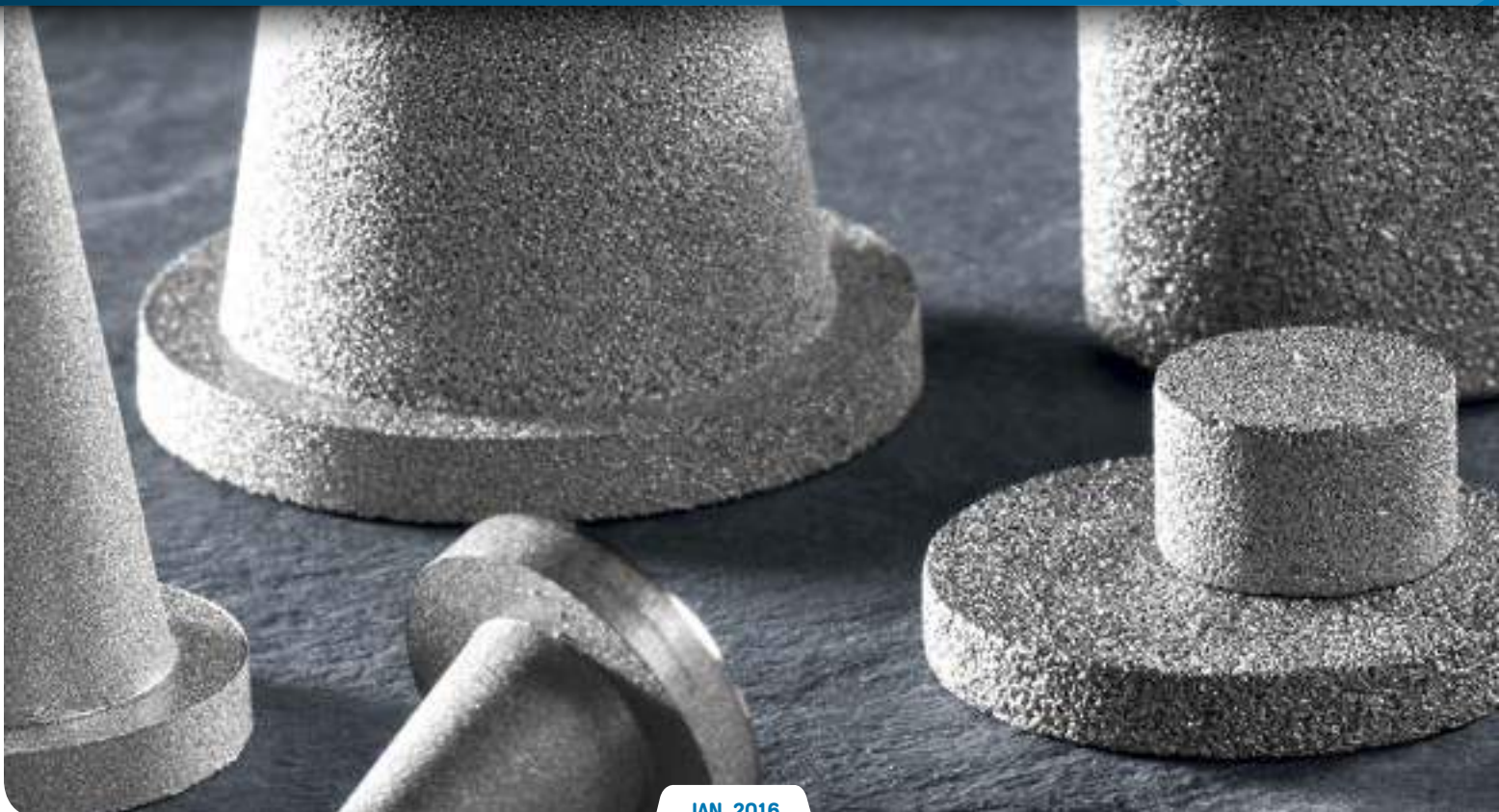




 **PORAL**®
Filtration Solutions

www.sintertech.org

P O R O U S S I N T E R E D M E T A L P R O D U C T S



JAN. 2016

Well-known brand name for high performance porous sintered metal filters, in stainless steel, bronze or nickel alloys, for liquid or gas filtration.

NORMES QUALITÉ

- › ISO 14001
- › OHSAS 18001
- › ISO 9001



PORAL® products are manufactured by compaction and sintering of metal powders. Pore size is defined by the powder granulometry and classified as PORAL® grade.

MAIN ADVANTAGES OF SINTERED METAL FILTERS

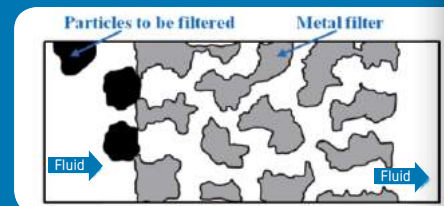
- **High temperature resistance,** stability over a wide temperature range from cryogenic ($\ll -150^{\circ}\text{C}$) to 900°C .
- **High corrosion resistance,** chemical stability.
- **High mechanical strength,** high differential pressure capability, resistance to vibration and abrasion.
- **Easy cleaning** for significant operational cost savings by reverse flushing with a clean fluid, by appropriate solvents, chemical reagents, ultrasonic washing or calcining.
- **Easy to implement** in any installation design.

Filtration capacity

There are two possible operating modes using PORAL® Filters:

Barrier or surface filtration

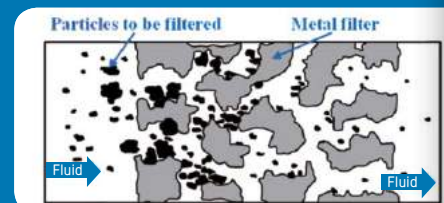
When pore size is smaller than particle size, all particles are retained on the filter surface. In this configuration, back flush cleaning is readily performed.



In-Depth Filtration

When particles size is smaller than pore size, particles tend to penetrate in the sinuous porosity of the filter media. Particles meet a lot of obstacles, and a large proportion are then retained on the pore walls.

In this configuration, the filtration capacity is given by the filtration efficiency but depends of many parameters as fluid viscosity, flow rate, PORAL® thickness etc...



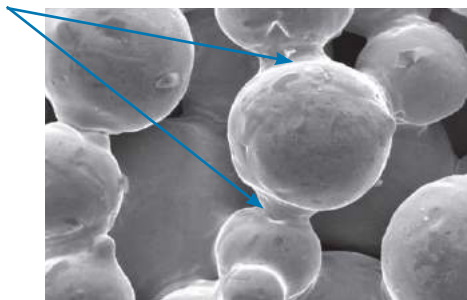
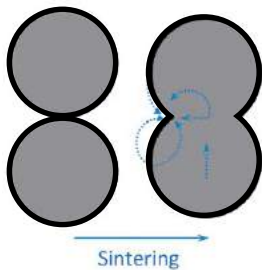
Material Selection

