6.480	1385	6.995	1413	7.530	1439	8.054	1465	8.598
	1310	5.454	1339	5.949	1366	6.452	1393	6.976	1420	7.505	1447	8.048	1473	8.594	1498	9.142
	1349	5.947	1376	6.441	1403	6.966	1429	7.498	1455	8.041	1482	8.607	1507	9.158	1532	9.728
	1387	6.457	1414	6.974	1440	7.506	1466	8.063	1491	8.620	1517	9.192	1542	9.766	1566	10.339

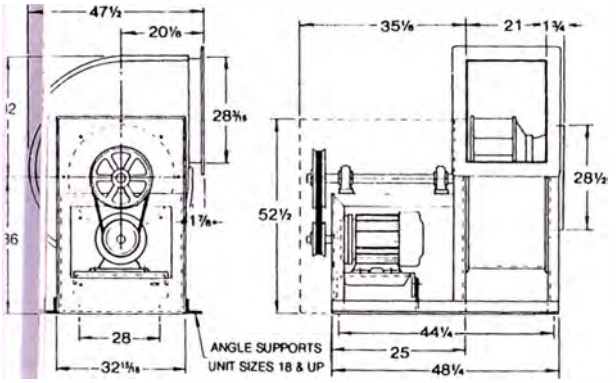
(M)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
3	972	1.849	1022	2.091												
3	980	2.017	1029	2.274	1076	2.536	1121	2.803								
4	989	2.191	1037	2.458	1084	2.740	1128	3.021	1213	3.610	1292	4.213				
4	997	2.362	1046	2.653	1093	2.953	1137	3.250	1221	3.872	1299	4.508	1373	5.159	1444	5.840
4	1008	2.549	1056	2.856	1101	3.163	1146	3.486	1229	4.130	1307	4.802	1380	5.489	1450	6.195
4	1015	2.693	1066	3.055	1112	3.391	1156	3.730	1238	4.405	1316	5.110	1389	5.831	1458	6.567
5	1023	2.835	1072	3.203	1120	3.582	1166	3.972	1248	4.690	1325	5.426	1398	6.180	1467	6.950
5	1034	2.987	1081	3.361	1126	3.746	1172	4.150	1259	4.983	1335	5.751	1407	6.536	1476	7.340
5	1050	3.166	1093	3.538	1137	3.932	1180	4.341	1265	5.194	1346	6.086	1417	6.899	1484	7.722
6	1068	3.368	1110	3.746	1150	4.131	1191	4.543	1271	5.401	1352	6.328	1428	7.277	1495	8.138
6	1090	3.615	1128	3.971	1167	4.361	1206	4.777	1283	5.647	1358	6.566	1434	7.548	1506	8.558
6	1113	3.884	1150	4.247	1186	4.621	1222	5.018	1295	5.892	1369	6.838	1440	7.816	1512	8.855
6	1136	4.166	1173	4.546	1208	4.926	1243	5.328	1312	6.183	1380	7.110	1450	8.109	1518	9.153
7	1161	4.435	1196	4.859	1231	5.256	1265	5.662	1329	6.482	1396	7.425	1461	8.413	1528	9.480
7	1187	4.724	1221	5.161	1254	5.600	1287	6.010	1352	6.878	1413	7.764	1477	8.776	1539	9.818
7	1213	5.025	1246	5.467	1279	5.933	1310	6.386	1374	7.274	1434	8.177	1493	9.136	1554	10.208
8	1239	5.339	1272	5.799	1304	6.269	1335	6.747	1397	7.701	1456	8.621	1512	9.560		
8	1266	5.680	1299	6.158	1330	6.632	1361	7.128	1419	8.124	1478	9.080	1534	10.053		
8	1297	6.090	1325	6.517	1357	7.024	1387	7.523	1445	8.554	1501	9.574				
9	1328	6.520	1354	6.936	1383	7.416	1413	7.933	1471	9.000	1525	10.075				
9	1360	6.986	1386	7.420	1411	7.855	1440	8.375	1497	9.461						
9	1392	7.473	1418	7.927	1442	8.364	1466	8.815	1523	9.937						

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D27

- **Maximum RPM: 1550**
- **Wheel Diameter: 27⅞"**
- **Maximum BHP: $(\frac{RPM}{612})^3$**
- **Tip Speed: 7.30 × RPM**
- **Outlet Area: 4.11 Sq. Ft.**
- **Maximum Motor Frame Size: 286T**

Note: for fan curve see page 27.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
3000	0.250	370	70	66	69	58	55	49	44	39
3000	1.500	745	89	85	81	75	74	69	65	63
4900	0.500	559	81	78	75	75	66	61	57	51
4900	1.750	834	94	89	86	80	78	74	69	67
4900	2.750	1016	99	92	92	84	80	77	73	71
4900	4.500	1287	102.1	95	95	88	84	80	76	74
6800	0.750	732	89	87	83	78	76	72	67	63
6800	2.000	964	97	90	92	83	81	78	73	70
6800	3.500	1174	101	95	95	87	84	81	77	74
6800	5.000	1373	104	97	97	90	86	83	79	76
8700	0.250	755	87	85	82	76	74	70	64	61
8700	1.000	898	93	91	91	84	82	78	73	69
8700	2.250	1096	99	93	94	86	84	81	76	73
8700	4.000	1314	103	96	97	90	86	83	79	76
10600	1.250	1059	98	93	95	88	86	83	78	73
10600	2.500	1231	102	95	97	89	86	83	79	75
10600	5.000	1515	106	99	99	92	88	85	81	78
12500	0.250	1052	93	88	90	83	81	78	73	68
12500	1.000	1149	99	93	96	89	87	84	79	74
12500	2.250	1312	103	96	98	91	88	86	82	77
12500	4.000	1508	105	98	99	91	87	84	80	77
14400	0.500	1230	98	92	95	87	85	83	78	73
14400	2.000	1404	105	97	100	94	90	89	84	79
14400	3.000	1513	106	98	100	94	90	88	84	79
16300	0.250	1351	99	91	94	88	85	84	79	74
16300	1.000	1427	103	95	98	93	89	88	83	78
16300	1.750	1504	106	98	101	96	92	91	86	81

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

CF	OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
30(	730	370	0.221	461	0.397	539	0.594	614	0.825	682	1.068	745	1.328				
34	845	396	0.271	486	0.491	556	0.683	623	0.919	688	1.182	749	1.456	806	1.744	860	2.046
39	963	425	0.332	510	0.577	579	0.808	640	1.038	698	1.300	756	1.597	811	1.900	864	2.220
44	1076	454	0.399	533	0.661	604	0.952	661	1.188	715	1.447	768	1.743	820	2.067	870	2.398
49	1192	484	0.476	559	0.762	627	1.072	687	1.386	736	1.634	786	1.929	834	2.249	880	2.587
53	1307	515	0.566	587	0.877	651	1.204	710	1.552	762	1.877	807	2.156	852	2.469	896	2.812
58	1423	547	0.671	616	1.008	677	1.354	733	1.717	787	2.109	832	2.438	874	2.746	915	3.076
63	1539	580	0.793	646	1.149	704	1.517	758	1.900	809	2.303	858	2.731	899	3.077	938	3.408
68	1654	614	0.935	676	1.302	732	1.697	784	2.102	833	2.522	880	2.960	925	3.421	964	3.801
72	1770	648	1.094	707	1.474	761	1.897	811	2.320	859	2.765	903	3.212	947	3.687	989	4.182
77	1885	683	1.277	739	1.669	791	2.109	839	2.558	885	3.024	928	3.487	970	3.979	1011	4.485
82	2001	719	1.487	771	1.881	821	2.336	868	2.822	912	3.297	954	3.788	995	4.298	1034	4.817
87	2116	755	1.718	803	2.110	852	2.589	898	3.099	941	3.608	981	4.133	1021	4.643	1059	5.182
91	2232	792	1.980	836	2.367	883	2.860	928	3.392	969	3.926	1009	4.459	1047	5.007	1084	5.557
96	2347	828	2.258	870	2.658	915	3.161	958	3.702	999	4.272	1038	4.839	1075	5.403	1111	5.983
101	2463	865	2.569	905	2.982	947	3.483	989	4.044	1029	4.633	1066	5.225	1103	5.817	1138	6.417
106	2578	902	2.908	939	3.322	980	3.838	1020	4.408	1059	5.015	1096	5.639	1131	6.253	1166	6.882
110	2694	940	3.285	975	3.713	1013	4.217	1052	4.808	1090	5.432	1126	6.072	1160	6.721	1194	7.368
115	2810	977	3.683	1011	4.134	1046	4.627	1084	5.232	1121	5.872	1156	6.528	1190	7.207	1223	7.896
121	2925	1015	4.125	1047	4.586	1081	5.093	1117	5.696	1153	6.355	1187	7.024	1220	7.717	1252	8.429
125	3041	1052	4.587	1083	5.069	1115	5.575	1149	6.170	1184	6.846	1218	7.546	1251	8.271	1282	8.994
129	3156	1090	5.097	1119	5.586	1150	6.103	1182	6.689	1217	7.399	1249	8.095	1281	8.830	1312	9.584
133	3272	1127	5.619	1156	6.149	1185	6.668	1216	7.265	1249	7.963	1281	8.691	1312	9.437	1343	10.223
	3387	1164	6.173	1193	6.748	1221	7.286	1251	7.892	1282	8.575	1313	9.316	1343	10.072	1373	10.866
	3503	1202	6.780	1230	7.385	1257	7.941	1285	8.535	1314	9.197	1345	9.972	1375	10.760	1404	11.562
14	3618	1239	7.407	1267	8.061	1293	8.634	1320	9.233	1348	9.904	1378	10.681	1407	11.480	1435	12.288
15	3734	1276	8.073	1304	8.777	1330	9.388	1355	9.973	1382	10.650	1410	11.399	1439	12.232	1467	13.073
15	3849	1314	8.798	1342	9.557	1366	10.162	1391	10.778	1417	11.457	1443	12.175	1472	13.043	1499	13.891
16	3965	1351	9.545	1379	10.358	1403	10.998	1427	11.625	1451	12.278	1477	13.028	1504	13.863	1531	14.744

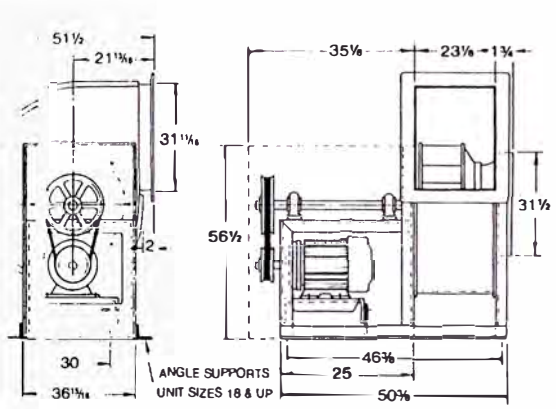
C	OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
	1076	919	2.744	966	3.102	1011	3.469	1055	3.854	1136	4.626						
	1192	927	2.957	972	3.328	1016	3.710	1059	4.109	1140	4.926	1216	5.776	1287	6.648		
	1307	939	3.177	981	3.562	1024	3.974	1065	4.381	1145	5.235	1220	6.119	1291	7.032	1359	7.985
	1423	957	3.454	996	3.830	1035	4.233	1074	4.662	1151	5.552	1225	6.470	1296	7.434	1363	8.414
	1539	976	3.758	1014	4.142	1052	4.556	1088	4.972	1160	5.877	1231	6.832	1301	7.826	1367	8.837
	1654	999	4.138	1035	4.514	1071	4.918	1106	5.343	1174	6.238	1241	7.212	1308	8.245	1373	9.291
	1770	1026	4.598	1059	4.956	1093	5.355	1125	5.746	1192	6.668	1255	7.622	1318	8.663	1381	9.762
	1885	1051	5.020	1086	5.474	1117	5.851	1149	6.266	1211	7.133	1273	8.113	1332	9.125	1392	10.240
	2001	1073	5.362	1110	5.916	1144	6.427	1174	6.834	1234	7.712	1292	8.643	1351	9.700	1407	10.777
	2116	1096	5.736	1132	6.298	1168	6.897	1202	7.490	1258	8.342	1314	9.275	1369	10.273	1425	11.395
5	2232	1120	6.129	1155	6.713	1190	7.319	1224	7.942	1285	9.070	1338	9.985	1391	10.980	1444	12.057
0	2347	1146	6.566	1179	7.150	1213	7.777	1246	8.406	1310	9.720	1365	10.806	1415	11.773	1466	12.843
5	2463	1172	7.023	1205	7.634	1237	8.258	1269	8.907	1332	10.250	1391	11.623	1441	12.662	1489	13.695
0	2578	1199	7.512	1231	8.138	1263	8.790	1294	9.453	1354	10.798	1413	12.219	1468	13.618	1515	14.677
5	2694	1227	8.027	1258	8.682	1289	9.344	1319	10.012	1377	11.390	1436	12.862	1491	14.342		
0	2810	1255	8.565	1286	9.248	1315	9.920	1345	10.615	1403	12.049	1458	13.499	1514	15.057		
5	2925	1283	9.127	1314	9.839	1343	10.539	1372	11.268	1428	12.704	1482	14.201				
0	3041	1312	9.732	1342	10.455	1371	11.182	1399	11.916	1454	13.411	1508	14.961				
5	3156	1342	10.352	1371	11.120	1399	11.852	1427	12.615	1481	14.172						
0	3272	1372	10.999	1400	11.785	1428	12.575	1456	13.368	1508	14.928						

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

30

- **Maximum RPM: 1450**
- **Wheel Diameter: 30¾″**
- **Maximum BHP: $(\frac{RPM}{524})^3$**
- **Tip Speed: 7.97 × RPM**
- **Outlet Area: 5.08 Sq. Ft.**
- **Maximum Motor Frame Size: 286T**

e: for fan curve see page 28.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
6000	0.250	430	75	73	68	63	59	53	47	42
6000	1.250	643	84	83	75	71	69	66	61	58
8500	0.500	609	80	86	78	75	72	68	63	59
8500	1.500	776	82	89	83	79	76	73	69	66
8500	2.500	909	86	89	83	78	74	72	70	67
11000	0.250	707	82	86	80	77	74	70	66	63
11000	0.750	777	86	91	85	82	79	76	71	68
11000	1.750	913	82	86	82	76	73	70	68	65
11000	2.750	1029	89	87	90	80	77	74	73	69
11000	4.500	1210	97	92	93	85	81	78	77	73
13500	0.250	853	85	89	86	80	78	75	70	67
13500	1.000	939	81	83	81	74	71	68	66	63
13500	2.000	1051	88	84	89	79	76	73	72	68
13500	3.000	1158	92	86	92	82	80	76	75	71
13500	5.000	1335	98	91	94	86	84	80	79	75
16000	0.250	1001	78	77	81	71	68	64	63	59
16000	0.750	1049	83	80	85	75	72	68	67	63
16000	1.750	1144	90	83	89	80	77	73	72	68
16000	2.750	1240	93	87	92	83	80	77	76	72
16000	4.500	1397	97	91	95	87	84	81	79	76
18500	0.500	1171	85	79	85	75	73	69	68	64
18500	1.500	1255	90	84	89	80	78	74	73	69
18500	2.500	1335	94	87	92	83	81	78	76	73
18500	3.500	1419	97	90	95	86	84	80	79	75
20500	0.250	1269	85	79	84	76	73	70	68	64
20500	1.000	1327	90	84	88	80	77	74	72	69
20500	1.750	1384	93	87	91	82	80	77	75	72

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

OV PM)	STATIC PRESSURE IN INCHES W.G. ¼″ RPM	¼″ BHP	½″ RPM	½″ BHP	¾″ RPM	¾″ BHP	1″ RPM	1″ BHP	1¼″ RPM	1¼″ BHP	1½″ RPM	1½″ BHP	1¾″ RPM	1¾″ BHP	2″ RPM	2″ BHP
179	430	0.527	493	0.830	548	1.140	596	1.418	643	1.748						
277	456	0.621	515	0.939	569	1.280	615	1.587	659	1.906	702	2.271				
376	483	0.729	537	1.054	590	1.424	636	1.787	676	2.087	717	2.447	758	2.857		
474	510	0.848	559	1.179	610	1.571	657	1.970	698	2.338	735	2.670	773	3.062	811	3.501
572	537	0.978	583	1.325	632	1.734	677	2.152	719	2.585	755	2.939	790	3.308	825	3.720
670	564	1.122	609	1.496	654	1.906	698	2.354	739	2.803	776	3.239	809	3.601	843	4.015
769	592	1.284	635	1.681	676	2.090	719	2.561	760	3.044	797	3.519	831	3.959	862	4.346
867	620	1.455	661	1.882	699	2.296	741	2.784	780	3.285	817	3.785	852	4.302	883	4.734
965	649	1.650	688	2.104	724	2.530	763	3.020	802	3.557	838	4.079	872	4.605	904	5.140
063	678	1.861	715	2.340	750	2.790	786	3.281	823	3.820	859	4.387	893	4.939	924	5.482
162	707	2.091	742	2.593	777	3.081	808	3.544	845	4.110	880	4.697	913	5.272	945	5.857
260	736	2.339	769	2.865	803	3.379	834	3.869	868	4.431	902	5.029	934	5.638	966	6.248
358	765	2.607	797	3.168	829	3.695	860	4.214	890	4.751	924	5.377	956	6.014	986	6.637
456	794	2.896	824	3.478	856	4.036	886	4.579	914	5.116	946	5.741	978	6.405	1008	7.074
555	824	3.217	853	3.820	883	4.398	912	4.965	940	5.530	969	6.140	1000	6.814	1029	7.487
653	853	3.549	881	4.171	910	4.782	939	5.390	966	5.966	992	6.556	1022	7.239	1051	7.939
751	882	3.903	910	4.558	937	5.188	965	5.817	992	6.425	1017	7.023	1044	7.682	1073	8.410
849	912	4.296	938	4.954	965	5.635	992	6.277	1018	6.908	1043	7.533	1067	8.166	1095	8.898
948	942	4.714	967	5.389	992	6.089	1019	6.761	1045	7.436	1069	8.068	1092	8.705	1118	9.432
046	971	5.143	996	5.850	1020	6.576	1046	7.270	1071	7.967	1095	8.628	1118	9.293	1141	9.986
144	1001	5.615	1025	6.338	1049	7.096	1073	7.805	1098	8.533	1122	9.239	1144	9.907	1166	10.601
242	1030	6.110	1054	6.853	1077	7.623	1101	8.389	1125	9.125	1148	9.853	1170	10.548	1192	11.270
341	1060	6.654	1084	7.416	1106	8.199	1128	8.978	1152	9.745	1175	10.519	1197	11.245	1218	11.968
439	1090	7.229	1113	7.989	1135	8.804	1156	9.620	1179	10.393	1201	11.170	1223	11.944	1244	12.694
537	1120	7.837	1142	8.591	1163	9.415	1184	10.270	1206	11.070	1228	11.877	1249	12.671	1270	13.450
635	1149	8.455	1171	9.223	1192	10.080	1212	10.942	1233	11.777	1255	12.614	1276	13.451	1296	14.236
734	1179	9.129	1201	9.912	1221	10.776	1241	11.671	1261	12.543	1282	13.382	1303	14.250	1323	15.086
832	1209	9.838	1230	10.608	1250	11.505	1269	12.403	1288	13.313	1309	14.182	1330	15.081	1349	15.936
930	1239	10.583	1260	11.365	1279	12.268	1298	13.198	1316	14.125	1337	15.048	1357	15.944	1376	16.832
028	1269	11.365	1289	12.129	1308	13.064	1327	14.027	1345	14.986	1364	15.914	1384	16.841	1403	17.758

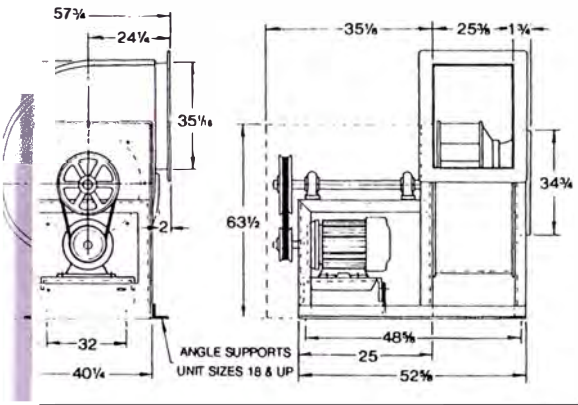
OV FPM)	STATIC PRESSURE IN INCHES W.G. 2¼″ RPM	2¼″ BHP	2½″ RPM	2½″ BHP	2¾″ RPM	2¾″ BHP	3″ RPM	3″ BHP	3½″ RPM	3½″ BHP	4″ RPM	4″ BHP	4½″ RPM	4½″ BHP	5″ RPM	5″ BHP
1769	893	4.771	925	5.250	956	5.752	988	6.309								
1867	912	5.140	942	5.602	972	6.099	1001	6.612								
1965	933	5.574	961	6.012	989	6.487	1018	7.017	1074	8.140						
2063	955	6.050	982	6.493	1008	6.940	1035	7.442	1089	8.544	1144	9.811				
2162	975	6.443	1003	6.999	1029	7.469	1054	7.940	1106	9.029	1157	10.213	1210	11.586		
2260	995	6.839	1024	7.465	1051	8.046	1076	8.542	1124	9.557	1174	10.754	1223	12.041	1273	13.474
2358	1016	7.273	1044	7.902	1071	8.542	1097	9.147	1144	10.178	1191	11.318	1238	12.572	1285	13.949
2456	1037	7.725	1065	8.379	1092	9.045	1118	9.718	1165	10.859	1209	11.935	1255	13.198	1300	14.524
2555	1058	8.195	1085	8.851	1112	9.541	1138	10.238	1186	11.567	1230	12.692	1273	13.876	1317	15.213
2653	1079	8.656	1106	9.365	1133	10.081	1158	10.776	1207	12.228	1251	13.479	1293	14.666	1335	15.959
2751	1101	9.153	1128	9.911	1154	10.642	1179	11.362	1227	12.834	1273	14.330	1314	15.533	1353	16.735
2849	1123	9.670	1149	10.427	1175	11.220	1200	11.968	1248	13.491	1293	15.031	1335	16.431	1374	17.682
2948	1145	10.206	1171	10.990	1196	11.780	1221	12.596	1268	14.137	1313	15.725	1356	17.349	1395	18.662
3046	1167	10.761	1193	11.573	1218	12.390	1242	13.211	1289	14.838	1334	16.476	1377	18.151	1416	19.675
3144	1190	11.366	1215	12.176	1240	13.021	1264	13.869	1310	15.562	1355	17.252	1397	18.937	1437	20.640
3242	1213	11.991	1238	12.832	1262	13.673	1286	14.548	1331	16.290	1375	18.012	1417	19.745		
3341	1238	12.686	1260	13.479	1284	14.347	1308	15.250	1353	17.045	1396	18.835	1438	20.620		
3439	1264	13.439	1284	14.208	1307	15.078	1330	15.974	1375	17.824	1417	19.677				
3537	1290	14.222	1309	14.985	1329	15.798	1352	16.721	1397	18.626	1439	20.532				
3635	1316	15.036	1335	15.826	1354	16.639	1375	17.530	1419	19.453						

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D33

Maximum RPM: 1250
Wheel Diameter: 34⅛"
Maximum BHP: $(\frac{RPM}{431})^3$
Tip Speed: 9.07 × RPM
Outlet Area: 6.17 Sq. Ft.
Maximum Motor Frame Size: 286T

ote: for fan curve see page 28.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
6000	0.250	345	75	70	62	61	59	57	55	54
6000	1.000	526	89	84	79	73	72	69	67	65
6000	2.000	711	92	90	84	79	77	74	71	69
6000	4.000	994	101	95	91	84	83	80	77	73
8500	0.500	489	85	80	75	69	68	65	64	62
8500	2.250	779	97	93	88	83	81	76	73	71
8500	4.500	1064	103	95	93	86	85	81	78	75
10375	0.750	597	89	86	79	74	73	70	68	65
10375	2.500	855	99	94	91	84	83	78	75	72
10375	5.000	1132	104	97	95	88	86	83	80	76
12250	1.250	737	93	91	85	81	79	75	72	69
12250	2.750	933	100	95	93	85	84	80	77	73
12250	5.000	1154	105	98	95	88	87	84	81	77
14125	0.250	648	86	84	77	72	71	67	64	62
14125	2.500	963	101	95	94	86	84	80	77	74
14125	5.000	1195	106	98	96	89	87	84	81	78
16625	1.000	850	95	92	88	82	81	76	72	69
16625	2.000	966	100	94	94	86	84	80	76	73
16625	4.000	1180	105	97	96	88	87	84	81	77
19125	0.750	912	95	91	89	81	80	76	72	69
19125	2.250	1074	102	95	95	87	85	81	78	75
19125	3.000	1146	104	96	96	88	86	83	79	76
21625	0.500	983	96	90	89	81	79	75	72	68
21625	2.000	1136	102	95	95	87	85	81	78	74
23500	0.250	1035	95	89	88	80	78	74	71	68
23500	1.000	1107	99	92	92	84	82	78	75	72
23500	1.750	1179	102	94	95	86	84	81	77	74

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

M	OV (FPM)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
00	971	345	0.510	421	0.813	477	1 180	526	1.567	575	1.989	623	2.425	669	2.891	711	3.358
25	1072	367	0.595	439	0.937	494	1.315	542	1.726	586	2.163	631	2.634	675	3.117	716	3.601
50	1173	388	0.690	454	1.099	513	1.471	559	1.904	602	2.361	642	2.843	683	3.352	723	3.874
75	1274	410	0.804	470	1.285	532	1.645	577	2.095	619	5.581	658	3.082	694	3.597	732	4.144
00	1376	432	0.930	489	1.453	548	1 862	596	2.307	636	2.806	675	3.343	711	3.888	744	4.434
25	1477	455	1.076	510	1.611	562	2.138	615	2.545	655	3 064	691	3 600	727	4.176	761	4.769
50	1578	478	1.238	532	1.793	578	2.399	631	2.834	674	3.336	710	3.903	744	4.493	777	5.098
75	1679	501	1.415	553	1.994	597	2.646	645	3.186	692	3 654	729	4 222	762	4.825	794	5.460
00	1780	525	1.618	575	2.221	619	2.895	661	3.559	708	4.019	748	4.558	781	5.192	812	5.839
25	1881	549	1.839	597	2.466	640	3.144	679	3.894	722	4.478	764	4.968	800	5.578	831	6.256
50	1983	573	2.081	619	2.728	662	3.440	699	4.217	737	4.927	780	5.447	818	6.029	850	6.691
75	2084	598	2.357	642	3.024	683	3.748	720	4.536	755	5.352	794	6.015	834	6.537	868	7.147
00	2185	623	2.657	665	3.341	705	4 093	742	4 890	775	5.774	810	6.554	848	7.131	885	7.743
25	2286	648	2.982	688	3.680	727	4 458	763	5.268	796	6.166	828	7.060	862	7 806	900	8 356
50	2387	673	3.332	712	4.058	749	4 845	785	5.698	818	6.600	847	7.544	879	8.409	914	9.110
75	2488	699	3.725	735	4.444	772	5.276	806	6.128	839	7.035	869	8.039	898	9.009	929	9.841
00	2589	724	4.131	759	4.874	795	5.732	828	6.604	861	7 554	890	8.527	918	9.592	947	10.554
25	2691	750	4.584	783	5.330	818	6.215	850	7.105	882	8.072	912	9.065	939	10.139	966	11.219
	2792	776	5.062	807	5.816	841	6.724	873	7 658	904	8.642	933	9 637	961	10.741	986	11.853
	2893	801	5.551	832	6.357	864	7.261	896	8.241	926	9.239	955	10.277	982	11.333	1007	12.482
00	2994	827	6.094	857	6.931	888	7.853	918	8 824	947	9 832	976	10 911	1004	12 022	1029	13 173
25	3095	853	6.672	882	7.539	912	8.476	942	9.495	970	10.517	998	11 607	1025	12.725	1051	13.890
50	3196	879	7.285	907	8.182	935	9.104	965	10.168	993	11.235	1020	12.332	1046	13.455	1072	14.637
75	3297	904	7.908	933	8.890	959	9.792	988	10.873	1016	11.985	1042	13.087	1068	14 254	1093	15.438
00	3399	930	8.595	958	9.607	983	10.515	1012	11.645	1039	12.769	1064	13.876	1090	15.084	1115	16.311
25	3500	956	9.321	983	10.363	1008	11 314	1035	12 417	1062	13.587	1087	14 738	1112	15 947	1136	17.173
50	3601	982	10 086	1009	11.191	1033	12.153	1059	13.261	1085	14.440	1110	15.636	1134	16 843	1158	18.111
75	3702	1008	10.894	1034	12 027	1058	13.033	1083	14.143	1108	15.328	1133	16.570	1157	17 822	1180	19.085
00	3803	1035	11.778	1060	12.940	1083	13.954	1107	15.063	1132	16.296	1156	17.541	1179	18.791	1202	20093

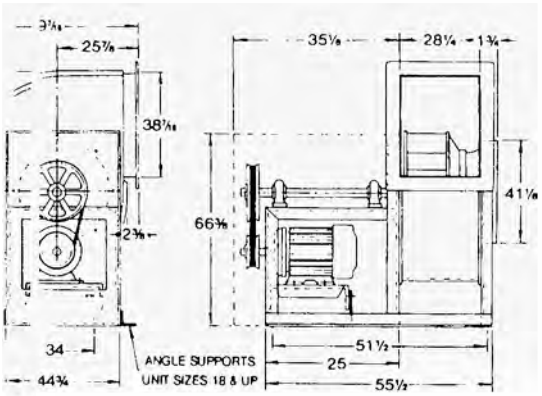
M	OV (FPM)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
00	971	752	3.857	791	4.373	828	4 899	863	5.431	931	6.569	994	7.743				
62	1072	757	4.134	795	4.664	831	5.201	866	5.762	933	6.936	996	8.172	1055	9.436	1111	10 748
72	1173	762	4 409	800	4 970	836	5.540	871	6.131	936	7 321	998	8.587	1057	9 915	1113	11 283
87	1274	769	4.716	806	5.293	841	5.876	875	6.476	941	7.753	1002	9 053	1060	10.410	1115	11 807
35	1376	779	5.019	813	5.624	848	6.251	881	6.864	946	8.181	1006	9 520	1064	10.934	1118	12 359
	1477	792	5 354	825	5.992	857	6.629	888	7.275	951	8 608	1011	10.006	1068	11 460	1122	12 939
75	1578	809	5.732	839	6 370	868	7 014	899	7 700	958	9.086	1017	10 524	1073	12 006	1127	13.555
37	1679	825	6.103	855	6.771	883	7 433	911	8 139	968	9 574	1024	11 071	1079	12 589	1132	14 164
00	1780	842	6.511	872	7 209	900	7.903	927	8 610	979	10 064	1033	11 609	1086	13 204	1138	14 810
62	1881	860	6.938	888	7.638	916	8.360	944	9.127	995	10.631	1045	12 200	1095	13.813	1145	15.494
25	1983	879	7.404	907	8.138	933	8 862	960	9 629	1011	11.193	1059	12.805	1106	14 438	1154	16167
28	2084	898	7 891	925	8 628	952	9.411	977	10.176	1028	11 804	1075	13 440	1120	15.138	1166	16 904
35	2185	917	8 399	944	9 167	970	9 950	995	10 744	1044	12 399	1092	14.133	1136	15 847	1178	17 607
41	2286	933	9.015	963	9.728	989	10.542	1014	11 366	1062	13.067	1108	14 803	1153	16 622	1195	18 438
47	2387	950	9.707	980	10.402	1008	11.156	1033	12 012	1080	13.738	1125	15.535	1169	17 369	1211	19 246
	2488	964	10 519	996	11.130	1025	11 868	1052	12 682	1099	14 470	1143	16 289	1186	18 182	1228	20 121
	2589	977	11 355	1011	11.990	1042	12 699	1070	13 478	1118	15 228	1162	17 108	1203	18 994		
66	2691	994	12.135	1025	12 943	1057	13.583	1086	14 343	1137	16 011	1180	17 909	1222	19 901		
72	2792	1012	12 888	1040	13 824	1071	14 622	1102	15 298	1154	16 894	1199	18 781	1241	20 837		
	2893	1032	13.687	1058	14.717	1085	15 631	1115	16 380	1171	17 944	1219	19 730				
	2994	1053	14 385	1077	15.545	1102	16.573	1129	17.543	1187	18.990	1236	20.788				

to ince shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

D36

- Maximum RPM: 1125
- Wheel Diameter: 37⅜"
- Maximum BHP: $(\frac{RPM}{367})^3$
- Tip Speed: 9.68 × RPM
- Outlet Area: 7.54 Sq. Ft.
- Maximum Motor Frame Size: 286T

Note: for fan curve see page 28.



CFM	SP	RPM	SOUND POWER LEVELS (dB re 10^{-12}) OCTAVE BAND CENTER FREQUENCY (hz)							
			63	125	250	500	1000	2000	4000	8000
9000	0.250	360	80	70	62	58	54	51	48	47
9000	1.500	565	89	89	81	74	72	68	65	64
11600	0.500	475	84	84	73	66	63	59	55	54
11600	1.750	633	91	92	83	77	76	72	69	68
11600	2.750	760	97	96	88	82	80	77	75	74
14200	0.750	582	88	92	81	75	72	67	64	61
14200	2.000	712	93	94	86	80	79	75	71	69
14200	3.000	814	97	98	91	84	82	78	76	73
14200	4.000	918	100	100	95	87	85	81	78	76
16800	1.000	684	92	96	87	81	79	74	70	68
16800	2.250	794	95	98	90	83	81	77	73	70
16800	4.000	945	100	101	97	88	86	82	78	76
19400	0.250	700	88	92	84	78	75	70	66	64
19400	1.250	783	94	98	90	83	81	79	73	70
19400	2.250	857	96	99	93	85	83	78	75	72
19400	5.000	1066	102	103	102	91	89	85	81	78
22000	1.000	846	96	99	93	85	83	78	74	71
22000	2.250	930	97	99	96	87	84	80	76	73
22000	4.500	1084	102	102	102	91	89	85	81	78
24600	0.750	908	95	98	94	85	82	77	73	71
24600	2.000	993	98	99	97	87	84	80	76	73
24600	3.500	1079	101	101	101	90	87	84	80	77
27200	0.500	982	95	96	96	85	82	77	73	70
27200	1.500	1044	100	100	101	90	86	82	78	75
27200	2.500	1100	100	100	99	89	86	82	79	75
29150	0.250	1036	94	95	95	84	81	76	72	69
29150	1.750	1120	101	101	103	92	88	84	80	77

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

(RPM)	STATIC PRESSURE IN INCHES W.G. ¼" RPM	¼" BHP	½" RPM	½" BHP	¾" RPM	¾" BHP	1" RPM	1" BHP	1¼" RPM	1¼" BHP	1½" RPM	1½" BHP	1¾" RPM	1¾" BHP	2" RPM	2" BHP
[illegible]	360	0.885	400	1.284	443	1.737	482	2.209	523	2.752	565	3.335				
[illegible]	380	1.033	418	1.454	457	1.917	495	2.410	532	2.951	571	3.552	609	4.159		
[illegible]	401	1.206	436	1.627	472	2.119	509	2.634	544	3.185	579	3.782	615	4.418	651	5.076
[illegible]	421	1.387	456	1.839	489	2.347	524	2.886	557	3.438	590	4.049	623	4.694	657	5.376
[illegible]	442	1.589	475	2.057	505	2.573	538	3.137	571	3.720	601	4.308	633	4.989	664	5.671
[illegible]	462	1.799	495	2.312	524	2.842	554	3.420	586	4.037	616	4.658	644	5.287	674	6.005
[illegible]	483	2.039	515	2.588	543	3.129	571	3.732	600	4.350	630	5.002	658	5.666	685	6.352
[illegible]	503	2.287	535	2.886	562	3.435	588	4.052	616	4.704	645	5.387	672	6.058	698	6.755
[illegible]	524	2.569	555	3.206	582	3.784	607	4.414	632	5.066	659	5.765	686	6.467	712	7.195
[illegible]	546	2.890	576	3.567	601	4.144	626	4.797	649	5.471	675	6.190	701	6.923	726	7.653
[illegible]	567	3.220	596	3.935	621	4.548	645	5.203	667	5.886	691	6.623	716	7.400	741	8.163
[illegible]	589	3.594	617	4.335	641	4.978	664	5.632	686	6.349	708	7.106	732	7.890	756	8.695
[illegible]	611	3.995	637	4.738	661	5.435	684	6.124	705	6.836	726	7.607	748	8.399	771	9.236
[illegible]	633	4.426	657	5.167	682	5.946	704	6.646	724	7.348	745	8.155	765	8.963	787	9.799
[illegible]	656	4.910	678	5.647	702	6.461	724	7.198	744	7.918	764	8.729	783	9.549	803	10.386
[illegible]	678	5.405	699	6.156	723	7.034	744	7.780	763	8.502	783	9.331	802	10.185	820	11.036
[illegible]	700	5.932	719	6.668	743	7.595	764	8.393	783	9.150	802	9.960	820	10.810	838	11.699
[illegible]	722	6.492	740	7.237	764	8.210	784	9.038	803	9.831	821	10.625	839	11.502	857	12.427
[illegible]	744	7.088	762	7.870	784	8.825	805	9.752	823	10.545	841	11.375	859	12.267	876	13.184
[illegible]	767	7.749	783	8.507	804	9.471	825	10.465	843	11.294	861	12.160	878	13.021	895	13.974
[illegible]	789	8.419	805	9.212	825	10.185	846	11.248	864	12.120	881	12.981	898	13.876	914	14.974
[illegible]	811	9.127	827	9.956	846	10.935	866	12.002	884	12.942	901	13.839	917	14.722	933	15.648
[illegible]	834	9.909	849	10.740	866	11.682	886	12.791	905	13.847	921	14.734	937	15.653	953	16.604
[illegible]	856	10.698	871	11.565	887	12.505	907	13.660	925	14.746	941	15.668	957	16.623	973	17.611
[illegible]	878	11.528	893	12.431	908	13.367	927	14.521	946	15.726	962	16.694	977	17.633	993	18.658
[illegible]	901	12.442	915	13.341	929	14.268	948	15.468	966	16.667	982	17.710	998	18.741	1013	19.747
[illegible]	923	13.359	937	14.294	951	15.258	968	16.405	986	17.647	1003	18.823	1018	19.836	1033	20.879
[illegible]	946	14.367	960	15.341	973	16.294	989	17.433	1007	18.721	1023	19.925	1038	20.973	1053	22.053
[illegible]	968	15.376	982	16.387	995	17.377	1010	18.504	1027	19.781	1044	21.102	1059	22.217	1073	23.272
[illegible]	991	16.482	1004	17.482	1017	18.508	1031	19.619	1048	20.941	1064	22.246	1079	23.445	1093	24.535
[illegible]	1013	17.588	1026	18.624	1039	19.687	1052	20.779	1068	22.085	1084	23.431	1100	24.785	1114	25.914
[illegible]	1036	18.797	1048	19.816	1061	20.917	1073	21.985	1089	23.335	1105	24.727	1120	26.090		

(RPM)	STATIC PRESSURE IN INCHES W.G. 2¼" RPM	2¼" BHP	2½" RPM	2½" BHP	2¾" RPM	2¾" BHP	3" RPM	3" BHP	3½" RPM	3½" BHP	4" RPM	4" BHP	4½" RPM	4½" BHP	5" RPM	5" BHP
[illegible]	725	7.522	752	8.321	778	9.112	806	9.964	861	11.707						
[illegible]	736	7.912	762	8.728	788	9.572	814	10.448	866	12.218	918	14.033				
[illegible]	751	8.434	774	9.195	799	10.058	823	10.908	873	12.732	923	14.623	972	16.527		
[illegible]	765	8.943	788	9.736	810	10.532	834	11.438	881	13.277	930	15.252	977	17.188		
[illegible]	779	9.472	802	10.296	824	11.127	846	11.996	891	13.863	937	15.846	983	17.889	1029	19.952
[illegible]	794	10.058	817	10.916	838	11.738	859	12.602	902	14.476	945	16.437	990	18.551	1034	20.696
[illegible]	809	10.669	831	11.519	853	12.414	873	13.266	914	15.129	955	17.111	997	19.211	1041	21.448
[illegible]	825	11.304	846	12.186	867	13.071	888	13.999	927	15.835	967	17.852	1007	19.960	1048	22.192
[illegible]	841	11.949	861	12.864	882	13.797	902	14.710	941	16.607	978	18.545	1017	20.710	1057	22.992
[illegible]	857	12.617	877	13.565	897	14.548	917	15.494	956	17.458	992	19.408	1029	21.538	1066	23.768
[illegible]	874	13.346	893	14.292	913	15.319	932	16.306	970	18.280	1006	20.292	1041	22.385	1077	24.637
[illegible]	893	14.139	910	15.094	929	16.107	947	17.108	985	19.186	1021	21.263	1055	23.356	1089	25.566
[illegible]	911	14.914	927	15.890	945	16.921	963	17.955	999	20.061	1035	22.200	1069	24.355		
[illegible]	930	15.770	946	16.780	962	17.818	980	18.887	1014	21.023	1050	23.231	1084	25.451		
[illegible]	949	16.658	965	17.703	980	18.728	996	19.792	1030	21.994	1064	24.224				
[illegible]	969	17.634	984	18.661	999	19.721	1013	20.752	1046	22.994	1079	25.315				
[illegible]	988	18.593	1003	19.654	1018	20.748	1032	21.813	1063	24.093						
[illegible]	1007	19.601	1022	20.682	1037	21.812	1051	22.912	1079	25.156						

Performance shown is for Dynamo units with outlet ducts. BHP ratings do not include drive losses.

Sound Power Data

nce ıy mechanical process transmits some sound energy o th air, fans will create some noise. This noise is a func- n of many different factors in the fan's design, construc- n ar application. Because of the great number of factors luer ing sound output, it is invalid to compare fans based RP , tip speed or outlet velocity. The only accurate basis cor arison is the sound power level generated by the ı at e required point of operation.

ıvin sound power levels for a specific fan at specific erat g points allows the system designer to determine the ore al sound pressure level at any point in the occupied ace AMCA Publication 303-79 and the ASHRAE Guides ovic more information on this process. Another typical plic ion of sound power levels is to compare similar fans ing onsidered for a specific application. As a general rule unc ower level differences of 6 dB in the 63 Hz band and dB ı all other bands are not considered significant.

ste designers use many methods to predict acoustic cep bility of an occupied space. The A-weighted sound ess e level provides a single number that corresponds ll t the human judgment of relative loudness. OSHA ses equirements regarding exposure to noise on A- igh d sound pressure levels. The disadvantage of this eth is that A-weighted sound pressure levels do not provide information as to the quality of the sound. NC (Noise Criteria) curves are also widely used. To determine the NC level, the sound power spectrum is compared to defined limits. Like A-weighted sound pressure levels, NC values give no information on the quality of sound. Other methods include RC curves, Sones, SIL and Noise Rating Curves.

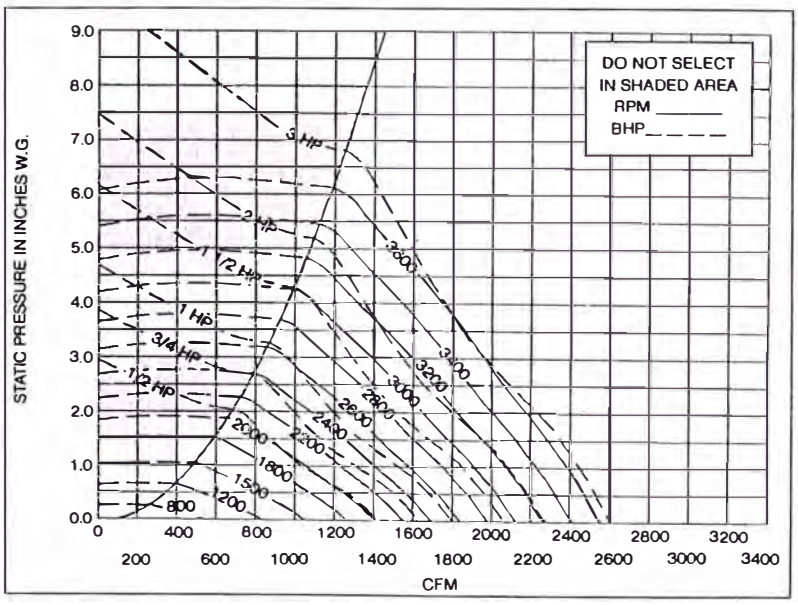
Each method relies on sound pressure level information because the human ear "hears" sound pressure fluctuations not sound power (Watts). Sound pressure is a function of the attenuation of the space and the distance from the source. To illustrate this concept, consider a 100 Watt light bulb. It provides adequate light for a closet, but not a classroom. And in a stadium it would be virtually imperceptible. While the light source was the same power (100 Watts), the brightness level changed dramatically. Similarly the same sound power level (acoustical energy) can produce greatly different sound pressure levels (noise).

Sound power levels shown in this catalog were measured and certified using AMCA Standard 300-85 Reverberant Room Method for Sound Testing of Fans. The values shown are for the eight octave bands defined in this standard which agree with the definitions in ANSI S1.11-1986. 1/3 octave band sound power levels are available on request. The sound power levels shown are rated in decibels (dB) using 10^{-12} Watts as a reference.

Performance Curves

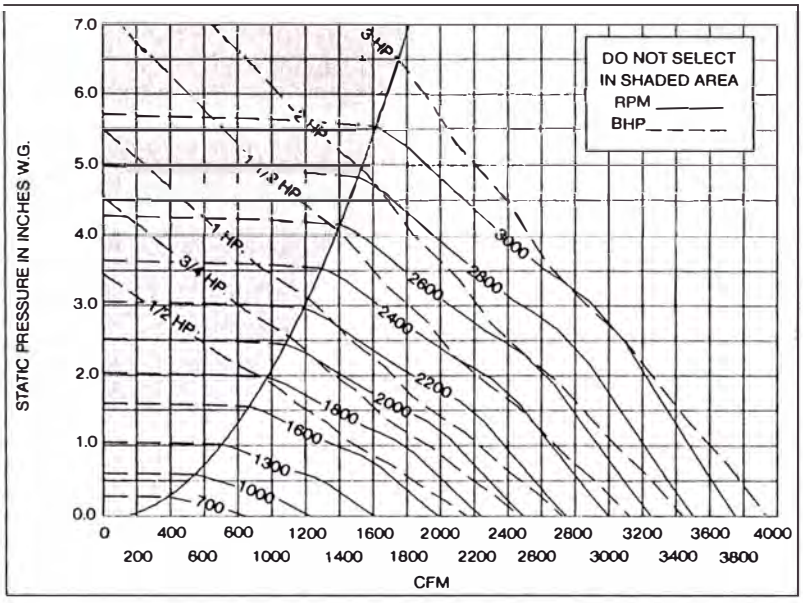
nan fan curves are based on laboratory tests conducted coc dance with AMCA standards. Fan curves show shaded d u shaded areas and selection must be made from sha ed area only. The shaded area reflects unstable per- ma e characteristics and should be avoided.

E: D amo fans are one component of a system. As such, fan performance is tly e cted by that system. It is critical that system designers determine the d sys n losses to ensure that the actual flow is as specified in the system design.

