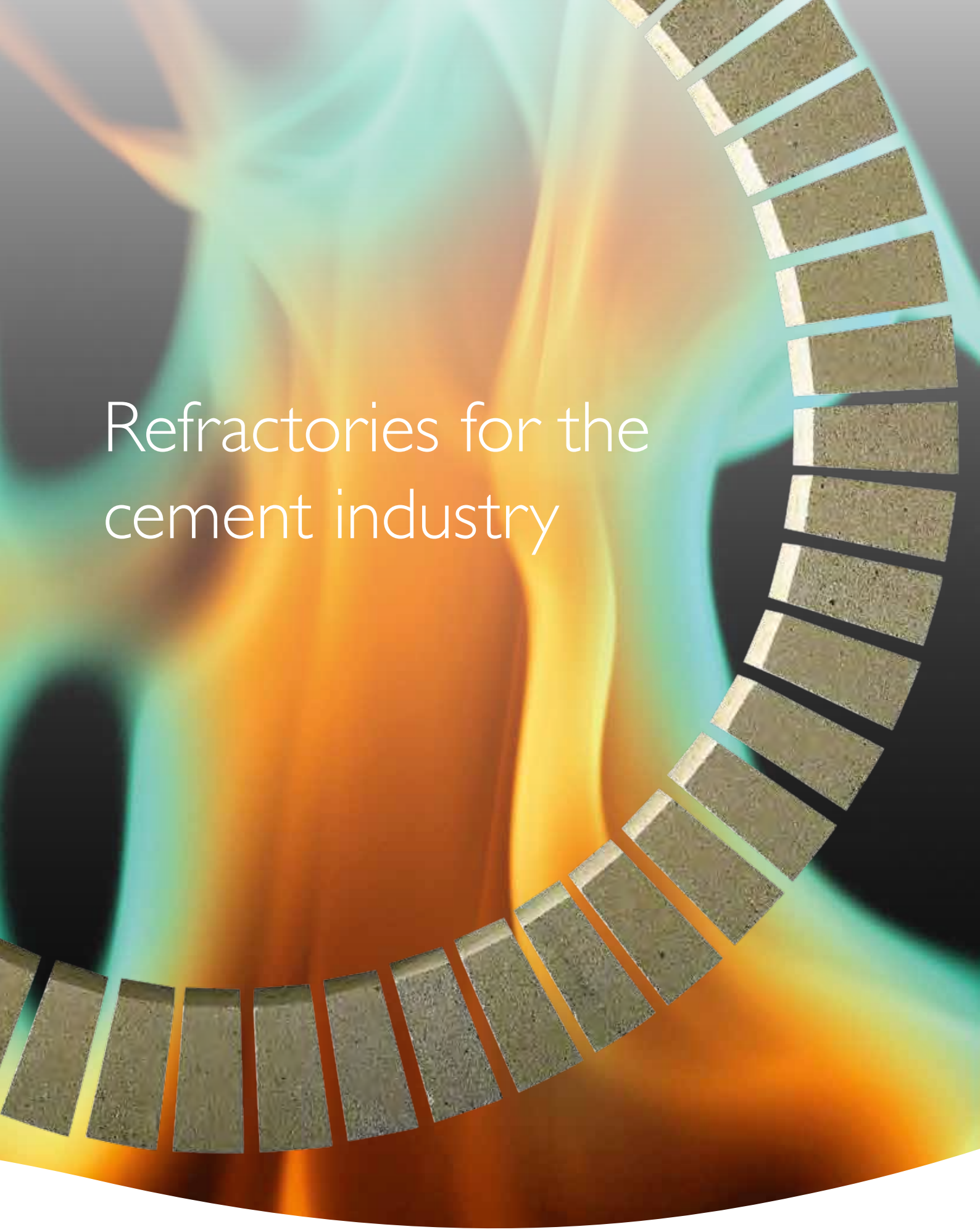

Refractories for the cement industry

Höganäs Bjuf
Refractories

Contents

The Cement Specialists

The special demands of cement manufacturing have always required specialized refractories – especially now, when more and more alternative fuels are used.

