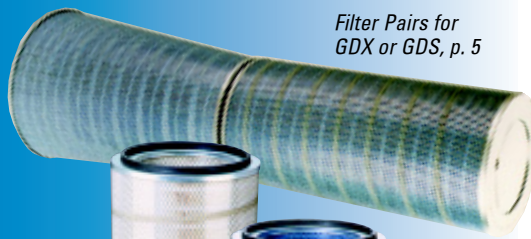


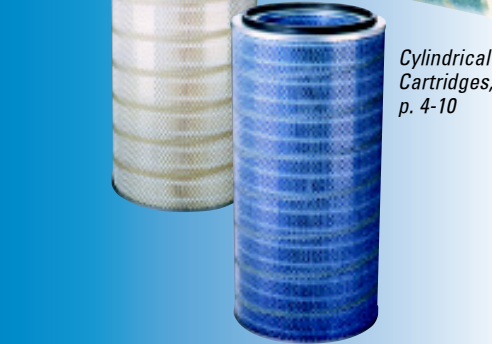


Donaldson Replacement Filters & Spare Parts Catalog

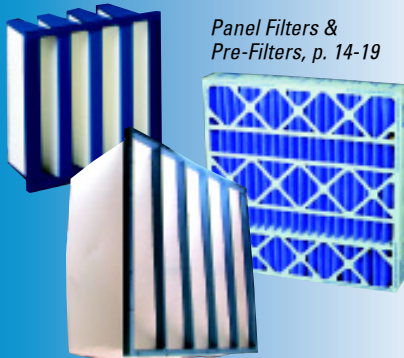
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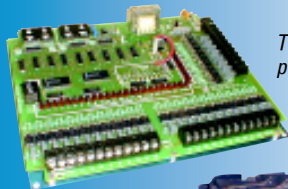
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Pulstar is a tradename of American Air Filter.
Pneuma-Pulse is a tradename of Pneumafil Co.
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NEW in this catalog:

- ☒ Spider-Web®XP Extra Performance media in cartridge & panel filters, page 27
- ☒ More filters sized for competitors' systems, pages 8-9
- ☒ XLR filtration systems with PowerCore® panels, page 19
- ☒ Optional corrosion-resistant filters with stainless steel liners & endcaps, pages 5, 6, 7
- ☒ Donaldson-identified merchandise...jackets, caps, shirts, golfballs, flashlights, and other fun items, page 36

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Donaldson Air Filters Sorted by Shape & Size

Choose Filter Media for the Performance You Need

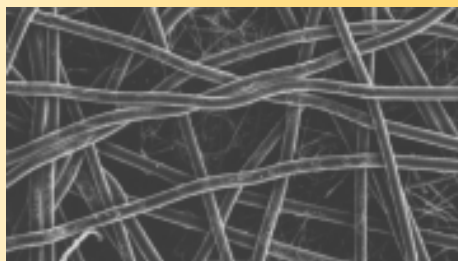
Duratek™

Our special blend of man-made and natural fibers designed to resist moisture. Perfect for high humidity conditions, especially when used as a substrate with Spider-Web® nanofibers.



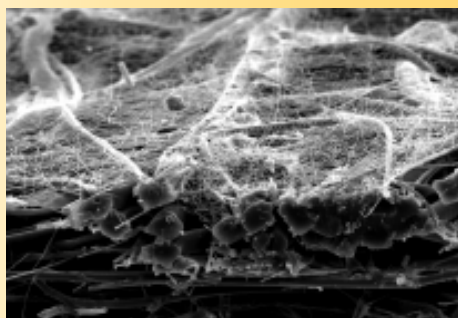
Synthetic

Man-made fibers with superior dust-holding capacity, our synthetic media is sturdy, durable, and moisture resistant. Best filtration performance in most cases, especially when used as a substrate with Spider-Web® nanofibers.



Donaldson Spider-Web®

High filtration performance can significantly increase turbine output! Developed & patented by Donaldson, Spider-Web® consists of a 'web' of nanofibers bonded over a substrate of Donaldson filter media (synthetic, Duratek, or cellulose). By capturing more particles in the 0-2µm size than any other media available, Spider-Web® helps reduce compressor blade fouling and thereby increase turbine output. [Read the full story on pages 25 - 27.](#)



If your operation needs extra performance, choose Donaldson filters with **Spider-Web®XP** media. It significantly reduces compressor fouling! [Photos and information on page 27.](#)

Pre-Filters

Length/Style	Media	Part No.	Page
22" Pre-Filter Wrap	poly	P19-1005	13
24" Sq Metal Panel	G4, Metal Mesh	P19-1752	14
24" Sq Panel	G4 with metal frame	P03-0171	14
24" Sq Panel	G4 LM6000 Guard Filter	P03-0228	14
24" Sq Panel	G4 in Bev-Bd frame	P19-1249	14
24" Sq Pocket Filter	G4	P03-0204	16
26" Pre-Filter Wrap	poly	P19-0978	13
26" Pre-Filter Wrap	poly	P19-0979	13
28" Pre-Filter Wrap	poly	P19-1992	13
30" Pre-Filter Wrap	poly	P19-1502	13
34" Pre-Filter Wrap	poly	P19-1592	13
36" Pre-Filter Wrap	poly	P19-1939	13
Rectangle Pre-Filter	poly	P03-0195	14
Rectangle Pre-Filter	G4	P19-1995	14

Panel Filters

Length/Style	Media	Part No.	Page
20" Sq Panel	Cellulose	P14-6555	15
20" Sq Panel	Cellulose	P14-6555	15
20" Sq Panel	Fiberglass	P53-4557	15
20" x 7" Round Panel	PowerCore/Spider-Web	P19-1988	18
24" Sq Panel	PowerCore/Spider-Web	P19-1334	17
24" Sq Panel	PowerCore/Spider-Web	P19-1358	17
24" Sq Panel	PowerCore/Synthetic	P19-1705	17
24" Sq Panel	PowerCore/Synthetic	P19-1708	17
24" Sq Panel	PowerCore/Spider-Web	P19-1751	17
24" Sq Panel	PowerCore/Spider-Web	P19-1968	17
24" Sq Pocket Filter	F6	P03-0205	16
24" Sq Pocket Filter	F7	P03-0256	16
24" Sq Pocket Filter	F5	P03-0257	16
24" x 12" Panel	PowerCore/Synthetic	P19-1774	17
27" Round Panel	PowerCore/Spider-Web	P03-0001	18
2x4 Panel	Duratek/Spider-Web	P19-1596	16
2x4 Panel	Synthetic/Spider-Web	P19-1748	16
Slim VeePac	Cellulose	P12-5310	15
XLR Front Panel	Duratek/Spider-Web	P03-0085	19
XLR Front Panel	Synthetic/Spider-Web	P03-0190	19
XLR Front Panel	Spider-Web XP	P03-0206	19
XLR Rear Panel	Duratek/Spider-Web	P03-0086	19
XLR Rear Panel	Synthetic/Spider-Web	P03-0191	19
XLR Rear Panel	Spider-Web XP	P03-0207	19

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Donaldson Air Filters Sorted by Shape & Size

Cartridge Filters

Length/Style	Media	Part No.	Page
22" Cylin + wrap	Duratek/Spider-Web	P19-1399	6
22" Cylin + wrap	Cellulose	P19-1595	6
22" Cylin + wrap	Synthetic	P19-1744	6
22" Cylin + wrap	Duratek	P19-1789	6
22" Cylindrical	Synthetic	P03-0229	6
22" Cylindrical	Duratek/Spider-Web	P03-0230	6
22" Cylindrical	Synthetic/Spider-Web	P19-0949	6
22" Cylindrical	Cellulose	P19-1006	6
22" Cylindrical	Synthetic	P19-1031	6
22" Cylindrical	Duratek	P19-1234	6
22" Cylindrical	Duratek/Spider-Web	P19-1310	6
22" Cyn (Pulstar)	Synthetic	P03-0071	9
22" Cyn (Pulstar)	Synthetic/Spider-Web	P19-1782	9
26" CFS Inner	poly	P19-0844	10
26" CFS Inner	poly	P19-0847	10
26" CFS Inner	man-made fiber	P19-5778	10
26" CFS Outer	Synthetic/Spider-Web	P03-0050	10
26" CFS Outer	Synthetic/Spider-WebXP	P03-0065	10
26" CFS Outer	Synthetic	P03-0067	10
26" CFS Outer	Synthetic/Spider-Web	P03-0252	10
26" CFS Outer	Synthetic/Spider-Web	P19-0848	10
26" CFS Outer	Synthetic/Spider-Web	P19-1469	10
26" CFS Set	Synthetic	P03-0227	10
26" CFS Set	Synthetic/Spider-Web	P19-0856	10
26" CFS Set	Synthetic/Spider-Web	P19-1129	10
26" Conical	Synthetic/Spider-Web	P03-0034	5
26" Conical	Spider-Web XP	P03-0151	5
26" Conical	Spider-Web XP	P03-0158	5
26" Conical	Duratek	P03-0169	5
26" Conical	Synthetic	P03-0173	5
26" Conical	Spider-Web XP	P03-0175	5
26" Conical	Duratek/Spider-Web	P03-0178	5
26" Conical	Cellulose	P19-1039	5
26" Conical	Synthetic	P19-1107	5
26" Conical	Synthetic/Spider-Web	P19-1150	5
26" Conical	Synthetic/Spider-Web	P19-1178	5
26" Conical	Duratek	P19-1238	5
26" Conical	Duratek/Spider-Web	P19-1281	5
26" Conical	Synthetic/Spider-Web	P19-1619	5
26" Conical	Synthetic	P19-1773	5
26" Conical	Duratek/Spider-Web	P19-1962	5
26" Conical	Duratek	P19-9711	5
26" Conical (Braden)	Duratek	P03-0243	8
26" Conical (Braden)	Duratek/Spider-Web	P03-0244	8
26" Conical (Braden)	Synthetic	P03-0245	8
26" Conical (Braden)	Synthetic/Spider-Web	P03-0246	8
26" Conical Set/GDS-II	Synthetic/Spider-Web	P77-7171 &2	4
26" Conical Set/GDS-II	Duratek/Spider-Web	P77-8230 &1	4
26" Cylin + wrap	Synthetic	P03-0165	5,7

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26" Cylindrical	Spider-Web XP	P03-0025	5,7
26" Cylindrical	Spider-Web XP	P03-0166	5,7
26" Cylindrical	Duratek	P03-0168	5,7
26" Cylindrical	Synthetic	P03-0172	5,7
26" Cylindrical	Spider-Web XP	P03-0174	5,7
26" Cylindrical	Duratek/Spider-Web	P03-0179	5,7
26" Cylindrical	Synthetic	P03-0192	5,7
26" Cylindrical	Synthetic	P19-1033	5,7
26" Cylindrical	Cellulose	P19-1037	5,7
26" Cylindrical	Synthetic/Spider-Web	P19-1149	5,7
26" Cylindrical	Synthetic/Spider-Web	P19-1177	5,7
26" Cylindrical	Duratek	P19-1236	5,7
26" Cylindrical	Duratek/Spider-Web	P19-1280	5,7
26" Cylindrical	Synthetic/Spider-Web	P19-1607	5,7
26" Cylindrical	Synthetic/Spider-Web	P19-1701	5,7
26" Cylindrical	Synthetic	P19-1772	5,7
26" Cylindrical	Duratek/Spider-Web	P19-1961	5,7
26" Cylindrical	Duratek	P19-9710	5,7
27" Flange-Top	Duratek/Spider-Web	P19-1261	8
27" Flange-Top	Duratek	P19-1295	8
27" Flange-Top	Duratek/Spider-Web	P19-1731	8
27" Flange-Top	Synthetic/Spider-Web	P19-1754	8
27" Flange-Top	Synthetic/Spider-WebXP	P19-1788	8
27" Flange-Top	Cellulose	P19-1937	8
28" Twist-Lock	Duratek/Spider-Web	P19-1964	9
28.25" Cyn (Pulstar)	Duratek/Spider-Web	P03-0183	9
28.25" Cyn (Pulstar)	Duratek/Spider-Web	P03-0184	9
28.25" Cyn (Pulstar)	Synthetic/Spider-Web	P03-0253	9
28.25" Cyn (Pulstar)	Synthetic/Spider-Web	P03-0254	9
29" Cylindrical	Duratek	P19-1617	7
30" Cylin + wrap	Duratek/Spider-Web	P19-1713	7
30" Cylin + wrap	Cellulose	P19-1726	7
30" Cylin + wrap	Duratek	P19-1790	7
30" Cylindrical	Cellulose	P19-1461	7
30" Cylindrical	Duratek	P19-1462	7
30" Cylindrical	Duratek/Spider-Web	P19-1463	7
34" Twist-Lock	Cellulose	P19-1581	9
34" Twist-Lock	Duratek	P19-1587	9
34" Twist-Lock	Duratek/Spider-Web	P19-1589	9
34" Twist-Lock	Synthetic	P19-1949	9
34" Twist-Lock + wrap	Duratek/Spider-Web	P19-1738	9
34.5" Cyn (Pulstar)	Duratek	P03-0064	9
34.5" Cyn (Pulstar)	Synthetic	P03-0072	9
34.5" Cyn (Pulstar)	Synthetic/Spider-Web	P19-1781	9
34.5" Cyn (Pulstar)	Duratek	P03-0070	9
36" Cylindrical	Duratek/Spider-Web	P19-1767	7
Cylindrical	Oil Mist Eliminator Element	P15-7523	14

26" Filter Pairs for GDX & GDS (1 Cylindrical & 1 Conical)

28" GDS-II Filter Pairs (2 Conicals)

In the Donaldson GDS-II Air Inlet Static Filtration Systems that we provide in Europe and Asia, two conical filters are paired and mounted horizontally to provide superior turbine protection, low pressure drop, and long service life.



Features

- High performance media to fit specific operating conditions
 - Ruggedly constructed for long life
 - Can be individually boxed or bulk packed on a pallet.....your choice.
- The smaller of the GDS-II cone pair is nested inside the larger for volume efficiency in shipping.

Construction

- Shape: conical (both)
- Liners & Endcaps: Galvanized
- Gasket: Seamless urethane

Part Numbers

Each set contains 1 large & 1 small conical filter

P77-7171 & P77-7172

Synthetic/Spider-Web

P77-8230 & P77-8231

Duratek/Spider-Web

Dimensions

Small Cone

Large end OD 17½"/446mm

Small end OD 12¾"/324mm

Length 28"/711mm

Large Cone

Large end OD 22¾"/571mm

Small end OD 17½"/446mm

Length 28"/711mm

In the Donaldson GDX Air Inlet Self-Cleaning (pulsed) and GDS (static) Filtration Systems, one conical and one cylindrical filter are paired and mounted horizontally to provide superior turbine protection. The conical + cylindrical pair is typically in systems Donaldson supplies in the Americas and Asia.

Features

- Many high performance choices, including our exclusive high performance Spider-Web and new Spider-WebXP nanofiber media.
- Can be individually boxed or bulk packed on a pallet.....your choice.

Sturdy Construction

- Pleats: To maintain maximum filtering surface: (a) pleats are held in place with hot melt spiral beading inside and outside, (b) our patented Pleatloc™ technique prevents media bunching.
- Liners & Endcaps: Galvanized metal or stainless steel (see Part Number list)
- Gasket: Seamless urethane

Typically Used In:

- GDX Pulse-Cleaned and GDS Static Filter Systems in the Americas

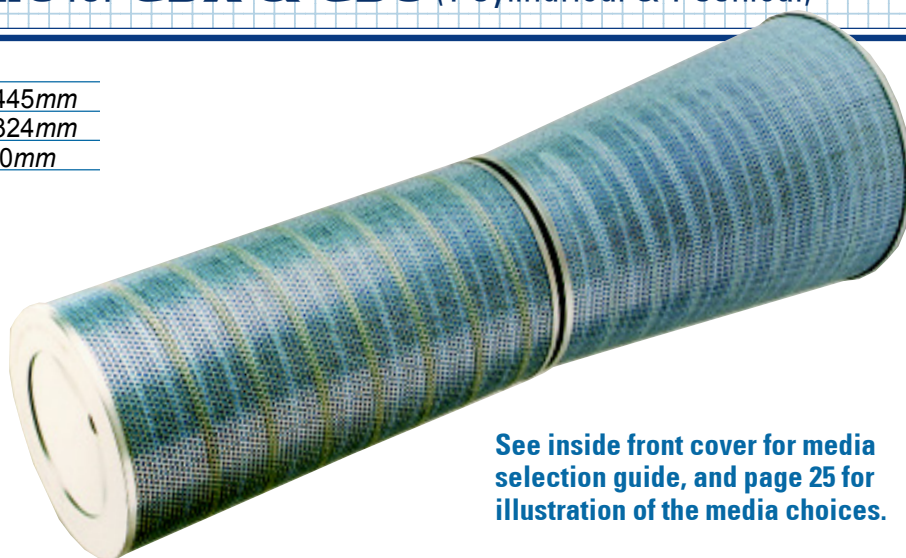


26" Filter Pairs for GDX & GDS (1 Cylindrical & 1 Conical)

Dimensions	Cylinder	Cone
Large end OD	12¾"/324mm	17½"/445mm
Small end OD	12¾"/324mm	12¾"/324mm
Length	26"/660mm	26"/660mm

Find Related Parts:

- Element retention hardware - pg 11
- Pre-filter wraps - pg 13
- Filters that fit Braden, Pneumafil AAF and other non-Donaldson systems - pg 9
- Explanation of "flame retardant" media - pg 23



See inside front cover for media selection guide, and page 25 for illustration of the media choices.

Part Numbers (sorted by Media)

Part No.	Shape	Media	Liner & Endcap Metal*	Pairs With
P03-0174	Cylindrical	Spider-Web XP	SS inner liner & endcaps	P03-0175
P03-0175	Conical	Spider-Web XP	SS inner liner & endcaps	P03-0174
P03-0166	Cylindrical	Spider-Web XP	SS inner liner	P03-0158
P03-0158	Conical	Spider-Web XP	SS inner liner	P03-0166
P03-0025	Cylindrical	Spider-Web XP	Galvanized	P03-0151
P03-0151	Conical	Spider-Web XP	Galvanized	P03-0025
P19-1177	Cylindrical	Synthetic/Spider-Web	Galvanized	P19-1178
P19-1178	Conical	Synthetic/Spider-Web	Galvanized	P19-1177
P19-1149	Cylindrical	Synthetic/Spider-Web Treated for Flame Retardancy*	Galvanized	P19-1150
P19-1150	Conical	Synthetic/Spider-Web Treated for Flame Retardancy*	Galvanized	P19-1149
P19-1619	Conical	Synthetic/Spider-Web	SS inner liner	P19-1701
P19-1701	Cylindrical	Synthetic/Spider-Web	SS inner liner	P19-1619
P19-1607	Cylindrical	Synthetic/Spider-Web	SS inner liner & endcaps	P03-0034
P03-0034	Conical	Synthetic/Spider-Web	SS inner liner & endcaps	P19-1607
P19-1033	Cylindrical	Synthetic	Galvanized	P19-1107
P03-0165	Cylindrical	P19-1033 with wrap installed	Galvanized	
P19-1107	Conical	Synthetic	Galvanized	P19-1033
P03-0192	Cylindrical	Synthetic	SS inner liner & endcaps	
P03-0173	Conical	Synthetic	SS liners & endcaps	
P19-1772	Cylindrical	Synthetic	SS inner liner	P19-1773
P19-1773	Conical	Synthetic	SS inner liner	P19-1772
P03-0178	Conical	Duratek/Spider-Web	SS liners & galv. endcaps	P03-0179
P03-0179	Cylindrical	Duratek/Spider-Web	SS liners & endcaps	P03-0178
P19-1961	Cylindrical	Duratek/Spider-Web	SS inner liner	P19-1962
P19-1962	Conical	Duratek/Spider-Web	SS inner liner	P19-1961
P19-1280	Cylindrical	Duratek/Spider-Web	Galvanized	P19-1281
P19-1281	Conical	Duratek/Spider-Web	Galvanized	P19-1280
P03-0168	Cylindrical	Duratek	SS liners & endcaps	P03-0169
P03-0169	Conical	Duratek	SS liners & galv. endcaps	P03-0168
P19-9710	Cylindrical	Duratek	SS inner liner	P19-9711
P19-9711	Conical	Duratek	SS inner liner	P19-9710
P19-1236	Cylindrical	Duratek	Galvanized	P19-1238
P19-1238	Conical	Duratek	Galvanized	P19-1236
P19-1037	Cylindrical	Cellulose	Galvanized	P19-1039
P19-1039	Conical	Cellulose	Galvanized	P19-1037

* Media is self-extinguishing. See page 23 for full explanation.

Abbreviations: SS = stainless steel. Galv = galvanized metal.

22"-Long Cylindrical Filter Cartridges



Features

- Available in wide choice of media to fit specific operating conditions
- Ruggedly constructed for long life
- Can be individually boxed or bulk packed on a pallet.....your choice.
- Available with pre-filter wraps already installed (see part number list below).

