



ASSOCIAÇÃO PORTUGUESA DE
ENGINEERING HOSPITALAR



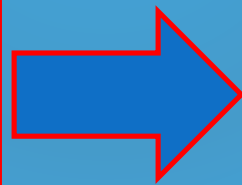
XLIII Seminário APEH INSTALAÇÕES CERTIFICADAS, SEGURANÇA NA ESTERILIZAÇÃO E ÁREAS DE ASSEPSIA

Classificação Energética Filtros de AVAC

Hospitais Senhor do Bonfim - 3 de Novembro de 2016

Filtro de Ar: É uma unidade concebida para «limpar» o ar da contaminação provocada por partículas.

Meio filtrante
Caixilho
Suportes
Vedantes



FILTRO

EN 779:2012

**Norma europeia que classifica os
filtros quanto ao desempenho**

EUROVENT

**Programa de certificação energética
de filtros com base no documento
RS 4/C/001-2016**

O programa de certificação de filtros aplica-se aos filtros das classes M5, M6, F7, F8 e F9 conforme a EN 779:2012, com as dimensões da face de 592 x 592 mm e com o caudal nominal compreendido entre 0,24 m³/s (864 m³/h) e 1,5 m³/s (5.400 m³/h)

EN 779:2012 “Particulate Air Filters for General Ventilation”

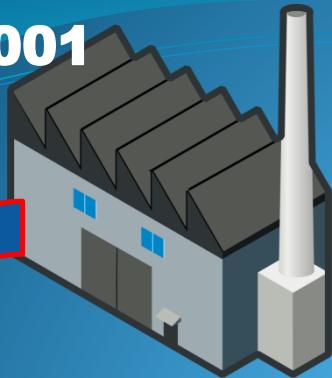
CM 12th December 2015 “Certification Manual of the Eurovent Certified Performance Mark”

OM-11-2016 January 2016 “Operational Manual for the Certification of Air Filters”

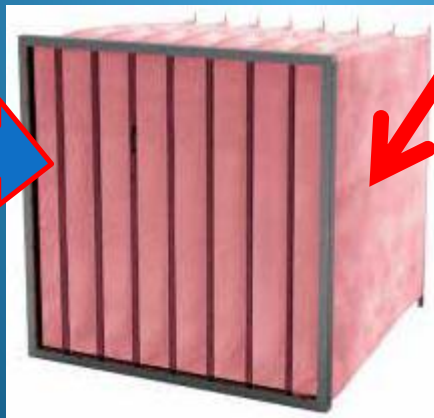
RS 4/C/001-2016 “Rating Standard for the Certification of Air Filters”

EUROVENT 4/21 – 2014 - Calculation Method for the Energy use related to Air Filters in General Ventilation Systems

ISO 9001



EN 779 : 2012



OM - 11 - 2016

**RS
4 / 21**

Classificação conforme EN 779:2012

Group	Class	Average arrestance [%]	Average efficiency [%]	Minimum efficiency [%]
Coarse Dust (grosso)	G1	$50 \leq A_m < 65$	-	-
	G2	$65 \leq A_m < 80$	-	-
	G3	$80 \leq A_m < 90$	-	-
	G4	$90 \leq A_m$	-	-
Fine Dust	M5	-	$40 \leq E_m < 60$	-
	M6	-	$60 \leq E_m < 80$	-
	F7	-	$80 \leq E_m < 90$	35
	F8	-	$90 \leq E_m < 95$	55
	F9	-	$95 \leq E_m$	70

partículas
0,4 microns

Quais os grupos de filtros que podem ser submetidos à certificação EUROVENT ?

Filtros do grupo « Fine Dust », pertencentes aos grupos M e F classificados de acordo com a norma EN 779 : 2012 vigente.

