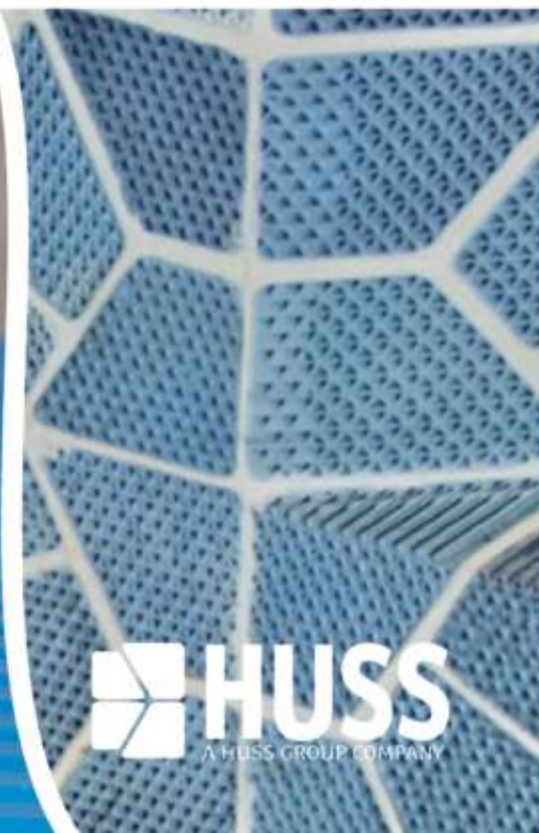




CleanDieselCeramics



***LPS-SiC DIESEL PARTICULATE  
FILTERS FOR HEAVY-DUTY AND  
OFF-ROAD APPLICATIONS***



**HUSS**  
A HUSS GROUP COMPANY



**“EXPERT IN DIESEL PARTICULATE FILTERS FOR HEAVY-DUTY AND OFF-ROAD APPLICATIONS”**

CleanDieselCeramics specializes in the development and production of diesel particulate filters made of Liquid-Phased Silicon Carbide (LPS-SiC). Remarkable innovations in material and process engineering as well as decades of market experience are built into these new and patented particulate filters.

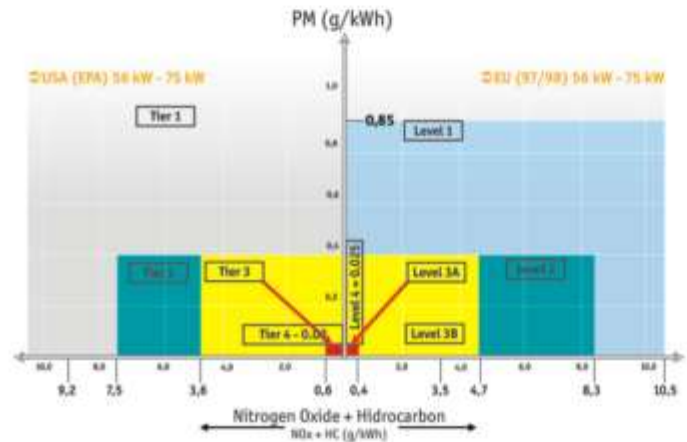
As a member of the HUSS Group, CleanDieselCeramics is focused on heavy-duty and off-road vehicle applications. Product development and production are tailored to the specific customer needs in these markets.

**BEST TECHNOLOGY AVAILABLE FOR TODAY AND THE FUTURE**



**“REGULATIONS DROP ENGINE EMISSIONS BY 90% IN THE FUTURE”**

The worldwide growing population leads to a steadily growing number of vehicles and to tough demands on mobility. In order not to pollute the air we are breathing, the emission values of engines are limited.



A reduction by another 90%, compared to current limits, will occur in the near future. Exhaust after treatment systems are the best solution for meeting this challenge. Our ceramic material is a proven best technology available for catalysts and diesel particulate filters.



