

Solutions for filtration applications

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An Introduction

Clean and aerosol free gas is critical for industrial equipment to operate effectively and reliably. Petrogas filtration is dedicated to designing and manufacturing dust filter and coalescer cartridges that provide high efficiency removal of solids and liquids from contaminated gases, ultimately protecting downstream equipment and reducing maintenance costs.



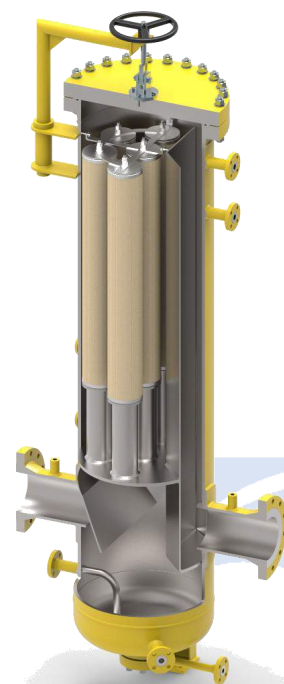
Petrogas filtration is a part of Petrogas Gas-Systems, Dutch engineering company that develops, manufactures and supplies processing equipment worldwide. Our filter cartridges are designed for application in filter-separators to remove particulates from the process streams of air, hydrogen and natural gas.



Our quality management system is ISO9001 certified and is carried out to the highest standards using the latest manufacturing technology to ensure a high quality, consistent and efficient product.

We use only high quality grade media materials from a prominent supplier that is a global leader in creating, manufacturing and supplying technically advanced high efficiency and liquid filtration media.

Petrogas upholds a stringent QC policy ensuring that every filter cartridge delivers a performance according to its design. Besides rigorously upholding our quality we are also constantly trying to improve upon it. Through research, design and frequent testing we are constantly stimulating product



Filter Element Performance Testing Method

Petrogas filtration has conducted elaborate filtration efficiency tests at renowned testing facilities. The test method and apparatus are in accordance with VDI 3926 standard.

The performance test for separation of solid particles is operated by negative pressure suction in such a way that a fixed quantity of test dust particles are added constantly through the feeder (Palas BEG-1000) at air intake. The aerosol enters into the filter and passes through the filter element to achieve filtering.

The solid particles are discharged finally through the ash hopper. A number of sensors are used in the test to check the actual working performance of the filter element at different filtration velocities.

The test procedure is as shown in Fig. 1. Relevant parameters measured in the test are as below:



gas-solid test apparatus

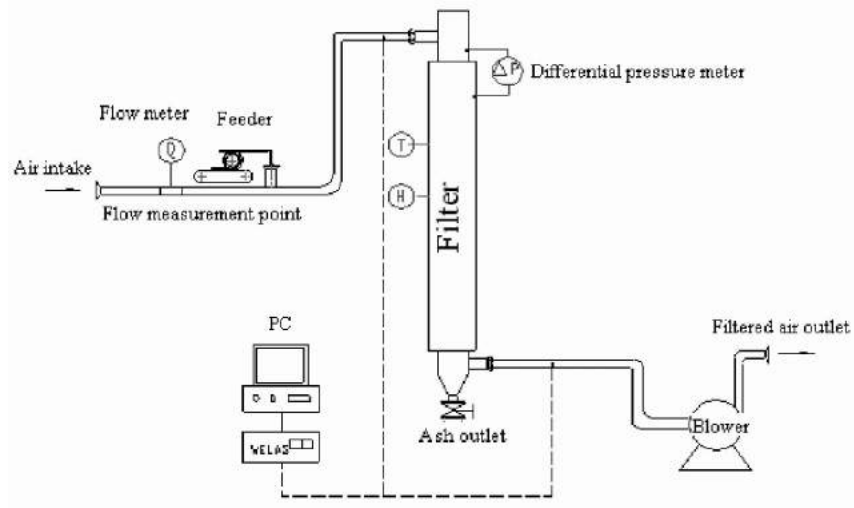


Fig. 1 Overview Test Device (Gas-Solid)



gas-liquid test apparatus

The performance test for separation of liquid particles is also operated by negative pressure suction in such a way that a fixed quantity of gasliquid mixture is added constantly through the sprayer at filter inlet.

The aerosol enters into the filter and passes through the coalescence filter element to achieve filtering. The liquid is discharged finally through the liquid outlet. A number of sensors are used in the test to check actual agglomeration working performance of the filter element at different filtration velocities.

Relevant parameters: Test temperature 27 °C, relative humidity 44.8 %, particle diameter 0.3~17mm
Test method and laboratory apparatus are in accordance with VDI3926 standard.



Filter Element Performance Testing Method

The test for separation of liquid particles is as shown in Fig. 2. Relevant parameters measured in the test are as below:

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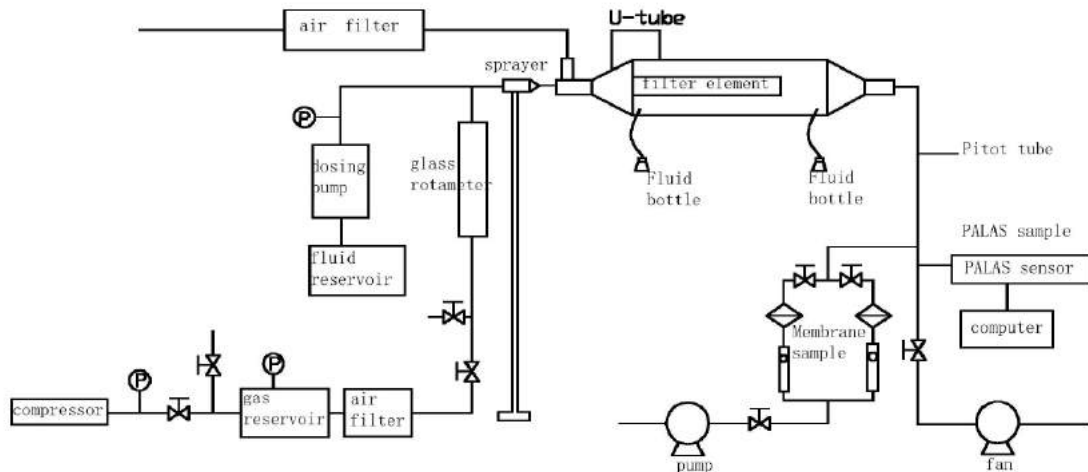


Fig. 2 Overview Test Device (Gas-Liquid)



Welas particle measuring control unit

The measuring of aerosol particle size and distribution in the up-stream and down-stream of the filter is done by an optical particle counter (Palas Welas 3000 Series). This particle measuring system, as shown below in Fig. 3,

includes a vacuum pump, sampling nozzle, diluter and computed particle detection system. Sampling is made with the own vacuum pump in Welas Control System and the sampling flow is 5 Lmin-1. A series of sampling nozzles are fabricated aiming at the common flow range. In order to ensure coaxial and iso-

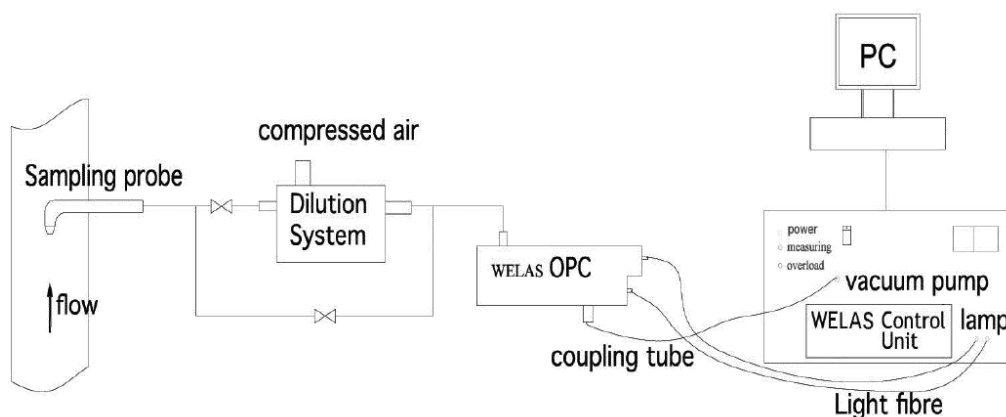


Fig. 3 Particle measurement system

Relevant parameters: Test temperature 27 °C, relative humidity 44.8 %, particle diameter 0.3~17mm
Test method and laboratory apparatus are in accordance with VDI3926 standard.



Low Temperature Dust Filter Cartridges

The P-DS LT series filter cartridge is a composite of pleated cellulose and polyester fiber and ensures high efficient removal of dust particles in air, hydrogen, natural gas and other industrial gases. This filter is recommended for low temperature applications with peak temperatures up to 90°C. The polyester reinforcement stabilizes the cellulose and provides greater moisture resistance. Its pleated structure maximizes the effective filtration area which assures high flow rate, low differential pressure and an ultimately longer service life. The filter has an inner and outer metal mesh for support and protection of the filter media. Due to its high effective filtration area and high efficiency media, this filter provides a high solid removal efficiency which ensures optimum protection of downstream equipment.



Performance Specifications:

Filter efficiency: refer to graph
Flow direction: from outside to inside
Maximum allowable differential pressure: 1.5 bar
Recommended change cartridge differential pressure: 800-1000 mbar
Maximum operating temperature: 70°C ;
short peak temperatures of max. 90°C (max. 20 min.) are acceptable.

Available Dimensions:

Inside / outside diameters [mm]:
170/230; 220/280; 270/330;
350/410
Lengths [mm]: 500, 600, 750
Additional sizes upon request.

Product Specifications:

Materials of Construction

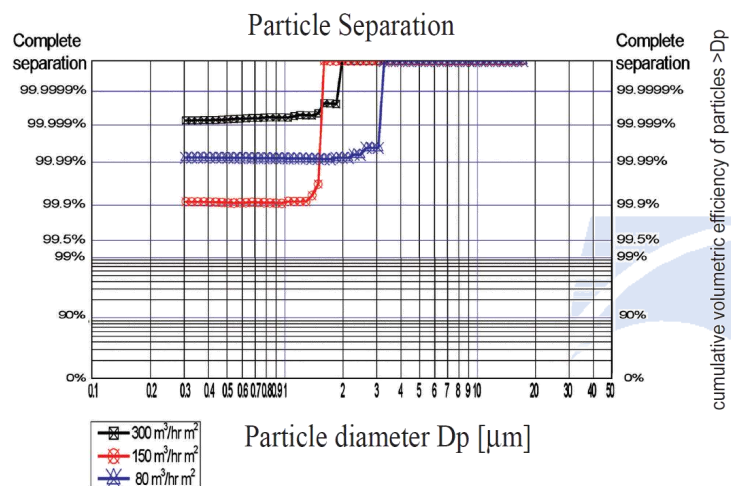
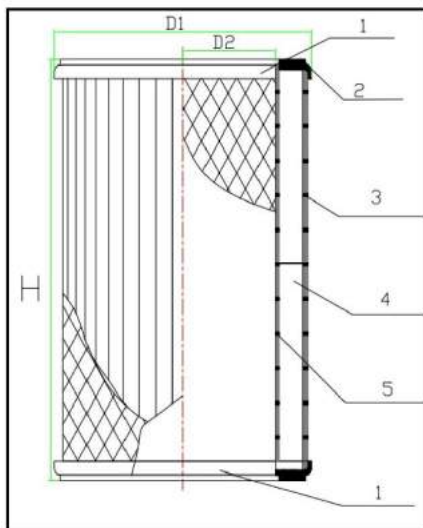
Filter Media (4): Resin impregnated high cellulose grade with 20% water repellent polyester fibers.