Classificação conforme EN 779:2012

Group	Class	Average arrestance [%]	Average efficiency [%]	Minimum efficiency (IPA treated) [%]
Coarse Dust (groseiro)	G1	$50 \leq A_m < 65$	-	-
	G2	$65 \leq A_m < 80$	-	-
	G3	$80 \leq A_m < 90$	-	-
	G4	$90 \leq A_m$	-	-
Fine Dust	M5	-	$40 \leq E_m < 60$	-
	M6	-	$60 \leq E_m < 80$	-
	F7	-	$80 \leq E_m < 90$	35
	F8	-	$90 \leq E_m < 95$	55
	F9	-	$95 \leq E_m$	70

Certificação - Características

Queda de pressão inicial (Δp_0), em Pa, medida conforme a EN 779 : 2012 ;

Eficiência inicial conforme a EN 779 : 2012 (apenas para filtros F7 a F9 ;

Eficiência mínima conforme a EN 779 (apenas para filtros de F 7 a F 9) ;

Classe de eficiência energética conforme RS e a EUROVENT 4/21 ;

Consumo anual de energia conforme a EUROVENT 4/21

CLASSIFICAÇÃO e ETIQUETAGEM

Eficiência Energética

O consumo anual de energia calculado de acordo com o método descrito no Eurovent Document 4/21 – 2014 comparado com a Tabela do «Rating Standard for the Certification of Air Filters» (RS 4/C/001 – 2016) determina a classe energética do filtro classificado segundo a EN 779:2012

Tabela 1 – Limites da classe de Eficiência Energética

* Caudal 0,944 m³/s (3.400 m³/h)

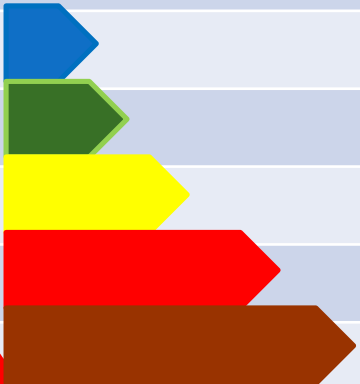





Filter Classe		EN 779:2012	
ME		M5	M6
Consumo anual em [kWh]			
	A+	0 – 450	0 – 550
	A	> 450 – 600	> 550 – 650
	B	> 600 – 700	> 650 – 800
	C	> 700 – 950	> 800 – 1.100
	D	> 950 – 1.200	>1.100 – 1.400
	E	> 1.200	> 1.400

Tabela 1 – Limites da classe de Eficiência Energética

* Caudal 0,944 m³/s (3.400 m³/h)

Filter Classe		EN 779:2012		
ME		F7	F8	F9
		Consumo anual em [kWh]		
	A+	0 – 800	0 – 1.000	0 – 1.250
	A	> 800 – 950	> 1.000 – 1.200	> 1.250 – 1.450
	B	> 950 – 1.200	> 1.200 – 1.500	> 1.450 – 1.900
	C	> 1.200 – 1.700	> 1.500 – 2.000	> 1.900 – 2.600
	D	> 1.700 – 2.200	> 2.000 – 3.000	> 2.600 – 4.000
	E	> 2.200	> 3.000	> 4.000

EUROVENT 4/21 - 201

Método de Cálculo da Energia Consumida

EN 779 - Air Filter test results (Abstract)

General

Test no.:	XYZ	Date of test:	Testing organisation:
Report no.:			XYZ laboratories

Device tested

Model:	ABC	Manufacturer:	Sample Filter Ltd.	Weight 5063,2g
Construction:	rigid filter 8x V-banks	Net effective filter area:	18 m ²	Dim.: 592x592x292 mm

Test data

Test air flow rate:	Test air temperature:	Test air relative humidity:	Test aerosol:	Loading dust:
0.944 m ³ /s	21 °C	34 %	DEHS	ASHRAE

Results

Initial pressure drop:	Initial arrestance:	Initial efficiency:	Dust holding capacity:	Efficiency (0,4 µm) of media Untreated: 61 % IPA treated: 57 %
77 Pa	100 %	58 %	535 g	
Final pressure drop:	Average arrestance:	Average efficiency:	Filter class:	
450 Pa	99 %	92 %	F8	
Remarks				

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Test data				
Test air flow rate: 0.944 m³/s	Test air temperature: 21 °C	Test air relative humidity: 34 %	Test aerosol: DEHS	Loading dust: ASHRAE
Results				
Initial pressure drop: 77 Pa	Initial arrestance: 100 %	Initial efficiency: 58 %	Dust holding capacity: 535 g	Efficiency (0,4 µm) of media Untreated: 61 % IPA treated: 57 %
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Test data

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Remarks				

Utiliza-se a perda de carga de um filtro para definir a sua classificação energética

$$W = \frac{q_v \cdot \Delta p \cdot t}{\eta \cdot 1000}$$

W – Consumo anual de energia [kWh]

q_v – Caudal de ar [m³/s]