Alloy grades	Advantages	Max. T°C under oxidizing atmosphere	Max. T°C under reducing atmosphere
Bronze / Copper allow			
Bronze	<ul style="list-style-type: none"> Good corrosion resistance in sea water. Compatible with oxygen, hot / cold freshwater or with diluted non-oxidizing acids (without air). Typically used for hydraulic and pneumatic applications. 	250	300
Stainless Steel			
SS 316 L	<ul style="list-style-type: none"> Common usage for food application. Often used in oxidizing conditions, with nitric or organic acids (except formic and oxalic), with sulphuric, phosphoric or hydrochloric acids. Heat resistant. 	400	500
SS 304 L		500	600
Ni alloys			
Inconel 600	<ul style="list-style-type: none"> Good resistance to corrosion and heat. Good resistance to oxidizing conditions at high temperature. Resists to oxidizing in corrosive solutions and to sulfur compounds. Typically used in nuclear, chemical and heat-treating industry for its strength and corrosion resistance. 	600	800
Inconel 625	<ul style="list-style-type: none"> Withstands a wide variety of severe corrosive environments under a wide range of temperatures and pressures. Resists to chloride-ion stress-corrosion cracking. Excellent choice for sea-water applications. Typically used for aerospace and chemical processing field. 	650	650
Monel 400	<ul style="list-style-type: none"> Resists to anhydrous hydrofluoric acid, to chlorine derivatives, fluorine, H₂SO₄, NaOH. 	500	500
Hastelloy X	<ul style="list-style-type: none"> High resistance under high temperature oxidizing atmosphere. 	800	900
Hastelloy C276	<ul style="list-style-type: none"> Good resistance to HF, HNO₃. 	650	650

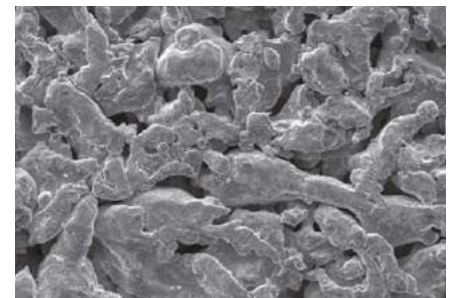
Typical microstructure of sintered metal filters:

Sintering neck formed by solid state diffusion

Schematic representation of sintering mechanisms :



Microstructure of Bronze PORAL® filters after sintering.
Gr. 15- x 250



Microstructure of Stainless steel & Ni alloys PORAL® filters after sintering.
Gr. 15- x 100

Filtration efficiency

The efficiency values below are given for air and water at a given flow rate.

Bronze

PORAL® Grade	Filtration efficiency			
	GASES		LIQUIDS	
	98% of particles stopped (µm)	99,9% of particles stopped (µm)	98% of particles stopped (µm)	99,9% of particles stopped (µm)
03	0,7	1	3,8	5
05	2,3	3	17	22
07	3,4	5	23	30
10	4,6	7,5	29	39
15	6,2	12	45	60
20	7	14	73	97
30	8,5	20	102	135
40	10,5	26	140	185
60	13	35	190	270

Stainless Steel And Ni Alloys

PORAL® Grade	Filtration efficiency			
	GASES		LIQUIDS	
	98% of particles stopped (µm)	99,9% of particles stopped (µm)	98% of particles stopped (µm)	99,9% of particles stopped (µm)
03	0,2	0,5	3,2	4,5
05	0,4	1,2	5,9	9
07	0,7	2,3	12	16
10	1,2	3,6	16	24
15	2	6	26	37
20	3,2	8,6	40	58
30	5	13	60	90
40	8	20	90	130

Standards : ISO 12500-3 in gaz = air and ASTM F795 in liquid = water

Permeability and Pressure drop calculation (ISO 4022)

The fluid permeability of a sintered metal filter is defined by two permeability coefficients: a friction-dependent permeability coefficient α and an inertia-dependant permeability coefficient β .

In a laminar flow, the pressure drop increases linearly proportionally to the flow rate. In that case, all the energy losses are due to the viscosity of the fluid only, following Darcy's law:

$$\frac{\Delta P}{e} = \alpha \times \eta \times \frac{Q_v}{S} = \frac{1}{P_0} \times \eta \times \frac{Q_v}{S}$$

In case of a turbulent flow (only significant at high flow), several other mechanisms are involved. The equation above, completed by Forchheimer, becomes:

$$\frac{\Delta P}{e} = \alpha \times \eta \times \frac{Q_v}{S} + \beta \times \rho \times \left(\frac{Q_v}{S}\right)^2$$

P., α and β coefficients, average values:

PORAL® Grade		03	05	07	10	15	20	30	40	60
Stainless steel & Ni Alloys	α ($\times 10^{10}$) [m ⁻²]	455	111	57	31	18	11,5	6,5	3,5	-
	β ($\times 10^5$) [m ⁻¹]	13	9	7	6	5	4	3,5	3	-
Bronze	α ($\times 10^{10}$) [m ⁻²]	207	51	25,5	12,5	7	3,5	2,1	1,2	0,6
	β ($\times 10^5$) [m ⁻¹]	15,5	5,5	3	2	1,2	0,8	0,5	0,4	0,3

ΔP = Pressure drop at the filter [Pa]
 e = Wall thickness of the filter [m]

$\alpha = 1/P_0$ = Viscous permeability coefficient [m⁻²]
 η = Dynamic viscosity of the fluid [Pa.s]

Q_v = Volume flow rate of the fluid [m³/s]
 S = Filtration Effective Surface [m²]

β = Inertia permeability coefficient [m⁻¹]
 ρ = Fluid density [kg/m³]

Functional controls

PORAL production process is under control to ensure the highest quality to our products. Final products are evaluated following international standards: results can be shared with you as EN 10204 material or quality certificates as.

Bubble-point test (EN ISO 4003)

The bubble test provides a simple method to determine the size of the «largest pore» of the PORAL test part.

The porous element to be tested is being immersed in ethanol, we measure the pressure needed to force the first bubble of gas through the test piece. The first bubble of gas will form at the pore having the greatest throat, the throat being the narrowest section of this pore.



Fluid permeability test (EN ISO 4022)

The test consists in measuring the pressure loss of an air flow through the PORAL porous media; to determine the viscous and inertia permeability coefficient.

Mechanical resistance

The sintering process is giving the mechanical properties to the porous material.

Tensile strength Rt

Evaluated through split disc tension tests on tube samples. Consists in shearing a porous ring cutted from a tube till breakage.

Mechanical resistance Rm

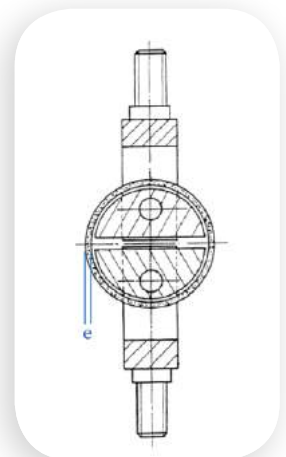
Evaluated though burst or collapse pressure test consists in measuring the maximum differential pressure sustained by a PORAL tube from inside to outside (burst) or from outside to inside (collapse).

Bending strength Rf

Evaluated through 3-points bending test on flat sheets Consists in applying a load F at the midpoint between 2 supports till breakage.

Fatigue resistance

Performed on candles or cartridges to evaluate the expected lifetime in automatic systems, where PORAL products are subject to many filtration / back flush cycles.