That's where we excel. Höganäs Bjuf refractory products improve profitability for cement manufacturers in more than 60 countries on six continents. We deliver refractory solutions that perform better, last longer, and give you lower refractory cost per ton of clinker produced – especially if you are burning alternative fuels.

Höganäs Bjuf is a multinational organization, part of Borgestad Industries. Our activities range from applications-driven R&D, production, distribution, support and service to complete refractory management, including wrecking and installation. R&D, production and corporate headquarters are located in Sweden, with sales and support in more than forty countries around the world.

How to contact us

Höganäs Bjuf is headquartered in Bjuv, Sweden, with subsidiaries in France, Germany, Poland, Russia, the Middle East, Malaysia and the Philippines, and agents and representatives around the world.

Höganäs Bjuf AB

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To find your local contact, please call or fax us at the numbers above. Up-to-date contact information can also be found at: www.cement.hoganasbjuf.com

Comprehensive product range

Each step of the cement making process is different, putting different demands on the refractories lining it. No single refractory, or refractory type, suits all applications. That's why we offer a complete range of refractory products, tailored to each production step. Our revolutionary products set performance benchmarks for the refractories industry, including:

- Victor 80 RK, Viking 330, Alsic 500 and Alsic 4000 bricks
- Victor Korund ES QF, Denscast Sicto and Denscast AXL QF castables
- Anchorex anchoring system
- CoroTexPro corrosion protection
- Linometer lining measurement instrument
- Refractory management software
- Compulsory paddle mixer

Responsiveness and know-how

We have the resources, know-how and products to answer your refractory needs, and we are committed to providing first-class service for both refractory and process problems.

We guarantee a quotation to you by return mail or fax on any item within our standard range of products. We can offer customized solutions, though they require more time, as quickly as humanly possible.

From the detailed pre-delivery consultation and installation follow-up that is part of our basic contract through to complete Refractory Management, we can supply the level of service you require. Our consultants and technicians are always available to serve your needs and answer your questions.

Quality Assurance throughout

Our Quality Assurance systems are fully ISO 9001 accredited. From regular review of our own suppliers and their QA systems to continuous sampling of raw materials, we maintain strict control over the quality of the product entering our production system.

This is just the beginning. Every aspect of our modern, automated production is monitored and controlled, employing statistical process control methods. Quality Assurance is a commitment which each of us makes personally, to ensure quick feedback and uniform high quality.

All products leaving our Höganäs Bjuf plant have been quality-checked and approved.


DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

Höganäs Bjuf AB

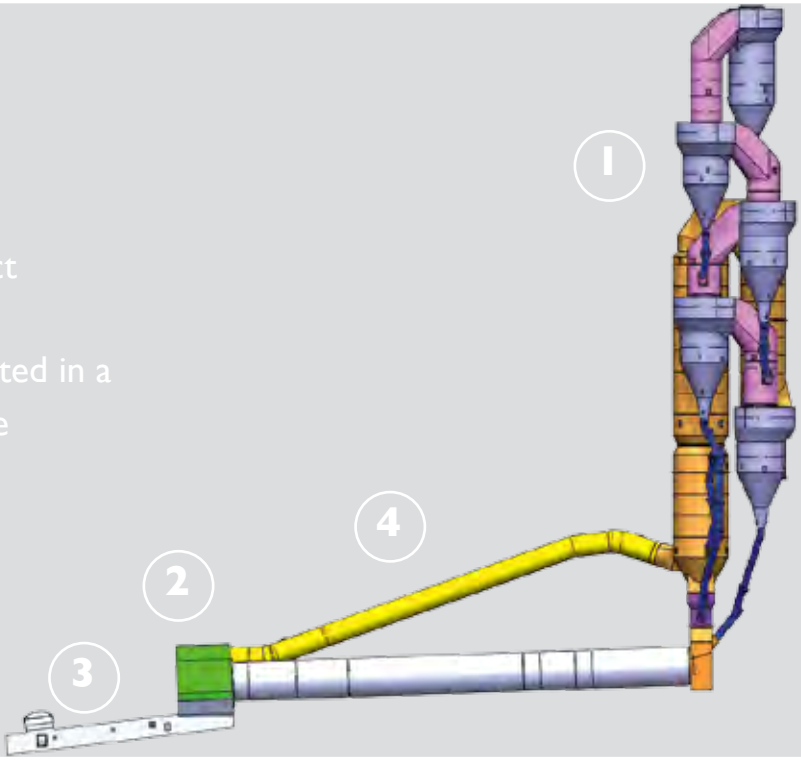
Affiliated manufacturers

In order to provide you with comprehensive refractory solutions, Höganäs Bjuf works closely with producers of complementary refractory materials and the other components necessary for refractory installations. Our global network of approved suppliers guarantees you qualified refractory installations.

Refractories in the cement process

1. Preheater
2. Kiln hood
3. Cooler
4. Tertiary air duct

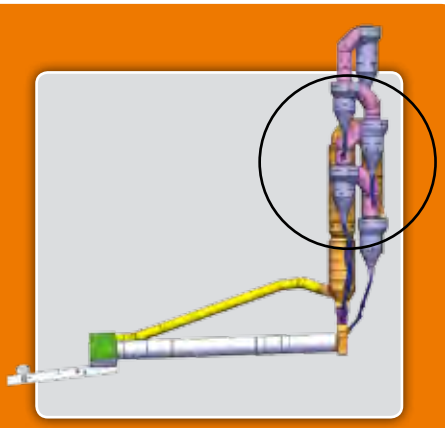
The kiln is presented in a separate brochure

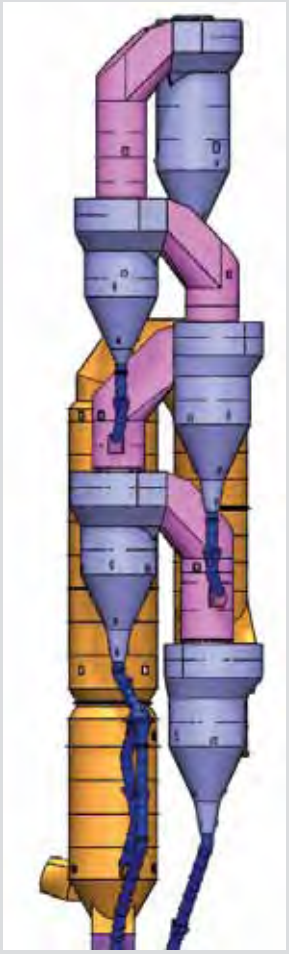


Each stage in the cement-making process places unique demands on the refractory lining. Your refractory selection is influenced by your choice of raw meal, the type(s) of fuel you burn, and your kiln's design- and operating characteristics.

From raw meal to ready clinker, you will find a chapter covering each primary stage in the cement making process, with our suggestions for how to achieve long-lasting, cost-effective refractories. For each stage we present solutions for both standard and alternative-fuel installations. The process- and external shell temperatures noted are statistical approximations, and are based on an ambient temperature of + 20°C.