Δp – A média da perda de carga [Pa]

t – Tempo de operação [h] = 6.000 h /ano

η – Eficiência do ventilador = 0,50

Avaliação da Eficiência Energética

A avaliação é sempre executada num filtro do tamanho
592 x 592 mm

$$qV = 0.944 \text{ m}^3/\text{s}$$

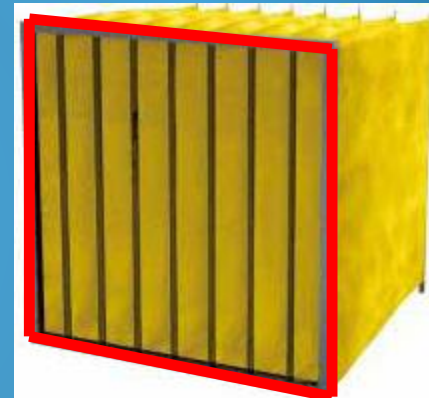
ASHRAE dust

Final Perda de carga:

$$M_5 \text{ e } M_6 = 250 \text{ Pa}$$

$$F_7, F_8 \text{ e } F_9 = 450 \text{ Pa}$$

Regista-se 5 pontos



Avaliação da Eficiência Energética

$$\Delta p = a \cdot m^4 + b \cdot m^3 + c \cdot m^2 + d \cdot m + \Delta p_i$$

Usa-se a equação polinomial do 4º grau para calcular os coeficientes de polinômio «a», «b», «c» e «d»

Se o coeficiente de determinação R^2 da curva for igual ou superior a 0,99. Se não usa-se uma equação do 3º ou 5º grau.

A média da perda de carga é calculada

$$\overline{\Delta p} = \frac{1}{M_x} \int_0^{M_x} \Delta p(m) \cdot dm = \frac{1}{5} a \cdot M_x^4 + \frac{1}{4} b \cdot M_x^3 + \frac{1}{3} c \cdot M_x^2 + \frac{1}{2} d \cdot M_x + \Delta p_i$$

Avaliação da Eficiência Energética

$$\overline{\Delta p} = \frac{1}{M_x} \int_0^{M_x} \Delta p(m) \cdot dm = \frac{1}{5} a \cdot M_x^4 + \frac{1}{4} b \cdot M_x^3 + \frac{1}{3} c \cdot M_x^2 + \frac{1}{2} d \cdot M_x + \Delta p_i$$

Sendo :

«a», «b», «c» e «d» os coeficientes de polinômio

M_x representa a quantidade fixa de pó que simula a quantidade de pó retida num filtro após um ano de operação

$x = \text{Grupo } G, M \text{ ou } F$

Grupo	M_x
G	$M_G = 350 \text{ g}$
M	$M_M = 250 \text{ g}$
F	$M_F = 100 \text{ g}$

Avaliação da Eficiência Energética

Se a quantidade de pó retida no filtro for inferior ao valor M_x o filtro não pode ser avaliado