Typically Used In:

- S&S LM2500, LM5000, LM6000 Static Air Filter Systems
- TTD on Solar Turbines
(filters are mounted vertically)

Construction

- Shape: cylindrical
- Pleats: To maintain maximum filtering surface: (1) our patented Pleatloc™ technique maintains uniform spacing and (2) pleats are held in place with hot melt spiral beading inside and outside.
- Liners: Expanded metal, either galvanized or stainless steel (see PN list below)
- Endcaps: Galvanized metal with filter media potted in plastisol
- Gasket: Seamless urethane

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Filter Part Numbers (sorted by Media)

Part No.	Media	Liner & Endcap Metal
P19-0949	Synthetic/Spider-Web	Galvanized
P19-1031	Synthetic	Galvanized
P19-1744	Synthetic	With pre-filter wrap installed
P03-0229	Synthetic	SS inner liner & galv. endcaps
P19-1310	Duratek/Spider-Web	Galvanized
P19-1399	Duratek/Spider-Web	With pre-filter wrap installed
P03-0230	Duratek/Spider-Web	SS inner liner & galv. endcaps
P19-1234	Duratek	Galvanized
P19-1789	P19-1234 with wrap installed	
P19-1006	Cellulose	Galvanized
P19-1595	Cellulose	With pre-filter wrap installed

Note: SS = stainless steel

Accessories

P19-1005	22" Poly Pre-Filter Wrap**	Packaged 30 per box
P52-4742	Crank (swage end)	Carbon Steel retention hardware
P13-5249	Crank for Quick Nut	Carbon Steel retention hardware
P19-0717	Crank for Quick Nut	SS Retention hardware

** Wraps are generally not recommended for use in pulse-clean systems
...read why on page 13.

Photos of cranks are on page 11

Dimensions

Diameter OD	12¾"/324mm
Diameter ID	8.38"/213mm
Length	22"/559mm

See inside front cover for media selection guide, and page 25 for illustration of the media choices.



TTD self-cleaning air filter protects a Solar turbine in the hot, arid, dusty environment in Nevada USA.

26" to 36"-Long Cylindrical Filter Cartridges

Features

- Available in broad choice of media to fit specific operating conditions.
- Can be individually boxed or bulk packed on a pallet....your choice.

Construction

- Shape: cylindrical
- To maintain full surface availability over the life of the filter, uniform pleat spacing is maintained with Donaldson's patented Pleatloc™ technique, and held in place with hot melt spiral beading on the tips.
- Liners: Expanded metal, either galvanized or stainless steel (see list below)
- Endcaps: Galvanized metal with fiber media potted in plastisol
- Gasket: Seamless urethane

Typically Used In:

- GDX (filters mounted horizontally)
- GDS (filters mounted horizontally)
- TTD(filters mounted vertically)



Dimensions	Diameter OD	Diameter ID	Length
	12 3/4"/324mm	8.38"/213mm	see list below

Part Numbers (sorted by Length & Media)

Part No.	Length	Media	Comments
P03-0025	26"/ 660mm	Spider-Web XP	Galvanized liners
P03-0166	26"/ 660mm	Spider-Web XP	SS inner liner
P03-0174	26"/ 660mm	Spider-Web XP	SS inner liner & endcaps
P19-1177	26"/ 660mm	Synthetic/Spider-Web	Use alone (TTD) or mate to P19-1178 (GDX/GDS)
P19-1607	26"/ 660mm	Synthetic/Spider-Web	SS liners & endcaps
P19-1701	26"/ 660mm	Synthetic/Spider-Web	SS inner liner. Use alone (TTD) or mate to P19-1619 (GDX)
P19-1149	26"/ 660mm	Synthetic/Spider-Web	Use alone (TTD) or mate to P19-1150 (GDX)
		Treated for Flame Retardancy	
P19-1772	26"/ 660mm	Synthetic	SS inner liner
P03-0172	26"/ 660mm	Synthetic	SS end caps/liner
P19-1033	26"/ 660mm	Synthetic	Use alone (TTD) or mate to P19-1107 (GDX/GDS)
P03-0192	26"/ 660mm	Synthetic	SS inner liner & endcaps
P19-1772	26"/ 660mm	Synthetic	SS inner liner
P03-0179	26"/ 660mm	Duratek/Spider-Web	SS liners & endcaps
P19-1961	26"/ 660mm	Duratek/Spider-Web	SS inner liner
P19-1280	26"/ 660mm	Duratek/Spider-Web	Use alone (TTD) or mate to P19-1281 (GDX/GDS)
P03-0168	26"/ 660mm	Duratek	SS liners & endcaps
P19-9710	26"/ 660mm	Duratek	SS inner liner
P19-1236	26"/ 660mm	Duratek	Use alone (TTD) or mate to P19-1238 (GDX/GDS)
P19-1037	26"/ 660mm	Cellulose	Use alone (TTD) or mate to P19-1039 (GDX/GDS)
P19-1617	29"/ 737mm	Duratek	
P19-1463	30"/ 762mm	Duratek/Spider-Web	
P19-1713	30"/ 762mm	Duratek/Spider-Web	Set: P19-1463 with pre-filter wrap installed
P19-1462	30"/ 762mm	Duratek	
P19-1790	30"/ 762mm	Duratek	Set: P19-1492 with pre-filter wrap installed
P19-1461	30"/ 762mm	Cellulose	
P19-1726	30"/ 762mm	Cellulose	Set: P19-1461 with pre-filter wrap installed
P19-1767	36"/ 914mm	Duratek/Spider-Web	

Notes: SS = stainless steel.

Pre-filter wraps for these cartridges are listed on page 13.

Element retention hardware is listed on page 11.

Cartridge Filters for Non-Donaldson Systems

16"-Diameter Conical For Braden Cartridge Systems

When replacing cylindrical/conical pairs in your Braden filtration system, choose from among four high-performance Donaldson filter media! These replacement elements are sized to fit Braden systems: 16" OD diameter at the large end and 26" long. They pair with our 26"-long cylindrical filters listed on pages 5 & 7.



- Filter media choices to accommodate your specific operating conditions.
- Constructed to ensure high filter performance: Donaldson Pleatloc™, and hot melt spiral beading, both inside and outside the filter.
- Galvanized metal endcaps and liners for long, corrosion-resistant life.

Dimensions

Large end OD	16"/406mm
Small end OD	12¾"/324mm
Length	26"/660mm

Conical Filters for Braden Systems

Part No.	Media
P03-0243	Duratek
P03-0244	Duratek/Spider-Web
P03-0245	Synthetic
P03-0246	Synthetic/Spider-Web
P03-0270	Synthetic/Spider-Web XP

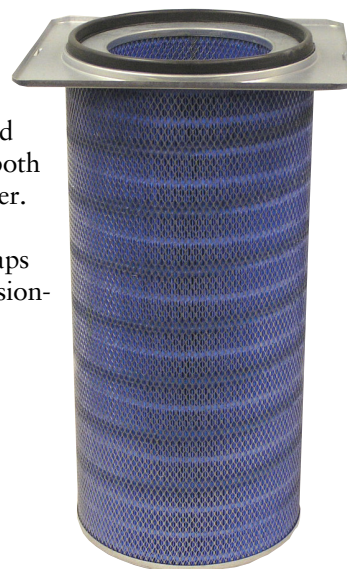
Cylindrical filters to pair with these are listed on page 7.
Pre-Filter Wraps are listed on page 13.

Flange-Top Cartridge For Farr Tenkay Systems

Our flanged replacement filters let you put the superior quality and performance of Donaldson-made filter cartridges into a Farr Tenkay-GT system.

Although a direct replacement in form and fit, these filters have features added for improved performance, including:

- Choice of media.
See list below.
- Constructed to ensure high filter performance: Donaldson Pleatloc™, and hot melt spiral beading, both inside and outside the filter.
- Galvanized metal endcaps and liners for long, corrosion-resistant life.



Dimensions

Diameter OD	12¾"/324mm
Length	27"/686mm *
*except P191731, which is 40" long	

Flange-Top Filters

Part No.	Media
P19-1788	Synthetic/Spider-WebXP
P19-1754	Synthetic/Spider-Web
P19-1261	Duratek/Spider-Web
P19-1731	Duratek/Spider-Web (40" long)
P19-1295	Duratek
P19-1937	Cellulose
P19-0978	27" Pre-filter wrap

See inside
front cover for
media selection guide.

Cartridge Filters for Non-Donaldson Systems

Twist-Lock Cartridge For Pneuma-Pulse Systems



Now you can put the superior quality and performance of Donaldson-made filter cartridges into a Pneuma-Pulse self-cleaning air filter system by Pneumafil, with our twist-lock replacement filters.

Although they are a direct replacement in form and fit (with the twist-lock top), these filters have

many features for improved performance, including:

- Filter media choices to accommodate your specific operating conditions.
- Designed for high filter performance over time: Donaldson Pleatloc™ and hot melt spiral beading to maintain full filtering surface area.
- Galvanized metal endcaps and liners for long, corrosion-resistant life.

Dimensions

Diameter OD	12 ³ / ₄ " / 324mm
Length	34" / 864mm *

*except P191964, which is 28" / 711mm long

Twist-Lock Filters

Part No.	Media
P19-1949	Synthetic
P19-1589	Duratek/Spider-Web
P19-1964	Duratek/Spider-Web (28" / 711mm long)
P19-1738	Duratek/Spider-Web (with pre-filter wrap factory-installed)
P19-1587	Duratek
P19-1581	Cellulose
P19-1592	34" Pre-filter wrap

16"-Diameter Cartridge For AAF Pulstar Systems

AAF Pulstar inlet systems require one of two filter arrangements:



1) When the system uses vertically-mounted filters, choose the 34.5"-long replacement filter, as shown at left.

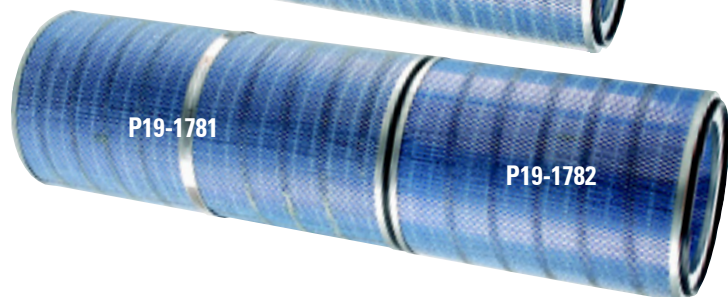
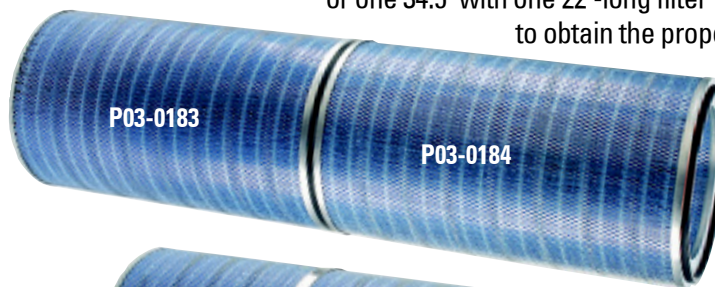
2) When filters are installed horizontally in a 'crossflow' system, pair two filters to obtain the required 56.5" total length.

To obtain the 56.5" length, use a 34.5" filter with a 22"-long filter, or two 28.25"-long filters. Both arrangements provide the same operating characteristics, but the 28.25" filters cost less and are easier to handle & install.

- Filter media choices to accommodate your specific operating conditions.
- Constructed to ensure high filter performance: Donaldson Pleatloc™, and hot melt spiral beading, both inside and outside the filter.
- Galvanized metal endcaps and liners for long, corrosion-resistant life.

Choose two 28.25"-long filters, or one 34.5" with one 22"-long filter

to obtain the proper 56.5" total length needed for your AAF Pulstar Filter House.



Filters for Pulstar Systems (OD 16" / 406 mm)

Part No.	Media	Length
P19-1781	Synthetic/Spider-Web	34.5" / 876mm
P19-1782	Synthetic/Spider-Web	22" / 559mm
P03-0072	Synthetic	34.5" / 876mm
P03-0071	Synthetic	22" / 559mm
P03-0070	Duratek	34.5" / 876mm
P03-0064	Duratek	22" / 559mm
P03-0253	Synthetic/Spider-Web	28.25" / 717mm
P03-0254*	Synthetic/Spider-Web	28.25" / 717mm
P03-0183*	DuratekSpider-Web	28.25" / 717mm
P03-0184	DuratekSpider-Web	28.25" / 717mm

* This unit has one closed endcap

Composite-Filter™ System (CFS) Replacement Filters

The Donaldson Composite-Filter™ is a two-stage filter element: an inner and an outer filter that work together as a composite design. The inner filter is made of depth-loading filter media, and the outer filter employs Donaldson's patented Spider-Web® nanofiber filter technology.

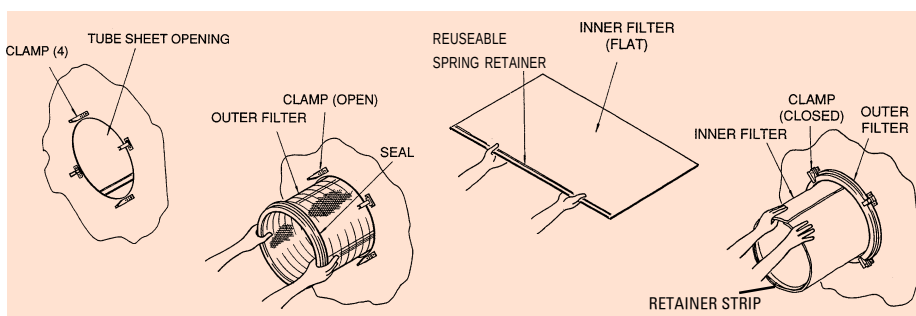
The CFS inner filter is configured as a wrap that can be installed and removed easily, held securely by a flat spring retainer. Typically changed more often than the outer filter, it is not only the first line of defense against large contaminant, it also protects the outer filter and actually extends its life. For urban environments with oily hydrocarbons, the pleated style inner filter offers more filtering surface than the standard flat style.

Construction

- Inner Filter: non-woven poly
- Outer Filter: pleated filter media
- Shape: cylindrical
- To maintain maximum filtering surface: (a) pleats are held in place with hot melt spiral beading inside and outside, (b) our patented Pleatloc™ technique prevents media bunching.
- Liners & Endcaps: Galvanized metal standard Stainless steel optional (see list below)
- Gasket: The 360° gasket and gasket stop ensure 100% sealing without over-compressing the gasket.
- Filter Retention: four over-center latches secure element into tube-sheet. Available in stainless steel or galvanized, as listed below. Photo on page 11.



LM6000 Operators: Ask for our GTS-406 brochure, which illustrates air filters, pre-filters, and hydraulic filters specially designed for LM6000's!



Pleated Inner Filter for Urban Environments

Outer Filter Dimensions

Diameter OD (w/ lip)	18¾" / 476mm
Diameter OD (w/o lip)	17½" / 446mm
Diameter ID	14" / 356mm
Length	26" / 660mm

Part Number	Length/Style	Media/Material	Comments
P03-0065	Composite Filter, outer	Synthetic/Spider-WebXP	Extra performance media
P19-0856	Composite Filter Set	Synthetic/Spider-Web	Outer filter + flat inner, w/ springretainer
P19-1129	Composite Filter Set	Synthetic/Spider-Web	Outer filter + pleated inner , w/o spring retainer
P19-0848	Composite Filter, outer	Synthetic/Spider-Web	Galvanized liners
P19-1469	Composite Filter, outer	Synthetic/Spider-Web	SS inside & outside liners
P03-0050	Composite Filter, outer	Synthetic/Spider-Web	SS outside liner
P03-0252	Composite Filter, outer	Synthetic/Spider-Web	SS outer liner & SS closed endcap
P03-0227	Composite Filter Set	Synthetic	Outer filter + flat inner filter
P03-0067	Composite Filter, outer	Synthetic	For high hydrocarbon environments
P19-5778	Composite Filter, inner	man-made fiber	Pleated. For high hydrocarbon environments
P19-0844	Composite Filter, inner	poly	Flat style, w/ spring retainer
P19-0847	Composite Filter, inner	poly	Flat style, w/o spring retainer

Accessories

P19-0883	Spring Retainer		separate from inner element, reusable
31295-01	CFS Latch	yellow zinc plated	over-center latch
31295-02	CFS Latch	stainless steel	over-center latch

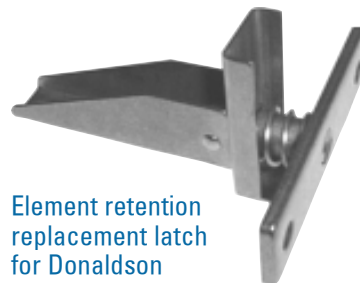
Element Retention Hardware

Retention Hardware

Part No.	Description	Comments	For Filters on Page
P77-0920	Retention Nut	for GDS-II, GDS-I, GDX	5, 8
P52-4740	Gasket, Washer	for GDS-II, GDS-I, GDX	5, 8
P52-4742	22" Crank (swage end)	carbon steel	6
P19-0806	22" Crank (swage end)	304 stainless steel	6
P15-7359	26" Crank (swage end)	carbon steel	7
AD52632-01	26" Crank (swage end)	304 stainless steel	7
P19-1501	30" Crank (swage end)	carbon steel	7
P13-5249	22" Crank for Quick Nut	carbon steel	6
P19-0717	22" Crank for Quick Nut	304 stainless steel	6
P14-9555	26" Crank for Quick Nut	carbon steel	7
56602-01	26" Crank for Quick Nut	304 stainless steel	7
P19-1500	30" Crank for Quick Nut	carbon steel	7
24767-00	Quick Nut Assembly	for TTD's	6
31295-01	CFS over-center latch	galvanized steel	10
31295-05	CFS over-center latch	stainless steel	10
P19-0883	CFS Spring Retainer	secures CFS inner filter	10
53791-02	GDX Yoke Bolt Kit	304 stainless steel	5
53501-02	GDX Yoke Leg Set	304 stainless steel	5
53501-01	GDX Yoke Leg Set	steel with zinc flo-coat	5
67009	Retention Clip	for PowerCore square filters	17

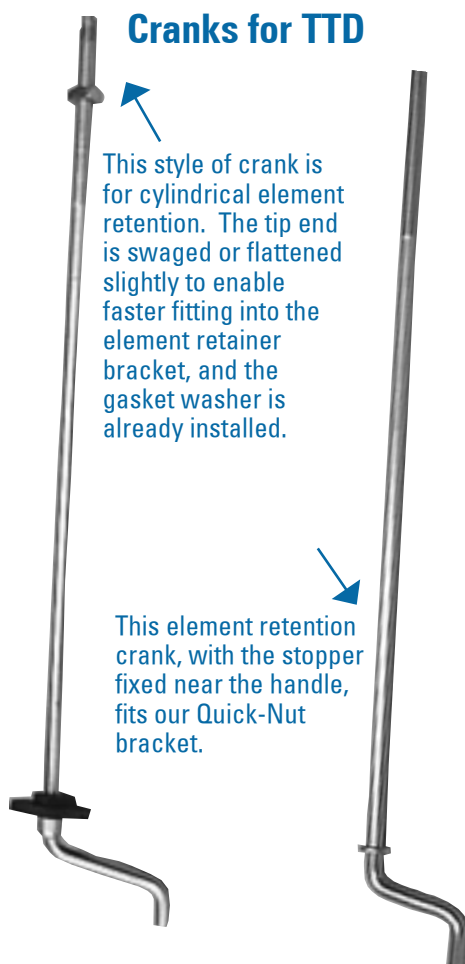


P52-4740
Gasket Washer



Element retention replacement latch for Donaldson Composite-Filter Systems (CFS), available in: galvanized (31295-01) or stainless (31295-05)

Cranks for TTD



This style of crank is for cylindrical element retention. The tip end is swaged or flattened slightly to enable faster fitting into the element retainer bracket, and the gasket washer is already installed.

This element retention crank, with the stopper fixed near the handle, fits our Quick-Nut bracket.

GDX Support Yokes

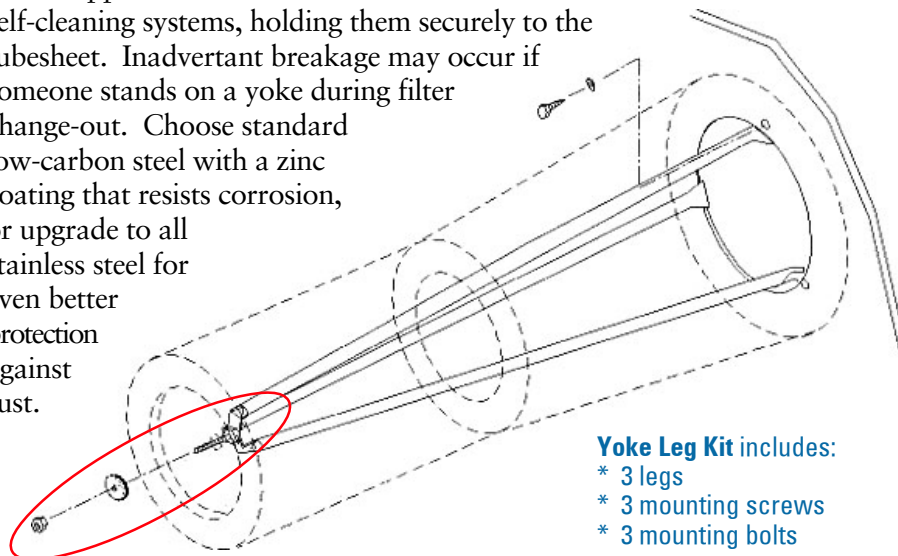
Yoke supports are located inside the filter elements on GDX self-cleaning systems, holding them securely to the tubesheet. Inadvertant breakage may occur if someone stands on a yoke during filter change-out. Choose standard low-carbon steel with a zinc coating that resists corrosion, or upgrade to all stainless steel for even better protection against rust.

Yoke Bolt Kit includes:

- * the **BOLT** that is inserted from back to front, through the holes in the yoke legs;
- * the **WASHER** through which the bolt goes; and
- * the **NUT** that screws on and holds it all together.

Yoke Leg Kit includes:

- * 3 legs
- * 3 mounting screws
- * 3 mounting bolts



Retention Clip for square PowerCore filters. Part number 67009



Installation Aids for Conical Pre-Filter Wraps

Cuts Conical Wrap Installation Time without Turbine Shut-Down!

