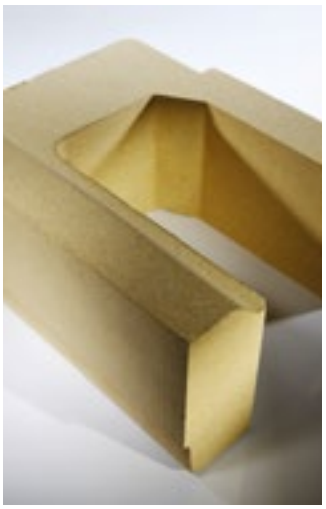
REFRATECHNIK

BURTON®
A trade name of Refratechnik

Expect the best – refractory systems from the global market leader



Find out more about:
www.burton-is-now-refratechnik.com

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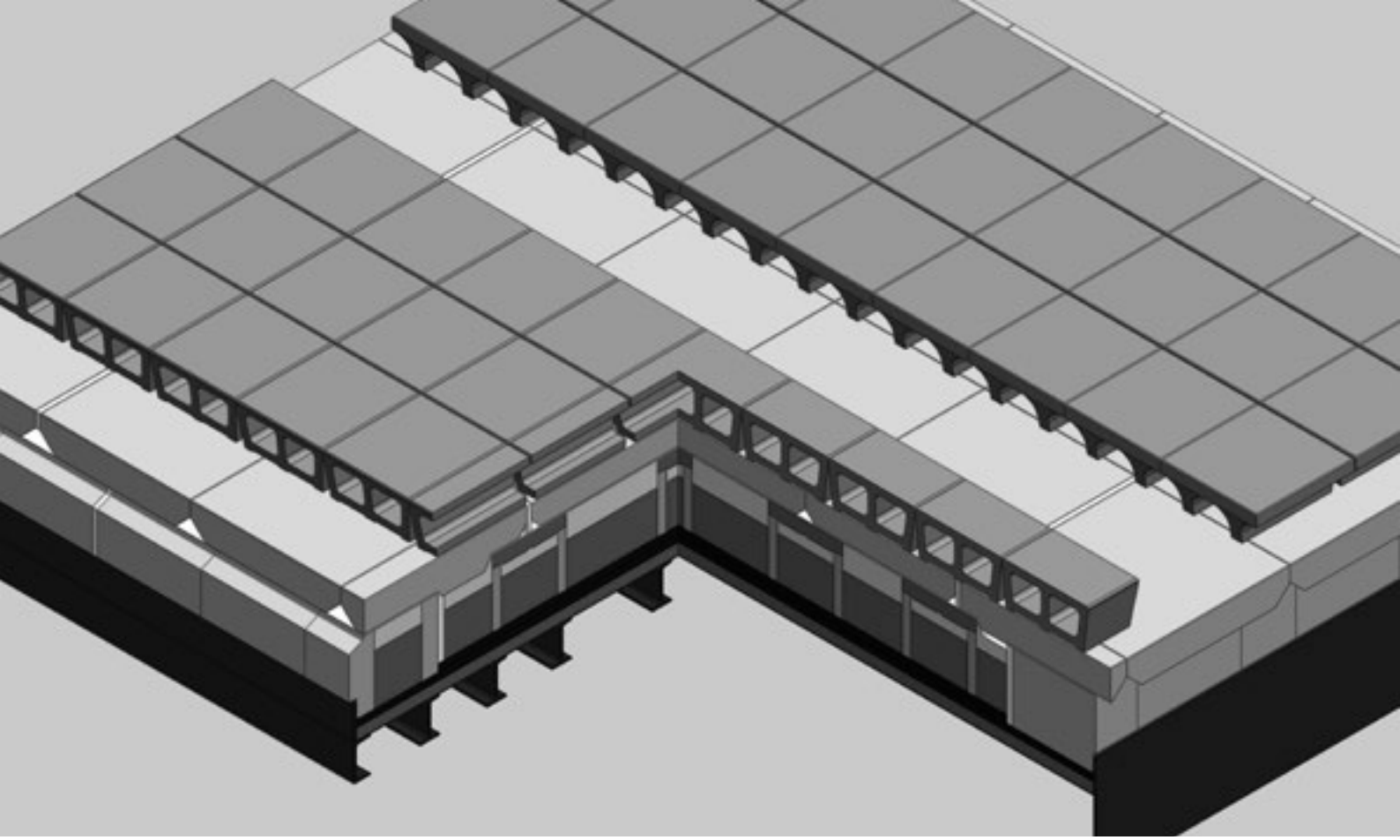


The Refratechnik Group
Success with strategy

The Refratechnik Group of companies originated from traditional craftsmanship and a working partnership between company founder Karl Albert and Norddeutsche Portlandcementfabriken – later named NordCement AG, now Holcim. Based on more than 60 years of continuous development, the Group is one of the world's most successful and dynamic organizations in the refractory business.