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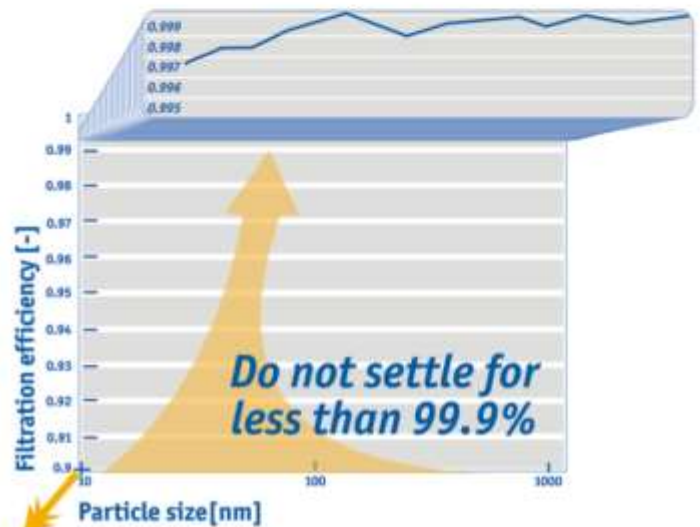
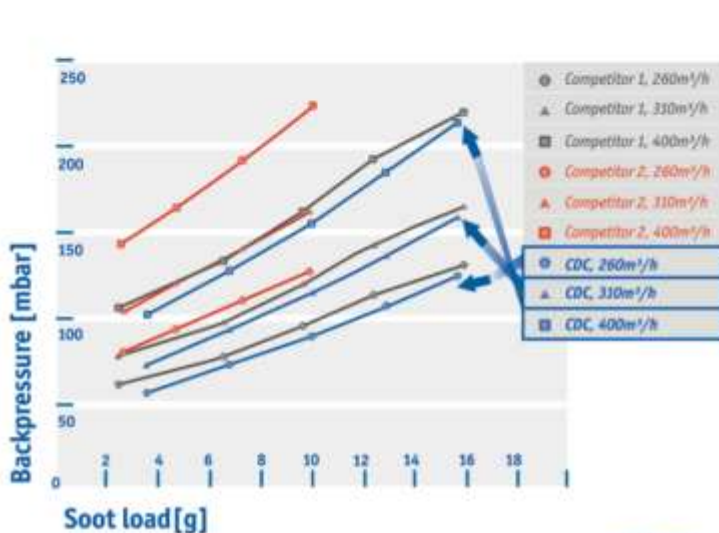
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## LPS-SiC AS ROBUST AS THE APPLICATIONS IT IS BUILT IN

A diesel particulate filter is the core element of an exhaust after treatment system. It has to be as durable as the application it is built in. Off-road and heavy-duty vehicles work under severe conditions and have a long lifecycle. The goal of CleanDieselCeramics was to develop a filter that is able to perform under these conditions with an excellent filtration rate.

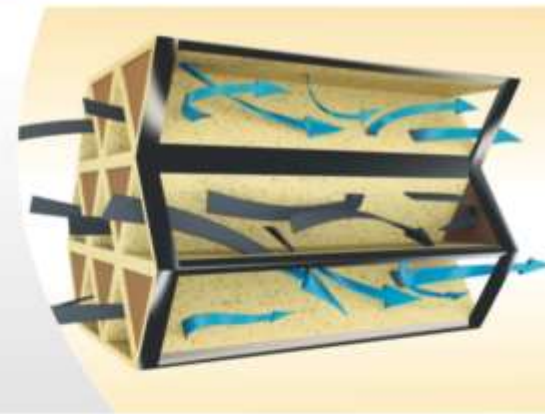
In order to achieve these extreme objectives, only a special LPS-SiC material and an innovative wall-flow filtering technology would succeed. The application of a special heavy-duty and off-road filter is now a reality.



Filtration efficiency already begins above 90%

### Wall-flow technology: 99.9% filtration rate

The special LPS-SiC of CleanDieselCeramics is a high-tech ceramic that offers unique material properties. High thermal and chemical resistance, enormous heat conductivity, mechanical durability and extreme heat resistance are only a few of the outstanding features. The wall-flow filtering technology achieves a soot collection rate of 99.9% which exceeds most existing emission regulations.



**HOW IT WORKS:** The exhaust gases are lead into the particulate filter and the channels of its segments are alternately closed. This means that the exhaust gases have to flow through the ceramic walls into the neighbour channel. The porosity of the walls is designed in a way that gases can pass and particles are held back efficiently. This is the reason why particulate filters from CleanDieselCeramics filter 99.9% by numbers of soot particles and through the entire range of particle sizes.