Calcula-se a energia em kWh

$$W = \frac{q_v \cdot \overline{\Delta p} \cdot t}{\eta \cdot 1000}$$

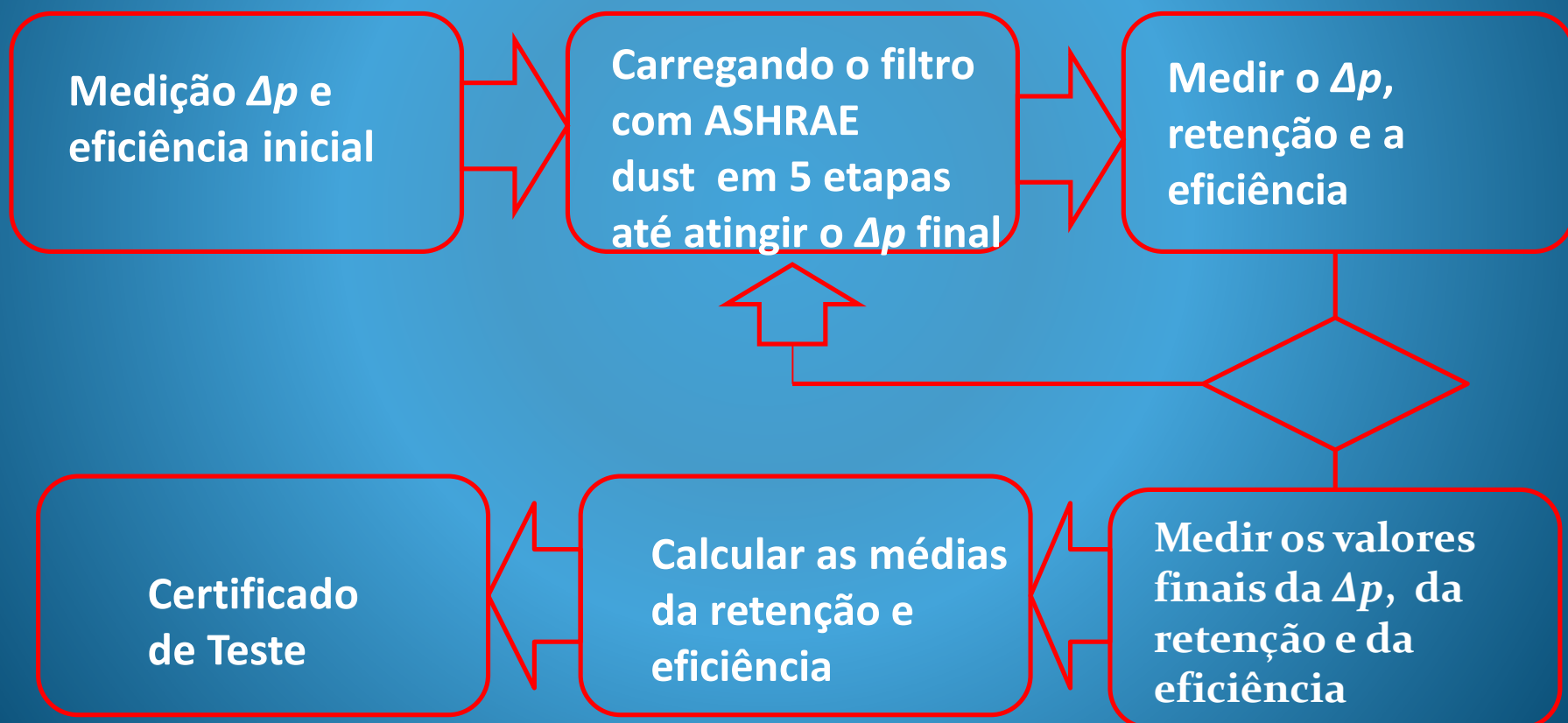
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Calcula-se a energia em kWh

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Processo de Certificação



Quais são as entidades que realizam os testes

Laboratórios independentes foram selecionados para realizar os testes regulares:

"SP Technical Research Institute", na Suécia, e;

VTT Technical Research Centre", na Finlândia.

CETIAT, França

Fabricantes Certificados

<http://www.eurovent-certification.com>

Fabricantes Certificados



Eurovent Certita Certification S.A.S. - 48/50, rue de la victoire - 75009 PARIS FRANCE
R.C.S. PARIS 513 133 637 - NAF 7120B

Accreditation #5-0517 Products and Services Certification
according to EN 45011 :1998 - Scope available on www.cofrac.fr.
COFRAC is signatory of EA MLA, list of EA members is available in
<http://www.european-accreditation.org/ea-members>

Certification Diploma N° : 13.10.003

Eurovent Certita Certification certifies that

M5-F9 Air Filters

from

VENFILTER Ventilacion y Filtracion S.L.

Located at

De la Terra 36 - Pol. Ind. Els Bellots
8227 Terrassa - Barcelona, Spain

DIPLOMA

**EUROVENT
CERTIFIED
PERFORMANCE**
www.eurovent-certification.com

Eurovent Certita Certification S.A.S. - 40/50, rue de la victoire - 75009 PARIS FRANCE
R.C.S. PARIS 513 133 637 - NAF 7120B

Accredited ISO 9001 Product and Service Certification
according to ISO 9001:2015 and ISO 17065:2012 - Scope available on
www.eurovent-certification.com
COPRAC is a signatory of the AIA MSA, the European standard for
ISO 9001 certification and ISO 17065 certification

Certification Diploma N° : 13.10.003

Eurovent Certita Certification certifies that

M5-F9 Air Filters

from

VENFILTER Ventilacion y Filtracion S.L.

