The LiqTech ceramic history

The first contract was in 1983 with design, production and sales

The first series production of 150 complete and catalysed soot trap systems for the CityCat street sweeper.

The picture show the actual EX-66 Cordierite WFF tested at DTU in 1985. Which started the ambitious investment of 100 man-year in the development of the porous Silicon Carbide technology, suitable for:

- DPF - Diesel Particle Filter monoliths
- ceramic membranes for filtering liquids
- hot zones for Solar Thermal Power Plant

Two young scientists / engineers (Jakob Høj & Per Stobbe) from The Danish Technical University (DTU) started out in 1986 with the first alternative DPF.

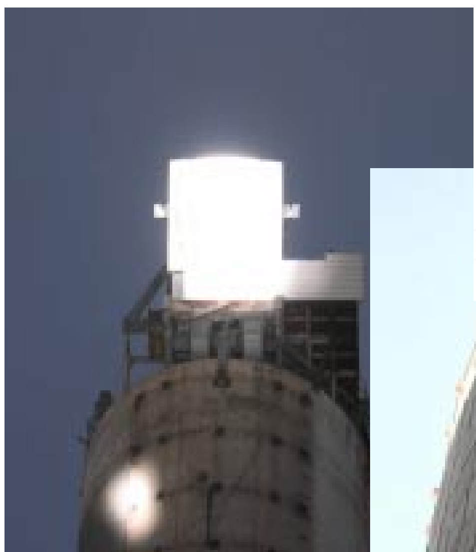
In order to reach the full potential commercial stage Mr. Lasse Andreassen joined LiqTech year 2000. Hereafter the mission is formed to concentrate on manufacturing of honeycomb SiC ceramics with or without membranes.

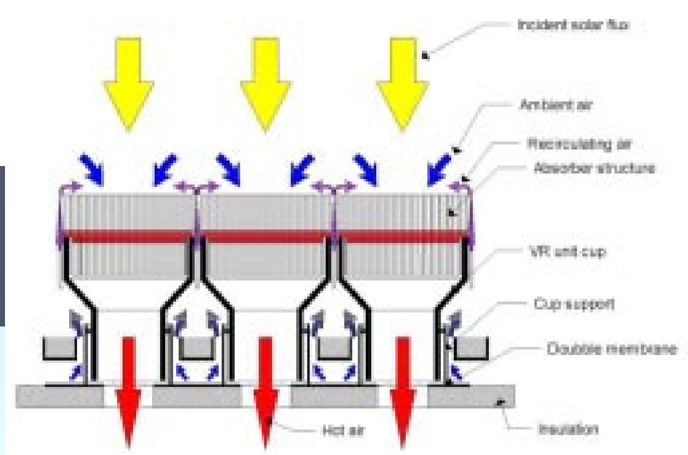
SiC ceramic Micro-Filtration membranes for use in liquids like:

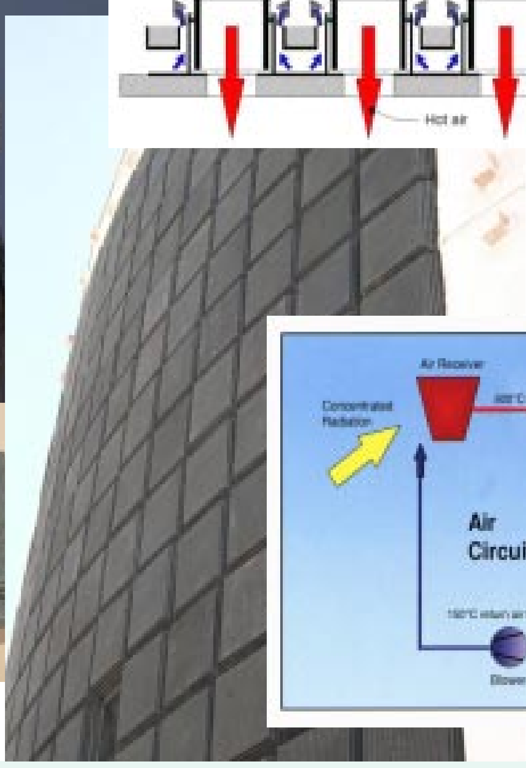
- virus and bacteria removal from milk
- yeast removal from beer
- waste water clean-up

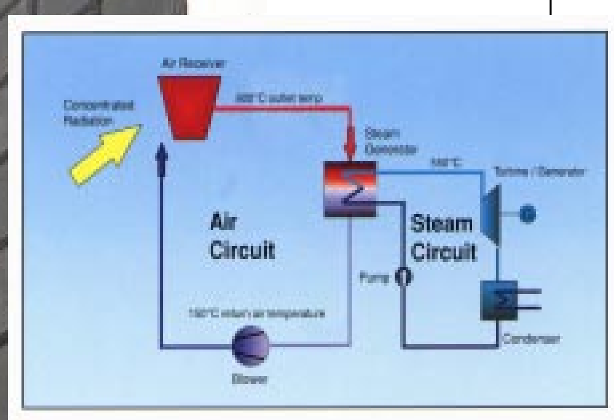
are a few of the potential applications for the new CelSiC™ membranes developed together with Saint-Gobain Ceramics.