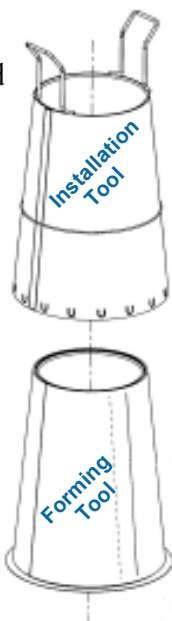
Our new wrap installation tools make changing the hard-to-reach conical wraps easier and faster.

Donaldson GDS and GDX systems have pairs of filters mounted horizontally. Because of the proximity of adjacent filters and the depth of the double filter arrangement, it's difficult to reach the rear conical filter when installing new wraps. These tools solve that problem!

There are 2 pieces: the Forming Tool and the Installation Tool. Made of aluminum, each piece weighs about 10 lbs, and is designed for many years of usage.

In our field testing, this tool enable a 2-man crew to replace pre-filters at a rate of 25 pairs (both conical and cylindrical) per hour.

Compare that to how long it currently takes your crew and you can easily figure how much this set of tools can save in labor time.



Using these tools, there is no need to shut down the turbine because wraps can be changed during operation. First remove the used pre-filters that are being replaced, then:

1) Wrap the fresh pre-filter around the forming tool (the unit without the handles) and overlap the velcro strip so that the pre-filter is snug but not tight.



2) Slide the Installation Tool over the wrap. The tabs around the bottom of the Installation Tool grab the wrap.



3) Lift the Installation Tool up, sliding it and the wrap off the Forming Tool.



4) Using the handles, slide the Installation Tool, with the wrap inside, over the cylindrical filter. Push the Tool all the way to the back wall, covering the conical element.

If the wrap is not all the way to the backwall, use the Installation Tool to push/twist the wrap further back.



5) Pull the Installation Tool back out and the conical wrap is in place! The cylindrical wrap can now be installed without using any special tools.



Wrap Aid Tools

Part No.	Description
AD74708	Set of both tools
AD74733	Forming Tool
AD74739	Installation Tool

Pre-Filter Wraps

Donaldson pre-filter wraps extend primary filter service life and add an additional stage of filtration on turbine air inlet static filter systems. These medium efficiency polyester pre-filters are designed to capture large particles, insects, seeds, and airborne fibers before they reach the filter cartridge.

Many operations use wraps to protect against site-specific seasonal problems, such as insects or cottonwoods seeds.

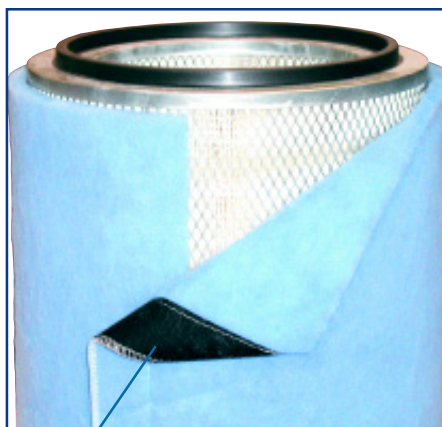
Wraps are inexpensive and easy to change. They can be installed and removed without shutting down the turbine.

Great for:

- Urban and industrial environments with a mix of dust and hydrocarbons.
- Areas with seasonal higher-than-normal concentrations of airborne fibers, seeds, or large particulate.

A Word of Caution

Customers tell us that our competitors offer wraps or sprays claiming that they “work just as well as Spider-Web®.” This is **simply not true!** Pore sizes (the spaces between the fibers through which air passes) of these two materials are very different: Spider-Web is designed to capture very small particles (see photos on page 25), and pre-filter wraps are designed to capture large dirt and debris. Each has a distinct purpose and function in gas turbine inlet filtration.



Velcro® strip for secure closure

Part No.	Length	Shape
P19-1005	22"	cylindrical*
P19-0978	26"	cylindrical*
P19-0979	26"	conical*
P19-0978	27"	cylindrical**
P19-1992	28"	cylindrical**
P19-1502	30"	cylindrical**
P19-1592	34"	cylindrical**
P19-1939	36"	cylindrical**
* In-stock ** Lead time applies		

See pages 6 & 7 for part numbers of filters with wraps factory-installed.

We generally don't recommend using wraps on pulse-cleaned systems. The pulsing causes the particulate to migrate through the wrap into the pleated filter media, where it becomes trapped in the pleats; the wrap prevents it from pulsing away.

Features

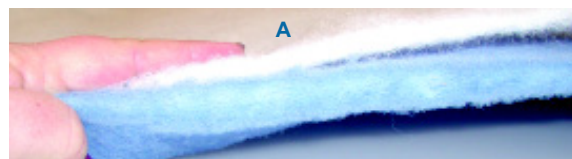
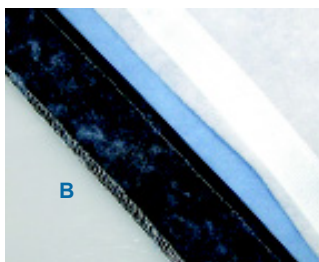
- High-loft filter media has minimal effect on system ΔP .
- An integral tackifier in the media makes dirt particles cling to the fibers.
- Velcro closure has major benefits:
 - 1) It allows easier installation and removal around cylindrical and conical filters compared to other 'sock' styles of wrap.
 - 2) It allows you to create a snug fit without gaps -- resulting in better performance.

Weight: 7 oz/yd² (nominal)

Thickness: 0.7" / 18mm (nominal)

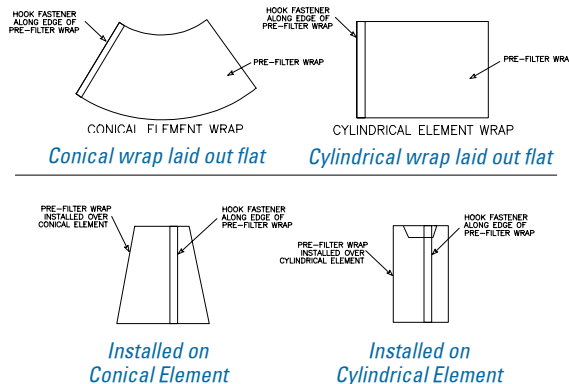
Initial Resistance: <0.1" w.g.

Efficiency: 90% Arrestance



Compare! (A) When comparing the Donaldson high-loft wrap to a competitive wrap, notice the difference in thickness -- the blue Donaldson wrap is about twice as thick, and twice as effective! You won't have to change the Donaldson wrap as often. (B) The Velcro on the blue Donaldson wrap is finished on the edge instead of left raw, as on the competitive (white) one.

Donaldson pre-filter wraps are easier to install and remove because they have a Velcro strip at the seam. Competitive wraps are more like socks, designed to slide over the filter. And anyone who's ever tried to do that knows how difficult 'sliding' the rough texture of the wrap over the filter can be! So take it easy -- with Donaldson wraps!



G4 Pre-Filter Panels

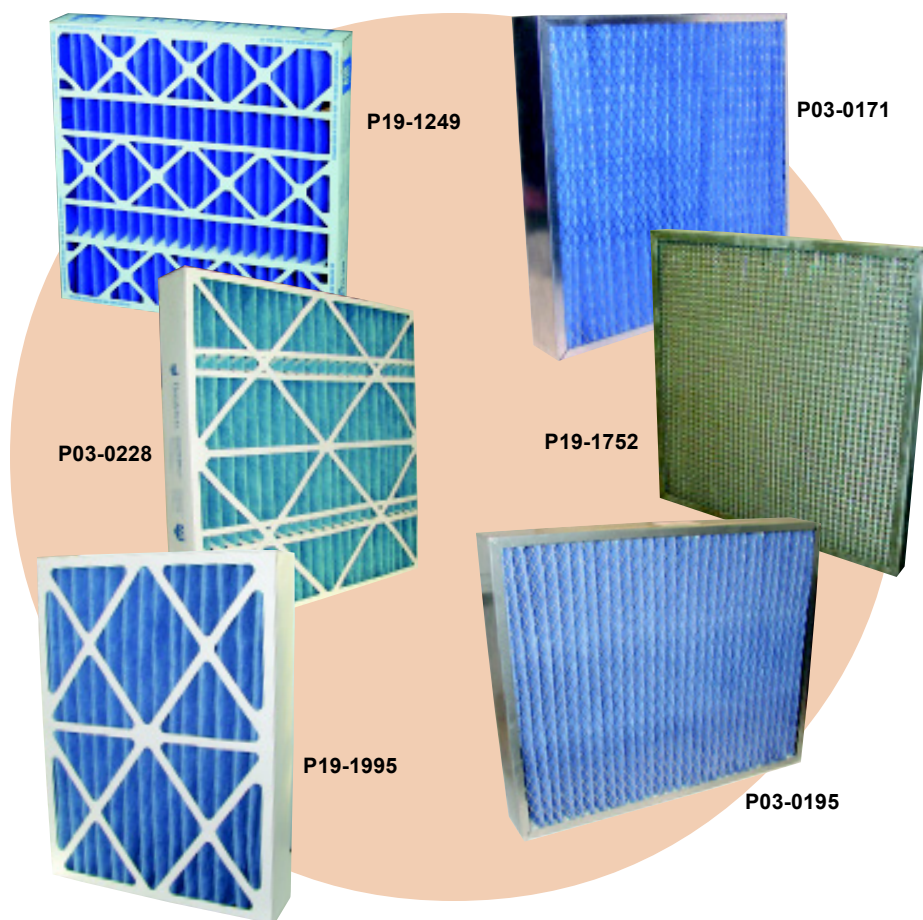
Specially designed for use in gas turbine inlet applications, these sturdy pre-filters can withstand up to 3" / 76mm ΔP. Economical and easy to install, they sit in front of primary filter panels, providing a G4 first stage of filtration on large particulatean effective way to extend the life of the primary filters. Can be changed out without shutting down the turbine.

The media is pleated poly material, rated G4. (See page 31 for rating information.)

On all pre-filter styles, the air-leaving side of the filter media is bonded to a wire grid (copper-coated welded wire on the P03-0228) for stability, and the media is pleated to minimize the airflow resistance while maximizing the particle arestance and dust-holding capacity. On the beverageboard models, pleat separators ("fingers") are an integral part of the frame and serve to maintain the spacing between pleats.

The beverageboard frame units are fully incinerable. Choose the metal frame for high moisture/humidity conditions.

The P19-1752 has metal mesh media is also known as a mist eliminator.



Part No.	Media & Shape	Nominal Dimensions	Frame
P19-1249	G4 - Square	in: 24 x 24 x 4 mm: 610 x 610 x 102	Beverageboard
P03-0228	G4 - Square	in: 24 x 24 x 3.5 mm: 610 x 610 x 89	Beverageboard
<i>Designed to fit into LM6000 "Guard Filter" door framing.</i>			
P03-0171	G4 - Square	in: 24 x 24 x 4 mm: 610 x 610 x 102	Metal
P19-1752	G4 Metal Mesh - Square	in: 24 x 24 x 4 mm: 610 x 610 x 102	Metal
P19-1995	G4 - Rectangle	in: 17.5 x 24 x 4 mm: 444 x 610 x 102	Beverageboard
P03-0195	G4 - Rectangle	in: 29 x 23 x 4 mm: 738 x 610 x 102	Metal



Oil Mist Eliminator

Mounted on a lube system, oil mist eliminator coalesces oily mist, then redirects the collected oil droplets back into the lube system.

The eliminator units hold either one element or two. (The filter element is the same for both eliminator models)

Oil Mist Eliminator	Part Number
Element	P15-7523
Housing (for 1 element)	P12-5489
Housing (for 2 elements)	P12-5490

Panel Filters

Slim VeePac®

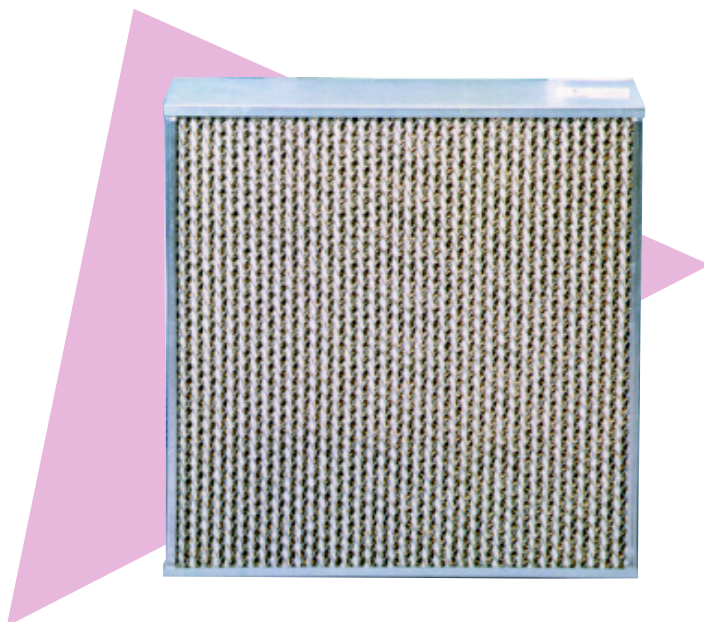
Barrier filters in efficient "V" shape, designed to fit TJD, TMD, and other Donaldson "T" series filter houses.



Specifications

- **Media:** Cellulose
- **Shape:** vee-shaped long panel
- **Dimensions:**
inches: 36.5L x 14H, 6.2W, 3.57W
mm: 927L x 356H, 157W, 91W
- **Rated Airflow:** 1000 cfm
- **Carton weight:** 16 lbs.
- Pleats are held in place with hot melt beading that prevents media bunching, even in high humidity.
- **Liners:** Galvanized expanded metal

Part Number
P12-5310



20" Sq Barrier Filter Panel

Standard 20"/508mm square barrier panel filter is available in two models: high performance and economy.

The **P14-6555 high performance** unit is the same one we put into first-fit systems for our OEM customers. It contains over 100 sq. ft. of heavy-duty cellulose media, is structurally strong via polymer pleat spacers, and is built for long life and high efficiency at low ΔP .

- The **economical P53-4557** panel contains almost 50 sq.ft. of fiberglass media, and has metal spacers for structural stability.

Specifications

- **Efficiency:** F8 / 90-95% ASHRAE
(see table on page 30)
- **Shape:** square
- **Dimensions:**
20 x 20 x 5 inches / 508 x 508 x 127 mm
- **Rated Airflow:** 1300-2000 cfm
- **Liners:** aluminized steel
- **Carton Weight:** 20 lbs

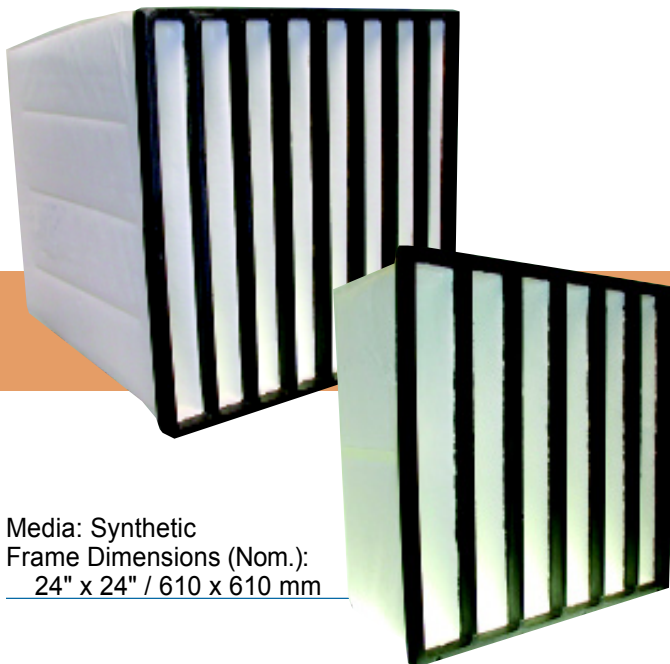
Part Numbers

P14-6555
Media: Long-Life Cellulose

P53-4557
Media: Economical Fiberglass

Panel Filters

Pocket Filters



Media: Synthetic
Frame Dimensions (Nom.):
24" x 24" / 610 x 610 mm

Donaldson offers a pair of synthetic pocket filters for gas turbine filtration that can be used in various combinations of pre-filter and final filter, depending on your cleanliness requirements.

With a polymer frame, they are non-corrosive and can be incinerated after use.

Used in our new GTM Marine/Offshore Filtration System (see write-up on page 37), as well as in other non-Donaldson inlet systems.

Part No.	Media Rating	ASHRAE Arrestance*
P03-0204	G4	90%
P03-0257	F5	40-60%
P03-0205	F6	60-80%
P03-0256	F7	80-90%

* See pages 30 & 31 for Media Rating information

Mini-Pleat

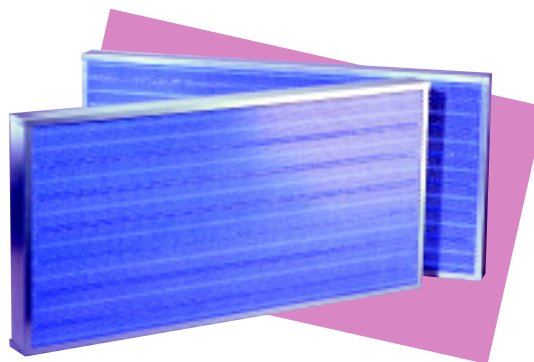
Our mini-pleat panel filter is perfect for gas turbine applications with high velocity air requirements, high moisture environments, and/or high dust situations. Designed to fit gas turbine air filter systems that use standard 24x24" mini-pleat filters.

Call for further details.



2by4 Panel

Our "2by4" replacement panel filters let you put the superior quality, performance and technology of Donaldson-made filters into an AAF filter system. Choose either Duratek™ or Synthetic filter media; both have our exclusive Spider-Web® media treatment.



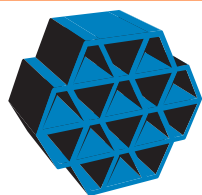
Specifications

- **Dimensions:** 46.4 x 22.1 x 3.25 inches / 1179 x 561 x 83 mm
- Two-inch deep pleats are held in place with hot melt spiral beading inside and outside.
- **Linings:** Galvanized expanded metal, 74% open area.
- **Endcaps:** Galvanized metal
- **Gasket:** Seamless

Part Numbers

P19-1748
Media: Synthetic/Spider-Web
P19-1596
Media: Duratek/Spider-Web

Panel Filters



PowerCore™
A DONALDSON FILTRATION TECHNOLOGY

Donaldson PowerCore® technology is a unique filter media packaging technique for creating high efficiency, lightweight, disposable air filters. When combined with our exclusive patented Spider-Web® nanofiber media treatment, the result is significantly increased filter performance! PowerCore® yields longer filter service life and maintains lower ΔP over the life of the filter -- resulting in improved turbine output. PowerCore® is clearly the 'higher value' filter for air inlet systems!

Low ΔP in the long term is what's important for best value.

PowerCore® yields a significant performance gain over conventional panel filters!

- Lower service resistance
- Longer filter life
- Higher dust-holding capacity
- Higher value

Donaldson applies PowerCore technology in filters for diesel & gasoline engines, and in chemi-adsorptive filters for semiconductor processing -- as well as in various configurations for gas turbines, as shown on this and the next page.

PowerCore Panels Replace Mini-Pleats

Donaldson PowerCore® panels yield longer filter service life and maintain lower ΔP than mini-pleat style filters -- yielding improved turbine output.

Many PowerCore panel filters include our exclusive and patented Spider-Web® media treatment -- resulting in significantly increased filter performance for your existing turbine inlet air panel filtration system.

Typically Used In

- Existing panel filter inlet air systems
- Systems that use 24" x 24" (610 x 610 mm) nominal size filters

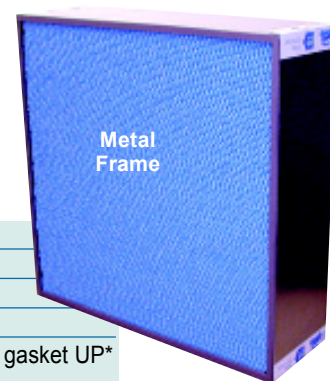
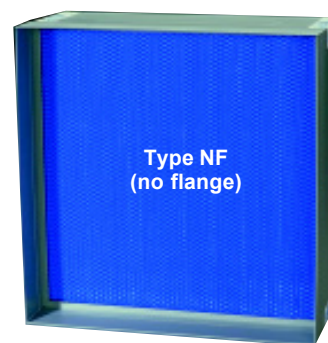
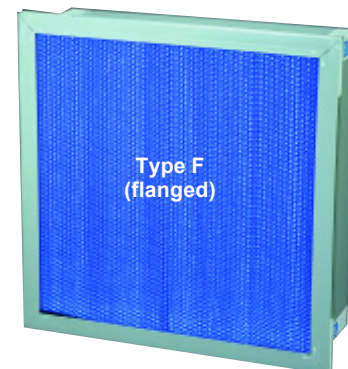
Features

- Increased dust holding capacity yields longer filter service interval.
- Polymer construction -- no rust!
- The fluted media means no pleat bunching.
- Pre-filter available (NF style includes retention frame for prefilter.)
- Polymer frames are for use in temperatures less than 150°F/66°C.

Dimensions

Type F	23.38"/ 594mm W&H*
	21.75"/ 552mm at rear
Type NF	23.38"/ 594mm W&H*
Metal Frame	23.38"/ 594mm W&H
Half-Panel	24"x 12"/ 610x305mm

* Dimension includes gasket



PowerCore Square Panel

Part No.	Type	Media	Comments
P19-1334	F	Spider-Web	Polymer frame
P19-1705	F	Synthetic	Polymer frame
P19-1358	NF	Spider-Web	Polymer frame
P19-1751	NF	Spider-Web	Polymer frame, gasket UP*
P19-1708	NF	Synthetic	Polymer frame
P19-1774	NF	Synthetic	Half panel, polymer frame
P19-1968	NF	Spider-Web	Metal frame
67009	for NF Retention clip for Farr systems (see page 11)		

* Gasket is mounted on the upstream side of the filter.
(All other models have gaskets on the downstream side.)