### MATERIAL OVERVIEW

- Built to perform under extreme conditions
- High thermal and chemical resistance
- High mechanical durability
- Resistant to corrosion and heat
- Patent protected
- Long product life

# PRODUCTS

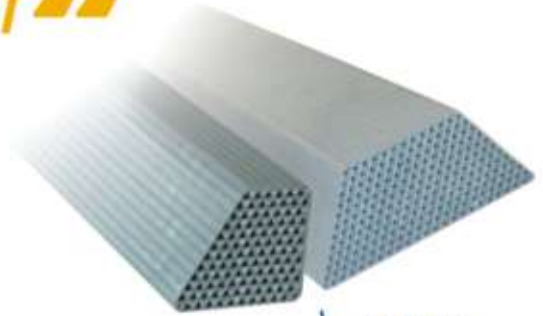
## "20 YEARS OF MARKET EXPERIENCE SUPPORTING THE FILTER DEVELOPMENT"



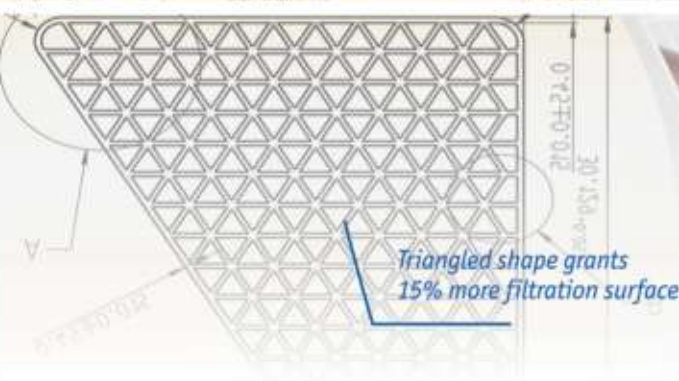
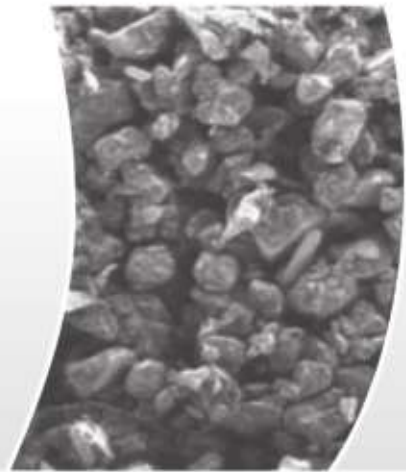
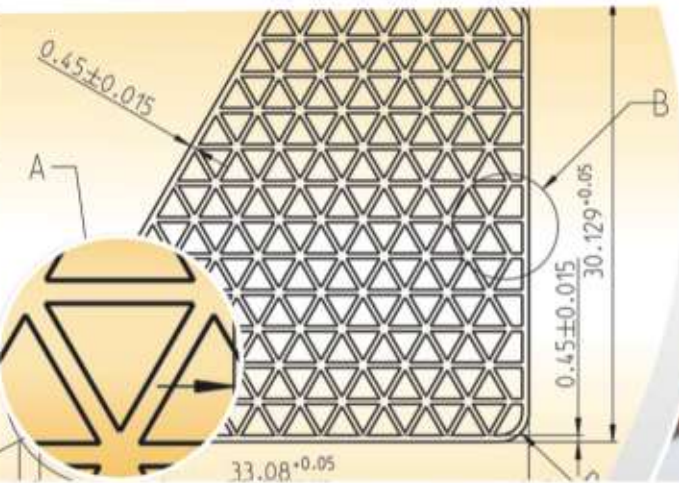
Canned CDC Diesel  
Particulate Filter

Beyond the innovative ceramic material, CleanDieselCeramics was engaged in the design of the channels and the honey combs of the particulate filter.

The extraordinary polygonal outer shape of the honey combs also increases the mechanical stability. Once bonded together, the different heat gradients experienced during the regeneration process are equally distributed. In addition, changing the configuration of the honey comb assembly allows for a wide variety of possible filter shapes.