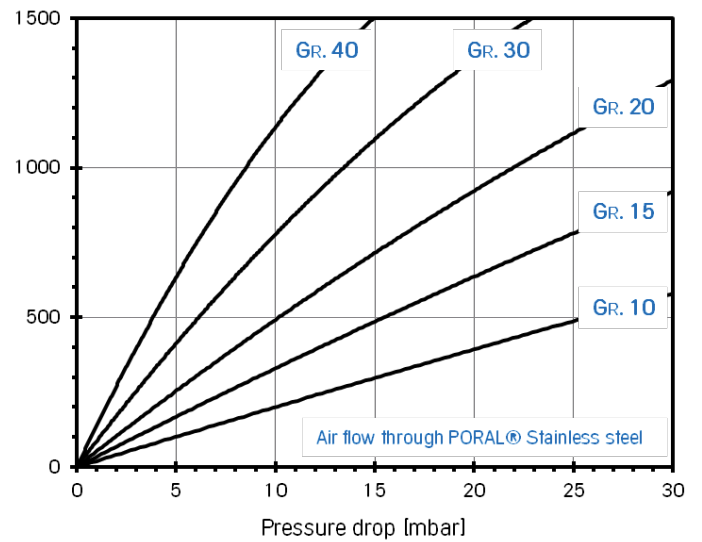
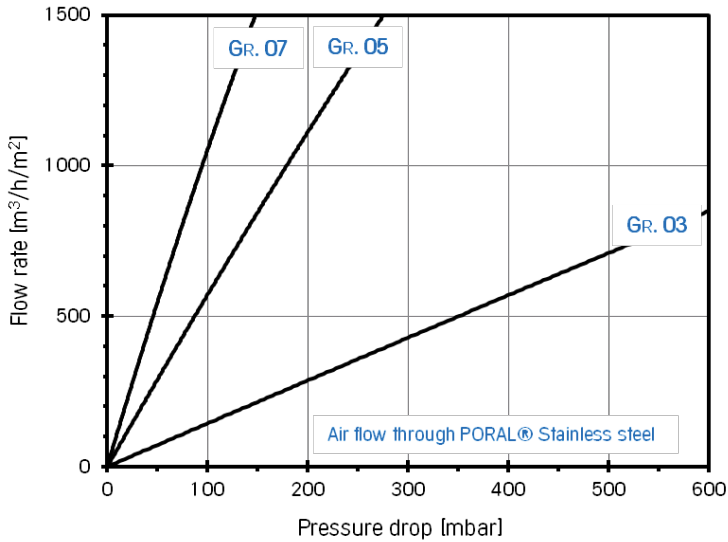


Permeability in a gas flow

Mean Value Characteristic lines of Permeability corresponding to an Air flow, in accordance with DIN ISO 4022

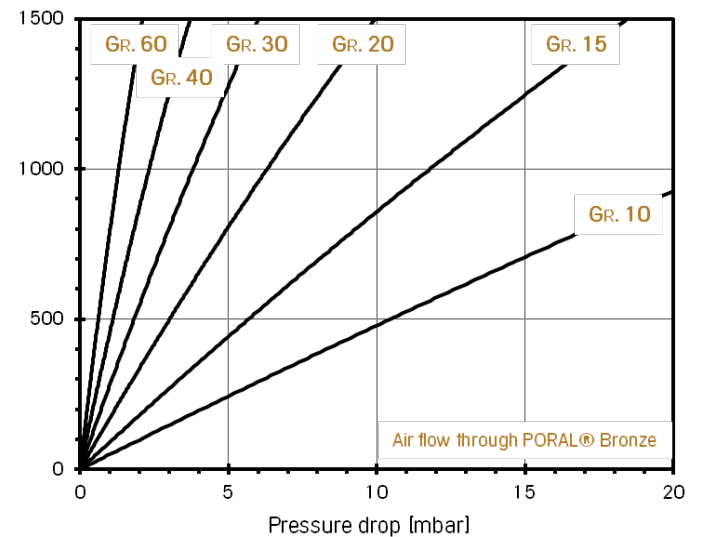
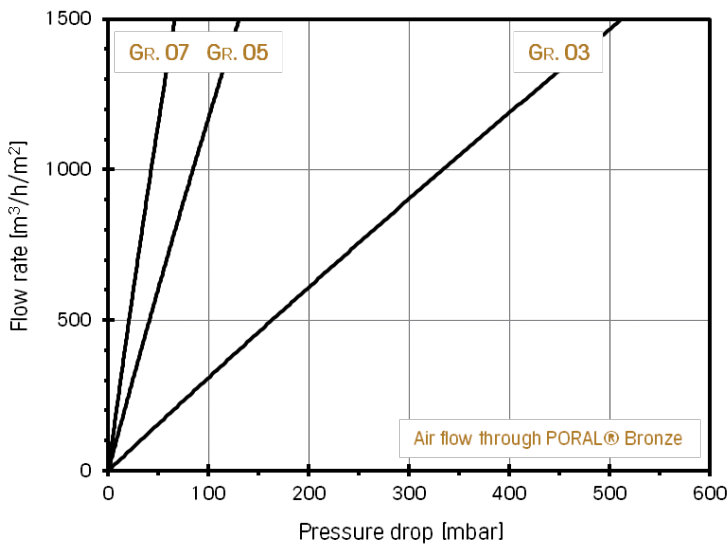
Conditions:

Material: Stainless steel 316L
Wall thickness: 3 mm
Air at 20°C and 4 bars



Conditions:

Material: bronze
Wall thickness: 3 mm
Air at 20°C and 4 bars

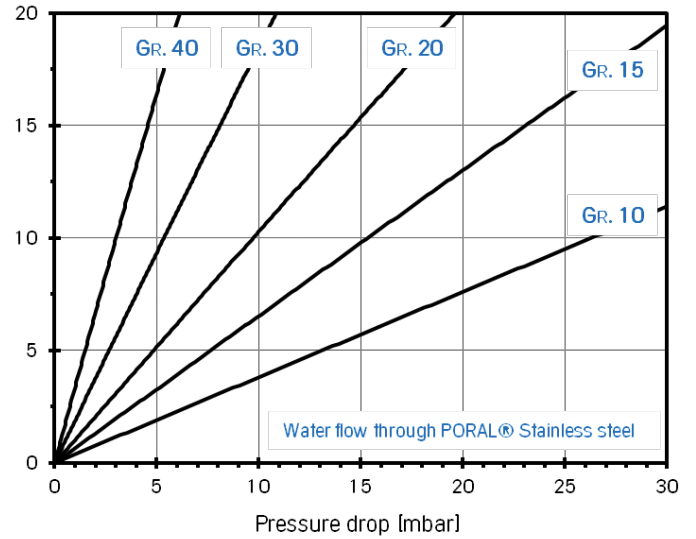
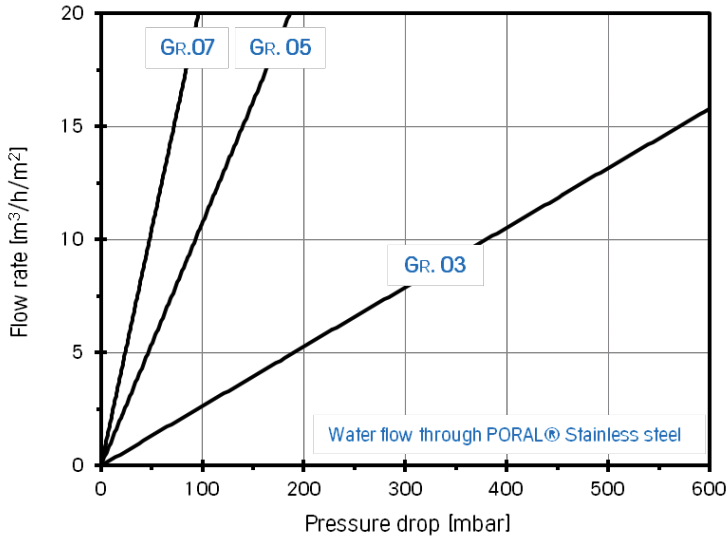