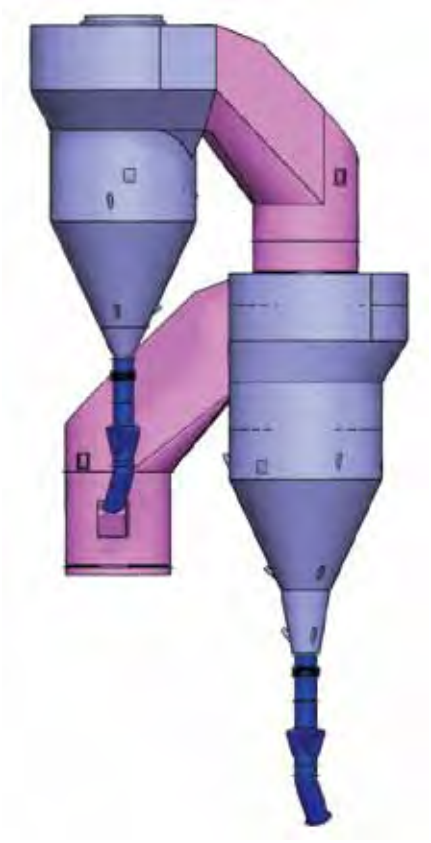
2. Preheater





1. Cyclone Stage 1
2. Cyclone Stage 2
3. Cyclone Stage 3
4. Cyclone Stage 4
5. Cyclone Stage 5

With connecting ducts and calciner



Plant design has evolved rapidly since the beginning of the 20th century, to meet the needs of modern cement production.

The preheater system is now a major factor in efficient cement production, thanks to growing production volumes and increasing energy costs. Its design and complexity have evolved rapidly.

These advances deliver both capacity and energy benefits. Today's dry process kilns, coupled to multiple-stage preheater systems, offer 20 times more capacity than similarly sized wet-process kilns. The thermal efficiency and capacity of a modern cement-making operation is very high.

But it can be even higher. On the following pages, we deal specifically with the following areas of the preheater:

- Cyclones (including connecting ducts)
- Calciner
- Smoke chamber and riser ducts
- Meal pipes

Cyclones and connecting ducts

The cyclone system is the key to an efficient modern kiln. Each cyclone system is unique, its design, construction and operating characteristics decided by such factors as:

- The raw meal it processes,
- Nominal- and peak throughput,
- The combination of fuels burned, particularly alternative fuels burned at the calciner and/or smoke chamber, and
- The design of subsequent process steps.

Today, each new cyclone system must answer two major needs: greater thermal efficiency, and greater kiln capacity. Both place heavy demands on refractory linings, anchor systems and expansion joints:

- To operate under increasingly high temperatures,
- To withstand the chemical attack of alkalis, chlorine, sulfur and transition metals,
- To meet the construction requirements of ever-larger cyclone units,
- To provide the smooth, non-wetting surfaces that support optimal airflow and reduce or eliminate build-ups.

The operational requirements of most modern cyclones include increasingly larger diameters, which challenges refractory stability, and higher operating temperatures, which increases the risk of alkali & chloride penetration. Build-ups are also a problem area, related both to chemical attack and to the cyclone's increasingly complex design.

Large cyclone diameters

Increasingly large cyclone diameters make it difficult to keep bricks in place in the vertical sections. To meet this challenge, Höganäs Bjuf developed the CY brick, which has an interlocking profile that allows adjacent bricks to support each other.

Higher operating temperatures

Higher operating temperatures, particularly in the lower cyclones, require use of refractories with high refractoriness and high strength. With higher temperatures, corrosive vapors can penetrate higher into the cyclone system, so alkali- and chloride-resistant refractories should be used.

The interlocking CY brick: secure solution for large-diameter cyclones

Build-ups

Usually caused by chemical attack, in combination with venturi effect in the cyclone's complex design, build-ups can also be caused by rapid temperature drops – the result of, for example, air leakage.

Build-ups reduce cyclone efficiency, and their removal ultimately requires a production stop. Regardless of the method used, removal is dangerous work. In the most severe cases, explosives are used. Several mechanical alternatives exist, none of which is particularly satisfactory:

- Manual removal is time consuming, ineffective and unsafe.
- Waterblast, though effective, requires production stoppage and exposes linings to severe thermal shock.
- Air canons place high demands on the strength of the refractory installation.

The best option, however, is a refractory that eliminates or minimizes build-ups, such as Denscast Sicto. In very severe problem areas, this solution can be advantageously combined with air canons.

Clean wall section of Alsic 500

Riser duct lined with 561 Denscast SIC 30

Alkali & chloride penetration

Chemical attack – in the form of alkali penetration – is unavoidable in cement production. The worst damage occurs in lower cyclone stages and riser ducts, kiln inlets and even recliners. Alkali- and acid vapors infiltrate the refractory linings and attack the binding phase at temperatures as low as 600-700°C, thus endangering the lining.