Following a strategic takeover of BURTON GmbH & Co. KG and BURTON Kiln Furniture Kft. in Hungary in 2013, Refratechnik has integrated the two companies into the Group as Refratechnik Ceramics GmbH and Refratechnik Hungaria Kft. As a result, Refratechnik now owns a performance center with 125 years of experience and tradition in the ceramic industry, and has taken over as market leader in the field of refractory products for the ceramic kiln construction business.

The world-famous BURTON® brand is here to stay and provides innovation, quality and stability.

Today, the Group is active globally and is structured into customer-oriented dynamic companies according to market segments and geographical areas – in compliance with the strategic guidelines of Refratechnik Holding GmbH in Ismaning.

Refratechnik Holding GmbH, Ismaning

Refratechnik Ceramics GmbH, Melle

Refratechnik Cement GmbH, Göttingen

Refratechnik Holding GmbH, Ismaning, Germany

- Baymag Inc. Calgary Canada
- Refratechnik Cement GmbH Göttingen Germany
  - Refratechnik Ibérica, S.A. Spain
  - Refratechnik Italia S.r.L. Italy
  - Refratechnik North America, Inc. USA
  - Refratechnik México S.A. de C.V. Mexico
- Refratechnik Steel GmbH Düsseldorf Germany
  - Refratechnik Casting GmbH Düsseldorf Germany
- Refratechnik Ceramics GmbH Melle Germany
  - Refratechnik Hungaria Kft. Hungary
- Refratechnik Asia Ltd. Hongkong China
  - Yingkou Refratechnik Refractories Co., Ltd. China
  - Zibo Refratechnik Refractories Co., Ltd. China
  - ZKD Kiln & Furnace Technology Co., Ltd China

With its production site in Melle, and the subsidiary company Refratechnik Hungaria Kft. in Hungary, **Refratechnik Ceramics GmbH** (BURTON GmbH & Co. KG up to 2013) is firmly established in the international ceramic industry. With three production facilities in Germany and Spain, **Refratechnik Cement GmbH** in Göttingen – site of the original Refratechnik headquarters – is the Group's largest performance center for the cement and lime industrial segments. The company has own subsidiaries in Italy, Spain, USA, and Mexico. Today, **Refratechnik Asia Ltd.** in Hong Kong, People's Republic of China, is the starting point for business developments in the Asia-Pacific region, and is ideally positioned in the world's fastest-growing cement market. The company already owns three manufacturing subsidiaries in Yingkou, Zibo, and Refratechnik Trading in Dalian, plus the joint venture ZKD Kiln & Furnace Technology Co. Ltd. **Refratechnik Steel GmbH,** together with its subsidiary **Refratechnik Casting GmbH** in Düsseldorf, represents the Group's center for the metalworking industries and associated activities, such as e.g. environmental technology. Two production sites, the Group's factories, and long-term business partnerships provide the basis for worldwide services.

Baymag Inc. in Calgary/Canada is the owner and exploiter of the high-grade Mount Brussilof magnesite deposit. The magnesia produced from the magnesite ore is used in countless industrial applications worldwide.

Refratechnik Asia Ltd., Hong Kong

Refratechnik Steel GmbH, Düsseldorf

Baymag Inc., Calgary

Complete high-performance systems
for the ceramic industry

Backed by more than 125 years of experience, Refratechnik Ceramics develops innovative refractory systems that are matched precisely to the technical and economic needs of the ceramic industry.