Inner Core (5): Q235 perforated galvanized steel

Outer Core (3): Q235 perforated galvanized steel

End Caps (1): Q235 Galvanized sheet steel

Gasket (2): Wool felt



Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Medium Temperature Dust Filter Cartridges

The P-DS MT series filter cartridge is a composite of pleated cellulose and polyester fiber and ensures high efficient removal of dust particles in air, hydrogen, natural gas and other industrial gases. This filter is recommended for medium temperature applications with peak temperatures up to 150 °C. The polyester reinforcement stabilizes the cellulose and provides greater moisture resistance. Its pleated structure maximizes the effective filtration area which assures high flow rate, low differential pressure and an ultimately longer service life. The filter has an inner and outer metal mesh for support and protection of the filter media.

Due to its high effective filtration area and high efficiency media, this filter provides a high solid removal efficiency which ensures optimum protection of downstream equipment.



Performance Specifications:

Filter efficiency: refer to graph

Flow direction: from outside to inside

Maximum allowable differential pressure: 1.5 bar

Recommended change cartridge differential pressure: 800-1000 mbar

Maximum operating temperature: 120°C ;

short peak temperatures of max. 150°C (max. 20 min.) are acceptable.

Available Dimensions:

Inside / outside diameters [mm]:

170/230; 220/280; 270/330;

350/410

Lengths [mm]: 500, 600, 750

Additional sizes upon request.

Product Specifications:

Materials of Construction

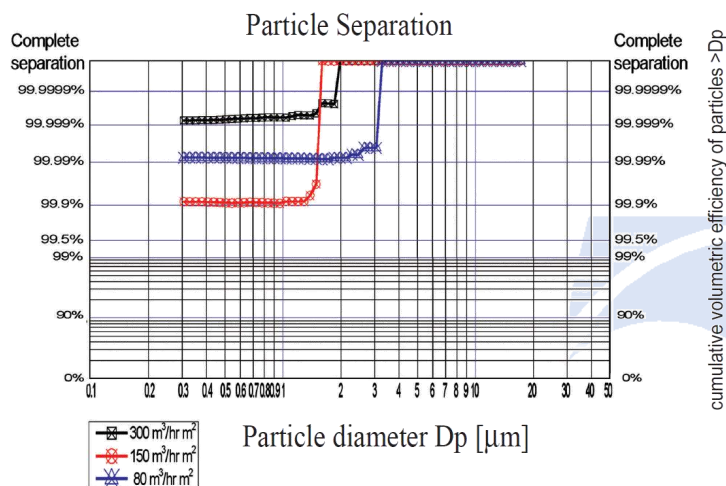
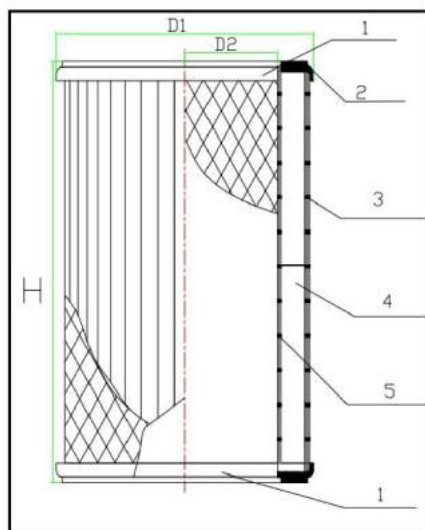
Filter Media (4): Resin impregnated high cellulose grade with 20% water repellent polyester fibers.

Inner Core (5): Q235 perforated galvanized steel

Outer Core (3): Q235 perforated galvanized steel

End Caps (1): Q235 Galvanized sheet steel

Gasket (2): Wool felt



Ultra High Temperature Dust Filter Cartridges

The P-DS UHT series filter cartridge is a pleated combination of high temperature resistant felt on a stable support and ensures high efficient removal of solid particles from hot moist gaseous media.

This filter is recommended for ultra high temperature applications with peak temperatures up to 260 C. It's pleated structure maximizes the effective filtration area which assures high flow rate, low differential pressure and an ultimately longer service life. The filter has an inner and outer metal mesh for support and protection of the filter media. Due to its high effective filtration area and high efficiency media, this filter cartridge provides a high solid removal efficiency which ensures optimum protection of downstream equipment.



Performance Specifications:

Filter efficiency: refer to graph
Flow direction: from outside to inside
Maximum allowable differential pressure: 3 bar
Recommended change cartridge differential pressure: 1000 mbar
Maximum operating temperature: 240°C ;
short peak temperatures of max. 260°C (max. 30 min.) are acceptable.

Available Dimensions:

Inside / outside diameters [mm]: 170/232
Lengths [mm]: 500, 600, 750
Additional sizes upon request.