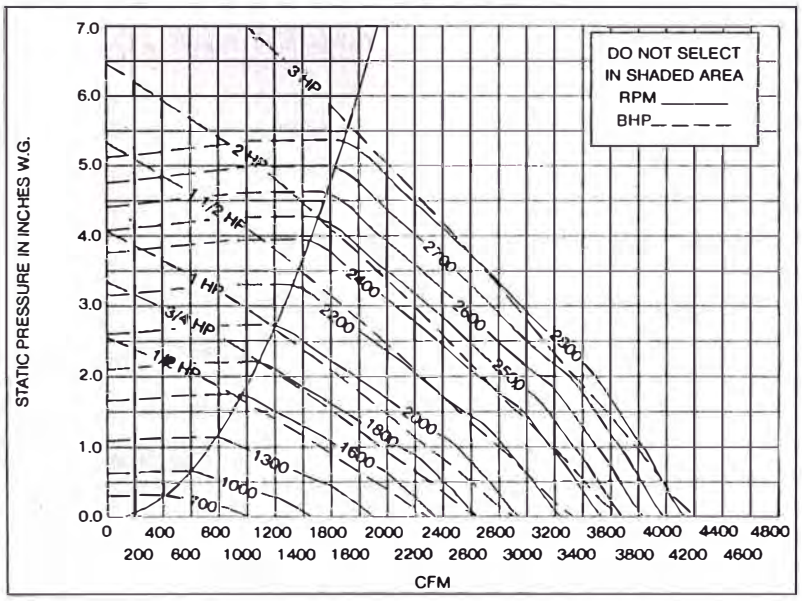


D10

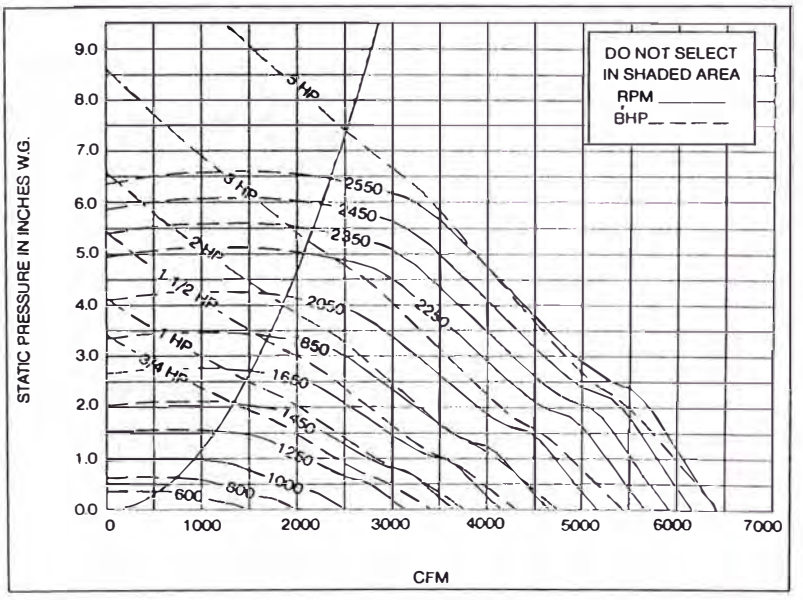
D12


STATIC PRESSURE IN INCHES W.G.
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
1/2 HP
3000
2800
2600
2400
2200
2000
1800
1600
1300
1000
700
DO NOT SELECT
IN SHADED AREA
RPM _____
BHP_ _ _ _
0 400 600 1200 1600 2000 2400 2800 3200 3600 4000
200 600 1000 1400 1800 2200 2600 3000 3400 3800
CFM

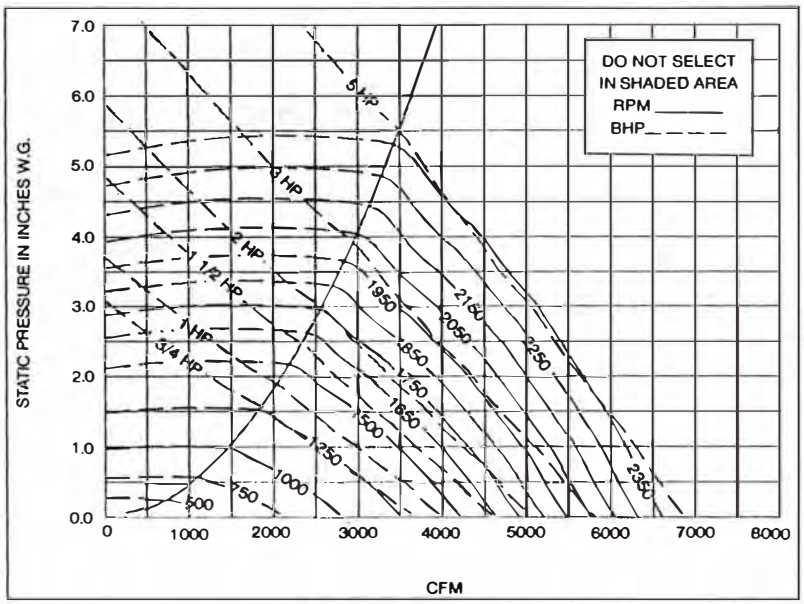
D13


STATIC PRESSURE IN INCHES W.G.
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
1/2 HP
2700
2600
2500
2400
2300
2200
2000
1800
1600
1300
1000
700
DO NOT SELECT
IN SHADED AREA
RPM _____
BHP_ _ _ _
0 400 600 1200 1800 2000 2400 2800 3200 3600 4000 4400 4800
200 600 1000 1400 1600 2200 2600 3000 3400 3800 4200 4600
CFM

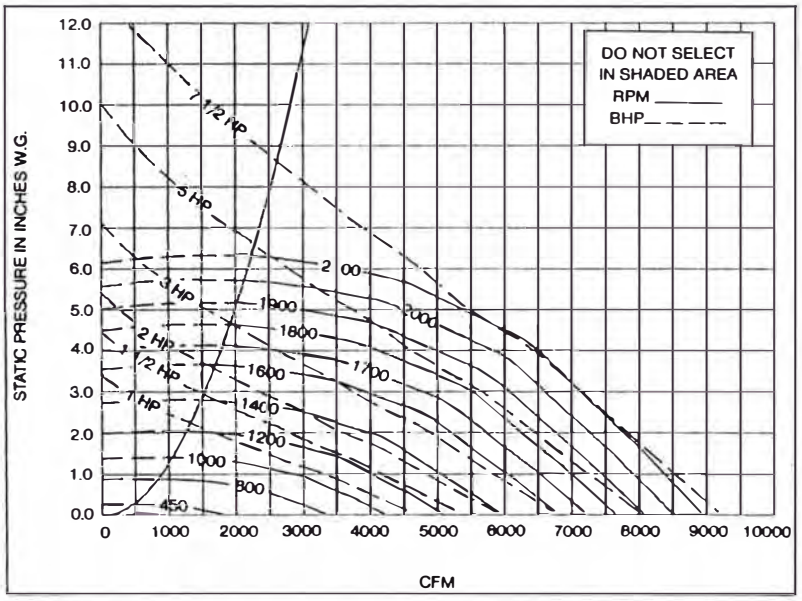
D15


STATIC PRESSURE IN INCHES W.G.
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
2550
2450
2350
2250
2050
1850
1650
1450
1250
1000
800
600
DO NOT SELECT
IN SHADED AREA
RPM _____
BHP_ _ _ _
0 1000 2000 3000 4000 5000 6000 7000
CFM

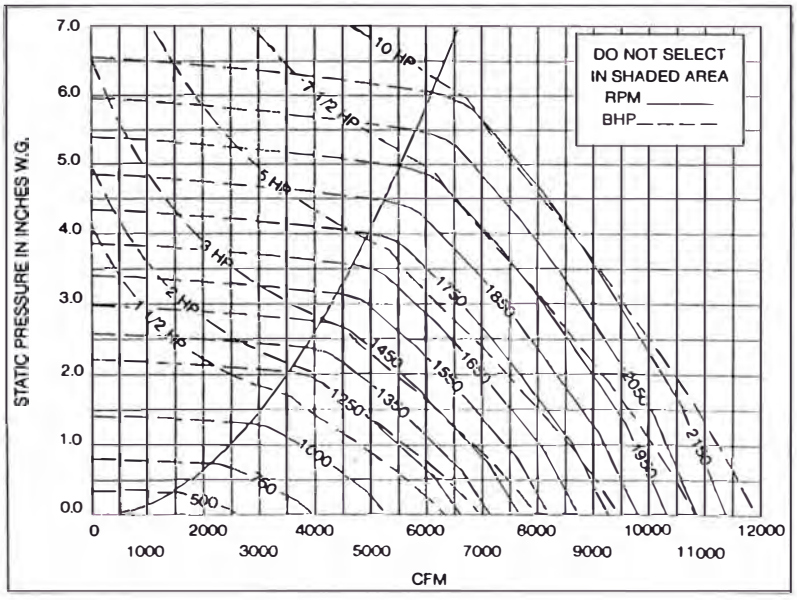
D16


STATIC PRESSURE IN INCHES W.G.
CFM
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
500
750
1000
1250
1500
1650
1750
1850
1950
2050
2150
2250
2350

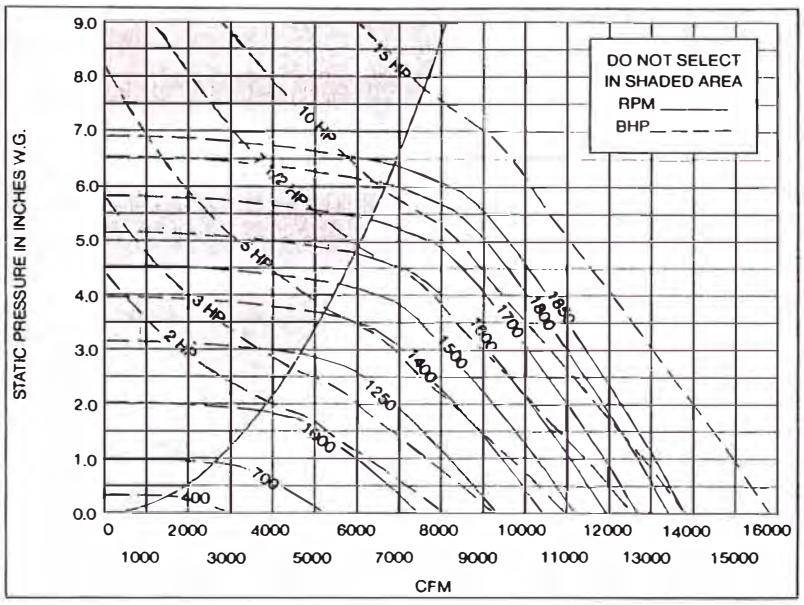
D18


STATIC PRESSURE IN INCHES W.G.
CFM
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _
1 1/2 HP
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
450
800
1000
1200
1400
1600
1700
1800
1900
2000

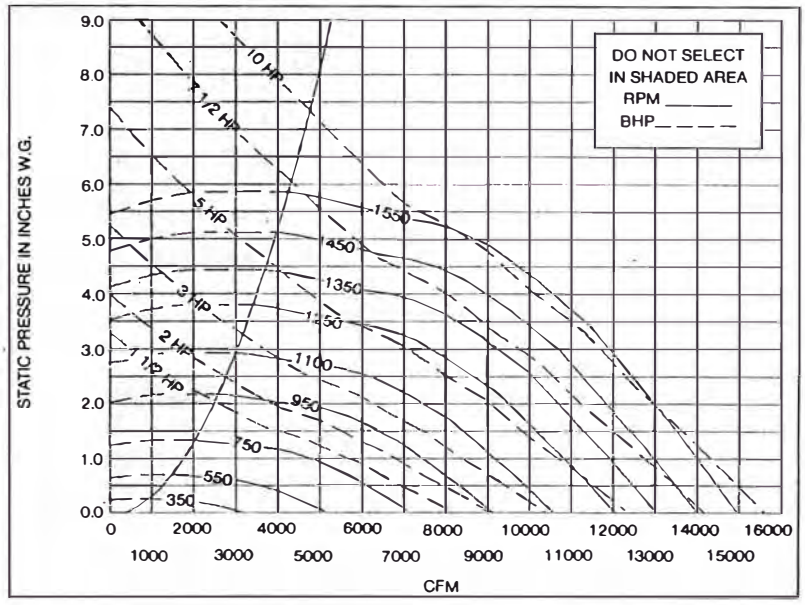
D20


STATIC PRESSURE IN INCHES W.G.
CFM
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _
10 HP
7 1/2 HP
5 HP
3 HP
2 HP
1 1/2 HP
500
750
1000
1250
1300
1450
1550
1650
1750
1850
1950
2050
2150

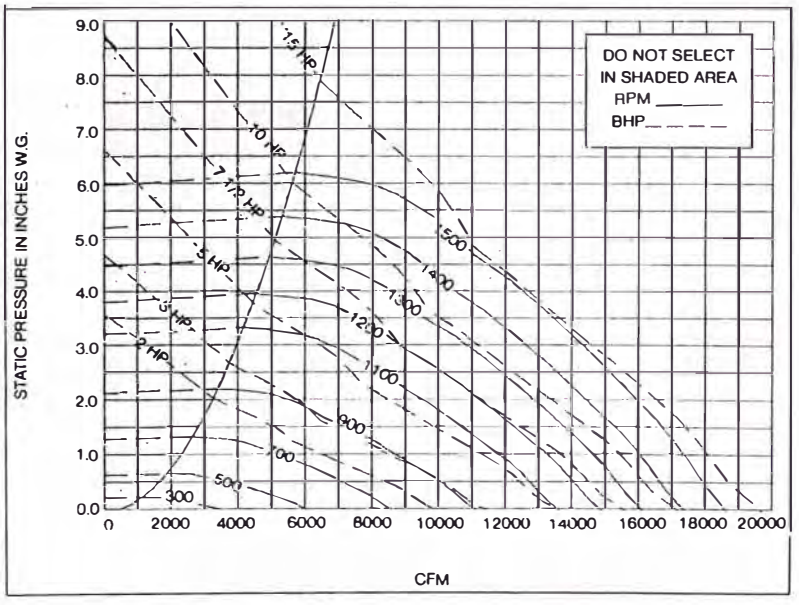
D22


STATIC PRESSURE IN INCHES W.G.
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _
15 HP
10 HP
7 1/2 HP
5 HP
3 HP
2 HP
1850
1700
1600
1500
1400
1250
1000
700
400
0 2000 4000 6000 8000 10000 12000 14000 16000
1000 3000 5000 7000 9000 11000 13000 15000
CFM

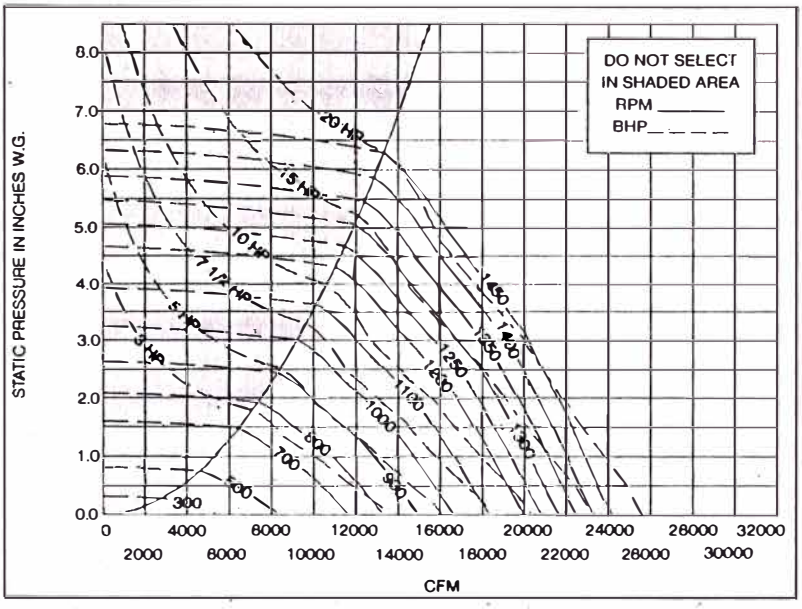
D24


STATIC PRESSURE IN INCHES W.G.
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _
10 HP
7 1/2 HP
5 HP
3 HP
2 HP
1 1/2 HP
1550
1450
1350
1250
1100
950
750
550
350
0 2000 4000 6000 8000 10000 12000 14000 16000
1000 3000 5000 7000 9000 11000 13000 15000
CFM

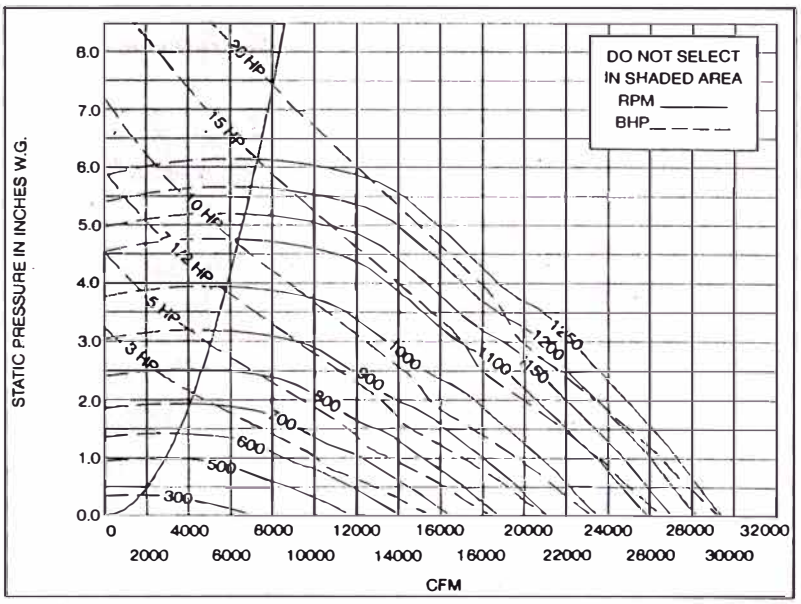
D27


STATIC PRESSURE IN INCHES W.G.
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _
15 HP
10 HP
7 1/2 HP
5 HP
3 HP
2 HP
1500
1400
1300
1200
1100
900
700
500
300
0 2000 4000 6000 8000 10000 12000 14000 16000 18000 20000
CFM

D30


STATIC PRESSURE IN INCHES W.G.
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _ _
20 HP
15 HP
10 HP
7 1/2 HP
5 HP
3 HP
1450
1400
1350
1250
1200
1100
1000
900
800
700
600
500
300
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0
0 4000 8000 12000 16000 20000 24000 28000 32000
2000 6000 10000 14000 18000 22000 26000 30000
CFM

D33


STATIC PRESSURE IN INCHES W.G.
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _ _
20 HP
15 HP
10 HP
7 1/2 HP
5 HP
3 HP
1250
1200
1150
1100
1000
900
800
700
600
500
300
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0
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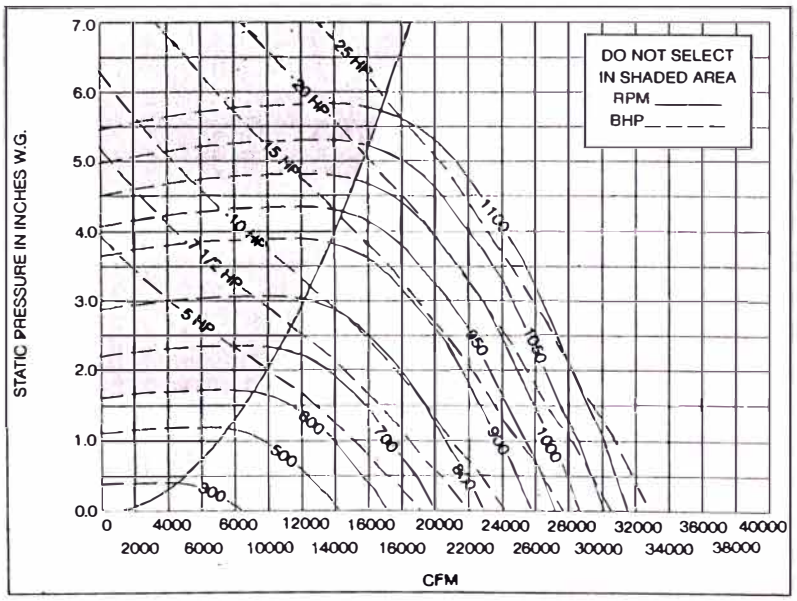
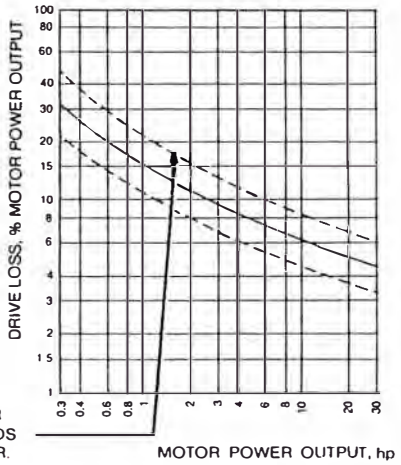
2000 6000 10000 14000 16000 22000 26000 30000
CFM

D36


STATIC PRESSURE IN INCHES W.G.
DO NOT SELECT IN SHADED AREA
RPM _____
BHP_ _ _ _ _
25 HP
20 HP
15 HP
10 HP
7 1/2 HP
5 HP
1100
1050
1000
950
900
850
800
700
500
300
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0
0 4000 6000 12000 16000 20000 24000 28000 32000 36000 40000
2000 6000 10000 14000 16000 22000 26000 30000 34000 38000
CFM

Belt Drive Losses

MC/ Review Committee has developed the chart her for the purpose of estimating belt drive losses. cula total BHP (including drive losses): Find the of yc operating point on the X-Axis of the chart. the ertical line to the lines indicating the range of osse Look at the Y-Axis on the left and find the drive erce age. Calculate the total BHP by adding the oss the operating point BHP. For BHP's below 3,)%. (AUTION: For totally enclosed, explosion proof, spee and all 1.0 Service Factor motors, fan BHP not xceed motor rated HP. Note: Penn's computer ire, Insizer, calculates and includes the drive loss u. Fr e design tools from Penn Ventilator are desbel v.



RANGE OF DRIVE LOSS FOR STANDARD BELTS. HIGHER FAN SPEEDS TEND TO HAVE HIGHER LOSSES THAN LOWER FAN SPEEDS AT THE THE SAME HORSEPOWER.

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t of u r friendly features includes online help, onscreen uct d wings and dimensions, and complete text specons- each at the touch of a single key. In addition you onv your job schedules to ASCII code for use with pro ams like word processing.

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Engineering Data

The following section includes engineering and technical data, guidelines and system explanations related to air moving and control devices. Fan laws and system descriptions are consistent with industry standards, definitions and accepted practices. It is provided to assist system designers in sizing, selecting and defining their air moving and control systems as well as explaining variables inherent in system design.

FLOW AND STATIC PRESSURE

For any change in static pressure (SP), a squared relationship is applied to the flow ratio. This is expressed by the formula:

$$\frac{P_2}{P_1} = \left(\frac{CFM_2}{CFM_1}\right)^2$$

Where P_1 is the original static pressure,
P_2 is the desired static pressure,
CFM_1 is the original flow rate in cu.ft. per minute, and
CFM_2 is the desired flow rate in cu.ft. per minute.

This formula is based upon performance of a fan at one point on a system. This data can be used to calculate a fan performance curve indicative of all points from 0" SP (maximum flow) to maximum SP (0 flow).

$$\frac{CFM_2}{CFM_1} = \frac{RPM_2}{RPM_1} \qquad \frac{P_2}{P_1} = \left(\frac{CFM_2}{CFM_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{CFM_2}{CFM_1}\right)^3$$

$$\frac{CFM_2}{CFM_1} = \frac{RPM_2}{RPM_1} \qquad \frac{P_2}{P_1} = \left(\frac{RPM_2}{RPM_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{RPM_2}{RPM_1}\right)^3$$

AIR SYSTEMS

An air system may consist simply of fan with ducting connected to either the inlet or discharge or to both. A more complicated system may include a fan, ductwork, air control dampers, cooling coils, heating coils, filters, diffusers, noise attenuators, turning vanes, etc. The fan is the component in the system which provides energy to the airstream to overcome the resistance to flow of the other components.

COMPONENT LOSSES

Every system has a combined resistance to flow which is usually different from every other system and is dependent upon the individual components in the system.

The determination of the "pressure loss" or "resistance to flow", for the individual components can be obtained from the component manufacturers. The determination of pressure losses for ductwork and branch piping design is well documented in standard handbooks such as the ASHRAE Handbook of Fundamentals and SMACNA Duct Design Manual.

THE SYSTEM CURVE

At a fixed volume flow rate (CFM) through a given air system a corresponding pressure loss, or resistance to this flow, will exist. If the flow rate is changed, the resulting pressure loss, or resistance to flow, will also change. The relationship governing this change for most systems is:

$$PRESSURE_c / PRESSURE = (Q_c / Q)^2$$

Q = CFM $\qquad$ $_c$= change

INTERACTION OF THE SYSTEM CURVE AND THE FAN PERFORMANCE CURVE

If the system characteristic curve, composed of the resistance to flow of the system and the appropriate System Effect Factors have been accurately determined, then the fan selected will develop the equivalent and necessary pressure to meet the system requirements; i.e. the fan will deliver the designated flow rate when installed in the system.

The point of intersection of the system curve and the fan performance curve determines the actual flow volume. If the system resistance has been accurately determined and the fan properly selected, their performance curves will intersect at the design flow rate. Refer to Figure 1. The normalized Duct System A from Figure 1 has been plotted with a normalized fan performance curve.

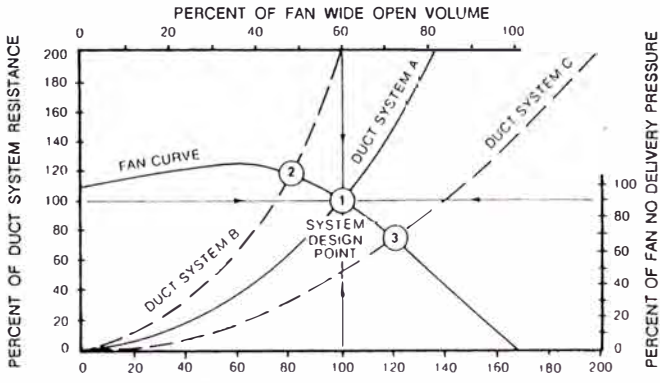

Figure 1. Interaction of System Curves and Fan Curve

The volume flow rate through the system in a given installation may be varied by changing the system resistance. This is usually accomplished by using fan dampers, duct dampers, mixing boxes, terminal units, etc. Figure 1 shows the volume flow rate may be varied from 100% design Q (Point 1, Duct System A), to approximately 80% of the design Q by increasing the resistance to flow, thus changing the system curve characteristics to Duct System B. This results in fan operation at Point 2 (the intersection of the fan curve and the new Duct System B). Similarly, the volume flow rate can be increased to approximately 120% of the design Q by decreasing the resistance to flow, thus changing the system curve characteristic to Duct System C. This results in fan operation at Point 3 (the intersection of the fan curve and the new Duct System C).

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EFFECT OF CHANGES IN SPEED

es or decreases in fan speed will alter the volume e through a system. Figure 2 illustrates the increase rate when the fan speed increases 10% to Point 2. % increase in flow rate, however, extracts a severe penalty. According to the fan laws (see below), the ncrease is 33%. This fact is often startling to the system er who finds a flow deficiency. Only 10% more air is d but the connected motor horsepower is not capable % increase in load. (Note that the increased power ments are the result of increased work done).

eater air volume flow rate moved by the fan against ulting higher system resistance to the flow is a measure ncreased work done. In the same system, the power ses as the cube of the speed ratio; the fan efficiency s the same at all points on the same system curve.

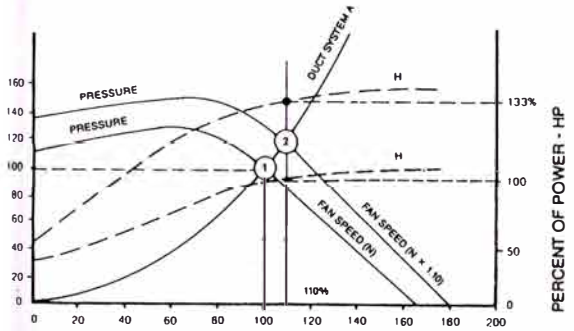

Figure 2. Effect of 10% Increase in Fan Speed

EFFECT OF CHANGE IN SPEED

Fan Size and Gas Density Remaining Constant)

e same size fan, $D_c = D$ and, therefore, $(D_c/D) = 1$. When ensity does not vary, $p_c = p$ and the density $(p_c/p) = 1$.

$$Q_c = Q\ (RPM_c / RPM)$$
$$P_{tc} = P_t\ (RPM_c / RPM)^2$$
$$P_{sc} = P_s\ (RPM_c / RPM)^2$$
$$P_{vc} = P_v\ (RPM_c / RPM)^2$$
$$HP_c = HP_c\ (RPM_c / RPM)^3$$

D = diameter
HP = horsepower
Q = CFM
P = static pressure
p = density

$_c$ = change
$_t$ = total
$_s$ = static
$_v$ = velocity

EFFECT OF DENSITY ON SYSTEM RESISTANCE

The resistance of a duct system is dependent upon the density of the gas flowing through the system. A gas density of 0.075 lb/ft³ is standard in the fan industry. Figure 3 illustrates the effect on the fan performance of a density variation from the standard value.

The pressure and horsepower vary directly as the ratio of the gas density at the fan inlet to standard density. This density ratio must always be considered when selecting fans from manufacturers' catalogs or curves.

EFFECT OF CHANGE ON DENSITY

(Fan Size and Speed Remaining Constant)

When the speed of the fan does not change, $RPM_c = RPM$ and, therefore $(RPM_c / RPM) = 1$. The fan size is also fixed, $D_c = D$ and therefore $(D_c / D) = 1$.

$$Q_c = Q$$
$$P_{tc} = P_t\ (p_c / p)$$
$$HP = HP\ (p_c / p)$$
$$P_{sc} = P_s\ (p_c / p)$$
$$P_{vc} = P_v\ (p_c / p)$$

D = diameter
HP = horsepower
Q = CFM
P = static pressure
p = density

$_c$ = change
$_t$ = total
$_s$ = static
$_v$ = velocity

See Table 1, which provides air density adustment factors, so fans can be selected to account for non-standard density. NOTE: Penn's Fansizer software can make density corrections for you.

Table 1. Unity Basis = Standard Air Density of .075 lb/ft³
At sea level (29.92 in. Hg barometric pressure) this is equivalent to dry air at 70° F.

AIR TEMP. °F	ALTITUDE IN FEET ABOVE SEA LEVEL												
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	15000	20000
	BAROMETRIC PRESSURE IN INCHES OF MERCURY												
	29.92	28.86	27.82	26.82	25.84	24.90	23.98	23.09	22.22	21.39	20.58	16.89	13.75
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.714	0.688	0.564	0.460
100	0.946	0.912	0.880	0.848	0.818	0.787	0.758	0.730	0.703	0.676	0.651	0.534	0.435
150	0.869	0.838	0.808	0.770	0.751	0.723	0.696	0.671	0.646	0.620	0.598	0.490	0.400
200	0.803	0.774	0.747	0.720	0.694	0.668	0.643	0.620	0.596	0.573	0.552	0.453	0.369
250	0.747	0.720	0.694	0.669	0.645	0.622	0.598	0.576	0.555	0.533	0.514	0.421	0.344
	AIR DENSITY RATIOS												

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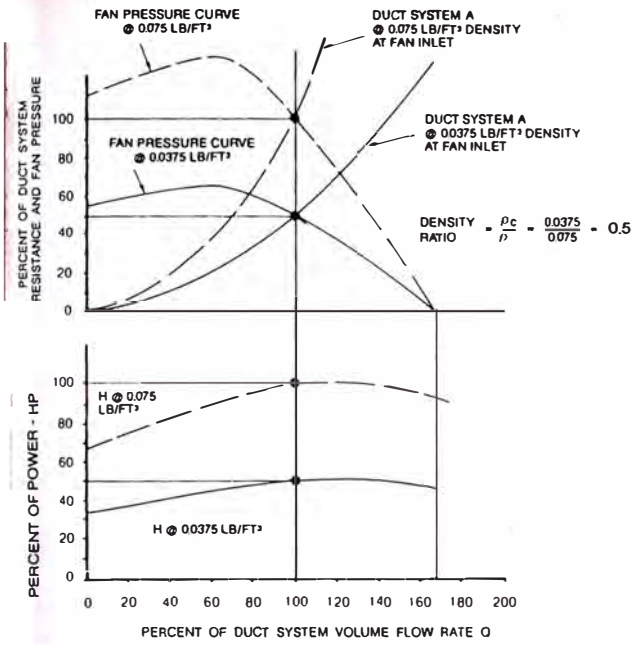

Figure 3. Density Effect

EFFECTS OF ERRORS IN ESTIMATING SYSTEM RESISTANCE

gher System Resistance. Actual Duct System B in Figure hows a situation where an actual system has more resis- ıce to flow than was calculated. This condition is generally e result of an inaccurate estimate of system resistance to w. All losses must be considered when calculating sys- n pressure losses or the final system will be more restric- e than designed; the actual flow rate will be less than pected, (Point 2). If the actual duct system pressure loss greater than design, an increase in fan speed may be cessary to achieve Point 5, the design volume flow rate. efore increasing fan speed, check with the fan manufac- er to determine if the speed can be safely increased. Also termine the expected increase in horsepower: power will crease as the cube of the speed and it is very easy to ceed the capacity of the connected motor and even the ailable electrical source.

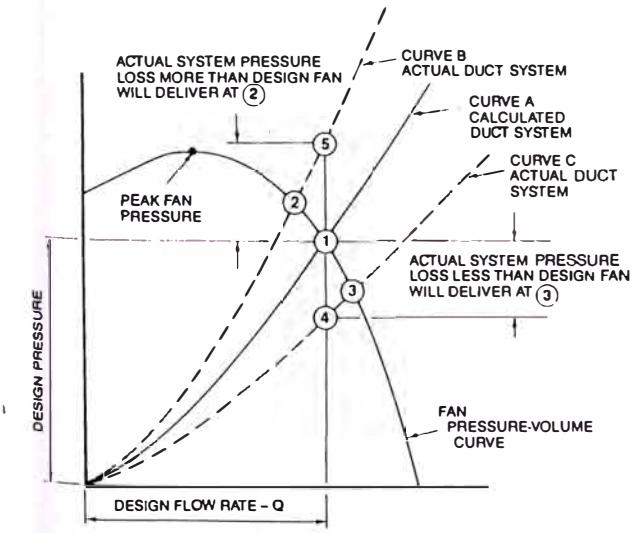

Figure 4. Fan/Duct System Curve not at Design Point

Lower System Resistance. Actual duct system C in Figure 4 shows a situation where a system has less resistance to flow than was expected; the actual flow rate will be more than expected, (Point 3).

SYSTEM EFFECT

Figure 5 illustrates deficient fan/system performance resulting from one or more undesirable flow conditions. It is assumed that the system pressure losses, shown in system curve A, have been accurately determined, and a suitable fan selected for operation at Point 1. However, no allowance has been made for the effect of the system connections on the fan's performance. To compensate for this System Effect it will be necessary to add a System Effect Factor (SEF) to the calculated system pressure losses to determine the actual system curve. The SEF for any given configuration is velocity dependent and will, therefore, vary across the range of flow volumes for the fan.

In Figure 5 the point of intersection between the fan performance curve and the actual system curve B is Point 4. The actual flow volume will, therefore, be deficient by the difference from 1-4. To achieve design flow volume a SEF equal to the pressure difference between Point 1 and 2 should have been added to the calculated system pressure losses and the fan selected to operate at Point 2. Note that because the System Effect is velocity related, the difference represented between Points 1 and 2 is greater than the difference between Points 3 and 4.

The SEF includes only the effect of the system configuration on the fan's performance.

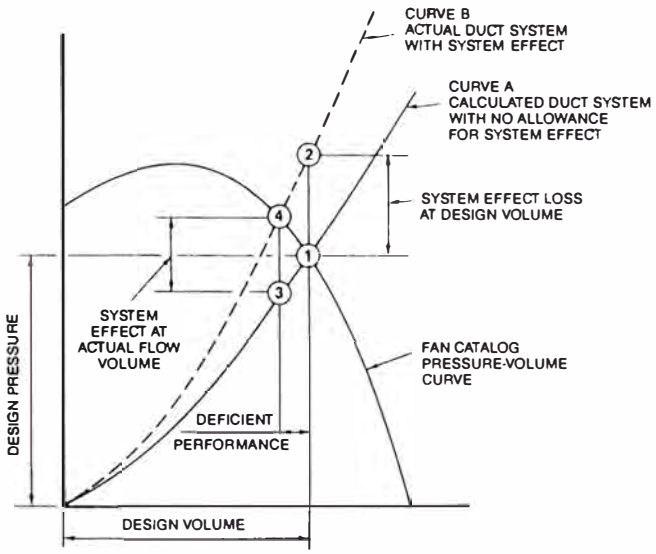

Figure 5. Deficient Fan/Duct System Performance, System Effect Ignored

SYSTEM EFFECT FACTOR

A System Effect Factor is a pressure loss which recognizes the effect of fan inlet restrictions, fan outlet restrictions, or other conditions influencing fan performance when installed in the system.

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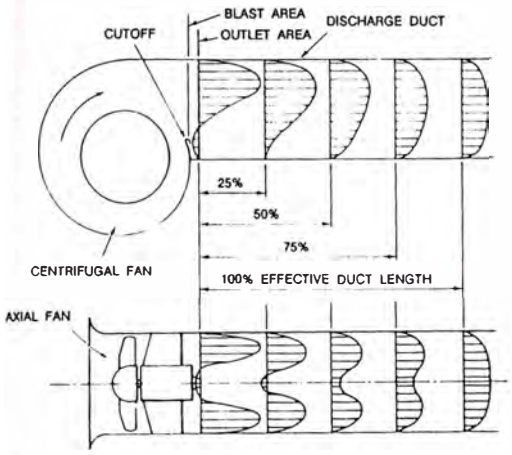
Outlet Ducts.



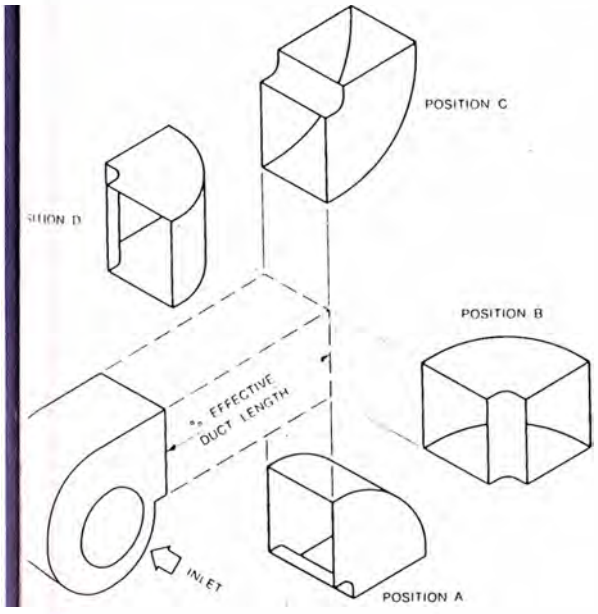
ULATE 100% EFFECTIVE DUCT LENGTH, ASSUME A MINIMUM OF 2½ DUCT DIAMETERS FPM OR LESS. ADD 1 DUCT DIAMETER FOR EACH ADDITIONAL 1000 FPM.

= 5000 FPM = 5 EQUIVALENT DUCT DIAMETERS. IF THE DUCT IS RECTANGULAR DIMENSIONS a AND b, THE EQUIVALENT DUCT DIAMETER IS EQUAL TO $(4ab/\pi)^{0.5}$

NTROLLED DIFFUSION AND ESTABLISHMENT OF A UNIFORM VELOCITY PROFILE IN A STRAIGHT LENGTH OF OUTLET DUCT

Figure 6. Fan Outlet Velocity Profiles

fugal Fans Outlet Duct Elbows. The outlet velocity of ugal fans is generally higher toward one or adjacent of the rectangular duct. If an elbow must be located ne fan outlet it should have a minimum radius to duct ter ratio of 1.5, and should be arranged to give the uniform airflow possible. Refer to Figure 7.



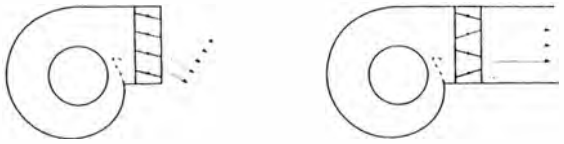
SWSI CENTRIFUGAL FAN SHOWN

Figure 7. Outlet Elbows on SWSI Centrifugal Fans

turning vanes. Turning vanes will usually reduce the pressure loss through an elbow. However, where a non-uniform approach velocity profile exists, such as at a fan outlet, the vanes may actually serve to continue the non-uniform profile beyond the elbow. This may result in increased losses in other system components downstream of the elbow.

Volume Control Dampers. Volume Control Dampers are manufactured with either "opposed" blades or "parallel" blades. When partially closed, the parallel bladed damper diverts the airstream to the side of the duct. This results in a non-uniform velocity profile beyond the damper and flow to branch ducts close to the downstream side may be seriously affected.

The use of an opposed blade damper is recommended when volume control is required at the fan outlet and there are other system components, such as coils or branch takeoffs downstream of the fan. When the fan discharges into a large plenum or to free space a parallel blade damper may be satisfactory. Refer to Figure 8.



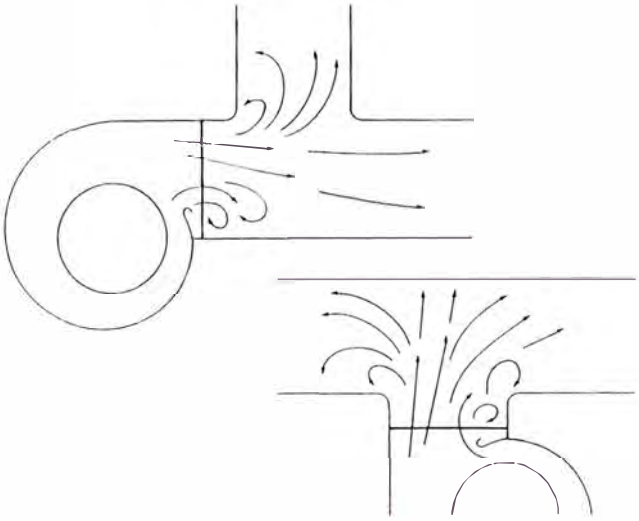
PARALLEL BLADED DAMPER ILLUSTRATING DIVERTED FLOW

OPPOSED BLADED DAMPER ILLUSTRATING NON-DIVERTED FLOW

Figure 8. Parallel Blade vs. Opposed Blade Dampers

Duct Branches. Standard procedures for the design of duct systems are all based on the assumption of uniform flow profiles in the system.

In Figure 9 branch takeoffs or splits are located close to the fan outlet. Non-uniform flow conditions will exist and pressure loss and airflow may vary widely from the design intent. Wherever possible a length of straight duct should be installed between the fan outlet and any split or branch takeoff.



AVOID LOCATION OF SPLIT OR DUCT BRANCH CLOSE TO FAN DISCHARGE. PROVIDE A STRAIGHT SECTION OF DUCT TO ALLOW FOR AIR DIFFUSION.

Figure 9. Branches Located Too Close to Fan

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INLET SYSTEM EFFECT FACTORS

inlet and non-uniform inlet flow can often be corrected nlet straightening vanes or guide vanes. Restricted fan ts located too close to walls, obstructions or restrictions sed by a plenum or cabinet will decrease the useable ormance of a fan. Cabinet clearance effect or plenum ct is considered a component part of the entire system; pressure losses through the cabinet or plenum must be sidered as a System Effect when determining system racteristics.

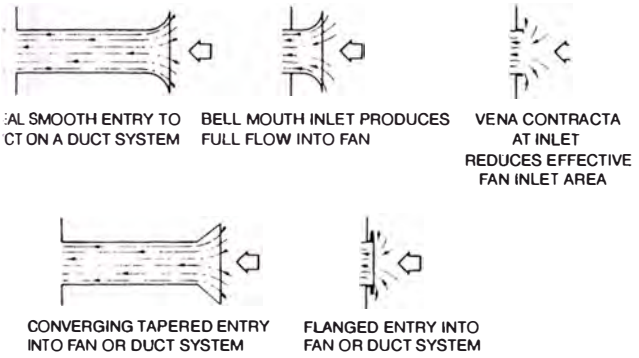


Figure 10. Typical Inlet Connections for Centrifugal and Axial Fans

INLET DUCT ELBOWS

n-uniform flow into a fan inlet is the most common cause leficient fan performance. An elbow located at, or in close ximity to the fan inlet will not allow the air to enter the peller uniformly. The result is less than catalogued air formance.

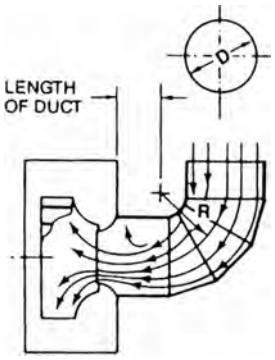


Figure 11a. Non-Uniform Flow into a Fan Inlet Induced by a 90°, 3-Piece Section Elbow—No Turning Vanes

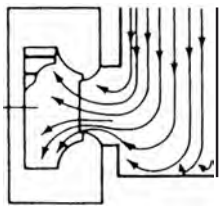


Figure 11b. Non-Uniform Flow Induced into Fan Inlet by a Rectangular Inlet Duct

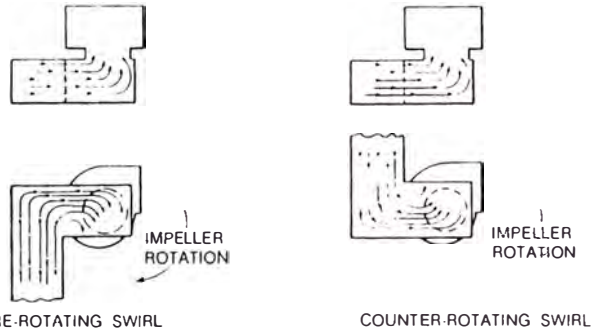
INLET VORTEX (SPIN OR SWIRL)

Another major cause of reduced performance is an inlet duct condition that produces a vortex or spin in the air-stream entering a fan inlet. An example of this condition is illustrated in Figure 12.

The ideal inlet condition is one which allows the air to enter axially and uniformly without spin in either direction. A spin in the same direction as the impeller rotation (pre-rotation) reduces the pressure volume curve by an amount dependent upon the intensity of the vortex. The effect is similar to the change in the pressure volume curve achieved by inlet vanes installed in a fan inlet; the vanes induce a controlled spin in the direction of impeller rotation reducing the volume flow rate.

A counter-rotating vortex at the inlet may result in a slight increase in the pressure-volume curve but the horsepower will increase substantially.

Figure 12. Inlet Duct Connections Causing Inlet Spin



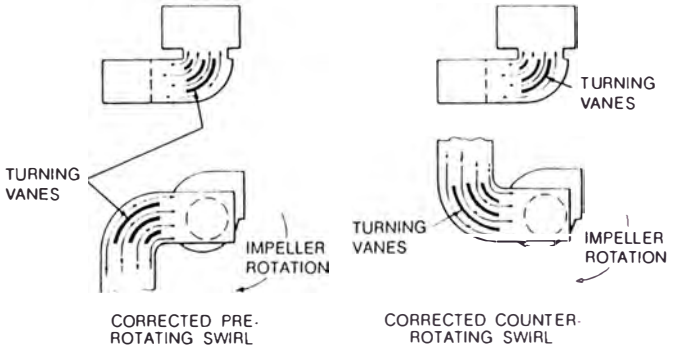
INLET TURNING VANES

Where space limitations prevent the use of optimum fan inlet connections, more uniform flow can be achieved by the use of turning vanes in the inlet elbow (see Figure 13).

Numerous variations of turning vanes are available from a single curved sheet metal vane to multi-bladed "airfoil" vanes.

The pressure drop through these devices must be added to the system pressure losses.

Figure 13. Corrections for Inlet Spin



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SIZE-A-DUCT

r-Cooled Single Package Cooling and
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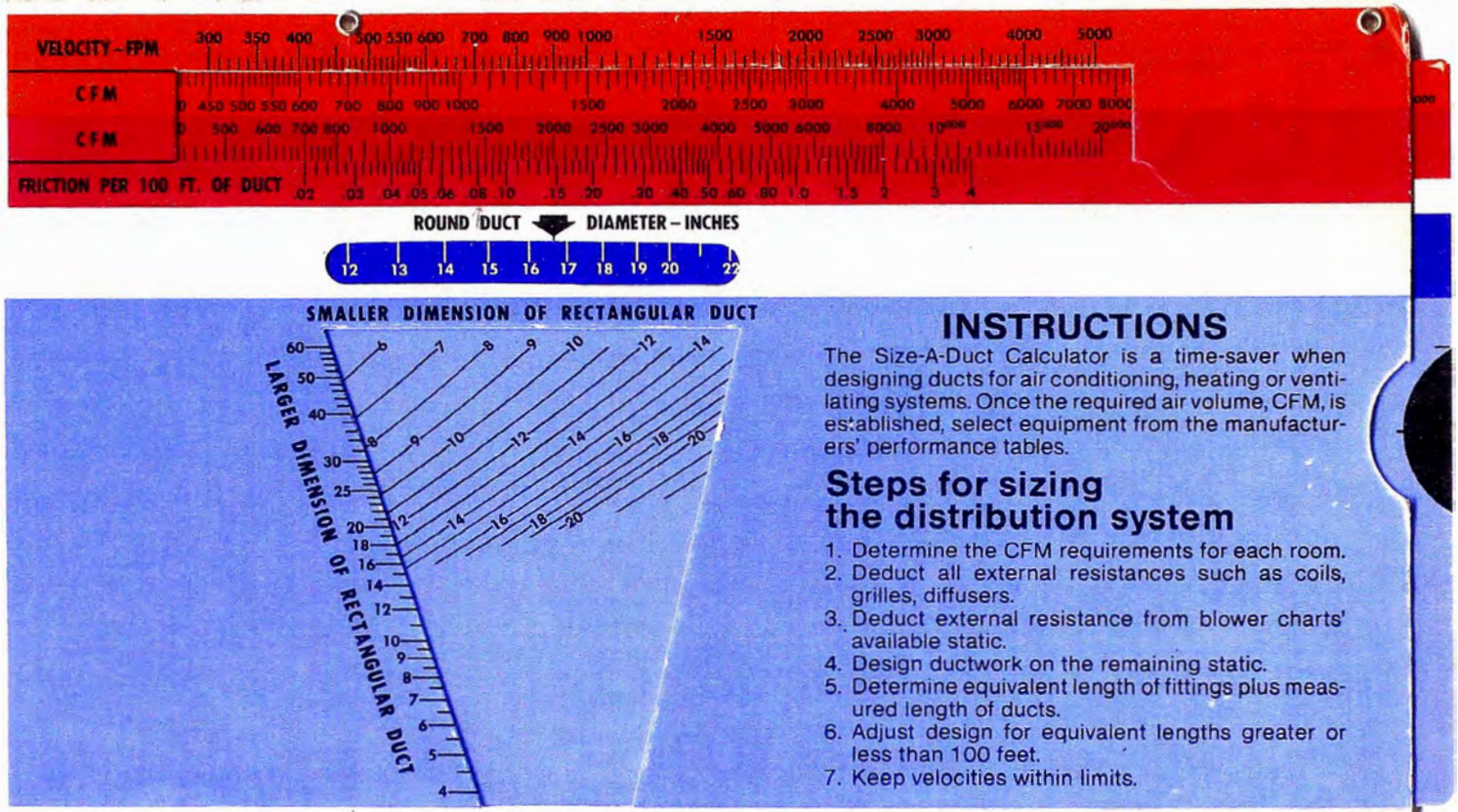

INSTRUCTIONS

The Size-A-Duct Calculator is a time-saver when designing ducts for air conditioning, heating or ventilating systems. Once the required air volume, CFM, is established, select equipment from the manufacturers' performance tables.

Steps for sizing the distribution system

1. Determine the CFM requirements for each room.
2. Deduct all external resistances such as coils, grilles, diffusers.
3. Deduct external resistance from blower charts' available static.
4. Design ductwork on the remaining static.
5. Determine equivalent length of fittings plus measured length of ducts.
6. Adjust design for equivalent lengths greater or less than 100 feet.
7. Keep velocities within limits.