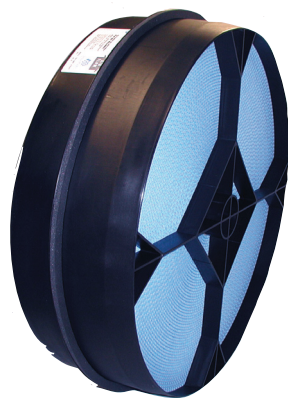
Pre-Filter Panel for NF Type Panel

P19-1249	Poly Pre-Filter	details on page 14
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PowerCore® Round Filters

27" Round PowerCore Panels

Donaldson PowerCore in the 27"-round configuration is now available in a new, more robust design, which includes bracing on the back side.



Bracing on the back side maintains filter integrity

Part Number P03-0001

Media: PowerCore/Spider-Web
Diameter: 27" / 686 mm
Depth: 7" / 178 mm

20" Round PowerCore® Filters for Microturbines

Donaldson PowerCore® air filters are the choice of major microturbine manufacturers worldwide. PowerCore filter have such high dust-holding capacity that you won't have to replace them often -- but when the time comes, be sure to come to the original filter designer & manufacturer: *Donaldson!*



The blue Donaldson PowerCore air filter is on the front of this Capstone Microturbine unit.

Part Number P19-1988

Media: PowerCore/Spider-Web
Diameter: 20" / 508 mm
Depth: 7" / 178 mm

PowerCore Protects People, Machinery, Engines in Light, Medium & Heavy-Duty Applications

Besides being used on small and large turbines, Donaldson has applied PowerCore inlet air filtration to off-road vehicles, on-road trucks, fuel-cell vehicles, semiconductor processing...and more! Donaldson PowerCore technology is extensively field-proven in the vehicle and industrial air filtration markets that Donaldson serves throughout the world. PowerCore enables us to design smaller, yet very effective, filters and filtration systems.

- In postal service mail rooms for enhanced air quality: Donaldson Downdraft bench filters
- In fuel cell applications: Mercedes EV2 bus
- Gen Sets: Caterpillar 3500
- Medium-duty trucks: Volvo FL6, Freightliner M2, Blue Diamond F650/750, Iveco Eurocargo
- Agricultural vehicles: John Deere 5000/6000/7000
- Lawn & garden: John Deere 355D
- Light vehicles & pick-up trucks: Ford F350/450/550, GM G-Van diesel

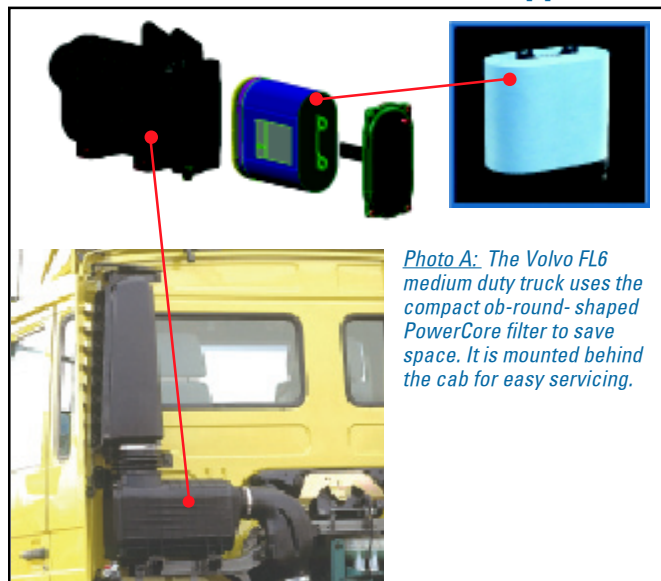


Photo A: The Volvo FL6 medium duty truck uses the compact ob-round-shaped PowerCore filter to save space. It is mounted behind the cab for easy servicing.

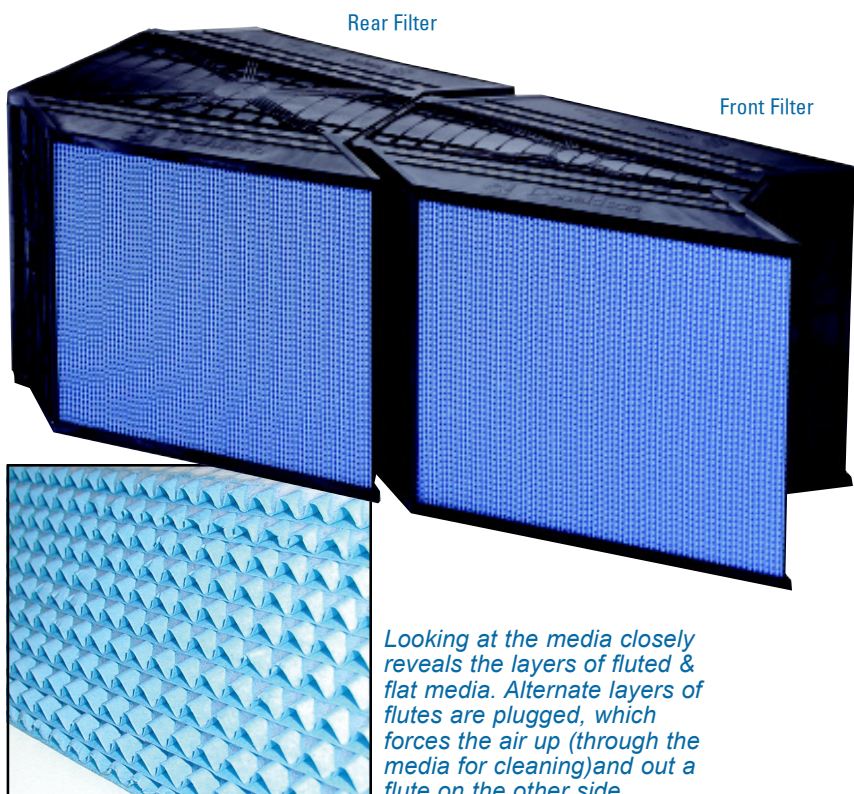
PowerCore® XLR Panel Filters

Early in 2004, Donaldson introduced the XLR, an entirely new self-cleaning inlet air filtration system for gas turbines that uses our innovative PowerCore technology to achieve high performance:

- Reduced initial pressure loss and long filter life result in improved turbine efficiency and heat rate.
- 50% fewer filters, so change-out time and expense are reduced.
- Newly designed, more robust valves keep filters cleaner longer, so maintenance is reduced.

The filter elements contain no metal, so are incinerable after use.

Available with a variety of media to meet your particular environmental challenge. They function in pairs, so you'll need to order both front and rear units to make a pair.

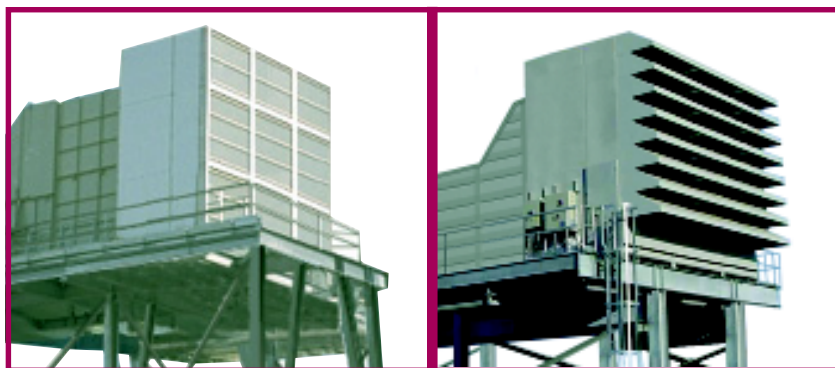


Donaldson PowerCore Filters Have Great Advantages for Turbine Operators

- About 10 times more dust-holding capacity than pleated media filters -- so you don't have to change them as often.
- The fluted media construction yields a robust, sturdy filter.
- No metal! No corrosion.... easier to dispose of after use.
- Media is rated at F9 / 95% efficiency to protect your equipment well.

XLR PowerCore Replacement Filters

Part No.	Media	Comments
P03-0206	Spider-Web XP	Front filter. Pairs with P03-0207
P03-0207	Spider-Web XP	Rear filter. Pairs with P03-0206
P03-0190	Synthetic/Spider-Web	Front filter. Pairs with P03-0191
P03-0191	Synthetic/Spider-Web	Rear filter. Pairs with P03-0190
P03-0085	Duratek/Spider-Web	Front filter. Pairs with P03-0086
P03-0086	Duratek/Spider-Web	Rear filter. Pairs with P03-0085



XLR self-cleaning filter houses are available with marine louvers, shown at left, or weather hoods, as shown at right. Turn to page 37 for more system information.

Conversions/Modifications/Upgrades (CM&U)

Air Filtration System Retrofit and Refurbishment

Turbines operate for many years, as do the Donaldson Inlet Air Filtration Systems that protect them from airborne contaminants. As your filter system ages, it may need some refurbishment... or need to be modified for better performance...or converted to a more efficient design.

The Donaldson Conversions, Modifications, and Upgrades Team (CM&U) stands ready to discuss your specific needs and find the best solution for your update.

Please call us to discuss your next project.

Ask about our **Annual Service Contract !**

- Annual air inlet system inspection
- Filter and/or pre-filter change-out
- Annual evap cooler re-commissioning

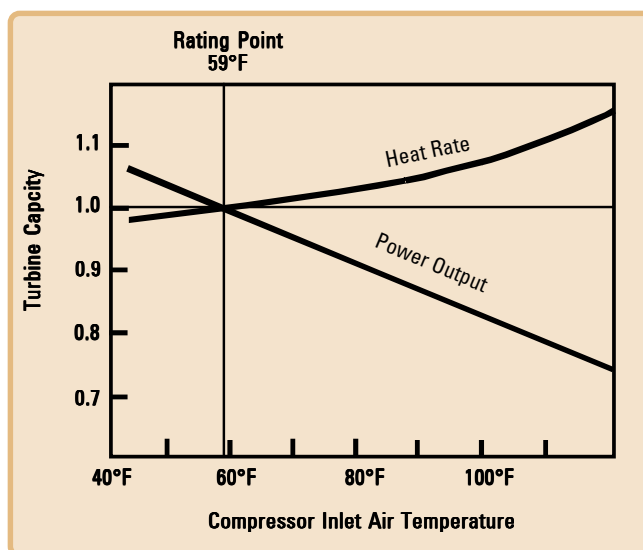
See page 24 for details

Increase Power Output by Adding Cooling to Your Donaldson GDX, GDX or TTD Inlet System

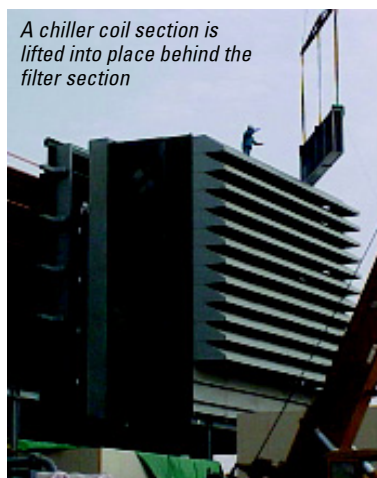
If your inlet air is not at optimum temperature (about 59°F), you are not getting the highest turbine output that you could. The graph shows heat rate higher than 59°F causes a decrease in power!

Adding chiller coils or an evaporative cooler (proven & reliable cooling technology) behind the air filter could be your answer to finding increased turbine output and efficiency. Cooling can typically decrease inlet air temps by as much as 20° to 30° F, depending on the ambient humidity. Call our CM&U team to discuss how you can retrofit a cooling scheme.

For example, a gas turbine generator with a Donaldson evaporative cooling system installed at a site having an ambient temperature of 100°F and a relative humidity of 30% could deliver up to 7.6% more power than a gas turbine without an evaporative cooler.



Copyright 1999, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (<http://www.ashrae.org>)
Reprinted by permission from "Design Guide for Combustion Turbine Inlet Air Cooling Systems" by William E. Stewart, Jr., Ph.D., P.E.



Conversions/Modifications/Upgrades (CM&U)



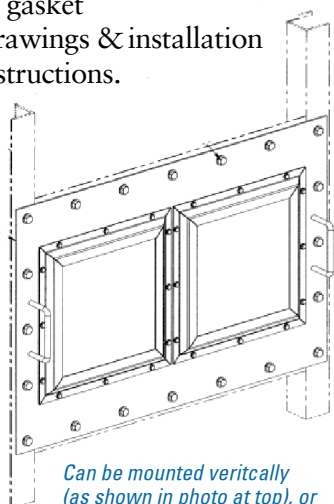
Lexan Window Enables Visibility into Transition

Allows visual inspection of the ducting downstream of the evaporative cooler. These 2-panel windows are constructed of heavy gauge materials and fasteners to withstand ΔP up to 15" -- to ensure safety and durability.

Two are recommended, one for each side of the transition.

Kit includes:

- Window set with mounting frame
- Installation hardware & gasket
- Drawings & installation instructions.



Can be mounted vertically (as shown in photo at top), or horizontally, as illustrated here.

'Hobbit' Door Allows Physical Access to Area Behind Evaporative Cooler

Make your life easier with our 30"-high hatch that allows access to the ducting downstream of the evaporative cooler module for physical inspection and service -- without your having to remove media to get there.

Built of all stainless steel, our 'hobbit' door is engineered with a positive seal to preclude leaks. Bolt-in installation, no welding required!

Kit includes:

- Door
- Installation hardware
- Drawings & installation instructions.



Here you can see the depth of the 'hobbit' door access hatch.



From the backside. The drift eliminator panels snug up to the sides of the door.



The 30"-high 'hobbit' door opens easily for access to the transition area behind the evaporative cooler media.

Conversions/Modifications/Upgrades (CM&U)

Find the System You Need with our Intake Configurator

Looking to retrofit a new filter house on an older or refurbished turbine? Our new standard systems will make it easy to select exactly what you need -- a custom design with the speed & pricing of standard. Colorful, illustrated brochures guide you through step by step in specifying a new TTD (pulsed/self-cleaning) or GDS (static) filtration system. **Ask for free brochures:**



Larger systems (to 1.2 million ACFM) can be custom quoted. Call us!

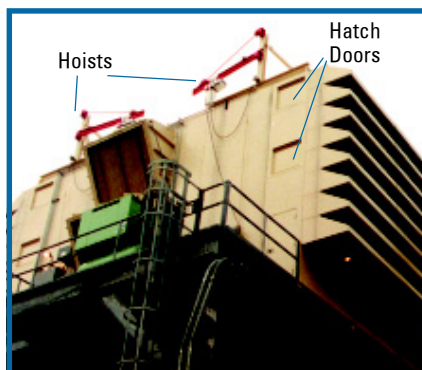
GTS-111 **GDS Static System**
(9000-79000 ACFM)

GTS-103 **TTD Pulse System**
(2400 - 88000 ACFM)

Make Filter Change-out Faster & Easier by Adding Access Doors and a Hoist

Lifting new elements by hand up to the various filter levels at filter change-out time can be cumbersome, labor intensive, and potentially damaging to the fresh filters. A **hoist** will ease this burden!

You may want to add access doors at the end of each walkway level if your GDX or GDS does not already have them. Our access door retrofit kit includes one welded frame, hinged door, bolts, paintable caulk. Creates an opening that is 28.5"x30"/724x762mm.



Usually, a hatch door is added at each filter level for convenient access. Hoists are typically mounted on the roof of the filter house.

Component	Part Number	Description
Access Door Kit	AD63850-01	Install Kit for 1 access door
Hoist	38446-*	Manual, lifts 1/4 Ton
Hoist	44479-*	Electrical, lifts 1/4 Ton
Hoist	55225-03	Pneumatic, lifts 1/4 Ton
Regulator	55225-01	for Compressed Airflow
Air Hose	55225-04	1/2" diam, 12-ft length

* Check your Filter System Manual for specific suffix, which indicates various options.

Upgrade Air Inlet System Performance by Installing Better Filter Media

If you're using air filters with commodity media, you could attain better system performance with just a simple change: **upgrading to better media**, such as Donaldson Spider-Web®.

The cost is surprisingly low compared to the improved result. See full story on pages 25-27.



In this magnified view of an edge of Spider-Web® and the substrate media, we can see how dirt collects on the 'web' at the surface, instead of penetrating the media where it can clog

media pores and restrict airflow. Donaldson Spider-Web® has very small pores (spaces between fibers) that allow air to pass through even as the media loads with particulate -- thus keeping ΔP low over the entire life of the filter.



Conversions/Modifications/Upgrades (CM&U)

Enhancements for Inlet Hoods

Weather hoods over the air inlet that protect the filter elements from rain, snow, insects, etc. Call us to discuss how their effectivity can be enhanced by adding

- ☑ Mist eliminators
- ☑ Bird/trash screens



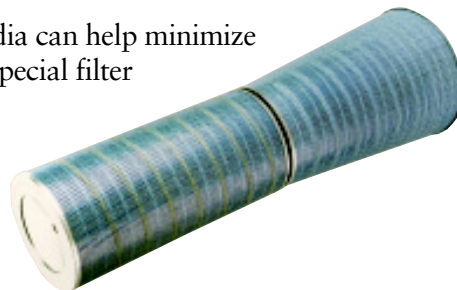
Reduce Pulse Noise in Urban Areas

To contain the noise made by Donaldson GDX pulse systems, you can replace the standard hoods with our new **Attenuation Hoods**. They contain advanced attenuation technology that reduces pulse noise significantly. Call for details.

Flame Retardant Media is Self-Extinguishing

Our filters with flame retardant media can help minimize the risk of damage from fire. This special filter media is designed:

- * Not to support a flame,
- * Not to spread a fire when the turbine is shut down, and
- * Smolder and snuff out once the external ignition source has been removed.

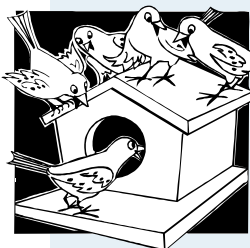


Filter media is essentially paper and we urge you to use caution. Sparks from maintenance welding or a careless smoker, combined with a strong wind on a dry day, can be a fire risk in a filter house.

Filters with Flame Retardant Media:

P19-1150	26" Conical Media: Synthetic/Spider-Web Mate to P19-1149 in GDX & GDS-I
P19-1149	26" Cylindrical Media: Synthetic/Spider-Web Use alone (in TTD) or mate to P19-1150 in GDX & GDS-I

Protect Filters with Bird/Trash Screens or Moisture Eliminator Panels In the Hoods



Birds and bats will nest in the inlet hoods of your Donaldson air filtration system. They can make a mess of

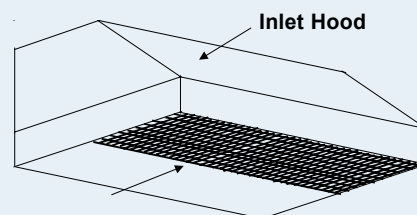
your inlet and even ruin your filters. Debris and airborne trash can also become hazards.

Prevent bird nesting and trash ingestion by installing Donaldson bird/trash screens or moisture eliminator panels.

Screens or panels (cut to size), bracket supports, and fasteners enough to protect one filter house module are packaged into handy retrofit kits. The number of kits you need depends on how many modules comprise your Donaldson filter house.

Screens or panels can be installed from the internal walkway in the filter house with just a socket wrench and other common hand tools.

Kits listed are designed to fit most GDX & GDS style filter houses.



Bird/trash screens and/or moisture eliminator panels lay horizontally in the inlet hoods.

Part Numbers

39569

[Galvanized Metal Birdscreen Kit](#)

83768

[Stainless Steel Birdscreen Kit](#)

Each Kit is comprised of enough pieces for 1 module of your Donaldson Filter House.

Moisture eliminator panels are listed on page 40.

Field Services

Filter System Inspection



Annual inspection of your Donaldson air inlet filter system will help you keep it running at optimal performance. A typical inspection takes only one day, after which you'll receive a full report and recommendations.

We inspect:

- Filter element & element retention condition (*checking for dents, damage, possible leak paths, bent yokes, damaged/missing bolts*)
- Filter element seals (*checking for leak paths*)
- Filter house seams & joints (*checking for leak paths*)

On self-cleaning systems, we also inspect the pulsing mechanisms & electrical system to ensure that everything is in proper working order and correctly adjusted.

For best economy, have us perform inspection of your evaporative cooler at the same time. Under separate order from you, Donaldson can also perform any repair work that may be needed.

Upgrades and Repair Work

When it's time to enhance your inlet system with service access doors, moisture eliminators in the hoods, silencing baffles, or component repairs, call upon Donaldson to perform the work. We designed the original system, so we know how to modify it and still retain its high performance and structural integrity.



We have standard kits for many items, and can properly design a modification for you if there's not an existing kit.

Call Donaldson for:

- Exterior access hatches at walkway level for tossing out used filters at service time
- Inlet hood modifications — add moisture eliminators, pre-filters, birdscreens
- Evaporative cooler work (see more info on page 46)
- Filter support upgrades to stainless steel
- Instrumentation repair, replacement or upgrade

Filter and/or Pre-Filter Change-Out

Free up your maintenance staff for other duties by having Donaldson change out the air filters in your inlet systems. Our experienced expert crews can perform a variety of services.....choose just the ones you need, or choose the whole package, it's up to you.

We can:

- Stage new filters and necessary equipment to perform change-out
- Remove old filters
- Dispose of old filters
- Install new filters and pre-filters

To quote, we'll need to know the type and number of filters in your systems.