Located at
De la Terra 36 - Pol. Ind. Els Bellots
8227 Terrassa - Barcelona, Spain

Trade name
VENFILTER

have been assessed according the requirements of following standard
OM-11-2016


All products inside this defined scope are certified according to "Certify-all" principle

The list of certified products is displayed at :
<http://www.eurovent-certification.com>

VENFILTER Ventilacion y Filtracion S.L.
Is authorised to use the EUROVENT CERTIFIED PERFORMANCE mark
In accordance with the rules specified in the Operational Manual
OM-11-2016

Erick MELQUIOND
President

Approval date : 2013/10/08
Re-checked on : 2016/03/22
Valid until : 2017/05/31



Doc version: Prod 5.0.0 08/01/2016



FIL / AIR FILTER	13.10.003	MV242412F9 (592X592X292)	F9	140	80	B
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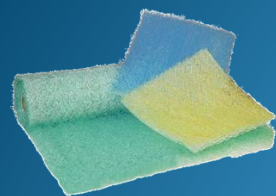
Referencias

Referencia	Modelo	Dimensiones H x B x P	Clase EN 779	Caudal Nominal (m3/h)	INICIAL Pa	V. Unitario (m3)	Peso (kg)	ME* %	Clas. Energ.	Cons. Energ. Kwh/ Año
MV242412F9	MV	592x592x292	F9	3400/4250	140/175	0,11	5	80	B	1900



CLASE G - PREFILTROS

Para filtración de partículas de 10 micras



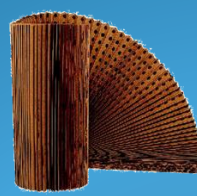
Faint Stop / Glass-Oil

Rolls y Paneles de Fibra de vidrio
Autoextinguible
Clase EN779 : G2, G3, G4



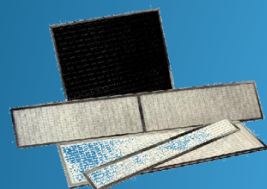
Manta Filtrante

Rolls y Paneles de Fibra Sintética
Autoextinguible
Clase EN779 : G2, G3, G4, M5



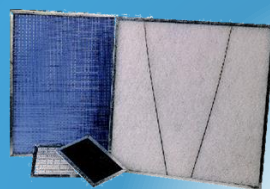
Andreae

Cartón Plegado, Perforado
Color: Blanco y Marrón
Clase EN779 : G4



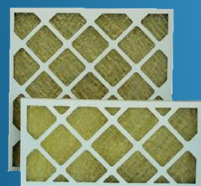
Marcos Fan-Coil

Marco Galvanizado, Paneles Desechables
Fibra Sintética / Espuma de Poliuretano
Ancho Máximo: 230mm
Clase EN779 : G2, G3, G4



Marcos Metálicos

Marco Galvanizado
Paneles Desechables / Paneles Recambiables
Fibra Sintética / Espuma de Poliuretano
Clase EN779 : G2, G3, G4



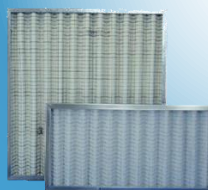
Packven

Marcos de Cartón
Paneles Desechables
Fibra de Vidrio / Fibra Sintética
Clase EN779: G2, G3, G4



Quebraven Carton

Marcos de Cartón
Panel Desechable de
Superficie Quebrada
Clase EN779: G4



Quebraven Metálico

Marco Galvanizado
Panel Desechable de
Superficie Quebrada
Clase EN779: G4



Bag-Synthetic

Marco Galvanizado y Plástico
Filtro de Bolsas en Fibra Sintética
Clase EN779: G4, M5

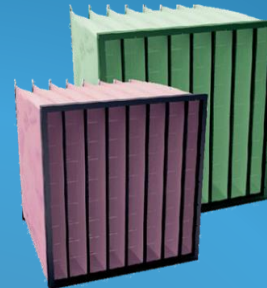


Quebraven Marco Plástico

Marco Plástico
Panel Desechable de Superficie Quebrada.