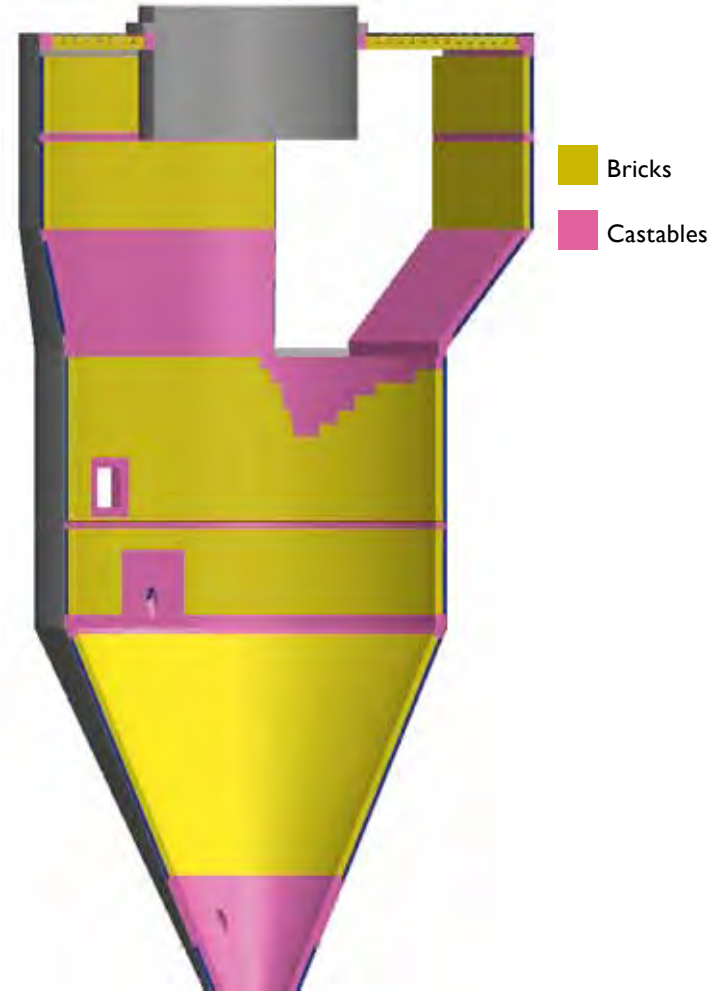
When these gases penetrate behind the refractories, the effects are even worse. Cl_2 and SO_2 combine with condensing steam to form acids that corrode anchors. Left unchecked, this can lead to lining collapse.

The safest, most cost-effective method to deal with this? Reduce the amount of insulation used, in order to move the vapor's 'dewpoint' outside the shell of the cyclone. If refractory and cyclone external shell temperatures remain above 100°C, ambient moisture and chemical vapors will not condense.

Regular test are done for measuring alkali penetration. The photo shows Bjuf SX extremly good resistance against alkali.

Lining your cyclone

Following is Höganäs Bjuf's expert suggestion for lining your cyclone system, both for standard and alternative fuels. Cyclone roof linings usually depend on the type of cyclone construction. Therefore, they are not detailed here. We are ready to provide you with a proposal once details are known, so please feel free to contact us.



Brick or monolithic?