HEATING AND AIR CONDITIONING PRODUCTS FOR RESIDENTIAL AND COMMERCIAL APPLICATIONS

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ADJUSTMENT OF DUCT DESIGN PRESSURE FOR EQUIVALENT LENGTH

CORRECTED PRESSURE DROP (FRICTION) PER 100 FT. DUCT LENGTH*

TOTAL PRESSURE DROP (in. of water column)

TOTAL EFF.	.05	.06	.08	.10	.125	.14	.16	.18	.20	.25	.30	.34	.375	.40	.50	.625	.75	1.00
14	.13	.15	.20	.25	.32	.35	.40	.45	.50	.63	.75	.85	.95	1.00	1.25	1.50	1.90	2.54
34	.10	.12	.16	.20	.25	.28	.32	.36	.40	.50	.60	.68	.76	.80	1.00	1.26	1.52	2.02
54	.08	.10	.13	.17	.21	.23	.27	.30	.33	.42	.50	.57	.63	.67	.83	1.05	1.26	1.68
74	.07	.09	.11	.14	.18	.20	.23	.26	.29	.36	.43	.49	.54	.57	.72	.90	1.00	1.44
94	.06	.08	.10	.13	.16	.18	.20	.23	.25	.31	.38	.43	.47	.50	.63	.79	.94	1.26
94	.06	.07	.09	.11	.14	.16	.18	.20	.22	.28	.33	.38	.42	.45	.56	.70	.84	1.12
04	.05	.06	.08	.10	.13	.14	.16	.18	.20	.25	.30	.33	.38	.40	.50	.63	.75	1.01
14	.05	.05	.07	.09	.11	.13	.15	.16	.18	.23	.28	.31	.34	.37	.47	.57	.69	.91
29	.04	.05	.07	.08	.10	.12	.13	.15	.17	.21	.25	.28	.31	.33	.46	.51	.62	.82
49	.04	.04	.06	.07	.09	.10	.11	.13	.14	.18	.21	.24	.27	.29	.36	.45	.54	.72
69	.03	.04	.05	.06	.08	.09	.10	.11	.13	.16	.19	.21	.24	.25	.31	.39	.47	.63
89	.03	.03	.04	.06	.07	.08	.09	.10	.11	.14	.17	.19	.21	.22	.28	.35	.42	.56
14	.03	.03	.04	.05	.06	.07	.08	.09	.10	.13	.15	.17	.19	.20	.25	.31	.37	.50
39	.02	.03	.04	.05	.05	.06	.07	.08	.09	.11	.13	.15	.17	.18	.22	.28	.33	.44
64	.02	.02	.03	.04	.05	.06	.06	.07	.08	.10	.12	.14	.15	.16	.20	.25	.30	.40
89	.02	.02	.03	.04	.04	.05	.06	.07	.07	.09	.11	.12	.14	.15	.18	.23	.27	.36
24	.02	.02	.03	.03	.04	.05	.05	.06	.07	.08	.10	.11	.12	.13	.17	.20	.24	.33
74	.02	.02	.02	.03	.04	.04	.05	.05	.06	.07	.09	.10	.11	.11	.14	.18	.21	.29
24	.01	.02	.02	.03	.03	.04	.04	.05	.05	.06	.08	.09	.09	.10	.13	.16	.19	.25
74	.01	.01	.02	.03	.03	.03	.04	.04	.05	.06	.07	.08	.08	.09	.11	.14	.17	.22
24	.01	.01	.02	.02	.03	.03	.03	.04	.04	.05	.06	.07	.08	.08	.10	.13	.15	.20
74	.01	.01	.02	.02	.02	.03	.03	.03	.04	.05	.06	.07	.07	.07	.09	.11	.14	.18
25	.01	.01	.01	.02	.02	.02	.03	.03	.03	.04	.05	.06	.06	.07	.08	.10	.13	.17

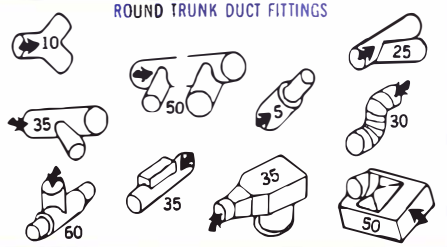
*Formula for Friction Loss (if not found in above table): Friction Loss Per 100 ft. = System design pressure x 100 / Total equiv. length of duct

NOTE: Scale on front of chart is for 100 ft. of duct. For greater or lesser equivalent lengths, use friction indicated in above table.

RECOMMENDED VELOCITIES IN FPM

DESIGNATION	SUPPLY				RETURN			
	RECOMMENDED		MAXIMUM		RECOMMENDED		MAXIMUM	
	RIGID	FLEX	RIGID	FLEX	RIGID	FLEX	RIGID	FLEX
Main Plenum	700	600	900	600	600	600	700	600
Branch Ducts	600	600	700	600	400	600	600	600
Registers, Diffusers and Grilles—Face Velocity	500		750		400		600	
Filter Grille—Face Velocity	—		—		300		300	

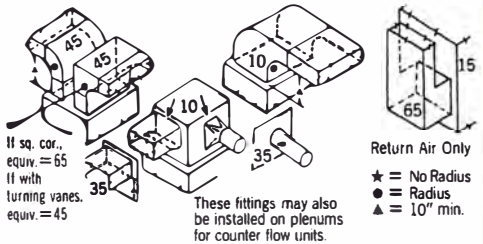
ROUND TRUNK DUCT FITTINGS



PLENUMS AND AIR DROPS

COMMONLY USED FITTINGS—CONNECTIONS ETC. AS INDICATED

NUMERALS INDICATE EQUIVALENT FEET OF STRAIGHT DUCT



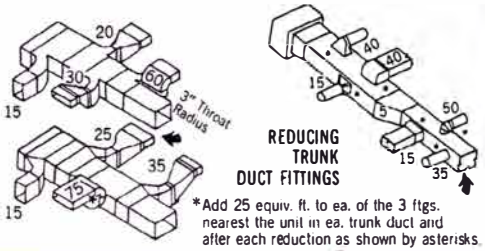
If sq. cor., equiv.=65
If with turning vanes, equiv.=45

These fittings may also be installed on plenums for counter flow units.

Return Air Only

★ = No Radius
● = Radius
▲ = 10" min.

EXTENDED PLENUM FITTINGS



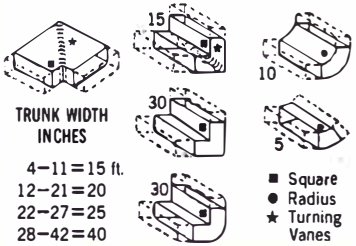
REDUCING TRUNK DUCT FITTINGS

*Add 25 equiv. ft. to ea. of the 3 ftgs. nearest the unit in ea. trunk duct and after each reduction as shown by asterisks.

ANGLES & ELBOWS FOR TRUNK DUCTS*

*(Inside Radius = 1/2 Width of Duct)

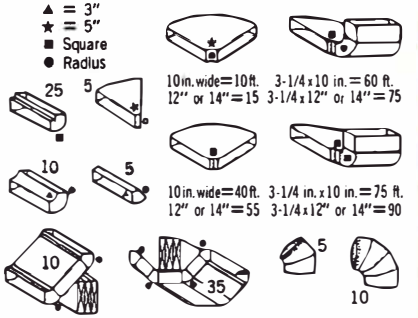
TRUNK WIDTH INCHES	TRUNK WIDTH INCHES	TRUNK WIDTH INCHES
4–11=10 ft.	4–15=5 ft.	4–6=20 ft.
12–21=15	16–27=10	7–11=40
22–27=20	28–41=15	12–15=55
28–33=25	42–52=20	16–21=75
34–42=30	53–64=25	22–27=100
43–51=40		28–33=125
52–64=50		34–42=150



TRUNK WIDTH INCHES
4–11=15 ft.
12–21=20
22–27=25
28–42=40

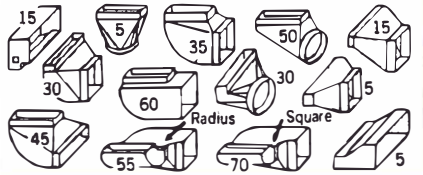
ANGLES & ELBOWS FOR INDIVIDUAL & BRANCH DUCTS

Inside Radius:
▲ = 3"
★ = 5"
■ Square
● Radius



BOOT FITTINGS

These values may also be used for floor diffuser boxes.



FORM NO. 501.00-PMIV (1288)

GRÁFICO 7. PÉRDIDA POR ROZAMIENTO EN CONDUCTO REDONDO

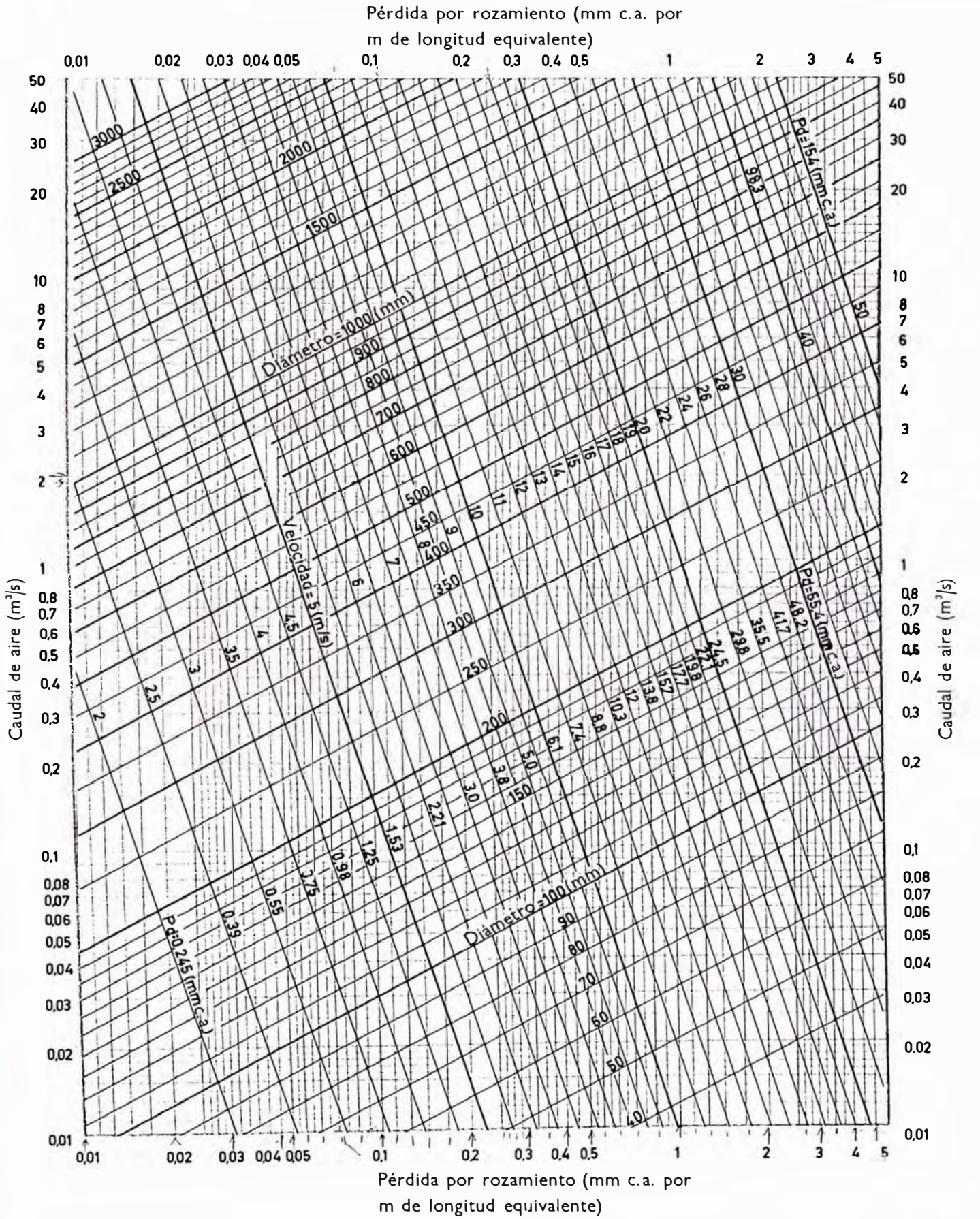


TABLA 6. DIMENSIONES DE CONDUCTOS. ÁREA DE LA SECCIÓN, DIÁMETRO EQUIVALENTE, Y TIPO DE CONDUCTO *

MEDIDAS DEL CONDUCTO (mm)	150		200		250		300		350		400		450		500		550	
	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)
250	0,036	213	0,048	249	0,06	287												
300	0,042	231	0,057	272	0,071	302	0,087	333										
350	0,048	249	0,067	292	0,084	328	0,103	361	0,119	389								
400	0,055	264	0,075	308	0,094	348	0,116	384	0,134	414	0,154	445						
450	0,061	280	0,084	328	0,106	368	0,129	407	0,151	439	0,173	470	0,196	501				
500	0,067	292	0,092	343	0,117	384	0,142	427	0,168	460	0,192	496	0,216	526	0,242	556		
550	0,072	305	0,10	358	0,128	404	0,156	447	0,184	485	0,21	518	0,238	551	0,284	582	0,292	612
600	0,078	315	0,107	371	0,139	422	0,169	465	0,198	503	0,229	541	0,257	574	0,288	607	0,316	638
650	0,082	326	0,118	384	0,149	435	0,182	483	0,214	524	0,246	561	0,278	597	0,31	630	0,341	664
700	0,088	335	0,123	396	0,158	450	0,193	498	0,229	541	0,285	582	0,301	620	0,333	655	0,368	689
750	0,093	346	0,13	409	0,168	465	0,205	514	0,244	559	0,283	602	0,32	640	0,36	677	0,392	711
800	0,099	356	0,137	419	0,179	478	0,218	529	0,28	576	0,301	620	0,341	661	0,381	698	0,418	734
850	0,105	366	0,146	432	0,188	490	0,23	544	0,274	592	0,318	637	0,36	678	0,404	719	0,443	756
900	0,109	374	0,153	442	0,198	504	0,242	556	0,288	607	0,336	656	0,378	696	0,424	736	0,467	775
950	0,113	381	0,18	452	0,208	516	0,255	572	0,303	622	0,352	671	0,398	714	0,448	757	0,494	798
1.000	0,118	389	0,167	463	0,216	526	0,267	585	0,318	637	0,368	686	0,418	732	0,469	775	0,517	816
1.050	0,123	396	0,172	470	0,225	536	0,276	595	0,33	650	0,384	701	0,436	747	0,492	793	0,54	834
1.100	0,128	404	0,18	480	0,233	546	0,288	607	0,343	662	0,401	716	0,453	762	0,513	810	0,563	852
1.150	0,132	412	0,186	488	0,242	556	0,298	618	0,359	678	0,416	729	0,472	777	0,534	825	0,586	869
1.200	0,137	419	0,193	498	0,25	567	0,31	630	0,373	691	0,43	742	0,491	793	0,553	841	0,611	887
1.250			0,196	506	0,26	577	0,32	641	0,384	701	0,448	757	0,51	808	0,573	856	0,633	903
1.300			0,205	514	0,27	587	0,33	651	0,398	714	0,463	770	0,53	824	0,594	871	0,656	915
1.350			0,212	521	0,276	595	0,343	664	0,41	724	0,478	782	0,546	836	0,614	896	0,679	935
1.400			0,218	531	0,286	605	0,354	674	0,422	734	0,492	793	0,563	849	0,636	902	0,702	951
1.450			0,225	536	0,296	615	0,365	684	0,434	744	0,507	806	0,58	862	0,654	915	0,724	965
1.500			0,237	544	0,303	622	0,376	694	0,448	756	0,523	819	0,602	876	0,673	927	0,747	983
1.600			0,244	559	0,32	640	0,392	709	0,472	778	0,548	841	0,636	902	0,714	956	0,79	1.008
1.700					0,336	656	0,415	729	0,497	798	0,58	862	0,665	923	0,752	981	0,831	1.034
1.800					0,355	674	0,436	746	0,527	820	0,61	885	0,697	946	0,786	1.004	0,876	1.063
1.900					0,38	696	0,454	762	0,543	834	0,632	900	0,735	971	0,824	1.029	0,923	1.088
2.000					0,384	701	0,478	782	0,57	854	0,67	925	0,766	991	0,853	1.052	0,961	1.113
2.100							0,502	800	0,594	876	0,698	946	0,792	1.008	0,9	1.075	0,998	1.133
2.200							0,517	813	0,615	887	0,73	966	0,827	1.030	0,934	1.095	1,035	1.152
2.300							0,535	828	0,64	905	0,753	982	0,868	1.055	0,962	1.113	1,081	1.177
2.400							0,546	839	0,65	920	0,778	996	0,898	1.070	0,999	1.130	1,118	1.200
2.500									0,685	937	0,787	1.020	0,907	1.080	1,045	1.165	1,138	1.210
2.600									0,704	951	0,824	1.030	0,94	1.105	1,072	1.172	1,202	1.240
2.700									0,731	966	0,852	1.045	0,952	1.119	1,11	1.194	1,238	1.261
2.800									0,75	981	0,88	1.063	1,005	1.135	1,138	1.205	1,275	1.278
2.900											0,908	1.078	1,040	1.158	1,165	1.222	1,32	1.303
3.000											0,925	1.090	1,068	1.168	1,21	1.248	1,33	1.308
3.100											0,94	1.105	1,1	1.185	1,238	1.260	1,387	1.331
3.200											0,953	1.120	1,12	1.197	1,277	1.279	1,432	1.353
3.300													1,158	1.216	1,302	1.292	1,48	1.368
3.400													1,186	1.231	1,334	1.310	1,498	1.380
3.500													1,22	1.241	1,352	1.321	1,525	1.397
3.600													1,23	1.252	1,397	1.344	1,551	1.414

* Los números de mayor tamaño que figuran en la tabla indican la clase de conducto.

TABLA 6. DIMENSIONES DE CONDUCTOS, ÁREA DE LA SECCIÓN, DIÁMETRO EQUIVALENTE Y TIPO DE CONDUCTO * (Cont.)

MEDIDAS DEL CONDUCTO (mm)	600		650		700		750		800		850		900		950		1.000	
	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*
250																		
300																		
350																		
400																		
450																		
500																		
550																		
600	0,346	*666*																
650	0,373	*692*	0,407	*722*														
700	0,401	*716*	0,437	*749*	0,472	*777*												
750	0,433	*745*	0,468	*775*	0,502	*803*	0,543	*834*										
800	0,457	*765*	0,497	*798*	0,536	*829*	0,576	*859*	0,618	*889*								
850	0,485	*788*	0,527	*823*	0,568	*854*	0,61	*884*	0,654	*914*	0,697	*944*						
900	0,517	*813*	0,549	*838*	0,603	*875*	0,646	*909*	0,692	*940*	0,736	*971*	0,783	*1.002*				
950	0,542	*834*	0,591	*869*	0,636	*903*	0,679	*934*	0,728	*966*	0,775	*996*	0,822	*1.028*	0,873	*1.057*		
1.000	0,569	*853*	0,622	893	0,668	*925*	0,714	*955*	0,767	*992*	0,816	*1.020*	0,864	*1.052*	0,914	*1.083*	0,972	*1.114*
1.050	0,597	*874*	0,65	*914*	0,702	*948*	0,752	*981*	0,803	*1.015*	0,853	*1.044*	0,907	*1.078*	0,963	*1.108*	1,018	*1.139*
1.100	0,624	*894*	0,679	*934*	0,733	*969*	0,786	*1.004*	0,840	*1.038*	0,89	*1.068*	0,952	*1.103*	1,0	*1.133*	1,054	*1.165*
1.150	0,652	*914*	0,706	*951*	0,764	*990*	0,818	*1.025*	0,877	*1.057*	0,934	*1.093*	0,99	*1.127*	1,045	*1.159*	1,1	*1.190*
1.200	0,675	*930*	0,736	*971*	0,794	*1.009*	0,856	*1.046*	0,915	*1.082*	0,972	*1.116*	1,027	*1.148*	1,092	*1.180*	1,148	*1.215*
1.250	0,702	*949*	0,764	*990*	0,823	*1.028*	0,89	*1.068*	0,953	*1.105*	1,008	*1.139*	1,072	*1.171*	1,128	*1.204*	1,2	*1.240*
1.300	0,728	*966*	0,792	*1.006*	0,856	*1.046*	0,924	*1.089*	0,99	*1.126*	1,054	*1.161*	1,118	*1.198*	1,175	*1.226*	1,248	*1.263*
1.350	0,755	*984*	0,818	*1.025*	0,89	*1.066*	0,963	*1.108*	1,018	*1,143*	1,092	*1.181*	1,165	*1.219*	1,22	*1.248*	1,295	*1.286*
1.400	0,779	*999*	0,848	*1.042*	0,92	*1.084*	0,99	*1.126*	1,055	*1.163*	1,128	*1.201*	1,2	*1.241*	1,268	*1.272*	1,34	*1.308*
1.450	0,798	*1.011*	0,877	*1.059*	0,952	*1.102*	1,018	*1.143*	1,092	*1.184*	1,165	*1.223*	1,238	*1.260*	1,312	*1.296*	1,388	*1.331*
1.500	0,822	*1.027*	0,902	*1.074*	0,97	*1.118*	1,055	*1.165*	1,128	*1.202*	1,2	*1.242*	1,275	*1.280*	1,35	*1.318*	1,435	*1.355*
1.600	0,872	*1.057*	0,952	*1.105*	1,035	*1.154*	1,118	*1.199*	1,192	*1.238*	1,275	*1.280*	1,358	*1.321*	1,432	*1.356*	1,525	*1.398*
1.700	0,923	*1.088*	1,008	*1.135*	1,091	*1.185*	1,183	*1.229*	1,267	*1.275*	1,35	*1.316*	1,441	*1.359*	1,525	*1.396*	1,616	*1.438*
1.800	0,961	*1.115*	1,063	*1.165*	1,147	*1.215*	1,248	*1.262*	1,331	*1.308*	1,423	*1.351*	1,515	*1.395*	1,608	*1.435*	1,692	*1.475*
1.900	0,998	*1.141*	1,108	*1.194*	1,21	*1.245*	1,302	*1.292*	1,396	*1.340*	1,498	*1.388*	1,599	*1.430*	1,692	*1.470*	1,785	*1.511*
2.000	1,063	*1.168*	1,165	*1.219*	1,267	*1.272*	1,359	*1.321*	1,46	*1.368*	1,572	*1.418*	1,673	*1.462*	1,775	*1.505*	1,875	*1.599*
2.100	1,108	*1.192*	1,22	*1.248*	1,312	*1.299*	1,423	*1.350*	1,525	*1.397*	1,636	*1.448*	1,748	*1.496*	1,858	*1.542*	1,96	*1.584*
2.200	1,155	*1.217*	1,266	*1.272*	1,368	*1.325*	1,488	*1.380*	1,598	*1.429*	1,71	*1.478*	1,821	*1.528*	1,932	*1.575*	2,042	*1.618*
2.300	1,192	*1.237*	1,312	*1.299*	1,433	*1.355*	1,543	*1.405*	1,665	*1.457*	1,775	*1.507*	1,895	*1.557*	2,015	*1.604*	2,128	*1.650*
2.400	1,228	*1.258*	1,368	*1.325*	1,469	*1.371*	1,59	*1.426*	1,72	*1.486*	1,821	*1.530*	1,95	*1.580*	2,095	*1.639*	2,22	*1.682*
2.500	1,285	*1.285*	1,386	*1.344*	1,545	*1.402*	1,655	*1.455*	1,775	*1.508*	1,905	*1.562*	1,998	*1.600*	2,165	*1.664*	2,293	*1.715*
2.600	1,35	*1.315*	1,46	*1.368*	1,58	*1.422*	1,72	*1.485*	1,84	*1.538*	1,98	*1.592*	2,095	*1.639*	2,228	*1.690*	2,365	*1.740*
2.700	1,368	*1.325*	1,498	*1.388*	1,627	*1.443*	1,775	*1.508*	1,895	*1.559*	2,035	*1.612*	2,17	*1.669*	2,293	*1.715*	2,45	*1.770*
2.800	1,396	*1.348*	1,552	*1.410*	1,692	*1.473*	1,82	*1.528*	1,95	*1.582*	2,08	*1.632*	2,265	*1.702*	2,375	*1.745*	2,505	*1.790*
2.900	1,46	*1.370*	1,6	*1.432*	1,747	*1.495*	1,878	*1.552*	2,035	*1.615*	2,17	*1.670*	2,295	*1.715*	2,425	*1.762*	2,605	*1.825*
3.000	1,497	*1.387*	1,645	*1.451*	1,793	*1.515*	1,932	*1.575*	2,095	*1.639*	2,235	*1.695*	2,41	*1.768*	2,515	*1.794*	2,683	*1.855*
3.100	1,535	*1.402*	1,7	*1.475*	1,83	*1.532*	1,995	*1.600*	2,145	*1.660*	2,33	*1.728*	2,45	*1.775*	2,605	*1.825*	2,735	*1.881*
3.200	1,58	*1.425*	1,738	*1.492*	1,878	*1.552*	2,06	*1.628*	2,19	*1.678*	2,37	*1.744*	2,525	*1.800*	2,655	*1.848*	2,79	*1.894*
3.300	1,608	*1.436*	1,785	*1.512*	1,922	*1.570*	2,09	*1.635*	2,265	*1.703*	2,43	*1.765*	2,61	*1.830*	2,765	*1.880*	2,855	*1.948*
3.400	1,655	*1.456*	1,822	*1.528*	1,978	*1.593*	2,125	*1.650*	2,32	*1.723*	2,485	*1.785*	2,65	*1.845*	2,82	*1.900*	3,015	*1.964*
3.500	1,71	*1.478*	1,877	*1.550*	2,06	*1.627*	2,23	*1.689*	2,395	*1.752*	2,545	*1.805*	2,715	*1.868*	2,915	*1.932*	3,095	*1.988*
3.600	1,738	*1.490*	1,905	*1.562*	2,095	*1.638*	2,29	*1.715*	2,43	*1.765*	2,61	*1.829*	2,765	*1.885*	2,955	*1.948*	3,14	*2.010*

* Los números de mayor tamaño que figuran en la tabla indican la clase de conducto.

TABLA 6. DIMENSIONES DE CONDUCTOS, ÁREA DE LA SECCIÓN, DIÁMETRO EQUIVALENTE, Y TIPO DE CONDUCTO * (Cont.)

MEDIDAS DEL CONDUCTO (mm)	1.050		1.100		1.150		1.200		1.250		1.300		1.350		1.400		1.450	
	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*	Sec. (m^2)	*Diám. equiv. (mm)*
1.050	1,065	*1.165*																
1.100	1,109	*1.190*	1,165	*1.222*														
1.150	1,155	*1.215*	1,21	*1.248*	1,276	*1.278*												
1.200	1,2	*1.240*	1,265	*1.275*	1,32	*1.302*	1,395	*1.336*										
1.250	1,248	*1.265*	1,322	*1.300*	1,378	*1.327*	1,452	*1.361*	1,505	*1.389*								
1.300	1,302	*1.290*	1,368	*1.325*	1,432	*1.352*	1,497	*1.388*	1,57	*1.418*	1,598	*1.444*						
1.350	1,349	*1.316*	1,42	*1.350*	1,486	*1.378*	1,55	*1.413*	1,625	*1.443*	1,69	*1.469*	1,773	*1.508*				
1.400	1,395	*1.339*	1,468	*1.375*	1,542	*1.403*	1,605	*1.435*	1,68	*1.468*	1,745	*1.495*	1,81	*1.523*	1,894	*1.555*		
1.450	1,45	*1.363*	1,525	*1.398*	1,588	*1.426*	1,66	*1.460*	1,735	*1.495*	1,81	*1.523*	1,885	*1.555*	1,948	*1.582*	2,03	*1.612*
1.500	1,495	*1.388*	1,57	*1.418*	1,645	*1.451*	1,718	*1.485*	1,8	*1.519*	1,875	*1.550*	1,948	*1.579*	2,014	*1.608*	2,076	*1.634*
1.600	1,597	*1.432*	1,67	*1.467*	1,755	*1.489*	1,828	*1.531*	1,912	*1.565*	1,995	*1.595*	2,07	*1.630*	2,145	*1.658*	2,028	*1.698*
1.700	1,69	*1.473*	1,782	*1.511*	1,855	*1.545*	1,95	*1.578*	2,025	*1.609*	2,115	*1.646*	2,195	*1.679*	2,28	*1.709*	2,355	*1.735*
1.800	1,792	*1.515*	1,875	*1.552*	1,975	*1.591*	2,05	*1.621*	2,135	*1.655*	2,235	*1.692*	2,315	*1.723*	2,41	*1.756*	2,505	*1.790*
1.900	1,885	*1.555*	1,975	*1.592*	2,07	*1.629*	2,16	*1.668*	2,265	*1.702*	2,355	*1.738*	2,44	*1.769*	2,54	*1.802*	2,67	*1.850*
2.000	1,975	*1.592*	2,07	*1.630*	2,17	*1.668*	2,27	*1.708*	2,374	*1.745*	2,475	*1.782*	2,595	*1.825*	2,66	*1.848*	2,78	*1.885*
2.100	2,07	*1.629*	2,17	*1.670*	2,28	*1.708*	2,385	*1.748*	2,485	*1.785*	2,595	*1.825*	2,69	*1.858*	2,79	*1.892*	2,91	*1.932*
2.200	2,15	*1.660*	2,26	*1.702*	2,375	*1.745*	2,485	*1.785*	2,595	*1.825*	2,715	*1.863*	2,825	*1.900*	2,93	*1.938*	3,02	*1.970*
2.300	2,245	*1.698*	2,365	*1.740*	2,475	*1.702*	2,595	*1.825*	2,705	*1.862*	2,815	*1.900*	2,95	*1.944*	3,055	*1.978*	3,165	*2.010*
2.400	2,33	*1.727*	2,47	*1.778*	2,55	*1.805*	2,715	*1.865*	2,79	*1.892*	2,935	*1.940*	3,065	*1.980*	3,13	*2.002*	3,295	*2.050*
2.500	2,405	*1.755*	2,505	*1.790*	2,675	*1.850*	2,79	*1.891*	2,915	*1.935*	3,02	*1.968*	3,12	*1.998*	3,28	*2.050*	3,38	*2.085*
2.600	2,505	*1.790*	2,625	*1.832*	2,715	*1.878*	2,873	*1.916*	3,02	*1.968*	3,145	*2.008*	3,305	*2.055*	3,425	*2.095*	3,555	*2.135*
2.700	2,59	*1.821*	2,725	*1.870*	2,83	*1.900*	2,985	*1.955*	3,075	*1.982*	3,26	*2.045*	3,38	*2.085*	3,555	*2.132*	3,675	*2.172*
2.800	2,695	*1.859*	2,79	*1.892*	2,95	*1.942*	3,06	*1.982*	3,225	*2.030*	3,48	*2.085*	3,51	*2.120*	3,675	*2.170*	3,775	*2.195*
2.900	2,775	*1.885*	2,955	*1.945*	3,02	*1.968*	3,145	*2.008*	3,315	*2.060*	3,505	*2.120*	3,68	*2.170*	3,79	*2.200*	3,92	*2.240*
3.000	2,835	*1.905*	3,02	*1.968*	3,105	*1.992*	3,31	*2.055*	3,456	*2.105*	3,635	*2.155*	3,775	*2.200*	3,87	*2.225*	4,025	*2.270*
3.100	2,91	*1.930*	3,105	*1.993*	3,175	*2.027*	3,37	*2.075*	3,555	*2.135*	3,755	*2.188*	3,835	*2.215*	4,0	*2.265*	4,12	*2.295*
3.200	2,97	*1.952*	3,14	*2.005*	3,345	*2.070*	3,465	*2.110*	3,62	*2.144*	3,825	*2.210*	3,965	*2.250*	4,12	*2.295*	4,33	*2.350*
3.300	3,065	*1.980*	3,22	*2.030*	3,405	*2.090*	3,58	*2.140*	3,755	*2.190*	3,935	*2.248*	4,075	*2.285*	4,24	*2.332*	4,43	*2.385*
3.400	3,14	*2.008*	3,285	*2.050*	3,51	*2.120*	3,665	*2.165*	3,85	*2.220*	4,05	*2.275*	4,14	*2.305*	4,375	*2.370*	4,58	*2.425*
3.500	3,26	*2.045*	3,415	*2.090*	3,58	*2.145*	3,74	*2.190*	3,915	*2.235*	4,14	*2.305*	4,29	*2.345*	4,49	*2.395*	4,64	*2.443*
3.600	3,305	*2.060*	3,49	*2.115*	3,695	*2.175*	3,82	*2.210*	4,07	*2.285*	4,22	*2.325*	4,42	*2.375*	4,58	*2.425*	4,76	*2.470*

* Los números de mayor tamaño que figuran en la tabla indican la clase de conducto.

TABLA 6. DIMENSIONES DE CONDUCTOS, ÁREA DE LA SECCIÓN, DIÁMETRO EQUIVALENTE Y TIPO DE CONDUCTO * (Cont.)

MEDIDAS DEL CONDUCTO (mm)	1.500		1.600		1.700		1.800		1.900		2.000		2.100		2.200		2.300	
	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)	Sec. (m^2)	Diám. equiv. (mm)
1.050																		
1.100																		
1.150																		
1.200																		
1.250																		
1 300																		
1.350																		
1.400																		
1.450																		
1.500	2,17	1.670																
1.600	2,31	1.720	2,47	1.780														
1.700	2,45	1.770	2,62	1.833	2,79	1.890												
1.800	2,59	1.823	2,76	1.883	2,94	1.941	3,12	2.005										
1.900	2,73	1.872	2,92	1.934	3,09	1.992	3,3	2.057	3,48	2.115								
2.000	2,87	1.913	3,07	1.985	3,25	2.043	3,46	2.105	3,66	2.165	3,85	2.222						
2.100	3,0	1.960	3,22	2.028	3,42	2.094	3,62	2.156	3,82	2.215	4,04	2.275	4,25	2.332				
2.200	3,14	2.008	3,35	2.073	3,57	2.138	3,83	2.207	4,02	2.265	4,22	2.325	4,43	2.385	4,67	2.445		
2.300	3,29	2.055	3,5	2.115	3,73	2.185	3,96	2.255	4,18	2.315	4,41	2.380	4,63	2.435	4,87	2.495	5,1	2.552
2.400	3,42	2.100	3,68	2.170	3,89	2.240	4,12	2.300	4,38	2.370	4,6	2.430	4,78	2.480	5,1	2.554	5,34	2.615
2.500	3,55	2.130	3,81	2.210	4,08	2.292	4,38	2.370	4,64	2.440	4,78	2.485	4,92	2.510	5,24	2.605	5,56	2.670
2.600	3,72	2.185	3,96	2.250	4,27	2.335	4,46	2.385	4,76	2.520	4,96	2.525	5,29	2.605	5,49	2.655	5,76	2.715
2.700	3,85	2.225	4,08	2.285	4,33	2.355	4,63	2.435	4,89	2.505	5,14	2.555	5,41	2.630	5,64	2.685	5,98	2.770
2.800	3,91	2.235	4,18	2.315	4,52	2.405	4,78	2.470	5,02	2.530	5,3	2.605	5,44	2.640	5,88	2.750	6,21	2.805
2.900	4,07	2.285	4,4	2.375	4,73	2.455	4,98	2.520	5,27	2.595	5,56	-2.665	5,85	2.735	6,12	2.800	6,4	2.860
3.000	4,2	2.320	4,59	2.425	4,78	2.475	5,16	2.570	5,44	2.640	5,76	2.715	6,05	2.785	6,37	2.855	6,66	2.920
3.100	4,36	2.360	4,6	2.427	4,97	2.515	5,24	2.590	5,56	2.665	5,88	2.740	6,12	2.800	6,4	2.862	6,77	2.945
3.200	4,4	2.372	4,74	2.464	5,12	2.555	5,42	2.635	5,71	2.703	6,05	2.780	6,3	2.830	6,68	2.930	7,05	3.000
3.300	4,58	2.422	4,9	2.490	5,2	2.575	5,56	2.665	5,93	2.754	6,32	2.838	6,64	2.905	6,9	2.980	7,26	3.046
3.400	4,64	2.440	5,07	2.536	5,44	2.640	5,75	2.710	5,98	2.766	6,44	2.852	6,74	2.935	7,08	3.010	7,53	3.105
3.500	4,84	2.490	5,14	2.565	5,57	2.675	5,89	2.745	6,26	2.830	6,59	2.890	6,98	2.990	7,32	3.055	7,64	3.130
3.600	5,0	2.530	5,34	2.615	5,65	2.692	5,97	2.765	6,39	2.858	6,77	2.928	7,21	3.035	7,5	3.100	7,87	3.175

* Los números de mayor tamaño que figuran en la tabla indican la clase de conducto.

AERONCA, INC.
BUENSOD/AGITAIR DIVISION

AR-101

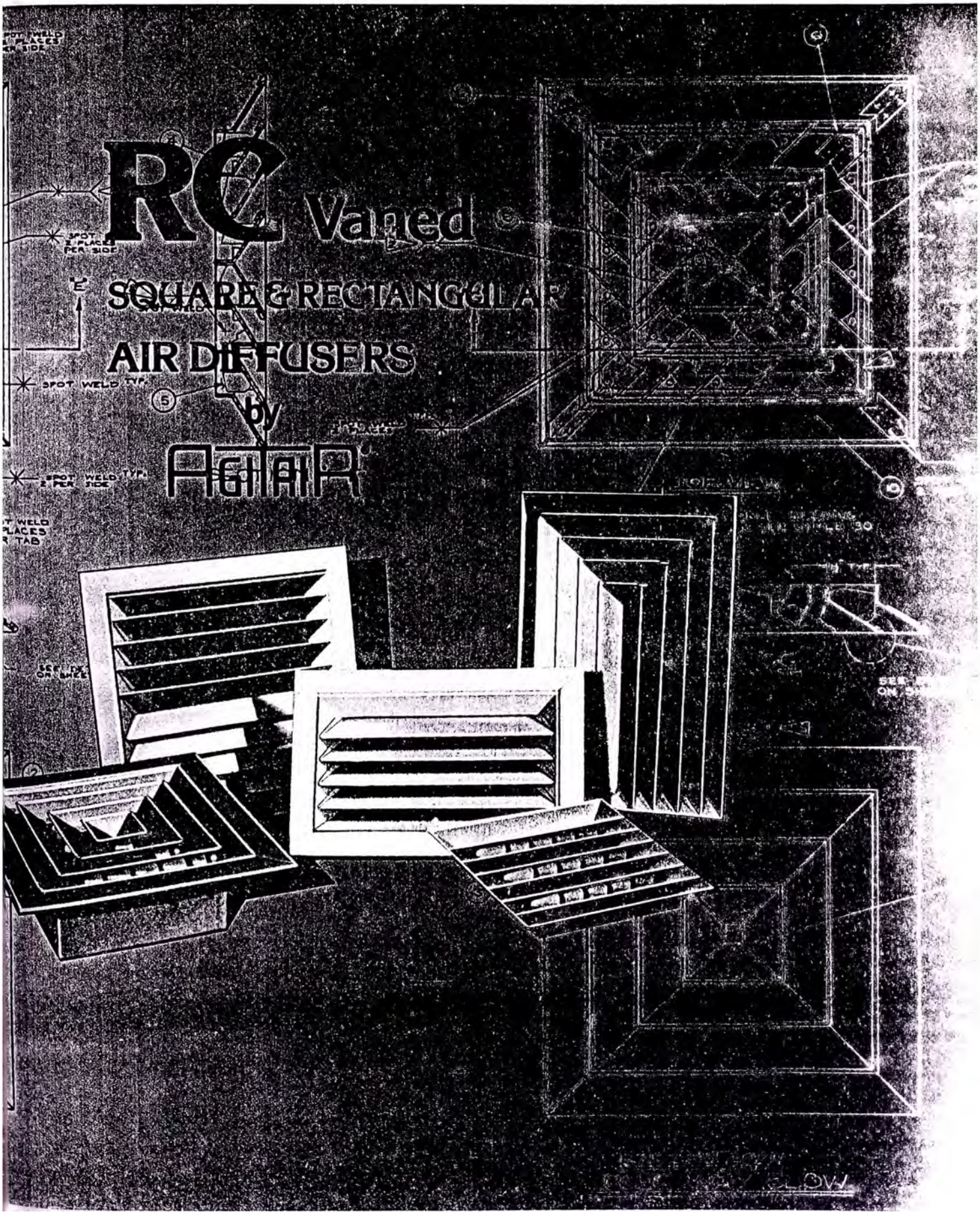


FIGURE 1

KEY: TEMP. / FPM

RC DIFFUSER ROOM TEMPERATURE GRADIENT

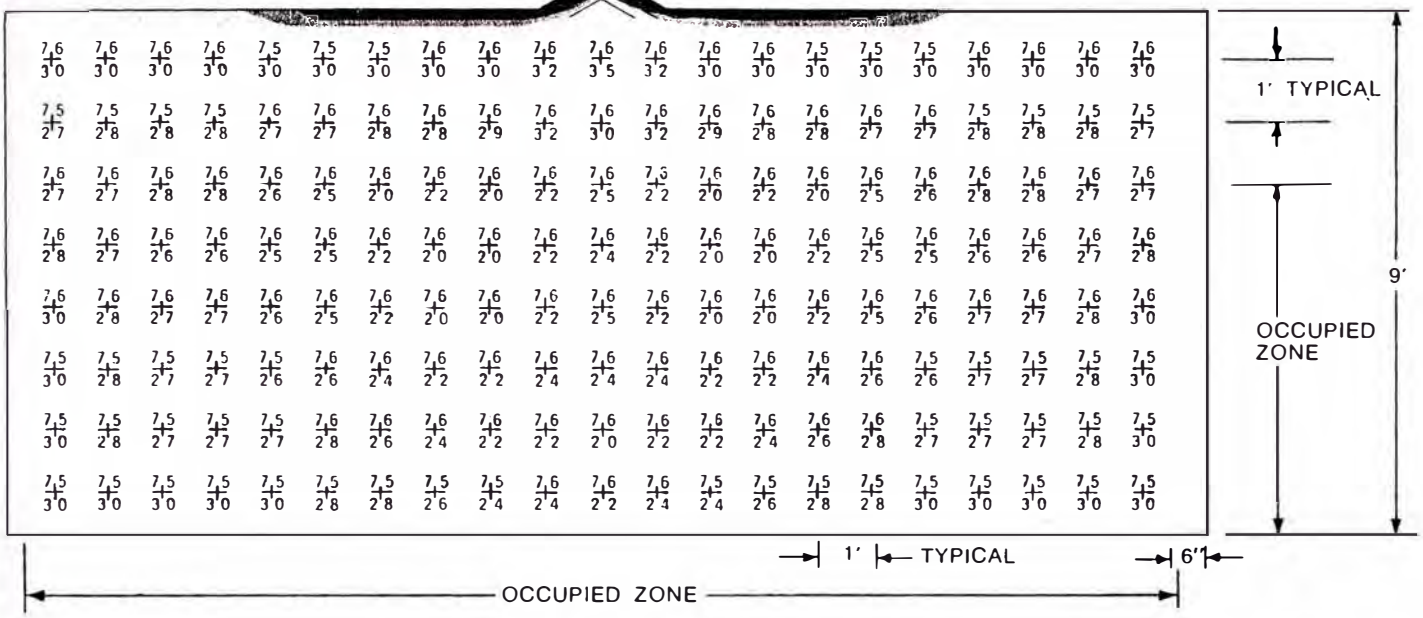
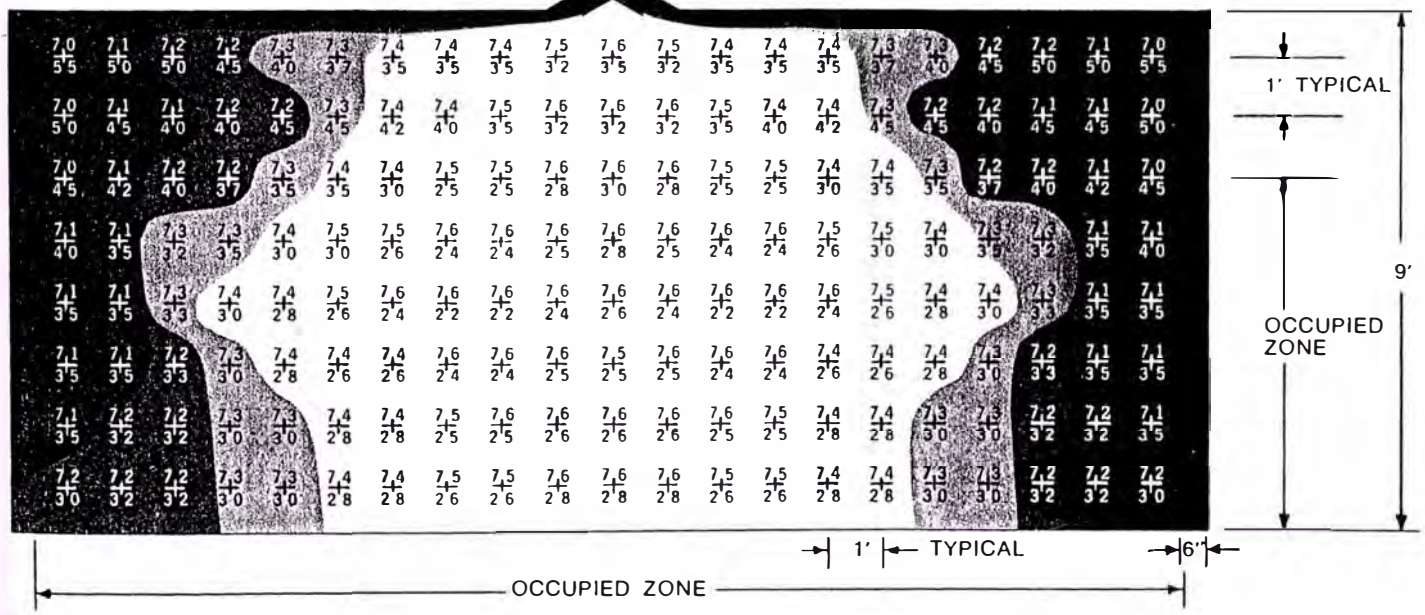


FIGURE 2

KEY: TEMP. / FPM

STANDARD DIFFUSER ROOM TEMPERATURE GRADIENT



TEST NOTES:

DIFFUSERS - 9x9 Neck, 4-way pattern
ROOM SIZE - 22'x22'x9'
SUPPLY AIR - 308 CFM (550 FPM)
Temp. 56°F
ROOM AIR - 76°F

TEMPERATURE VARIATION 1°< 2°< 3°< 4°< 5°<

SPECIFICATIONS

Provide square or rectangular diffusers of the jet induction, air mixing type which are assembled in combinations of louver sections arranged to discharge air from each side in quantities proportional to the areas served. Between the louvers, diffusing vanes extend to the diffuser face and are designed to compress the air into jets which will induce room air. Jets from adjacent channels discharge in opposite directions to insure rapid mixing of primary and room air.

Diffuser louvers and vanes are securely welded to prevent tampering or alteration of elements. Diffusers are fabricated of steel-welded construction, rust-proofed, or aluminum. Finish is baked aluminum enamel. Diffusers shall be Agitair Type RC (or RCTC, RCR or RCDF to meet individual job conditions), each provided with a removable core permitting easy access to the neck connection.

ALTERNATE (One Piece Construction)

Provide Agitair Type R or RV diffusers (to meet individual job conditions).

Aeronca, Inc. reserves the right to change specifications and design without notice.

SUPERIOR AIR DIFFUSION and DISTRIBUTION with RC DIFFUSERS

If your AIR DISTRIBUTION GOALS are
Uniform air temperature . . .
Elimination of drafts . . .
Hushed, quiet performance . . .
RC SQUARE AND RECTANGULAR
CEILING DIFFUSERS by AGITAIR
ARE THE PROVEN ANSWER!

PROVEN SUPERIORITY

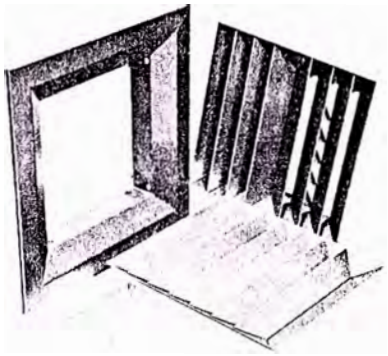
Years of field experience and thousands of highly satisfied customers testify to the unexcelled performance of the RC. Now, new laboratory tests in an ADC-certified facility confirm the superiority of the RC over standard square diffusers.

RC PERFORMANCE (Fig. 1)

Only *1 DEGREE temperature difference* throughout the entire room. *Low air velocity* in the occupied zone—20 to 30 FPM. Although the throw for the RC is greater, the isovels for terminal velocities are much narrower.

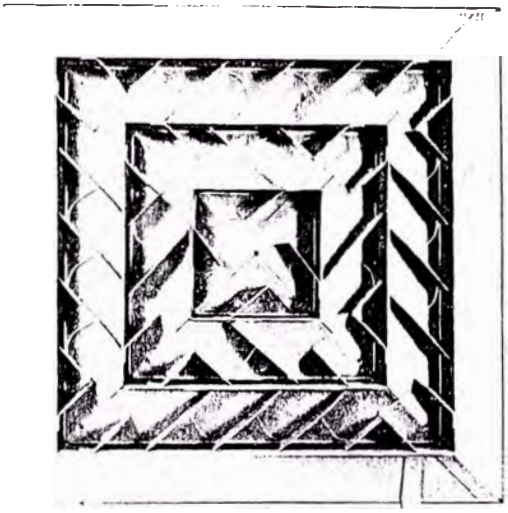
STANDARD DIFFUSER PERFORMANCE (Fig. 2)

A *6 DEGREE temperature difference* in the occupied zone. *Higher air velocity* to create drafts - 22 to 45 FPM. Despite the shorter throw, the isovels tend to spread out over a wider area creating drafts and poor air mixing, thus wide temperature variations.



APPLICATION FLEXIBILITY

Choose 1, 2, 3 or 4-way patterns or combinations of patterns to suit the individual application. You have complete design freedom plus, in many cases, you can reduce costly duct runs. Select either one-piece (R or RV) or two-piece (removable core) diffusers. Choose from a variety of frame styles to meet any application.



UNIQUE DESIGN

Agitair's patented RC diffuser produces numerous counter-flowing air streams. This jet action generates a higher degree of turbulence where primary and room air meet. The result is rapid mixing, aspiration and temperature equalization between primary and room air WITHIN A ONE-FOOT RADIUS, HORIZONTALLY AND VERTICALLY, OF THE DIFFUSER. Non-isothermal jets create a thin envelope of air that, along with the surface effect, adheres to the ceiling. The result, in other words, is draftless, noiseless, equal air distribution from any ceiling location - TOTAL UNIFORM COMFORT FOR THE ROOM OCCUPANTS!

ATTRACTIVE DURABILITY

The crisp, functional styling is available in steel or aluminum. The standard finish is primed baked aluminum enamel for steel diffusers and etch with clear lacquer for aluminum. Other finishes are available upon request. Diffuser louvers and vanes are securely welded to prevent tampering or alteration.

LOWER INSTALLED COST

Size for size, RC diffusers do cost more than standard diffusers BUT:

RC diffusers can be selected with 30% to 50% SMALLER NECK DIMENSIONS THAN STANDARD DIFFUSERS. Draftless, uniform room temperature will be maintained at up to twice the neck velocities recommended for standard diffusers, with very acceptable sound levels.

Superior performance for less money, plus smaller ducts for further savings.

TYPE "RC"

"RC" diffusers feature interchangeable that fit into separate, smartly designed ting frames for easier and neater installa- We recommend the "RC" for all types of installations requiring surface mounting e diffusers with the ceiling line. If the is made of soft or porous materials, use with overlapping flange.

TYPE "RCTC"

"C" diffusers are designed especially for ation in acoustical ceilings. Mounting s are sized to conform to standard tile nsions. "RCTC" diffusers combine effi- plus economy plus attractiveness.

TYPE "RCDF"

mounting frames on these "RC" type ers make them ideal for installation where s, lights or other ceiling obstructions could ere with correct air distribution. "RCDF" ers have separate mounting frames, dis- vely designed to blend pleasingly with any g.

TYPE "R"

e are one-piece units, tailor-made in vaned rns to match conditions for your specific cation. Type "R" diffusers assure 100% less air distribution in any shape area, from ocation.

TYPE "RCB"

"RCB" combines the basic "RC" diffuser the beveled frame. As with all members he "RC" series, optimum operating effi- y is matched with modern styling.