CLASE M y F - MEDIA ALTA EFICACIA

Para filtración de partículas de 1 micra



Bio-Bag

Marco Galvanizado
Filtro de Bolsas en Fibra Sintética
Bolsas: Termo Soldadas / Cosidas
Clase EN779 : M6, F7, F8



Bag-Glass

Marco de Galvanizado
Filtro de Bolsas en Fibra de vidrio
Bolsas Termo Soldadas
Clase EN779 : M6, F7, F8, F9



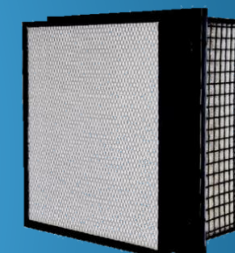
Multiven

Marco de Plástico
Filtro de Bolsas Rígido
Gran superficie filtrante, Incinerable
Clase E779 : M6, F7, F8, F9



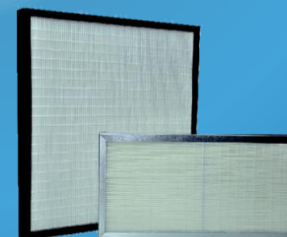
Poliven

Marco Galvanizado
Gran Superficie filtrante
Grandes Caudales
Profundidades: 292/400MM
Clase EN779 : M6, F7, F8



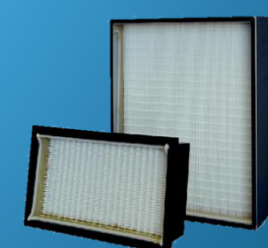
Varipac Compact/F6

Marco Plástico
Prefiltro + Alta Eficacia
Profundidad 130+292mm.
Clase EN 779 : (G4 e M6)
+ (F7,F8 y F9)



Varipleat

Marco Plástico / Marco Galvanizado
Compacto
Sistema de Mini Plegue
Separadores con Cola Termoplástica
Profundidades: 48/96mm
Clase EN779 : M6, F7, F8, F9

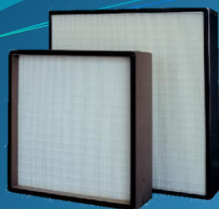


Varipac

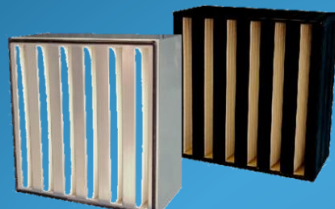
Marco de Plástico con Brida / Marco Galvanizado
Sistema de Mini Plegue
Separadores con Cola Termoplástica
Profundidades: 135/190/292mm
Clase EN779 : M6, F7, F8, F9

CLASE E, H y U - ABSOLUTOS Y FLUJO LAMINAR

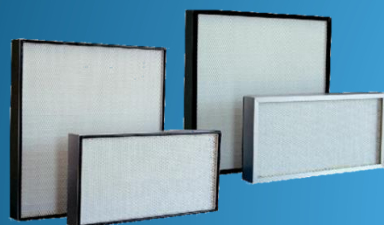
Para filtración de partículas de 0,15 a 0,3 micras (MPPS)



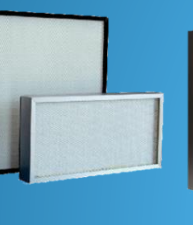
MICROVEN y ASTROVEN
Marco Galvanizado / Marco MDF
Sistema de Mini Plegue
Separadores con Cola Termoplástica
Clase EN1822 : E10, H13, H14



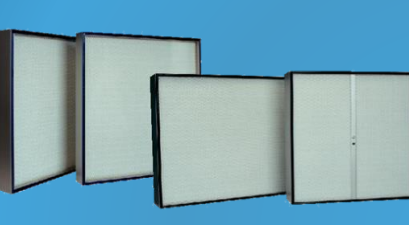
POLIVEN
Marco Galvanizado / Marco de Plástico
Alta Capacidad / Forma Multididrica
Sistema de Mini Plegue
Separadores con Cola Termoplástica
Clase EN1822 : E10, H13, H14



LAMINARVEN
Marco de Perfil de Aluminio
Flujos Unidireccionales
Flejos Laminares
Junta de Poliuretano
semicircular continua
Profundidades: 69/90/110mm
Clase EN1822 : E10, H13,
H14, U15, U16



LAMINARVEN
Marco de Perfil de Aluminio
Junta de Neopreno
Profundidades: 78mm
Clase EN1822 : H13, H14