Permeability in a liquid flow

Mean Value Characteristic lines of Permeability corresponding to a Water flow, in accordance with DIN ISO 4022

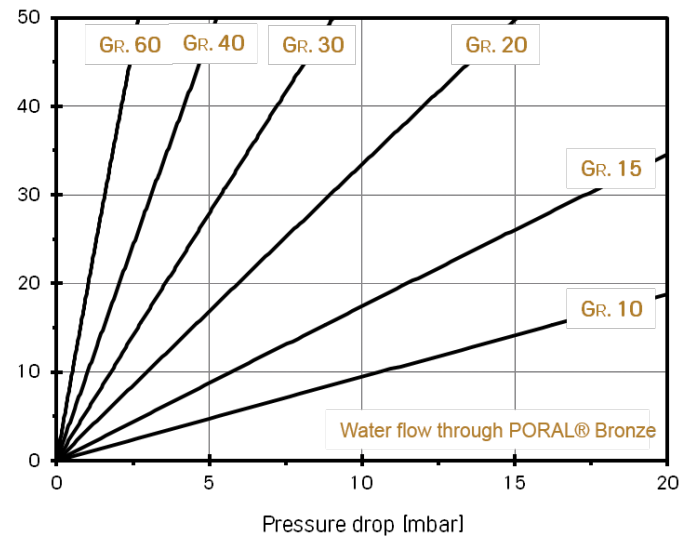
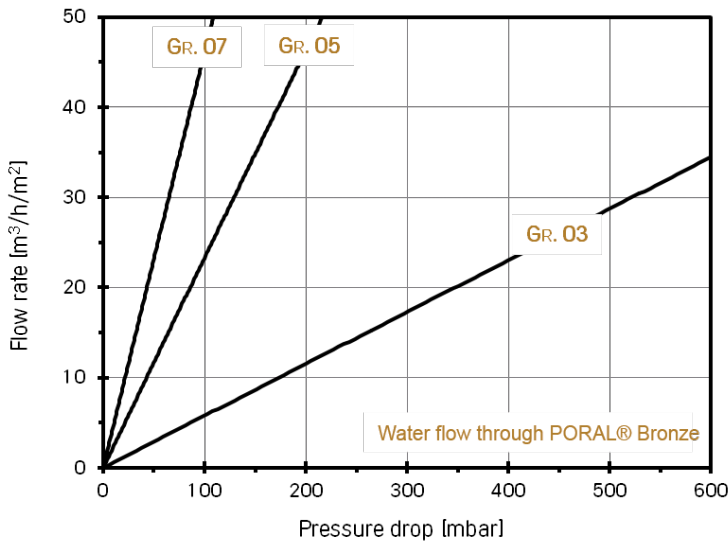
Conditions:

Material: Stainless steel 316L
 Wall thickness: 3 mm
 Water at 20°C



Conditions:

Material: Bronze
 Wall thickness: 3 mm
 Water at 20°C



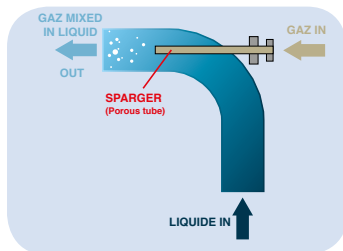
Spargers - diffusers

For injection of gas into a liquid: wine or beer production, water treatment, fermentation for example

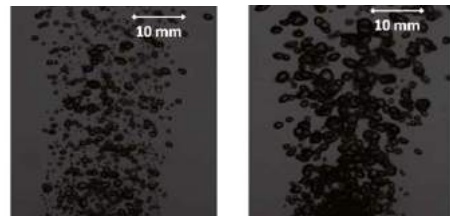


Two main operating configurations can be suggested

- **Static diffusers:** usually used in batch tank productions and/or for lower quantity of liquid. Diffusers are generally placed in the bottom of tanks and could be mounted in different ways using single or multiple elements, clamped on the outside tank wall.
- **Dynamic diffusers:** gas is directly injected in a pipeline through a porous PORAL® filter. Using the velocity and turbulence of the flowing liquid, this configuration is the most efficient diffuser systems since it results in fine bubbles, for superior performance.



Effect of flow rate on bubble size (PORAL® Grade O5), Static configuration



Beyond a certain flow rate, the bubble size reaches a maximum value, substantially the same independently of the grade considered. This observation could be explained inter alia by coalescence phenomena.



As small bubbles transfer gases more efficiently, bubble size is an important criteria to consider

According to the evolution of bubble size vs. flow rate in static configuration, Stainless steel PORAL filters can be divided into two groups:

Grades O3 to 10:

$QV < 3 \text{ L/h/cm}^2$: bubble size increases with the flow rate from 0.400 to 1.4 mm on average.

$Qv > 3 \text{ L/h/cm}^2$: stabilization of bubble size around 1.4 mm independently of the PORAL grade.

Grades 15 to 40:

$QV < 2 \text{ L/h/cm}^2$: bubble size varies differently from one grade to another, but rapidly reaches millimeter values.

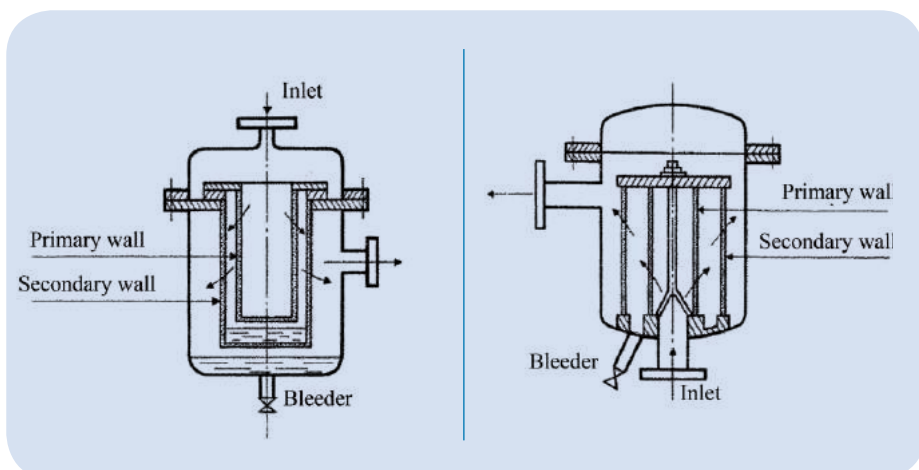
$Qv > 2 \text{ L/h/cm}^2$: stabilization of bubble size around 1.4 mm whatever the PORAL grade.

Liquid-gas filtration

The PORAL® microstructure allows the separation of liquid vesicles conveyed by a gas

- By entrapping liquid vesicles in the thickness of the filter if the pollution of the gas is low.
- By coalescence of liquid vesicles into droplets easier to remove in case of dense fogs.

Examples of double-walled filters used to eliminate liquid impurities in a gas flow:



The primary wall acts as a coalescer; vesicles or aerosols are trapped inside and combined in a continuous liquid phase. The secondary wall is a safety; its role is to retain droplets of relatively large dimensions which could be thrown out to the outlet.

The PORAL® filters could also be used as safety filters or genlock. In that case, the filter is sized to allow the gas flow under a low pressure drop but to oppose, to an accidental crossing of a liquid mass, a sufficient pressure drop to stop completely any flow of liquid in the pipeline.