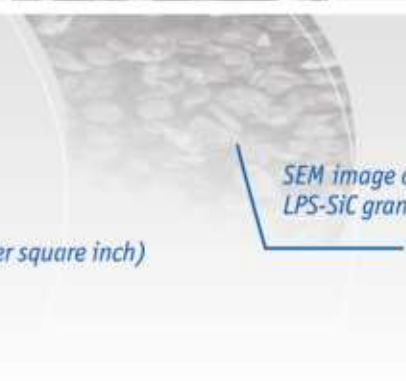
LPS-SiC filter  
single & double  
segments



Triangled shape grants  
15% more filtration surface



High density of  
200 cpsi (cells per square inch)



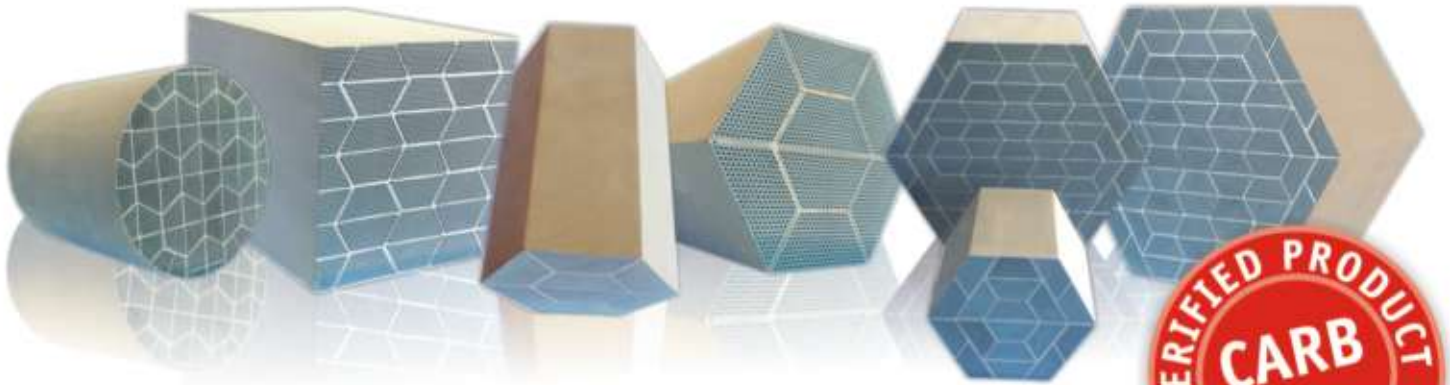
SEM image of  
LPS-SiC granulate

### PRODUCT OVERVIEW

- Wide variety of possible filter shapes
- Single filter up to 400 hp (300kW)
- Approved for serial production
- 15% higher filtration surface
- 200 cpsi cell density
- Equalization of heat gradients

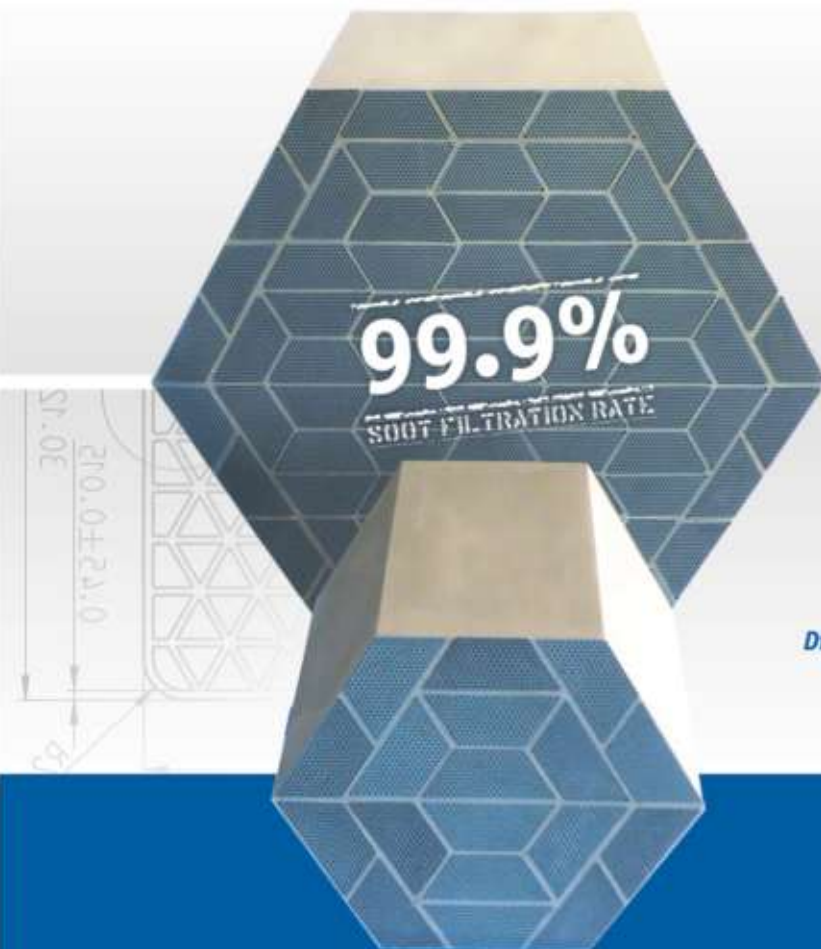
# INNOVATION FOR MEETING CUSTOMER DEMANDS