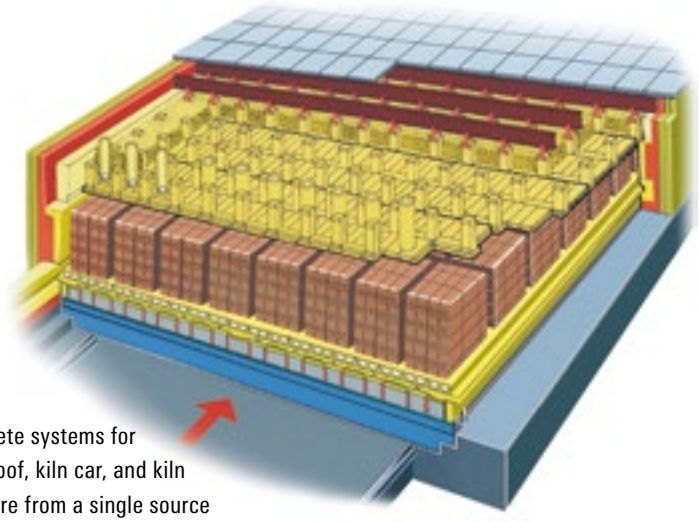
The inventive spirit of earlier generations is continued to this day in outstanding research and development work. Worldwide shipments and high flexibility have enabled our company to become the global market leader. Our product portfolio includes wall, roof, and kiln car systems with all the necessary kiln furniture. That makes Refratechnik Ceramics the only supplier worldwide able to provide complete refractory installations for kilns in the ceramic industry.

High firing temperatures and aggressive kiln atmospheres place high demands on the quality and service life of refractory materials. Moreover, efficient use of energy and environmental regulations play an increasingly important role in the design of refractory systems.

Since 1994, the Melle production site has been certified according to DIN EN ISO 9001.

Efficient operations are ensured by the favourable balance between customized and series production as well as flexible shaping and firing procedures: Short delivery times and reliable branded quality – all in our customers' interests.

An extensive stock of far more than 25.000 different shaped products permits optimum matching to the wide range of kiln conditions.



Complete systems for wall, roof, kiln car, and kiln furniture from a single source

Economic wall systems
for tunnel kilns

A highly insulating wall construction is a prerequisite for efficient operation of a tunnel kiln.

In addition, short construction times require the largest possible lightweight elements that can be installed quickly and accurately.

Examples of tunnel kiln wall construction:

- BURTON® wall system with standard small wall elements
- BURTON® wall system with medium-sized wall elements
- BURTON® wall system with large-sized wall elements

Intelligent suspended roof systems
for tunnel kilns

Decisive for the efficient use of energy is the airtightness of a suspended roof. Thanks to the overlapping arrangement of the structural elements, BURTON® systems have made important contributions to technical advancement.

High demands are placed on the suspended roof of a modern tunnel kiln:

- Low weight for cost-effective construction
- Good insulation despite low constructional height
- Large-sized, dry-pressed structural elements for fast installation of a airtight suspended roof
- Use of materials that have been optimized for aggressive kiln atmospheres such as sulphur, salts, etc.

As safety plays an outstanding role in the construction of a suspended roof, every roof element undergoes an intensive quality check.