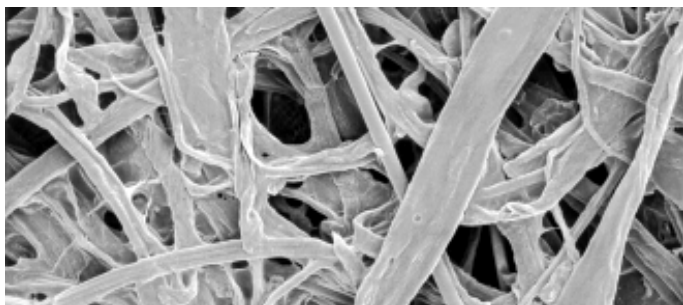


Take a Closer Look at Donaldson Filter Media

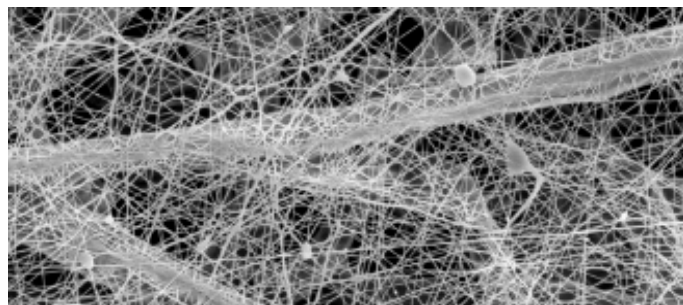
Examine the heart of the filter system -- the filter media.

In these photos taken with our scanning electron microscope (SEM), you're seeing filter media magnified hundreds of times! Note the pore size (spaces between the fibers) and the construction of the fibers (smooth, rough, large, small).

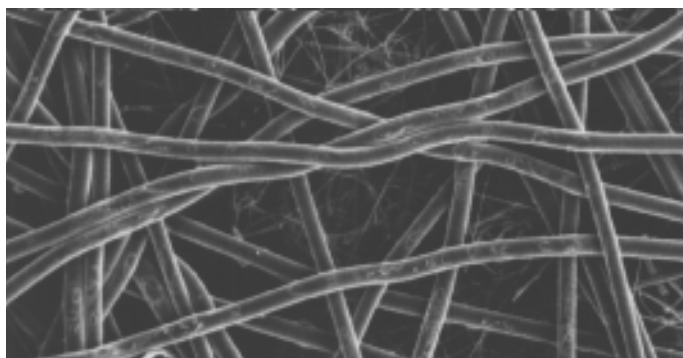
Duratek™ (Donaldson's proprietary blend of natural & synthetic fibers) -- Synthetic fibers mixed in add strength, efficiency, and moisture resistance. ↓



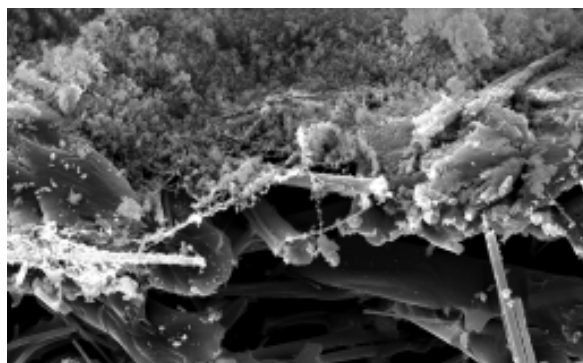
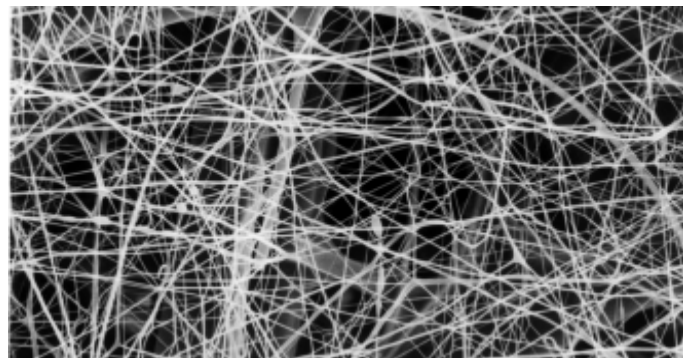
Duratek™ with Spider-Web® -- You can see how adding the layer of nanofibers (Spider-Web®) over the Duratek™ substrate creates very small pore sizes, enabling entrapment of sub-micron dust. ↓



Synthetic (Donaldson's man-made fiber filter media) -- In controlling the fiber diameter and the pore size, we've designed this proprietary filter media to be effective in various environments (desert, arctic/frost, urban, industrial, marine, etc.) The smooth fibers provide very low impedance to airflow -- helping to maintain low ΔP for the entire life of the filter. ↓



Synthetic with Spider-Web® -- Note the 'web' of nanofibers bonded over the synthetic substrate. This media formulation has proven to be the most effective filter solution for gas turbine protection -- best filtering efficiency and best pulsing characteristics. See page 27 for photos of our new very high performance version, Spider-Web XP. ↓



And Now It's Dirty -- The 'web' catches most of the very fine particulate, allowing two major benefits: (a) the very fine particles that cause fouling don't reach your turbine blades, and (b) pulse-cleaning is more effective due to the surface-loading characteristics of the Spider-Web® layer.

This photo shows an edge of Spider-Web, magnified 2500X under our Scanning Electron Microscope.

Spider-Web® Filter Media Technology

Donaldson Spider-Web is the first filter media to effectively combine very high filter efficiency with low airflow restriction both initially and throughout the life of the filter.

The result is better turbine protection, lower overall turbine operating costs and higher turbine availability.

Spider-Web Advantages

Surface -Loading

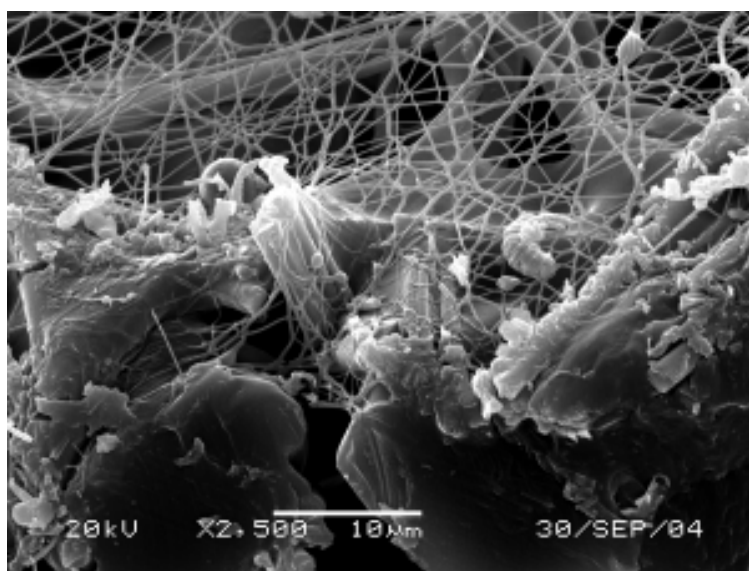
Donaldson's patented Spider-Web media technology consists of a "web" of sub-micron diameter fibers bonded to a substrate of Donaldson cellulose or synthetic filter media. The nanofiber web significantly improves the media's ability to collect dust particles on its surface, and minimizes the number of particles that penetrate into its depth. In traditional filter media without Spider-Web, particle ingress shortens filter service life.

Durability

The patented nanofiber web is extremely durable, as well as resistant to moisture and high temperature. This robust nanofiber layer protects the turbine and delivers superior self-cleaning performance throughout the life of the filter.

Low Pressure Drop

Incoming air passes through the Spider-Web layer without increasing filter pressure drop. Spider-Web fibers are very small compared to the airflow passages between media fibers. Particles collect on the Spider-Web layer, keeping the media pores open. In traditional filter media, dust particles lodge in the pores between fibers and become imbedded in the media depth. Eventually pores plug, causing filter pressure drop to increase.



This photo from our Scanning Electron Microscope shows Spider-Web media magnified 2500 times! Note the nanofiber 'web' over the filter media substrate.

High Efficiency

Initially

Traditional filters have an initial period during which filter efficiency must build up to peak levels, but Spider-Web filters are highly efficient from the time they are installed. Spider-Web media accelerates the forming of a dust cake on the media surface, bringing the efficiency to nearly 100% very quickly.

Because its fibers are less than 0.3µm in size, Spider-Web minimizes the number of fine particles that pass through the media during seasoning. Throughout filter service life Spider-Web's unique surface loading capabilities cause incoming dust particles to continuously build up on the media's surface rather than its depth, thereby maintaining high efficiency and extending filter service life.

On Sub-Micron Particles

Another advantage of Spider-Web is its ability to capture sub-micron size particles. Because Spider-Web is made up of a tight 'web' of sub-micron diameter fibers, it is much more efficient than traditional filter media at collecting dust particles less than one micron in diameter.

Performance Improvements for Pulse-Cleaned Filters

Better Dust Particle Release

Dust particles are more easily dislodged during pulse cleaning, because they load on the surface of Spider-Web filter media rather than in its depth. In traditional filter media, dust particles become lodged in media pores, making it difficult to remove them during the pulse-cleaning process.

Improved Turbine Availability

The improved pulse cleaning performance of Spider-Web filters results in fewer planned and unplanned maintenance outages for filter replacement. This extended filter life, and the reduction in the amount and frequency of turbine cleaning provides improved turbine availability.

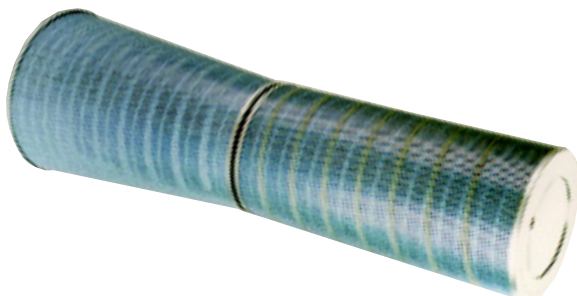
Lower, Stabilized Pressure Drop

Spider-Web's improved dust particle release capabilities result in a lower, stabilized filter pressure drop. The pressure drop of a pulse-clean filter system with Spider-Web filters stabilizes at a lower level than the same filter system with traditional filters, because the media's surface loading properties greatly improve dust particle release during the pulse-cleaning operation.

Spider-Web® Filter Media Technology

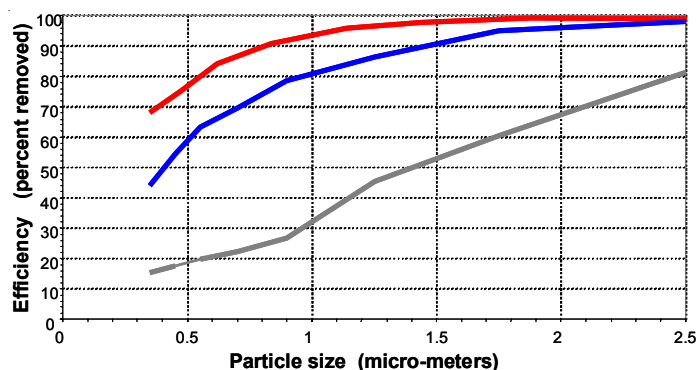
**GDX Element Pair* Tested at
1630 cubic feet per minute (cfm), or
0.77 cubic metres per second (cms)**

*One conical & one cylindrical together

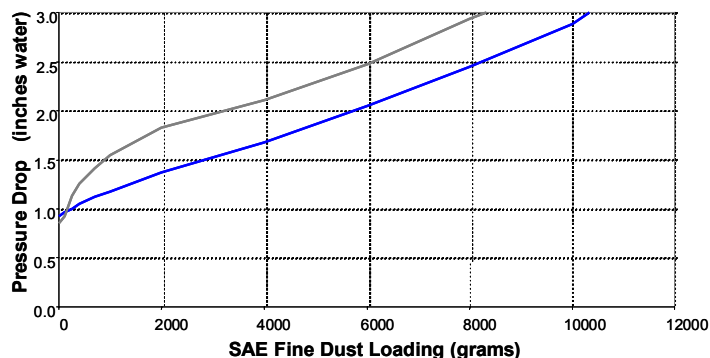


— Donaldson Spider-Web XP media
— Donaldson Duratek Spider-Web media
— Donaldson Duratek media (no Spider-Web)

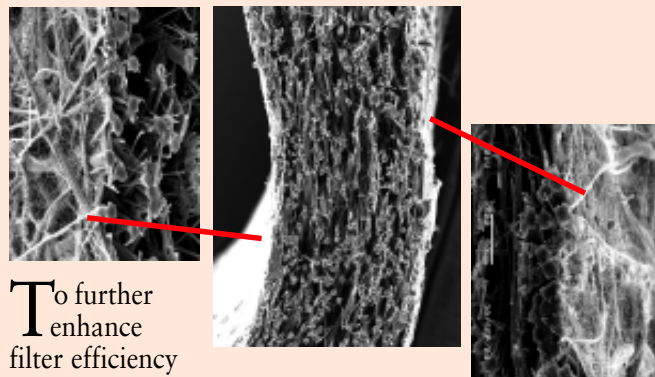
Initial Efficiency by Particle Size



ΔP with SAE Fine Test Dust Load



Choose Spider-Web XP for Premium Performance



To further enhance filter efficiency on sub-micron particulate, Donaldson has developed and patented Spider-Web XP. Spider-Web XP features the web of sub-micron diameter fibers on both sides of the filter media substrate. Thanks to this unique design, initial filter efficiency is improved. For urban and industrial locations with high concentration of particles below one micron in size, Spider-Web XP offers superior turbine protection against fouling.

Spider-Web® XP reduces blade fouling significantly by capturing more particulate that is smaller than 2µm. Tests on Donaldson GDX filter pairs show (see graph below) that Donaldson Spider-Web XP reduces by about HALF the sub-micron particulate that penetrates through to reach the turbine blades compared to regular Spider-Web. And, Spider-Web XP captures FOUR TIMES as much sub-micron particulate than a standard "blended" media (such as our Duratek).

The secret to this extra performance is bonding our patented Spider-Web® nanofibers in very thin but robust layers on both sides of the substrate media. The nanofibers are what enhance filter efficiency, especially on particles smaller than 1 µm, the ones that are primarily responsible for compressor fouling.

As shown in these photos of the media (taken with our scanning electron microscope at 500X magnification) the larger fibers are sandwiched between layers of very fine fibers. This triple-layer is what makes Donaldson Spider-Web® XP the most effective filter media for gas turbine protection!

Spider-Web® Case Studies

Spider-Web Reduces Fouling in Side-by-Side Comparison Test

Site: Large Pipeline in Canada

Turbines: LM series

Filter House: Donaldson TTD Self-Cleaning Cartridge Filter Systems

Situation

One of our customers in Canada was seeing fast fouling on compressor stator blades, which led to loss of turbine output -- which meant loss of revenue!

Since they had two turbines running side-by-side, they decided to test Donaldson Spider-Web® filters against the 'brand X' blended media filters they'd been using, to see which one would capture the majority of the very fine dirt particles that they

suspected had been fouling stator blades. Both the brand X and Donaldson filters were new & clean at the beginning of the test.

Result

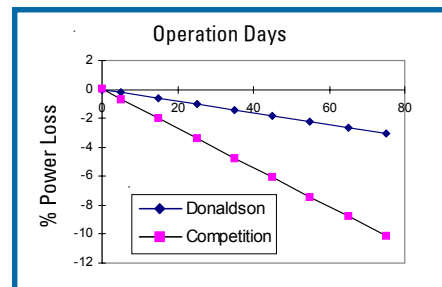
After 2360 operating hours, the stator blades on the turbine behind brand X were black with fouling, as shown in photo A. At the same time, the blades behind Spider-Web® were still clean & shiny! (photo B)

This customer measured their increased output from the turbine protected by Spider-Web® filters, as illustrated in the graph at right. Increased output value = OVER \$100,000 per year! The extra \$6200 they paid for a full set of Spider-Web® filters (over the blended media filters) was an investment that paid for itself in the first 2 months of operation!

A) After 2360 operational hours, the blades behind 'brand X' are fouled and causing turbine output loss!



B) After 2360 operational hours, the blades behind the filters with Donaldson Spider-Web® are still clean -- and maintaining turbine output at optimal levels!



Spider-Web® Proven Durable & Robust, Even in High Heat & Humidity

Site: Alba Power Station, Bahrain

Turbine: ABB GT13E2

Filter House: Donaldson GDX Self-Cleaning Cartridge Filter Systems

Situation

The harsh environment of Bahrain offers challenges to the gas turbine air inlet system! There is the very high heat of the desert, plus high humidity because of the Persian Gulf surrounding this archipelago kingdom. Often, sand storms arise that push various sizes of dust into the inlet at high velocities.

Donaldson put its high performance Spider-Web filters into this application. The layer of nanofiber



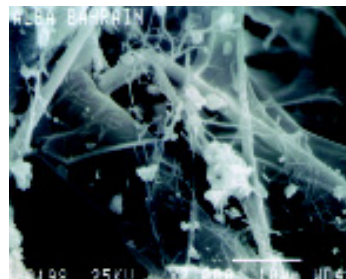
Six Donaldson GDX Self-Cleaning Cartridge Filter Systems were installed at Alba, Bahrain, in 1991-2. the filter discussed in this story was taken from these units. Donaldson supplied another 3 GDX systems to Alba in 2003.

Spider-Web over the media substrate averages only 2 microns thick. Would this media survive this harsh environment?

Result

After 3 years of continuous duty operation, the Donaldson Spider-Web proved durable! The customer sent a used filter into Donaldson, and our lab technicians carefully removed the built-up dust cake. What was revealed

is shown below in the 2000X microscope photo: the Spider-Web nanofiber layer is still there and still working!



Spider-Web® Case Studies

Spider-Web® XP Filters Increase Turbine Availability at Elyo France

Site: Elyo France power generation site at Pont-Sainte-Maxences, France

Turbine: Siemens GT10B

Filter House: Donaldson GDH Self-Cleaning System configured with 96 pairs of filters

Problem

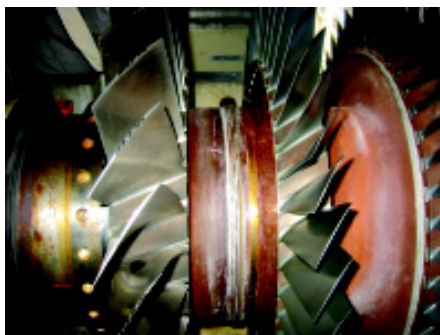
Elyo France was having to go off-line to water wash 3 times during a 6 month period of operation just to keep blade fouling under control. Donaldson came in to analyse the problem, offer a solution, implement solution, and follow-up.

Donaldson proposed using our new filter media, **Spider-Web® XP**, designed to capture more of the very small particulate that is the main cause of fouling, in conjunction with an active coating applied to mitigate the effects of sooty, sticky hydro-

carbon particles. Elyo France's goal was to reduce water washing by 2/3 so that they just had to wash once during the 6 month test.

Solution

Spider-Web® XP offers triple-layer protection against fine, airborne contaminants. At the core of Spider-Web® XP are synthetic fibers, made with tightly controlled fiber diameter and pore size (space between the fibers) to protect the turbine from particulate larger than 5µm. On both sides of the substrate, we bond our



patented Spider-Web® nanofibers in very thin but robust layers -- these are what enhance filter efficiency, especially on particles smaller than 2µm, the ones that are primarily responsible for compressor fouling. See photos on facing page.

Results

- ☑ Above expectations! See photo below of the turbine opened for maintenance after the 6 months -- clean!
- ☑ The plant did not have to water wash even once during the 6 month test. No time off-line for washing!
- ☑ Pressure drop increased by only 5mm WG (0.2" w.g.) over the 6 months of the test.
- ☑ Elyo France documented a significant increase in turbine availability as well as a substantial cost reduction due to not having to go off-line to water wash.

Spider-Web® XP Expected to Reduce Fouling at Alliance Pipeline

Site: Alliance Pipeline gas compressor stations in various locations in central Canada & United States

Turbines: GEAP LM2500

Filter Houses: Donaldson TTD Self-Cleaning ('Huff 'n Puff') Cartridge Filter Systems

Situation

Alliance Pipeline operates 14 compressor stations along their 1857 miles (2988 km) of pipeline running through the heart of North America, so consistently getting maximum output from their gas turbines is a primary goal of their operations staff.

When Donaldson introduced a new filter media, **Spider-Web® XP**, which is designed to capture more of the very small particulate that is the main cause of fouling, one of AP's plant engineers wondered if it could make a difference.

He reported, "I did a lot of research and cost analysis, and according to my calculations, the improved power due to reduced fouling caused by the higher efficiency filtration offered by the XP filters outweighed the additional capital cost of the investment."

This is the theory and they installed the filters based on this expectation. Alliance Pipeline is now in the process of testing and monitoring to see exactly how much power improvement there will be.



In the Donaldson laboratory and at other beta test sites, Spider-Web® XP proved itself with reduced compressor fouling, longer intervals between compressor washes, and higher average efficiency -- all of which increases power output.

Spider-Web® XP offers triple-layer protection against fine, airborne contaminants. At the core of Spider-Web® XP are synthetic fibers, made with tightly controlled fiber diameter and pore size (space between the fibers) to protect the turbine from particulate larger than 2µm.

How to Evaluate Filter Performance Tests

How to Compare Filter Efficiency Data

Different filter tests provide different types of stated filter efficiency.

Most of us consider the air that we breathe to be relatively clean when, in fact, each breath contains hundreds of tiny “dust” particles. Most of these particles are so small (less than 25µ) that they cannot be seen with the naked eye. Because a turbine “breathes” considerably more air than we do, it is much more susceptible to the negative effects of these dust particles.

There are three basic types of filter efficiency that are referenced in filter data reports:

ARRESTANCE -- the ratio of the weight of dust particles captured to the total weight of dust exposed to the filter;

DUST SPOT (or ASHRAE 52.1) -- relates to the relative “staining” characteristics of the dust that passes through a filter;

FRACTIONAL EFFICIENCY (or ASHRAE 52.2) -- the discrete measure of the number of particles of a specific size downstream of a filter compared to a measure of the number of particles of the same size upstream of the filter. This test is also called particle counting.