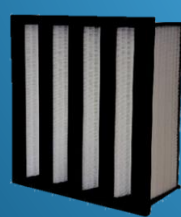
LAMINARVEN GEL
Marco de Perfil de Aluminio
Junta de Gel
Profundidades: 78/104mm
Clase EN1822 : H14, U15

BLOQUE TERMINAL
Marco de Perfil de Aluminio
Profundidades: 125/150mm
Clase EN1822 : H14, U15

ALTA TEMPERATURA



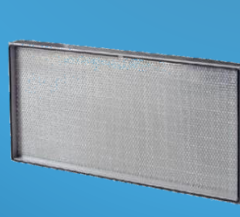
GOREBRAVEN HT
Marco Galvanizado
Papel Glass-Cable
Gr. Superficie Quebrada
Temperatura: 300°
Clase EN779 : G4



MULTIVEN HT
Marco de Policarbonato
Filtro de bolsas Rígido
Gr. Superficie filtrante-Incinerable
Temperatura: 125°
Clase EN779 : M6, F7, F8 y F9

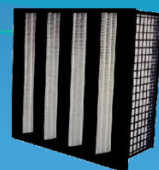


POLIVEN HT
Marco Galvanizado,
Gran superficie Filtrante,
Temperatura: 135°
Clase EN 779 : M6,
F7, F8 y F9

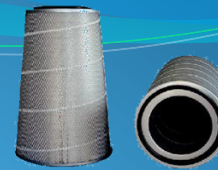


VARIVEN HT
Marco Galvanizado/ Marco Aluminio,
Separadores de Aluminio/ Separador
de Papel de Fibra de Vidrio,
Profundidades 55, 78, 150 y 292 mm,
Temperatura: 350°
Clase EN 779 : M6, F7, F8

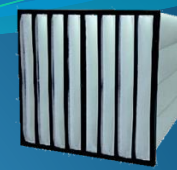
FILTROS DE AIRE PARA MOTORES Y TURBINAS



MULTIVEN TG
Marco Plástico
Rejillas de Refuerzo Salida de Aire
Filtro de Bolsas Rígido
Compacto, Incinerable
Clase EN1822 : M6, F7, F8, F9, E10



CARTUCHO TURBINA
Admisión de Aire de Turbinas de Gas
Filtro Autolimpiable de Alta Eficacia
Mezcla fibras Celulósicas
y Sintéticas Impregnadas
Clase EN1822 : F9 y E10

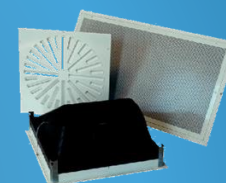


V-60
Marco Frontal de Polietileno,
Bolsas termosoldadas, Integradas
en el Marco,
Medio filtrante Poliéster Progresivo,
Clase EN1822 : M6

EQUIPAMIENTOS



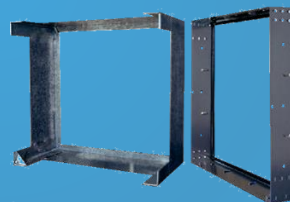
HOUSING METALICO
Difusor Techo Acero Pintado Epoxy RAL 9010
Filtros Recambiables Laminarven



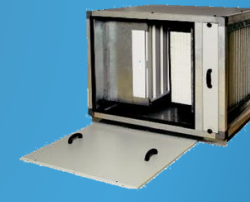
HOUSING PLASTICO
Difusor Techo en Poliestireno
Filtros Recambiables Laminarven



MÓDULO TERMINAL
Difusor de Techo con Ventilador Integrado,
Filtros Recambiables Laminarven



BASTIDORES
Marcos Galvanizado / Inox,
Portafiltros Prefiltros/ Media y Alta Eficacia
Portafiltros Filtros Absolutos.



INTERCALADOR DE CONDUCTO
Unidades de Filtración para
intercalar en Conducto
Con Ventilador / Sin ventilador



CAJON INDIVIDUAL PARA CAMBIO HIGIENICO
Contenedor Portafiltros,
Chapa de Acero Galvanizado, Ral 9010
Dispositivo Apriete Automático para el Filtro,
Dispositivo Prueba Estanqueidad.

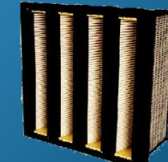
DESODORIZACIÓN



POLICARB
Marco Galvanizado en forma de "V"
Poliédrico con Paneles de carbón Activo,
Rejillas de Protección,
Carbon Granulado.