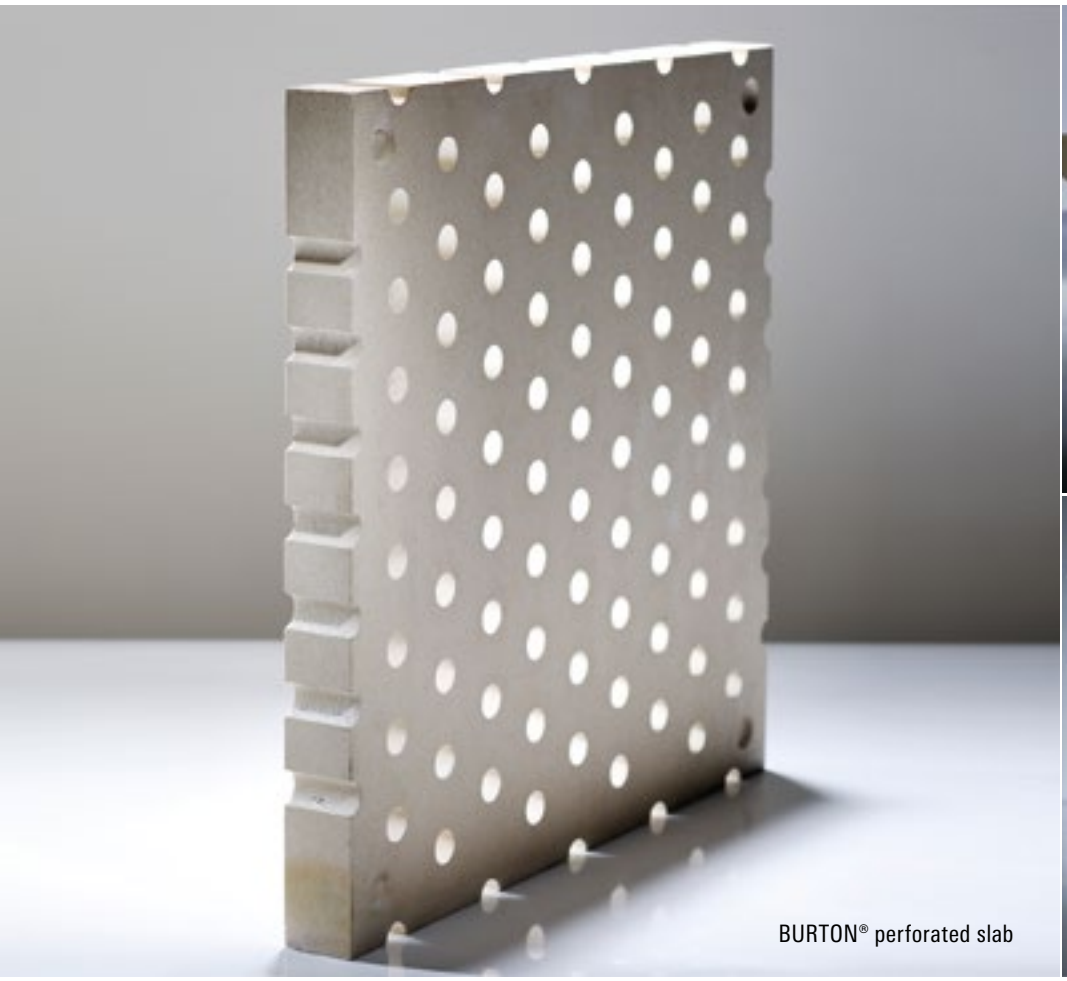
Tunnel kiln car systems
for the block, backing & facing brick industry

Due to continuous heating/cooling cycles, the kiln car is the most highly stressed component in a tunnel kiln system. Refratechnik's kiln cars take all important requirements into account:

- Lightweight, energy saving design and material selection
- Long service life
- Airtightness of car interlocks and labyrinth

Together with our customers we develop individual kiln car systems.

Examples:
- Clinker firing in top-fired kilns
- Firing of block and backing bricks in top-fired kilns
- Clinker firing in side-fired kilns



BURTON® perforated slab

BURTON® viaduct brick

BURTON® draught hole block

Our kiln furniture provides the basis for uniform firing, and therefore for optimum product quality.

Thanks to modern production methods, special design, and the selected materials, we are able to manufacture thin-walled, lightweight kiln furniture. They also feature a highly uniform wall thickness.
These parameters are essential for enabling fast, stress-free heating and cooling. Only this way a long service life of the refractory components can be ensured.

The dry-pressing method permits high dimensional accuracy, homogeneous structure, and good hot bending properties to be achieved, e.g. for

- Draught hole blocks
- Viaduct bricks
- Support bricks
- Perforated slabs
- Setting beams

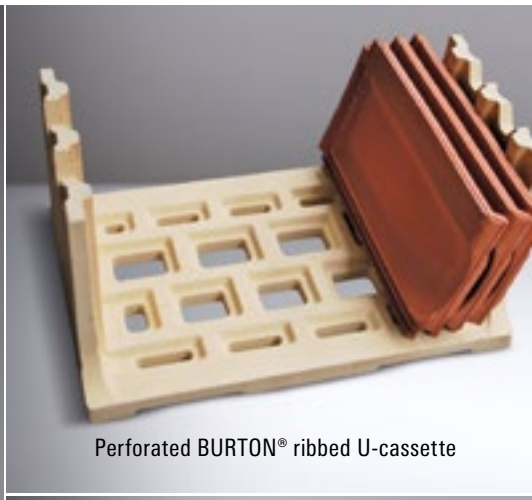
Individual tunnel kiln car systems
for the roofing tile industry

We provide cost-efficient systems, precisely matched to the respective market requirements. In this case, the U-cassette system or single-layer firing are the most robust and durable solutions.