TYPE "RV"

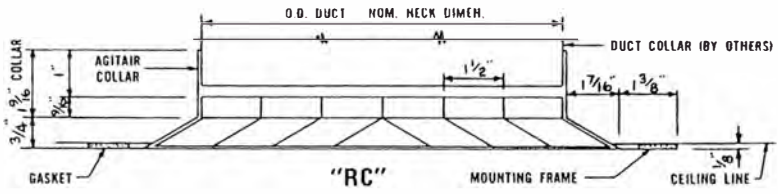
" diffusers follow the basic pattern and ating characteristics of the other diffusers ie "RC" series. The only difference is in the neter border — the "RV" is designed for k and easy installation on exposed drop irs and is generally used in unfinished es.

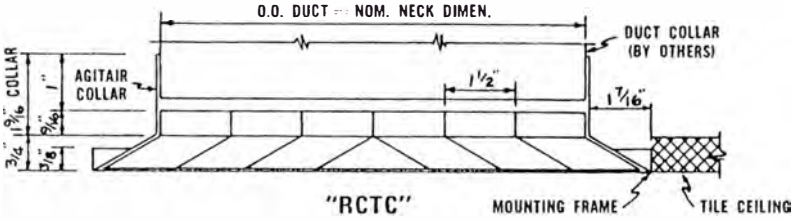
TYPE "RCV"

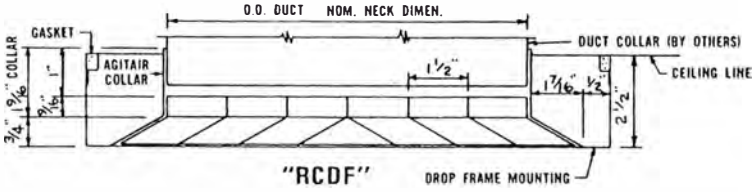
ou want the same advantage of the "RV" the advantage of a removable core, choose "RCV" — the two-piece "RV" diffuser.

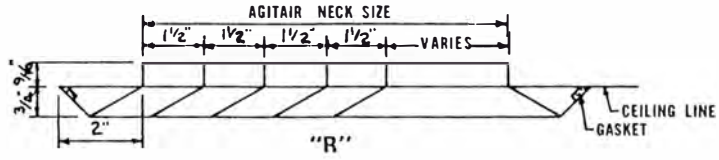
CONTINUOUS DIFFUSERS

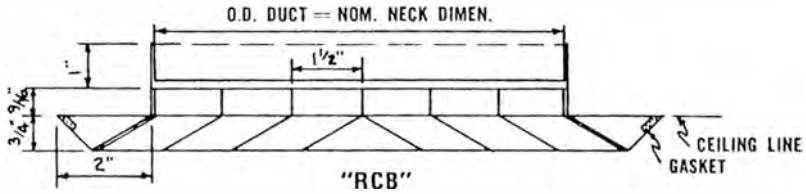
ose "RC" units with their separate mount- frames or the one-piece "R" units. Either ets the requirements for continuous air out- for ceiling installations. And, either can be alled as continuous units or in sections. only partial sections of the diffusers are essary for air delivery, blanks can be in- led above the diffuser necks. Regardless of length of the run, these Agitair diffusers vide noiseless, draftless, even air distribution.

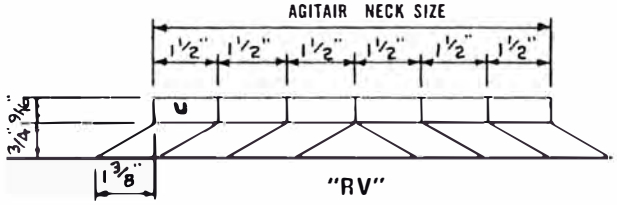


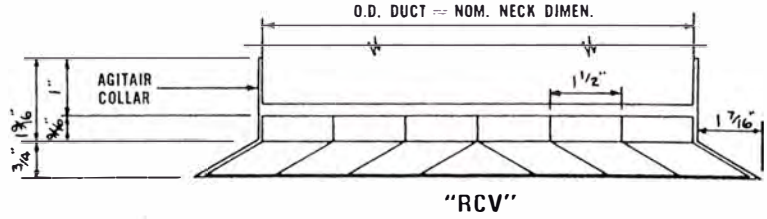


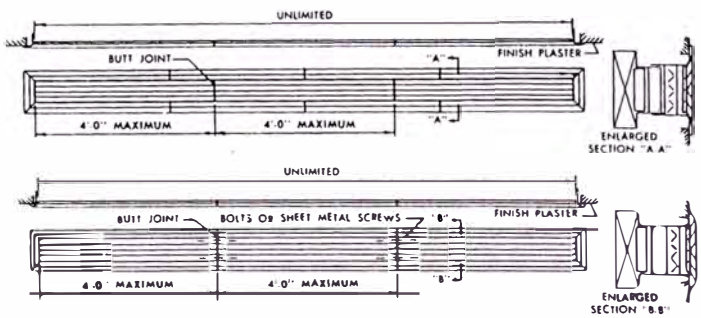












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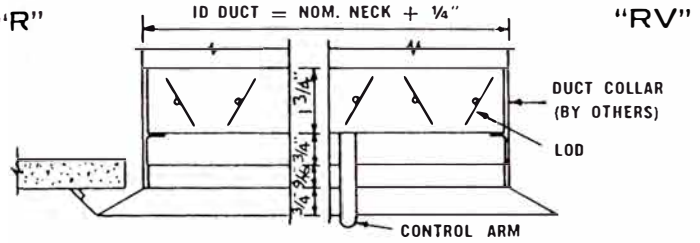
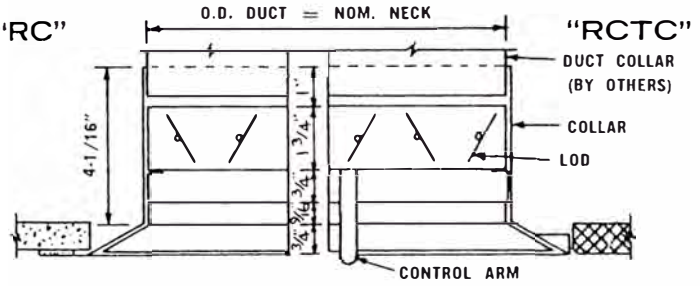
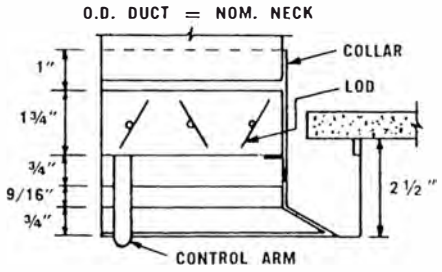
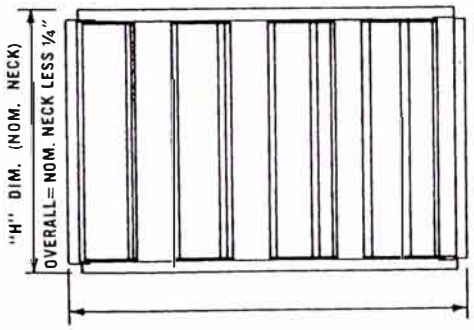


"RC" "RCTC"

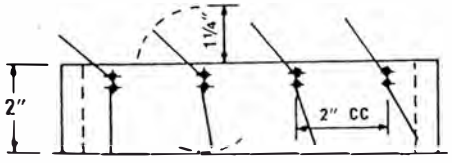


"RCDF"

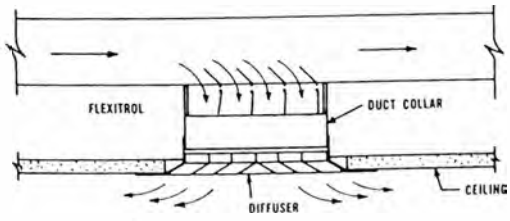




PLAN



SECTION



LOD DAMPERS

FOR ALL MODELS

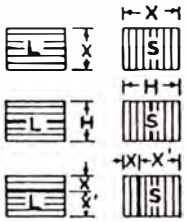
AGITAIR LOD dampers feature opposed blade design. They have an operating lever which can be adjusted through the face of the diffuser. Straight-through air flow is maintained at all settings. LOD dampers are designed especially for use with RC diffusers and are sized accordingly.

Manual control arms must travel parallel to Type R louvers. Damper blades are thus at right angles when dampers are used with the following patterns; blade lengths will be equal to dimension designations as follows:

R 10L, R 10S—DIMEN. X

R 20L, R 20S—DIMEN. H

R 21L, R21S—DIMEN. X+X'



Damper blades may parallel either dimension of all other pattern RC diffusers.

IMPORTANT:
When specifying damper size, always list blade dimensions last. Ex. 15" x 12" will have 12" long blades.

NOTE:
Maximum size of damper unit is 24" x 12". When larger dampers are required, multiples of smaller damper units will be supplied.

FLEXITROLS

Multi-Louver Orificing and Directional Dampers

ALL VANES ARE INDEPENDENTLY ADJUSTABLE TO INSURE BETTER CONTROL OF VOLUME, VELOCITY AND DIRECTION.

The FLEXITROL consists of two sets of air deflecting blades which are independently adjustable. One group regulates the volume and velocity while the other group controls the direction of the air.

Actually these FLEXITROLS provide positive control of volume at all outlets in a duct system. They function as a pressure orifice and also distribute the air over the entire throat area.

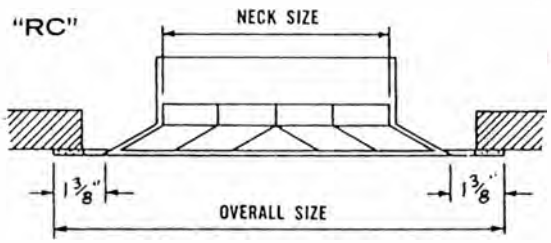
IMPORTANT!
When ordering, show Length (L dimension) first and Height (H dimension) second, as the latter indicates dimensions of Flexitrol blades.

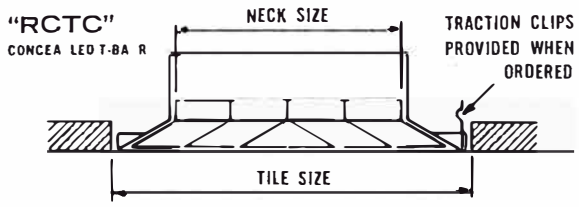
Maximum length of blades is 24". Two or more FLEXITROLS are supplied when the vertical (blade length) dimension exceeds 24". They can be rigidly assembled into a one-piece unit, if required.

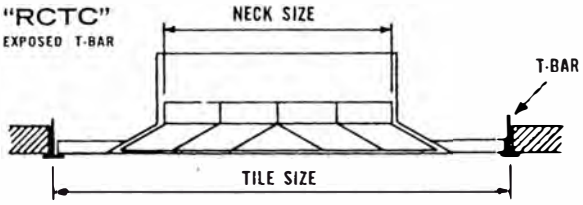
EXAMPLE:
One 24" x 45" unit consists of a combination of one 24" x 24" and one 24" x 21".

DIMENSIONS
L dimensions available are 3" to 36" as required. H dimensions (blade length) conform to diffuser dimensions; not to exceed 24".

RC DIFFUSERS FOR ACOUSTICAL CEILINGS







Agitair's standard RC diffusers with surface molding are recommended for ceiling installations where an overlapping frame is desired. The RCR style is also used in this manner.

Type RCTC is designed to fill ceiling openings left by the omission of one or more tiles. This type diffuser is highly recommended for use with "T" bar construction. The mounting frame lays in the "T" bar and is sized to hold it firmly in place.

RC ceiling diffusers are available in the desired neck size with an extended metal pan to span the necessary ceiling tile dimensions. Because of the many variations in ceiling suspension systems, it is often necessary to deviate from standard diffuser frame dimensions. Allowance must be made for accurate fitting of the diffuser into the opening left by the omission of ceiling tiles.

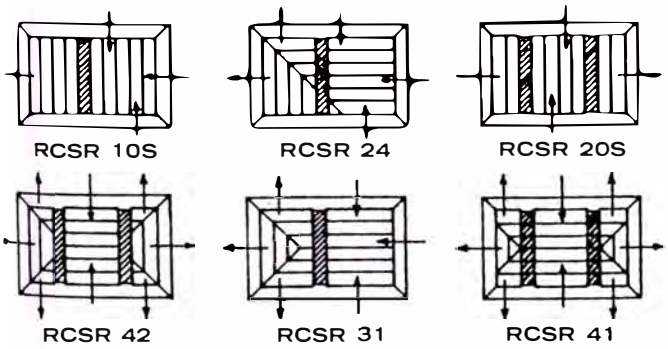
To avoid any on-the-job installation problems, consult your local Aeronca representative or write to Aeronca and include details of ceiling suspension systems and dimensions.

NOTE: Indicate exact OD dimensions of RC diffusers when ordering to fit tile opening.

COMBINATION SUPPLY & RETURN MODELS

You have the same directional and pattern control available in combination supply-and-return "RC" models as in those for supply air only. We provide the necessary collars for connecting the "RCSR" units to supply and return systems. To save headroom and reduce installation costs, follow the illustrated arrangements which permit both supply and return ducts to be run at the same elevation.

TYPE "RCSR" RECTANGULAR

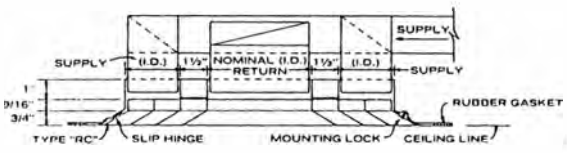


CFM CAPACITIES RECTANGULAR "RCSR"

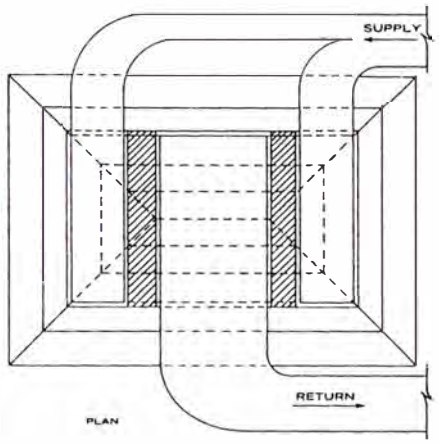
Size	Gross Neck Area	SUPPLY		RETURN		CAPACITIES	
		Dimen.	Total Sq. Ft.	Dimen.	Total Sq. Ft.	Supply 600 fpm	Return 500 fpm
15 x 6	.625	2-6 x 3	.25	1-6 x 6	.250	150	125
21 x 9	1.31	2-9 x 4½	.56	1-9 x 9	.560	336	280
24 x 9	1.50	2-9 x 5½	.688	1-9 x 10	.625	412	313
33 x 9	2.06	2-9 x 7½	.938	1-9 x 15	.938	564	468
24 x 12	2.00	2-12 x 6	1.00	1-12 x 9	.750	600	375
21 x 15	2.19	2-15 x 4½	.938	1-15 x 9	.938	564	468
24 x 18	3.00	2-18 x 6	1.50	1-18 x 9	1.125	900	562

HOW TO SIZE

1. Determine required supply area.
   $$\frac{\text{Supply CFM}}{\text{Supply Vel.}} = \text{Supply neck area}$$
2. Determine return area using neck velocity at least 100 FPM less than supply neck velocity.
   $$\frac{\text{Return CFM}}{\text{Return Vel.}} = \text{Return neck area}$$
3. Supply neck area + return neck area = total active neck area.
4. Refer to Performance Table II for RC size having equivalent area.
5. Increase one dimension to provide 1½" blank section between each supply and return area.
6. Select pattern most suitable for application.



SECTIONAL ELEVATION



EXAMPLE: Type R42 pattern selected
336 CFM supply
280 CFM return

Supply $\frac{336 \text{ CFM}}{600 \text{ FPM}} = .56$ sq. ft. supply neck area

Return $\frac{280 \text{ CFM}}{500 \text{ FPM}} = \frac{.56 \text{ sq. ft. return neck area}}{1.12 \text{ sq. ft. total neck area}}$

Refer to Performance Table II for neck sizes having 1.12 sq. ft. total area.

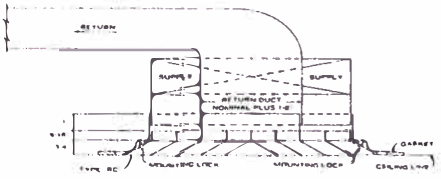
9" x 18" = 1.12 sq. ft. gross neck area

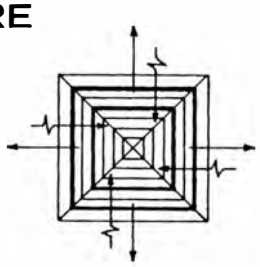
9" x 9" = .56 sq. ft. return neck area

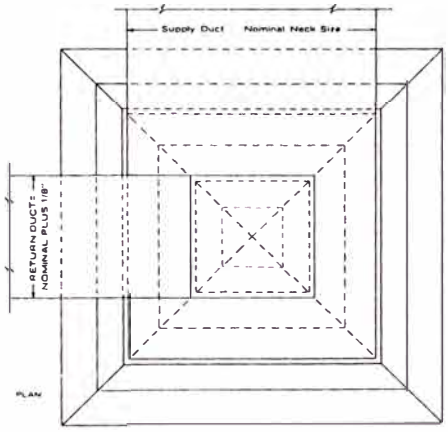
9" x 9" = .56 sq. ft. supply neck area
(2 — 9 x 4½" sections)

Over-all length must be 21" to include two 1½" blanks.

TYPE "RCSR-40" SQUARE







HOW TO SIZE

1. Determine required supply area.
   $\frac{\text{Supply CFM}}{\text{Supply Vel.}} = \text{Supply neck area}$
2. Determine return area using neck velocity at least 100 FPM less than supply neck velocity.
   $\frac{\text{Return CFM}}{\text{Return Vel.}} = \text{Return neck area}$
3. Supply neck area + return neck area = total active neck area.
4. Refer to Performance Table II for RC size having equivalent area.

EXAMPLE:

Supply $\frac{750 \text{ CFM}}{600 \text{ FPM}} = 1.25$ sq. ft. supply neck area

Return $\frac{500 \text{ CFM}}{500 \text{ FPM}} = \frac{1.00 \text{ sq. ft. return neck area}}{2.25 \text{ sq. ft. total neck area}}$

Refer to Performance Table II for neck sizes having 2.25 sq. ft. total area.

18" x 18" = 2.25 sq. ft. gross neck area

12" x 12" = 1.00 sq. ft. return neck area

1.25 sq. ft. supply neck area

Therefore, size = 18S — 12R

CFM CAPACITIES TYPE "RCSR40"

	NECK AREAS - SQ. FT.			CAPACITIES Supply	CAPACITIES Return
Size	Total	Supply	Return	600Fpm	500 Fpm
9S - 6R	.56	.31	.25	186	125
12S - 9R	1.00	.44	.56	264	280
15S - 9R	1.56	1.00	.56	600	280
15S - 12R	1.56	.56	1.00	336	500
18S - 12R	2.25	1.25	1.00	750	500
18S - 15R	2.25	.69	1.56	414	780
21S - 12R	3.06	2.06	1.00	1236	500
21S - 15R	3.06	1.50	1.56	900	780
24S - 15R	4.00	2.44	1.56	1464	780
24S - 18R	4.00	1.75	2.25	1050	1125
27S - 18R	5.06	2.81	2.25	1686	1125
27S - 21R	5.06	2.00	3.06	1200	1530
30S - 18R	6.25	4.00	2.25	2400	1125

QUICK SELECTION PROCEDURE

Data in Table I enables you to make a rapid selection of a diffuser that will satisfy a given condition. Requirements most frequently considered are: (1) total area of diffusion; (2) CFM per square foot and (3) the noise criteria level. Diffuser selection in the table is based upon the total effective area covered at a terminal velocity (V_t) of 50 FPM and its resulting throw. Air distribution in the occupied zone is uniform with a room velocity (V_r) varying from 35 FPM to 50 FPM depending upon total air supplied through the diffuser.

HOW TO SELECT THE PROPER DIFFUSER

1. Determine the total area of diffusion and rate of air change in CFM per square foot.
2. Refer to the column containing the various patterns and select the diffuser according to neck size and noise criteria level desired.
3. To obtain total CFM, refer to Table II and select proper chart for: Type (10, 20, etc.), Size (6x6, etc.) and Neck Velocity (A, B, C, etc.) and Check Table C for static pressure and total pressure.

TABLE I

AREA OF DIFFUSION IN SQUARE FEET

	100	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	2500	3000	3500	4000	4500	5000
0		6x6A	6x6D		6x6G	9x9E	9x9F	9x9G													
0		6x6A	6x6D 9x9A	6x6G 9x9B	9x9C	12x12A	9x9E	12x12C	9x9F 12x12D	9x9G 12x12E	12x12G		15x15E	15x15F		18x18F					
0																					
0	6x6A	6x6B	6x6C	6x6G		9x9E	9x9F	9x9G	12x12C		12x12D 15x15C	12x12F	15x15D 18x18B		15x15E 18x18C	15x15G 18x18D 21x21B	18x18E 21x21C	18x18F 21x21D	18x18G 21x21E	21x21F	21x21G
0		9x9A	9x9B	9x9C	9x9D		12x12E	12x12F		12x12G											
0							15x15A		15x15B	15x15C	15x15D	18x18C	18x18D		18x18E						
0		6x6E		9x9E	9x9G	12x12C	12x12D	12x12E	12x12G	15x15D	15x15E	15x15F 18x18D	15x15G	18x18E 21x21A	18x18F 24x24A	18x18G					
0			9x9B	9x9C	9x9D	12x12A	12x12B	15x15A		15x15B 18x18A											
0				12x12B	12x12C	12x12D		15x15D	15x15E	15x15F	15x15G										
0								18x18A		18x18B											
0	6x6A		9x9C	12x12A	15x15A		15x15B	15x15C 18x18A		18x18B	18x18C										
0																					

NOTE: 1) Data is based only on square diffusers
2) Average Room Velocity and CFM/Sq. Ft. is based upon ceiling height of 9 ft.

≤ NC30 ≤ NC35 ≤ NC40 ≤ NC45 < NC45

Room air motion and distribution are direct results of throw characteristics of a particular diffuser. Throw distances are based upon terminal velocity (Vt = 150, 100, 50 FPM) at a given horizontal distance (T) from the diffuser.

The throw distance (T) is above the 6′ vertical level of the occupied zone. Based on the maximum throw (T) with a terminal velocity (V_t) of 50 FPM, the average room velocity in the occupied zone will vary from a minimum to a maximum of 50 FPM, with a 20°F Δt between supply (primary) and average room ambient temperature. This also provides satisfactory room air change in the occupied zone. (The terminal velocity is the highest sustained measured velocity in the mixed air stream at the end of the throw. The velocity profile can be obtained in the plane of maximum velocity as determined by the isovel in the throw pattern diagram.)

CALCULATED SELECTION PROCEDURE

Laboratory tests plus many years of "on-the-job" experience have confirmed the importance of the following factors in selecting RC square and rectangular diffusers:

1. *Area to be served*
2. *Mounting height*
3. *Temperature differential*
4. *Number of air changes*
5. *Discharge velocity*
6. *Available air pressure*
7. *Noise level*

Since many of these factors are interrelated, the composite tables opposite have been prepared to assist the design engineer in selecting the most effective equipment.

SELECTION PROCEDURE

Indicate on floor plans the most convenient locations for duct runs. These do not have to be centered in each area but the extremity of an RC-served area should not exceed two times its mounting height. Give full consideration to simplified duct runs as well as to architectural and interior decorating limitations.

HOW TO SIZE

1. Select the most suitable RC pattern conforming to the contemplated duct layout.

2. Refer to Table A to determine maximum CFM which may be discharged through a single RC for the mounting height. Also check allowable maximum cooling temperature differential.

3. Divide total CFM for area by maximum CFM permissible per outlet. (See step 2.)
   Result = minimum number of RC diffusers required.

4. Refer to Table B for suitable neck velocity.

5. Divide CFM per outlet by neck velocity.
   Result = gross neck area of each RC:
   $\frac{\text{CFM per RC}}{\text{Neck Velocity}}$ = Sq. Ft. Neck Area Required

6. Refer to Performance Tables for sizes and neck areas.

7. Spot RC diffusers on duct layout and apportion percentage of total CFM to be discharged from each side.

8. Check Performance Tables to verify that RC diffusers selected conform to desired throw conditions.

9. Verify pressure requirements. Total pressure in RC diffuser neck consists of neck velocity pressure plus neck static pressure required to produce desired air flow.

   Static pressure in the duct system before the diffuser take-off should equal RC diffuser total pressure requirements plus turning and shock losses.

MAX. CFM AND TD FOR MTG. HEIGHT

TABLE A

This table governs selections of Types R, RV, RC, RCR and RCTC diffusers mounted in a ceiling. Where Type RCDF or other types are installed without ceiling effect, increase mounting height two feet for comparable cfm capacity.

Mtg. Ht.	Max. T.D.	Max. Total* CFM/Outlet	Max. CFM In* One Direction
7′	18°	400	150
8′	22°	750	250
9′	25°	1100	400
10′	26°	1500	500
11′	27°	2000	700
12′	28°	2600	900
13′	29°	3300	1100
14′	30°	4000	1400
15′	30°	5000	1700
16′	31°	6500	2000
17′	31°	8000	2800
18′	32°	10,000	3500
19′	32°	12,000	4500
20′	33°	15,000	6000

Air quantities less than the maximum CFM per outlet indicated may be used for any given mounting height.

EXAMPLE:
Room having 2 outlets mounted on 10′ clg. one R40 and one R20. The R40 may handle 1500 cfm total. However the R20 may not handle more than 500 cfm from each of 2 sides or a maximum of 1000 cfm.

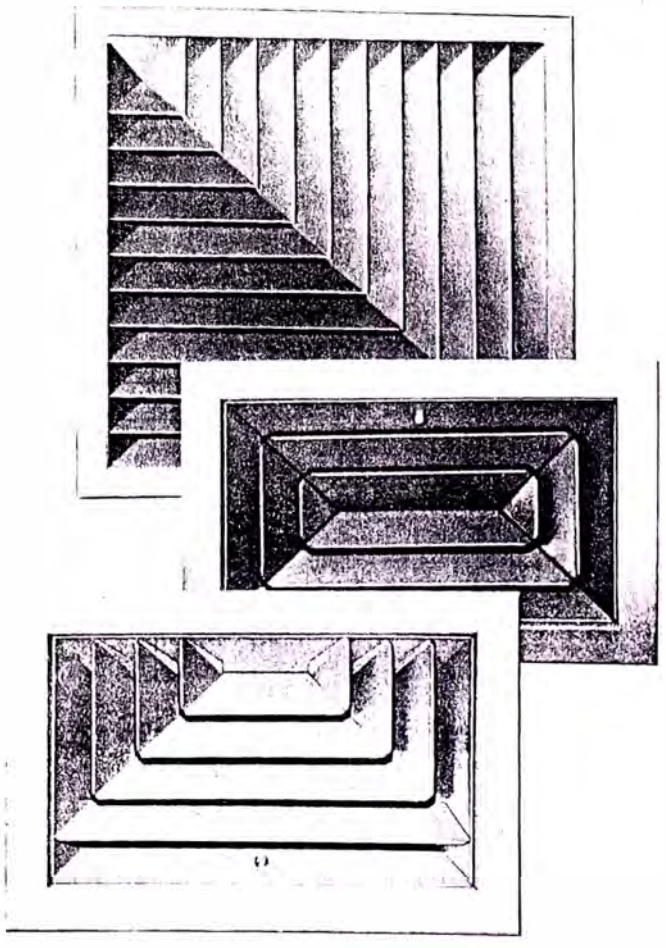


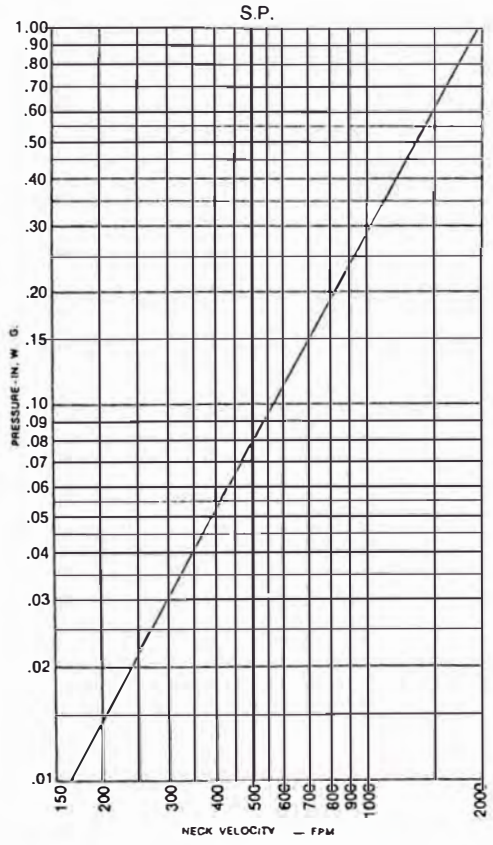
TABLE B
NC_{LP} FOR RC DIFFUSERS

SIZE	NECK AREA SQ. FT.	NECK VELOCITY — FPM								
		400	450	500	550	600	650	700	800	900
6 x 6	.25	25	26	28	30	31	32	34	36	36
9 x 9	.56	26	27	30	32	33	35	36	38	41
12 x 12	1.0	26	28	31	34	35	36	38	41	47
15 x 15	1.56	28	31	33	36	38	40	42	45	50
18 x 18	2.25	30	33	36	39	42	44	46	49	52
21 x 21	3.06	33	36	39	42	45	48	50	52	55
24 x 24	4.0	36	39	42	46	49	52	54	56	58
6 x 9	.375	25	26	29	32	33	34	36	39	41
6 x 12	.500	26	27	30	33	34	35	37	40	42
6 x 15	.625	26	27	30	33	34	35	37	40	43
6 x 18	.75	26	27	30	33	34	35	38	40	44
6 x 21	.875	26	28	31	34	35	36	38	41	45
6 x 24	1.0	26	28	31	34	35	36	38	41	47
9 x 12	.75	26	27	30	33	34	35	38	40	43
9 x 15	.938	26	28	31	34	35	36	38	41	46
9 x 18	1.125	26	29	31	34	36	37	39	42	47
9 x 21	1.31	27	30	32	35	37	39	41	44	49
9 x 24	1.5	28	31	33	36	38	40	42	45	50
12 x 15	1.25	27	30	32	35	37	39	41	44	49
12 x 18	1.5	28	31	33	36	38	40	42	45	50
12 x 21	1.75	29	32	34	37	40	42	44	47	51
12 x 24	2.0	30	33	36	39	42	44	46	49	52
15 x 18	1.875	29	32	34	37	40	42	44	47	51
18 x 21	2.62	31	34	37	40	43	45	47	50	53
18 x 24	3.0	33	36	39	42	45	48	50	52	55

NOTE: NC_{LP} is determined by requirements in ASHRAE Guide - Systems, Chapter 33 Sound and Vibration, Page 500
NC_{LP} Re: 10^{-12} Watts

Larger sizes available. Consult Aeronca Application Engineering (Pineville) for data.

TABLE C
STATIC & TOTAL PRESSURE - RC



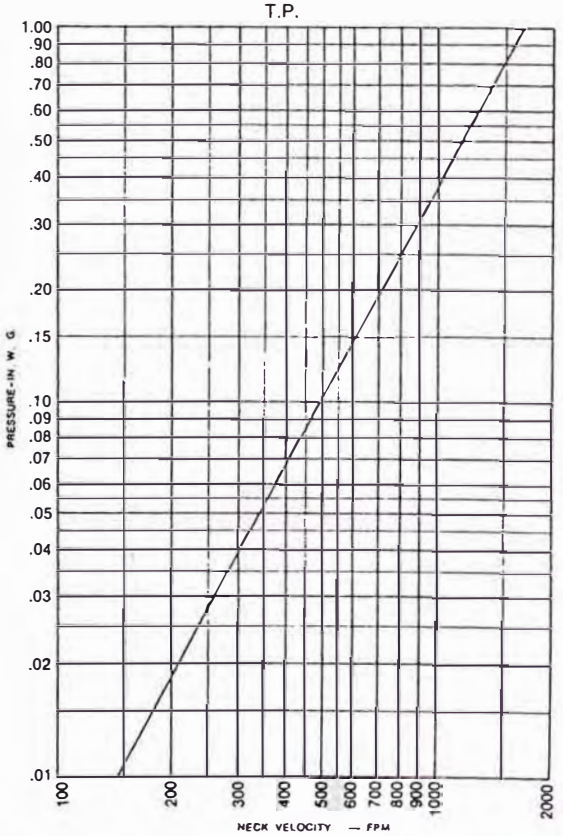
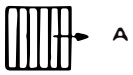


TABLE II PERFORMANCE DATA

All patterns shown are face views.
For static and/or total pressure at various velocities, refer to Table C.
For sound data for various velocities and sizes, refer to Table B.

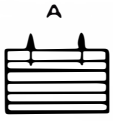
RC 10



NECK VELOCITIES — FPM

SIZE IN INCHES	NECK AREA SQ. FT.	SIDE	A		B		C		D		E		F		G		H		I	
			400		450		500		550		600		650		700		800		900	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
6 x 6	.25	TOTAL CFM	100		112		125		137		150		162		175		200		225	
		CFM ea. side	100		112		125		137		150		162		175		200		225	
		Throw in Ft.	7-10-14		8-11-14		9-12-16		9-13-17		10-15-18		12-16-19		13-17-22		15-20-25		16-22-27	
9 x 9	.56	TOTAL CFM	224		252		280		308		336		364		392		448		504	
		CFM ea. side	224		252		280		308		336		364		392		448		504	
		Throw in Ft.	10-13-16		11-15-18		13-16-20		14-18-22		15-20-24		16-21-26		17-22-28		20-26-32		23-29-35	
12 x 12	1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
		CFM ea. side	400		450		500		550		600		650		700		800		900	
		Throw in Ft.	12-15-18		14-17-20		15-19-22		17-21-25		18-23-27		26-24-29		21-26-31		24-30-36		27-33-41	
15 x 15	1.56	TOTAL CFM	624		702		780		858		936		1014		1092		1248		1404	
		CFM ea. side	624		702		780		858		936		1014		1092		1248		1404	
		Throw in Ft.	15-17-20		17-19-22		18-21-25		20-23-28		22-25-30		24-28-33		26-30-35		29-34-41		33-38-45	
18 x 18	2.25	TOTAL CFM	900		1012		1125		1238		1350		1462		1575		1800		2025	
		CFM ea. side	900		1012		1125		1238		1350		1462		1575		1800		2025	
		Throw in Ft.	17-19-22		19-21-24		21-24-27		23-26-30		25-29-33		27-31-35		30-33-38		34-38-44		38-43-49	
21 x 21	3.06	TOTAL CFM	1224		1377		1530		1683		1836		1990		2142		2448		2754	
		CFM ea. side	1224		1377		1530		1683		1836		1990		2142		2448		2754	
		Throw in Ft.	19-21-24		21-24-27		23-26-30		26-29-33		28-32-36		30-34-39		32-37-43		37-42-48		42-47-54	
24 x 24	4.0	TOTAL CFM	1600		1800		2000		2200		2400		2600		2800		3200		3600	
		CFM ea. side	1600		1800		2000		2200		2400		2600		2800		3200		3600	
		Throw in Ft.	20-23-26		23-26-29		25-29-32		28-31-35		30-34-39		33-37-42		35-40-45		40-46-51		45-51-58	

RC 10L



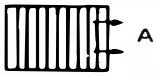
6 x 9	.375	TOTAL CFM	150	169	188	206	225	244	263	300	338
		CFM ea. side	150	169	188	206	225	244	263	300	338
		Throw In Ft.	9-12-15	10-14-17	12-15-19	13-17-21	14-19-23	15-20-25	16-21-27	19-25-31	22-28-34
6 x 12	.5	TOTAL CFM	200	225	250	275	300	325	350	400	450
		CFM ea. side	200	225	250	275	300	325	350	400	450
		Throw in Ft.	10-13-16	11-15-18	13-16-20	14-18-22	15-20-24	16-21-26	17-22-28	20-26-32	23-29-35
6 x 15	.625	TOTAL CFM	250	281	312	344	375	406	438	500	563
		CFM ea. side	250	281	312	344	375	406	438	500	563
		Throw in Ft.	10-13-16	11-15-18	13-16-20	14-18-22	15-20-24	16-21-26	17-22-28	20-26-32	23-29-35
6 x 18	.75	TOTAL CFM	300	337	375	413	450	487	525	600	675
		CFM ea. side	300	337	375	413	450	487	525	600	675
		Throw in Ft.	10-14-16	12-15-18	14-17-20	15-19-23	16-21-25	17-22-27	18-23-29	21-24-33	24-30-36

Vt = 150 FPM, 100 FPM, 50 FPM

NECK VELOCITIES — FPM

NECK AREA SQ. FT.	SIDE	A		B		C		D		E		F		G		H		I	
		400		450		500		550		600		650		700		800		900	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
.875	TOTAL CFM	350		394		437		481		525		570		612		700		788	
	CFM ea. side	350		394		437		481		525		570		612		700		788	
	Throw in Ft.	11-15-17		13-16-19		14-18-21		16-20-24		17-22-26		18-23-28		19-24-30		22-26-34		25-31-38	
1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
	CFM ea. side	400		450		500		550		600		650		700		800		900	
	Throw in Ft.	12-15-18		14-17-20		15-19-22		17-21-25		18-23-27		20-24-29		21-26-31		24-30-36		27-33-41	
1.31	TOTAL CFM	524		590		655		720		786		852		917		1048		1179	
	CFM ea. side	524		590		655		720		786		852		917		1048		1179	
	Throw in Ft.	14-16-19		15-18-21		17-20-24		18-22-26		20-24-28		22-26-31		23-28-33		26-32-38		30-35-43	
1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
	CFM ea. side	600		675		750		825		900		975		1050		1200		1350	
	Throw in Ft.	15-17-20		17-19-22		18-21-25		20-23-28		22-25-30		24-28-33		26-30-35		29-34-41		33-38-45	

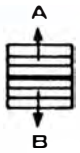
RC 10S



NECK AREA SQ. FT.	SIDE	A		B		C		D		E		F		G		H		I	
		400		450		500		550		600		650		700		800		900	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
	CFM ea. side	150		169		188		206		225		244		263		300		338	
	Throw in Ft.	9-12-15		10-14-17		12-15-19		13-17-21		14-19-23		15-20-25		16-21-27		19-25-31		22-28-34	
.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
	CFM ea. side	200		225		250		275		300		325		350		400		450	
	Throw in Ft.	10-13-16		11-15-18		13-16-20		14-18-22		15-20-24		16-21-26		17-22-28		20-26-32		23-29-35	
.625	TOTAL CFM	250		281		312		344		375		406		438		500		563	
	CFM ea. side	250		281		312		344		375		406		438		500		563	
	Throw in Ft.	10-13-16		11-15-18		13-16-20		14-18-22		15-20-24		16-21-26		17-22-28		20-26-32		23-29-35	
.75	TOTAL CFM	300		337		375		413		450		487		525		600		675	
	CFM ea. side	300		337		375		413		450		487		525		600		675	
	Throw in Ft.	10-14-16		12-15-18		14-17-20		15-19-23		16-21-25		17-22-27		18-23-29		21-24-33		24-30-36	
.875	TOTAL CFM	350		394		437		481		525		570		612		700		788	
	CFM ea. side	350		394		437		481		525		570		612		700		788	
	Throw in Ft.	11-15-17		13-16-19		14-18-21		16-20-24		17-22-26		18-23-28		19-24-30		22-26-34		25-31-38	
1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
	CFM ea. side	400		450		500		550		600		650		700		800		900	
	Throw in Ft.	12-15-18		14-17-20		15-19-22		17-21-25		18-23-27		20-24-29		21-26-31		24-30-36		27-33-41	
1.31	TOTAL CFM	545		590		655		720		786		852		917		1048		1179	
	CFM ea. side	524		590		655		720		786		852		917		1048		1179	
	Throw in Ft.	14-16-19		15-18-21		17-20-24		18-22-26		20-24-28		22-26-31		23-28-33		26-32-28		30-35-43	
1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
	CFM ea. side	600		675		750		825		900		975		1050		1200		1350	
	Throw in Ft.	15-17-20		17-19-22		18-21-25		20-23-28		22-25-30		24-28-33		26-30-35		29-34-41		33-38-45	

Vt = 150 FPM, 100 FPM, 50 FPM

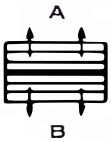
RC 20



NECK VELOCITIES — FPM

SIZE IN INCHES	NECK AREA SQ. FT.	SIDE	A		B		C		D		E		F		G		H		I	
			400		450		500		550		600		650		700		800		900	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	.25	TOTAL CFM	100		112		125		137		150		162		175		200		225	
		CFM ea. side	50	50	56	56	62	62	69	69	75	75	81	81	88	88	100	100	112	112
		Throw in Ft.	4-7-10	4-7-10	5-8-10	5-8-10	6-9-11	6-9-11	6-9-12	6-9-12	7-10-12	7-10-12	8-11-13	8-11-13	9-12-14	9-12-14	10-13-17	10-13-17	11-15-20	11-15-20
	.56	TOTAL CFM	224		252		280		308		336		364		392		448		504	
		CFM ea. side	112	112	126	126	140	140	154	154	168	168	182	182	196	196	224	224	252	252
		Throw in Ft.	8-10-13	8-10-13	9-11-14	9-11-14	10-13-16	10-13-16	11-14-18	11-14-18	12-15-19	12-15-19	13-16-21	13-16-21	14-18-22	14-18-22	16-20-25	16-20-25	18-23-27	18-23-27
	1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
		CFM ea. side	200	200	225	225	250	250	275	275	300	300	325	325	350	350	400	400	450	450
		Throw in Ft.	12-14-18	12-14-18	13-15-18	13-15-18	14-16-20	14-16-20	15-17-21	15-17-21	17-19-2.	17-19-22	18-21-23	18-21-23	18-21-24	18-21-24	21-24-27	21-24-27	24-28-30	24-28-30
	1.56	TOTAL CFM	624		702		780		858		936		1014		1092		1248		1404	
		CFM ea. side	312	312	351	351	390	390	429	429	468	468	507	507	546	546	624	624	702	702
		Throw in Ft.	13-16-19	13-16-19	15-18-21	15-18-21	17-20-23	17-20-23	19-21-25	19-21-25	20-22-28	20-23-28	21-25-30	21-25-30	23-27-32	23-27-32	26-31-36	26-31-36	30-35-40	30-35-40
	2.25	TOTAL CFM	900		1012		1125		1238		1350		1462		1575		1800		2025	
		CFM ea. side	450	450	506	506	563	563	619	619	675	675	731	731	788	788	900	900	1012	1012
		Throw in Ft.	16-18-21	16-18-21	18-20-23	18-20-23	20-22-26	20-22-26	22-24-28	22-24-28	24-27-31	24-27-31	26-29-34	26-29-34	28-31-36	28-31-36	32-36-42	32-36-42	36-40-47	36-40-47
	3.06	TOTAL CFM	1224		1377		1530		1683		1836		1990		2142		2448		2754	
		CFM ea. side	612	612	688	688	765	765	841	841	918	918	995	995	1071	1071	1224	1224	1377	1377
		Throw in Ft.	18-20-23	18-20-23	20-23-26	20-23-26	23-25-29	23-25-29	25-28-32	25-28-32	27-30-35	27-30-35	30-32-38	30-32-38	32-35-40	32-35-40	36-40-47	36-40-47	40-45-50	40-45-50
	4.0	TOTAL CFM	1600		1800		2000		2200		2400		2600		2800		3200		3600	
		CFM ea. side	800	800	900	900	1000	1000	1100	1100	1200	1200	1300	1300	1400	1400	1600	1600	1800	1800
		Throw in Ft.	20-22-25	20-22-25	22-24-28	22-24-28	25-27-31	25-27-31	27-29-34	27-29-34	30-32-37	30-32-37	33-35-40	33-35-40	35-37-43	35-37-43	40-42-49	40-42-49	44-47-52	44-47-52

RC 20L



	.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
		CFM ea. side	75	75	85	85	94	94	103	103	113	113	122	122	132	132	150	150	169	169
		Throw in Ft.	7-9-12	7-9-12	8-11-13	8-11-13	9-12-14	9-12-14	10-13-16	10-13-16	11-14-17	11-14-17	12-15-18	12-15-18	13-16-19	13-16-19	15-18-22	15-18-22	17-20-24	17-20-24
	.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
		CFM ea. side	100	100	112	112	125	125	137	137	150	150	163	163	175	175	200	200	225	225
		Throw in Ft.	8-10-13	8-10-13	9-11-14	9-11-14	10-13-16	10-13-16	11-14-18	11-14-18	12-15-19	12-15-19	13-16-21	13-16-21	14-18-22	14-18-22	16-20-25	16-20-25	18-23-27	18-23-27
	.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
		CFM ea. side	150	150	169	169	188	188	207	207	225	225	244	244	263	263	300	300	338	338
		Throw in Ft.	9-11-15	9-11-15	10-12-16	10-12-16	12-14-17	12-14-17	13-15-19	13-15-19	14-16-20	14-16-20	15-18-21	15-18-21	16-19-22	16-19-22	18-21-26	18-21-26	21-24-28	21-24-28
	.938	TOTAL CFM	375		422		469		516		563		610		657		750		844	
		CFM ea. side	188	188	211	211	235	235	258	258	282	282	305	305	329	329	375	375	422	422
		Throw in Ft.	10-12-16	10-12-16	11-13-17	11-13-17	13-15-18	13-15-18	14-16-20	14-16-20	16-18-21	16-18-21	16-19-22	16-19-22	17-20-23	17-20-23	19-22-26	19-22-26	22-25-29	22-25-29

Vt = 150 FPM, 100 FPM, 50 FPM

NECK VELOCITIES — FPM

	NECK AREA SQ. FT.		A		B		C		D		E		F		G		H		I	
ES		SIDE	400		450		500		550		600		650		700		800		900	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	1.125	TOTAL CFM	450		506		563		619		675		731		788		900		1013	
		CFM ea. side	225	225	253	253	281	281	309	309	337	337	365	365	394	394	450	450	507	507
		Throw in Ft.	12-14-17	12-14-17	13-15-18	13-15-18	14-16-20	14-16-20	15-17-21	15-17-21	17-19-22	17-19-22	18-21-23	18-21-23	18-21-24	18-21-24	21-24-27	21-24-27	24-28-30	24-28-30
	1.31	TOTAL CFM	524		590		655		721		786		852		917		1048		1179	
		CFM ea. side	262	262	295	295	327	327	360	360	393	393	426	426	458	458	524	524	590	590
		Throw in Ft	12-15-18	12-15-18	13-16-19	13-16-19	15-18-21	15-18-21	16-19-22	16-19-22	18-21-24	18-21-24	19-22-25	19-22-25	20-24-27	20-24-27	23-27-30	23-27-30	26-29-33	26-29-33
	1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
		CFM ea. side	250	250	281	281	312	312	344	344	375	375	406	406	437	437	500	500	563	563
		Throw in Ft	13-16-19	13-16-19	14-17-20	14-17-20	16-19-22	16-19-22	17-20-23	17-20-23	19-22-25	19-22-25	20-23-27	20-23-27	22-25-29	22-25-29	24-28-32	24-28-32	27-31-35	27-31-35
	1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
		CFM ea. side	300	300	337	337	375	375	412	412	450	450	487	487	525	525	600	600	675	675
		Throw in Ft	13-16-19	13-16-19	15-18-21	15-18-21	17-20-23	17-20-23	19-21-25	19-21-25	20-23-28	20-23-28	21-25-30	21-25-30	23-27-32	23-27-32	26-31-36	26-31-36	30-35-40	30-35-40
	1.75	TOTAL CFM	700		788		875		963		1050		1138		1225		1400		1575	
		CFM ea. side	350	350	394	394	437	437	481	481	525	525	569	569	612	612	700	700	788	788
		Throw in Ft.	14-17-20	14-17-20	16-19-22	16-19-22	18-21-24	18-21-24	20-22-26	20-22-26	22-25-30	22-25-30	23-27-32	23-27-32	25-29-34	25-29-34	28-33-38	28-33-38	33-37-42	33-37-42
	2.0	TOTAL CFM	800		900		1000		1100		1200		1300		1400		1600		1800	
		CFM ea. side	400	400	450	450	500	500	550	550	600	600	650	650	700	700	800	800	900	900
		Throw in Ft.	16-18-21	16-18-21	18-20-23	18-20-23	20-22-26	20-22-26	22-24-28	22-24-28	24-27-31	24-27-31	26-29-34	26-29-34	28-31-36	28-31-36	32-36-42	32-36-42	36-40-47	36-40-47

RC 20S

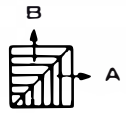
6 x 9	.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
		CFM ea. side	75	75	85	85	94	94	103	103	113	113	122	122	132	132	150	150	169	169
		Throw in Ft	7-9-12	7-9-12	8-11-13	8-11-13	9-12-14	9-12-14	10-13-16	10-13-16	11-14-17	11-14-17	12-15-18	12-15-18	13-16-19	13-16-19	15-18-22	15-18-22	17-20-24	17-20-24
6 x 12	.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
		CFM ea. side	100	100	112	112	125	125	137	137	150	150	163	163	175	175	200	200	225	225
		Throw in Ft.	8-10-13	8-10-13	9-11-14	9-11-14	10-13-16	10-13-16	11-14-18	11-14-18	12-15-19	12-15-19	13-16-21	13-16-21	14-18-22	14-18-22	16-20-25	16-20-25	18-23-27	18-23-27
9 x 12	.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
		CFM ea. side	150	150	169	169	188	188	207	207	225	225	244	244	263	263	300	300	338	338
		Throw in Ft.	9-11-15	9-11-15	10-12-16	10-12-16	12-14-17	12-14-17	13-15-19	13-15-19	14-16-20	14-16-20	15-18-21	15-18-21	16-19-22	16-19-22	18-21-26	18-21-26	21-24-28	21-24-28
9 x 15	.938	TOTAL CFM	375		422		469		516		563		610		657		750		844	
		CFM ea. side	188	188	211	211	235	235	258	258	282	282	305	305	329	329	375	375	422	422
		Throw in Ft.	10-12-16	10-12-16	11-13-17	11-13-17	13-15-18	13-15-18	14-16-20	14-16-20	16-18-21	16-18-21	16-19-22	16-19-22	17-20-23	17-20-23	19-22-26	19-22-26	22-25-29	22-25-29
9 x 18	1.125	TOTAL CFM	450		506		563		619		675		731		788		900		1013	
		CFM ea. side	225	225	253	252	281	281	309	309	337	337	365	365	394	394	450	450	507	507
		Throw in Ft.	12-14-17	12-14-17	13-15-18	13-15-18	14-16-20	14-16-20	15-17-21	15-17-21	17-19-22	17-19-22	18-21-23	18-21-23	18-21-24	18-21-24	21-24-27	21-24-27	24-28-30	24-28-30
9 x 21	1.31	TOTAL CFM	524		590		655		721		786		852		917		1048		1179	
		CFM ea. side	262	262	295	295	327	327	360	360	393	393	426	426	458	458	524	524	590	590
		Throw in Ft	12-15-18	12-15-18	13-16-19	13-16-19	15-18-21	15-18-21	16-19-22	16-19-22	18-21-24	18-21-24	19-22-25	19-22-25	20-24-27	20-24-27	23-27-30	23-27-30	26-29-33	26-29-33