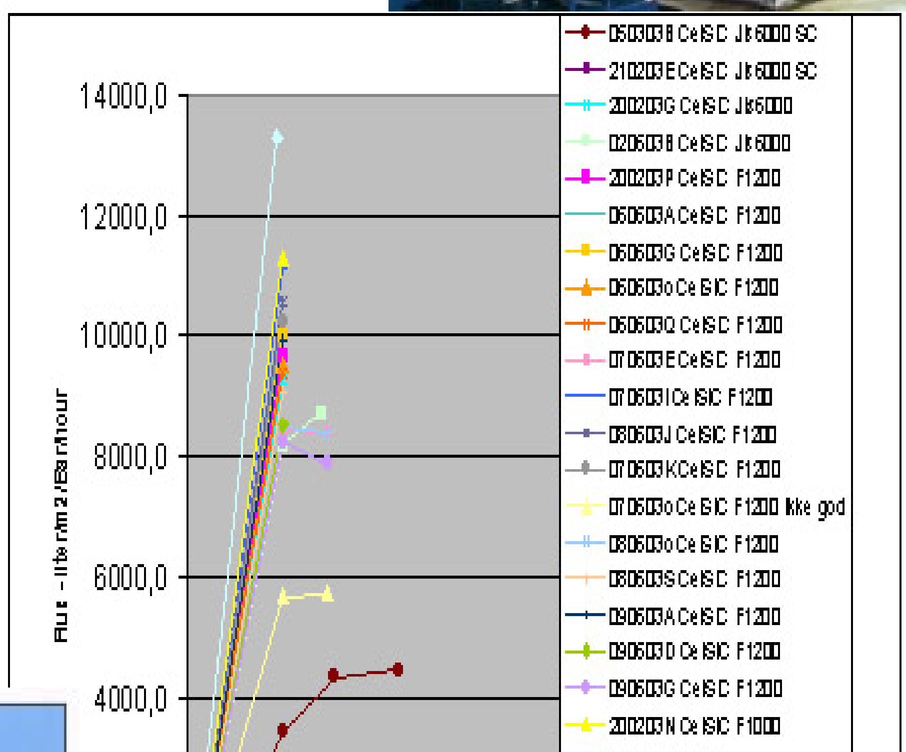
Sponsored by the European Commission under the 5th Frame Program LiqTech / HelioTech developed the SolAir ceramic hot zone from SiSiC ceramics for Solar Thermal Power Plants together with DLR and Saint-Gobain. The basic Volumetric Receiver principle was developed by Sulzer and (DLR) Deutsches Zentrum für Luft- und Raumfahrt in the 90ties. The SolAir project focus on 25% total efficiency for a 50 MW_{el} power plant.











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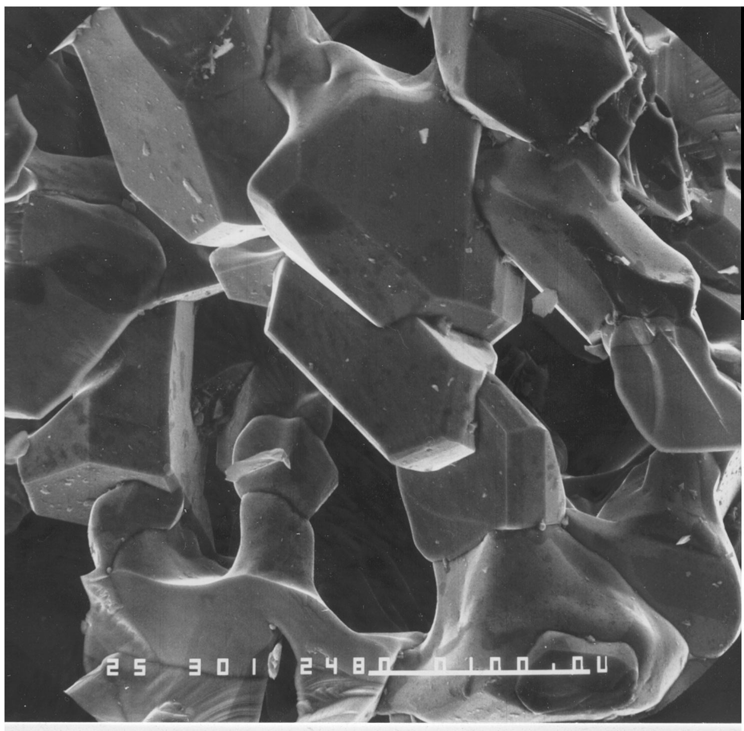
Silicon Carbide technologies