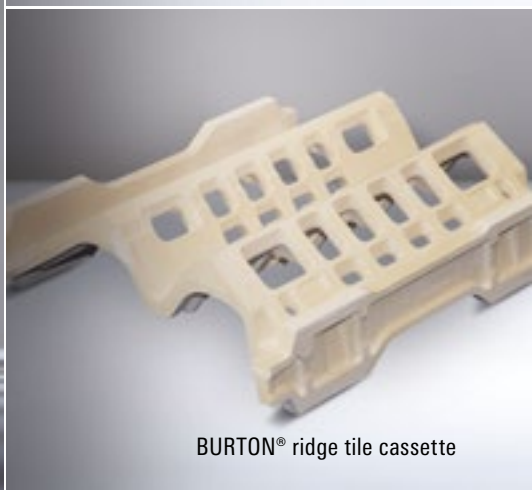
However, for firing high-quality roofing tiles, the H-cassette system offers decisive advantages: For the passage through the kiln, the individual roofing tiles are placed in specially designed H-cassettes, which ensure homogeneous firing without sagging. In particular, the use of H-cassettes is required when firing enamelled and glazed roofing tiles, as this results in considerably less adhesion.

Examples:
- Single-layer firing in side-fired kilns
- U-cassettes for top-fired kilns
- H-cassettes for top-fired kilns

BURTON® H-cassette



Perforated BURTON® ribbed U-cassette



BURTON® ridge tile cassette

Thanks to the use of the latest CAD technology, all customer requirements can be fulfilled precisely, both in terms of design as well as the material selection.

Depending on customer specifications, the kiln furniture is manufactured either by means of dry pressing or by casting.

The dry pressing method ensures high dimensional accuracy, so that no rework is required, thereby eliminating the associated risk of damage to the fired surface. On the other hand, the casting method permits a wide range of shapes to be produced, so that e.g. almost 100% of cassettes for accessory tiles can be manufactured in this way.

Our kiln furniture is featured by enormous diversification:

- H-cassettes
- U-cassettes
- Accessory cassettes
- Setting frames for fast firing
- Setting slabs and perforated slabs
- Support beams
- Supports and support blocks
- SiC systems

BURCOTOP®

High mechanical strength

High setting weight as well as non-automated handling lead to severe mechanical loads.

We develop and manufacture technical solutions that can withstand these loads.

Due to its high density and low porosity, BURCOTOP® reduces mechanical wear, spalling, and cracking to a minimum. Consequently, the resulting long service life of our refractory products makes a decisive contribution towards efficient production.

BURCOLIGHT®

Energy saving by weight reduction

Reduced energy consumption and lower CO_2 emissions are central topics in the ceramic industry. The selection of the most suitable tunnel kiln car systems enables energy efficiency to be improved significantly. This not only reduces fuel costs, but also subsequential costs such as the purchase of emission trading certificates.