Vt = 150 FPM, 100 FPM, 50 FPM

NECK VELOCITIES — FPM

SIZE IN INCHES	NECK AREA SQ. FT.	SIDE	A		B		C		D		E		F		G		H		I	
			400		450		500		550		600		650		700		800		900	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
2 x	1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
		CFM ea. side	250	250	281	281	312	312	344	344	375	375	406	406	437	437	500	500	563	563
		Throw in Ft.	13-16-19	13-16-19	14-17-20	14-17-20	16-19-22	16-19-22	17-20-23	17-20-23	19-22-25	19-22-25	20-23-27	20-23-27	22-25-29	22-25-29	24-28-32	24-28-32	27-31-35	27-31-35
2 x	1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
		CFM ea. side	300	300	337	337	375	375	412	412	450	450	487	487	525	525	600	600	675	675
		Throw in Ft.	13-16-19	13-16-19	15-18-21	15-18-21	17-20-23	17-20-23	19-21-25	19-21-25	20-23-28	20-23-28	21-25-30	21-25-30	23-27-32	23-27-32	26-31-36	26-31-36	30-35-40	30-35-40
12 x	1.75	TOTAL CFM	700		788		875		963		1050		1138		1225		1400		1575	
		CFM ea. side	350	350	394	394	437	437	481	481	525	525	569	569	612	612	700	700	788	788
		Throw in Ft.	14-17-20	14-17-20	16-19-22	16-19-22	18-21-24	18-21-24	20-22-26	20-22-26	22-25-30	22-25-30	23-27-32	23-27-32	25-29-34	25-29-34	28-33-38	33-37-42	33-37-42	33-37-42
12 x 24	2.0	TOTAL CFM	800		900		1000		1100		1200		1300		1400		1600		1800	
		CFM ea. side	400	400	450	450	500	500	550	550	600	600	650	650	700	700	800	800	900	900
		Throw in Ft.	16-18-21	16-18-21	18-20-23	18-20-23	20-22-26	20-22-26	22-24-28	22-24-28	24-27-31	24-27-31	26-29-34	26-29-34	28-31-36	28-31-36	32-36-42	32-36-42	36-40-47	36-40-47

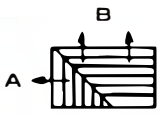
RC 22



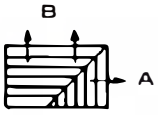
6 x 6	.25	TOTAL CFM	100		112		125		137		150		162		175		200		225	
		CFM ea. side	50	50	56	56	62	62	69	69	75	75	81	81	88	88	100	100	112	112
		Throw in Ft.	4-7-10	4-7-10	5-8-10	5-8-10	6-9-11	6-9-11	6-9-12	6-9-12	7-10-12	7-10-12	8-11-13	8-11-13	9-12-14	9-12-14	10-13-17	10-13-17	11-15-20	11-15-20
9 x 9	.56	TOTAL CFM	224		252		280		308		336		364		392		448		504	
		CFM ea. side	112	112	126	126	140	140	154	154	168	168	182	182	196	196	224	224	252	252
		Throw in Ft.	8-10-13	8-10-13	9-11-14	9-11-14	10-13-16	10-13-16	11-14-18	11-14-18	12-15-19	12-15-19	13-16-21	13-16-21	14-18-22	14-18-22	16-20-25	16-20-25	18-23-27	18-23-27
12 x 12	1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
		CFM ea. side	200	200	225	225	250	250	275	275	300	300	325	325	350	350	400	400	450	450
		Throw in Ft.	12-14-18	12-14-18	13-15-18	13-15-18	14-16-20	14-16-20	15-17-21	15-17-21	17-19-22	17-19-22	18-21-23	18-21-23	18-21-24	18-21-24	21-24-27	21-24-27	24-28-30	24-28-30
15 x 15	1.56	TOTAL CFM	624		702		780		858		936		1014		1092		1248		1404	
		CFM ea. side	312	312	351	351	390	390	429	429	468	468	507	507	546	546	624	624	702	702
		Throw in Ft.	13-16-19	13-16-19	15-18-21	15-18-21	17-20-23	17-20-23	19-21-25	19-21-25	20-23-28	20-23-28	21-25-30	21-25-30	23-27-32	23-27-32	26-31-36	26-31-36	30-35-40	30-35-40
18 x 18	2.25	TOTAL CFM	900		1012		1125		1238		1350		1462		1575		1800		2025	
		CFM ea. side	450	450	506	506	563	563	619	619	675	675	731	731	788	788	900	900	1012	1012
		Throw in Ft.	16-18-21	16-18-21	18-20-23	18-20-23	20-22-26	20-22-26	22-24-28	22-24-28	24-27-31	24-27-31	26-29-34	26-29-34	28-31-36	28-31-36	32-36-42	32-36-42	36-40-47	36-40-47

Vt = 150 FPM, 100 FPM, 50 FPM

RC



23



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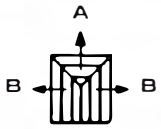
NECK VELOCITIES — FPM

E ES	AREA SQ. FT. NECK	SIDE	A 400 A	A 400 B	B 450 A	B 450 B	C 500 A	C 500 B	D 550 A	D 550 B	E 600 A	E 600 B	F 650 A	F 650 B	G 700 A	G 700 B	H 800 A	H 800 B	I 900 A	I 900 B
	.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
		CFM ea. side	50	100	56	113	62	126	68	138	75	150	81	163	88	175	100	200	112	225
		Throw in Ft.	4-7-10	7-10-14	5-8-10	8-11-14	6-9-11	9-12-16	6-9-12	9-13-17	7-10-12	10-15-18	8-11-13	12-16-19	9-12-14	13-17-22	10-13-17	15-20-25	11-15-20	16-22-27
	.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
		CFM ea. side	50	150	56	169	62	188	68	207	75	225	81	244	88	262	100	300	112	338
		Throw in Ft.	4-7-10	9-12-15	5-8-10	10-14-17	6-9-11	12-15-19	6-9-12	13-17-21	7-10-12	14-19-23	8-11-13	15-20-25	9-12-14	16-21-26	10-13-17	19-25-30	11-15-20	22-28-31
	.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
		CFM ea. side	112	188	127	211	141	234	155	258	169	281	183	305	197	328	225	375	253	422
		Throw in Ft.	8-10-13	10-13-16	9-11-14	11-15-18	10-13-16	13-16-20	11-14-18	14-18-22	12-15-19	15-20-24	13-16-21	16-21-25	14-18-22	17-22-27	16-20-25	20-26-31	18-23-27	23-27-32
	.938	TOTAL CFM	375		422		469		516		563		610		657		750		845	
		CFM ea. side	112	263	127	295	141	328	155	361	169	394	183	427	197	460	225	525	253	592
		Throw in Ft.	8-10-13	12-15-18	9-11-14	13-16-19	10-13-16	15-18-21	11-14-18	16-19-22	12-15-19	18-21-24	13-16-21	19-22-26	14-18-22	20-24-28	16-20-25	23-27-31	18-23-27	26-29-33
	1.125	TOTAL CFM	450		506		563		619		675		731		788		900		1012	
		CFM ea. side	112	338	127	379	141	422	155	464	169	506	183	548	197	591	225	675	253	759
		Throw in Ft.	8-10-13	12-16-18	9-11-14	14-17-20	10-13-16	15-19-22	11-14-18	17-20-24	12-15-19	18-22-26	13-16-21	19-23-28	14-18-22	20-24-30	16-20-25	24-27-33	18-23-27	27-31-36
	1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
		CFM ea. side	200	300	225	338	250	375	275	413	300	450	325	488	350	525	400	600	450	675
		Throw in Ft.	10-13-16	10-14-16	11-15-18	12-15-18	13-16-20	14-17-20	14-18-22	15-18-23	15-20-24	16-20-24	16-21-25	17-22-27	17-22-26	18-23-28	20-24-30	21-24-32	23-25-33	24-27-34
	1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
		CFM ea. side	200	400	225	450	250	500	275	550	300	600	325	650	350	700	400	800	450	900
		Throw in Ft.	10-13-16	12-14-18	11-15-18	14-17-20	13-16-20	15-19-22	14-18-22	17-21-25	15-20-24	18-23-27	16-21-25	20-24-29	17-22-26	21-26-31	20-24-30	24-30-35	23-25-33	21-33-38

RC 30



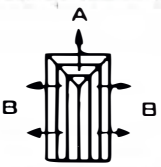
	.25	TOTAL CFM	100		112		125		137		150		162		175		200		225	
		CFM ea. side	24	38	28	42	31	47	35	51	38	56	42	60	45	65	50	75	56	85
		Throw in Ft.	2-4-6	3-5-7	2-4-6	4-6-8	3-5-7	4-6-9	3-5-8	5-7-10	3-6-9	5-8-11	4-6-9	6-8-12	4-6-10	7-9-12	5-8-11	8-10-14	6-9-13	9-11-16
	.56	TOTAL CFM	224		252		280		308		336		364		392		448		504	
		CFM ea. side	56	84	63	95	70	105	77	115	84	126	91	136	98	147	112	169	126	190
		Throw in Ft.	4-6-8	6-8-11	4-6-9	7-9-13	4-7-10	7-10-14	5-7-11	8-11-15	5-8-12	9-12-17	5-9-13	10-13-18	6-9-14	10-14-19	8-11-17	12-16-22	10-13-19	13-18-25
	1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
		CFM ea. side	100	150	113	169	124	188	138	206	150	225	162	244	174	263	200	300	225	338
		Throw in Ft.	7-10-12	8-11-16	8-11-13	9-12-17	9-12-15	10-14-19	9-12-17	13-16-20	10-14-18	14-17-21	11-15-19	15-18-22	12-16-19	16-20-24	14-18-21	18-23-27	16-20-23	20-25-30
	1.56	TOTAL CFM	624		702		780		858		936		1014		1092		1248		1404	
		CFM ea. side	156	234	176	253	195	293	215	322	234	350	254	381	273	409	312	468	350	527
		Throw in Ft.	9-12-14	12-15-19	10-13-16	14-17-21	12-15-18	15-19-23	13-16-20	17-21-26	14-18-22	19-23-28	15-20-23	20-24-30	17-21-25	22-26-32	19-23-27	25-31-35	21-25-29	28-34-39

Vt = 150 FPM, 100 FPM, 50 FPM

NECK VELOCITIES — FPM

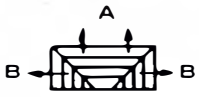
NECK AREA SQ. FT.	SIDE	A		B		C		D		E		F		G		H		I	
		400		450		500		550		600		650		700		800		900	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
2.25	TOTAL CFM	900		1012		1125		1238		1350		1462		1575		1800		2025	
	CFM ea. side	226	338	254	379	281	422	308	465	338	506	366	548	393	591	450	675	506	760
	Throw in Ft.	14-17-18	16-19-22	16-19-20	18-21-24	18-20-23	20-24-27	20-23-25	22-26-30	21-25-27	24-28-32	23-27-29	26-30-34	25-29-32	28-32-36	27-31-34	32-36-41	30-34-37	36-40-45

RC 31



.375	TOTAL CFM	150		169		188		206		225		244		263		300		337	
	CFM ea. side	24	63	28	70	31	79	35	85	38	94	42	101	45	109	50	125	56	140
	Throw in Ft.	2-4-6	5-7-10	2-4-6	6-8-11	3-5-7	6-9-12	3-5-8	7-10-13	3-6-9	8-11-14	4-6-9	9-12-15	4-6-10	10-13-16	5-8-11	11-15-18	6-9-13	12-16-20
.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
	CFM ea. side	24	88	28	98	30	110	35	120	38	131	41	142	44	153	50	175	56	197
	Throw in Ft.	2-4-6	6-8-11	2-4-6	7-9-13	3-5-7	7-10-14	3-5-8	8-11-15	3-6-9	9-12-15	4-6-9	10-13-18	4-6-10	10-14-19	5-8-11	12-16-22	6-9-13	13-18-25
.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
	CFM ea. side	56	122	62	138	71	152	79	167	84	183	92	198	99	213	112	244	126	274
	Throw in Ft.	4-6-8	8-10-13	4-6-9	9-11-14	4-7-10	10-13-16	5-7-11	11-14-18	5-8-12	12-15-19	5-9-13	13-16-21	6-9-14	14-18-22	8-11-17	16-20-25	10-13-19	18-23-27
.938	TOTAL CFM	375		422		469		516		563		610		657		750		845	
	CFM ea. side	55	160	62	180	71	199	78	219	85	239	92	259	99	279	112	319	126	359
	Throw in Ft.	4-6-8	9-12-15	4-6-9	10-14-17	4-7-10	12-15-19	5-7-11	13-17-20	5-8-12	14-19-22	5-9-13	15-20-24	6-9-14	16-21-25	8-11-17	19-23-28	10-13-19	22-26-30
1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
	CFM ea. side	100	200	113	225	125	250	138	275	150	300	163	325	175	350	200	400	225	450
	Throw in Ft.	7-9-12	12-14-18	8-11-13	13-15-18	9-12-14	14-16-20	10-13-16	15-17-21	11-14-17	17-19-23	12-15-18	18-21-25	13-16-19	18-21-26	15-18-22	21-24-29	17-20-24	24-28-31
1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
	CFM ea. side	100	250	113	281	126	312	137	344	150	375	163	406	174	438	200	500	225	562
	Throw in Ft.	7-9-12	12-15-18	8-11-13	13-16-19	9-12-14	15-18-21	10-13-16	16-19-22	11-14-17	18-21-24	12-15-18	19-22-26	13-16-19	20-24-28	15-18-22	23-27-31	17-20-24	26-29-33
1.875	TOTAL CFM	750		844		938		1031		1125		1219		1313		1500		1687	
	CFM ea. side	156	297	176	334	196	371	215	408	235	445	255	482	273	520	312	594	351	668
	Throw in Ft.	9-12-14	13-16-19	10-13-16	15-18-21	12-15-18	17-20-23	13-16-20	19-21-25	14-18-22	20-23-27	15-20-23	21-25-28	17-21-25	23-27-31	19-23-27	26-30-34	21-25-29	29-33-37

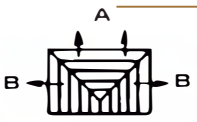
RC 32



.625	TOTAL CFM	250		282		312		344		375		406		437		500		563	
	CFM ea. side	150	50	170	56	188	62	206	69	225	75	244	81	263	87	300	100	338	112
	Throw in Ft.	9-12-15	4-7-10	10-14-17	5-8-10	12-15-19	6-9-11	13-17-21	6-9-12	14-19-23	7-10-12	15-20-25	8-11-13	16-21-27	9-12-14	19-25-31	10-13-17	22-28-34	11-15-20
1.31	TOTAL CFM	524		590		655		721		786		852		917		1050		1180	
	CFM ea. side	300	112	338	126	375	140	411	155	448	169	486	183	523	197	598	225	673	253
	Throw in Ft.	10-14-16	8-10-13	12-15-18	9-11-14	14-17-20	10-13-16	15-18-23	11-14-18	16-20-24	12-15-19	17-22-27	13-16-21	18-23-28	14-18-22	21-24-32	16-20-25	24-27-34	18-23-27
1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
	CFM ea. side	376	112	423	126	470	140	515	155	562	169	609	183	656	197	750	225	844	253
	Throw in Ft.	12-14-18	8-10-13	14-17-20	9-11-14	15-19-22	10-13-16	17-21-25	11-14-18	18-23-27	12-15-19	20-24-29	13-16-21	21-26-31	14-18-22	24-30-35	16-20-25	27-33-38	18-23-27

Vt = 150 FPM, 100 FPM, 50 FPM

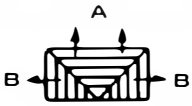
RC 33



NECK VELOCITIES — FPM

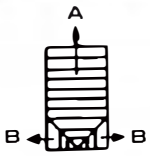
ES	AREA SQ. FT. NECK	SIDE	A		B		C		D		E		F		G		H		I	
			400		450		500		550		600		650		700		800		900	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
		CFM ea. side	56	47	63	53	71	59	78	64	84	71	92	76	99	82	112	94	126	106
		Throw in Ft.	4-6-8	4-7-10	4-6-9	5-8-10	4-7-10	6-9-11	5-7-11	6-9-12	5-8-12	7-10-12	5-9-13	8-11-13	6-9-14	9-12-14	8-11-17	10-13-17	10-13-19	11-15-20
	.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
		CFM ea. side	100	100	112	113	125	125	137	138	150	150	162	162	175	175	200	200	225	225
		Throw in Ft.	7-10-12	7-10-14	8-11-13	8-11-14	9-12-15	9-12-16	9-12-17	9-13-17	10-14-18	10-15-18	11-15-19	12-16-19	12-16-19	13-17-20	14-18-21	15-20-23	16-20-23	16-22-25
	.938	TOTAL CFM	375		422		469		516		563		610		657		750		844	
		CFM ea. side	155	110	174	124	195	137	214	151	233	165	254	178	273	192	312	219	350	247
		Throw in Ft.	9-12-14	8-10-13	10-13-16	9-11-14	12-15-18	10-13-16	13-16-20	11-14-18	14-18-22	12-15-19	15-20-23	13-16-21	17-21-25	14-18-22	19-23-27	16-20-25	21-25-29	18-23-27
	1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
		CFM ea. side	156	172	175	194	195	215	214	237	234	258	253	280	273	301	312	344	350	387
		Throw in Ft.	9-12-14	10-12-16	10-13-16	11-13-17	12-15-18	13-15-18	13-16-20	14-16-20	14-18-22	16-18-21	15-20-23	16-19-22	17-21-25	17-20-23	19-23-27	19-20-26	21-25-29	22-25-29
	1.875	TOTAL CFM	750		844		938		1031		1125		1219		1313		1500		1688	
		CFM ea. side	226	262	254	295	282	328	309	361	337	394	365	427	393	460	450	525	506	590
		Throw in Ft.	14-17-18	10-13-16	16-19-20	11-15-18	18-20-23	13-16-20	20-23-25	14-18-22	21-25-27	16-20-24	23-27-29	17-21-26	25-29-32	18-22-28	27-31-34	20-26-31	30-34-37	23-29-33

RC 34



6 x 2	.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
		CFM ea. side	100	50	113	56	126	62	137	69	150	75	163	81	176	87	200	100	225	113
		Throw in Ft.	7-10-12	4-7-10	8-11-13	5-8-10	9-12-15	6-9-11	9-12-17	6-9-12	10-14-18	7-10-12	11-15-19	8-11-13	12-16-19	9-12-14	14-18-21	10-13-17	16-20-23	11-15-20
9 x	1.125	TOTAL CFM	450		506		563		619		675		731		788		900		1013	
		CFM ea. side	226	112	254	126	281	141	309	155	337	169	365	183	394	197	450	225	507	253
		Throw in Ft.	14-17-18	8-10-13	16-19-20	9-11-14	18-20-23	10-13-16	20-23-25	11-14-18	21-25-27	12-15-19	23-27-29	13-16-21	25-29-32	14-18-22	27-31-34	16-20-25	30-34-37	18-23-27
2 x	2.0	TOTAL CFM	800		900		1000		1100		1200		1300		1400		1600		1800	
		CFM ea. side	400	200	450	225	500	250	550	275	600	300	650	325	700	350	800	400	900	450
		Throw in Ft.	16-18-21	12-14-18	18-20-23	13-15-18	20-22-26	14-16-20	22-24-28	15-17-21	24-27-31	17-19-22	26-29-34	18-21-23	28-31-36	18-21-24	32-36-42	21-24-27	36-40-47	24-28-30

RC 35



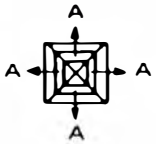
6 x 9	.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
		CFM ea. side	126	12	141	14	156	16	172	17	187	19	204	20	219	22	250	25	282	28
		Throw in Ft.	8-10-13	1-2-3	9-11-14	1-2-3	10-13-16	1-2-3	11-14-18	1-3-4	12-15-19	1-3-4	13-16-21	2-3-4	14-18-22	2-3-5	16-20-25	2-4-5	18-23-27	3-4-5
9 x 9	.56	TOTAL CFM	224		252		280		308		336		364		392		448		504	
		CFM ea. side	168	28	190	31	210	35	232	38	252	42	274	45	294	49	336	56	378	63
		Throw in Ft.	9-12-15	2-9-6	10-14-17	2-4-6	12-15-19	3-5-7	13-17-20	3-5-8	14-19-22	3-6-9	15-20-24	4-6-9	16-21-25	4-6-10	19-23-28	5-8-11	22-26-30	6-9-12

Vt = 150 FPM, 100 FPM, 50 FPM

NECK VELOCITIES — FPM

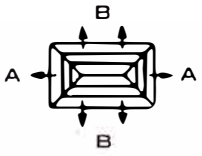
AREA SQ. FT. NECK		A		B		C		D		E		F		G		H		I	
	SIDE	400		450		500		550		600		650		700		800		900	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
	CFM ea. side	244	28	276	31	305	35	335	38	366	42	396	45	427	49	488	56	549	63
	Throw in Ft.	12-15-18	2-4-6	13-16-19	2-4-6	15-18-21	3-5-7	16-19-22	3-5-8	18-21-24	3-6-9	19-22-26	4-6-9	20-24-28	4-6-10	23-27-31	5-8-11	26-29-33	6-9-12
.938	TOTAL CFM	375		422		469		516		563		610		657		750		844	
	CFM ea. side	319	28	360	31	399	35	438	38	479	42	518	45	559	49	638	56	718	63
	Throw in Ft.	13-16-19	2-4-6	15-18-21	2-4-6	17-20-23	3-5-7	19-21-25	3-5-8	20-23-27	3-6-9	21-25-29	4-6-9	23-27-31	4-6-10	26-31-35	5-8-11	30-35-38	6-9-12
1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
	CFM ea. side	300	50	338	56	374	63	412	69	450	75	488	81	524	88	600	100	675	113
	Throw in Ft.	10-14-16	4-7-10	12-15-18	5-8-10	14-17-20	6-9-11	15-18-23	6-9-12	16-20-24	7-10-12	17-22-26	8-11-13	18-23-28	9-12-14	21-24-32	10-13-17	24-27-34	11-15-20
1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
	CFM ea. side	400	50	450	56	500	63	550	69	600	75	650	81	700	88	800	100	900	113
	Throw in Ft.	12-15-18	4-7-10	14-17-20	5-8-10	15-19-22	6-9-11	17-21-25	6-9-12	18-23-27	7-10-12	20-24-29	8-11-13	21-26-31	9-12-14	24-30-36	10-13-17	27-33-41	11-15-20

RC 40



.25	TOTAL CFM	100		112		125		137		150		162		175		200		225	
	CFM ea. side	25	25	28	28	31	31	34	34	38	38	41	41	44	44	50	50	56	56
	Throw in Ft.	2-4-6	2-4-6	2-4-6	2-4-6	3-5-7	3-5-7	3-5-8	3-5-8	3-6-9	3-6-9	4-6-9	4-6-9	4-6-10	4-6-10	5-8-11	5-8-11	6-9-13	6-9-13
.56	TOTAL CFM	224		252		280		308		336		364		392		448		504	
	CFM ea. side	56	56	63	63	70	70	77	77	84	84	91	91	98	98	112	112	126	126
	Throw in Ft.	4-6-8	4-6-8	4-6-9	4-6-9	4-7-10	4-7-10	5-7-11	5-7-11	5-8-12	5-8-12	5-9-13	5-9-13	6-9-14	6-9-14	8-11-17	8-11-17	10-13-19	10-13-19
1.0	TOTAL CFM	400		450		500		550		600		650		700		800		900	
	CFM ea. side	100	100	113	113	125	125	138	138	150	150	163	163	175	175	200	200	225	225
	Throw in Ft.	7-10-12	7-10-12	8-11-13	8-11-13	9-12-15	9-12-15	9-12-17	9-12-17	10-14-18	10-14-18	11-15-19	11-15-19	12-16-19	12-16-19	14-18-21	14-18-21	16-20-23	16-20-23
1.56	TOTAL CFM	624		702		780		858		936		1014		1092		1248		1404	
	CFM ea. side	156	156	176	176	195	195	215	215	234	234	254	254	273	273	312	312	350	350
	Throw in Ft.	9-12-14	9-12-14	10-13-16	10-13-16	12-15-18	12-15-18	13-16-20	13-16-20	14-18-22	14-18-22	15-20-23	15-20-23	17-21-25	17-21-25	19-23-27	19-23-27	21-25-29	21-25-29
2.25	TOTAL CFM	900		1012		1125		1238		1350		1462		1575		1800		2025	
	CFM ea. side	225	225	253	253	281	281	309	309	338	338	365	365	394	394	450	450	506	506
	Throw in Ft.	14-17-18	14-17-18	16-19-20	16-19-20	18-20-23	18-20-23	20-23-25	20-23-25	21-25-27	21-25-27	23-27-29	23-27-29	25-29-32	25-29-32	27-31-34	27-31-34	30-34-37	30-34-37
3.06	TOTAL CFM	1224		1377		1530		1683		1836		1990		2142		2448		2754	
	CFM ea. side	306	306	344	344	382	382	421	421	459	459	497	497	535	535	612	612	688	688
	Throw in Ft.	17-20-21	17-20-21	19-22-24	19-22-24	21-24-26	21-24-26	23-27-29	23-27-29	25-28-31	25-28-31	27-30-33	27-30-33	29-33-36	29-33-36	33-37-41	33-37-41	37-41-45	37-41-45
4.0	TOTAL CFM	1600		1800		2000		2200		2400		2600		2800		3200		3600	
	CFM ea. side	400	400	450	450	500	500	550	550	600	600	650	650	700	700	800	800	900	900
	Throw in Ft.	19-21-23	19-21-23	22-24-26	22-24-26	24-27-28	24-27-28	26-29-31	26-29-31	28-32-34	28-32-34	31-34-37	31-34-37	33-37-40	33-37-40	36-40-43	36-40-43	38-43-45	38-43-45

VI = 150 FPM, 100 FPM, 50 FPM



NECK VELOCITIES — FPM

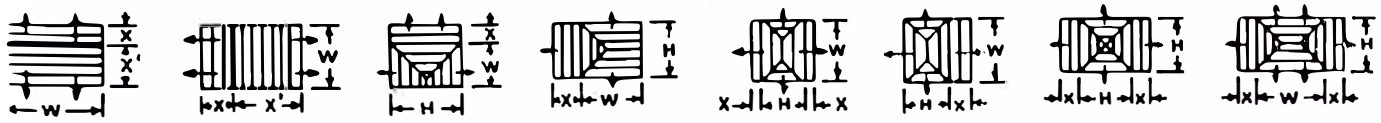
ECK REA D. FT.	SIDE	A		B		C		D		E		F		G		H		I	
		400		450		500		550		600		650		700		800		900	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
.375	TOTAL CFM	150		169		188		206		225		244		263		300		338	
	CFM ea. side	25	50	28	57	31	63	35	68	38	75	41	81	44	88	50	100	57	113
	Throw in Ft.	2-4-6	4-7-10	2-4-6	5-8-10	3-5-7	6-9-11	3-5-8	6-9-12	3-6-9	7-10-12	4-6-9	8-11-13	4-6-10	9-12-14	5-8-11	10-13-17	6-9-13	11-15-20
.5	TOTAL CFM	200		225		250		275		300		325		350		400		450	
	CFM ea. side	25	75	28	84	31	94	35	103	38	112	41	122	44	131	50	150	57	169
	Throw in Ft.	2-4-6	7-9-12	2-4-6	8-11-13	3-5-7	9-12-14	3-5-8	10-13-16	3-6-9	11-14-17	4-6-9	12-15-18	4-6-10	13-16-19	5-8-11	15-18-22	6-9-13	17-20-24
.75	TOTAL CFM	300		338		375		413		450		488		525		600		675	
	CFM ea. side	56	94	63	106	70	117	77	129	84	141	91	153	98	165	113	187	127	211
	Throw in Ft.	4-6-8	8-10-13	4-6-9	9-11-14	4-7-10	10-13-16	5-7-11	11-14-18	5-8-12	12-15-19	5-9-13	13-16-21	6-9-14	14-18-22	8-11-17	16-20-25	10-13-19	18-23-27
.938	TOTAL CFM	375		422		469		516		563		610		657		750		844	
	CFM ea. side	56	132	63	148	70	164	77	181	84	197	91	214	98	231	113	262	127	295
	Throw in Ft	4-6-8	8-11-14	4-6-9	9-12-15	4-7-10	11-14-17	5-7-11	12-15-19	5-8-12	13-16-21	5-9-13	14-17-22	6-9-14	15-19-23	8-11-17	18-21-26	10-13-19	20-25-29
1.125	TOTAL CFM	450		506		563		619		675		731		788		900		1013	
	CFM ea. side	56	169	63	190	70	211	77	232	84	253	91	274	98	296	113	338	127	380
	Throw in Ft.	4-6-8	9-12-15	4-6-9	10-14-17	4-7-10	12-15-19	5-7-11	13-17-20	5-8-12	14-19-22	5-9-13	15-20-24	6-9-14	16-21-25	8-11-17	19-23-28	10-13-19	22-26-30
1.31	TOTAL CFM	524		590		655		721		786		852		917		1048		1179	
	CFM ea. side	56	206	63	232	70	257	77	283	84	309	91	335	98	360	113	413	127	464
	Throw in Ft.	4-6-8	11-13-17	4-6-9	12-15-18	4-7-10	14-16-20	5-7-11	15-17-21	5-8-12	17-19-23	5-9-13	18-21-25	6-9-14	18-21-26	8-11-17	21-24-29	10-13-19	24-28-31
1.25	TOTAL CFM	500		563		625		688		750		813		875		1000		1125	
	CFM ea. side	100	150	113	169	125	188	138	206	150	225	163	244	175	263	200	300	225	338
	Throw in Ft.	7-10-12	9-12-15	8-11-13	10-14-17	9-12-15	12-15-19	9-12-17	13-17-21	10-14-18	14-19-23	11-15-19	15-20-25	12-16-19	16-21-27	14-18-21	19-25-31	16-20-23	22-28-34
1.5	TOTAL CFM	600		675		750		825		900		975		1050		1200		1350	
	CFM ea. side	100	200	113	225	125	250	138	274	150	300	163	324	175	350	200	400	225	450
	Throw in Ft.	7-10-12	11-13-17	8-11-13	12-15-18	9-12-15	14-16-20	9-12-17	15-17-21	10-14-18	17-19-23	11-15-19	18-21-25	12-16-19	18-21-26	14-18-21	21-24-29	16-20-23	24-28-31
1.75	TOTAL CFM	700		788		875		963		1050		1138		1225		1400		1575	
	CFM ea. side	100	250	113	281	125	313	138	344	150	375	163	406	175	438	200	500	225	563
	Throw in Ft.	7-10-12	12-15-18	8-11-13	13-16-19	9-12-15	15-18-21	9-12-17	16-19-22	10-14-18	18-21-24	11-15-19	19-22-26	12-16-19	20-24-28	14-18-21	23-27-31	16-20-23	26-29-33

Vt = 150 FPM, 100 FPM, 50 FPM

NECK AREA SQ. FT.	SIDE	NECK VELOCITIES — FPM																	
		A		B		C		D		E		F		G		H		I	
		400		450		500		550		600		650		700		800		900	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
2.0	TOTAL CFM	800		900		1000		1100		1200		1300		1400		1600		1800	
	CFM ea. side	100	300	113	337	125	375	138	412	150	450	163	487	175	525	200	600	225	675
	Throw in Ft.	7-10-12	13-16-19	8-11-13	15-18-21	9-12-15	17-20-23	9-12-17	19-21-25	10-14-18	20-23-27	11-15-19	21-25-28	12-16-19	22-27-31	14-18-21	26-30-34	16-20-23	29-33-37
1.875	TOTAL CFM	750		844		938		1031		1125		1219		1313		1500		1688	
	CFM ea. side	156	219	176	246	195	274	215	301	234	329	253	357	273	384	312	438	351	492
	Throw in Ft.	9-12-14	12-14-17	10-13-16	13-15-18	12-15-18	14-16-20	13-16-20	15-17-21	14-18-22	17-19-22	15-20-23	18-21-23	17-21-25	18-21-24	19-23-27	21-24-27	21-25-29	24-28-30
2.62	TOTAL CFM	1050		1179		1310		1441		1572		1703		1834		2096		2358	
	CFM ea. side	225	300	253	337	281	374	309	412	337	449	365	487	393	524	450	600	507	675
	Throw in Ft.	14-17-18	13-16-19	16-19-20	15-18-21	18-20-23	17-20-23	20-23-25	19-21-25	21-25-27	20-23-27	23-27-29	21-25-28	25-29-32	23-27-31	27-31-34	26-30-34	30-34-37	29-33-37
3.0	TOTAL CFM	1200		1350		1500		1650		1800		1950		2100		2400		2700	
	CFM ea. side	225	375	253	422	282	468	310	515	337	563	367	608	394	656	450	750	507	844
	Throw in Ft.	14-17-18	16-18-21	16-19-20	18-20-23	18-20-23	20-22-26	20-23-25	22-24-28	21-25-27	24-27-31	23-27-29	25-28-32	25-29-32	27-30-34	27-31-34	30-34-38	30-34-37	33-37-40

Vt = 150 FPM, 100 FPM, 50 FPM

OTHER "RC" SERIES PATTERNS AVAILABLE

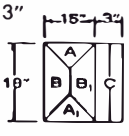


HOW TO APPORTION

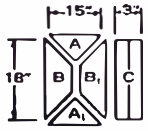
When the location of an "RC" diffuser requires a two, three or four-way pattern, each section should be considered as a separate outlet. The percentage of the total CFM discharged through any section represents the same percentage of the neck area.

EXAMPLE:

R43 "RC" 18"x18" — W = 18", H = 15", X = 3"
Total Air 1125 CFM
Total Neck Area 2.25 sq. ft.
Neck Velocity 500 FPM



Area A = .39 sq. ft. x 500 FPM = 195 CFM
Area A_1 = .39 sq. ft. x 500 FPM = 195 CFM
Area B = .547 sq. ft. x 500 FPM = 274 CFM
Area B_1 = .547 sq. ft.
Area C = .375 sq. ft.
Total 2.25 sq. ft. 1,125 CFM



(See Tables D, E and F)

ABLE D

REAS OF TRIANGLES AND TRAPEZOIDS (IN SQ. FT.)

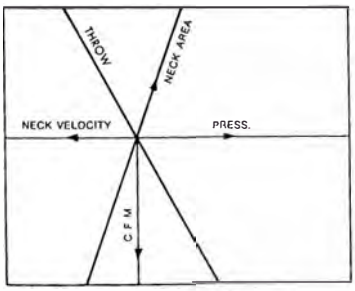
Dimension "X"	X	X	Y = 3"	4½"	6"	7½"	9"	10½"	12"	13½"	15"
3"	.031	.016									
4½"	.070										
6"	.125	.063									
7½"	.195		.094								
9"	.281	.141	.125								
10½"	.383		.156	.188							
12"	.50	.25	.188	.234							
13½"	.635		.219	.281							
15"	.781	.39	.250	.328	.375						
16½"	.945		.281	.375	.438	.469					
18"	1.13	.563	.313	.422	.50	.547					
19½"	1.32		.344	.469	.563	.625	.656				
21"	1.53	.766	.375	.516	.625	.703	.750				
24"	2.00	1.00	.438	.609	.75	.859	.938	.984			
27"	2.53	1.27	.500	.703	.875	1.02	1.13	1.20	1.25		
30"	3.13	1.56	.563	.797	1.00	1.17	1.31	1.42	1.50	1.55	
33"	3.78	1.89	.625	.891	1.13	1.33	1.50	1.64	1.75	1.83	1.88
36"	4.5	2.25	.688	.984	1.25	1.48	1.69	1.86	2.00	2.11	2.19
39"	5.28	2.64	.75	1.08	1.38	1.64	1.88	2.08	2.25	2.39	2.50
42"	6.13	3.06	.813	1.17	1.50	1.80	2.06	2.30	2.50	2.67	2.81

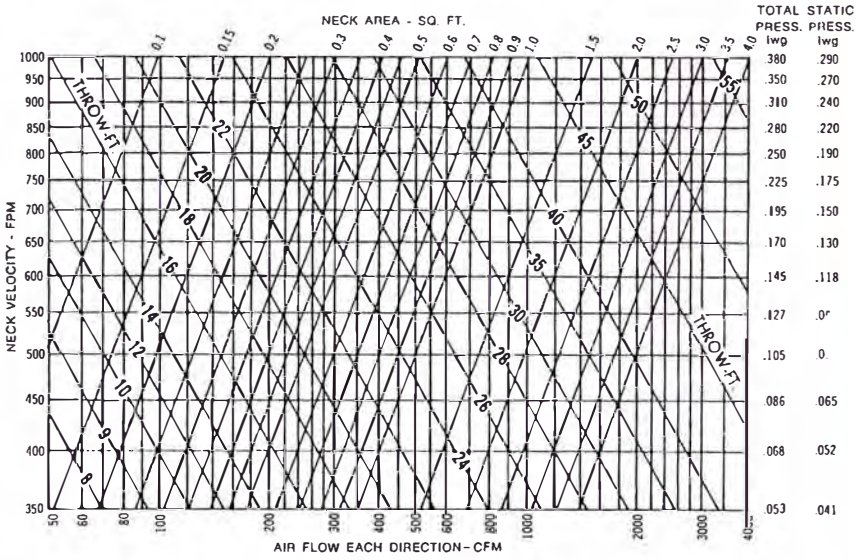
ABLE E THROW CHART

pproximate)

ws" are for ceiling mounted diffusers.

no ceiling effect is present decrease blows 20%.

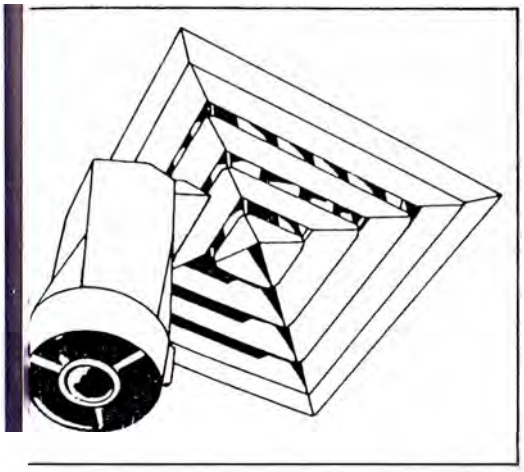




ABLE F TABLE OF SQUARE AND RECTANGULAR AREAS (IN SQ. FT.)

Size	1½"	3"	4½"	6"	7½"	9"	10½"	12"	13½"	15"	16½"	18"	19½"	21"	22½"	24"	25½"	27"	28½"	30"	31½"	33"	34½"	36"
3"	.031	.063																						
4½"	.047	.094	.141																					
6"	.063	.125	.1875	.25																				
7½"	.078	.156	.234	.313	.39																			
9"	.094	.188	.281	.375	.469	.56																		
10½"	.109	.219	.328	.438	.547	.656	.766																	
12"	.125	.25	.375	.50	.625	.75	.875	1.00																
13½"	.141	.281	.422	.563	.703	.844	.984	1.13	1.27															
15"	.156	.313	.469	.625	.781	.938	1.10	1.25	1.41	1.56														
16½"	.172	.344	.516	.688	.859	1.03	1.20	1.38	1.55	1.72	1.89													
18"	.188	.375	.563	.75	.938	1.125	1.31	1.50	1.69	1.875	2.06	2.25												
19½"	.203	.406	.61	.813	1.015	1.22	1.42	1.63	1.83	2.03	2.23	2.44	2.64											
21"	.219	.438	.656	.875	1.09	1.31	1.53	1.75	1.97	2.19	2.41	2.62	2.84	3.06										
22½"	.234	.469	.703	.938	1.17	1.41	1.64	1.88	2.11	2.34	2.58	2.81	3.05	3.28	3.52									
24"	.25	.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00								
25½"	.266	.531	.797	1.06	1.33	1.59	1.86	2.13	2.39	2.66	2.92	3.19	3.45	3.72	3.98	4.25	4.52							
27"	.281	.563	.844	1.125	1.41	1.69	1.97	2.25	2.53	2.81	3.09	3.375	3.66	3.94	4.22	4.50	4.78	5.06						
28½"	.297	.594	.891	1.19	1.48	1.78	2.08	2.38	2.67	2.97	3.27	3.56	.386	4.16	4.45	4.75	5.05	5.34	5.64					
30"	.313	.625	.938	1.25	1.56	1.875	2.19	2.50	2.81	3.125	3.44	3.75	4.06	4.375	4.69	5.00	5.31	5.625	5.94	6.25				
31½"	.328	.656	.984	1.31	1.64	1.97	2.30	2.63	2.95	3.28	3.61	3.94	4.27	4.59	4.92	5.25	5.58	5.91	6.23	6.56	6.89			
33"	.344	.688	1.03	1.375	1.72	2.06	2.41	2.75	3.09	3.44	3.78	4.125	4.47	4.81	5.16	5.50	5.84	6.19	6.53	6.875	7.22	7.56		
34½"	.359	.719	1.08	1.44	1.80	2.16	2.52	2.88	3.23	3.59	3.95	4.31	4.67	5.03	5.39	5.75	6.11	6.47	6.83	7.19	7.55	7.91	8.27	
36"	.375	.75	1.125	1.5	1.88	2.25	2.63	3.00	3.38	3.75	4.13	4.50	4.88	5.25	5.63	6.00	6.38	6.75	7.13	7.50	7.88	8.25	8.63	9.00
37½"	.391	.781	1.17	1.56	1.95	2.34	2.73	3.13	3.52	3.91	4.30	4.69	5.08	5.47	5.86	6.25	6.64	7.03	7.42	7.81	8.20	8.59	8.98	9.38
39"	.406	.813	1.22	1.625	2.03	2.44	2.84	3.25	3.66	4.06	4.47	4.875	5.28	5.69	6.09	6.50	6.91	7.31	7.72	8.125	8.53	8.94	9.34	9.75
40½"	.422	.844	1.27	1.69	2.11	2.53	2.95	3.38	3.80	4.22	4.64	5.06	5.48	5.91	6.33	6.75	7.17	7.59	8.02	8.44	8.86	9.28	9.70	10.13
42"	.438	.875	1.31	1.75	2.19	2.625	3.06	3.50	3.94	4.375	4.81	5.25	5.69	6.125	6.56	7.00	7.44	7.875	8.31	8.75	9.19	9.625	10.06	10.50

AGITAIR "R" TYPE INSTRUMENT ACCURATELY MEASURES AIR VELOCITIES



lapter Cone Used With Anemometer

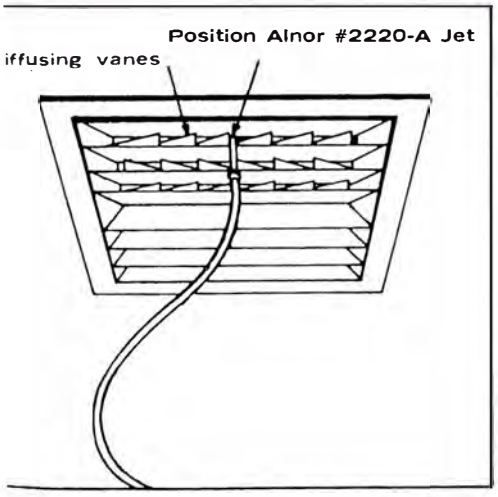


FIGURE 1

TESTING INSTRUCTIONS

) 1

rotating vane Anemometer into cone with ace outward.

ep 2

instrument on face of diffuser as illustrated g. 1. Take series of Anemometer readings for inute (minimum) at various locations.

) 3

ert all readings to 1 minute basis and deter- average fpm. Apply Anemometer correction.

) 4

Table III obtain neck velocity (FPM) correspond- o corrected Anemometer FPM from Step #3.

) 5

ulate air quantity

where Q = Cubic Feet Per Minute, cfm
A = Neck Area of Diffuser, sq. ft.
V = Neck Velocity, fpm

ck Figure # 2 for some typical instrument lo- ons on face on diffusers.

The AGITAIR cone type instrument, developed by the engineering staff of Aeronca, Inc., has been especially designed for balancing air conditioning and ventilating systems by providing "on the job" accurate determination of air quantities (cfm) issuing from AGITAIR square and rectangular air diffusers.

The AGITAIR air measuring instrument, consisting of an adapter cone and a rotating vane Anemometer, has two outstanding features:

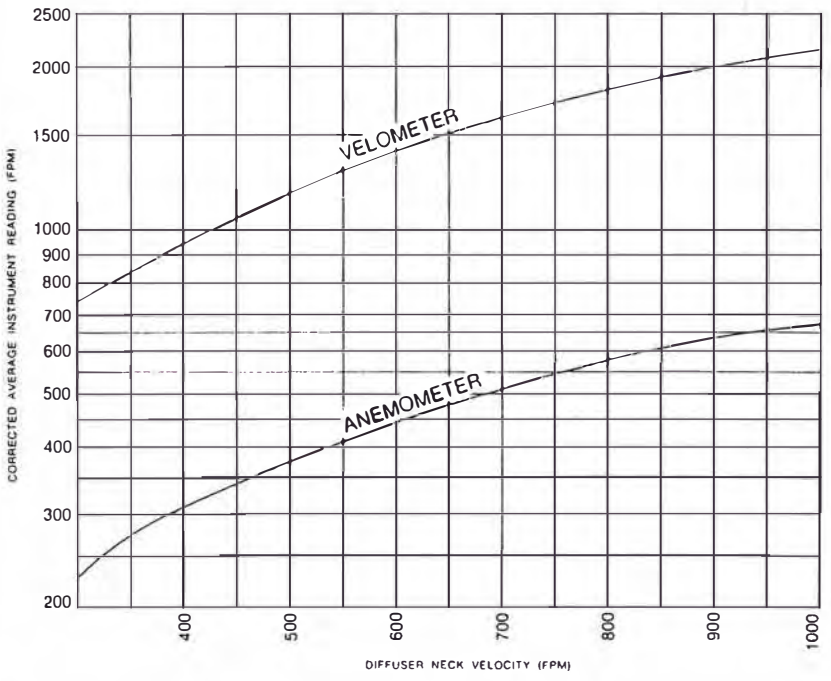
1. It positions the measuring instrument with respect to the diffuser face. (See illustration.)
2. It has built-in means for smoothing out and straightening the air flow at the point where air measurements are made.

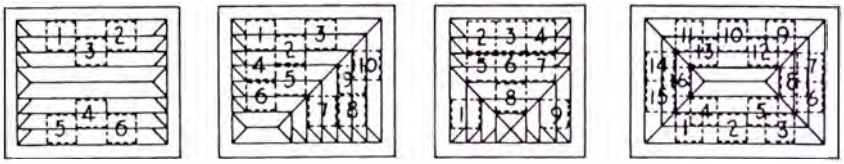
The testing instructions enable the user of the AGITAIR cone type instrument to quickly and accurately balance air conditioning and ventilating systems and provide:

(a) dependable on-the-job measurements of air quantity issuing from diffuser;
(b) evidence of any variation in air flow at any point of diffuser face;
(c) elimination of the human element in positioning the instrument.

The AGITAIR cone type instrument is not intended for use on diffusers which are used as air returns.

TABLE III
AK FOR RC DIFFUSERS

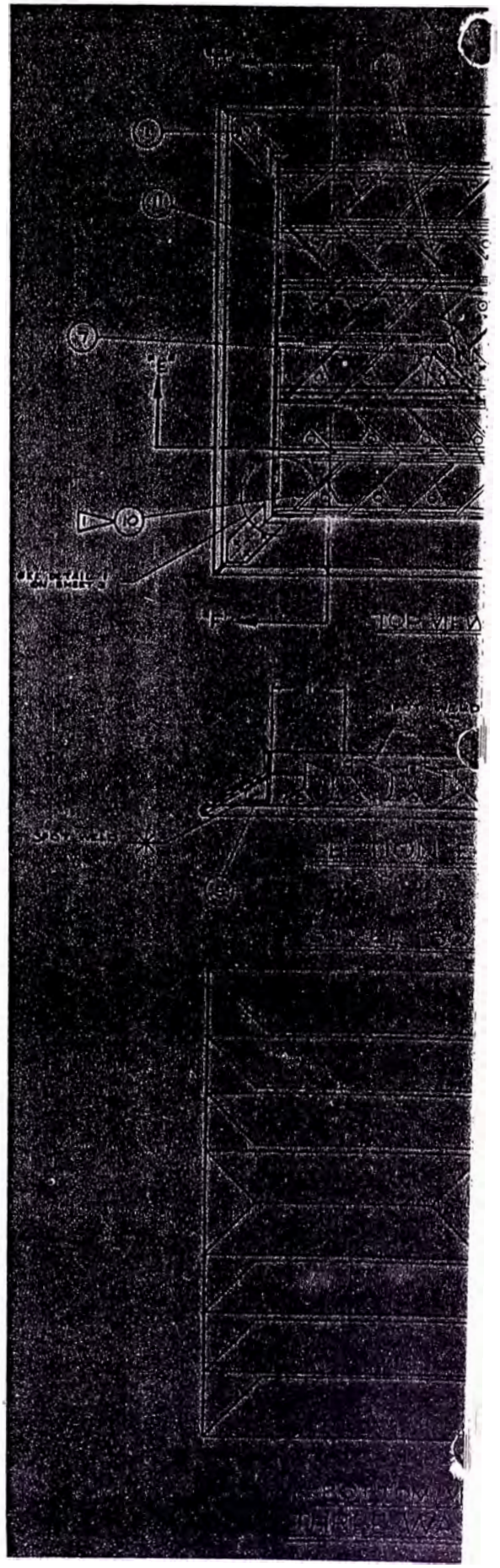




RC 20L RC 24 RC 35 RC 42

FIGURE 2
Some Suggested Locations For Placing Cones

AERONCA, INC.
BUENSOD/AGITAIR DIVISION



Warranty

Agitair warrants for a period of one year from shipment that all its products are free from defects in workmanship and material and have the capacities set forth in its catalogs. Agitair's obligations and liabilities under this warranty are limited to furnishing, F. O. B. factory, replacements for any of its products not conforming to this warranty and returned to it transportation charges prepaid. Returned items are subject to inspection at the factory for evidence of mistreatment and abuse after leaving Agitair's control. The warranty and liability set forth in this paragraph are in lieu of all other warranties and liabilities expressed or implied. Said liability shall be limited to the purchase price of the materials manufactured by Agitair.

Aeronca, Inc. reserves the right to change specifications and design without notice.