Product Specifications:

Materials of Construction

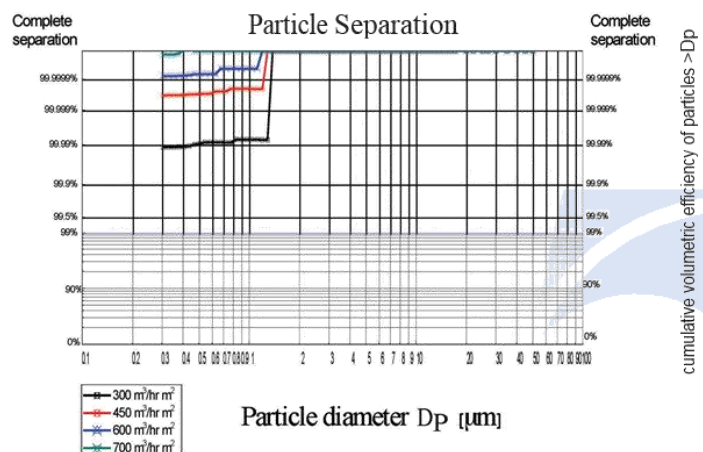
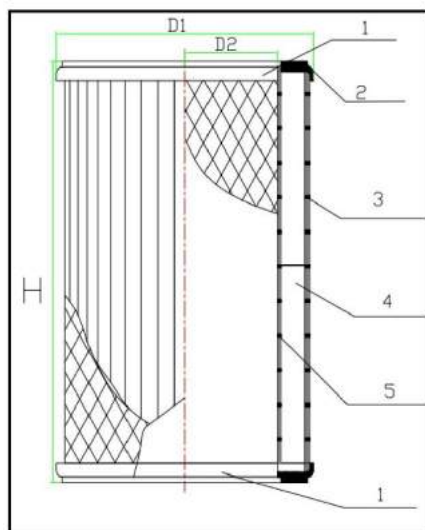
Filter Media (4): High temperature resistant felt

Inner Core (5): Q235 perforated galvanized steel

Outer Core (3): Q235 perforated galvanized steel

End Caps (1): Q235 Galvanized sheet steel

Gasket (2): High temperature resistant felt



Liquid Separation Filter Cartridges

The P-LS LT series is a cost effective liquid coalescer filter cartridge that removes liquid particles from wet gas with an ultra high efficiency while simultaneously presenting a very low restriction to gas flow, resulting in low pressure drop.

This filter is recommended for low temperature applications with peak temperatures up to 120 C. It's composite structure of wound polyester and densely wrapped layers of glass microfibers yields maximum efficiency. A cotton sock forms the most outer layer of the filter to absorb the coalesced moisture.

Due to its high effective filtration area and high efficiency media, this filter provides a low saturated pressure drop and a consistent high liquid removal efficiency which ensures optimum protection of downstream equipment



Available Dimensions:
Inside / outside diameters [mm]:
90/150
Lengths [mm]: 735, 835, 1100
Additional sizes upon request.

Performance Specifications:

Filter efficiency: refer to graph

Flow direction: from inside to outside

Maximum allowable differential pressure: 2.0 bar

Recommended change cartridge differential pressure: 800-1000 mbar

Maximum operating temperature: 70°C ; short peak temp. of max. 120°C (max. 20 min.) are acceptable.

Product Specifications:

Materials of Construction

Prefilter Media (6): polyester

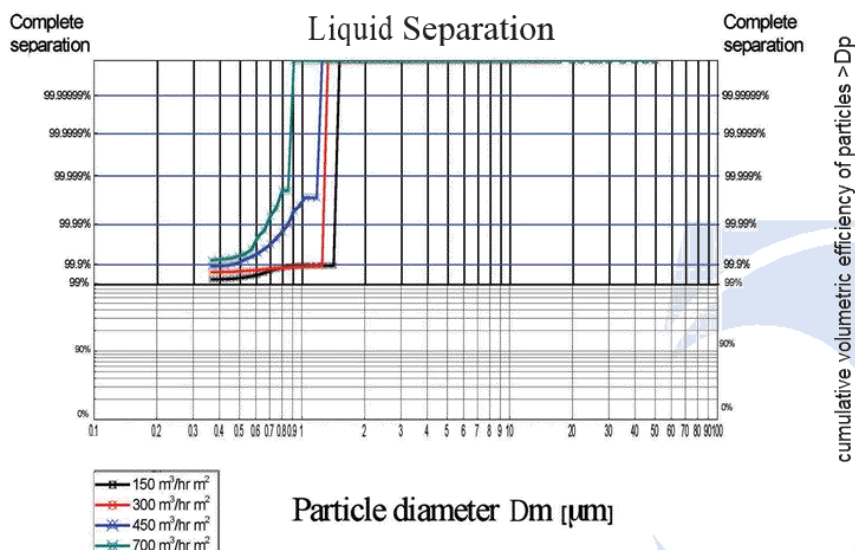
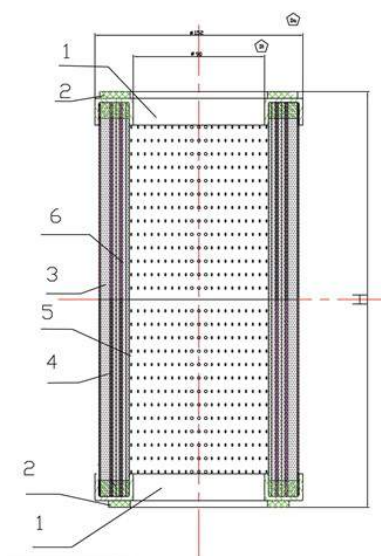
Coalescing Media (3): densely wrapped layers of glass microfibers