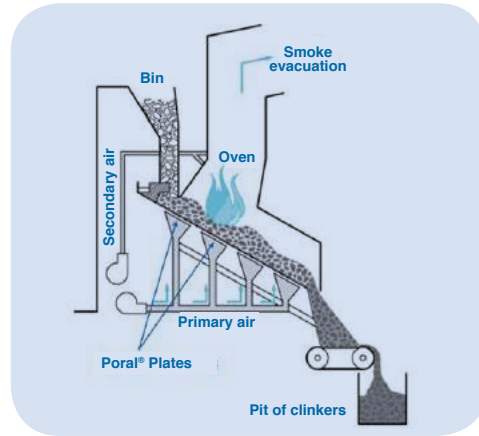
Fluidization

The advantage of the fluidized state is that the solids particles have similar flow properties to those of a liquid phase. The fluidized state begins when the gas velocity is sufficient to be able to carry the powdery material (bed of solid particles).

This fluidized state could be reached blowing through PORAL® sintered metal products, for:

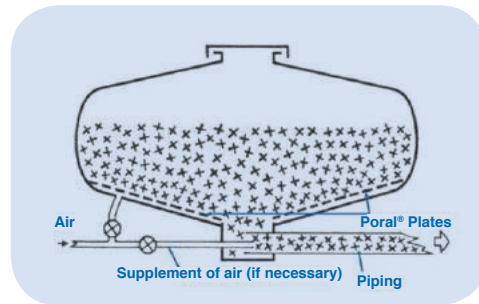
• Transport by gravity force

Allowing bulk material carriage on PORAL® airslides. PORAL products are appreciated in the cement industry for example because of their heat, abrasion and vibration resistance.



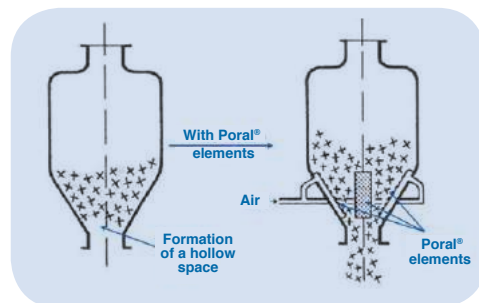
• Transport under pressure (bulk carrying)

To allow the carriage of powdery materials when transport by gravity force is not sufficient, especially when the distance to be covered is ascending or sinuous.



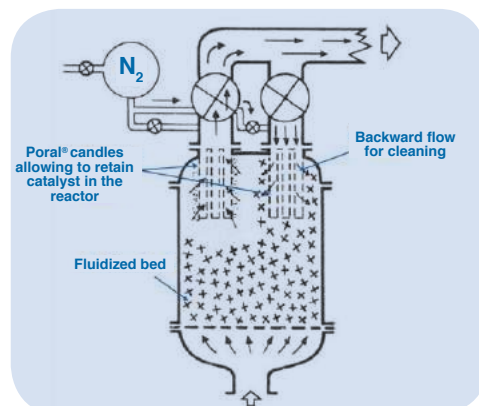
• In Silo-flows

Fluidization is used in these cases to ensure the flow of powdery materials by gravity force at the bottom of silos without any arching or dead zones.



• In fluidized bed reactor

Many types of reactions could occur in fluidized bed reactors as catalytic reactions, polymerization, etc... offering a uniform particle mixing.



Implementation and assembly

PORAL filtration media can be offered in different shapes such as tubes, plates, discs, cones...

- Welded to fitting / ending.
Electrical or laser welding are possible, depending of the application.
- Welded together to reach higher plate or tube dimension.
- Brazed in an assembly.
- Laser / water or wire cutted to a final specific dimension.
- Machined or drilled using conventional machining tools.
Take care: machining will close the surface open porosity.
- Threaded.
- Glued in an assembly.
- Rolled / unrolled or stamped.
- Cartridges or cones may be clamped: it is then recommended to insert a flexible gasket.

The choice of the best assembly methods will depend of the environment.
Don't hesitate to ask us for recommendations!



Cleaning of PORAL® sintered filters

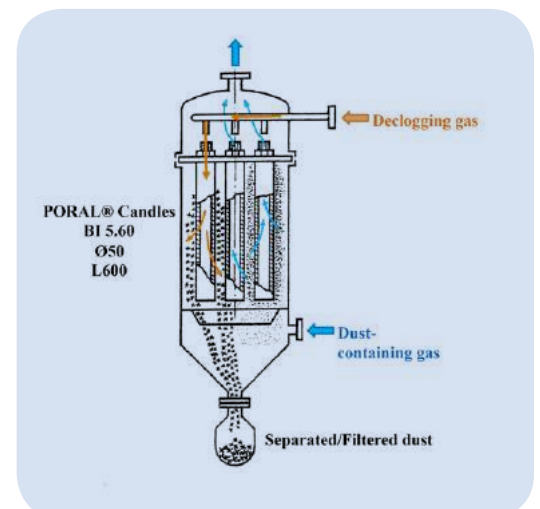
A significant advantage of porous sintered filtration media is to be cleanable and reusable over a long period of time.

Cleaning is mainly operated in situ, in automatic systems when blowback or backflush is automatically generated at a given max pressure drop level. It can be manually operated as well, even outside from the systems.

Specific cleaning procedures can be developed depending on the type of pollution (inorganic or organic); most of which will consist on one or a combination of the following methods:

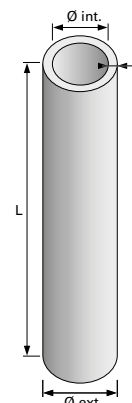
- **Backwash cleaning.**
- **Chemical cleaning** using acids, solvents, detergent solutions...
- **Calcining or heat treatment** in an oven.
- **Ultrasonic cleaning**, mainly for chemically inert materials.

The effectiveness of the unclogging could be assessed by testing the filters using bubble test and pressure drop measurement and to be compared with initial characteristics.



Porous Stainless Steel Isostatic Tubes (IS)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Ext. Diameter: 14 to 110 mm
- Length: to 1 000 mm

Material

316 L construction per default.
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Basic shape for standard candles (BI) or cartridges (CRI, CFI and DOE).

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade O3) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade O3) to 8 µm (PORAL grade 40).

Designation / ordering guide

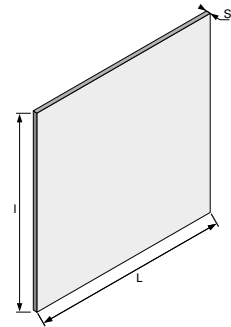
ISOSTATIC TUBES				
TYPE	Ext. Ø [mm]	Length [mm]	Wall thickness e [mm]	Filtration surface S [cm ²]
IS 14.250	14	250	2,0	110
IS 17.600	17	600	2,0	320
IS 20.600	20	600	2,0	434
IS 30.600	30	600	2,5	565
IS 35.600	35	600	2,5	660
IS 40.600	40	600	2,5	754
IS 50.600	50	600	2,5	942
IS 60.600	60	600	2,5	1131
IS 80.600	80	600	3,0	1508
IS 100.600	100	600	3,0	1885
IS 17.900	17	900	2,5	481
IS 23.1000	23	1000	2,5	723
IS 30.1000	30	1000	2,5	942
IS 35.1000	35	1000	2,5	1100
IS 40.1000	40	1000	2,5	1257
IS 50.1000	50	1000	2,5	1571
IS 60.1000	60	1000	2,5	1885
IS 70.1000	70	1000	3,0	2200
IS 80.1000	80	1000	3,0	2513
IS 100.1000	100	1000	3,0	3142

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: IS diameter.length.grade Ex IS 30.600.05

Porous Stainless Steel Plates (IK)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- **Max Dimensions:**
600 x 300 mm
Higher dimension possible,
welding plates together.
- **Thickness:** 3 or 5 mm

Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Typical application: fluidized bed plate.