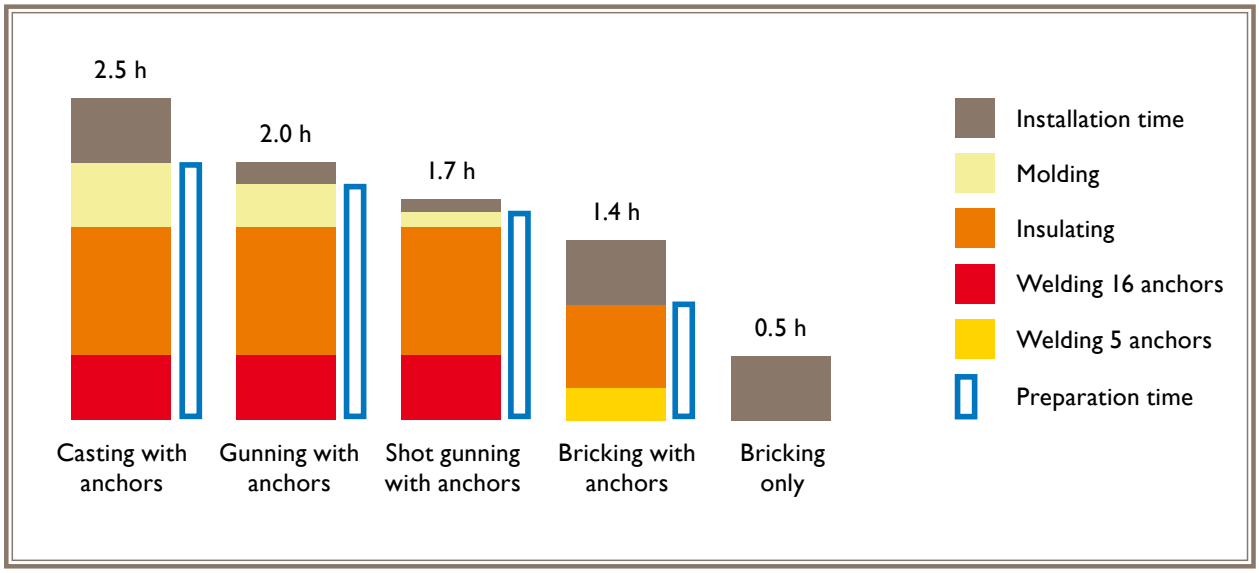
It is commonly believed that casting, gunning and shot-gunning are faster, and therefore less expensive than installing bricks.

The simple truth is quite the opposite.

Brick is simple to install and ready to use immediately – unlike castables, gunnables and other monolithics. It is a finished product – pressed, fired and quality-controlled before delivery. Kilo for kilo, it offers a more cost-effective solution than a monolithic with the same properties.

We therefore suggest you use brick or precast wherever possible, unless a monolithic solution offers the most important refractory characteristics.

Estimated time in man hours needed for installing 1 m^2 of lining.
Wall thickness 215 mm (100 mm insulating & 115 mm hot face)



CYCLONE STAGE 1

Refractory lining thickness: 114 mm
Process temp ~ 306 °C
External shell temp ~ 97 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15	Solcast/ Solgun	Stainless steel SIS 2368/ Ceramic	
ALTERNATIVE FUELS	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	None

CYCLONE STAGE 2

Refractory lining thickness: 114 mm
Process temp ~ 503 °C
External shell temp ~ 142 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15	Solcast/ Solgun	Stainless steel SIS 2368/ Ceramic	65 mm calcium silicate 1100
ALTERNATIVE FUELS	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	None

CYCLONE STAGE 3

Refractory lining thickness: 146 mm
Process temp ~ 665 °C
External shell temp ~ 132 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	65 mm calcium silicate 1100
ALTERNATIVE FUELS	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	32 mm Porosil G2

CYCLONE STAGE 4

Refractory lining thickness: 180 mm
Process temp ~ 806 °C
External shell temp ~ 155 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	100 mm calcium silicate 1100
ALTERNATIVE FUELS	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	65 mm Porosil G2

CYCLONE STAGE 5

Refractory lining thickness: 230 mm
Process temp ~ 890 °C
External shell temp ~ 134 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	100 mm calcium silicate 1100
ALTERNATIVE FUELS	Viking 330/ Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	114 mm Porosil G2

Calciner

Re-cycling heated air delivered from the grate cooler via the tertiary duct, the calciner dramatically improves thermal efficiency in the cyclone system.

It also reduces fuel costs by optimizing the use of cheaper waste and low-grade alternative fuels. However, there are some special considerations for lining the calciner, and appropriate refractory precautions must be taken when burning waste fuels.
Because of higher operating temperature, chemical attack is a more severe problem in the calciner than in the cyclones. High refractoriness and good resistance to thermal shock are also necessary, especially around the burner blocks.