Separation of particles from hot gases like diesel engine exhaust



We offer 3 different re-crystallaized SiC materials all highly suited as DPF and selected depending on the specific application:

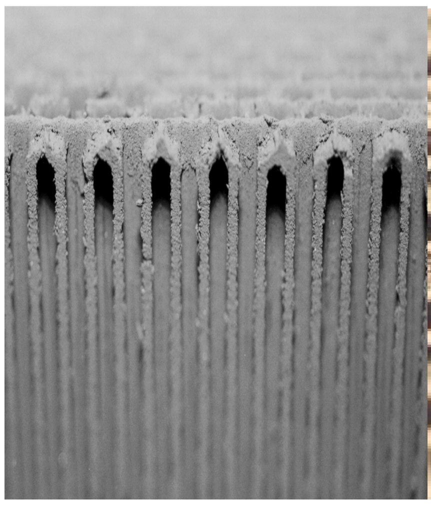
- F180 with pore size 20 - 25 µm in 50 and 90 cpsi
- F220 with pore size 12 - 15 µm in 150 cpsi
- F240 with pore size 6 - 10 µm in 150 - 200 cpsi

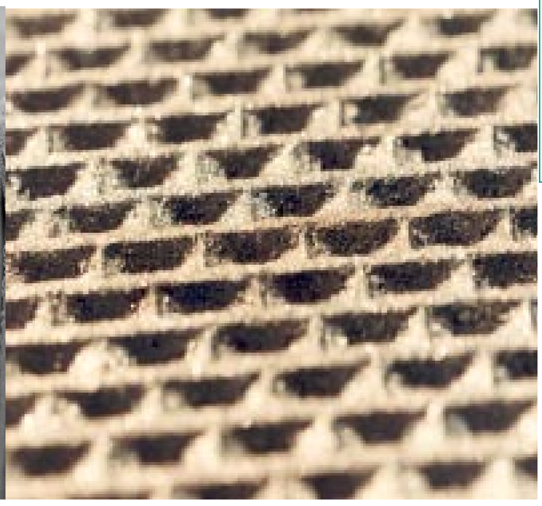
Properties for the StobbeDPF type F180 for retro-fit applications
Specifications - ISO

Material Code	F180
Material	100% Re-SiC
Pore size - µm	20-25
Porosity - %	45
Thermal conductivity - 630°C (W/mk)	15
Specific heat - 25°C - J/kg/K	750
Expansion / radial x10^{-6} °C^{-1} - 25°C	4.2
CPSI coding	90
CPSI - calculated cells per square inch	82.2
CPScm - calculated cells per square centimeter	12.75
Cell size, wall width - mm	2.0 x 2.0
Wall thickness - mm, 1000/inch	0.8 / 31
Pitch = wall width + wall thickness - mm	2.8
Pore size - µm, 1000/mm	20 - 25
Porosity - % - liquid absorption	40-45
Air through wall permeability (10 x $^{-12}$/m^2 Darcy) at 20°C	0.70
Filtration efficiency - % - clean filter - PM10	>95
Filtration efficiency - % - 10% loaded filter	>98
Specific weight - wall density - kilo/dm^3	1.8
Monolith weigth - bulk density - kilo/dm^3	0.92
Monolith filter area - m^2 / dm^3 volume	0.51

From the smallest to the largest world! Protection of our globe is the only issue as the heritage to our children! For this, materials understanding combined with inventive production technology has created a product based on Silicon Carbide, which actually safes life! Its now well recognized that particle emission cause serious health problems in urban areas.

