EcoLight-System Sanitary
Advancing Efficiency
EcoLight-System Sanitary

With the innovative EcoLight-System Sanitary, Schunk Carbon Technology has set a new standard for lightweight kiln car superstructures for tunnel kilns in the Sanitary industry as far as efficiency is concerned.

The benefits are:
- Reduced thermal mass and therefore reduction of gas-consumption (cost-saving potential approx. > 10% p.a.)
- Improved convective heat-flow due to Bore-Grid structure with a positive impact on yield
- Excellent long-term quality-performance
- Outstanding Product / Service packages

The below shown kiln car superstructure visualizes an exemplary set-up for a tunnel kiln car. Different set-up configurations (i.e. incl. Lavi Setters, beams for supporting Double-Basins etc.) are also feasible. Single items (i.e. EcoLight® Beams, Bore Grids, Vertical Posts) are also available for Shuttle kilns.
Bore-Grids

The Bore-Grid structure with a max. size of 800x600mm allows a better convective heat-flow and therefore a positive impact on the yield of the ware being fired.

Benefits:
- Significantly reduced thermal mass (~ 20.5 kg/m² and therefore > 50% less weight compared to standard Cordierite batts. Approx. -10% less weight compared to plain NSiC batts)
- Positive impact on the yield due to improved convective heat flow in particular for large complex sanitary ware (i.e. reported less firing-cracks)
- Excellent long-term quality-performance (no creep compared to Cordierite)

EcoLight® (silicon-infiltrated, reaction-bonded silicon carbide)
High strengths RBSiC grade with superior hot-bending and creep-resistance properties allow the efficient application of tailor-made load to mass optimized beams and profiles with cross-sections ≤ 30x30mm for longitudinal beams for tunnel or intermittent kiln car superstructures with outstanding long-time quality performance. We provide outstanding products and unrivaled service package to give maximum benefits.

CarSiK® (silicon-infiltrated, reaction-bonded silicon carbide)
Standard RBSiC grade with excellent hot-bending and creep-resistance properties in especially for longitudinal beams ≥ 40x40mm and high loaded transverse beams used either in tunnel or intermittent kiln car superstructures with an outstanding long-time quality performance.

IntrinSiC® (silicon-infiltrated, reaction-bonded silicon carbide)
IntrinSiC® combines excellent material properties of RBSiC with process-related advantages of 3D-printing providing a new dimension of constructive design potentials.

CarSiK-NG (silicon nitride-bonded silicon carbide)
CarSiK-NG is a NSiC with excellent material properties which results in optimum price-performance ratios, especially for large volume products Bore-Grids, Carrier Plates and Lavi-Setters.

The charts below shows a comparison of the Modulus of Rupture from commercially available refractory grades and Technical SiC ceramics, giving a direct comparison between Cordierite and NSiC in correlation to the temperature. Essentially, NSiC and SiSiC (RBSiC) show an outstanding performance in particular as far as bending strengths, creep-resistance and long term quality performance in general are concerned. Like being typical for Cordierite, it is not necessary to turn Bore-Grids and Battts in operation. Washcoat is available for Bore-Grids upon request.
Y-Riser

The one piece 3D-printed riser design in RBSiC grade IntrinSiC® - with integrated cover-plate, combined with a Y - shaped bottom structure for a defined 3-point loading is a new innovation. Y-Risers are available with separate cover plate, also available washcoated upon request.

Benefits:
- Significantly reduced thermal mass (less than half of weight compared to traditional Cordierite designs)
- High degree of stability for direct placing on beams due to Y-shape
- Outstanding long-term quality-performance (Oxidation- and Creep resistance)
- Outstanding degree of design-flexibility due to 3D-printing technology (no costs for patterns and/or moulds)
- Short lead times due to 3D-printing

Vertical Posts

A joined/glued insert ensures a defined line-loading of the longitudinal beams and therefore a controlled loading distribution.

Benefits:
- Significantly reduced thermal mass (less than half the weight of traditional Cordierite designs)
- Excellent long-term quality-performance (no creep compared to Cordierite)

Loading Setters

Loading Setters in an outstanding degree of design flexibility are available in our 3D-printed RBSiC-grade IntrinSiC®.

Benefits:
- Significantly reduced thermal mass (less than half of weight compared to traditional Cordierite designs)
- Outstanding long-term quality performance (Oxidation- and Creep resistance)
- Outstanding degree of design flexibility due to 3D-printing technology (no costs for patterns and/or moulds)
- Short lead times due to 3D-printing technology

Eco-Light® Beams

Eco-Light® Beams of Schunk Carbon Technology is the most innovative product line available for longitudinal beams used in the sanitary industry.

Benefits:
- This high strength material with excellent hot-bending and creep resistance properties allows for the efficient application of tailor made load providing mass optimized beams with square cross-sections ≤30 mm x 30 mm. Apart from lower investment costs, the use of Eco-Light® Beams has a positive impact on the energy costs due to decrease in thermal mass.