Plates IK16 can be offered in different thicknesses from 2 to 10 mm.

Others plates offered only in 3 or 5 mm thicknesses.

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.

In liquids, retention at 98% of solid particles from 3,2 μm (PORAL grade 03) to 90 μm (PORAL grade 40).

In gases, retention at 98% of solid particles from 0,2 μm (PORAL grade 03) to 8 μm (PORAL grade 40).

Designation / ordering guide

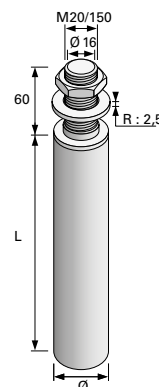
PLATES				
TYPE	Length L [mm]	Width l [mm]	Thickness e [mm]	Filtration surface S [cm ²]
IK 5.30	600	300	3	1800
IK 5.50	600	300	5	1800
IK 8.30	500	250	3	1250
IK 8.50	500	250	5	1250
IK 10.30	300	300	3	900
IK 10.50	300	300	5	900
IK 16.30	250	250	3	625
IK 16.50	250	250	5	625

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: IK type.thickness x 10.grade Ex IK 10.30.10

Porous Stainless Steel Candles (BI)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Ext. Diameter: 14 to 50 mm
- Length: 100 to 900 mm

Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Candles to be screwed under a filter plate in a filtration vessel or at the end of a piping.
Standard thread M20x150 - Ø16 opening on one end + closed ending on the other end.
Other fitting on request : NPT, BSP or others.

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade 03) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade 03) to 8 µm (PORAL grade 40).

Designation / ordering guide

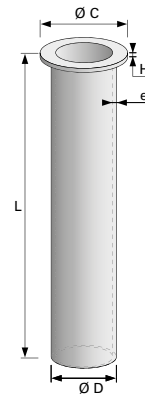
CANDLES			
TYPE	Ext. Ø [mm]	Porous Length L [mm]	Filtration surface S [cm ²]
BI 2.10	20	100	70
BI 4.12	40	125	150
BI 4.25	40	250	300
BI 5.30	50	300	450
BI 5.60	50	600	900

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: BI type.grade Ex BI 4.25.05

Porous Stainless Steel Cartridges (CRI)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Ext. Diameter: 30 to 60 mm
- Length: 250 to 900 mm

Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Cartridges to be clamped on a filter plate in a filtration vessel or on a tank wall.
Standard flange Ø C / thickness 8mm on one end + closed ending on the other end.
Other flange on request.

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade 03) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade 03) to 8 µm (PORAL grade 40).

Designation / ordering guide

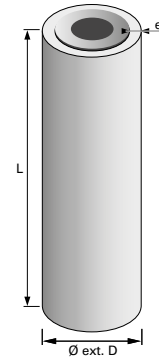
CARTRIDGES CRI				
TYPE	Ext. Ø D [mm]	Porous Length L [mm]	Flange Ø C [mm]	Filtration surface S [cm ²]
CRI 3.25	30	250	30	200
CRI 3.50	30	500	30	400
CRI 4.25	40	250	40	300
CRI 4.50	40	500	40	600
CRI 5.30	50	300	50	450
CRI 5.60	50	600	50	900
CRI 5.90	50	900	50	1350
CRI 6.30	60	300	60	550
CRI 6.60	60	600	60	1100
CRI 6.90	60	900	60	1650

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: CRI type.grade Ex CRI 5.60.05

Porous Double-Open Ends Cartridges (DOE)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Ext. Diameter: 2 1/2" or 3"
- Length: 10 to 40"

Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Cartridges for standard fitting in DOE housing, mainly for steam filtration.
Sealing at your choice depending of operating environment.

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade 03) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade 03) to 8 µm (PORAL grade 40).

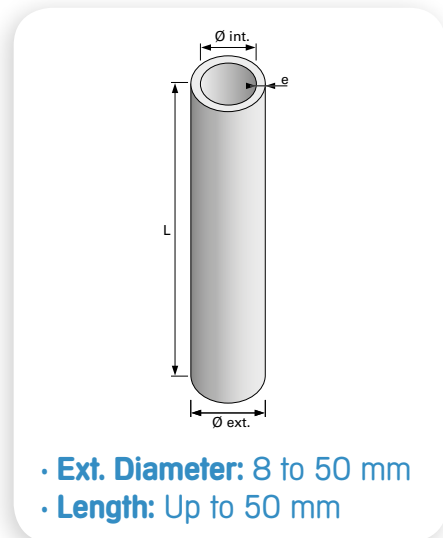
Designation / ordering guide

CARTRIDGES DOE				
TYPE	Ext. Ø D ["]	Porous Length L ["]	Wall thickness e [mm]	Filtration surface S [cm ²]
DOE 2 ^{1/2} ,10	2 1/2	10	2,5	507
DOE 2 ^{1/2} ,20	2 1/2	20	2,5	1013
DOE 2 ^{1/2} ,30	2 1/2	30	2,5	1520
DOE 3.20	3	20	2,5	1216
DOE 3.40	3	40	2,5	2432

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: DOE type.grade Ex DOE 2^{1/2}.10.05

Porous Stainless Steel Uniaxial Tubes (IP)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Mainly used as flame arrestors in welding devices.

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade 03) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade 03) to 8 µm (PORAL grade 40).

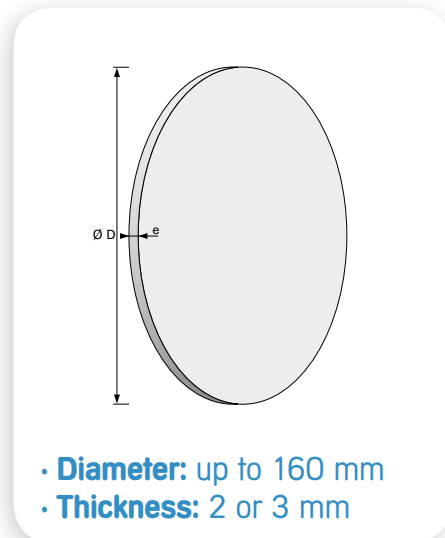
Designation / ordering guide

UNIAXIAL TUBES				
TYPE	Ext. Ø D [mm]	Porous Length L [mm]	Wall thickness e [mm]	Filtration surface S [cm ²]
IP 8.20	8	20	2,0	5,0
IP 20.30	20	30	2,0	19,0
IP 30.50	30	50	2,0	47,0
IP 50.40	50	40	2,0	63,0

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: IP type.grade Ex IP 8.20.10

Porous Stainless Steel Discs (IC)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 μm (PORAL grade 03) to 90 μm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 μm (PORAL grade 03) to 8 μm (PORAL grade 40).