Inner Core (5): Q235 perforated galvanized steel

Outer Core (4): Q235 perforated galvanized steel

End Caps (1): Q235 galvanized sheet steel

Gaskets (2): wool felt



Test method and apparatus: according to VDI 3926 testing standards of filtration media



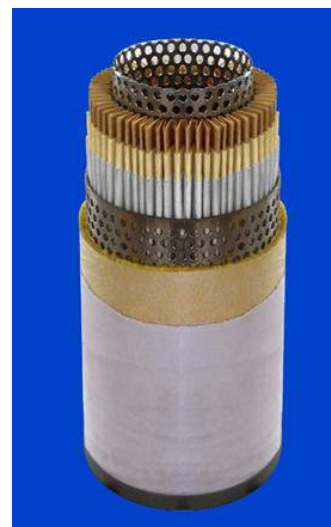
Low Temperature Coalescer Filter Cartridges

The P-DLS LT series is a cost effective coalescer filter that removes particles from moist natural gas with an ultra high efficiency while simultaneously presenting a very low restriction to the gas flow, resulting in low pressure drop.

This filter is recommended for low temperature applications with peak temperatures up to 90 °C. Its high performance is two-phased: Pre-filtering and Coalescing.

Pre-filtering removes dirt particles using a three layered pre-filter that is composed of resin impregnated pleated cellulose, polyester and glass microfibers. The second coalescing phase utilizes a densely wrapped fiberglass for maximum efficiency. A cotton sock forms the most outer layer of the filter to absorb the coalesced moisture.

Due to its high effective filtration area and high efficiency media, this filter provides a low saturated pressure drop and a consistent high solid and liquid removal efficiency which ensures optimum protection of downstream equipment.



Available Dimensions:

Inside / outside diameters [mm]:
90/150; 160/240

Lengths [mm]: 600, 735, 835, 1100

Performance Specifications:

Filter efficiency: refer to graph

Flow direction: from inside to outside

Maximum allowable differential pressure: 2.0 bar

Recommended change cartridge differential pressure: 800-1000 mbar

Maximum operating temperature: 70°C ;

short peak temperatures of max. 90°C (max. 20 min.) are acceptable.

Product Specifications:

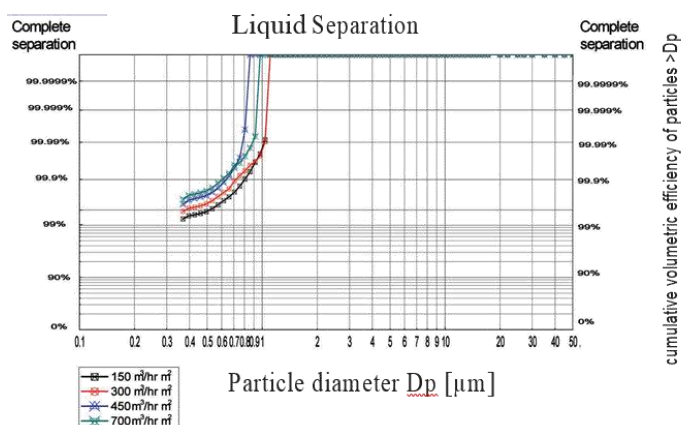
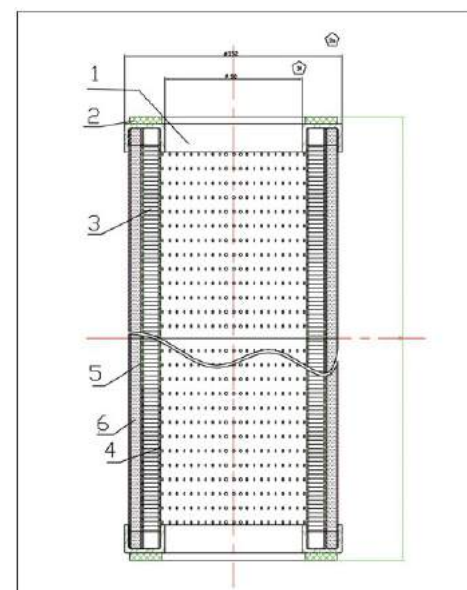
Materials of Construction

Prefilter Media (3): pleated microfiberglass coalescing media, a resin impregnated cellulose support layer and a polyester drainage layer.

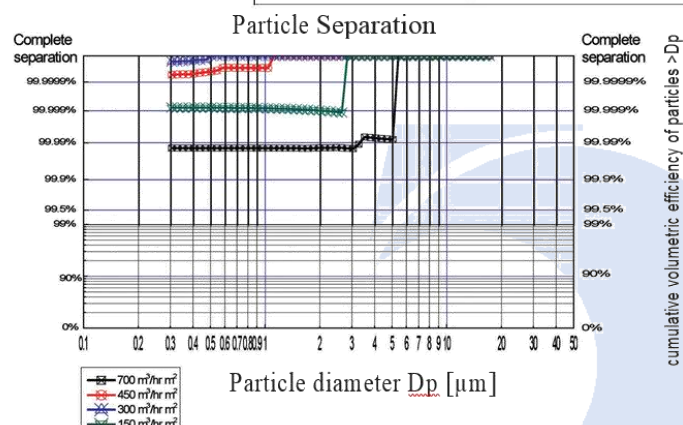
Coalescing Media (6): densely wrapped layers of glass microfibers

Inner Core (4): Q235 perforated galvanized steel

Outer Core (5): Q235 perforated galvanized steel



Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Test method and apparatus: according to VDI 3926 testing standards of filtration media.