How are these measurements important in gas turbine filters?

Although “small” particles in the air outnumber “large” particles by a ratio in the range of a million to one, the large particles account for most of the weight. Large particles (>5µm) are what cause erosion on turbine blades, and if a filter’s efficiency did not quickly approach 99+% on these particles, that filter would not be used for a turbine application. For this reason, arrestance efficiency is of little significance for turbine filters.

Dust spot efficiency is a significant test because it measures a filter’s ability to remove smaller micron particles that will adhere to turbine compressor blades or deposit inside cooling passages. These small particles (<5 µm) will foul the compressor over time and result in reduced turbine performance. The ability of a filter to prevent this fouling results in increased turbine performance and a reduction in the amount and frequency of cleaning needed.

Fractional efficiency (or particle count) is a significant test, especially on smaller particulate sizes, because it is a method for comparing different filter element efficiencies on specific particle sizes. This test shows differences in efficiency performance of ‘similar’ types of filter media, and for the most part will show the same efficiency relationship between filters as shown by the Dust Spot.

When Analyzing Filter Test Data...

Not only is it important to recognize that there are different types of efficiency, it is also important to recognize that filter data being compared must be from tests performed at similar airflow rates. That is why Donaldson has invested

so heavily in multiple tests of the same filters at different airflow rates: there is little value in looking at a filter tested for a flow rate of 500 cfm on a 26" filter element if the filter elements in your air filtration system are 22" long, operating at a flow rate of 900 cfm.

It is also important to look at all of the data in a filter test. If a filter element has an efficiency of 99.5% on a particular micron size after it has been loaded with 100 grams of dust, the average efficiency from start-up to that point will be significantly less, and the 99.5% efficiency is of little value to a turbine operator unless the filter element is loaded with dust before it is installed in the air filter.

The “Average Efficiency” from start-up to any point on a loading curve should be the only efficiency data that is compared and is determined by the ratio of the area under the efficiency curve to the total area of the graph. This is the same method employed when a filter is rated with an (average) ASHRAE Efficiency.

Finally, it is important to recognize that efficiency data shows how much dust a filter media has captured rather than how much dust has passed through (penetrated) the filter media.

It is the comparison of dust penetration that should be of interest to turbine users, because it is only the dust that passes through a filter that affects the performance of the turbine.

For example, although there doesn’t appear to be much difference between a 94% filter efficiency and a 96% filter efficiency, the 94% efficient filter allows 50% more dust to pass through (penetrate) the filter media.

Filtration Basics

Group	MERV Rating	(E ₁) Composite Avg. Particle Size Efficiency (PSE) 0.3 – 1.0 Microns	(E ₂) Composite Avg. Particle Size Efficiency (PSE) 1.0 – 3.0 Microns	(E ₃) Composite Avg. Particle Size Efficiency (PSE) 3.0 – 10.0 Microns	Average Arrestance by ASHRAE 52.1 Method	MERV: Minimum Efficiency Reporting Values (ASHRAE Standard 52.2)
1	MERV 1	–	–	Less than 20%	<65%	
	MERV 2	–	–	Less than 20%	65% – 69.9%	
	MERV 3	–	–	Less than 20%	70% – 74.9%	
	MERV 4	–	–	Less than 20%	≥75%	
2	MERV 5	–	–	20% – 34.9%	–	
	MERV 6	–	–	35% – 49.9%	–	
	MERV 7	–	–	50% – 69.9%	–	
	MERV 8	–	–	70% – 84.9%	–	
3	MERV 9	–	Less than 50%	≥85%	–	
	MERV 10	–	50% – 64.9%	≥85%	–	
	MERV 11	–	65% – 79.9%	≥85%	–	
	MERV 12	–	80% – 89.9%	≥90%	–	
4	MERV 13	Less than 75%	≥90%	≥90%	–	
	MERV 14	75% – 84.9%	≥90%	≥90%	–	
	MERV 15	85% – 94.9%	≥90%	≥90%	–	
	MERV 16	≥95%	≥95%	≥95%	–	

Air Filter Classification Equivalency Table

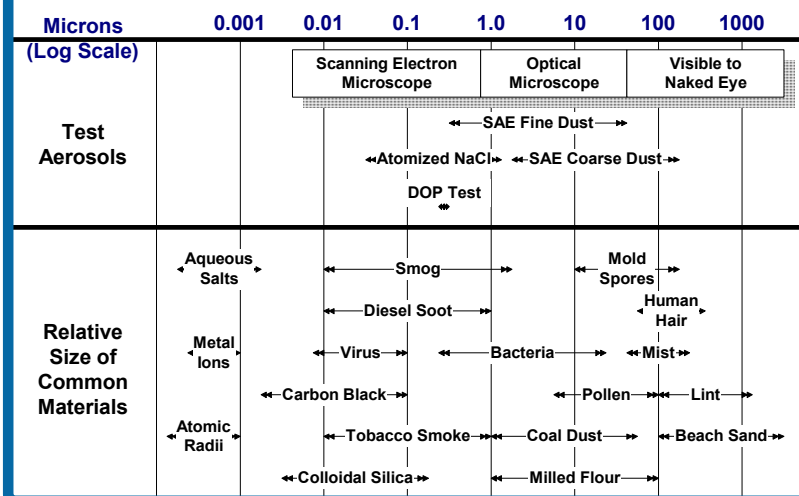
Meeting global standards: ASHRAE 52.1, EN 1779, Eurovent 4/5, BS 6540, DIN 24 185

Filter Type	Eurovent	EN779	ASHRAE 52.1 Efficiency	Measured By
for Coarse Dust	EU1	G1*	<65%	Synthetic Dust Weight Arrestance
	EU2	G2*	65<80%	
	EU3	G3*	80<90%	
	EU4	G4*	>90%	
for Fine Dust	EU5	F5**	40<60%	Atmo-spheric Dust Spot Efficiency
	EU6	F6**	60<80%	
	EU7	F7	80<90%	
	EU8	F8	90<95%	
	EU9	F9	>95%	
European HEPA Standards	EU10	H10	85%	Sodium Chloride or Liquid Aerosol
	EU11	H11	95%	
	EU12	H12	99.5%	
	EU13	H13	99.95%	
	EU14	H14	99.995%	
US HEPA Standard			99.97%	DOP test MIL Std 282

* Tested per EN 779
** Efficiency @ 0.4 μm

HEPA = High Efficiency
Particulate Air Filter

Relative Dust/Particle Sizes



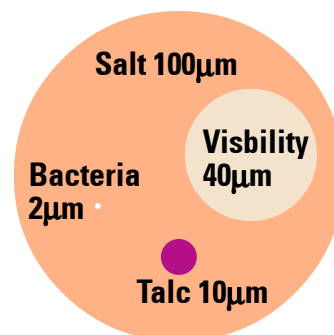
How Big is a Micron?

As a unit of measure, 1 micron also called micro meter) = 1 millionth of a meter or .000039 inch.

Symbol = μm

Size examples of familiar particles:

- 100μm = Grain of table salt (.004 inch)
- 40μm = Lower limit of visibility (.0015 inch)
- 10μm = Talcum powder (.0004 inch)
- 2μm = Bacteria (.00008 inch)



Hydraulic Filters



Duramax®

Highest Pressure Spin-On in the Industry



HMK05 & HMK25 Duramax® Spin-On

Media Number	Media Type	$\beta_{x(c)} = 1000$ Rating	Length (in./mm)	Part No.
No. 1	Synteq®	6µm	11.6/294	P170906
			11.6/294	P1712732 Viton seals
No. 2	Synteq®	9µm	11.6/294	P165675
			11.6/294	P1712742 Viton seals
			14.2/361	P179763
No. 2½	Synteq®	10µm	11.6/294	P176567
No. 3	Synteq®	14µm	14.2/361	P170949
No. 4	Synteq®	20µm	11.6/294	P165659
			11.6/294	P1712752 Viton seals
No. 9	Synteq®	23µm	11.6/294	P165569
			11.6/294	P1712762 Viton seals
			14.2/361	P173789
No. 10	Cellulose	23µm	11.6/294	P165705
No. 20	Synteq®	>50µm	11.6/294	P165672
			14.2/361	P170546
No. 149	Wiremesh	150µm nominal	11.6/294	P173943

Working Pressures to:

350 psi, 2413 kPa, 24.1 bar

Rated Static Burst to:

800 psi, 5520 kPa, 55.2 bar

Flow Range to:

50 gpm, 189.3 l/min, 378.5 l/min

HPK04 Cartridges

Media Number	$\beta_{x(c)} = 1000$ Rating	Length (in./mm)	Part Number	Comments
1	6µm	8/203	P167842	
			P167185	High Collapse
			16/406 P169433	
2	9µm	8/203	P167187	High Collapse
			P164594	
			P164601	Viton Seals
2½	10µm	16/406	P164598	
			P164603	Viton Seals
			P164166	
4	20µm	8/203	P167186	High Collapse
			P164170	
			P164367	Viton Seals
9	23µm	8/203	P167188	High Collapse
			P164365	Viton Seals
			P164174	
20	>50µm	16/406	P164178	
			P165319	
74	—/—/75	8/203	P162233	200 wiremesh screen



Working Pressures to:

6000 psi, 41,400 kPa, 413.8 bar

Rated Static Burst to:

12000 psi, 82800 kPa, 827.6 bar

Flow Range to:

120 gpm, 454 l/min



All HPK04 replacement cartridges contain Synteq filter media

Filter Notes

- Filters with seals made of **BunaN** are appropriate for most applications involving petroleum oil. Filters with seals made of **fluorocarbon elastomer** (such as Viton® or Fluorel®) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F. (Viton® is a registered trademark of DuPont Dow Elastomers and Fluorel® is a trademark of 3M Company.)
- The plastisol (heat cured) and urethane (self-curing) potting materials used in Donaldson filters perform well with petroleum-based fluids. Contact us to special order epoxy potting.
- Synteq® filter media is compatible with petroleum based fluids, and most phosphate esters, water oil emulsions, and HWCF (high water content fluids.)
- Donaldson high collapse filters, with their steel endcaps and reinforcing wire-backed media, are rated to withstand up to 3000 psi/ 20,700 kPa before collapsing.

Hydraulic Filters



**Full line of hydraulic filters
in stock! Call us today!**

Full Line of Replacement Cartridges & Spin-ons

Whether you need a spin-on or a cartridge replacement, a BunaN or a special fluorocarbon seal (such as Viton), or a particular media to handle the contamination you face, Donaldson most likely has a replacement hydraulic filter for your industrial application.

What cleanliness level do you need? We have abroad line-up of replacement filters, heads and full assemblies, to fulfill your oil cleanliness level requirements. Most are in-stock, ready to ship. Call us with any brand part number, and we can cross reference it to a Donaldson unit that offers equivalent or superior performance.

Media Choices

For highest performance, choose Donaldson Synteq®, our exclusive synthetic media that we formulated specifically for industrial liquid filtration. Natural fiber cellulose for low-contaminant applications, and wire mesh for heavy duty situations are also available.



Synteq®

HBK05 Spin-on

Media	$\beta_{x(c)} = 1000$ Rating	Length		Part Number
No.		in	mm	
No. 1/2	<3µm	10.7	271	P167796 Viton Seal
No. 1	6µm	6.7 10.7	170 271	P169430 P167832
No. 2	9µm	6.7 10.7	170 271	P167162 P165762
No. 2 1/2	10µm	6.7 10.7	170 271	P165875 P165876
No. 6	13µm	6.7 10.7	170 271	P167944 Viton Seal P167945 Viton Seal
No. 9	23µm	6.7 10.7	170 271	P165877 P165878
No. 20	>50µm	6.7 10.7	170 271	P165879 P165880

Working Pressures to:

150 psi, 1034 kPa, 10.3 bar

Rated Static Burst to:

250 psi, 1724 kPa, 17.2 bar

Flow Ranges to:

60 gpm, 227 l/min (Return-line)

30 gpm, 114 l/min (Suction)

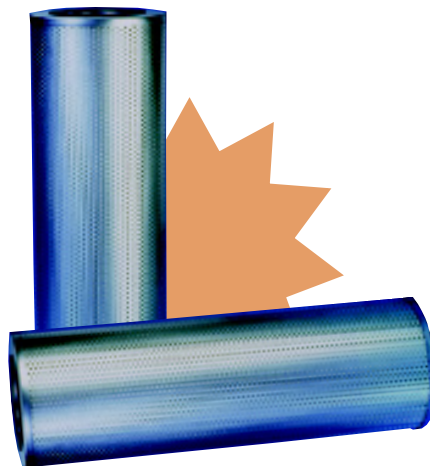


All HBK05 spin-ons contain Donaldson Synteq® synthetic filter media.

6X18 Hydraulic Replacement Cartridges

Media No.	Media Technology	Efficiency		Part Number	Inside Diameter
1/2	Synteq®	$\beta=1000^*$	<5µm(c)	P178729	2.6"/ 66mm
1	Synteq®	$\beta=1000$	6µm(c)	P176202	3.2"/ 81mm
2	Synteq®	$\beta=1000$	9µm(c)	P170102	2.6"/ 66mm
9	Synteq®	$\beta=1000$	23µm(c)	P170103	2.6"/ 66mm
9	Synteq®	$\beta=1000$	23µm(c)	P176205	3.2"/ 81mm
3	Cellulose	$\beta=1000$	24µm(c)	P550212	2.6"/ 66mm
10	Cellulose	$\beta=1000$	23µm(c)	P550213	2.6"/ 66mm
25	Cellulose	$\beta=200$	32µm(c)	P550216	2.6"/ 66mm

* Beyond the capability of the particle counter.



For more information on Donaldson Hydraulic Filters, call us or access our website:
www.donaldson.com
or ask for catalog **F112100**

Also Call Donaldson For....

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Email: hydraulicfilters@mail.donaldson.com

- Low-, Medium- & High-Pressure
- Complete line of heads, housings, cartridges, spin-ons, and replacement elements.
- Extensive cross-reference line
- Most part numbers are in stock



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- Engine air cleaner housings & air filter elements
- Complete line of liquid filters -- lube, fuel, coolant
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Email: semiconductor@mail.donaldson.com

- Air/chemical filters for fuel cells
- Air/chemical filters for computer disk drives & microelectronics
- Air/chemical filters for semiconductor processing



Filters for Dust Collectors

Call 800-365-1331

Email: dustmktg@mail.donaldson.com

- Dust, fume & mist collectors
- Replacement parts and cartridge filters
- Many media choices to suit special applications



Helpful Documents Available

Donaldson designs and manufactures the most technically advanced gas turbine air inlet filtration systems on the planet! For detailed information on new systems or retrofits, please call us or see our website: www.donaldson.com. We look forward to serving you.

Inlet Air Filtration Systems

- **Panel Systems: XLR & GTM.**

Using PowerCore media packaging technology enables XLR to be up to 40% smaller than other air inlet systems for large turbines. Less steel and fewer filters to change, yet the same high performance you expect from Donaldson. The GTM system is designed for marine/offshore applications and employs louvers and pocket filters. See page 37 for details.

- **Cartridge Systems GDX/GDS.**

With cartridge filter pairs mounted horizontally, this system has become the industry standard for high efficiency air filtration. Available as self-cleaning (pulsed) or static, single or dual inlet, for small or large turbines. The static GDS can be upgraded later to pulse.

- **Cartridge System TTD.**

The original *Huff 'n Puff* self-cleaning filter for gas turbine and generator ventilation applications. Cartridge filters are mounted vertically.

Air Inlet Enhancements

- **Air Inlet Cooling Systems**

- **Inlet Silencing**

- **Anti-Icing Systems/Inlet Heating**

Donaldson's Tech Topics publications are available to you. Call or email for a free copy!

Subject	Publication Number
Filter Element Replacement Procedure for GDX & GDS Filtration Systems	GTS-501
Filter Element Long-Term Storage Guidelines	GTS-513
Optimizing Turbine Output with Good Air Filtration	GTS-803
7 Things to Know When Replacing Filters (Comparing Filter Performance)	GTS-512
Filter Comparison Data (Donaldson against TDC)	GTS-505
Executive Summary of GTS-505	GTS-506
Spider-Web Cost Comparison -- in English	GTS-507
Spider-Web Cost Justification -- in Spanish	GTS-511
Spider-Web Cost Justification -- in Portuguese	GTS-515
Gain Access Behind Evap Cooler with Hobbit Doors & Lexan Windows	GTS-514
Preventing Biological Growth in Evaporative Coolers	GTS-517
Why Locate Cooling Coils Downstream of the Filters	GTS-518



Donaldson Company, Inc. is a 90-year-old manufacturer with over a billion dollars in annual revenues. Over the years, many of the major advancements in industrial filtration have been pioneered by Donaldson -- such as self-cleaning (pulsed) systems; 2-stage filtration; inertial separation STRATA® tubes; new & unique filter media technology, such as Spider-Web® nanofiber medi, PowerCore media packaging.... and more!

Our commitment to advanced products is surpassed only by our commitment to quality -- as evidenced by ISO9001/2 certification in our own factories, as well as quality certification by over 60 of our major OEM customers, including General Electric, General Motors, Caterpillar, Ford, Mack, John Deere, Cummins.

Donaldson has a network of 40 domestic and international engineering, manufacturing, warehousing, and sales operations throughout the world. 3 to 5% of our revenue is put back into research & development every year, so that we can bring you the most advanced filtration systems in the world.

Serving you....worldwide:

Corporate World Headquarters:
Minneapolis, Minnesota USA

European Headquarters:
Brussels, Belgium

Asia/Pacific Headquarters:
Singapore



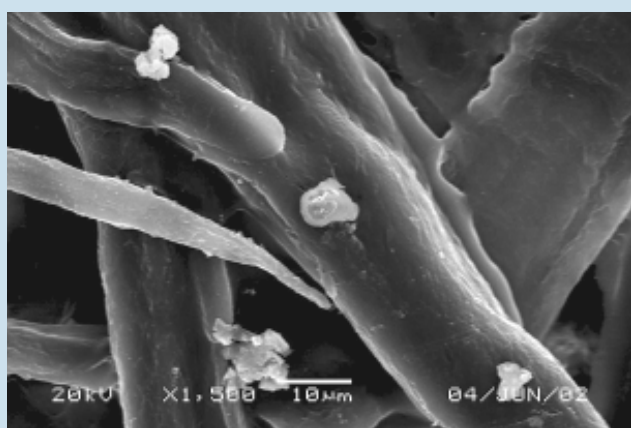
FM28249



Services

Why Re-Using Filters That Have Been Washed is NOT a Good Idea

Donaldson does not recommend washing filter cartridges or panels, or cleaning them with compressed air, because of the possibilities of cross-contamination. Here's an example of what typically happens. Under the microscope, the photo below shows filter media after the element had been washed.



This is the downstream side (the "clean air side") of the filter media! Note that large particles of dirt -- ranging from 5 to 12 µm in size -- are clearly visible as deposits on the media fibers. They can sluff off the media and be carried to the turbine inlet.

This means that washing had the exact opposite effect from what was intended -- it actually negated the protection the filter normally offers!

Filter Product Warranty

Donaldson warrants all the filters we manufacture against defects in materials and workmanship for one year from time of manufacture, provided normal operating conditions prevail and our procedures for storage, service, and care are followed. Note that washing of our filters is never recommended. See the full warranty statement on our website:

www.donaldson.com

Filter Analysis Service

Donaldson's labs can evaluate the condition of your filters to determine if they should be replaced, or to make recommendations that could help improve the operation of your air inlet system relative to contamination problems specific to your site. Call us for details.



Filter samples must have been installed in an operating turbine for 2 years or more, or for 1200+ operating hours. Testing is available for a fee on filters that have not been operating for the 2 year/1200 hour minimum. Chemical testing is also available for a fee.



Release Ship Programs

For your scheduling convenience, Donaldson offers warehousing programs on blanket orders for up to 4 months after receipt of order, releasing filters when you need them during outage, or in batches over a few weeks to suit your work schedule. Call for details.



Donaldson-Identified Merchandise

Log-on to find good-looking, high quality wearables and other handy logo merchandise:

<https://ssl.cpimarketing.com/donaldson/>

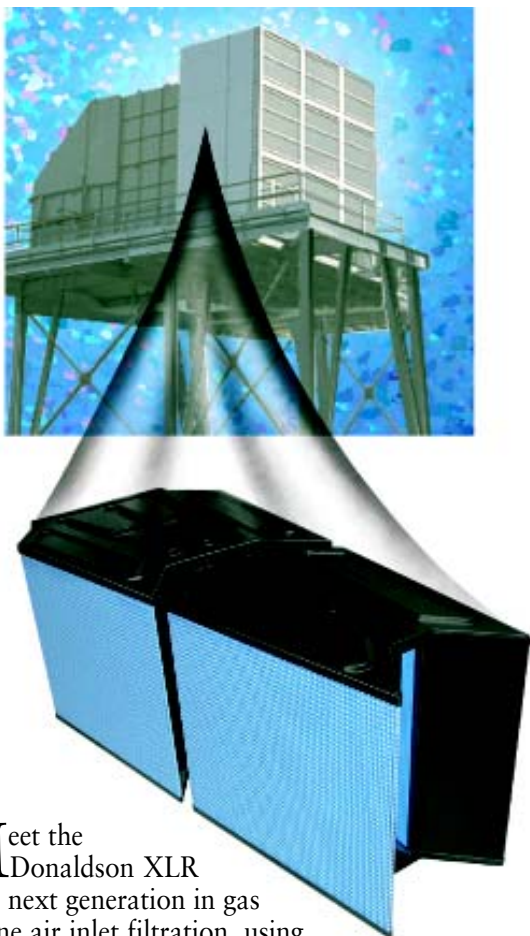
You'll find a variety of:

- ☒ caps
- ☒ jackets
- ☒ golf shirts
- ☒ pens
- ☒ golf accessories



NEW Inlet Filtration Systems from Donaldson

XLR for Large Turbines ... 40% Smaller



Meet the Donaldson XLR -- the next generation in gas turbine air inlet filtration, using Donaldson PowerCore media technology to produce a system for large turbines that can be up to 40% smaller! And it's designed for low maintenance and easier servicing.