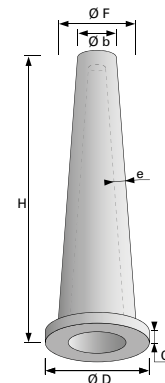
Designation / ordering guide

DISCS		
TYPE	\varnothing [mm]	Filtration surface S [cm ²]
IC 10	10	0,78
IC 21	21	3,5
IC 30	30	7
IC 42	42	14
IC 60	60	28
IC 90	90	63,5
IC 114	114	102
IC 160	160	200
IC 250	250	491

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: Item - thickness (x10) - grade. Ex.: IC 114.20.05

Porous Stainless Steel Cones (ICN)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Diameter: 8 to 30 mm
- Height: 20 to 59 mm

Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Mainly used for in-time filtration offering larger filtration surface in small diameters.
To be clamped or inserted in PPL assembly.

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade O3) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade O3) to 8 µm (PORAL grade 40).

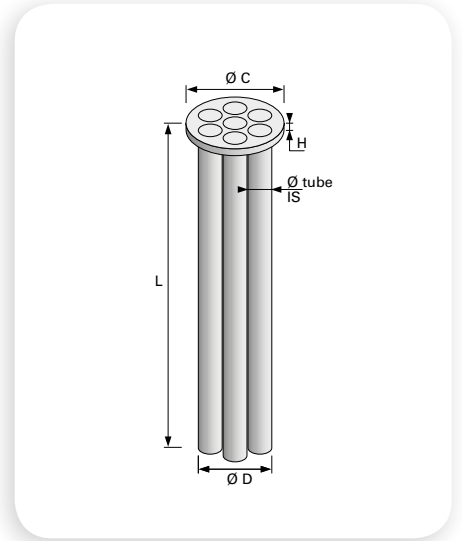
Designation / ordering guide

CONES							
TYPE	Ø F [mm]	Height H [mm]	Ø D [mm]	Wall thickness [mm]	Flange thickness C [mm]	Ø b [mm]	Filtration surface S [cm ²]
ICN 8	8	20	13	1,5	2,5	1	1
ICN 12	12	32	17	2	2,5	2	5
ICN 15	15	41	21	2	3	2	10
ICN 21	21	59	27	2,5	3	2,8	20

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: Item - grade. Ex.: ICN 8,20 Grade O5 & 20

Porous Stainless Steel Multi Cartridges (CFI)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



Material

316 L construction per default,
304 L / Inconel 600 / Monel 400 or Hastelloy on request.

Features & Benefits

Mainly used for filtering gases at high flow rate with a low pressure drop or in reduce spaces.
Flange Thickness = 10 mm

Retention rates

8 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,2 µm (PORAL grade O3) to 90 µm (PORAL grade 40).
In gases, retention at 98% of solid particles from 0,2 µm (PORAL grade O3) to 8 µm (PORAL grade 40).

Designation / ordering guide

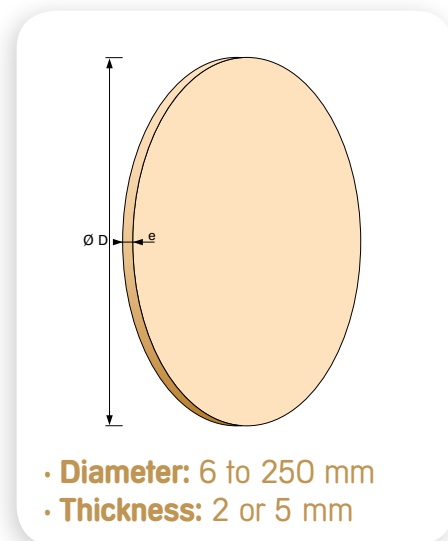
CARTRIDGES CFI						
TYPE	Ø D [mm]	Length L [mm]	Ø TUBE IS	Nbr TUBE IS	Ø C [mm]	Filtration surface S [cm ²]
CFI 8.60	80	600	35	3	100	1800
CFI 8.90	80	900	35	3	100	2700
CFI 10.60	100	600	30	7	120	3500
CFI 10.90	100	900	30	7	120	5300

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: Item - grade. Ex.: CFI 890.40

Porous Bronze Discs (BC)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.

In liquids, retention at 98% of solid particles from 3,8 μm (PORAL grade 03) to 190 μm (PORAL grade 60).

In gases, retention at 98% of solid particles from 0,7 μm (PORAL grade 03) to 13 μm (PORAL grade 60).

Designation / ordering guide

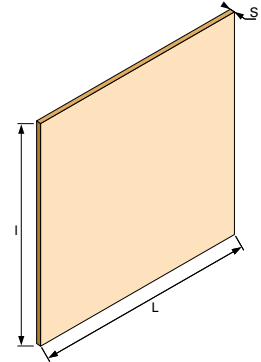
DISCS		
TYPE	Ø [mm]	Filtration surface S [cm ²]
BC 6	6	0,3
BC 13	13	1,3
BC 21	21	3,5
BC 30	30	7
BC 42	42	14
BC 60	60	28
BC 90	90	63,5
BC 114	114	102
BC 250	250	450

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: Item - thickness (x10) - grade. Ex.: BC 114.20.05

Porous Bronze Plates (BK)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



• **Diameter:** 500 x 500
or 600 x 300 mm
*Higher dimensions possible
by BK plates welding.*

Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.

In liquids, retention at 98% of solid particles from 3,8 μm (PORAL grade 03) to 190 μm (PORAL grade 60).

In gases, retention at 98% of solid particles from 0,7 μm (PORAL grade 03) to 13 μm (PORAL grade 60).

Designation / ordering guide

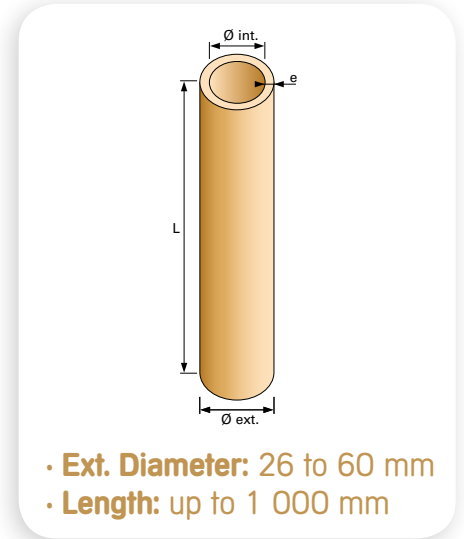
PLATES			
TYPE	Height [mm]	Width [mm]	Filtration surface S [cm ²]
BK 4	500	500	2500
BK 5	600	300	1800
BK 8	500	250	1250
BK 10	300	300	900
BK 16	250	250	625

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: Item - thick. (x10) - grade. Ex.: BK 10.30.15

Porous Bronze Seamless Tubes (BLR & BS)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- **Ext. Diameter:** 26 to 60 mm
- **Length:** up to 1 000 mm

Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,8 μm (PORAL grade O3) to 190 μm (PORAL grade 60).
In gases, retention at 98% of solid particles from 0,7 μm (PORAL grade O3) to 13 μm (PORAL grade 60).