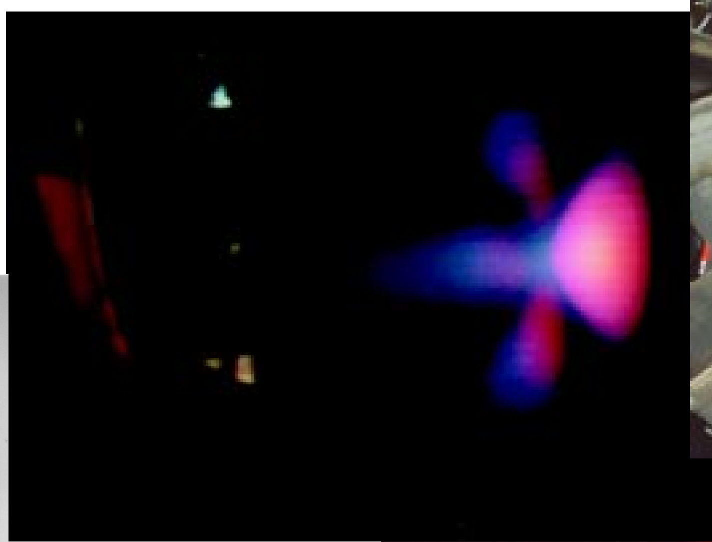
We can help you with supply of DPF for this environmental friendly marked oppotunities.

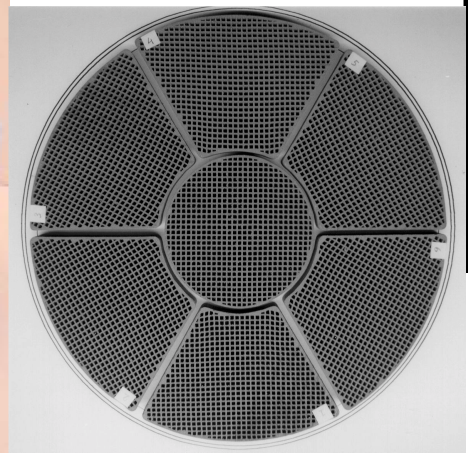




The many parallel channels are closed in one end and the other half in the other end creating the well known WFF principle. This method offer lowest possible pressure drop and optimize the filtration area to volume ratio.

Engine dynomometer testing show how severe the soot oxidation can actually take place. The robust 90 cpsi StobbeDPF and a well designed regeneration technology combines the best from two worlds into a durable DPF system.





The robustness of the larger sized StobbeDPF is obtained by selecting a careful designed segmentation method. Which offer the best surface area to volume ratio on the marked, with 90 cpsi or with 150 cpsi.

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Production technologies

From quarts sand + petroleum coke to the finished porous SiC DPF

Edward Acheson (1856-1931) invented 1893 Silicon Carbide, originally known as Carborundum, when being a superintendent at one of Edison's plants producing lamps. Many realized that the mass production of precision-ground, interchangeable metal parts would be practically impossible without this new „substance". The hardest surface made by man and second only to diamond in hardness, Carborundum ended the search for a highly effective and durable abrasive that the industry had so badly needed.

Annual worldwide production of SiC is now more than 850,000 tons per year primarily for the abrasives industry. The shown pile at one of Saint-Gobain´s facilities in Norway consume 120 MW/h of energy for converting 95 tons of raw materials to 9.5 ton of high quality SiC during the reaction: $SiO^2 + 3C = SiC + 2CO$.

LiqTech raw materials for manufacturing of honeycombs

One of the more advanced technologies in honeycomb fabrication based on the abrasive SiC are design and manufacturing of the die heads.

The extrusion process force under high pressure the plastically paste through the highly advanced die head and hereby shape the paste to a somewhat soft multi-cell honeycomb structure. Which is dried right away, cut to length, channels blocked, fired, inspected and shipped.

SAINT-GOBAIN
CERAMICS

The giant yellow truck carry more than 1000 Diesel Particle Filters in just one mouthful from loading area into the furnace chamber.

Furnaces for firing several tons of SiC ceramics in each batch is needed in order to fulfill every commercial needs. The large scale firing technology are developed in collaboration with Saint-Gobain Industri Keramik GmbH in Rödental. The 3 furnaces shown are each rated at 750 kW electrical power in order to reach ~2400°C for a couple of hours.

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The product - StobbeDPF

Cleaning exhaust gases from diesel engines using SiC ceramic filters

The standard 90 cpsi StobbeDPF is manufactured in the most common international sizes ranging from 1.0 to 23 liters. Specifically designed for vehicle retro-fit application based on „simple" regeneration technology. Applications were no management support from the engine CPU is offered, which hereby require a very robust DPF.

The awareness of diesel engines as the cause of reduced life length in urban areas around the globe has increased considerably the last years. Particulate emission requires a soot trap mounted in the exhaust system right after the engine. The trap passes the hot gas and collect the microscopic particles continuously. Sequentially the trap will generate and oxidize the collected carbon particles to water and CO_2. Regeneration technology vary depending on the systems manufacturer philosophy and the actual application.