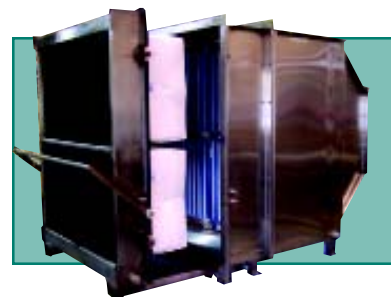
XLR is self-cleaning: a strong reverse pulse-jet of air is automatically initiated when ΔP through the system exceeds a preset limit. There are about half as many filter elements in the XLR as in the GDX, so filter change-out is faster.

The valves in the pulse system have been redesigned to more effectively clean both elements in the pair, and the blowpipe nozzles have been re-designed to distribute the pulse cross the entire face of the elements at almost 3 times the pressure of the GDX nozzle. The valves are mounted such that the operator can perform all valve/manifold service from the walkway on the filter side. Each valve is held in by only 4 bolts that are easily accessible as an operator faces the filters. The new valve also has a quick release to service the solenoid, for faster & easier servicing. XLR replacement filters are shown on page 19.

GTM for Marine/Offshore Applications



The front of the GTM system pulls out like a drawer (rather than being hinged like a door). This enables a smaller system footprint, as well as operator convenience.



The new Donaldson GTM Inlet Air Filtration System is specially designed for gas turbine combustion & ventilation intake applications on FPSO's, offshore platforms, coastal regions, and other marine applications.

4 filtration stages protect your rotating equipment by removing salt & dirt particulate and water droplets from the intake air. The housing is stainless steel.

The high-velocity GTM fits industry-standard skid systems, meeting today's requirements for a small envelope and light weight. This is beneficial on both first-fit and retrofit applications.

GTM units are fully assembled and delivered in a single lift (subject to transportation limitations) so that installation is faster & easier on both new and retrofit applications.

GTM replacement filters are shown on page 16.

Helpful Information

How to Reduce Water Washing to Reduce Cost of Operations

PROBLEM: Excessive on-line water washing costs something, even when de-min water seems 'free.'

SOLUTION: Donaldson filter cartridges made with Spider-Web® (our exclusive, patented nanofiber media technology), protect turbine blades so well that on-line water washes can be reduced, significantly in many cases.

EXAMPLE: on a GE Frame 7EA Turbine

Daily Water Washing

De-min water produced by plant = 3¢ per gallon
 X 500 gallons per wash = \$15 per wash, per day
 X 360 wash days = **\$5,400 per year COST**

Water Washing Every Other Day

But, what if this site used Donaldson Spider-Web® nanofiber filter technology, enabling water wash reduction to every other day?

De-min water produced by plant = 3¢ per gallon
 X 500 gallons per wash = \$15 per wash, per day
 X 180 wash days = \$2,700 per year
 = **\$2,700 per year SAVINGS**
over daily water washing

1X Per Week Water Washing

And what if this site used Donaldson Spider-Web® nanofiber filter technology, enabling water wash reduction to only one time per week?

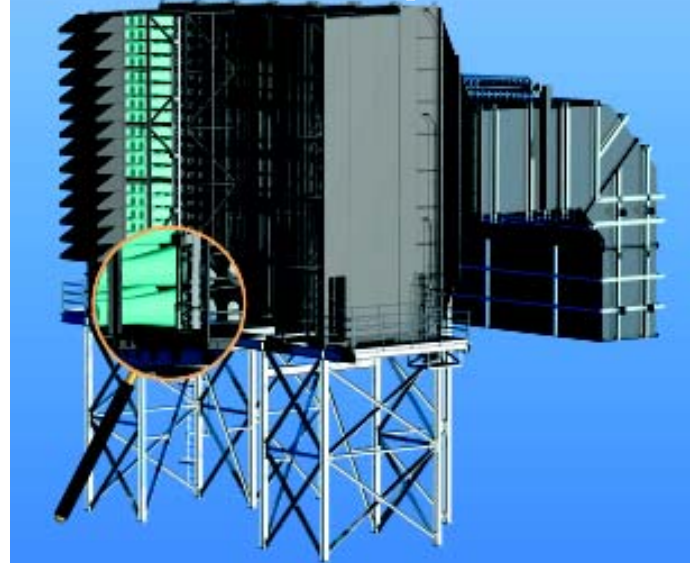
De-min water produced by plant = 3¢ per gallon
 X 500 gallons per wash = \$15 per wash, per day
 X 52 wash days = \$780 per year
 = **\$4,600 per year SAVINGS**
over daily water washing

Because of its superior performance, Spider-Web can SAVE expenses throughout the year, year after year!

Here's how:

864 Spider-Web cartridges @ \$10 more than non-Spider-Web filters = \$8640 more every 3 years (average filter life). Compare this (about \$2,880 per year) to the potential water-wash savings (\$4,600 per year!) every year, over the life of the filters! Net gain of \$1720 per year, or \$5160 over a 3-year filter life. (Filter life varies according to environment and other operational factors.)

Donaldson GDX Self-Cleaning Inlet Air Filter with Evaporative Cooler



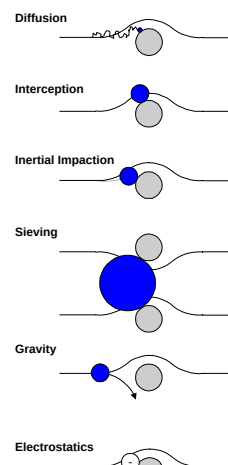
5 Signs of Evap Cooler Media Deterioration

If you have one or a combination of these conditions in your evaporative cooler media, you know it's time to replace some media panels.

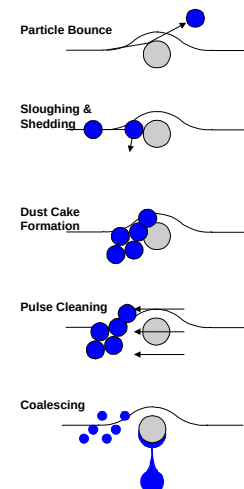
- 1) The ΔP across the evaporative cooler has doubled compared to when it was new.
 - 2) Media edges are crumbling.
 - 3) The media is mushy.
 - 4) There is water downstream of the evap cooler.
 - 5) The media is separating from the steel framework.
- Find replacement media part numbers on page 47.

Various Filtration Mechanisms

Primary



Secondary



System Spare Parts Sorted by Part Number

Part No.	Description	Page	Part No.	Description	Page
25006	Pressure Gauge	45	70174-01	Pulse Cycle Counter	41
25182	Evap Cooler Wetting Media	47	76154-01	Lift & Turn Door Handle	48
27005	Evap Cooler Distribution Pad	47	80835-01	Switch, Multi-Station	46
27381	Pressure Gauge	45	80857-28	Fuse, 60 amp	41
37760	Solenoid Encl - NEMA 7	43	81026-01	Pressure Transmitter	44
38446	Hoist - manual	22	81408-02	Valve, Ball, 1/8" NPT	46
39068	Water Separation Media	40	84402-01	Low Pressure Switch	42
39569	Birdscreen Kit - galvanized	23	86684-XX	Pump, Centrifugal, 60 Hz	46
44479	Hoist - electric	22	86685-XX	Pump, Centrifugal, 50 Hz	46
44732	Solenoid Encl - Cenelec	43	89205-01	Retrofit Kit: Conductivty Contr.	46
46575	Solenoid Encl - NEMA 7	43	AD28743-01	Filter Assembly	42
53717	Evap Cooler Drift Eliminator	47	AD28744-01	Replacement Filter	42
67009	Retention Clip	11	AD52632-01	26" Crank (swage end)	11
70883	Caulking	48	AD63850-01	Access Door Kit	22
71671	Evap Cooler Drift Eliminator	47	AD70805	Conductivity Controller - digital	46
83768	Birdscreen Kit -stainless steel	23	AD83630	Water Separation Media Kit	40
19443-00	Diaphragm Valve - Pneu	43	P12-5342	Mist Eliminator	40
21882-01	Quick Coupling	40	P12-5343	Weather Louver	40
23536-00	Repair Kit - Diaph Valve	43	P12-5349	Mist Eliminator	40
24277-00	Diaphragm Valve - Pneu	43	P12-5350	Weather Louver	40
24699-02	Coupling Repair Kit	42	P12-5416	Pre-Filter (poly pad)	40
24765-00	Repair Kit - Solenoid	43	P12-5417	Pre-Filter (poly pad)	40
24767-00	Quick Nut Assembly	11	P12-5489	Housing 1 - oil mist	14
25409-00	Solenoid Coil 115VAC	43	P12-5490	Housing 2 - oil mist	14
25694-00	Solenoid Coil 24VDC	43	P12-5886	Relay & Socket	41
26106-00	Diaphragm Valve - Elec	42	P12-5887	Switch/Gauge	45
31295-01	CFS over-center latch	11	P12-5888	Timer Board - 115VAC	41
31295-05	CFS over-center latch	11	P13-2582	Fuse - 3 amp	41
31455-XX	Expl-proof Diff Press Switch	44	P13-5047	Relay, 24VDC	41
32889-00	Diaphragm Valve - Pneu	42	P13-5057	Timer Board - 24VDC	41
35672-01	Hose - GDX blowpipe	42	P13-5216	Power Supply	41
37260-00	Solenoid Coil 12VDC	43	P13-5223	Fuse, 2 amp	41
37827-00	Solenoid Coil 24VDC	43	P13-5247	Voltage Regulator	41
37969-01	Valve, Ball, 3/4" NPTF	46	P13-5249	22" Crank for Quick Nut	11
40202-01	T-Handle Door Handle	48	P13-5536	Pressure Gauge	42
42367-01	Repair Kit - Solenoid	42	P13-5712	Fuse, 1/4 amp	41
42366-00	Repair Kit - Diaph Valve	42	P13-9378	Differential Pressure Switch	44
44178-02	Valve, Solenoid, 1 1/2" NPTF	46	P13-9379	Differential Pressure Switch	44
44183-XX	Meter, Flow	46	P13-9675	Fuse, 1 amp	41
44351-03	Valve, Gate, 2", Flanged	46	P14-6849	Relay, 120V	41
45862-01	Relay, 24VDC, latching	41	P14-9555	26" Crank for Quick Nut	11
46152-03	Brass Ball Valve	42	P15-6458	Timer Board - 115VAC	41
47835-XX	Switch/Gauge	45	P15-7359	26" Crank (swage end)	11
49151-01	Timer, Tripper	41	P15-7523	Element - oil mist	14
49699-XX	Pressure Transmitter	44	P15-7760	Expl-proof Diff Press Switch	44
53292-00	Differential Pressure Switch	44	P19-0717	22" Crank for Quick Nut	11
53501-XX	GDX Yoke Leg Set	11	P19-0806	22" Crank (swage end)	11
53791-02	GDX Yoke Bolt Kit	11	P19-0883	CFS Spring Retainer	11
54972-01	Timer, Programmable	41	P19-1500	30" Crank for Quick Nut	11
55225-01	Regulator	22	P19-1501	30" Crank (swage end)	11
55225-03	Hoist - pneumatic	22	P52-4740	Gasket, Washer	11
55225-04	Air Hose	22	P52-4742	22" Crank (swage end)	11
56602-01	26" Crank for Quick Nut	11	P77-0920	Retention Nut	11
61096-XX	Conductivity Controller - Analog	46	TBD-019001	Inertial Separator/Air Filter	48
62105-01	Gauge, Pressure, 0-60 PSI	46			
63188-01	Diaphragm Valve - Elec	42			
66595-05	Valve, Globe, 1 1/2" NPTF	46			

Inlet Moisture Removal

Moisture Separation Panels inside Air Inlet Hoods

The panels inside the air inlet hoods on GDX, GDS and other Donaldson filter houses are made of sturdy polymer material and have no moving parts, so don't get replaced often. But, over 15 to 20 years, they may experience some general deterioration and need replacement.

When you call, tell us your filter model number and/or serial number, or tell us the dimensions of your panels. Buy a piece to replace deteriorated pieces, or buy a kit, which contains enough media & mounting hardware for an entire module of the filter house.

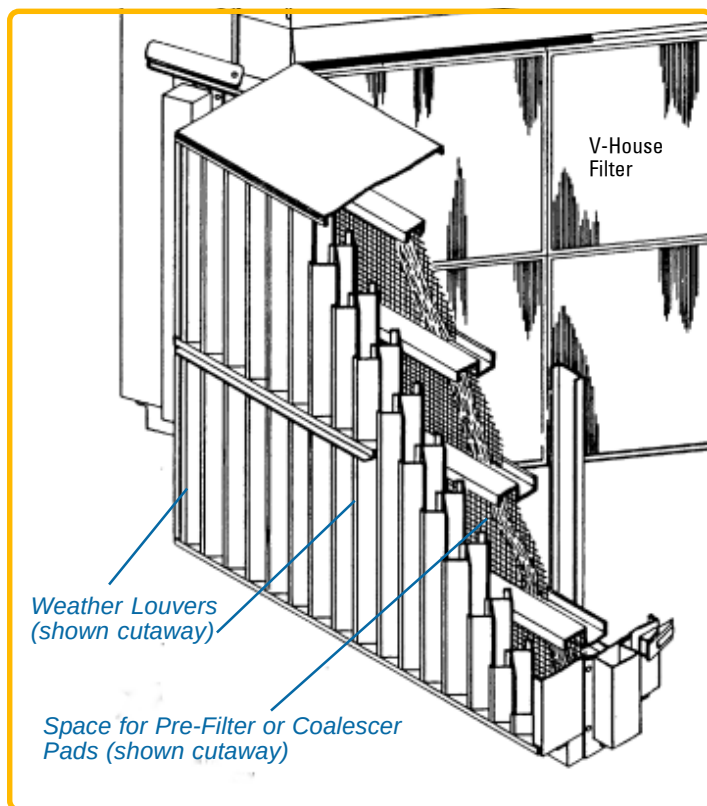
These also serve as bird/trash screens. See information about bird/trash screens on page 23.

Media panels sit horizontally inside air inlet hoods.

How It Works: Airflow enters from the bottom side. Air passes on through the media, while water droplets impinge on the curved surface, then roll backwards (due to gravity) to drain away.

Water Separation Media

Part No.	Description
39068	1 panel
AD83630	Kit for GDX/GDS



V-House Water Separation Parts

Louvers

The white vinyl louvers typically used on Donaldson V-House style filtration units (TMD, TJD, etc) employ inertial separation principles to remove rain, sleet & snow from the incoming airstream. While they don't wear out, they can incur damage (dents, tears, etc) from accidents with nearby machinery, and may need full or partial replacement. Donaldson louvers are sold in convenient sections so that you can replace only the damaged part, not the entire panel.

Pre-Filters & Coalescers

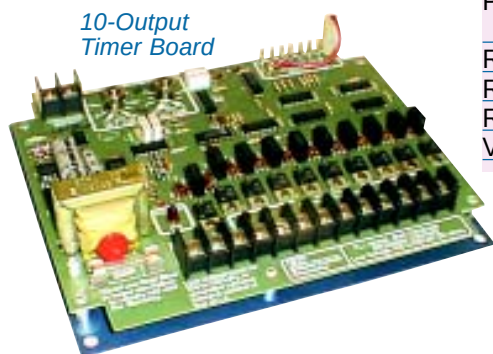
Between the white weather louvers and the panel filters on a Donaldson V-House System, there's a slot for either a pre-filter pad or a moisture eliminator/coalescer pad. Which you have depends on your environment -- pre-filters capture dust, while moisture eliminators coalesce the small water droplets that pass through the weather louvers. (Collected water is eliminated from the system via a Vacuator™ Valve at the bottom.)

Part Number	Description	Material or Media	Dimensions
P12-5343	Weather Louver	white vinyl	41.15" X 5"
P12-5350	Weather Louver	white vinyl	61.56" X 5"
P12-5342	Mist Eliminator	Polypropylene mesh (black)	10.75"W x 41.5"H x 1"D
P12-5349	Mist Eliminator	Polypropylene mesh (black)	10.75"W x 61.75"H x 1"D
P12-5416	Pre-Filter	polyester pad (white)	10.75"W x 41.5"H x 1"D
P12-5417	Pre-Filter	polyester pad (white)	10.75"W x 61.75"H x 1"D

Control Box Replacement Parts

Complete Control Box

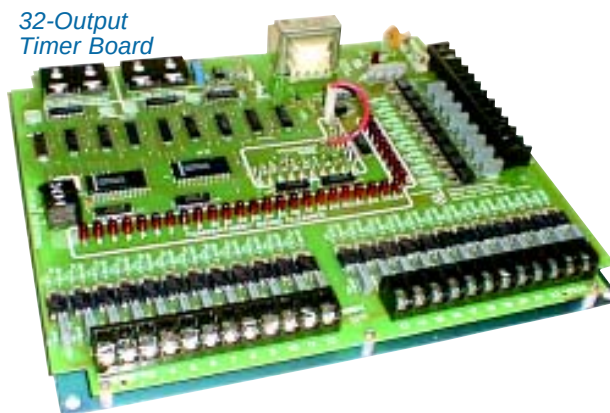
If your filtration system control box has been hit by lightning or has incurred irreparable damage, we can replace the entire box. Each control box is virtually unique, so call us with your system serial number for a quote on price and delivery.



10-Output
Timer Board

Control Box Replacement Parts

Component	Part Number	Comments
Timer Board	P12-5888	115VAC, 10 outputs
Timer Board	P15-6458	115VAC, 32 outputs
Timer Board	P13-5057	24VDC, 10 outputs
Relay & Socket	P12-5886	24 VDC
Pulse Cycle Counter	70174-01	formerly P14-4555
Fuse	P13-2582	3 amp
Fuse	P13-5223	2 amp
Fuse	P13-9675	1 amp
Fuse	P13-5712	1/4 amp
Fuse	80857-28	60 amp
Power Supply	P13-5216	115/230 VAC input, 24 VDC/2.5amp output
Relay	45862-01	24 VDC/2PDT, latching style
Relay	P13-5047	24 VDC/3PDT, #KUP14D15
Relay	P14-6849	120V #KUP14A15
Voltage Regulator	P13-5247	24 VDC input/ 24 VDC/3amp output



32-Output
Timer Board

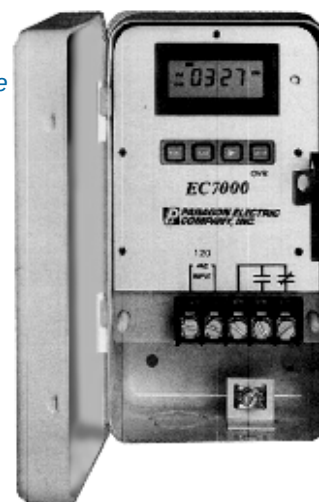
Clock Timers

Component	Part Number	Description
Timer, Tripper	49151-01	24 Hr, manually set
Timer, Programmable	54972-01	24 Hr, digital readout

Typically Used In:

- GDX & TTD pulse-cleaned systems to initiate pulse cleaning at specified times of day.

Programmable
Clock Timer



Tripper Clock Timer

Compressed Air System Components

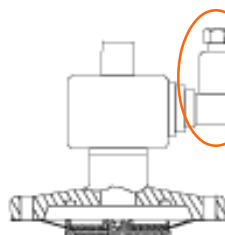
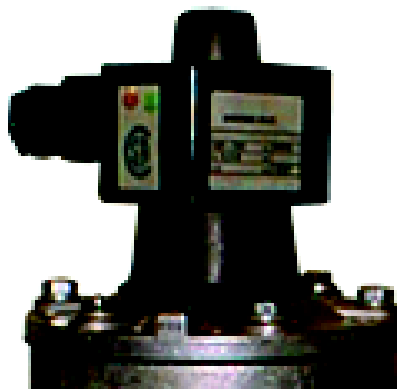
Electrically- and Pneumatically-Actuated Diaphragm Valves

Typically used in Donaldson GDX self-cleaning filter systems to control the reverse pulse of air that cleans the filters. All are rated for operation in temperatures from -40°C to +50°C.

The pneumatic valves have an integral solenoid for pilot control.

Typically Used In:

- GDX (filters mounted horizontally)

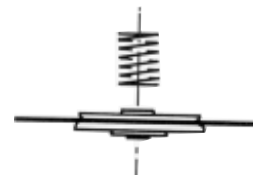


Assy A 26106-00 includes the connector gasket & socket.

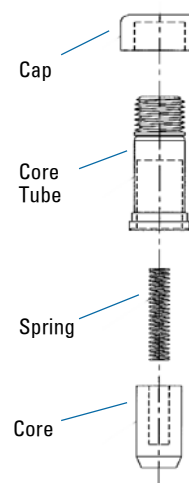
Assy B 63188-01 does NOT include these parts.

Repair Kits

for Diaphragm Valve
Part Number 42366-00



for Solenoid
Part Number 42367-01



Diaphragm Valve Assemblies

Description	Donaldson Part No.	Number on the Unit	Assembly Includes
Elect. Valve Hat Assy A	26106-00*	8495735.9305/2	Valve hat, diaphragm, solenoid, coil, connector
Elect. Valve Hat Assy B	63188-01*	8495735.9302	Valve hat, diaphragm, solenoid, coil
Pneu. Valve Hat Assy	32889-00	8494923/964	Valve hat & diaphragm for connector to remote (solenoid) pilot valve

* Electrical: 110/120 Volt, 50/60 Hz, 24VA

Compressed Air System Components

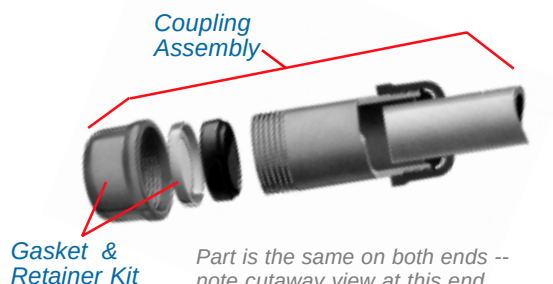
Clean, dry compressed air is used in Donaldson self-cleaning air inlet filtration systems to clean the filter elements via a quick blast of reverse-flow air. While there are many system parts, those listed below are the most commonly replaced. (Check your Filter System Manual for other part numbers specific to your system.)