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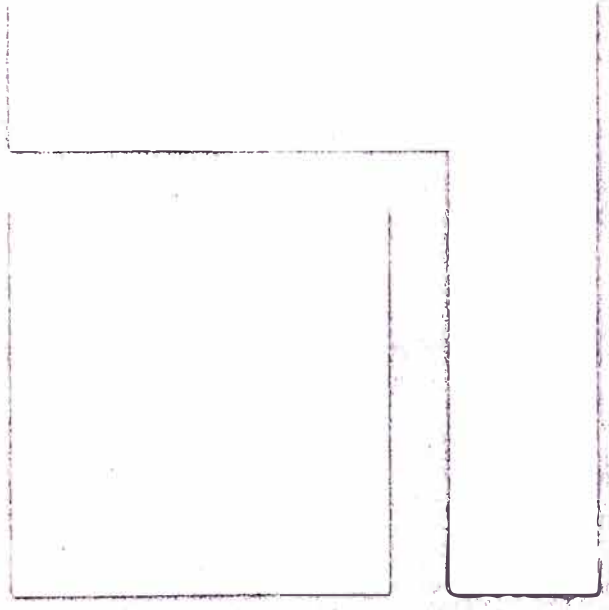
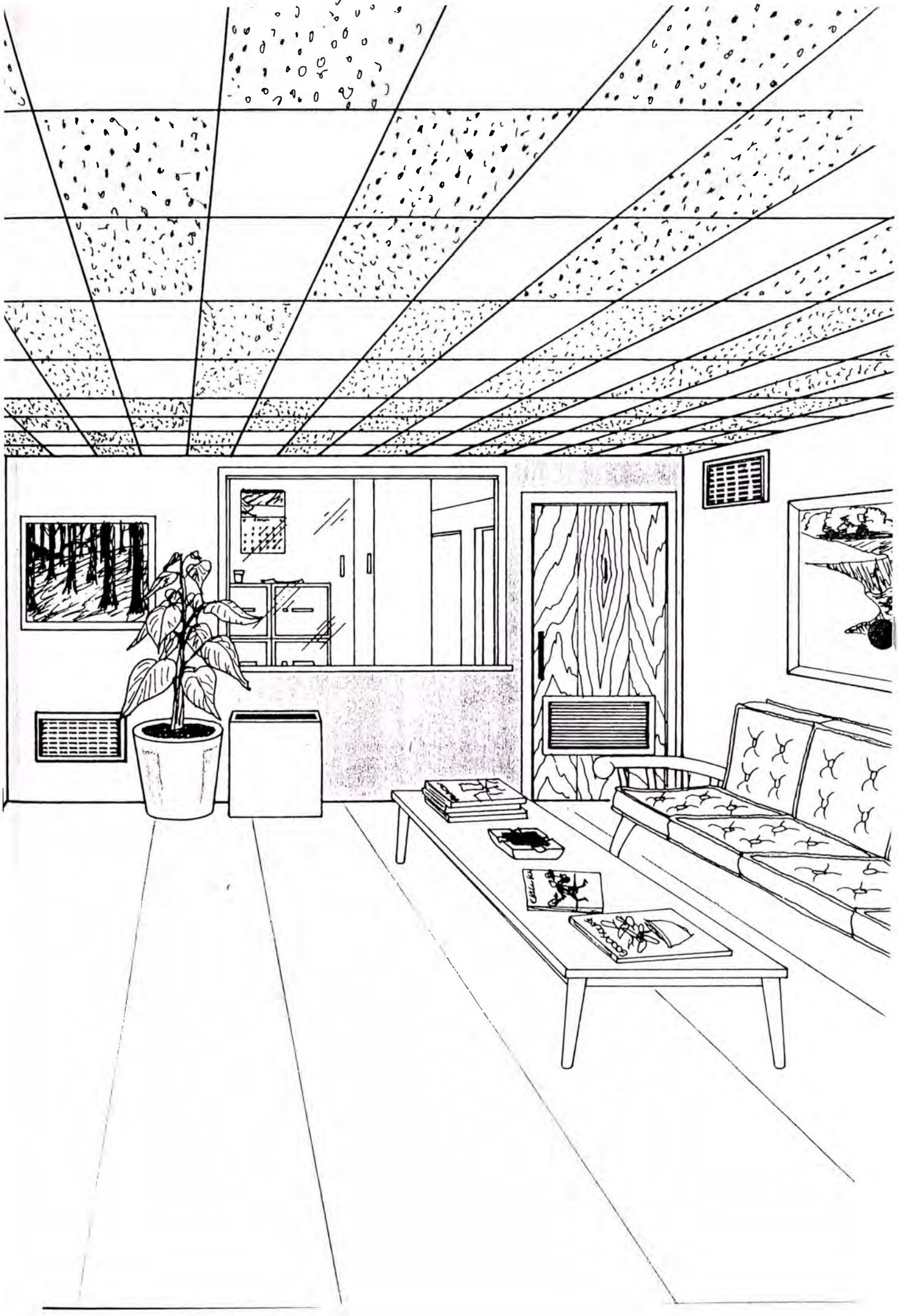
BUENSOD/AGITAIR DIVISION

el & Aluminum



Grilles & Registers



ıe basic air diffusion objective is to select proper pply air outlets and return intakes to evenly distriıte conditioned air within a given space while mainining occupant comfort conditions (noise levels, changes, temperature differentials). If this type of distribution is achieved, temperature within the ıace will be uniform, air motion will be great enough avoid "stagnant" air, and velocities will be low ıough to eliminate drafts.

ith this objective in mind, Agitair has designed and ıgineered a complete line of steel and extruded ıminum grilles and registers to provide optimum efficiency in air distribution plus the ultimate in appearance for unlimited architectural designs.

These quality, high performance grilles and registers are engineered to handle large quantities of primary air while producing minimum pressure drops and noise levels. Design characteristics permit adjustable or fixed directional air patterns – horizontally and/or vertically.

The wide variety of available styles and accessories feature:

Heavy-gauge steel construction – stainless or other materials available at extra cost.

Streamlined, hollow, sturdy, light-weight blade construction in ¾" spacing.

Adjustable deflection core.

Mitered corners with welded corner tabs.

Standard gray enamel finish by electrodeposition, depositing a uniform coating on all surfaces. (Optional white at no extra cost.) Special finishes available upon request.

Heavy-gauge steel plaster frame.

Available in single or double deflection, with or without damper.

Supply and return units.

Supply units furnished with gasketed frames.

Rough usage and hinged filter units available.

Screw holes and mounting screws furnished unless otherwise specified.

Sizes up to 48" x 48" standard with larger units furnished either butt-joint or adjacent construction.

Extruded aluminum construction – light-weight, yet rigid and durable.

Extruded aluminum blades available in ½" or ¾" spacing.

Adjustable deflection core.

Mitered corners – staked for structural strength and seamless appearance.

Standard aluminized tinted enamel finish – Durable and corrosion resistant. Special finishes available upon request.

Choice of two mounting frames and two border styles.

Available in single or double deflection, with or without damper.

Supply and return units.

Supply units furnished with gasketed frames.

Rough usage and hinged filter units available.

Screw holes and mounting screws furnished unless otherwise specified.

Sizes up to 48" x 30" standard with larger units furnished adjacent construction. Blade length is limited to 30", restricting double deflection units to 30" x 30".

Adjustable Single Deflection Supply Units	4
Adjustable Double Deflection Supply Units	4
Factory Set 0° Deflection Supply or Return Units	4
Factory Set 45° Deflection Return Units	5
Perforated Face Return Units	5
Rough Usage Units	6
Louver Ceiling Units	6
Door & Partition Units	6
Filter Grilles	6
Accessories	7
Performance Data	8

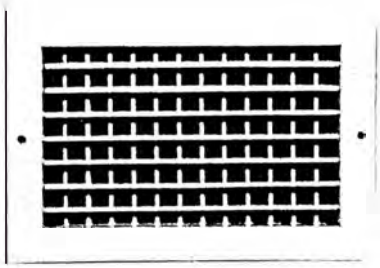
LY UNITS

DHO
- EDHO
gle Deflection, Adjustable Horizontal Fins

DVO
- EDVO
gle Deflection, Adjustable Vertical Fins

- DDHO*
– EDDHO
uble Deflection, Horizontal Front Fins

- DDVO*
– EDDVO*
uble Deflection, Vertical Front Fins



SUPPLY OR RETURN UNITS

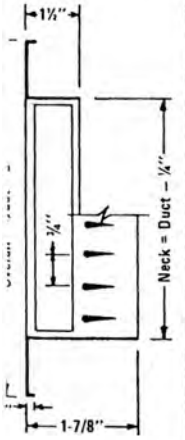
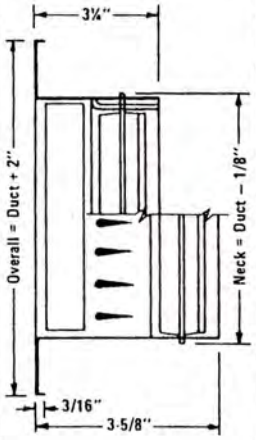
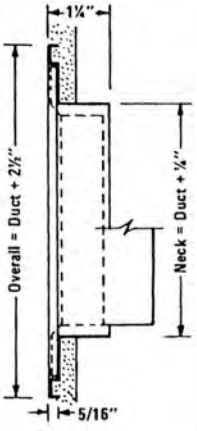
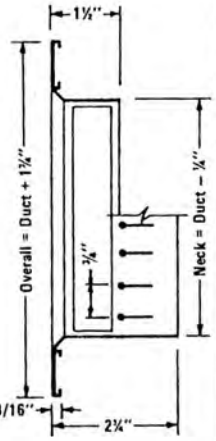
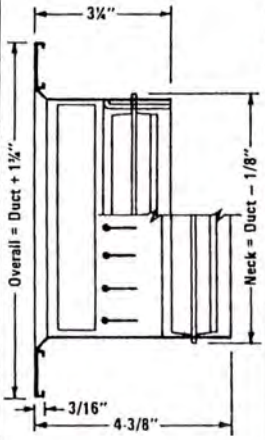
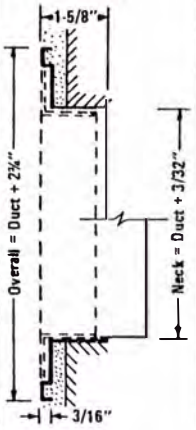
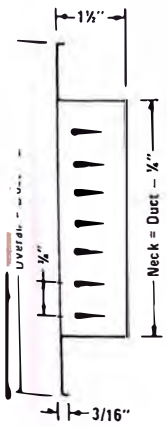
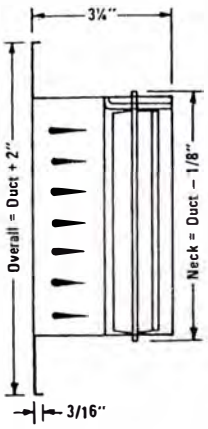
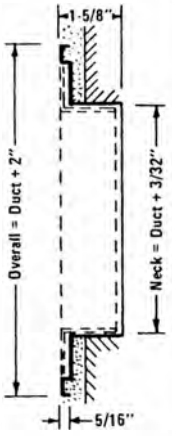
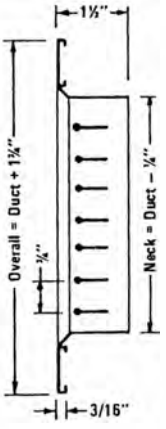
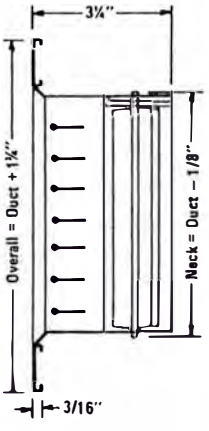
DHF – OHFO
EDHF – EDHFO
Single Deflection, Fixed Horizontal Fins

DVF – OVFO
EDVF – EDVFO
Single Deflection, Fixed Vertical Fins

E – Aluminum

O – Opposed Blade Damper

front and rear banks of double deflection units are adjustable for any combination of fin settings.

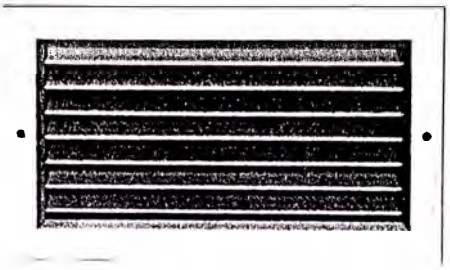
Steel Construction			Aluminum Construction		
Grille	*Register*	*Frame*	*Grille*	*Register*	*Frame*
DH – DV	DHO – DVO	PF	EDH – EDV	EDHO – EDVO	EPF
					
DDH – DDV	DDHO – DDVO		EDDH – EDDV	EDDHO – EDDVO	
DHF – DVF	DHFO – DVFO	PF	EDHF – EDVF	EDHFO – EDVFO	EPF
					

½" Blade Spacing Optional in Aluminum Construction

TURN UNITS

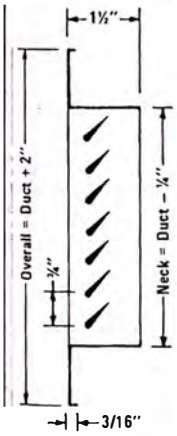
– DGO
; – EDGO
Single Deflection
Fins Factory Set at 45° Angle
– PGO
– EPGO
Perforated Face Plate

Aluminum
Opposed Blade Damper

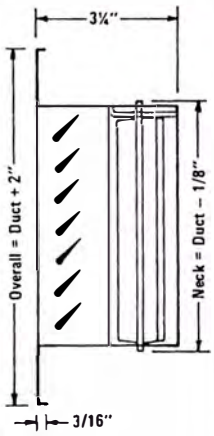


Steel Construction

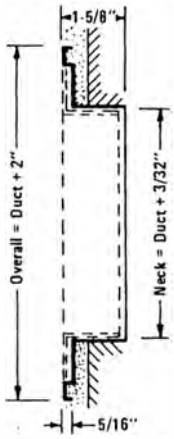
Grille — DG



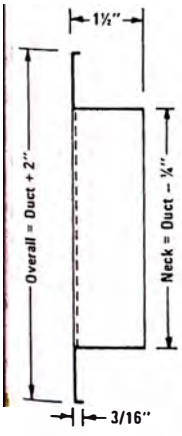
Register — DGO



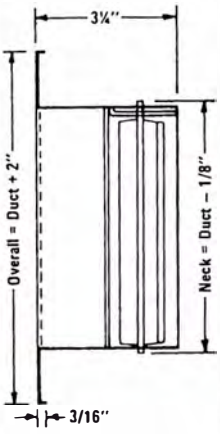
Frame — PF



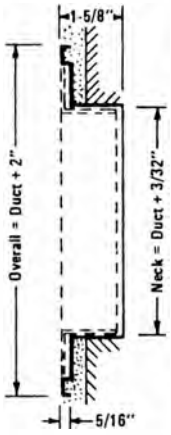
Grille — PG



Register — PGO

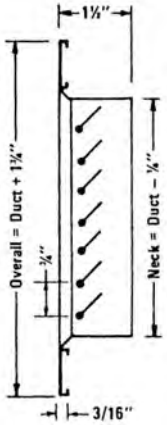


Frame — PF

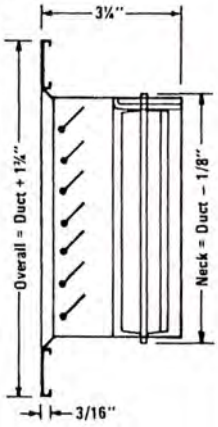


Aluminum Construction

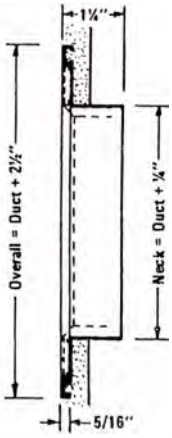
Grille — EDG



Register — EDGO

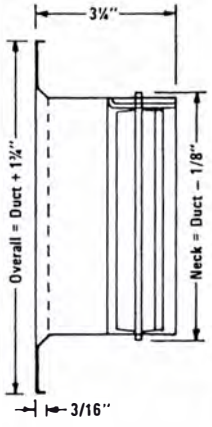


Frame — EPF

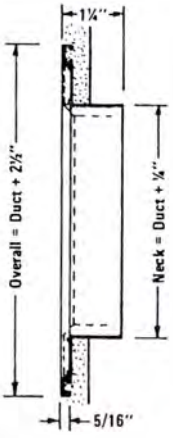


Grille — EPG

Register — EPGO



Frame — EPF



½" Blade Spacing Optional in Aluminum Construction

ECIAL PURPOSE UNITS

45 – RU-450
J-45 – ERU-450
Fixed 45° Fins

G – RUGO
JG – ERUGO
Fixed Horizontal Fins

Aluminum

EC-55 – EC-550
½" x ½" x ½" Grid

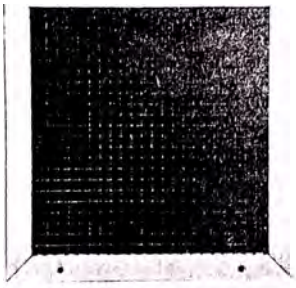
EC-10 – EC-100
1" x 1" x 1" Grid

O – Opposed Blade Damper

TYPE C GRILLE
Consists of Core only

TYPE FS GRILLE
Consists of core with two frames - one attached, one loose and telescoping

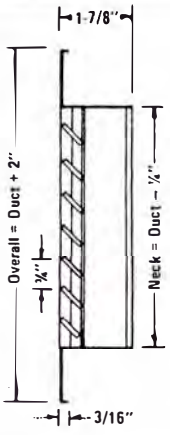
TYPE F GRILLE & REGISTER
Consists of core with frame attached to one side only



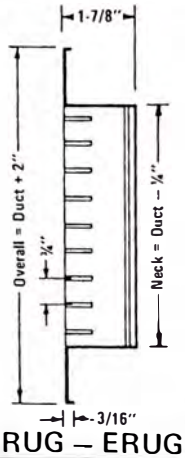
Steel or Aluminum Construction

Rough Usage Units

Grille

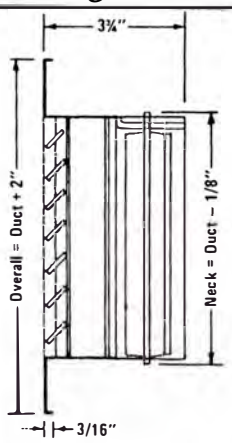


RU-45 – ERU-45

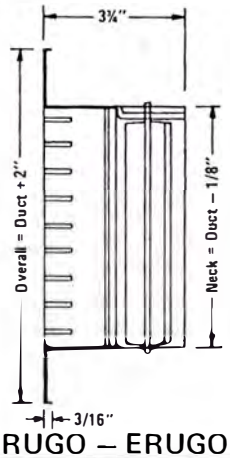


RUG – ERUG

Register

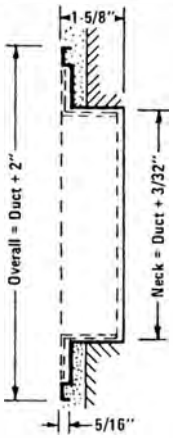


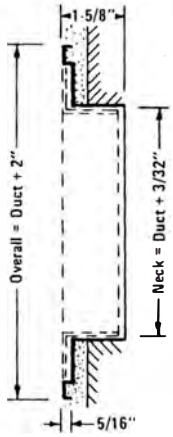
RU-450 – ERU-450



RUGO – ERUGO

Frame

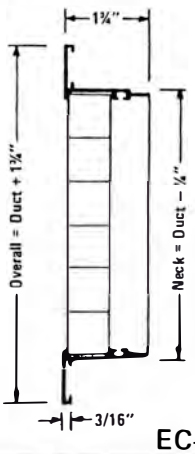




Louver Ceiling Units

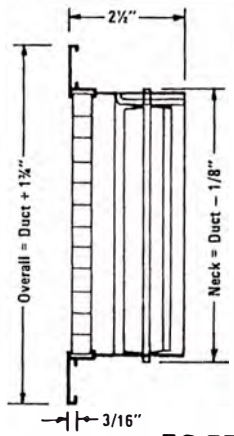
Grille

EC-55

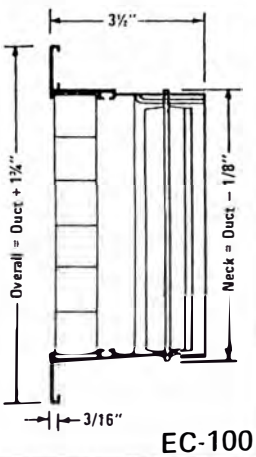


EC-10

Register



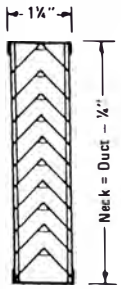
EC-550



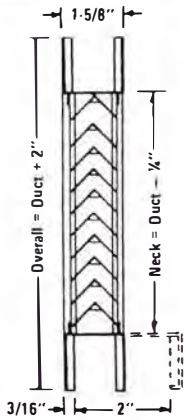
EC-100

Door & Partition Units

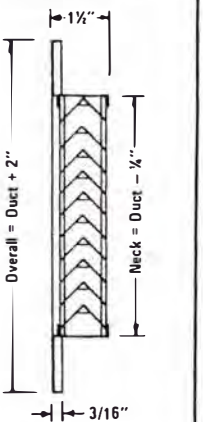
Type C



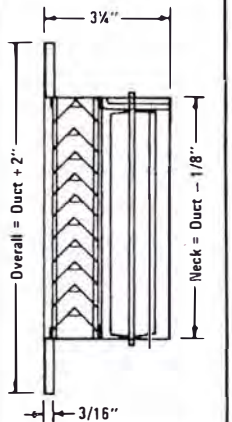
Type F



Type FS



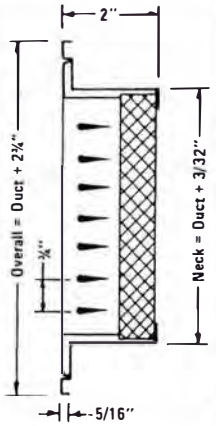
Grille



Register

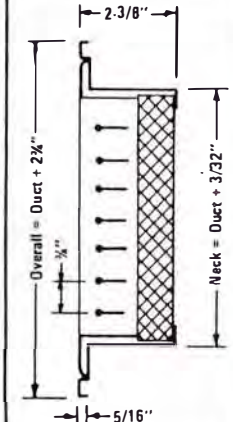
Filter Grilles

Steel



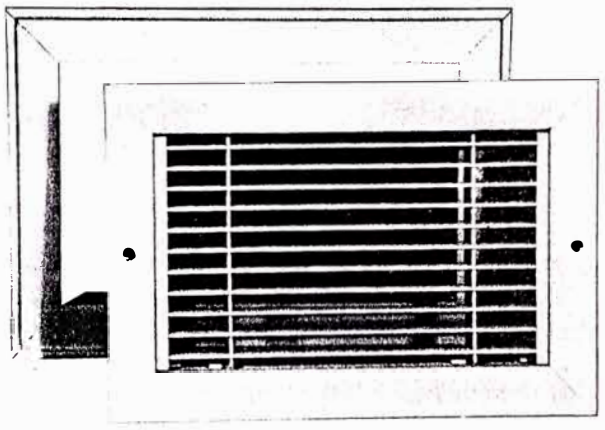
DHFF – DVFF

Aluminum

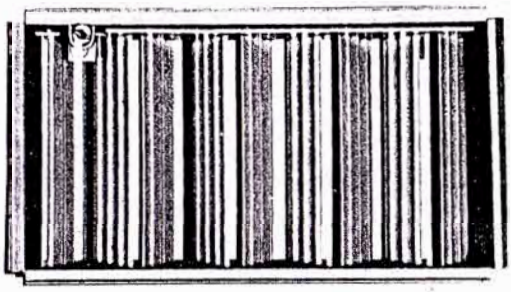


EDHFF – EDVFF

½" Blade Spacing Optional in Aluminum Construction



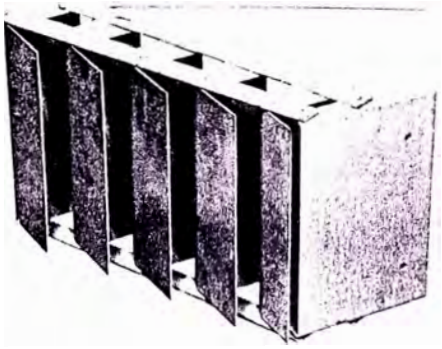
e use of the steel or aluminum plaster frames ·mits removal of the grille or register without .pping plaster or paint. The plaster frame has ficient depth to provide connections to ducts d can be readily attached to duct or lintel frame. e grille or register fits into the frame and can be :ured with standard sheet metal screws. The frame made to exact catalog size, and duct openings ɔuld be slightly oversize (1/8" min.) to receive ımes.



Volume Damper

The opposed action volume controller, OB or EOB, consists of a series of blades, adjustable from fully opened to fully closed. Through a unique actuating mechanism each blade turns toward a similarly opposed turning section. The result is maintenance of equal orifices in the valve assembly for air passage toward grille face and room.

ıe Scooptrol consists of a series of vanes with an ad- :table arm for adjusting air quantity of the grille d delivering air evenly across the face of the grille. ades may also be adjusted to affect the volume or ·ection of air. Stationary position of blades is main- ned by friction pins, pressure fitted into rolled ges.



ıe Branchtrol is available in 3 styles . . . Type S-2 — th control arm supplied for use with square rod op- ıtor . . . Type S-3 — with worm-gear assembly for eration through face of grille . . . Type S-3-S — ne as S-3 except with side operator for operation rough duct.

Supply Grilles and Registers

SINGLE AND DOUBLE DEFLECTION

☐ ≤NC20 ☐ ≤NC30 ☐ ≤NC40 ☐ ≤NC50 ☐ >NC50

NOMINAL HEIGHT									OUTLET VELOCITY 400–550				OUTLET VELOCITY 550–650				OUTLET VELOCITY 600–750				OUTLET VELOCITY 700–900			
									CFM	DEFLECTION			CFM	DEFLECTION			CFM	DEFLECTION			CFM	DEFLECTION		
										0°	22½°	45°		0°	22½°	45°		0°	22½°	45°		0°	22½°	45°
										V_k				V_k				V_k				V_k		
										400	450	550		550	600	650		600	700	750		700	800	900
										THROW				THROW				THROW				THROW		
6	8	10	12	14	16	18	20	24		V_t 50				V_t 50				V_t 50				V_t 50		
									40	9	8	6	50	12	11	9	60	15	14	11	70	17	15	12
									50	11	9	8	60	15	14	9	70	17	15	12	80	18	17	14
6									80	14	11	9	100	17	14	11	100	18	17	14	130	20	18	15
8									100	15	12	9	120	17	14	11	150	20	18	14	180	21	20	17
10	8								120	17	14	11	150	18	17	14	180	21	20	15	200	24	21	17
12									150	17	15	12	180	20	17	15	200	23	21	17	250	26	23	18
14	10								180	18	17	14	200	23	20	17	250	26	23	18	280	29	26	21
16	12	10							220	20	18	15	280	24	21	18	300	29	24	20	350	32	27	23
20	14	12							300	21	20	17	350	27	23	20	430	30	26	23	480	36	30	26
24	18	14	12						350	26	21	18	430	30	26	20	500	33	30	26	550	39	33	27
26	20	16	14						400	27	24	20	480	32	27	23	550	36	32	27	650	42	36	30
30	24	18	16	14					450	29	26	20	550	33	29	26	630	39	33	29	730	45	38	33
36	26	22	18	16					500	30	26	21	600	36	30	27	700	41	36	30	800	48	41	35
40	30	24	20	18	16				600	32	27	23	700	38	33	27	850	44	38	33	950	50	44	38
48	38	30	24	22	18				700	35	30	26	850	42	36	30	1000	50	42	36	1130	56	47	41
	40	32	28	24	20	18			800	38	32	27	950	47	39	33	1130	53	45	39	1280	59	50	44
	42	36	30	26	24	22	20		900	41	33	29	1100	48	41	35	1250	54	47	41	1450	63	54	47
	46	42	36	30	26	24	22		1000	44	38	32	1200	50	44	38	1400	60	50	44	1600	68	59	50
			44	38	34	30	28	24	1250	48	41	35	1500	54	45	41	1750	65	56	47	2000	72	65	54
				48	42	36	34	28	1500	51	44	38	1800	59	48	44	2100	68	60	50	2400	78	69	59
					44	40	36	30	1750	56	48	41	2100	63	53	48	2450	72	66	56	2800	83	74	63
							42	36	2000	59	50	44	2400	68	57	50	2800	78	69	60	3200	87	78	66
							48	40	2250	62	54	45	2700	72	60	54	3150	80	72	63	3600	92	81	69
								42	2500	65	57	48	3000	77	63	57	3500	86	77	66	4000	96	86	74
								48	3000	70	60	50	3600	80	68	60	4200	90	80	70	4800	102	90	78

V_k = Neck Velocity V_t = Terminal Velocity NC re 18db room attenuation

ıw is based on terminal velocity
0 fpm. To determine Throw at
r terminal velocities, multiply
ıe following factors:

t	50	75	100	150
tor	1.0	.67	.50	.33

NOMINAL HEIGHT									OUTLET VELOCITY 900–1100				OUTLET VELOCITY 1100–1300				OUTLET VELOCITY 1250–1550				OUTLET VELOCITY 1450–1750			
									CFM	DEFLECTION			CFM	DEFLECTION			CFM	DEFLECTION			CFM	DEFLECTION		
										0°	22½°	45°		0°	22½°	45°		0°	22½°	45°		0°	22½°	45°
										V_k				V_k				V_k				V_k		
										900	1000	1100		1100	1200	1300		1250	1400	1550		1450	1600	1750
										THROW				THROW				THROW				THROW		
6	8	10	12	14	16	18	20	24		V_t 50				V_t 50				V_t 50				V_t 50		
									80	20	17	14	100	23	20	17	130	29	24	20	150	33	29	23
									100	23	20	17	130	27	23	20	150	32	27	21	180	38	32	26
6									150	26	21	18	180	30	26	20	200	36	30	26	230	41	35	29
8									200	27	23	20	250	33	29	23	280	38	32	27	330	44	38	32
10	8								250	32	27	23	300	38	32	27	350	42	38	30	400	50	42	36
12									300	36	30	24	350	41	36	30	430	47	41	33	480	54	48	39
14	10								350	38	32	27	430	45	38	32	500	50	45	38	550	59	48	40
16	12	10							450	41	35	29	550	48	42	36	630	56	48	41	730	63	54	47
20	14	12							600	44	38	32	730	53	45	39	850	62	53	45	950	68	60	50
24	18	14	12						700	48	42	36	850	59	50	42	980	68	59	50	1130	74	65	57
26	20	16	14						800	50	45	38	950	62	53	45	1130	72	62	53	1280	78	69	60
30	24	18	16	14					900	54	47	40	1080	65	56	48	1250	77	65	56	1450	83	74	63
36	26	22	18	16					1000	59	50	42	1200	68	60	50	1400	80	68	59	1600	87	77	66
40	30	24	20	18	16				1200	63	54	47	1450	72	63	54	1680	86	72	63	1930	92	81	69
48	38	30	24	22	18				1400	68	59	50	1680	78	68	60	1950	90	77	68	2250		87	74
	40	32	28	24	20	18			1600	71	65	56	1930	84	72	65	2250		80	71	2500		93	80
	42	36	30	26	24	22	20		1800	74	66	60	2150	89	77	70	2500		86	75	2750			84
	46	42	36	30	26	24	22		2000	78	70	63	2400		80	74	2800		92	80	3200			89
			44	38	34	30	28	24	2500	84	75	68	3000		89	80	3500			87	4000			
				48	42	36	34	28	3000	90	80	72	3600			87	4200				4800			
					44	40	36	30	3500		89	80	4200				4900							
							42	36	4000			86	4800				5600							
							48	40	4500			90	5400											
								42																
								48																

SUPPLY GRILLES AND REGISTERS

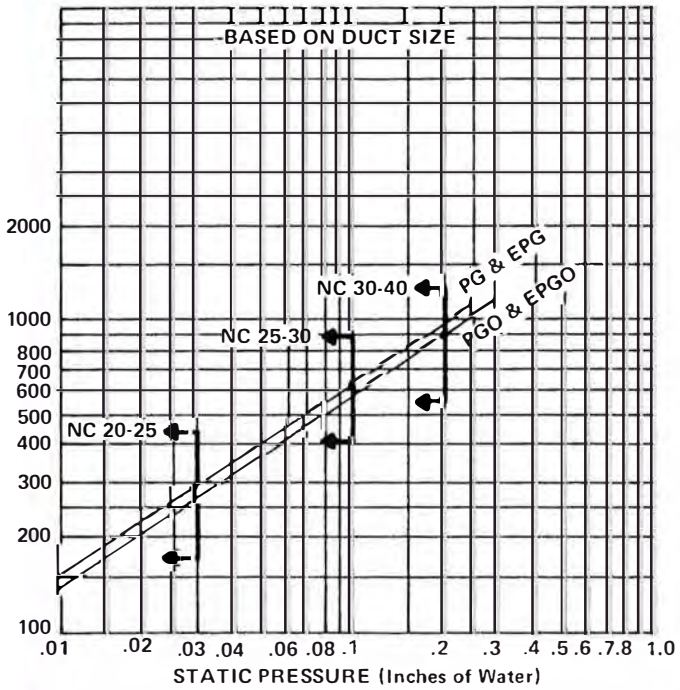
OUTLET VEL. F.P.M.	GRILLES						REGISTERS					
	DV & DH EDV & EDH			DDV & DDH EDDV & EDDH			DVO & DHO EDVO & EDHO			DDVO & DDHO EDDVO & EDDHO		
	DEFLECTION											
	0°	22½°	45°	0°	22½°	45°	0°	22½°	45°	0°	22½°	45°
400	.004	.005	.007	.006	.007	.010	.007	.008	.013	.009	.011	.016
450	.005	.006	.009	.008	.008	.013	.009	.011	.017	.012	.014	.021
500	.006	.008	.011	.009	.010	.016	.011	.013	.021	.014	.017	.026
550	.007	.010	.013	.011	.012	.019	.013	.016	.025	.017	.021	.031
600	.009	.012	.016	.013	.014	.023	.016	.019	.030	.021	.024	.037
650	.010	.014	.019	.016	.017	.027	.018	.022	.035	.025	.028	.043
700	.012	.016	.022	.018	.020	.032	.021	.026	.041	.029	.033	.050
750	.014	.018	.025	.021	.023	.037	.024	.029	.047	.033	.038	.057
800	.016	.021	.028	.024	.026	.041	.028	.033	.053	.037	.043	.066
900	.020	.026	.036	.030	.033	.052	.035	.042	.066	.047	.055	.083
1000	.025	.033	.044	.037	.040	.065	.044	.052	.082	.058	.068	.102
1100	.030	.040	.054	.045	.049	.078	.053	.063	.099	.070	.082	.124
1200	.035	.047	.064	.054	.058	.092	.063	.074	.118	.084	.098	.148
1250	.038	.051	.070	.058	.063	.100	.069	.080	.128	.091	.106	.161
1300	.041	.055	.075	.063	.069	.108	.074	.087	.138	.099	.115	.174
1400	.048	.064	.086	.073	.079	.125	.086	.100	.160	.115	.133	.202
1450	.052	.069	.094	.078	.085	.135	.093	.108	.172	.124	.143	.215
1550	.059	.079	.106	.090	.097	.155	.105	.125	.198	.140	.165	.250
1600	.063	.086	.113	.096	.104	.168	.112	.132	.210	.150	.176	.265
1750	.076	.100	.136	.114	.125	.196	.135	.157	.250	.180	.210	.316

1. To obtain Neck Velocities for: 0° deflection, multiply Outlet Velocity by .690.
   22½° deflection, multiply Outlet Velocity by .641.
   45° deflection, multiply Outlet Velocity by .585.
2. To obtain Velocity Pressure (P_v) use $P_v = V_n^2/4005^2$ where V_n = Neck Velocity.
3. To obtain Total Pressure (P_t) use $P_t = P_v + P_s$ where P_s = Static Pressure.

DG, EDG DVF, EDVF DHF, EDHF DGO, EDGO DVFO, EDVFO DHFO, EDHFO

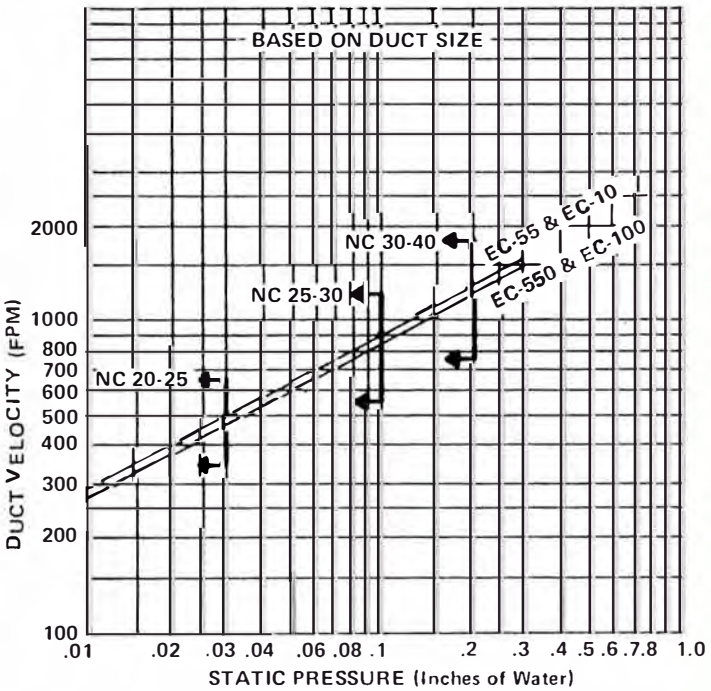
NOMINAL SIZE	FREE AREA SQ. FT.	INLET VELOCITY IN FEET PER MINUTE							
		300	500	700	900	1100	1300	1500	1700
		CAPACITY IN CUBIC FEET PER MINUTE							
10 x 6	.2431	73	122	170	219	267	316	365	413
12 x 6	.3615	108	181	253	325	398	470	542	615
14 x 6	.421	126	211	295	379	463	547	632	716
18 x 6	.546	164	273	382	491	601	710	819	928
10 x 8	.4007	120	200	280	361	441	521	601	681
12 x 8	.490	147	245	343	441	539	637	735	833
12 x 12	.750	225	375	525	675	825	975	1125	1275
18 x 12	1.13	339	565	791	1017	1243	1469	1695	1921
24 x 12	1.512	454	756	1058	1361	1663	1966	2268	2570
30 x 12	1.894	568	947	1326	1705	2083	2462	2841	3220
16 x 16	1.335	401	668	935	1202	1469	1736	2003	2270
18 x 18	1.713	514	857	1199	1542	1884	2227	2570	2912
24 x 18	2.290	687	1145	1603	2061	2519	2977	3435	3893
30 x 18	2.870	861	1435	2009	2583	3157	3731	4305	4879
36 x 18	3.451	1035	1726	2416	3106	3796	4486	5177	5867
24 x 24	3.075	923	1538	2153	2768	3383	3998	4613	5228
30 x 24	3.847	1154	1924	2693	3462	4232	5001	5771	6540
36 x 24	4.626	1388	2313	3238	4163	5089	6014	6939	7864
30 x 30	4.826	1448	2413	3378	4343	5309	6274	7239	8204
36 x 30	5.798	1739	2899	4059	5218	6378	7537	8697	9857
48 x 24	6.181	1854	3091	4327	5563	6799	8035	9272	10508
48 x 36	9.320	2796	4660	6524	8388	10252	12116	13980	15844
		STATIC RESISTANCE INCHES W. G.							
No Valve		.004	.012	.024	.040	.060	.085	.112	.143
With Valve		.004	.016	.031	.052	.076	.106	.142	.182

PG, EPG PGO, EPGO



1. Determine duct size (pseudo duct size) in square feet.
2. Divide desired CFM by duct size (ft.^{2}) to obtain velocity.

EC-55, EC-10 - EC-550, EC-100



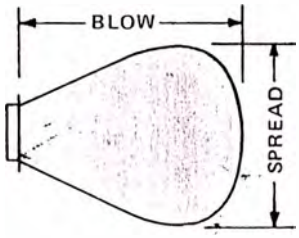
3. Enter graph at velocity and go to curve.
4. Read down to pressure drop.

TYPE OF ROOM	Recommended Noise Criteria Curve	Decibels "A" Scale Weighting
Radio Broadcasting Studios	NC 20-25	25-35
Theaters, Legitimate	NC 25-30	30-40
Theaters, Motion Picture	NC 30-35	35-45
Auditoriums, Concert Halls, Etc.	NC 30-35	35-45
Churches	NC 30-40	35-45
Private Offices	NC 30-40	35-45
Class Rooms	NC 30-40	35-45
Hospitals	NC 30-40	35-45

TYPE OF ROOM	Recommended Noise Criteria Curve	Decibels "A" Scale Weighting
General Offices	NC 35-50	40-55
Small Stores	NC 40-50	45-55
Department Stores	NC 40-50	45-55
Hotel Dining Rooms	NC 35-45	40-50
Restaurants and Cafeterias	NC 35-45	40-50
Office Machine Rooms	NC 40-60	45-65
Factories	NC 45-70	50-70

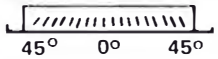
SIZE	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"
4"	.111																	
5"	.139	.174																
6"	.167	.208	.250															
8"	.222	.278	.333	.444														
10"	.278	.347	.417	.556	.694													
12"	.333	.417	.500	.667	.833	1.000												
14"	.389	.486	.583	.778	.972	1.167	1.361											
16"	.444	.556	.667	.889	1.111	1.333	1.556	1.778										
18"	.500	.625	.750	1.000	1.250	1.500	1.750	2.000	2.250									
20"	.556	.694	.833	1.111	1.389	1.666	1.944	2.222	2.500	2.778								
22"	.611	.764	.917	1.222	1.528	1.833	2.139	2.444	2.750	3.056	3.361							
24"	.667	.833	1.000	1.333	1.666	2.000	2.333	2.667	3.000	3.333	3.667	4.000						
26"	.722	.903	1.083	1.444	1.806	2.167	2.528	2.889	3.250	3.611	3.972	4.333	4.694					
28"	.778	.972	1.167	1.556	1.944	2.333	2.722	3.111	3.500	3.889	4.277	4.666	5.056	5.444				
30"	.833	1.042	1.250	1.667	2.083	2.500	2.917	3.333	3.750	4.167	4.583	5.000	5.417	5.833	6.250			
32"	.889	1.111	1.333	1.778	2.222	2.667	3.111	3.555	4.000	4.444	4.889	5.333	5.778	6.222	6.667	7.111		
34"	.944	1.181	1.417	1.889	2.361	2.833	3.306	3.778	4.250	4.722	5.194	5.667	6.139	6.611	7.083	7.556	8.028	
36"	1.000	1.250	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000	6.500	7.000	7.500	8.000	8.500	9.000

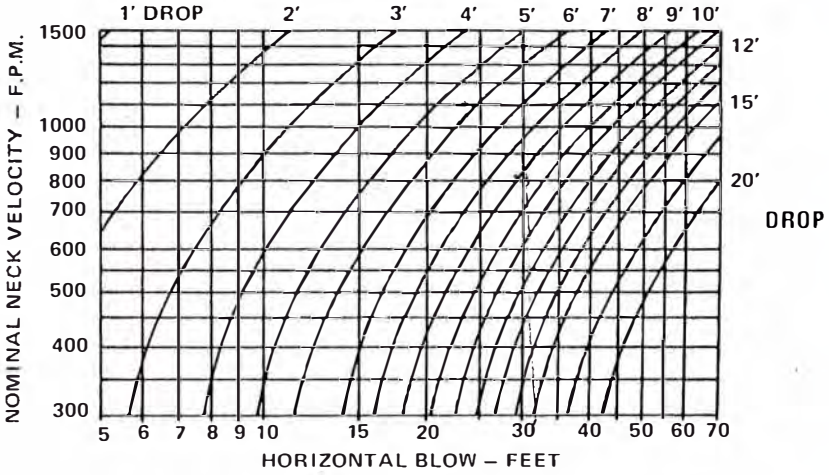
Primary Air Drop & Spread

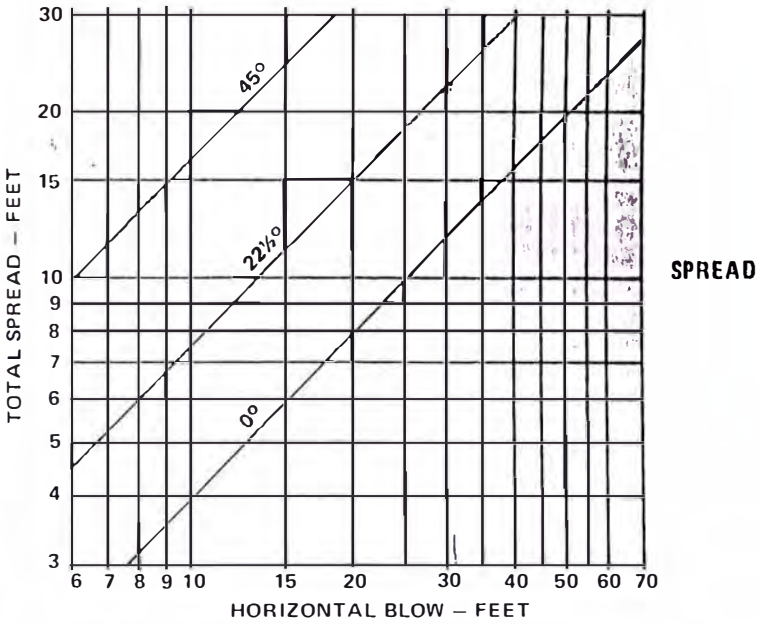


STRAIGHT
0° DEFLECTION

22½° 0° 22½°
22½° DEFLECTION


45° 0° 45°
45° DEFLECTION





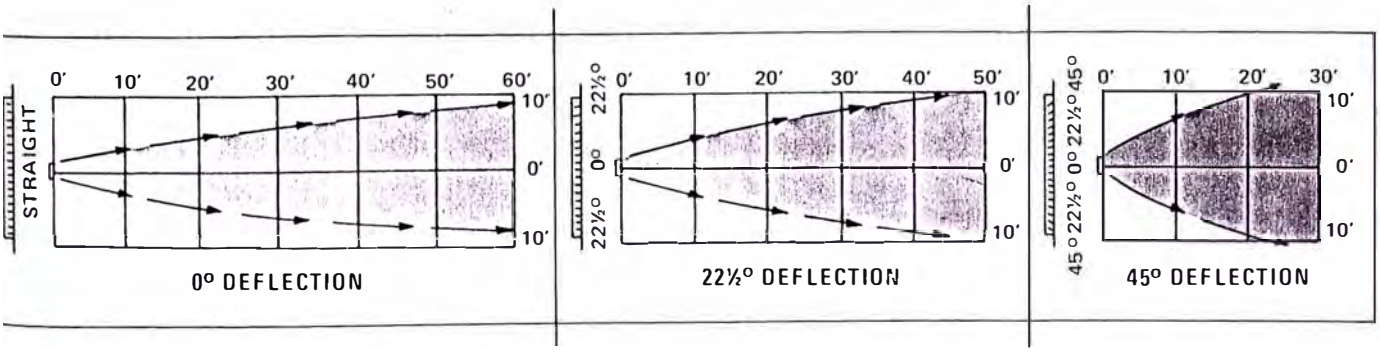
NOTE:

Air drop values based on 20° T.D.

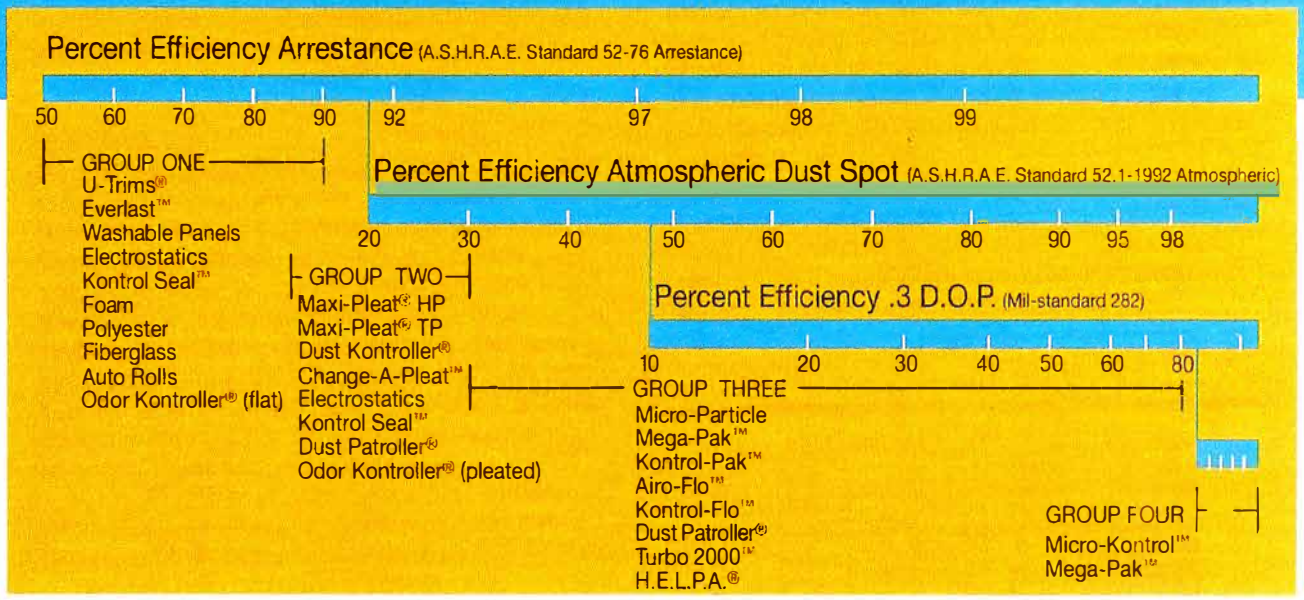
For 15° T.D., multiply by 0.78 factor.

For 25° T.D., multiply by 1.18 factor.

For 30° T.D., multiply by 1.42 factor.