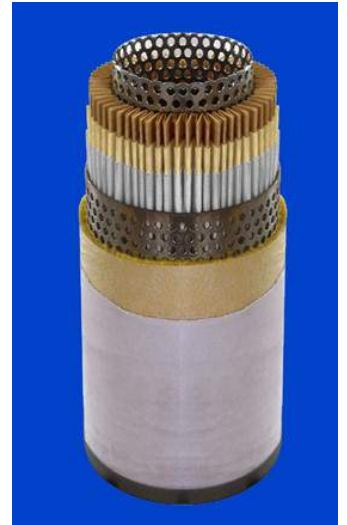
Medium Temperature Coalescer Filter Cartridges

The P-DLS LT series is a cost effective coalescer filter that removes particles from moist natural gas with an ultra high efficiency while simultaneously presenting a very low restriction to the gas flow, resulting in low pressure drop.

This filter is recommended for low temperature applications with peak temperatures up to 150°C. It's high performance is two-phased: Pre-filtering and Coalescing.

Pre-filtering removes dirt particles using a three layered pre-filter that is composed of resin impregnated pleated cellulose, polyester and glass microfibers. The second coalescing phase utilizes a densely wrapped fiberglass for maximum efficiency. A cotton sock forms the most outer layer of the filter to absorb the coalesced moisture.

Due to its high effective filtration area and high efficiency media, this filter provides a low saturated pressure drop and a consistent high solid and liquid removal efficiency which ensures optimum protection of downstream equipment.



Available Dimensions:
Inside / outside diameters [mm]:
90/150
Lengths [mm]: 600, 735, 835, 1100
Additional sizes upon request.

Performance Specifications:

Filter efficiency: refer to graph

Flow direction: from inside to outside

Maximum allowable differential pressure: 2.0 bar

Recommended change cartridge differential pressure: 800-1000 mbar

Maximum operating temperature: 120°C ;

short peak temperatures of max. 150°C (max. 20 min.) are acceptable.

Product Specifications:

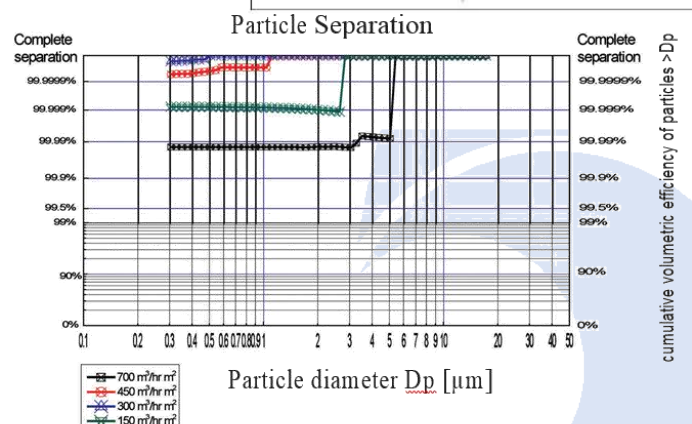
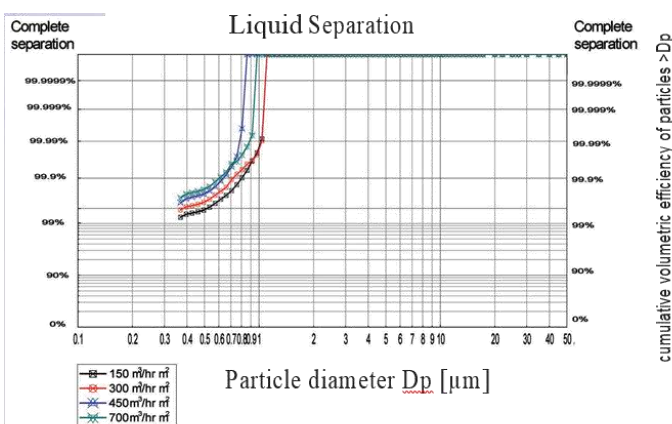
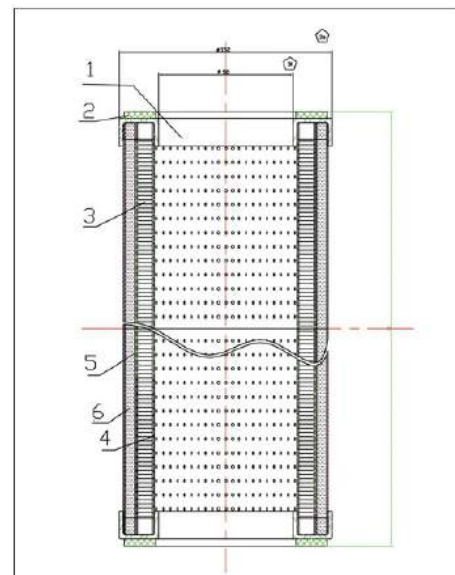
Materials of Construction

Prefilter Media (3): pleated microfiberglass coalescing media, a resin impregnated cellulose support layer and a polyester drainage layer.

Coalescing Media (6): densely wrapped layers of glass microfibers

Inner Core (4): Q235 perforated galvanized steel

Outer Core (5): Q235 perforated galvanized steel



High Temperature Coalescer Filter Cartridges

The P-DLS HT series is a cost effective coalescer filter that removes particles from moist natural gas with an ultra high efficiency while simultaneously presenting a very low restriction to the gas flow, resulting in low pressure drop.