<table>
<thead>
<tr>
<th>Cross-section</th>
<th>Wall-thk.</th>
<th>Warpage*</th>
<th>Max. length</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 x 30</td>
<td>6 + 1/0.5</td>
<td>≤ 0.10</td>
<td>3000</td>
</tr>
<tr>
<td>25 x 25</td>
<td>6 + 1/0.5</td>
<td>≤ 0.10</td>
<td>3000</td>
</tr>
<tr>
<td>20 x 20</td>
<td>6 + 1/0.5</td>
<td>≤ 0.10</td>
<td>3000</td>
</tr>
</tbody>
</table>

* Standard Deviation on two parallel sides according to DIN 40680.
Lateral Deviation ≤ 0.2% (over entire length).

The following chapters refer to the superior product Eco-Light® beams only and give a detailed overview about the technical advantages and an unrivaled service-package.
EcoLight® evolution of beam cross-sections

The majority of the beams in tunnel and shuttle kilns are “oversized” based on a historical development of SiC grades for kiln-furnitures. A few decades ago, the RSiC (recrystallized SiC) was introduced as a lightweight material used in designs for kiln car superstructures. Due to ongoing efforts with the goal to increase the product-lifetime of these construction elements, leading manufacturers - like Schunk Carbon Technology - developed gas-tight SiSiC (silicon-infiltrated, reaction-bonded SiC) giving superior quality performance in particular as far as oxidation-, creep-resistance and bending-strengths are concerned.

Schunk Carbon Technology has become a world leading supplier of this grade in a broad spectrum of various market segments. SiSiC has displaced RSiC and the majority of NSiC beams in the sanitary industry due to their excellent quality performance. The logical step in the innovation of increasing the efficiency was the combination of SiSiC with the benefit of tailor-made beam cross-sections which are based on individual loading scenarios of each customer. As the worldwide leading supplier, Schunk Carbon Technology launched in 2009 a global strategy moving away from the “stock-drop shipping” of the i.e. standard 40 mm x 40 mm longitudinal beams towards engineered solutions for customers specific needs.

The superior microstructure of EcoLight® Beams combined with a high density and a low content of free Si are the base for outstanding quality performance records with references for 25 mm x 25 mm and 30 mm x 30 mm beams being in operation for in excess of 15 years within the sanitary industry. Switching-over from the traditional beam cross-sections to EcoLight® Beams does have a significant monetary benefit. Apart from the reduced costs of purchase for replacement business and/or capital investments to equip new kilns, the reduction of the thermal mass has a positive impact on the annual gas-consumption as well (Example: 1100 kg less weight for SiSiC-beams 30 mm x 30 mm beams vs. 40 mm x 40 mm, base: 120 kiln-cars with 8 beams L = 1500 mm each). The image on the left below shows the approx. cost-savings for unit-prices in correlation to the cross-sections. The right image below shows a comparison of bending-strengths of commercially available SiSiC grades based on a common standard kiln-car-superstructure for a tunnel kiln-car in the sanitary industry. The figures indicated as “load [kg]” are based on statistically evaluated fracture stresses with an extrapolation on the specific loading scenario of the selected beam set-up. The indicated higher fracture-stress of ≈ 40 % vs. competitor products is the result of the superior material properties of EcoLight.

The most efficient result in terms of a high degree of reliability and economy in service will be achieved in using EcoLight® Beams and NSiC Bore-Grids made of CarSiK-NG. The convective heat flow of the Bore-Grids has a positive impact on the first firing yield.

Innovative product-package

Superior Product-Innovations for EcoLight® Beams

Bending Strengths up to 40 % higher vs Competitor products in SiSiC

Warpage ≤ 0.1 % over entire lengths on application side

Product-Warranty of 5 years

Tailor-Made cross-sections to eliminate oversized beams and to reduce investment costs

Apex, cost-savings of small cross-section EcoLight® (SiSiC) Beams vs. 40 x 40 mm

Extrapolated fracture-stress based on a typical kiln-car-superstructure in sanitary industry
Superior product innovations of Eco-Light® Beams

The EcoLight product-line is a distinguished example of the development competence of the company’s engineers. Not to settle for what has already been achieved, but to challenge for further innovation is the company’s goal. As an additional worldwide unique service feature, Schunk Carbon Technology offers further the regular 5 year product warranty for Eco-Light® Beams a new dimension of security - a warranty extension up to 10 years.

EcoLight-Systems by Schunk Carbon Technology improve firing processes in various industries. Mass-optimized kiln-furniture made of innovative ceramic material ensures a high degree of efficiency and introductions of cost saving potentials - minimum input of energy and material for highly efficient performance of function.