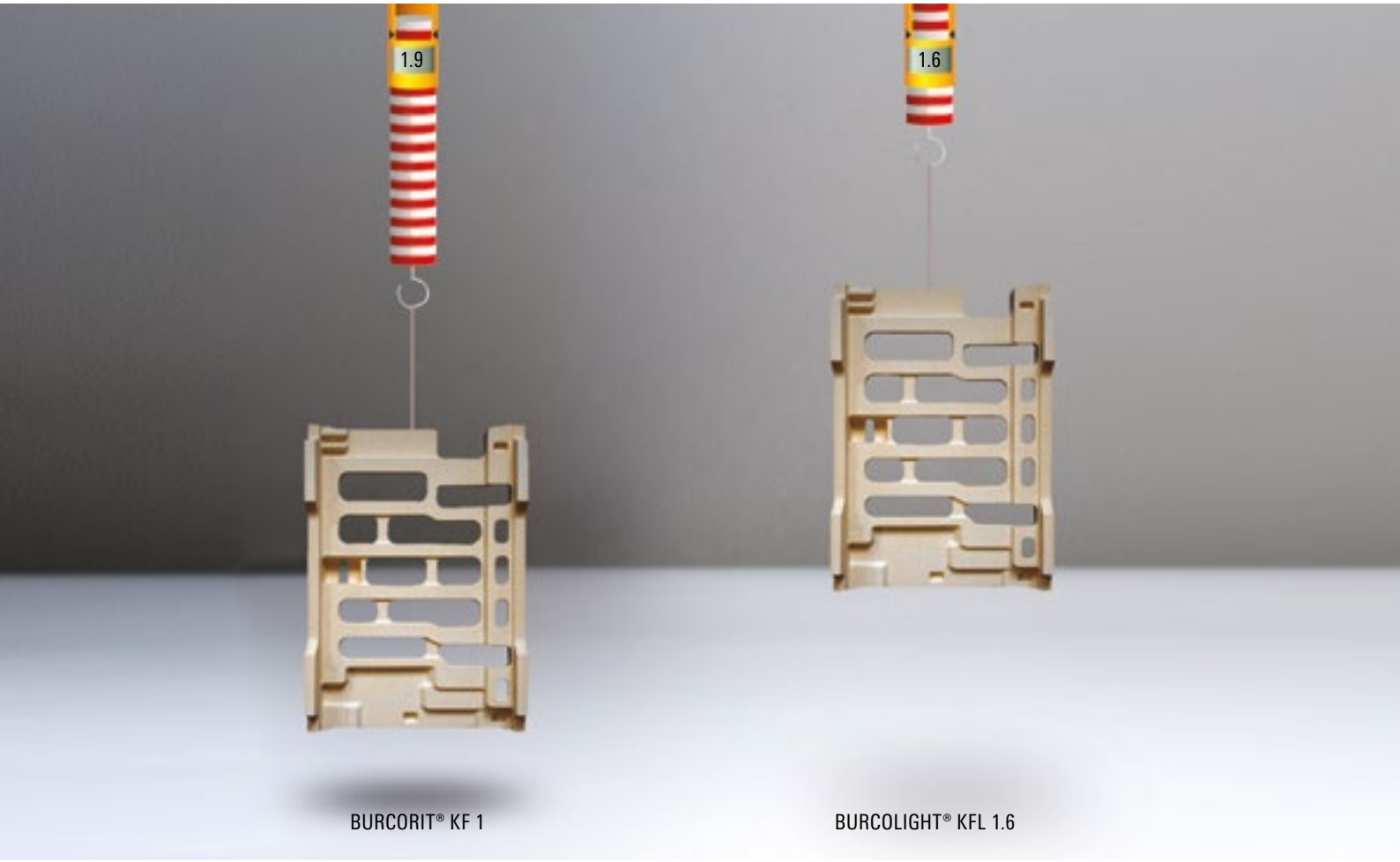
Kiln car systems equipped with BURCOLIGHT® bricks achieve energy saving by means of weight reduction.
The less mass needs to be heated up, the more energy is saved.

When used for kiln cars, BURCOLIGHT® brick types with a bulk density of ~1.3 to 1.5 kg/dm³ achieve energy savings up to 30% compared with BURCOTOP® brick types (depending on kiln car type and tunnel kiln temperature).

Thanks to these outstanding properties, the total energy savings of the kiln are between 8 and 12%.

In spite of its low weight, BURCOLIGHT® features excellent thermal shock resistance and low thermal conductivity.

Energy-efficient H-cassettes
for firing high-grade roofing tiles



BURCORIT® KF 1

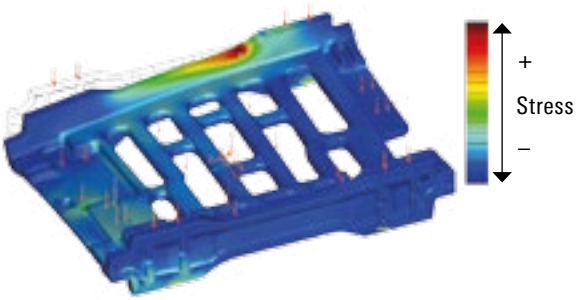
BURCOLIGHT® KFL 1.6

Energy savings are also possible with cassettes made of BURCOLIGHT®:

- Low bulk density (~1.6 to 1.8 g/cm³) and therefore less mass to be heated up

Even if energy-saving materials are used, the H-cassettes still exhibit high strength:

- Very good hot bending strength
- Low sag with the sagging test
- Low wear values when tested according to Böhme



In spite of their low weight, BURCOLIGHT® H-cassettes can withstand high mechanical loads.