Typically Used In

- GDX & TTD (pulsed, self-cleaning filter systems)

Component	Part Number	Comments
Pressure Gauge	P13-5536	0-160psig, 1/4" NPT
Filter Assembly	AD28743-01	Housing for AD28744-01 cartridge
Replacement Filter	AD28744-01	for AD28743-01 filter housing
Quick Coupling	21882-01	for 1" diam piping (see below)
Coupling Repair Kit	24699-02	gasket/retainer for 8PP-21882-01
Brass Ball Valve	46152-03	1" NPT
Low Pressure Switch	84402-01	0-100 psi, 1/2" NPT, CSA/UL appv'd
Hose	35672-01	for GDX blowpipe

QUICK COUPLING: Typically used to connect 1-inch-diameter air manifold piping, this versatile coupling is fast and easy to use -- and quite 'forgiving' as well: the connecting pipes can be out of alignment with each other by up to 14 degrees!



Part is the same on both ends -- note cutaway view at this end and exploded parts view at other end.

Compressed Air Control

Repair Kit for Solenoid Valve

(includes core tube, spring,
and core)

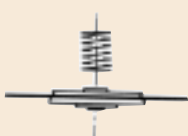
Repair kit for
RCA5V3 & 5V4 solenoids
Part No. 24765-00
(formerly P12-5763)



Diaphragm Valve Repair Kit

(includes diaphragm
& spring)

Part No. 23536-00



Seal & Retainer Repair Kit

Part No. 25696-00



Typically Used In

- TTD(filters mounted vertically)

Solenoid Coils

Electrical	NPT	Model	Part Number	Enclosure	Repair Kit for this valve
115VAC	1/8"	RCA3	25409-00	NEMA 4	37831-00
24VDC	1/8"	RCA3	37827-00	NEMA 7	24636-00
12VDC	1/8"	RCA3	37260-00	n/a	n/a
24VDC	1/4"	RCA5	25694-00	NEMA 7	24765-00

Solenoid Enclosure Assemblies

Part No.	Description
46575	NEMA 7
37760	NEMA 7 + UL-approved
44732	Cenelec-certified EEx'd'

Pilot Solenoid Valves & Enclosures

For valves that are inside enclosures that are NEMA 4, NEMA 7, CSA-appvd, UL-appvd, or Cenelec-certified EEx'd', you can:

- Replace only the coil (per valve numbers below),
- or
- Replace only the solenoid components (per listed repair kits),
- or
- Replace the entire valve enclosure (per numbers below.)



24277-00
Diaphragm Valve

Remote-Actuated Pneumatic Diaphragm Valves

Diaphragm valves are pneumatic valves that connect to a remote solenoid for pilot control. These valves, with 1" / 25mm orifices, are part of the mechanism that operates the reverse pulse of air that cleans the filters. Order the entire valve, or just a repair kit, depending on what you need.

Typically Used In

- TTD(filters mounted vertically)

Valves

Description	Part Number	Model	Comments	Compatible Repair Kit
Diaphragm Valve (Not pictured)	19443-00	RCA25TD	Needs 1" NPT couplings -40° to 180°F	23536-00
Diaphragm Valve (Photo shown above)	24277-00	RCA25DD	Integral couplings -40° to 180°F	23536-00 (diaphragm) 25696-00 (seal kit)

Differential Pressure Gauges & Switches



Explosion-Proof Differential Pressure Switches

The 1950 differential pressure switches are SPDT explosion proof, rated for Class 1 Div 1&2, Groups A,B,C,D and Class 2, Groups E,F,G, and at NEMA 7.

Typically used in: GDX, TTD, CFS, GDS filtration systems.



Settable Differential Pressure Switches

The 1910 differential pressure switches are SPDT settable for various upper limits of airflow restriction, and are typically used to alert the operator to filter condition and alarm the operator in case of shut-down conditions.

Typically used in: GDX, TTD, CFS, GDS filtration systems.

Part Number Number on Unit Comments

Explosion-Proof Differential Pressure Switches

ALL: Rated for Class 1, Groups A,B,C,D and Class 2, Groups E,F,G, and NEMA 7 Elec: 120-480 V, 60 Hz AC, Temp: 32° to 180°F

31455-01	1950-1	Preset: 1" H ₂ O Settable: 0.4" - 1.6" H ₂ O
31455-02	1950-5	Preset: 2" H ₂ O Settable: 1.4" - 5.5" H ₂ O
31455-03	1950-5	Preset: 3" H ₂ O Settable: 1.4" - 5.5" H ₂ O
31455-04	1950-5	Preset: 4" H ₂ O Settable: 1.4" - 5.5" H ₂ O
31455-11	1950-5	Preset: 2.5" H ₂ O Settable: 1.4" - 5.5"
31455-05 Formerly P135489	1950-10	Preset: 5" H ₂ O Settable: 3" - 11" H ₂ O
31455-06	1950-10	Preset: 6" H ₂ O Settable: 3" - 11" H ₂ O
31455-07 Formerly: P135490	1950-10	Preset: 7" H ₂ O Settable: 3" - 11" H ₂ O
31455-08 Formerly P157873	1950-10	Preset: 8" H ₂ O Settable: 3" - 11" H ₂ O
31455-09	1950-10	Preset: 9" H ₂ O Settable: 3" - 11" H ₂ O
31455-10	1950-10	Preset: 10" H ₂ O Settable: 3" - 11" H ₂ O
P15-7760 Low Temp Version	1910-10-Gold	Preset: 8" H ₂ O Settable: 3" - 11" H ₂ O Temp: -40° - 140°F

Settable Differential Pressure Switches

ALL: Elec: 120V, 60 Hz AC, Temp: 32° to 180°F

P13-9378	1910-0	Settable: 0.15" - 0.5" H ₂ O
P13-9379	1910-5	Settable: 1.4" - 5.5" H ₂ O
53292-00	1910-10	Settable: 3" - 11" H ₂ O
Formerly P15-6628		Max Pressure: 45" H ₂ O

Differential Pressure Transmitters

ALL: Stainless steel flange. Pressure range: to 30" H₂O, except 81026.

49699-01	1151	Housing: low-copper alum.NEMA 4X
49699-02	1151-B2	Housing: low-copper alum.NEMA 4X. Incl. mounting bracket
49699-03	1151-H1	Housing: 316 stainless steel. NEMA4X
49699-05	1151-K6	Housing: 316 stainless steel. NEMA4X . Incl. CSA certification.
81026-01	3051	Pressure Range: 0-0.5 to 0-25" H ₂ O Housing: polymer-covered aluminum CSA, CENELEC approved

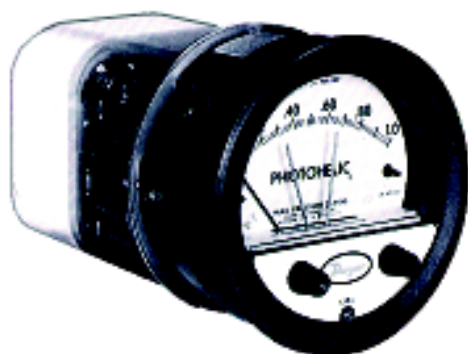


Differential Pressure Transmitter

Provides a continuous analog signal to your master control panel, usually connected to remote instrument to provide continuous readings of pressure. Available with NEMA 4X rating, either stainless steel or low-copper housing. Flange is stainless steel.

Differential Pressure Gauges & Switches

Pressure gauges tell you when to change filter elements in your Donaldson Gas Turbine Filtration System. As the filters do their job and load up with dust and dirt, the differential pressure (also called ΔP or pressure drop) across the filters gradually increases. When the upper limit of acceptability is reached on the gauge, you know it's time to change out the filter elements.

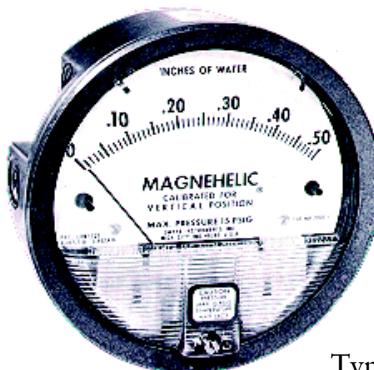


Part Number	Number on Unit	Comments
Differential Pressure Combination Switch/Gauges		
47835-01	A3008-RMR-LT	Settable: 0"-8" H ₂ O, Temp: -40° to 120°F Scales: inches H ₂ O & mm H ₂ O 12" switch-to-gauge cable
47835-02	A3008-RMR-LT	Settable: 0"-8" H ₂ O, Temp: -40° to 120°F Scales: inches H ₂ O & milibar 12" switch-to-gauge cable
47835-03 Formerly P12-5584	A3008-RMR-LT	Settable: 0"-8" H ₂ O Temp: -40° to 120°F Scales: inches H ₂ O & kPa 12" switch-to-gauge cable
P12-5887	A3000	Settable: 0"-8" H ₂ O, Temp: -40° to 120°F Scales: inches H ₂ O 16" switch-to-relay cable 24VDC (Does not inclu. relay pack)

Differential Pressure Gauges		
25006 Formerly P139022	2010	Scale: 0"-10" H ₂ O (also shows mm H ₂ O) Temp: -40° to 140°F Rating: 25 psig sustained
27381	2002	Scale: 0"-2" H ₂ O Temp: 30° to 140°F Rating: 15 psig

Pressure Gauge + Switch

This unit serves two functions: it is both a differential pressure gauge and a switch. (Although the photo above shows the gauge & switch physically connected, in most Donaldson filtration systems, they are physically separated and connected by a cable, which is also provided with the unit.) Pressure gauge/switches are typically used in Donaldson self-cleaning gas turbine filtration systems to start and stop the pulse-cleaning mechanism.
Typically used in: TTD & GDX self-cleaning filtration systems.



Differential Pressure Gauge

This gauge measures the differential pressure (also called ΔP or pressure drop) across two different areas, usually the inlet/outlet of the filters.

Typically used in: all Donaldson gas turbine filtration systems & inlet treatment systems

Evaporative Cooler Service & Spare Parts

Evaporative Cooler Inspection

To ensure you're getting optimal cooling performance from your Donaldson Evaporative Cooler, let the Donaldson experts perform a full inspection. You'll receive a detailed report.

We check for everything — that drift eliminator was installed per instructions, that there is sufficient caulking, that there are no gaps between media sections, that the sump components, pump, and orifices are working properly...and more! We designed it, so we know how the components should be installed and function.

Many turbine OEM's recommend annual inspection, and Donaldson is authorized to do such work.

Combine this with an inspection of your entire inlet filtration system for best economy and value.



ABOVE: Evap inspector checks for gaps in the media and signs of deterioration.

RIGHT: Evaporative cooler section is typically located behind filter section.

Annual Re-Commissioning of Evaporative Cooler

Major turbine makers recommend annual commissioning of evaporative coolers and have authorized Donaldson to do it. Typically, this involves full inspection to ensure that everything is in safe and proper working order, as well as any necessary repairs work before start-up every spring.

Scope of this work covers

- Sump/pump/meter tune-up
- Media evaluation & replacement
- Seals, gaskets, caulking
- Dry run and wet run testing
- Related work as necessary or requested



Evaporative Cooler Service Parts

Description	Part Number	Material
Controller, conductivity, analog 110 VAC, 3/4" NPTF	61096-01	stainless steel electrode
Controller, conductivity, analog 220 VAC, 3/4" NPTF	61096-02	stainless steel electrode
Controller, conductivity, digital 110/220 VAC, 50-60 Hz, 4-20 ma output	AD70805	stainless steel electrode
Retrofit Kit for adding conductivity controller**	89205-01	incl. valve, piping, flow meter, couplings, clamps, etc
Gauge, Pressure, 0-60 PSI	62105-01	steel case
Meter, Flow 2.6 - 26 GPM	44183-29	brass
Meter, Flow 5.3 - 53 GPM	44183-17	brass
Meter, Flow 7.9 - 79 GPM	44183-35	brass
Pump, Centrifugal, 50 Hz, Heater	86685-01	cast iron*
Pump, Centrifugal, 50 Hz	86685-02	cast iron*
Pump, Centrifugal, 60 Hz, Heater	86684-01	cast iron*
Pump, Centrifugal, 60 Hz	86684-02	cast iron*
Switch, Multi-Station	80835-01	brass
Valve, Ball, 1/8" NPT	81408-02	brass
Valve, Ball, 3/4" NPTF	37969-01	brass
Valve, Gate, 2", Flanged	44351-03	bronze
Valve, Globe, 1 1/2" NPTF	66595-05	bronze
Valve, Solenoid, 1 1/2" NPTF	44178-02	brass

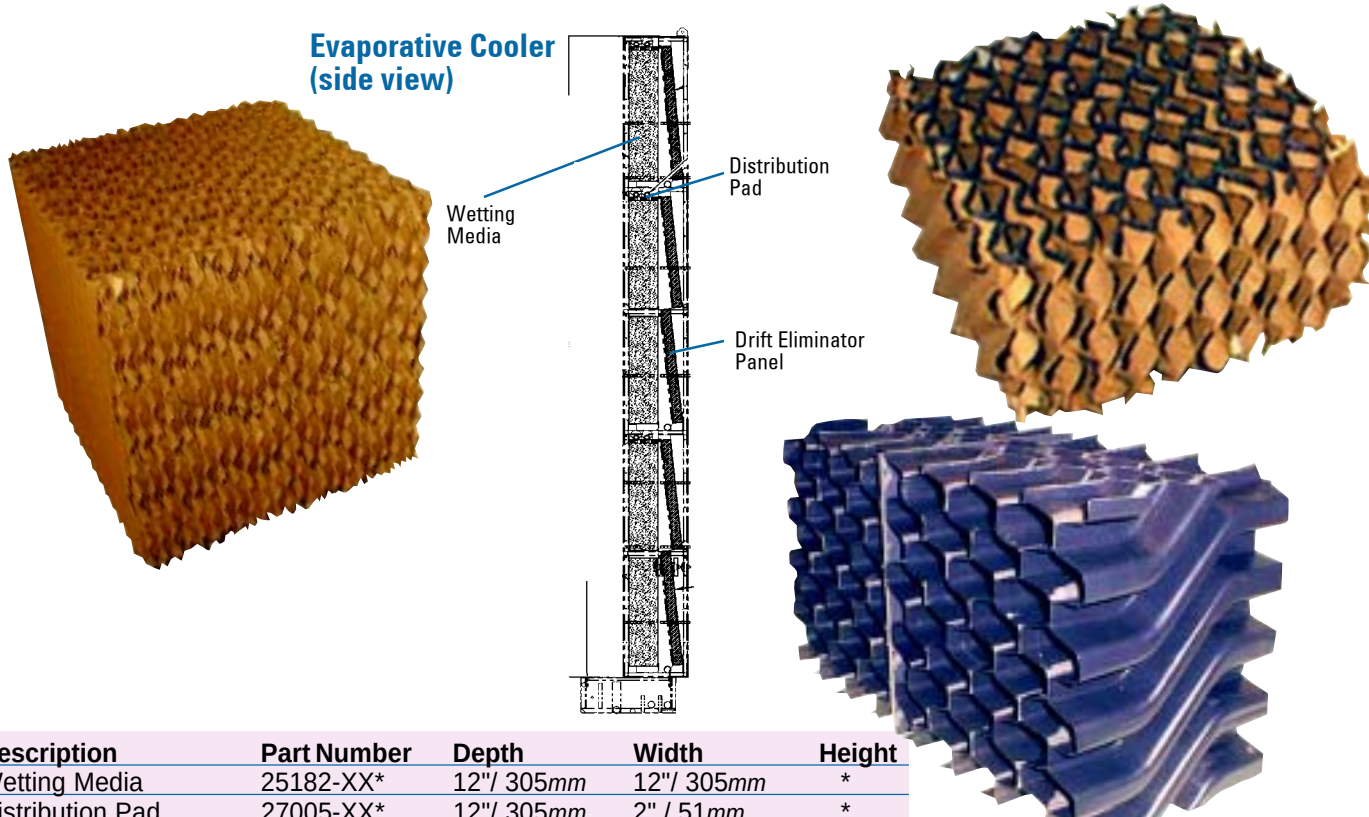
NOTES:

* Pump: cast iron casing, stainless steel shaft, bronze impeller.
Motor: cast iron casing.

** When retrofitting an evap cooler with a conductivity controller, order this kit AND one of the controllers listed. See explanation on page 47.

If you want to upgrade to other materials, such as bronze, brass or stainless steel, call us for specific part numbers and prices.

Evaporative Cooler Media



Description	Part Number	Depth	Width	Height
Wetting Media	25182-XX*	12" / 305mm	12" / 305mm	*
Distribution Pad	27005-XX*	12" / 305mm	2" / 51mm	*
Drift Eliminator Panel	53717-XX*	5 1/4" / 134mm	12 1/8" / 310mm or 25 1/8" / 640mm	*
	71671-XX*	5 1/4" / 134mm	*	*

* Cut to your desired length. The last 2 digits of the part number will indicate height.

Monitor Mineral Content in the Water in Evap Cooler with Conductivity Controller

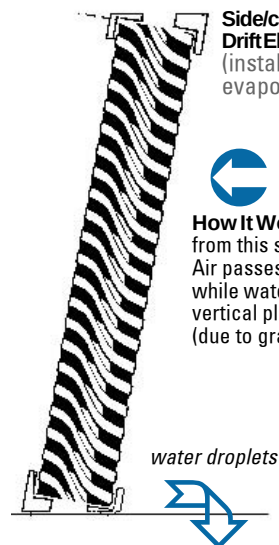
Add a conductivity controller to continuously monitor water quality (mineral content) of the water in your Donaldson Evaporative Cooling system. When the conductance exceeds a set value, a solenoid valve opens and blow-down initiates. The valve stays open until the conductance is below setpoint. This will protect the longevity of the evap media, as well as the system components, from the ravages of minerals.

Order one conductivity controller (either 110 or 220 VAC) and one installation kit. See part number list on page 46.

RIGHT: the drift eliminator panels viewed from the back side (inside the transition)



Side/cutaway view of Donaldson Drift Eliminator Panel (installed vertically in Donaldson evaporative coolers)



How It Works: Airflow enters from this side. Air passes on through the media, while water droplets coalesce on vertical plane, then roll backwards (due to gravity) to drain away.

Spare Parts for Donaldson Intake Systems

Repair Flaky Caulking!

We strongly recommend re-sealing the inlet system every 7-10 years

If the original caulking on your inlet system is 7 to 10 years old, it's time to refresh it to keep your the system airtight. Our terrific all-purpose sealant is the perfect solution! This sealant, which bonds between materials that have dissimilar coefficients of expansion, is resistant to weather, salts, acid, alkali, and water.



Seal every outside seam (even those with a gasket) on the filter house, the inlet ducting, and evaporative cooler module for best performance of your system.

You'll get 13 to 24 running feet of caulk from each tube, depending on how thick you make the bead. Offered in 4 colors, it is paintable.

Part Numbers	Color
70883-02	White
70883-03	Aluminum Gray
70883-04	Black
70883-06	Coping Stone

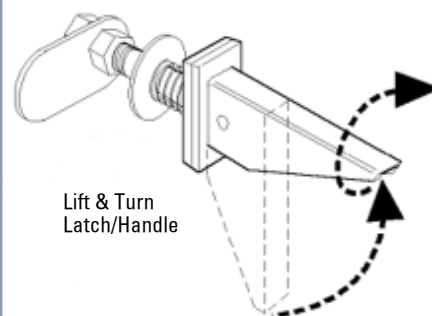
Door Gasket Material

If door gaskets have deteriorated over time due to weather and temperature extremes, you'll need to replace them. Available in 15-ft rolls, in various materials and densities. Call us for specifics related to your inlet system.

GDS System Door Handles

Two replacement door handles are available for the Donaldson Dual-Inlet GDS filter system doors.

- 1) Lift & Turn design (illustrated at below) is all 316 stainless steel.
- 2) Alternate style T-Handle (not shown here) is made of polymers, zinc, and some stainless steel.

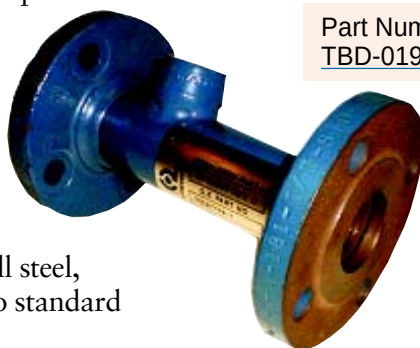


Part Numbers	
76154-01	Lift & Turn
40202-01	T-Handle

Inertial Separator / Steel STRATA® Tube

This inertial separator with standard pipe flange on each end removes cleaning materials (such as walnut shells) from the air bled off the compressor that is used for the gas turbine instrumentation.

Based on Donaldson-developed STRATA® tube technology, it's 95% to 99% efficient, depending on materials, system size, airflow, etc. All steel, no moving parts, mounts to standard pipe sizes.



Part Number
TBD-019001

Duplicate or Extra Filter System Manuals

Operation Manual get misplaced or lost? Need an extra for another operator? Call us!

Duplicate Manual	
For Large Filter System	\$385
For Small Filter System	\$225