The summary of the advantages in using Eco-Light® Beams are as follows:

- Tailor made cross-sections (to eliminate “oversized” beams with a positive impact on the annual gas consumption and to reduce investment costs)
- Product warranty of 5 years with option for extension up to 10 years
- Superior low warpage-specification of ≤0.1 % over the entire lengths (on the application side)
- Bending strengths up to 40 % higher (vs. competitor products in SiSiC)
- Unrivaled service package
Eco-Light® Advancing Efficiency and unrivaled Service Package

Based on ongoing efforts to design unique solutions with the goal to provide outstanding service to customers, Schunk Carbon Technology released the following currently unrivaled service package for Eco-Light® Beams which consist of:

- Economical assessment,
- Warranty,
- Technical advise,
- Service.

Our kiln furniture is low mass, but we’re putting more weight in our technical advice.

Our technical advice is the base for the constructive design and optimal selection of the correct ceramic grade of kiln furniture. Our specialists also offer a detailed calculation and assessment of the individual loading scenario of your kiln furniture superstructures. Core competence of this service is the preparation of an individual Loading-Profile for our Eco-Light® Beams (SiSiC) including a graphic presentation of the static loading parameters. This serves to demonstrate the combination of economic efficiency and safety resulting from the substitution of “oversized” beams by our EcoLight furniture.

We’re saving costs by analyzing their appearance.

The mass of a kiln car has a significant influence on the energy consumption, especially on tunnel kilns. The focus of our material and design development is therefore concentrated on reduction of the thermal mass. The innovative kiln furniture combination of Eco-Light® Beams (SiSiC) and CarSIK NG (NSiC) batts - respectively Bore Grids - give verifiable results in sanitary tunnel kilns and offer a significant cost saving potential. Compared to Cordierite batts combined with beams ≥ 40 x 40 mm approx. ≥ 50,000 Euro per annum is typical.

To provide kiln furniture which is as economical as possible, we do offer our customers a special service. On the basis of individual kiln parameters we are able to calculate the gas consumption of sanitary tunnel kilns with a special software and provide customers with their impact on cost savings.
We’re optimizing cost effectiveness by conveying specific knowledge.

The use of innovative light weight kiln furniture enables significant potential cost savings. In order to achieve these savings, we will make a detailed study of your kiln furniture and firing conditions. Our specialists are available to hold training courses for your technical staff on site.

A clean matter - EcoLight® CleanGuard.

Always on the safe side: We offer a fee based service in order to allow for the maximum lifetime of your kiln furniture: During our process CleanGuard, your Eco-Light® Beams (SiSiC) will be subject to professional cleaning, which eliminates residues (i.e. glazes) which may build up during the process in operation. This service also includes a specific strength test, which allows for ongoing excellent long time quality performance.

Even in the area of safety we’re showing our superior innovation.

The EcoLight® product line is a distinguished example for the development competence of our engineers. Not to settle for the achievement, but to challenge for further innovations is our goal, even in the area of safety. As an additional and superior service feature, Schunk Ingenieurkeramik GmbH offers apart from the regular 5 year product-warranty (*) for Eco-Light® Beams (SiSiC) a new dimension of safety: a warranty extension up to 10 years (*).

(*) Warranty according to the conditions of Schunk Ingenieurkeramik GmbH

Quality Commitment

Quality is in our DNA.

Our commitment and dedication to Quality is reinforced by proven internal processes flanked by intensive quality control and inspection methods within the entire line of manufacturing to ensure a constant high level of quality. As integrated part of our policy, we are committed to continuously improving our products, processes and services to meet and exceed our customers requirements. Our company is certified according to DIN ISO 9001.

We do ensure a high degree of quality in working on customer and application specific measurements prior to shipping as an integrated part of our in-house control. Apart from an optical inspection of the fired product, the material is (depending on the shape) subject to a 100% load-/ warpage testing as well as application-specific 3D-Scanning and X-ray measurement.

The Eco-Light® Life Time Warranty

Life Time Warranty is equal to a max. duration of 10 years according to the conditions of Schunk Ingenieurkeramik GmbH
Schunk Carbon Technology:
Always at your side.

Schunk Carbon Technology focuses on development, manufacture and application of carbon and ceramic solutions. It combines innovative spirit and technological expertise with exceptional customer service to provide a range of products and services unique to the market.

In Schunk Carbon Technology, you have a partner who can offer all the technological possibilities of an international company and implement ideas custom-tailored to your needs, both for high-volume industrial markets and for highly specialized niche markets.

A Schunk Group division

Enabling, idea-driven, cooperative - If you hope to apply technology to develop better products and capture new markets, we can help.

The Schunk Group has been supporting customers with innovative technologies since 1913. As an idea-driven technology company, innovation is fundamental to our culture. We forge long-lasting, cooperative working relationships with our customers.

You will find our custom-tailored, high-tech products and systems in markets such as: carbon technology and ceramics, environment simulation and air-conditioning technology, sintered metal and ultrasonic welding. The Schunk Group is active in a large number of key industries, from automotive, rail, aviation and marine technologies to solar and wind energy to the chemical and machine production industries. Our 8,000 employees in 29 countries are ready to serve you.

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