Assembly
of tunnel kiln cars

Our lightweight BURTON® construction systems permit the kiln car to be assembled in the shortest time. Installation is simple, and maintenance is easy and cost-effective.

Assembly in a clinker factory (from top left to bottom right.):

- The insulating layer is applied
- Setting of the border bricks
- The kiln car core is filled with high-quality insulating compound and levelled
- Finished tunnel kiln car

Technical data

Zone/type	Raw material basis	Reference temp. (max.) °C	Bulk density +/- 5% g/cm³	Open porosity Vol %	Cold crushing strength MPa	Al_2O_3 %	Fe_2O_3 %	MgO %
Wall								
BURTON® SFH	Fireclay	850	2.10	17	45	20	2.0	
BURTON® 35H	Fireclay	1.150	2.20	18	30	35	2.5	
BURTON® 42 TE	Fireclay	1.280	2.30	15	50	42	1.2	
BURTON® S 60 T	Andalusite	1.350	2.50	16	60	60	1.2	
Suspended roof								
BURTON® SF HD	Fireclay	850	2.10	15	50	25	2.0	
BURTON® 35 HD	Fireclay	1.150	2.25	15	50	35	2.0	
BURTON® 40 HD	Fireclay	1.250	2.30	15	50	40	1.3	
BURTON® 60 HD	Andalusite	1.350	2.55	13	50	58	1.3	
Tunnel kiln car								
BURCOTOP® 125 H	Cordierite	1.200	2.00		20	30		3.5
BURCOLIGHT® 14/25H	Cordierite	1.150	1.40		15	32		8.0
BURTON® 40 HWS	Cordierite, Mullite	1.100	2.00		35	35		4.5
BURTON® 60 HWS	Cordierite, Mullite	1.200	2.25		50	48		2.0
BURCOTOP® WT 12	Cordierite	1.150	2.00	22	20	32	2.4	4.0
Kiln furniture								
BURCORIT® 20 B	Cordierite, Mullite	1.230	2.15	17	60	38		5.0
BURTON® CM1S	Cordierite, Mullite	1.200	2.07	18		37		7.5
BURCORIT® KF1	Cordierite, Mullite	1.150	1.92	24-27		37	1.2	8.2
BURCOLIGHT® KFL 1.6	Cordierite, Mullite	1.100	1.65	28		38	0.9	8.0

Please note:
All data have been defined for generally encountered factory-specific conditions (oxidizing firing), but they must always be checked individually, and discussed with our technical department.

The reference temperature (max.) [C°] is the temperature that is transferred to the product from the temperature of the kiln. This temperature must never be exceeded.

For individual tolerances, please ask.

Thermal shock resistance	Cold modulus of rupture at 20 °C	Hot modulus of rupture at 1100 °C	Refractoriness under load $t_{0,5}$	Thermal expansion max. (reversible) at 1000 °C	Thermal conductivity at 200 °C	400 °C	600 °C	700 °C	800 °C	1000 °C	1200 °C
Cycles	MPa	MPa	°C	%	W/(mK)						
10			1.200	0.60		0.95	1.00		1.10	1.15	
15			1.280	0.60		1.10		1.20		1.30	1.40
15			1.400	0.60		1.42		1.45	1.50	1.50	1.55
50			1.580	0.60		1.88	1.79		1.76	1.92	2.02
10			1.180	0.60				1.30			1.45
20			1.300	0.65		1.21		1.22	1.30	1.38	1.45
20			1.380	0.65		1.35	1.36	1.40	1.42	1.48	1.55
40			1.580	0.55		1.85	1.79		1.75	1.92	2.00
70			1.240	0.45	1.16	1.11	1.18	1.20	1.25	1.29	1.36
90			1.250	0.30	0.76	0.76		0.79		0.87	0.95
80			1.280	0.40	1.32	1.27		1.28		1.29	1.35
70			1.340	0.45	1.66	1.62		1.56		1.75	1.85
30	–		1.280	0.45							
	12	19	1.320	0.35							
	15	22	1.380	0.34							
	20	25	1.350	0.28							
	12	24	1.350	0.50							

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