SOPORTE - CARTUCHOS
Pletina de Acero Galvanizado,
Cartucho Cilindrico de
Carbon Activo
Fijación rápida a Bayoneta



MULTICARB
Marco de Plástico,
Cable soldado, Filtración Activa
Eficacia y Molander, Incinerable,
Clase EN779 : F7



VENFILTER estabelecida em 1992

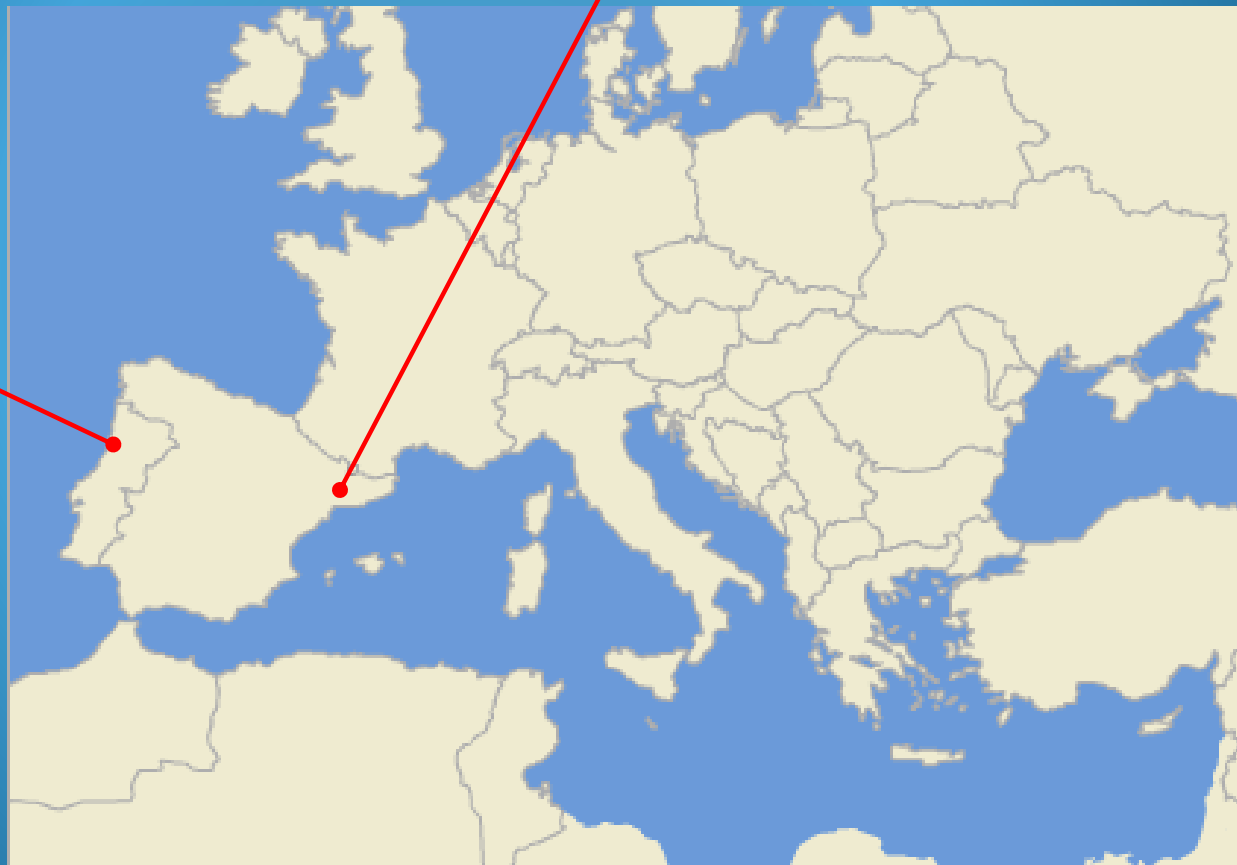
Criação marca VENFILTER em 1995

Certificação ISO 9001 em 2002

Nova linha de produção em 2012

Certificação Eurovent em 2013

VENFILTER / CLIFILTRA em 2015



VENFILTER...& ... CLIFILTRA os parceiros para o sucesso



Redução de Custos



Soluções Orientadas para o Cliente



Ambiente



Eficiência Energética





OBRIGADO