The channels have a triangle form which offers a 15% higher filter surface and keeps a low backpressure, especially in case of a higher soot load. The cell density was specifically adjusted to 200 cpsi (cells per square inch) in order to achieve an optimal balance between filter volume and mechanical stability of the honey combs.

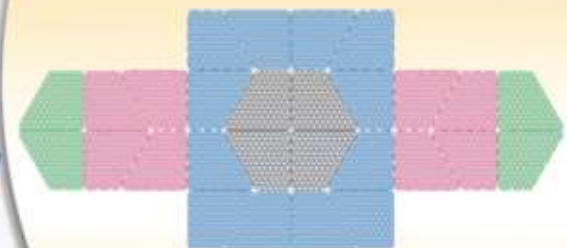


CleanDieselCeramics can build filter sizes up to 25 liters in order to meet the specifications of a 400 hp (300 kW) engine. By combining individual filters, large applications can be covered. Of course, the traditional round and oval forms can also be produced.

The HUSS LPS-SiC filters are verified as Best Available Technology (BAT Level 3+) by CARB.



Different shapes possibilities

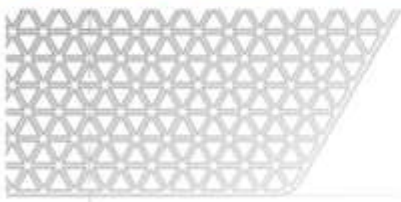


# PRODUCTION AND R&D



30.76

61.52



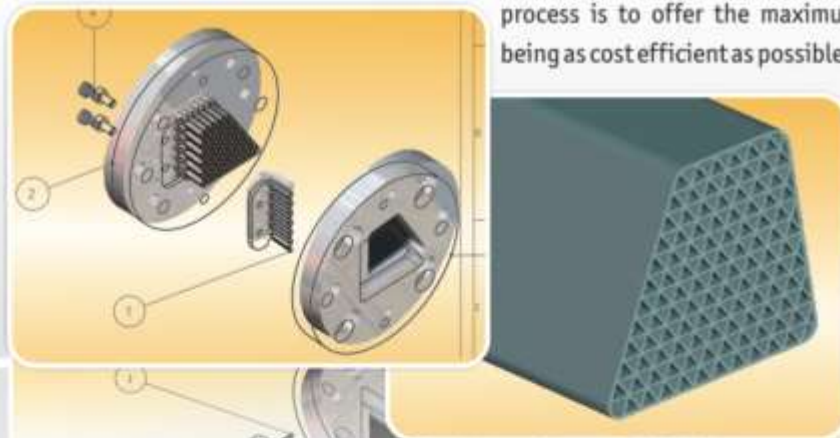
71.037

**“ MAXIMUM FLEXIBILITY  
TO MEET YOUR NEEDS ”**

Producing a diesel particulate filter is a high sophisticated process that requires a wealth of experience in material and process engineering. At several points along the multi-stage production process, a quality check is integrated. The goal of the CleanDieselCeramics production process is to offer the maximum flexibility by

being as cost efficient as possible. Therefore, our in-house process engineering and material development are central components of our

commitment to continuous improvement in production and R&D. As part of the HUSS Group, CleanDieselCeramics is integrated into a culture that values high-tech performance and customer focus.