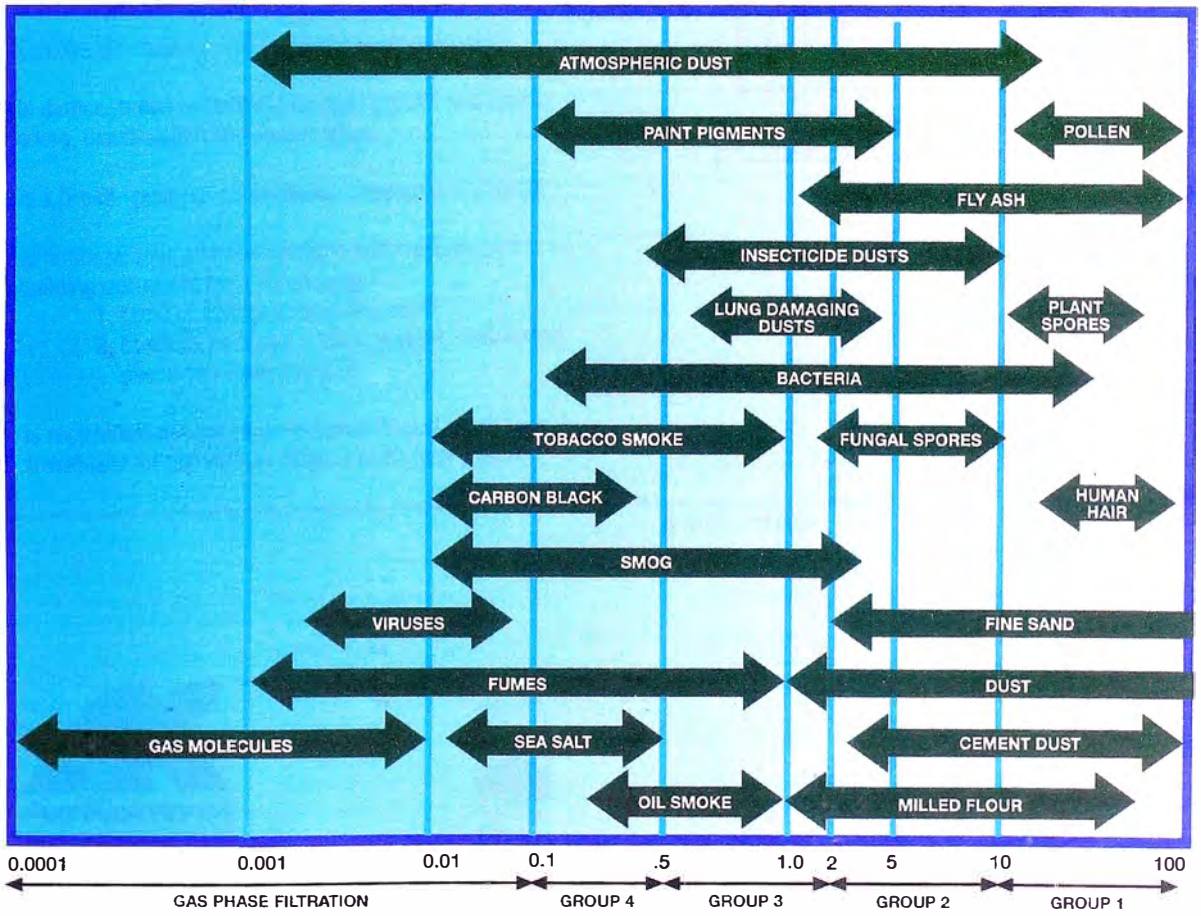


FILTER SELECTION GUIDE



The positicning of Air Kontrol's products, by name, on the above chart is intended to give each its range of filtration effectiveness and assist in the selection of the proper product. This simple way to classify air filters is according to their efficiency (ASHRAE Standard 52.1-1992) as the four groups above do. The user of this catalog will notice that each product listed above under its performance group has been identified by the group number throughout.

FILTER SELECTION GUIDE PARTICLE SIZE



HOW TO SPECIFY

Air Filter
Air Filter shall be (4"), (2"), (1") Maxi-Pleat TP, medium efficiency, pleated media, disposable type specified by size and model number; TP-1-40, (1" thickness); TP-2-40 (2" thickness); TP-4-40 (4" thickness).

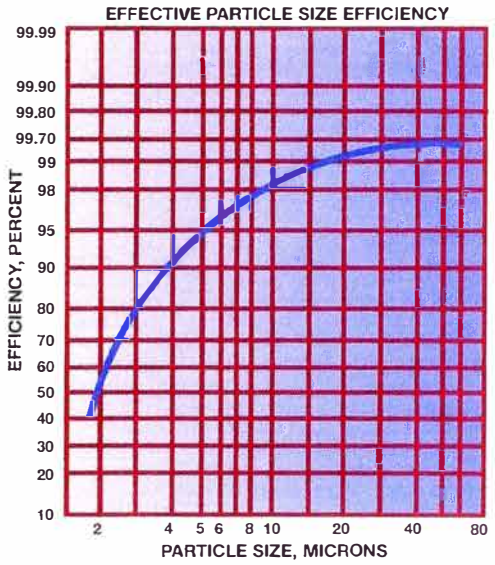
Filter Media
The filter media shall be comprised of a blend of non-woven cotton, plus polyester, which has been expressly manufactured for high dust holding air filtration and will have an average efficiency of 20-30% with average arrestance of 90%+ in accordance with ASHRAE 52.1-1992 atmospheric testing procedure. The media is to be continuously bonded to a 28 gauge galvanized expanded metal support grid with an effective open area of not less than 95% to ensure against media oscillation and pull away. The media and support grid is to be pleated together in a form which allows total aerodynamic usage.

The media shall be treated with an antibacterial and antifungal agent and shall be surface durable and non leeching and demonstrate durability for the useful life of the air filter media with the following characteristics:

- Demonstrate antibacterial activity against gram positive and gram negative bacteria, and antifungal activity against key Fungi when tested according to: AATCC-100, Dynamic Shake Flask Test AATCC-30, Tropical Chamber Test, Chemical analytical tests.
- Exhibits electrostatic and covalent bonding capability.
- Is demonstrated to control microbial growth that causes odors, discoloration and deterioration.
- Is a broad-spectrum bacteriostat, fungistat and algistat.
- Is nonhazardous and non-leeching and presents no risk to building occupants from off gassing.
    1. LD50 of 12.0 grams/kg or greater
    2. Contains no heavy metals, arsenic, chlorinated phenols or formaldehyde.
- Is registered with the Environmental Protection Agency specifically for use with air filters and air filter media.

Enclosing Frame
The enclosing frame shall be constructed of rigid, water resistant, heavy-duty beverage board. Die cut support members shall be an integral part of the enclosing frame and these shall be bonded on each side to the lead edge of the pleats to ensure pleat stability and spacing. The inside periphery of the enclosing frame shall be bonded to the filter pack to eliminate the possibility of air bypass.

Underwriters Classification
The air filter shall be listed by Underwriters Laboratory as meeting Class II specifications per U.L. Standard 900. Suggested operating temperature limit is 200°F (92°C).



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Founding Charter Member

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CLEANER AIR • LONGER LIFE • GREATER ENERGY EFFICIENCY

The new generation of pleated, disposable panel filters recommended for upgrading the indoor air quality of all potential and existing HVAC systems.

Maxi-Pleat's extended surface, pleated design, greatly improves efficiency over conventional disposable panel types.

The trend today is to use air filters that provide a better degree of filtration than that provided by conventional flat panel filters. The answer is Maxi-Pleat TP pleated extended surface panel filters. Even equipment manufacturers are installing Maxi-Pleat filters as basic filtration for their commercial equipment. One of the biggest categories of growth in Home Centers is the furnace filter section. Air Kontrol's pleated type filters have been tremendously popular among homeowners that want better air quality.

Maxi-Pleat filters have been the filter of choice for building owners and facilities managers because they are now aware of the need of providing good Indoor Air Quality (IAQ) in their facilities. Lawsuits and the potential of litigation over poor IAQ has made those responsible parties more aware of HVAC filtration and has mandated that they use a minimum filtration level of that provided by Maxi-Pleat air filters. Maxi-Pleat TP filters are 600% more efficient than fiberglass disposable type filters.

Air Kontrol has taken pleated panel filters to a higher level by offering it's entire pleated filter product line as BIO-KONTROL filters. Air Kontrol treats all filter media with an antimicrobial coating that inhibits the growth of germs, bacteria, mold, mildew, fungus, and other microbial growth on the filters surface. Independent laboratory tests have demonstrated that the antimicrobial coating on a Maxi-Pleat can reduce airborne microorganisms up to 86.5%* on the first air pass through the filter. This is just another way Air Kontrol can help the end user keep good IAQ in check!

Not only does the Maxi-Pleat TP work to keep better IAQ in check, it also helps keep maintenance costs in check. The usual method of controlling and reducing the cost of any maintenance related item is to locate replacement products of better performance, with a longer life cycle, thereby reducing total expenditures over the course of the year. Maxi-Pleat TP is a standard capacity pleated filter which has a higher dust holding capacity over conventional flat panel filters. This equates to a longer life cycle which means less labor and replacement costs.

Facility managers will also agree that short of turning air conditioning equipment off completely, the greatest cost savings are realized by maintaining clean coils. Maintaining clean coils means optimum heat transfer and less air flow resistance. Properly cleaning evaporative coils can be very costly. Maxi-Pleat TP will provide quality filtration for cleaner coils, air ducts and other facility assets.

Overall, better protection with Maxi-Pleat TP pleated filters means less labor and filter replacement costs, cleaner equipment and air ducts, less dirt deposits else where, greater capacity and reduced energy cost!

PERFORMANCE DATA

Model No.	Nominal Size	Actual Size	Capacity in CFM		Resistance in w.g.		Effective Media Area
	W-H-D	W-H-D	Med.	High	Med.	High	(Sq. Ft.)
TP-1-40 **1** 14 Pleats per linear foot	10 x 20 x 1	9.5 x 19.5 x .88	417	N/R*	.20	N/R*	2.8
	12 x 20 x 1	11.5 x 19.5 x .88	500	N/R*	.20	N/R*	3.4
	12 x 24 x 1	11.5 x 23.5 x .88	600	N/R*	.20	N/R*	4.1
	14 x 20 x 1	13.5 x 19.5 x .88	583	N/R*	.20	N/R*	4.0
	14 x 25 x 1	13.5 x 24.5 x .88	729	N/R*	.20	N/R*	5.0
	15 x 20 x 1	14.5 x 19.5 x .88	625	N/R*	.20	N/R*	4.3
	16 x 20 x 1	15.5 x 19.5 x .88	667	N/R*	.20	N/R*	4.5
	16 x 25 x 1	15.5 x 24.5 x .88	833	N/R*	.20	N/R*	5.7
	18 x 24 x 1	17.5 x 23.5 x .88	900	N/R*	.20	N/R*	6.1
	20 x 20 x 1	19.5 x 19.5 x .88	833	N/R*	.20	N/R*	5.7
	20 x 25 x 1	19.5 x 24.5 x .88	1042	N/R*	.20	N/R*	7.1
	20 x 24 x 1	19.5 x 23.5 x .88	1000	N/R*	.20	N/R*	6.8
	20 x 30 x 1	19.5 x 29.5 x .88	1250	N/R*	.20	N/R*	8.5
	24 x 24 x 1	23.5 x 23.5 x .88	1200	N/R*	.20	N/R*	8.2
	25 x 25 x 1	24.5 x 24.5 x .88	1302	N/R*	.20	N/R*	8.9
TP-2-40 **2** 10 Pleats per linear foot	10 x 20 x 2	9.5 x 19.5 x 1.88	417	694	.15	.32	4.1
	12 x 20 x 2	11.5 x 19.5 x 1.88	500	833	.15	.32	4.9
	12 x 24 x 2	11.5 x 23.5 x 1.88	600	1000	.15	.32	5.8
	14 x 20 x 2	13.5 x 19.5 x 1.88	583	972	.15	.32	5.7
	14 x 25 x 2	13.5 x 24.5 x 1.88	729	1215	.15	.32	7.1
	14.5 x 26.75 x 2	14.5 x 26.75 x 1.88	808	1347	.15	.32	7.9
	15 x 20 x 2	14.5 x 19.5 x 1.88	625	1042	.15	.32	6.1
	16 x 20 x 2	15.5 x 19.5 x 1.88	667	1111	.15	.32	6.5
	16 x 24 x 2	15.5 x 23.5 x 1.88	800	1333	.15	.32	7.8
	16 x 25 x 2	15.5 x 24.5 x 1.88	833	1389	.15	.32	8.1
	18 x 24 x 2	17.5 x 23.5 x 1.88	900	1500	.15	.32	8.8
	20 x 20 x 2	19.5 x 19.5 x 1.88	833	1389	.15	.32	8.1
	20 x 24 x 2	19.5 x 23.5 x 1.88	1000	1667	.15	.32	9.7
	20 x 25 x 2	19.5 x 24.5 x 1.88	1042	1736	.15	.32	10.1
	24 x 24 x 2	23.5 x 23.5 x 1.88	1200	2000	.15	.32	11.7
	25 x 25 x 2	24.5 x 24.5 x 1.88	1302	2170	.15	.32	12.7
TP-4-40 **4** 8 Pleats per linear foot	12 x 24 x 4	11.5 x 23.5 x 3.88	600	1000	.14	.30	10.4
	14.5 x 26.75 x 4	14.5 x 26.75 x 3.88	808	1347	.14	.30	14.0
	16 x 20 x 4	15.5 x 19.5 x 3.88	667	1111	.14	.30	11.5
	16 x 25 x 4	15.5 x 24.5 x 3.88	833	1389	.14	.30	14.4
	18 x 24 x 4	17.5 x 23.5 x 3.88	900	1500	.14	.30	15.5
	20 x 20 x 4	19.5 x 19.5 x 3.88	833	1389	.14	.30	14.4
	20 x 25 x 4	19.5 x 24.5 x 3.88	1042	1736	.14	.30	18.0
	20 x 24 x 4	19.5 x 23.5 x 3.88	1000	1667	.14	.30	17.2
	24 x 24 x 4	23.5 x 23.5 x 3.88	1200	2000	.14	.30	20.7
	24.5 x 28.5 x 4	24.5 x 28.5 x 3.88	1455	2424	.14	.30	25.1
	28 x 30 x 4	27.5 x 29.5 x 3.88	1750	2917	.14	.30	28.5

N/R* - Can be used, but 2" and 4" deep filters are recommended.

APPLICATIONS

Maxi-Pleat TP greatly enhances dust holding capacities over conventional fiberglass or polyester panel filters and is available in a wide variety of standard sizes.

1" Maxi-Pleat TP: Ideal for small residential and commercial package units that are equipped with 1" tracks.

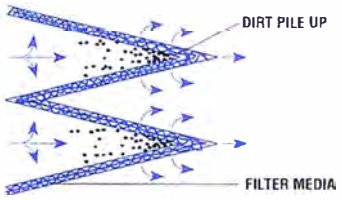
2" Maxi-Pleat TP: Designed for side access and built up filter banks both as an initial and prefilter to expensive secondary filters.

4" Maxi-Pleat TP: Designed for low pressure drop and high dust holding capacities for conventional 4" tracks as a prefilter or as a unitary filter where space constraints exist.

OPERATION

Filtered media is pleated to increase filtration surface area because it is denser and has a higher efficiency level than conventional flat panel type filters. Pleating the media reduces air flow resistance and extends filter's life cycle.

Controlled pleat spacing and alignment assures uniform dust loading throughout the filter. The configuration also increases the efficiency because the air flows through the sides of the pleat at an angle; thus moving through more of the media. Larger dirt particles are caught in the rear as their inertia prevents directional change, while smaller particles tend to be trapped along the sides of the pleat.



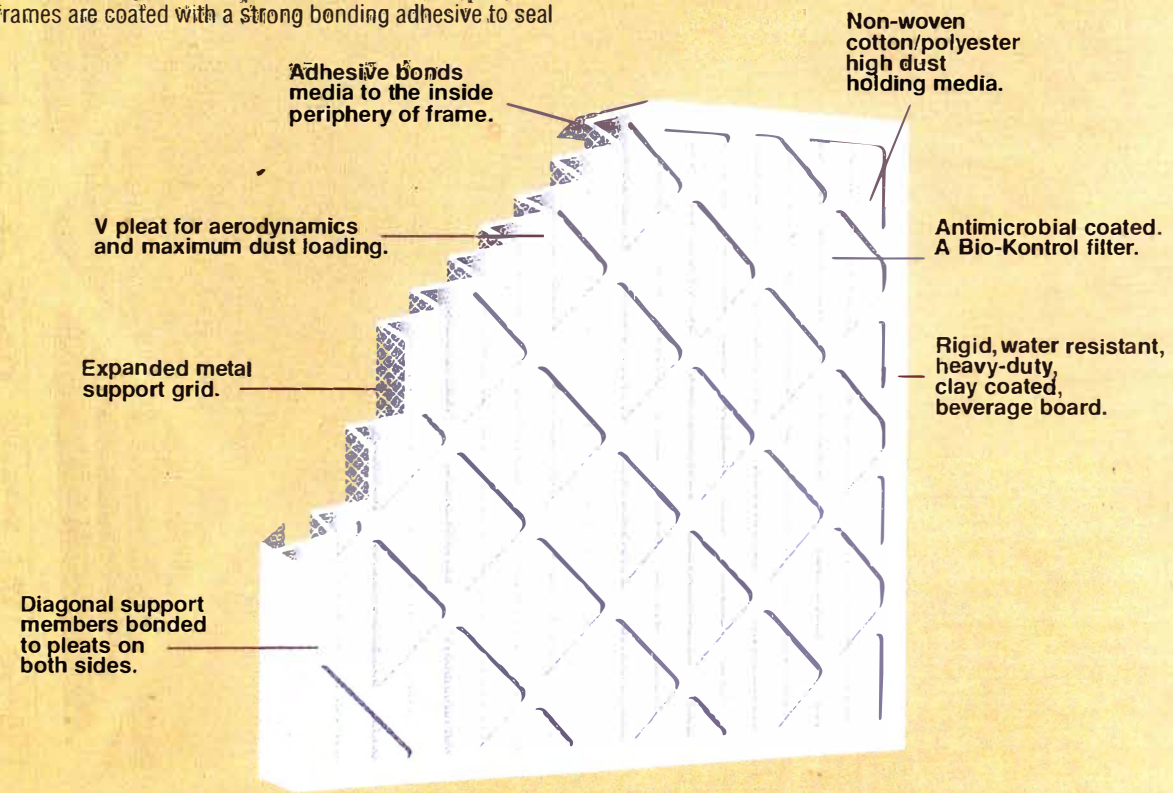
BIO-KONTROL ANTIMICROBIAL

Air Kontrol's entire pleated line utilizes an antimicrobial shield. This technology used is registered with the Environmental Protection Agency for use on HVAC air filtration and is far superior to other antimicrobial agents used in the filtration industry.

- The antimicrobial coating destroys microorganisms on contact without causing microbial adaptation.
- This long lasting treatment permanently becomes an integral part of the filter media.
- It is totally non-migrating, will not off-gas, and has no volatilization.
- Reduces airborne microorganisms up to 86.5% in one pass.
- Comes standard on every pleated filter . . . at NO additional cost.

CONSTRUCTION

It's exceptional performance and unwavering quality of construction makes the Maxi-Pleat the filter of choice! A special process bonds the Maxi-Pleat's antimicrobial coated cotton/polyester media to a support grid with 96% open face area. Special bonding process also helps prevent support grid from rusting like many competitive units. Media is aerodynamically pleated and encased in a two piece die cut, moisture resistant, heavy-duty, clay coated beverage board frame. Entire inside periphery of frames are coated with a strong bonding adhesive to seal media pack in place and to prevent any air-bypass around media pack. Strong adhesive also bonds diagonal support members to pleats to ensure proper pleat spacing for even dust loading. Also, assembling the two die cut beverage board frames together creates a double wall construction on all four sides of frame. This quality construction creates a rugged durable filter that will maintain it's integrity during installation and operation, under normal conditions.

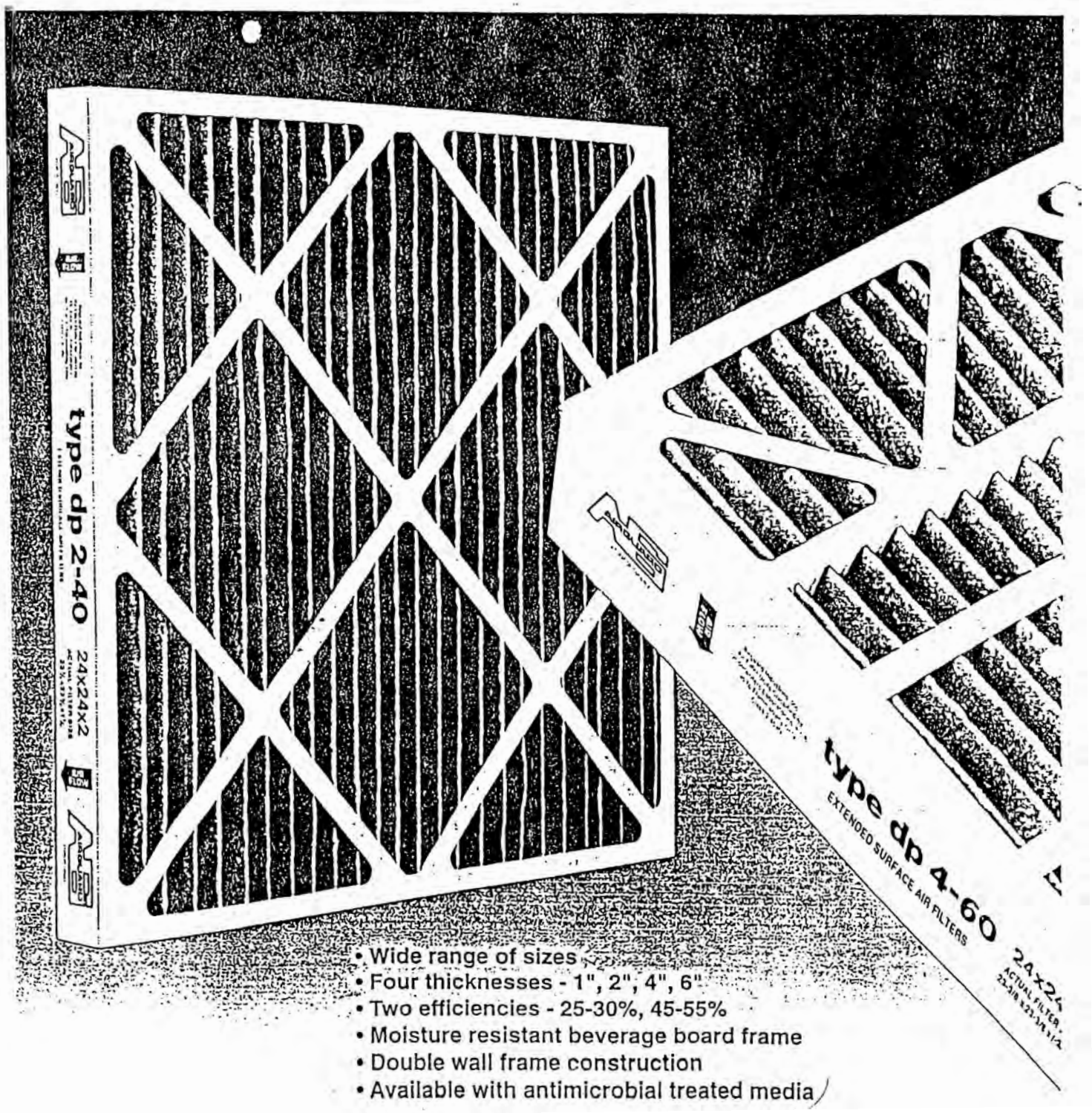


AIRGUARD®

a CLARCOR company

TYPE DP®

Extended Surface Pleated Panel Filters



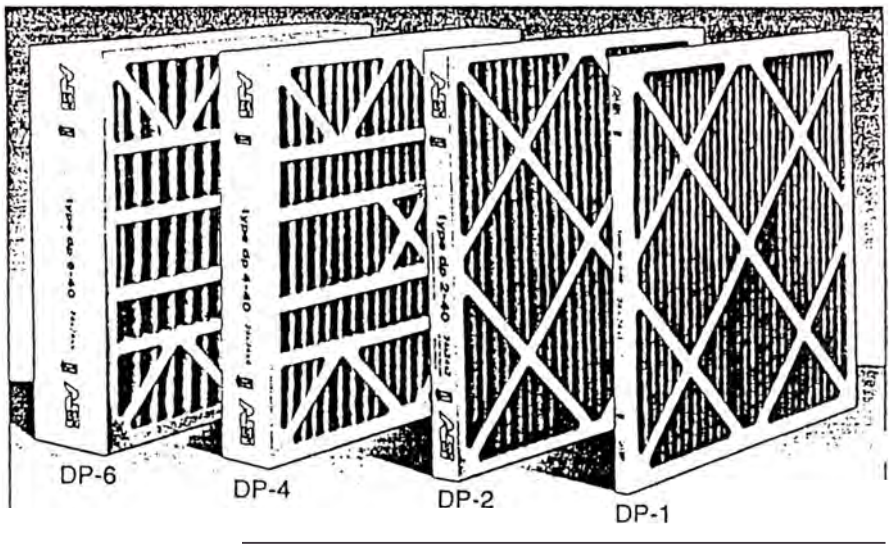
- Wide range of sizes
- Four thicknesses - 1", 2", 4", 6"
- Two efficiencies - 25-30%, 45-55%
- Moisture resistant beverage board frame
- Double wall frame construction
- Available with antimicrobial treated media

YPE DP®

ended Surface Pleated Panel Filters

PLICATIONS

y DP pleated panel filters are designed r stallation in virtually any type of air lt ion application. They may be used in y ms with filter face velocity from 300 to 2 PM. Pleated panel filters offer i ficantly high r efficiency than disposable a l filters, pad and frame systems, or e anent metal filters. Type DP filters are e mmended where a higher degree of air l nliness is required than that offered by i osable panel type filters. They are highly effective as prefilters to extend the life of m e costly high efficiency filters. Type DP ted filters are widely used in built up filter b ks, central station air handlers, and side a ess filter housings.



VDE RANGE OF SIZES

T e DP filters are available in four t knesses - - 1". 2" ,4" and 6" in a wide r ge of standard face sizes. Special made to c er sizes are also available.

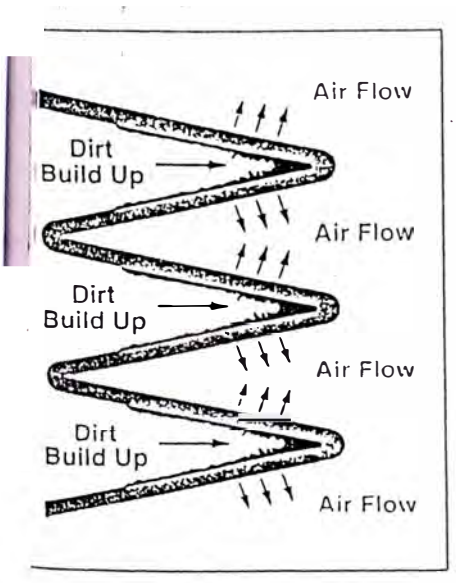
Bio•Pure
Antimicrobial Treated Filters

Available with Antimicrobial Treatment

Bio•Pure® pleated filters are available treated with an EPA registered antimicrobial agent to inhibit growth of bacteria, mold, mildew and fungi on the media. *Brochure IAQ-600*

INCIPLE OF OPERATION

e DP filters are designed with a consistent pleat ape on predetermined centers. The shape of the ats, motion of the air through the filter and inertia of larger, heavier particles cause these particles to be ried to the back of the pleats where they are caught. er particles follow the path of the air flow and are posited up the sides of the pleats. Dirt loads uniformly oughout the filter fully utilizing all the media.

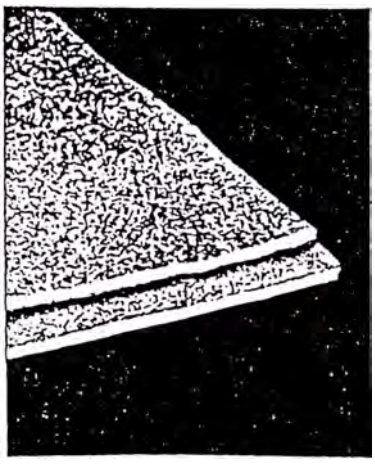


As the dirt load builds efficiency increases. A critical factor in achieving maximum filter life is maintaining pleat shape and spacing as dirt accumulates. DP filters demonstrate a slow steady rise in resistance over the life of the filter reflecting proper pleat alignment.

FILTER MEDIA

Type DP-40 media is green in color and is produced from a blend of cotton and polyester fibers. The crinkly nature of the blended fiber media increases dust holding capacity due to the expanded surface area to hold dirt. The media is treated with a fire retardant additive for safety purposes (U.L. Class 2). DP-40 media is rated at 25 - 30% efficiency (ASHRAE 52.1-1992). Arrestance value exceeds 90%.

Type DP-60 media is orange in color and is also a blend of cotton and polyester fibers. Smaller fiber diameters provide higher efficiency than the DP-40 media along with excellent dust holding characteristics. The media is treated with a fire retardant additive (U.L. Class 2). DP-60 media is rated at 45 - 55% efficiency (ASHRAE 52.1-1992). Arrestance value exceeds 95%.

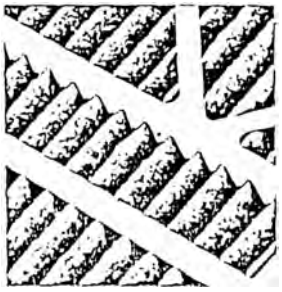


onsistent Pleat Alignment and Rigid onstruction Assure Dependable Operation

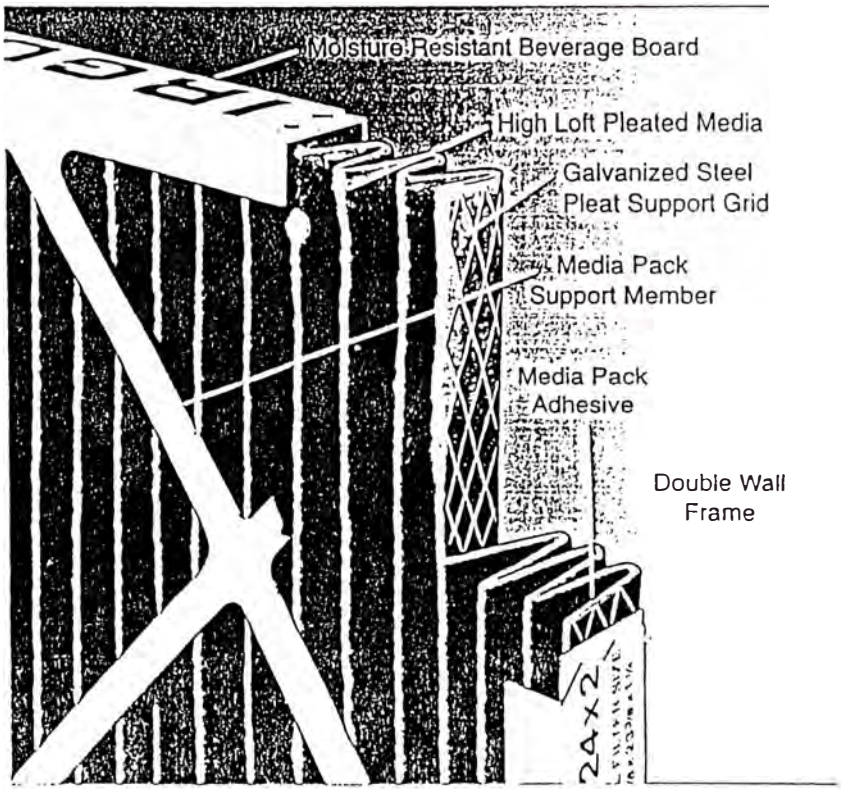
NIFORM PLEAT SHAPE ENHANCES UST HOLDING CAPACITY

ype DP pleats are formed by an expanded etal grid made of rust resistant galvanized teel laminated to the air leaving side of the edia. The metal grid maintains pleat shape nd prevents fluttering. Pleat stability in peration prevents dirt particles from shaking ose and blowing down stream. Consistent leat shape also assures maximum air flow with minimum resistance and high dirt loading characteristics throughout the life of the filter.

Pleat Stabilizers



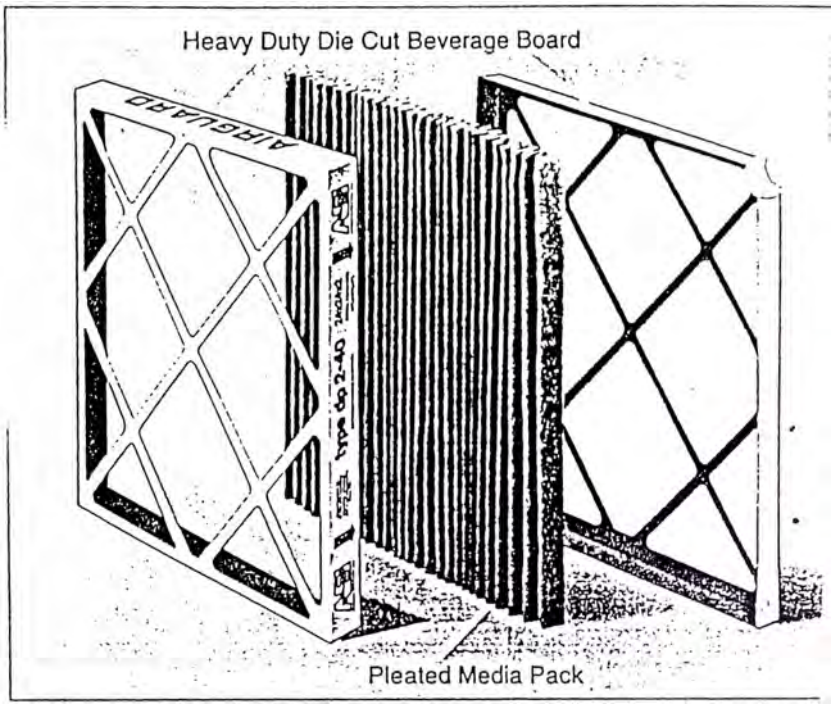
The 4" and 6" deep filters are equipped with individual die cut fingers that separate and stabilize each pleat. Consistent pleat alignment enhances dust holding capacity for longer service life.



BONDED MEDIA PACK PREVENTS BYPASS

The DP frame is made from two mating pieces of die cut beverage board that form a double wall around the entire perimeter of the filter. The entire inside surface of both pieces of the frame are coated with adhesive to bond with the media pack at all points of contact. This forms a totally unitized construction and prevents bypass.

The Type DP filter is unusually strong and rigid and will not rack, warp or bend under normal handling or operating conditions. Media pack support members on both sides of the filter add rigidity and help hold pleat shape as the dirt load builds and resistance rises. These cross members are an integral part of the die cut frame construction.



Two mating pieces of die cut beverage board form a double wall frame around all four edges of the filter. Type DP filters will not rack or warp unde normal operating conditions.

?-40™
O MANCE DATA
5 - 30%
CIENCY

Nominal Size in W x H x D	Actual Size W x H x D	Air Flow Capacity (CFM) 300 FPM	500 FPM	625 FPM	Initial Resistance (in. W.G.) 300 FPM	500 FPM	625 FPM	Gross Media Area (Sq. Ft.)
10 x 20 x 1	9-7/8 x 19-7/8 x 7/8	425*	700	N/R	.20	.44	N/R	3.2
12 x 24 x 1	11-3/8 x 23-3/8 x 7/8	600	1000	N/R	.20	.44	N/R	4.6
14 x 20 x 1	13-7/8 x 19-7/8 x 7/8	590	980	N/R	.20	.44	N/R	4.2
14 x 25 x 1	13-7/8 x 24-7/8 x 7/8	730	1225	N/R	.20	.44	N/R	5.3
15 x 20 x 1	14-7/8 x 19-7/8 x 7/8	630	1050	N/R	.20	.44	N/R	4.5
16 x 20 x 1	15-1/2 x 19-1/2 x 7/8	670	1120	N/R	.20	.44	N/R	4.8
16 x 25 x 1	15-1/2 x 24-1/2 x 7/8	840	1400	N/R	.20	.44	N/R	6.0
18 x 24 x 1	17-7/8 x 23-7/8 x 7/8	900	1500	N/R	.20	.44	N/R	7.1
20 x 20 x 1	19-1/2 x 19-1/2 x 7/8	840	1400	N/R	.20	.44	N/R	6.0
20 x 25 x 1	19-1/2 x 24-1/2 x 7/8	1050	1750	N/R	.20	.44	N/R	7.5
24 x 24 x 1	23-3/8 x 23-3/8 x 7/8	1200	2000	N/R	.20	.44	N/R	9.0
12 x 20 x 2	11-3/4 x 19-3/4 x 1-3/4	500	840	1050	.14	.28	.42	6.8
12 x 24 x 2	11-3/8 x 23-3/8 x 1-3/4	600	1000	1250	.14	.28	.42	8.3
14 x 20 x 2	13-3/4 x 19-3/4 x 1-3/4	590	980	1220	.14	.28	.42	8.0
14 x 25 x 2	13-3/4 x 24-3/4 x 1-3/4	730	1220	1525	.14	.28	.42	10.0
14-1/2 x 26-3/4 x 2	14-1/2 x 26-3/4 x 1-3/4	810	1350	1690	.14	.28	.42	11.8
15 x 20 x 2	14-3/4 x 19-3/4 x 1-3/4	630	1050	1310	.14	.28	.42	8.5
16 x 20 x 2	15-1/2 x 19-1/2 x 1-3/4	670	1120	1400	.14	.28	.42	10.1
16 x 24 x 2	15-1/2 x 23-1/2 x 1-3/4	800	1340	1670	.14	.28	.42	11.8
16 x 25 x 2	15-1/2 x 24-1/2 x 1-3/4	840	1400	1750	.14	.28	.42	12.5
18 x 20 x 2	17-3/4 x 19-3/4 x 1-3/4	750	1250	1570	.14	.28	.42	10.6
18 x 24 x 2	17-3/8 x 23-3/8 x 1-3/4	900	1500	1875	.14	.28	.42	12.7
18 x 25 x 2	17-3/4 x 24-3/4 x 1-3/4	940	1570	1960	.14	.28	.42	13.1
20 x 20 x 2	19-1/2 x 19-1/2 x 1-3/4	840	1400	1750	.14	.28	.42	12.2
20 x 24 x 2	19-3/8 x 23-3/8 x 1-3/4	1000	1670	2090	.14	.28	.42	14.7
20 x 25 x 2	19-1/2 x 24-1/2 x 1-3/4	1050	1750	2170	.14	.28	.42	15.3
24 x 24 x 2	23-3/8 x 23-3/8 x 1-3/4	1200	2000	2500	.14	.28	.42	17.6
25 x 25 x 2	24-3/4 x 24-3/4 x 1-3/4	1310	2180	2720	.14	.28	.42	19.2
12 x 24 x 4	11-3/8 x 23-3/8 x 3-3/4	600	1000	1250	.12	.25	.38	14.4
14-1/2 x 26-3/4 x 4	14-1/2 x 26-3/4 x 3-3/4	810	1350	1690	.12	.25	.38	19.4
16 x 20 x 4	15-1/2 x 19-1/2 x 3-3/4	670	1120	1400	.12	.25	.38	15.0
16 x 25 x 4	15-1/2 x 24-1/2 x 3-3/4	840	1400	1750	.12	.25	.38	18.6
18 x 24 x 4	17-1/2 x 23-1/2 x 3-3/4	900	1500	1875	.12	.25	.38	20.4
20 x 20 x 4	19-1/2 x 19-1/2 x 3-3/4	840	1400	1750	.12	.25	.38	19.0
20 x 24 x 4	19-3/8 x 23-3/8 x 3-3/4	1000	1670	2090	.12	.25	.38	22.8
20 x 25 x 4	19-1/2 x 24-1/2 x 3-3/4	1050	1750	2170	.12	.25	.38	23.5
24 x 24 x 4	23-3/8 x 23-3/8 x 3-3/4	1200	2000	2500	.12	.25	.38	27.6
24-1/2 x 28-1/2 x 4	24-1/2 x 28-1/2 x 3-3/4	1460	2430	3030	.12	.25	.38	32.4
28 x 30 x 4	28 x 30 x 3-3/4	1750	2920	3650	.12	.25	.38	40.2
12 x 24 x 6	11-3/8 x 23-3/8 x 5-7/8	600	1000	1250	.09	.20	.30	23.2
16 x 20 x 6	15-1/2 x 19-1/2 x 5-7/8	670	1120	1400	.09	.20	.30	24.3
16 x 25 x 6	15-1/2 x 24-1/2 x 5-7/8	840	1400	1750	.09	.20	.30	30.0
18 x 24 x 6	17-3/8 x 23-3/8 x 5-7/8	900	1500	1875	.09	.20	.30	32.0
20 x 20 x 6	19-1/2 x 19-1/2 x 5-7/8	840	1400	1750	.09	.20	.30	30.7
20 x 24 x 6	19-3/8 x 23-3/8 x 5-7/8	1000	1670	2090	.09	.20	.30	36.8
20 x 25 x 6	19-1/2 x 24-1/2 x 5-7/8	1050	1750	2170	.09	.20	.30	38.0
24 x 24 x 6	23-3/8 x 23-3/8 x 5-7/8	1200	2000	2500	.09	.20	.30	44.5

DP-60™
ORMANCE DATA
45 - 55%
FICIENCY

12 x 20 x 2	11-3/4 x 19-3/4 x 1-3/4	500	840	1050	.21	.36	.59	6.8
12 x 24 x 2	11-3/8 x 23-3/8 x 1-3/4	600	1000	1250	.21	.36	.59	8.3
14 x 20 x 2	13-3/4 x 19-3/4 x 1-3/4	590	980	1220	.21	.36	.59	8.0
14 x 25 x 2	13-3/4 x 24-3/4 x 1-3/4	730	1225	1525	.21	.36	.59	10.0
14-1/2 x 26-3/4 x 2	14-1/2 x 26-3/4 x 1-3/4	810	1350	1690	.21	.36	.59	11.8
15 x 20 x 2	14-3/4 x 19-3/4 x 1-3/4	630	1050	1310	.21	.36	.59	8.5
16 x 20 x 2	15-1/2 x 19-1/2 x 1-3/4	670	1120	1400	.21	.36	.59	10.1
16 x 25 x 2	15-1/2 x 24-1/2 x 1-3/4	840	1400	1750	.21	.35	.59	12.5
18 x 20 x 2	17-3/4 x 19-3/4 x 1-3/4	750	1250	1570	.21	.36	.59	10.6
18 x 24 x 2	17-1/2 x 23-1/2 x 1-3/4	900	1500	1875	.21	.36	.59	12.7
18 x 25 x 2	17-3/4 x 24-3/4 x 1-3/4	940	1570	1960	.21	.36	.59	13.1
20 x 20 x 2	19-1/2 x 19-1/2 x 1-3/4	840	1400	1750	.21	.36	.59	12.2
20 x 24 x 2	19-3/8 x 23-3/8 x 1-3/4	1000	1670	2090	.21	.36	.59	14.7
20 x 25 x 2	19-1/2 x 24-1/2 x 1-3/4	1050	1750	2170	.21	.36	.59	15.3
24 x 24 x 2	23-3/8 x 23-3/8 x 1-3/4	1200	2000	2500	.21	.36	.59	17.6
25 x 25 x 2	24-3/4 x 24-3/4 x 1-3/4	1310	2180	2720	.22	.32	.59	19.2
12 x 24 x 4	11-3/8 x 23-3/8 x 3-3/4	600	1000	1250	.18	.33	.48	14.4
14-1/2 x 26-3/4 x 4	14-1/2 x 26-3/4 x 3-3/4	810	1350	1690	.18	.33	.48	19.4
16 x 20 x 4	15-1/2 x 19-1/2 x 3-3/4	670	1120	1400	.18	.33	.48	15.0
16 x 25 x 4	15-1/2 x 24-1/2 x 3-3/4	840	1400	1750	.18	.33	.48	18.6
18 x 24 x 4	17-1/2 x 23-1/2 x 3-3/4	900	1500	1875	.18	.33	.48	20.4
20 x 20 x 4	19-1/2 x 19-1/2 x 3-3/4	840	1400	1750	.18	.33	.48	19.0
20 x 24 x 4	19-3/8 x 23-3/8 x 3-3/4	1000	1670	2090	.18	.33	.48	22.8
20 x 25 x 4	19-1/2 x 24-1/2 x 3-3/4	1050	1750	2170	.18	.33	.48	23.5
24 x 24 x 4	23-3/8 x 23-3/8 x 3-3/4	1200	2000	2500	.18	.33	.48	27.6
24-1/2 x 28-1/2 x 4	24-1/2 x 28-1/2 x 3-3/4	1460	2430	3030	.18	.33	.48	32.4
28 x 30 x 4	28 x 30 x 3-3/4	1750	2920	3650	.18	.33	.48	40.2
12 x 24 x 6	11-3/8 x 23-3/8 x 5-7/8	600	1000	1250	.15	.26	.42	23.2
16 x 20 x 6	15-1/2 x 19-1/2 x 5-7/8	670	1120	1400	.15	.26	.42	24.3
16 x 25 x 6	15-1/2 x 24-1/2 x 5-7/8	840	1400	1750	.15	.26	.42	30.0
18 x 24 x 6	17-3/8 x 23-3/8 x 5-7/8	900	1500	1875	.15	.26	.42	32.0
20 x 20 x 6	19-1/2 x 19-1/2 x 5-7/8	840	1400	1750	.15	.26	.42	30.7
20 x 24 x 6	19-3/8 x 23-3/8 x 5-7/8	1000	1670	2090	.15	.26	.42	36.8
20 x 25 x 6	19-1/2 x 24-1/2 x 5-7/8	1050	1750	2170	.15	.26	.42	38.0
24 x 24 x 6	23-3/8 x 23-3/8 x 5-7/8	1200	2000	2500	.15	.26	.42	44.5

TYPE DP EXTENDED SURFACE AIR FILTERS SUPPLEMENTAL DATA

(1) Type DP 40 filters have an average efficiency of 25-30%, while the average arrestance exceeds 90%. Type DP 60 filters have an average efficiency of 45-55%, while the average arrestance exceeds 95%. All performance data based on ASHRAE Standard 52.1-1992 Test Method. Performance tolerances conform to Section 7.4 of ARI Standard 850-93.

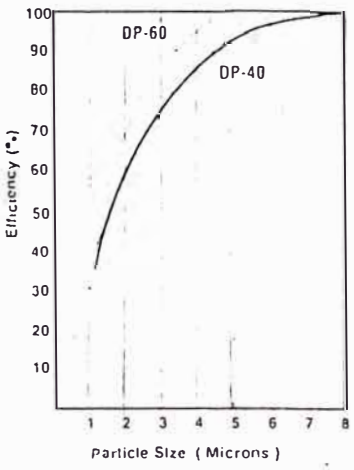
(2) Nominal sizes indicated are to conform with industry standards. Width and height dimensions are interchangeable. Type DP filters may be installed with the pleats in either vertical or horizontal position. Special size filters, those not listed above, are available on a made to order basis.

NOTES:
Recommended final resistance of 1.0" W.G. is typical of systems currently in operation. Type DP filters can be operated to higher or lower final resistance levels without materially affecting filter efficiency, based on requirements of system design.

Operating Temperature Limit for Type DP air filters is suggested at 200°F (92°C).

Type DP filters are classified by Underwriters Laboratories as a Class 2 air filter unit when tested in accordance with U.L. Standard 900.

Efficiency by Particle Size



AIRGUARD
a CLARCOR company

AIRGUARD INDUSTRIES, INC.

P.O. BOX 32578, LOUISVILLE, KENTUCKY 40232-2578
(502) 969-2304
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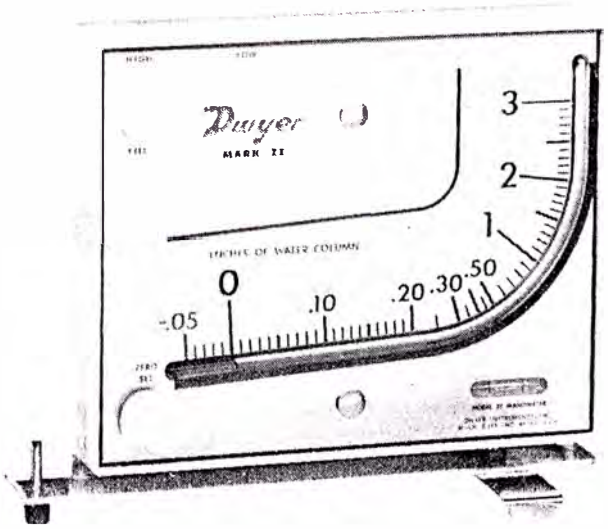
Uso, Instalacion y Mantenimiento

MANOMETROSDWYER MARK II



RANGOS

Modelo	Rango	Fluido
25	0~3"C.A.	0,826 rojo
26	0~7"C.A.	1,9 azul
M-80	0~80 mm C.A.	0,826 rojo
M-180	0~180 mm C.A.	1,9 azul
M-700 Pa	10~0~700 Pascal	0,826 rojo
27 *	0~7.000 pie./min.	0,826 rojo
28 *	0~10.500 pie./min.	1,9 azul

* Los modelos 27 y 28 requieren tubo Pitot, con costo adicional.

Instalacion

Instale el Mark II en una superficie vertical adecuada. El ambiente debe estar libre de vapores de sustancias cloradas, o solventes tales como benceno, acetona, tetracloruro de carbono, etc. El instrumento soporta presiones internas de hasta 10 PSI, o 0,703 bar, y temperaturas de hasta 140°F ó 60°C. **NO EXCEDA ESTOS LÍMITES!**.

Perfore dos orificios de 3,6 mm en línea vertical, separados por 100mm, e instale el instrumento con los tornillos autorroscantes provistos con él. Sin apretar demaslado, coloque el instrumento vertical con ayuda del nivel incluido en la parte inferior derecha del mismo. Verifique que ha quedado vertical y repita el proceso si es necesario. Para uso portable, use el soporte vertical tipo A-612.

Llenado

Gire en sentido antihorario la perilla de ajuste de cero hasta que se detenga; gírela nuevamente pero en sentido horario unas tres vueltas, de modo de dejar la posibilidad de ajuste en cualquier dirección. Retire el tapón de llenado y comience a llenar el manómetro lentamente hasta ver el líquido en las cercanías del cero de la escala.

ATENCION: use solamente aceite rojo de peso específico 0,826 para los modelos 25; 27; MM-80 y M-700Pa. Use solamente aceite azul de peso específico 1,9 para los modelos 26; 28 y MM-180.

Ajuste exactamente el cero del instrumento girando la perilla según corresponda, y reponga el tapón de llenado. Si el ajuste preciso es imposible por exceso de llenado, retire nuevamente el tapón y extraiga el exceso introduciendo un limpiador de tubos, que absorba el exceso.

Con el instrumento se suministra un tubo plástico flexible doble de 2,4 m juntamente con adaptadores para conexión a 1/8" NPT. Conecte el tubo marcado con una línea roja al la entrada de alta presión (HIGH, a la izquierda) y a la presión mas elevada a sensar. Repita el procedimiento con el tubo restante en la entrada de baja presión (LOW, a la derecha), y a la presión más baja a sensar.

Mantenimiento

Verifique de tanto en tanto el nivel de aceite, y reajuste el cero del instrumento según sea necesario. Asegúrese de haber venteado el instrumento desconectando los tubos de conexión a proceso (entradas HIGH y LOW en la parte superior del manómetro). Agregue aceite solo si es necesario, utilizando los aceites DWYER azul o rojo según corresponda. No utilice otros fluidos pues podrían dañar el material. Para limpieza use solo jabón neutro y agua, evitando solventes que puedan dañar el instrumento (vea Instalación). Limpie la perilla con un pincel pequeño y suave.