This filter is recommended for high temperature applications with peak temperatures up to 190 °C. Its co-pleated construction of reinforced Poly Phenyl Sulfide (PPS) felt media and densely wrapped fiberglass offers maximum filtration performance. A terylene sock forms the most outer layer of the filter to absorb the coalesced moisture.

Due to its high effective filtration area and high efficiency media, this filter provides a low saturated pressure drop and a consistent high solid and liquid removal efficiency which ensures optimum protection of downstream equipment.



Available Dimensions:
Inside / outside diameters [mm]:
90/150 ; 170/230
Lengths [mm]: 600, 735, 835, 1100
Additional sizes upon request.

Performance Specifications:

Filter element efficiency: refer to graph
Flow direction: from inside to outside
Maximum allowable differential pressure: 2.0 bar
Recommended change cartridge differential pressure: 800-1000 mbar
Maximum operating temperature: 170°C ;
short peak temperatures of max. 190°C (max. 20 min.) are acceptable.

Product Specifications:

Materials of Construction

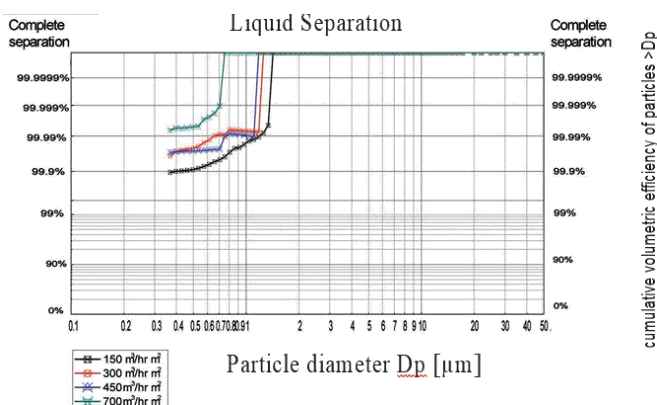
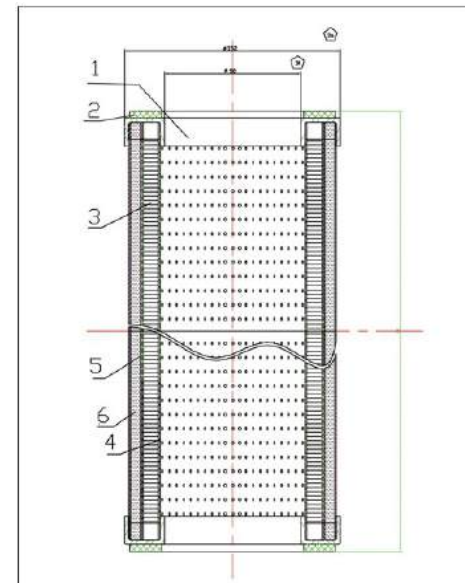
Filter Media: Reinforced PPS felt **(3)** with an outer core of ultra fine fiberglass and polyster **(6)**.

Inner Core (4): Q235 perforated galvanized steel

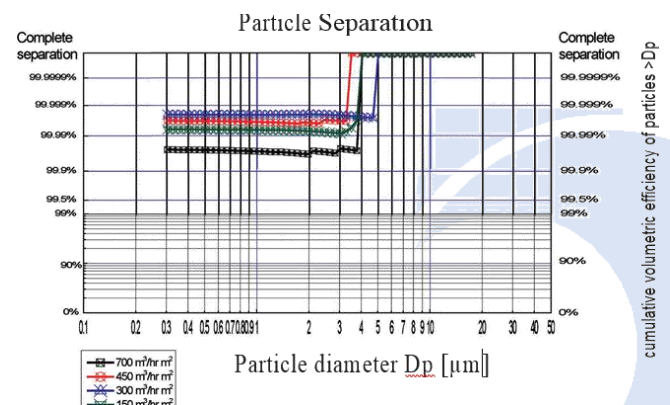
Outer Core (5): Q235 perforated galvanized steel

End Caps (1): Q235 galvanized sheet steel

Gasket (2): PPS



Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Filter Cartridge Specifications Overview

Dust Separation Medium Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DS-MT	50	112	300	-20 ~1 20	1,2	1,20
P-DS-MT	60	112	150	-20 ~1 20	0,5	0,66
P-DS-MT	86	165	270	-20 ~1 20	2,2	2,55
P-DS-MT	90	150	150	-20 ~1 20	0,7	0,80
P-DS-MT	90	150	400	-20 ~1 20	1,8	2,40
P-DS-MT	120	180	300	-20 ~1 20	2,6	2,65
P-DS-MT	120	180	400	-20 ~1 20	2,7	3,50
P-DS-MT	120	180	600	-20 ~1 20	5,3	5,32
P-DS-MT	150	210	400	-20 ~1 20	3,4	3,31
P-DS-MT	170	230	500	-20 ~1 20	4,5	4,89
P-DS-MT	170	230	600	-20 ~1 20	5,7	5,90
P-DS-MT	170	230	750	-20 ~1 20	6,7	7,41
P-DS-MT	170	230	800	-20 ~1 20	8	7,91
P-DS-MT	220	280	300	-20 ~1 20	4,6	3,25
P-DS-MT	220	280	500	-20 ~1 20	5,6	5,40
P-DS-MT	220	280	600	-20 ~1 20	6,8	6,5
P-DS-MT	220	280	750	-20 ~1 20	8	8,8
P-DS-MT	220	280	800	-20 ~1 20	8,5	10,68
P-DS-MT	265	370	466	-20 ~1 20	8,5	13,53
P-DS-MT	270	330	400	-20 ~1 20	6,3	5,39
P-DS-MT	270	330	500	-20 ~1 20	7,1	6,79
P-DS-MT	270	330	600	-20 ~1 20	8,1	8,20
P-DS-MT	270	330	750	-20 ~1 20	9,2	10,29
P-DS-MT	350	410	400	-20 ~1 20	6,0	6,93
P-DS-MT	350	410	500	-20 ~1 20	7,0	8,73
P-DS-MT	350	410	600	-20 ~1 20	8	10,60
P-DS-MT	350	410	750	-20 ~1 20	9,5	13,23

Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Filter Cartridge Specifications Overview

Dust Separation High Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DS-HT	200	320	500	-20 ~ 170	12,5	7,81
P-DS-HT	220	280	500	-20 ~ 170	8,2	2,81
P-DS-HT	220	280	750	-20 ~ 170	10,5	4,30
P-DS-HT	270	320	500	-20 ~ 170	11	2,70
P-DS-HT	270	320	500	-20 ~ 170	12,5	3,49

Dust Separation Ultra High Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DS-UHT	90	150	835	-20 ~ 240	5,6	2,30
P-DS-UHT	90	150	110	-20 ~ 240	7,3	3,04
P-DS-UHT	170	232	500	-20 ~ 240	6	2,13
P-DS-UHT	170	232	600	-20 ~ 240	8	2,63
P-DS-UHT	170	232	750	-20 ~ 240	10,5	3,23
P-DS-UHT	210	270	800	-20 ~ 240	10,5	4,16
P-DS-UHT	350	412	500	-20 ~ 240	11	4,5
P-DS-UHT	350	412	600	-20 ~ 240	15	5,40

Dust Separation High Efficiency Medium Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DS-UHE-MT	90	150	500	-20 ~ 120	3,7	2,6
P-DS-UHE-MT	170	230	800	-20 ~ 120	7,2	7,1
P-DS-UHE-MT	270	330	600	-20 ~ 120	8,3	7,3

Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Filter Cartridge Specifications Overview

Liquid Separation Medium Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-LS-MT	90	150	600	-20 ~ 120	3,5	0,81
P-LS-MT	90	150	735	-20 ~ 120	4,5	1,08
P-LS-MT	90	150	835	-20 ~ 120	5,5	1,25
P-LS-MT	90	150	1100	-20 ~ 120	7	1,65
P-LS-MT	160	240	735	-20 ~ 120	6	3,32

Liquid Separation High Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-LS-HT	90	150	735	-20 ~ 170	4,5	1,44
P-LS-HT	90	150	835	-20 ~ 170	5,5	1,64
P-LS-HT	90	150	1100	-20 ~ 170	6,8	2,17

Liquid Separation Ultra High Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-LS-UHT	90	150	1100	-20 ~ 240	6,5	2,17



Filter Cartridge Specifications Overview

Dust & Liquid Separation Medium Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DLS-MT	90	150	180	-20 ~ 120	1,5	0,38
P-DLS-MT	90	150	279	-20 ~ 120	1,4	0,57
P-DLS-MT	90	150	336	-20 ~ 120	1,6	0,69
P-DLS-MT	90	150	500	-20 ~ 120	3,2	1,05
P-DLS-MT	90	150	560	-20 ~ 120	3,7	1,18
P-DLS-MT	90	150	565	-20 ~ 120	3,75	1,19
P-DLS-MT	90	150	600	-20 ~ 120	4	1,26
P-DLS-MT	90	150	735	-20 ~ 120	4,5	1,56
P-DLS-MT	90	150	760	-20 ~ 120	5	1,64
P-DLS-MT	90	150	835	-20 ~ 120	5,6	1,89
P-DLS-MT	90	150	842	-20 ~ 120	5,7	1,91
P-DLS-MT	90	150	1000	-20 ~ 120	6,5	2,16
P-DLS-MT	90	150	1100	-20 ~ 120	7	2,38
P-DLS-MT	160	240	600	-20 ~ 120	6	2,75
P-DLS-MT	160	240	735	-20 ~ 120	7,5	3,38
P-DLS-MT	160	240	835	-20 ~ 120	8,5	3,85
P-DLS-MT	160	240	1100	-20 ~ 120	11,5	5,10

Dust & Liquid Separation High Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DLS-HT	90	150	600	-20 ~ 170	4,2	0,99
P-DLS-HT	90	150	735	-20 ~ 170	4,8	1,22
P-DLS-HT	90	150	835	-20 ~ 170	5,4	1,39
P-DLS-HT	90	150	1100	-20 ~ 170	7	1,85
P-DLS-HT	170	230	600	-20 ~ 170	5	1,46
P-DLS-HT	170	230	735	-20 ~ 170	6,5	1,8
P-DLS-HT	170	230	835	-20 ~ 170	7,5	2,05
P-DLS-HT	170	230	1100	-20 ~ 170	10	2,72

Test method and apparatus: according to VDI 3926 testing standards of filtration media.



Filter Cartridge Specifications Overview

Dust & Liquid Separation Ultra High Temperature	I.D.	O.D.	Length	Temp. Range °C	Weight (Kg.)	Filter Surface (M ²)
P-DLS-UHT	90	150	835	-20 ~ 170	5,6	1,64
P-DLS-UHT	90	150	1100	-20 ~ 170	7	2,17

Please feel free to contact the Petrogas spare parts department for any additional information.

spareparts@petrogas.nl or via TEL+31 182 565 395





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