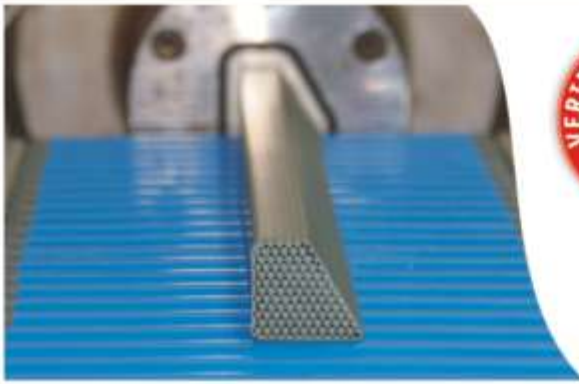


**“ HIGH VOLUME CAPACITY  
FOR SERIAL PRODUCTION ”**

## PRODUCTION- R&D OVERVIEW

- *Highly experienced in process engineering*
- *In-house material development*
- *Continuous quality control*
- *Extensive R&D capabilities within the HUSS Group*

# CleanDieselCeramics - Advantages



## PRODUCTION

- **High flexibility in production process**  
Focusses on special customer demands
- **Sufficient production capacity**  
Meets requests from customers from heavy-duty and off-road sectors
- **In-house process engineering**  
Provides continuous efficiency improvements
- **In-house material development**  
Improves the next filter generation
- **Continuous quality control**  
Ensures the production performance
- **Modern production**  
Equipped with latest machines and production technologies
- **R&D capabilities in the HUSS Group**  
Customized system integration and development

## PRODUCT

- **Specialised in heavy-duty and off-road applications**  
Using high performance materials
- **Long product life**  
According to the vehicles it is used for
- **Robust material**  
For extremely hard working conditions
- **Variety of outer shapes and sizes**  
With an extraordinary segment structure
- **Great filter volumes**  
Single filter up to 400 hp (300 kW) engine performance
- **Approved for serial production**  
Approved by German technical inspection authority (TÜV) and the federal motor transport authority (KBA)
- **20 years of market experience built in**  
Experience and expertise in every filter

## TECHNOLOGY

- **LPS-SiC high-tech ceramic**  
High-tech ceramic for severe applications
- **99.9% soot collection**  
Across all particle sizes by wall-flow filtering; meets future emission levels
- **200 cpsi cell density**  
Optimum between stability and backpressure
- **15% higher filtration surface**  
Featuring unique, triangled channel design
- **Triangled channels**  
Higher ash storage and soot loading capacity
- **Patent protected**  
New material and extraordinary design

**CLEANDIESEL CERAMICS**  
**FIELDS OF EXCELLENCE**

*Specialized in heavy-duty and off-road*

*Durable LPS-SiC ceramic material*

*Long product life*

*Flexible production process*

*Latest production technology*

*In-house research and development*

*Geared on large filter sizes*



## WE CARE FOR AIR.

**HUSS Group represents technical innovation and proven solutions in exhaust after treatment.** The focus is on both retrofit and firstfit of heavy-duty and off-road vehicles. Our common goal is to be internationally recognized as a leading company in this field.

The HUSS Group production facilities include; CleanDieselCeramics, the producer of the LPS-SiC ceramic filters and Metpela, the producer of the particulate trap casing.

HUSS locations in North America and Europe provide verified retrofit solutions to meet local regulatory requirements. HUSS Technologies is the ideal partner for the development and integration of engine and vehicle solutions for manufacturers.

The scope of our collective effort is embodied in our slogan: **HUSS – We care for air.**



We care for air.



**HUSS, Inc.**  
Retrofit sales and service /North America



**HUSS Umwelttechnik GmbH**  
Retrofit sales and service / Europe and other export markets

**HUSS Technologies GmbH**  
OEM/Firstfit sales and service, system integration



**CleanDieselCeramics GmbH**  
Development and production of LPS-SiC DPFs



**Metpela Oy**  
Development and production of mufflers and exhaust pipes; Canning technology

[WWW.HUSSGROUP.COM](http://WWW.HUSSGROUP.COM)