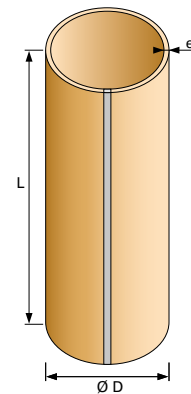
Designation / ordering guide

SEAMLESS TUBES				
TYPE	Ext. Ø [mm]	Length [mm]	Wall thickness e [mm]	Filtration surface S [cm ²]
BLR 26	26	48	3	39
BLR 32	32	250	3	200
Customized design available upon request: send your requirement to poral.sales@sintertech.org				
PORAL standard designation: Item – length - grade. Ex.: BLR 26.48.15				

TYPE	Ext. Ø ["]	Length ["]	Wall thickness e [mm]	Filtration surface S [cm ²]
BS	2"	30"	3	1173
Customized design available upon request: send your requirement to poral.sales@sintertech.org				
PORAL standard designation: Item – length - grade. Ex.: BLR 26.48.15				

Porous Bronze Welded Tubes (BT)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Ext. Diameter: 50 to 100 mm
- Length: up to 600 mm

Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.

In liquids, retention at 98% of solid particles from 3,8 μm (PORAL grade 03) to 190 μm (PORAL grade 60).

In gases, retention at 98% of solid particles from 0,7 μm (PORAL grade 03) to 13 μm (PORAL grade 60).

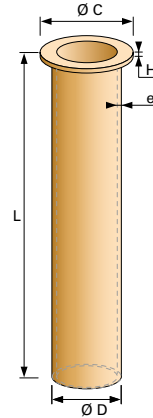
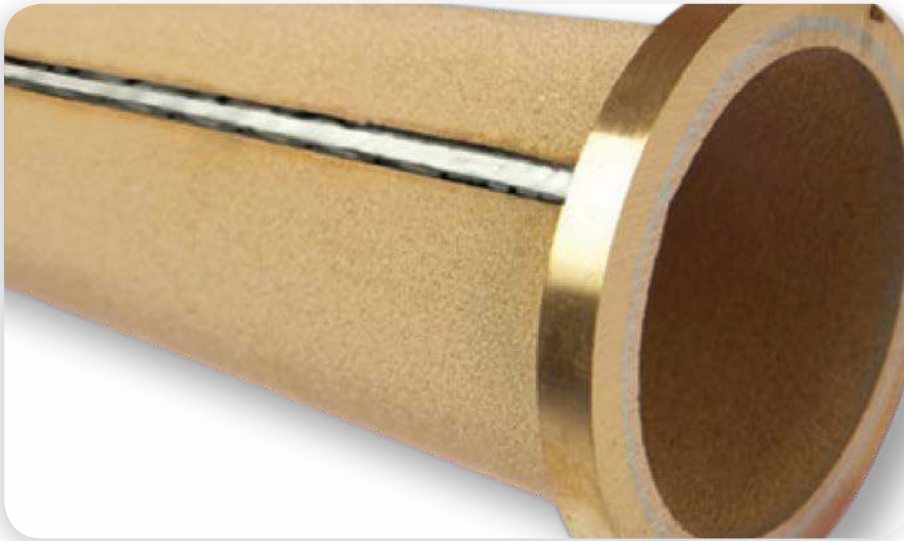
Designation / ordering guide

WELDED TUBES			
ITEM	Ext. Ø [mm]	Length [mm]	Filtration surface S [cm ²]
BT 20.5	50	300	450
BT 10.5	50	600	900
BT 16.8	80	250	625
BT 8.8	80	500	1250
BT 10.10	100	300	875
BT 5.10	100	600	1750

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: Item - thickness (x10) - grade. Ex.: BT 8.8.20.10

Porous Bronze Cartridges (CRB)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



- Ext. Diameter: 30 to 100 mm
- Length: 250 to 1 200 mm

Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,8 µm (PORAL grade 03) to 190 µm (PORAL grade 60).
In gases, retention at 98% of solid particles from 0,7 µm (PORAL grade 03) to 13 µm (PORAL grade 60).

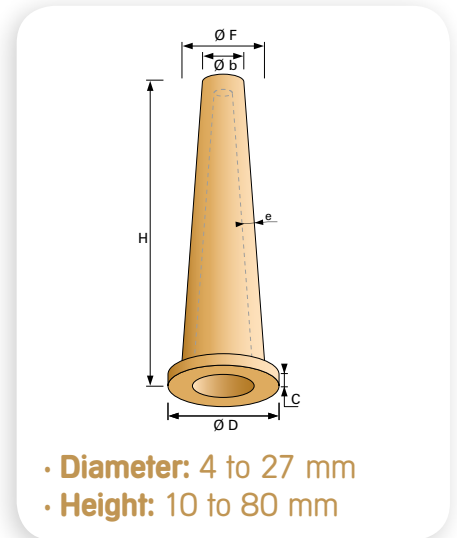
Designation / ordering guide

CARTRIDGES					
ITEM	Ø D [mm]	Length [mm]	Filtration Surface S [cm ²]	Ø C [mm]	Thickness H [cm ²]
CRB 3.25	32	250	200	48	8
CRB 3.50	32	500	400	48	8
CRB 5.30	50	300	450	70	8
CRB 5.60	50	600	900	70	8
CRB 5.90	50	900	1350	70	8
CRB 8.50	80	500	1250	100	10
CRB 8.100	80	1000	2500	100	10
CRB 10.60	100	600	1750	120	12
CRB 10.120	100	1200	3500	120	12

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: Item - grade. Ex.: CRB 5.90.15

Porous Bronze Cones (BCN)

PORAL standard products are covering a wide range of applications. Customized design available upon request.



Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.
 In liquids, retention at 98% of solid particles from 3,8 µm (PORAL grade 03) to 190 µm (PORAL grade 60).
 In gases, retention at 98% of solid particles from 0,7 µm (PORAL grade 03) to 13 µm (PORAL grade 60).

Designation / ordering guide

CONES							
ITEM	Ø F [mm]	Height [mm]	Ø D [mm]	Wall thickness [mm]	Flange thickness C [mm]	Ø b [mm]	Filtration surface S [cm ²]
BCN 8	13	20	3	8	1,5	2,5	4
BCN 12	17	40	10	12	2	2,5	6
BCN 15	21	60	20	15	2,5	3	8
BCN 21	27	80	40	21	3	3	10

Customized design available upon request: send your requirement to poral.sales@sintertech.org

PORAL standard designation: Item - grade. Ex.: BCN 15.05

Porous Bronze Silencers (SMH)

PORAL standard products are covering a wide range of applications.
Customized design available upon request.



Material

Bronze (89% Cu / 11% Sn) construction.

Features & Benefits

- Good durability against most aggressive fluids,
- Usable over a wide range of temperatures,
- High mechanical resistance,
- Regenerable through backflush / chemical / thermal or ultrasonic treatment.

Retention rates

9 PORAL grades available - see PORAL grades definition table for detailed information.
In liquids, retention at 98% of solid particles from 3,8 µm (PORAL grade 03) to 190 µm (PORAL grade 60).
In gases, retention at 98% of solid particles from 0,7 µm (PORAL grade 03) to 13 µm (PORAL grade 60).

Designation / ordering guide

SILENCERS					
ITEM	Thread	Ø D [mm]	Width A [mm]	Height E [mm]	Length H [mm]
SMH 1	1/8"	10	13	5,5	22,5
SMH 2	1/4"	13	19	8,5	36,5
SMH 3	3/8"	17	22	8,5	46,5
SMH 4	1/2"	21	30	11	59
SMH 5	3/4"	27	30	11,5	66,5
SMH 6	1"	34	36	14	74

Customized design available upon request: send your requirement to poral.sales@sintertech.org
PORAL standard designation: Item - CO (conic gas thread NPT) or CY (cylindric gas thread). Ex.: SMH 3 CO



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