Special sizes for compact vehicle or industrial applications can be assembled individually based on the many different design 90 cpsi „building" blocks available from 1.0 to 8 liters. Hereby custom made DPF sizes can be created ranging from 12.5 to 150 liter volume with tight tolerances, also in „race-track" and square designs.

Download all you need on our website!

The standard StobbeDPF

Standard sizes pure SiC supplied as a bare monolithic modules with no potential catalytically active coating, canning or canning interface

Item #	Description	Volume / litre	Size mm / Ø x L	Size Inches / Ø x L
80010	SiC DPF Ø80xL205-F180-1 90/0.8	1.0	80 x 205	3.2 x 8
80029	SiC DPF Ø118xL254-F180-1 90/0.8	2.8	118 x 254	4.66 x 10
80030	SiC DPF Ø118xL305-F180-1 90/0.8	3.3	118 x 305	4.66 x 12
80035-1	SiC DPF Ø144xL154-F180-1 90/0.8	2.5	144 x 154	5.66 x 6
80037	SiC DPF Ø144xL205-F180-1 90/0.8	3.3	144 x 205	5.66 x 8
80050	SiC DPF Ø190xL154-F180-4 90/0.8	4.4	190 x 154	7.5 x 6
80060	SiC DPF Ø190xL205-F180-4 90/0.8	5.8	190 x 205	7.5 x 8
800802	SiC DPF Ø228xL154-F180-7 90/0.8	6.3	228 x 154	9 x 6
80080	SiC DPF Ø228xL205-F180-7 90/0.8	8.4	228 x 205	9 x 8
800801	SiC DPF Ø228xL228-F180-7 90/0.8	9.3	228 x 228	9 x 9
80100	SiC DPF Ø228xL254-F180-7 90/0.8	10.4	228 x 254	9 x 10
80120	SiC DPF Ø228xL305-F180-7 90/0.8	12.5	228 x 305	9 x 12
80130	SiC DPF Ø254xL254-F180-7 90/0.8	12.9	254 x 254	10 x 10
80150	SiC DPF Ø254xL305-F180-7 90/0.8	15.5	254 x 305	10 x 12
80170	SiC DPF Ø286xL254-F180-7 90/0.8	16.4	286 x 254	11.25 x 10
80200	SiC DPF Ø286xL305-F180-7 90/0.8	19.6	286 x 305	11.25 x 12
80230	SiC DPF Ø286xL355-F180-7 90/0.8	22.8	286 x 355	11.25 x 14
80300	SiC DPF Ø381xL254-F180-9 90/0.8	29.0	381 x 254	15 x 10
80350	SiC DPF Ø381xL305-F180-9 90/0.8	34.6	381 x 305	15 x 12
80400	SiC DPF Ø381xL355-F180-9 90/0.8	40.0	381 x 355	15 x 14
80540	SiC DPF 140x140xL450-F180-1 90/0.8	8.8	140 x 140 x 450	5.5 x 5.5 x 17.7
80035-2	SiC DPF Ø144xL154-F240-1 150/0.5	2.5	144 x 154	5.66 x 6

Circular sizes available in 90 cpsi with 2 x 2 mm cell size and 0.8 mm wall

Circular sizes available in 90 cpsi with 2 x 2 mm cell size and 0.8 mm wall

Circular sizes available in 90 cpsi with 2 x 2 mm cell size and 0.8 mm wall

Square blocks available in 90 cpsi and 2 x 2 mm cell with size and 0.8 mm wall

Circular size available in 150 cpsi, 1.6 x 1.6 mm cell size and 0.5 mm wall

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DK-2820 Gentofte - Denmark
phone:+45 4593 4993 - fax: +45 4593 4983
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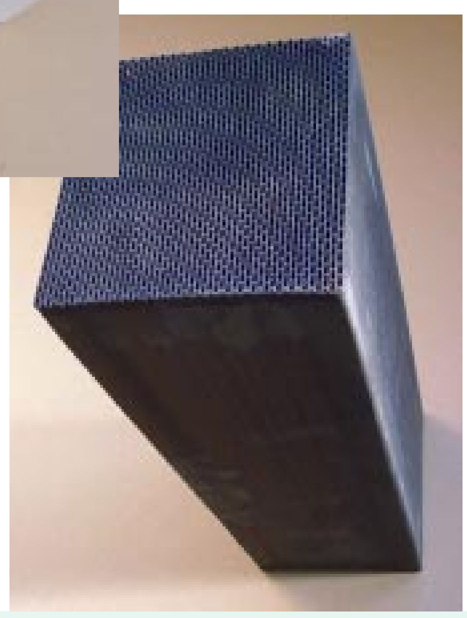

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