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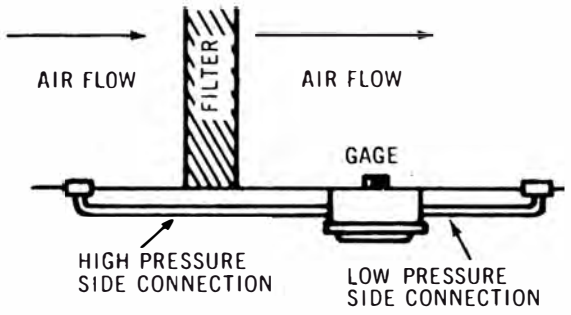
APLICACIONES



Medición de Tiro

Instale un tubo de hierro de 1/8" (3,2 mm) o mayor desde el conducto a medir hasta una distancia de 1,5 m del instrumento. Use únicamente al conector derecho (LOW). Se debe prever la limpieza periódica para evitar acumulación de suciedad.

Indicador de Presión Estática

Tenga en cuenta que las velocidades de aire superiores a 100 fpm (5 m/seg.) son una fuente de posibles errores en la medición. Es conveniente usar sondas para presión estática. De no ser disponibles, ingrese las conexiones al conducto, en ángulo recto a la corriente de aire, y deles una terminación suave en los extremos.

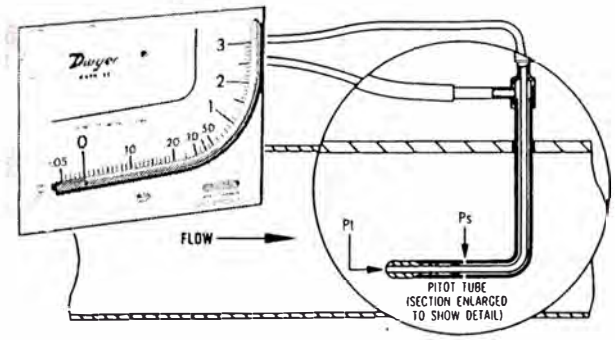
Indicador de Obstrucción de Filtros.

Instale el manómetro a distancia no mayor de 1 m del banco filtrante. Conecte el lado de descarga del filtro al conector LOW en la parte superior del instrumento y el otro tubo, al conector HIGH y a la presión positiva. Retire el papel protector de la flechas autoadhesivas (roja y verde) y adhiéralas adyacentes al tubo indicador para marcar lecturas de filtro limpio y sucio.

Medición de Velocidad de Aire en Conductos

Se requiere un tubo Pitot para esta aplicación. Instálelo bien centrado dentro del conducto, en una zona donde sea recto y sin obstrucciones por lo

MARK II MANOMETER



PITOT TUBE SENSES TOTAL AND STATIC PRESSURES.
MANOMETER MEASURES VELOCITY PRESSURE —
(DIFFERENCE BETWEEN TOTAL AND STATIC PRESSURES).

menos en distancias de 4 diámetros tanto corriente arriba como abajo del punto de inserción. Asegúrese que la punta del tubo Pitot está bien dirigida hacia la corriente de aire. Conecte el tubo doble a los conectores HIGH y LOW, de modo de conectar LOW al conector en ángulo recto del tubo Pitot, y el restante a HIGH. la velocidad leída es la máxima, correspondiente al centro del conducto. Para calcular la velocidad promedio multiplique por 0,9. Esta velocidad corresponde a aire seco, a 21°C a una presión de 760 mmHg y de una densidad de 0,075 /cuft. Para otras condiciones se deben aplicar factores de corrección de acuerdo a lo siguiente:

CALCULO DE VELOCIDAD DE AIRE

Velocidad de Aire = 1096,2 $\sqrt{}$ (Pv/D)

Donde Pv es la presión por velocidad en " de C. Agua.

D: densidad del aire en #/pie^3

Densidad de aire = 1,325 × (Pb/T)

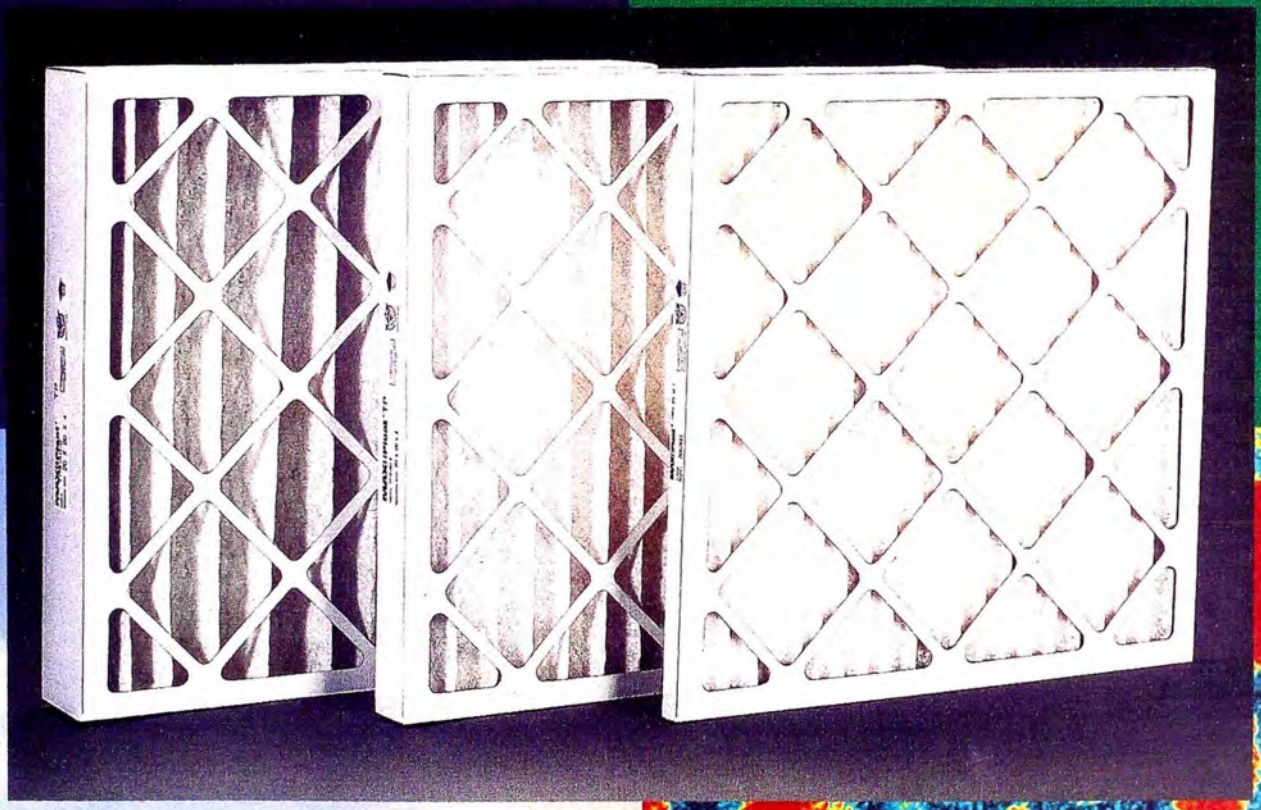
Para PB: presión barométrica en " de Mercurio, y T=Temperatura absoluta (°F+460)

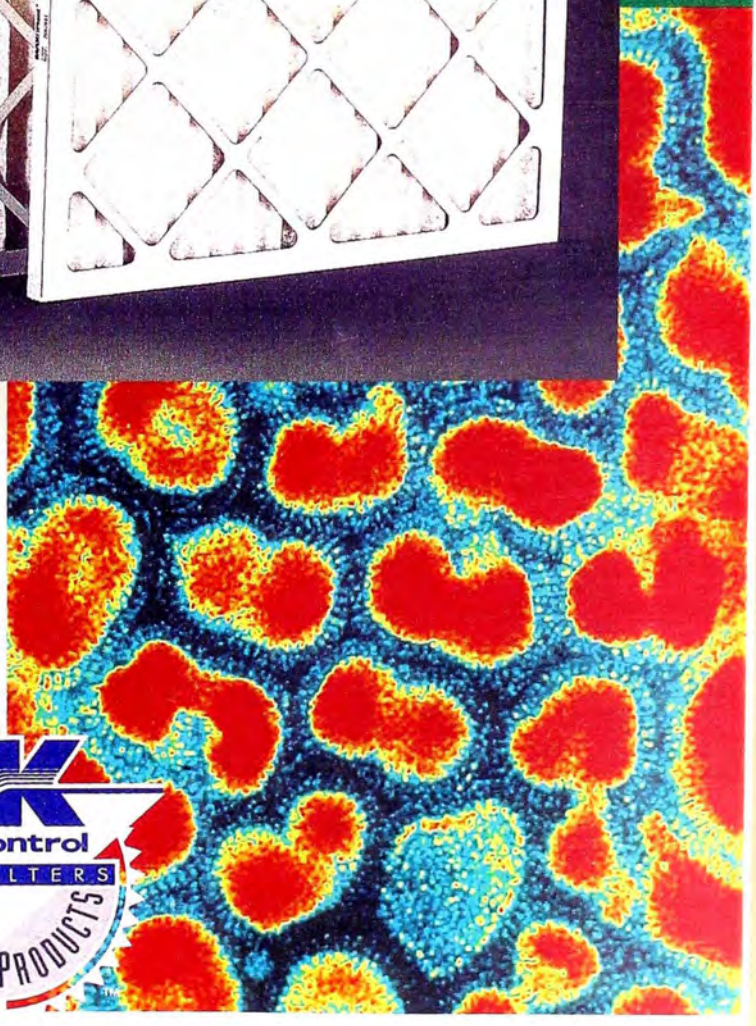
Caudal en pie^3/min. = Area del conducto (pie^2) × Veloc. de aire (pie/min.)

Dwyer®
Phone nearest sales office / warehouse:
Anaheim, CA 714/630-6424 Ivyland, PA 215/957-0355
Marietta, GA 770/427-9406 Houston, TX 713/446-1146

MAX Pleat® TP

STANDARD CAPACITY PLEATED FILTERS. YOUR SOLUTION TO BETTER FILTRATION AND EXTENDED FILTER LIFE. A BIO-KONTROL® ANTIMICROBIAL FILTER.





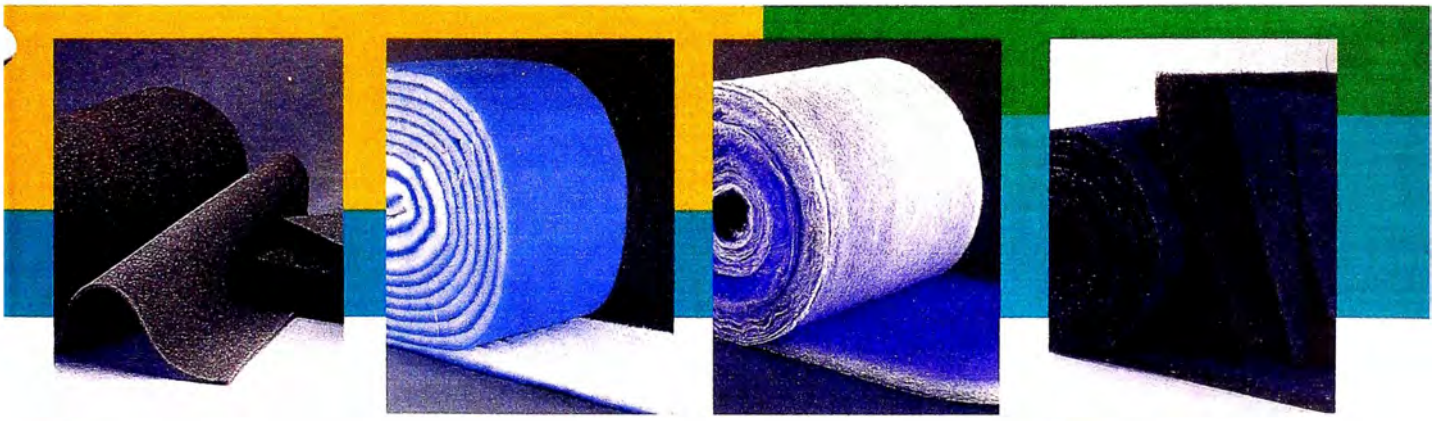
AirKontrol AIR FILTERS GENUINE PRODUCTS

U-Trims®

U-TRIM series of trim to size window unit and furnace filters are washable and packaged in attractively designed poly bags. A broad choice of materials are offered - foam, foam with support grid, electrostatic media, expanded aluminum, and EVERLAST natural hair fiber. Disposable type U-TRIMs are fiberglass and ODOR KONTROLLER charcoal impregnate with support grid.
Shown above left to right: AK1601A Aluminum, AK1550A Electrostatic with support grid.
See Bulletin: AKL1-100
GROUP ONE

U-Trim® Rangehood Filters

No more scouring about looking for the correct size rangehood filter. A replaceable grease or odor extraction type can be trimmed down to replace almost any size. Available in 15"x18", 12"x15", and 12"x 20" with light lens included. The filters will fit as small as an 11/32" range-hood track.
Shown above left to right: RGH1215, RHGL1220, RHC1215.
See Bulletin: AKL1-100
GROUP ONE



Washable Foam Service Rolls, Bulk Media, & Pads

Filter foam is a preferred washable media for use in window units and pad holding frames. Available in 1/4", 1/2", and 1" thicknesses plus various widths. It comes in 25 ft. service roll dispenser cartons in 1/4" and 1/2" thicknesses. Air Kontrol is a fabricator of foam pads and can supply various sizes, thicknesses and pore sizes.
See Bulletins: AKL1-100
AKL4-200
GROUP ONE

Polyester Service Rolls, Bulk Media, & Pads

Polyester fiber media was introduced to the market as an upgrade to fiberglass media. It is soft, easy to work with and disposable. It is available in many widths and thicknesses. Polyester media comes with a dry tackifier. Service rolls are offered in 240" lengths in dispenser cartons, and larger bulk lengths.
AKA7P Polyester roll shown above. Available as a Bio-Kontrol* filter.
See Bulletins: AKL1-100
AKL4-200
GROUP ONE

Fiberglass Service Rolls, Bulk Media, & Pads

AK's 1/2 - 1" -2" thick modigliani processed fiberglass is custom designed for filtration media. The spinning process is computerized to eliminate variation and the graded weave produces a progressively loading media. Available in pre-cut pads and rolls in various widths. Service rolls come in 1" thickness in dispenser cartons. AK40GFR Fiberglass roll shown above.
See Bulletin: AKL1-100
AKL4-200
GROUP ONE

Everlast™ Natural Fiber Rolls & Pads

A strong washable natural fiber material is composed of latex coated animal hair fibers that enhances high dust-holding capability. Available in various widths, 1/2" - 1" - 2" thicknesses and 25 ft. lengths. Excellent trim to size filter for central systems. Self supporting and requires no frame. EVERLAST is used by many equipment manufacturers. Hog hair roll and pads shown above.
See Bulletin: AKL1-100
GROUP ONE

* Filter media is treated with permanently bonding antimicrobial treatment.

Kustomfit® Series - Adjustable Size Frame and Filter Pack Trims to Fit All Sizes From 20"x25" & Below. Super Size Available to Fit All Sizes 25" x 30" & Below.

KustomFit COMMERCIAL QUALITY ELECTROSTATIC AIR CLEANER™ -High performance washable electrostatic filter effectively helps remove pollen, household dust, mold spores, bacteria, dust mites, animal dander, and other contaminants. Also available in standard and non-standard sizes. A Bio-Kontrol* filter. KFES2025 shown above. See Bulletin: AKL2-500, AKL2-400
GROUP TWO

KustomFit AIR MEDIC® Electrostatic Air Cleaner - It is the most widely used Electrostatic Air Cleaner in the world. This adjustable size air cleaner captures allergy triggering particles as well as other airborne solid paticulates. It is washable and has a lifetime limited warranty. Air Medic has a peak ASHRAE dust arrestance of 94%. Also available in standard and non-standard sizes. A Bio-Kontrol* filter. KFAM2530V shown above. See Bulletin: AKL2-500, AKL2-400
GROUP TWO

KustomFit KONOSTATIC™ Air Cleaner Filter System - Uses the same filtration principal as the Electrostatic but is not a Bio-Kontrol filter. KFTE2025 shown above. See Bulletin: AKL2-500
GROUP ONE

Kwick Klean® Electrostatic Air Filter

This economy grade electrostatic air filter is available in multitude of standard and non-standard sizes. It is a permanent washable furnace filter and is encased in an aluminum frame. It is easy to clean and will last for years. AIR MEDIC AND COMMERCIAL QUALITY ELECTROSTATIC are also available in standard and non-standard sizes.
See Bulletin: AKL2-400
GROUP ONE

Maxi-Pleat® Series Extended Surface Pleated Filters

Today's trend is to use a minimum of 20% air filtration. MAXI-PLEAT meets this requirement, as well as, reduces operating cost in terms of energy consumption and overall filter replacement costs. MAXI-PLEAT series of filters offer cleaner air, longer service life, reduced yearly installation cost, reduced equipment maintenance, reduced energy cost, and reduced interior decorating expenses over other less efficient panel filters. MAXI-PLEAT series come with a blended media that obtains ASHRAE efficiencies of 20-30%. MAXI-PLEATS and DUST KONTROLLERS are Bio-Kontrol* filters.

MAXI-PLEAT HP - This high capacity unit is our top of the line pleated filter. It utilizes a wedged V pleat design for maximum effective media area and the media area is supported by expanded metal, which offers a 96% open face area. Metal is coated in our manufacturing process to prevent rusting. The filter is enclosed in heavy duty moisture resistant beverage board frame. 2" thickness incorporates 15 pleats per lineal foot.
See Bulletin: AKL8-300
GROUP TWO

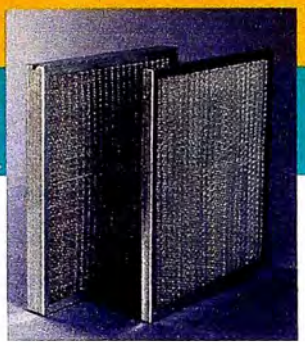
MAXI-PLEAT TP - Standard capacity unit that incorporates all the same construction and benefits as the HP, but utilizes expanded metal media retention which results in a V shaped pleat. Expanded metal is coated in our manufacturing process to prevent rusting. 2" thickness incorporates 10 pleats per lineal foot.
See Bulletin: AKL8-400
GROUP TWO

DUST KONTROLLER - Available in 1" thickness. Manufactured with the same media and media retention as the TP, but utilizes a one piece moisture resistant beverage board frame construction with die cut support members on downstream side. Its construction makes for an economical roughing filter. See Bulletin: AKL8-500
GROUP TWO

Micro Particle Air Filter

Uses a unique non-woven synthetic filter media that is electrostatically charged during it's manufacturing process. Media acts like a magnet to attract and hold airborne micro particles that can cause severe allergy problems. Independent laboratory tests show that this filter outperforms all competitive units on the market. Available in 1" thickness and a variety of face sizes.
See Bulletin: AKL8-600
GROUP THREE

* Filter media is treated with permanently bonding antimicrobial treatment.

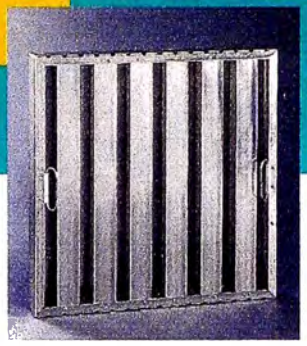


Permanent Metal

AK150C - (Shown above) All heavy duty galvanized steel multilayer filter for air or grease filtration. It can also be used in water and oil mist eliminators.
AK300C - All aluminum, lightweight but rugged. Excellent filter for high lint concentrations
AK400C - Multimedia filter combines corrugated light weight aluminum media with a layer of high dust holding foam. Excellent washable filter for added dust arrestance
See Bulletin: AKL2-450
GROUP ONE

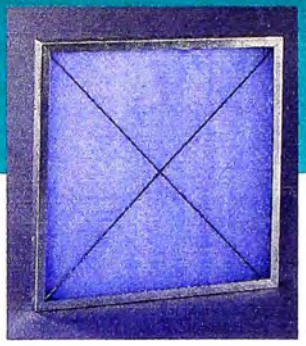
AK1900C Permanent Aluminum

AK's most widely used framed filter utilizes aluminum foil that has been expanded into various open patterns. The multi-layers of material are then bonded together which gives a finished product that has a pattern of baffles to collect dust. Aluminum filter is excellent for air or residential grease applications.
AK1900C 1" and 2" shown above.
See Bulletin: AKL2-200
GROUP ONE



Fire Protector™ Baffle Grease Filter

FIRE PROTECTOR acts as a grease trap and drains airborne grease away from the filter. It does not permit grease deposits and buildup associated with mesh type filters. Flash flame penetration is also prevented from penetrating into plenum and duct work. U.L. listed and comes in aluminum and stainless steel construction.
See Bulletin: AKL2-600
GROUP ONE



Change-A-Pad™ Frame System

Pad holding frames save money, storage space and labor each filter change. Frames are available in galvanized steel or aluminum. Frames can be used with fiberglass, polyester, pleated elements and many other types of media. AK40SF 1" with Glass Pad shown above.
See Bulletin: AKL4-150
GROUP ONE

Filter Plus'™ Aerosol Bulk Adhesive

Increase dust holding capabilities of air filter with FILTER PLUS. The liquid adhesive helps filter to increase efficiency and also aids in the cleaning process of washable filters. Available in 1,5, and 55 gallon bulk containers, 2 oz. pump spray, and 14 oz aerosol can. AK800-14 — 14 oz. aerosol can and AK800-2 — 2 oz. pump spray shown above.
See Bulletin: AKL3-150

AKX™ Filter Cleaner For Washable Filters And AKX Coil Cleaner

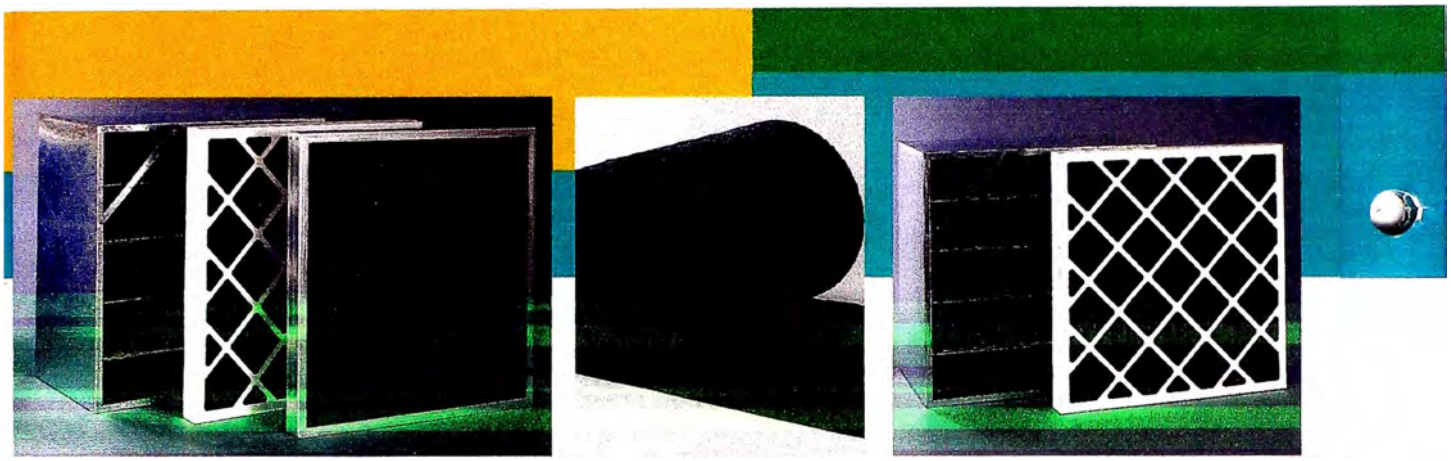
AKX FILTER CLEANER is a commercial strength formula to provide exceptional cleaning power when used in washing renewable type air or grease filters. Formulated with a lemon fragrance which creates a pleasant scent to the renewable filter. Cleaner is packaged in a 32 ounce pump spray bottle. AKX COIL CLEANER is used on outside coils to help keep system running efficiently. Available in 17 oz. aerosol spray.
See Bulletin: AKL3-150

Replacement Automatic Rolls

Replacement filter rolls for automatic roll filter systems are available to fit all other manufacturers' equipment. These rolls are available in fiberglass or polyester filter media. Polyester media shown above.
See Bulletin: AKL6-250
GROUP ONE

Kontrol Seal™ Internally Supported Panel Filters

Self-sealing design guards against air bypass, because the filter edges act as gaskets. KONTROL SEAL filters are fast to install and are fully self-supporting. Units are available in many thicknesses or plys and media types with internal wire rod supports. They are offered in single or linked panels. "Slip on" types are available which enable you to change out media by slipping replacement media over existing wire support rods. Available as a Bio-Kontrol* filter.
See Bulletin: AKL5-200
GROUP TWO

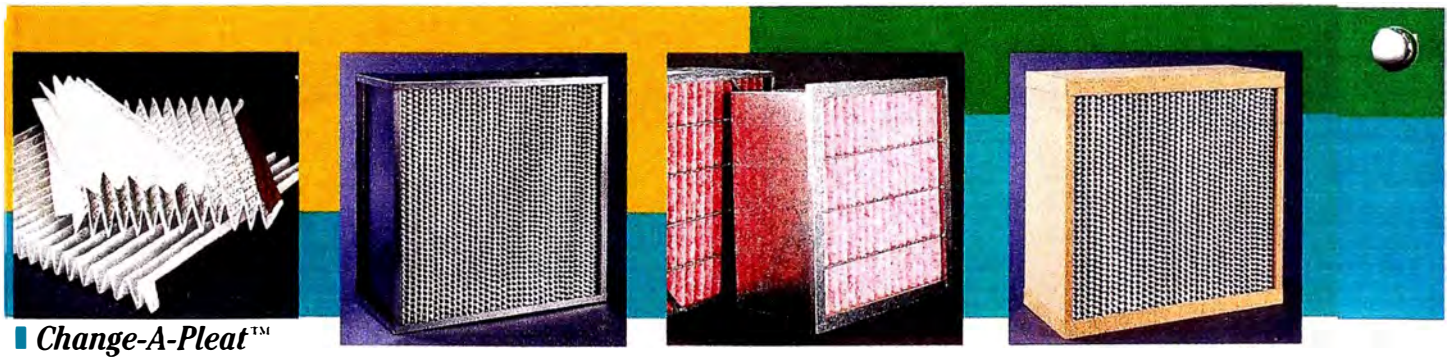


"Odor Kontroller"® Activated Carbon & Zeo-Sorb Gas Phase Filters "Purafilter" Potassium Permanganate Impregnated

These series of filters offer cost effective solutions to poor indoor air quality which is associated with over 40% of today's buildings. They will replace existing HVAC filters and require no equipment retrofit. They save in freight since they are lighter than bulk compound filters. Costly energy is saved because pressure drops are extremely lower than bulk filters. They serve a dual function by removing both gaseous compounds and particulate matter from the filtered air. The gaseous control compounds are impregnated onto a polyester filter substrate and offer highly effective removal of gaseous contaminants as well as solid airborne contaminants. Filters are offered in the following medias: activated carbon, zeolite, potassium permanganate. Available as the ultimate gas phase filter, these filters contain a blend of both activated carbon and potassium permanganate. Filters are offered in thicknesses of 1" to 12" and are offered in many face sizes.

Activated carbon filters are Bio-Kontrol* filters and potassium permanganate filters have an inherent resistance to biologicalians. Zeo-Sorb ODOR KONTROLLER provides a cost effective solution for removing unpleasant fumes and odors associated with ammonia and ammonium compounds (e.g. Urine).

See Bulletin: AKL12-200 **GROUP ONE:** Flat Media **GROUP TWO:** Pleated Media



Change-A-Pleat™ Extended Surface Replaceable Pleated Elements

Incorporates the features of MAXI-PLEAT filter series and more! CHANGE-A-PLEAT system design can be used in pad holding frames. Pleats save labor time and storage space, because they are compressed to take up little space and are easy to transport. Units are available with protective end caps and compression tied, or bulk packed without end caps and no ties. CHANGE-A-PLEAT media is available in pre-cut sizes or bulk rolls in 1", 2"& 4" thicknesses. A Bio-Kontrol* filter.

See Bulletin: AKL8-700
GROUP TWO

Airo-Flo™ Extended Surface ASHRAE Cell Filters

Compact design with rigid construction that fits all HVAC systems. This type filter is well suited for variable air volume systems where there is changing air velocity, in units where there is turbulent air, high temperature or high humidity. Available in 60-65%, 80-85% and 90-95% efficiencies. Their 6" and 12" depths enable them to be installed where space is limited. Available with side access headers and frame constructions of partical board or metal cell. No header, metal cell shown above.

See Bulletin: AKL9-600
GROUP THREE

Kontrol-Flo™ Extended Surface Filter

KONTROL-FLO is ideal for variable air volume systems, because its performance is not affected by changing air velocity or system shut down. It is also ideal for equipment where space is a problem. This rigid cell filter is encased in metal framing in 6" and 12" depths. Peripheral headers are available for side access units. KONTROL-FLO EF filters are available as Earth Friendlier products. They use no metal except expanded metal for media support. Both units are available as a Bio-Kontrol* filter.

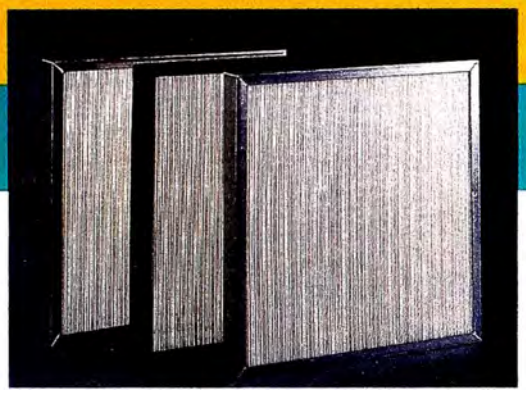
See Bulletin: AKL9-500, AKL9-530
GROUP THREE

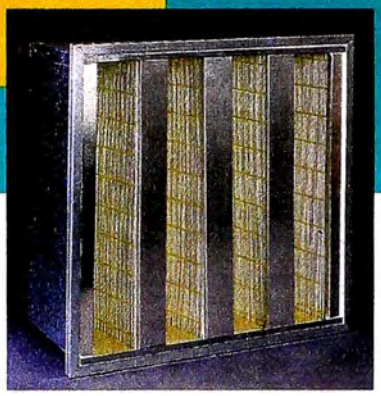
Micro-Kontrol® H.E.P.A.

Used where the highest degree of filtration is desired. H.E.P.A. filters are available in DOP efficiencies of 95%, 99.97% and scanned units of 99.999%. As in the Airo-Flo, H.E.P.A. filters offer different framing constructions and CFM capacities to suit your specific use. Wood H.E.P.A. shown above. Metal cells available.

See Bulletin: AKL11-500
GROUP FOUR

* Filter media is treated with permanently bonding antimicrobial treatment.





"Mega-Pak"™ Extended Surface Mini-Pleated Filters

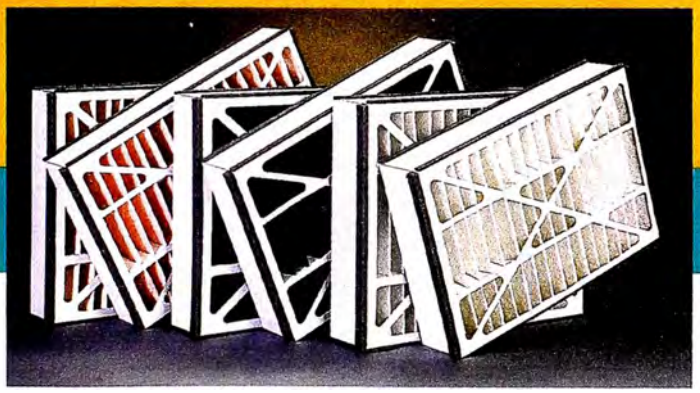
This state of the art filter allows for high efficiencies, lower pressure drop, extended life, and can occupy less depth space than other high efficiency filters. Our computerized manufacturing process enables us to produce 60-65%, 80-85%, 90-95%, and HEPA grade filters in 2", 4", 6", and 12" depths. Excellent filter to retrofit existing equipment to higher efficiencies. Filters come in many different frame types: wood, galvanized steel, aluminum, plastic, beverage board, and UV board.

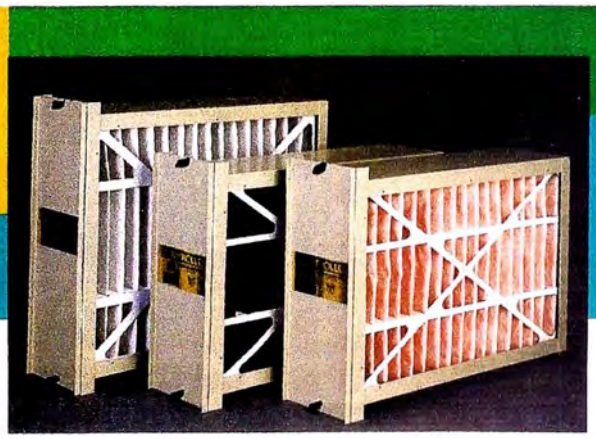
See Bulletin: AKL9-830, AKL9-850

GROUP THREE & GROUP FOUR

H.E.L.P.A.™

This patent pending 1" furnace filter is absolutely the most efficient 1" thick filter available today! Using mini-pleat technology this filter utilizes 60-65% ASHRAE media and achieves a pressure drop of .22 in. w.g. H.E.L.P.A. incorporates an exclusive pre-filter that can be vacuumed periodically which allows it to have a lifecycle of 2 years. It is available in standard and non-standard face sizes.
See Bulletin: AKL 9-800
GROUP THREE





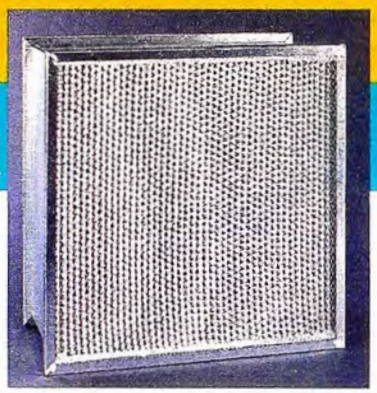
Dust Patroller® Ducted Air Cleaner

Duct mounted media air cleaner is designed for residential and light commercial applications. Cabinet is designed to utilize one of three different types of 5" thick filters - standard performance pleated filter, high performance pleated filter, or activated carbon pleated filter. Unit also comes with a separate 1" track which can serve as a pre-filter track or final filter track utilizing a 1" pleated activated carbon filter. DUST PATROLLER is offered in face sizes of 20"X 25" or 16"X 25". Air Kontrol replacement filter packs can be used as replacement filters in Research Products' Space-Gard®, Trion Air Bear®, General Filter, White Rogers, and Honeywell units.

Space-Gard® is the registered trademark of Research Products Corp.
Air Bear® is the registered trademark of Trion, Inc.
Trademarks and company names used for identification purposes only.

See Bulletin: AKL 13-100, AKL 13-200

GROUP TWO & THREE



Turbo 2000™

The TURBO 2000 is a heavy duty, high efficiency cartridge filter. Its construction and design meets or exceeds minimum standards for rotating machinery. Its metal construction will withstand the pulsations and surging of engines in heavy industries such as gas turbines, power plants, centrifugal compressors and many other major industrial applications. It may also be used in any air filter application where extreme velocities or turbulence occurs.
See Bulletin: AKL 9-700
GROUP THREE

Kontrol-Pak® Extended Surface Bag Filter

Medium and high efficiency bag filters come in a wide range of sizes that fit all types of air filtration systems. The controlled stitched pocket design enables high dust holding and long life. The self supporting bag filter provides superior performance in four efficiencies: 40-45%, 60-65%, 80-85%, and 90-95% constructed from medium and high efficiency synthetic or 90-95% glass media in a choice of face sizes, number of pockets, and pocket lengths. Kontrol-Pak 60-65% synthetic shown above. Available as a Bio-Kontrol® filter.
See Bulletin: AKL10-400
GROUP THREE

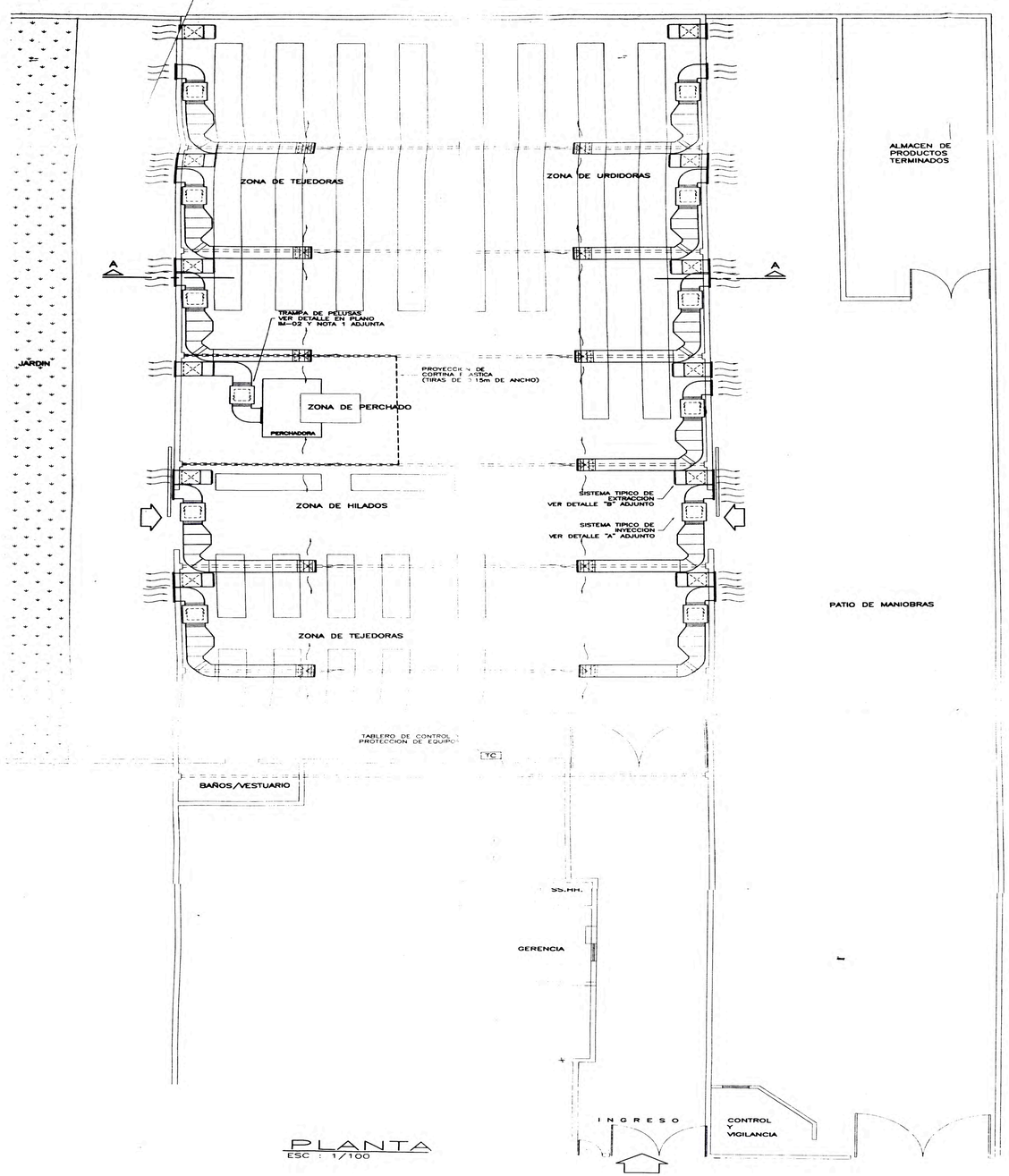
EASY EIGHT Holding Frame & Clips

Great for new construction or to retrofit an existing system, a standard size filter bank can be constructed using the Easy Eight holding frame. Three inches in depth and constructed of 16 gauge galvanized steel, Easy Eight holding frames are flush mitered and have welded corners. They are precision made with pre-punched mounting holes for bolting or riveting bank assemblies, and centering dimples allow for positive sealing. Gaskets allow for positive filter seals and a multitude of frame notches allow for fastening clips to be attached. Easy Eight frames and fastening clips can accommodate up to a 12" primary filter with a 4" pre-filter. See Bulletin: AKL14-100

Filter Fabrication Tools and Materials

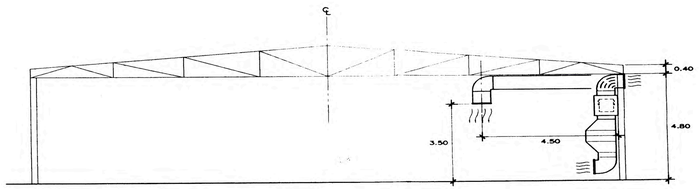
In 1958, Air Kontrol recognized the need for in-house air filter assembly. It would be impossible to stock enough filter sizes to satisfy every customer's need. We offer over 40 different types of materials so that you can make all different types and sizes at your premises. With Air Kontrol's tools and materials, you can build tremendous goodwill by being able to quickly deliver the filter your customer so desperately needs. With AK's tools and materials, you can fabricate any size framed washable filter or make pad holding frames in a matter of minutes.
See Bulletin: AKL7-200

PLANOS

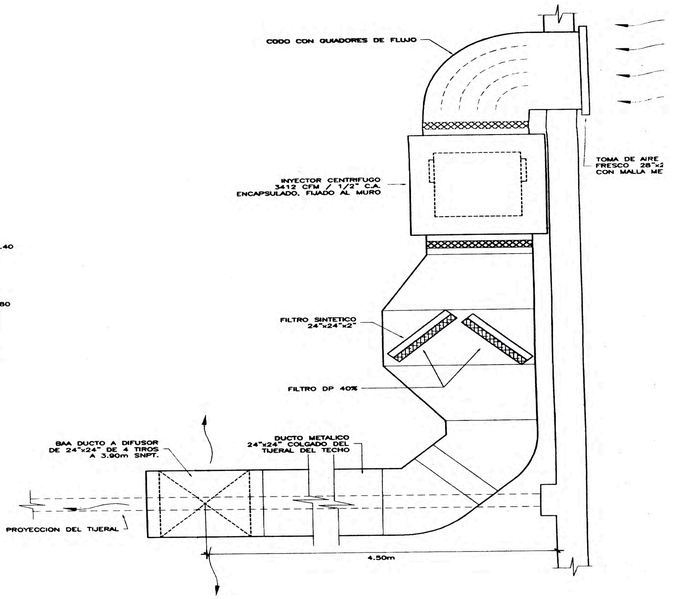


PLANTA
ESC : 1/100

DESCRIPCION	CANTIDAD	CAUDAL (pies3/min)	PRESION ESTATICA (pulgadas de columna de agua)	POTENCIA DE MOTOR
INYECTOR CENTRIFUGO	12	3,722	1 1/4	1.20
EXTRACTOR CENTRIFUGO	12	3,102	1 1/4	1.00

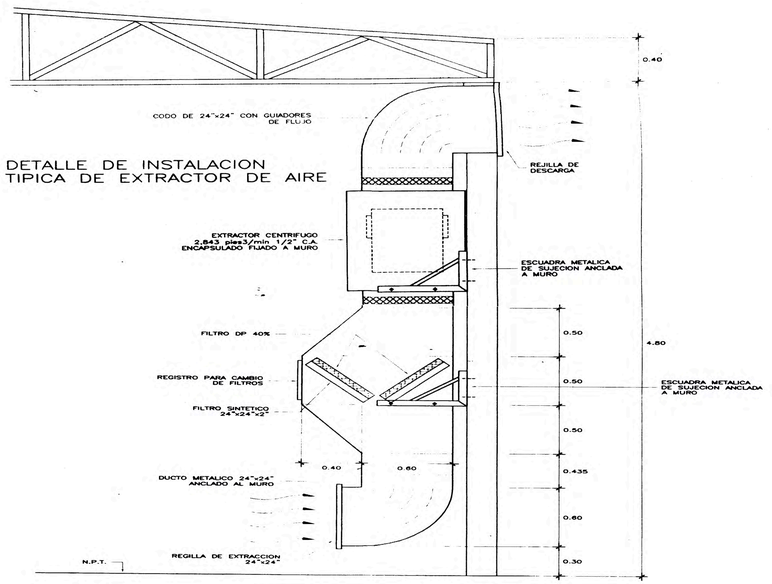


CORTE A–A
ESC : 1/100



DETALLE "A" (PLANTA)
ESC : 1/20

DETALLE DE INSTALACION TIPICA DE EXTRACTOR DE AIRE



DETALLE "B" – (ELEVACION)
ESC : 1/20

LEYENDA

SIMBOLO	DESCRIPCION
	DIFUSOR DE 4 TIROS
	REJILLA DE DESCARGA
	REJILLA DE ASPIRACION
	INYECTOR / EXTRACTOR EN GABINE

NOTAS :

1.– LA MAQUINA PERCHADORA TIENE INCORPORADO UN EXTRACTOR CENTRIFUGO QUE DESCARGA A LA TRAMPA DE PELUSAS
2.– VER DETALLE DE DIFUSORES Y REJILLAS EN PLANO IM–

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PROPIETARIO: REPRESENTACIONES DERCO INDUS

RESPONSABLE: EFRAIN MARTOS CLAVO
BACHILLER INGENIERIA MECANICA

PLANO: INSTALACIONES MECANICAS VENTILACION Y EXTRACCION DE PELUSAS

DIBUJO:	FECHA:	ESCALA:	ARCHIVO:
ME-40	2002	INDICADA	TALLER.DWG

LA
IM
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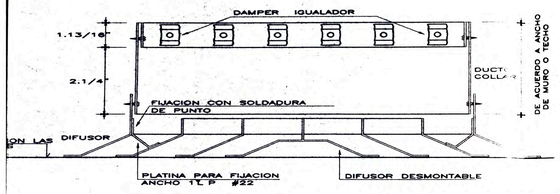
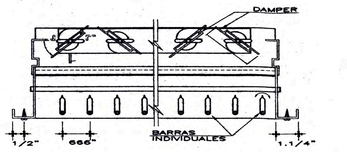


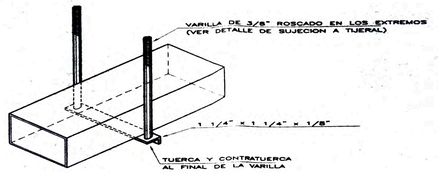
DETALLE DE DIFUSOR Y ACCESORIOS DE CONTROL

S/E



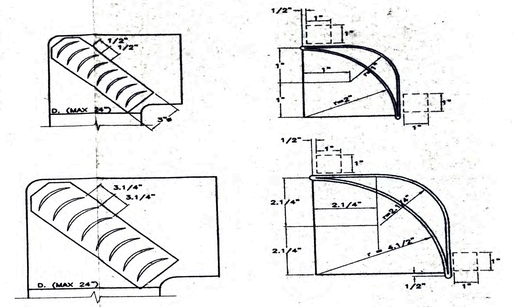
DETALLE DE REJILLA DE DESCARGA

S/E



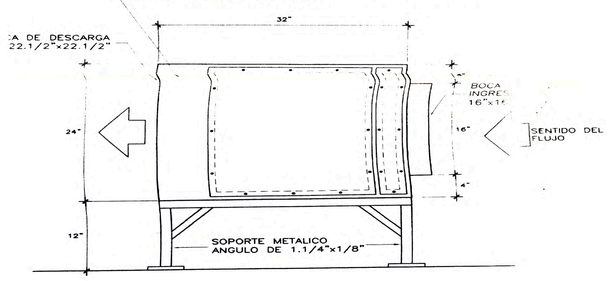
DETALLE DE COLGADOR DE DUCTOS

ESPACIAMIENTO MAXIMO ENTRE COLGADORES A 2.00 m ENTRE EJES.

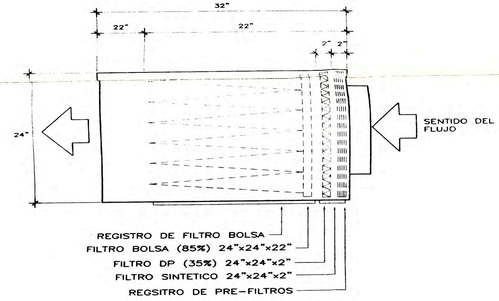


DETALLE DE DEFLECTORES EN CODOS RECTOS

CAJA METALICA FABRICADA CON PLANCHA GALVANIZADA DE 1/27" DE ESPESOR CON SOPORTES Y RIELES INTERIORES PARA ALOJAR FILTROS, CON REGISTROS HERMETICOS CON PERNOS Y TUERCAS MARIPOSA.



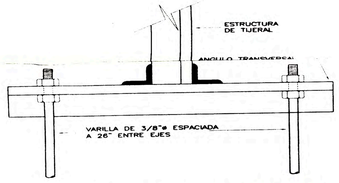
ELEVACION



PLANTA

DETALLE DE TRAMPA DE PELUSAS

ESC : 1/ 1



DETALLE DE SUJECION DE DUCTOS A TIJERAL

NOTAS GENERALES

2.- TODOS LOS DIFUSORES TENDRAN REGULADORES MANUALES DE CAUDAL.
3.- TODAS LAS DERIVACIONES DE DUCTOS DEBERAN TENER DAMPER REGULADORES DE CAUDAL
4.- EN TODOS LOS DIFUSORES DEBERA LOGRARSE UNIFORMIDAD DE FLUJO, PARA LO CUAL SE USARA EN LOS CASOS NECESARIOS GUIADORES CONVENIENTEMENTE DISENADOS
5.- SE ATENUARA CUALQUIER RUIDO QUE PUEDA PRODUCIRSE EN LOS DUCTOS Y EN LOS EQUIPOS.
6.- LOS PRESENTES PLANOS SE COMPLEMENTAN CON LAS ESPECIFICACIONES TECNICAS, MEMORIA DESCRIPTIVA Y PRESUPUESTO.
7.- EL SUMINISTRO, FABRICACION, INSTALACION Y PRUEBAS DE ESTE SISTEMA DEBERAN SER EJECUTADOS SEGUN LAS NORMAS INTERNACIONALES Y NACIONALES QUE LO RIGEN ASHRAE, AMCA Y R.N.C.

NOTA :
VER DISTRIBUCION DE EQUIPOS Y DETALLES EN PLANO IM-01

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PLANO: INSTALACIONES MECANICAS VENTILACION Y EXTRACCION DE PELUSAS				LAMINA: IM-0 02 de 02
DIBUJO: MP.CAD	FECHA: 2002	ESCALA: INDICADA	ARCHIVO: TALLER.DWG	