Correct insulation is important, but risk of chemical attack must also be considered. High operating temperature combined with the dense calciner refractories can lead to substantial heat loss if insulation is insufficient. The optimal solution must balance this against the risk of chemical attack.

If you burn waste fuels at the calciner …

From municipal waste to plastics, anything that will burn can find its way into the calciner. These fuels often cause operational or refractory problems, such as:

- Early wear on center pipes in the hotter cyclones,
- Clogging in the riser duct,
- Penetration of chemicals into the refractories, resulting in capping, and alkali attack on the refractories and metal components such as anchors, joints and shell.

… We can probably double refractory life

We supply the products and techniques you need to successfully combat the negative effects of alternative fuels:

- Dencast Sicto and Denscast SIC 30 castable and gunnables: high alkali- and abrasion resistance.
- Viking 330 and Bjuf SX brick: low porosity, high alkali- and abrasion resistance.
- CoroTexPro corrosion protection: corrosion- and abrasion-resistant protection for exposed metal surfaces.

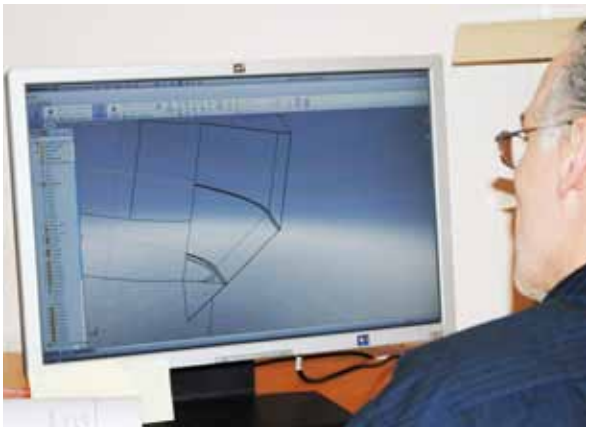
Damage area caused by chemical attack and unsufficient expansion.

Lining your calciner

Following is Höganäs Bjuf's expert suggestion for lining your calciner, both for standard and alternative fuels. The three key areas – cone, walls and roof – are specified individually.

Brick or monolithic?

Because of the high temperatures and chemically aggressive atmosphere of the calciner, we suggest you use only brick lining. If the decision is made to use monolithics in the roof section, remember that high temperatures require refractories with high refractoriness and hot strength. Clinker dust transported through the tertiary duct also requires that these refractories have high abrasion resistance. The Höganäs Bjuf range of castables meets all these requirements.



CALCINER - UPPER SECTION

Refractory lining thickness: 230 mm
Process temp ~ 900 °C
External shell temp ~ 135 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	114 mm Viking 330/ 114 mm Bjuf SX	H15	Denscast 50A QF	Stainless steel SIS 2368/ Ceramic	65 mm Calcium silicate 1100
ALTERNATIVE FUELS	114 mm Viking 330/ 114 mm Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic and CoroTexPro	114 mm Porosil G2

CALCINER - LOWER SECTION

Refractory lining thickness: 230 mm
Process temp ~ 900 °C
External shell temp ~ 135 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	114 mm Viking 330/ 114 mm Bjuf SX	H15		Stainless steel SIS 2368/ Ceramic	65 mm Calcium silicate 1100
ALTERNATIVE FUELS	150 mm Alsic 500	H15		Stainless steel SIS 2368/ Ceramic and CoroTexPro	114 mm Porosil G2

CALCINER CONES

Refractory lining thickness: 254 mm
Process temp ~ 1,100 °C
External shell temp ~ 156 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	114 mm Victor 60/70/80 RK	H15		Stainless steel SIS 2368/ Ceramic	65 mm calcium silicate 1100 at the shell, followed by 75 mm Porosil 23
ALTERNATIVE FUELS	150 mm Alsic 500	H15		Stainless steel SIS 2368/ Ceramic and CoroTexPro	114 mm Porosil G2

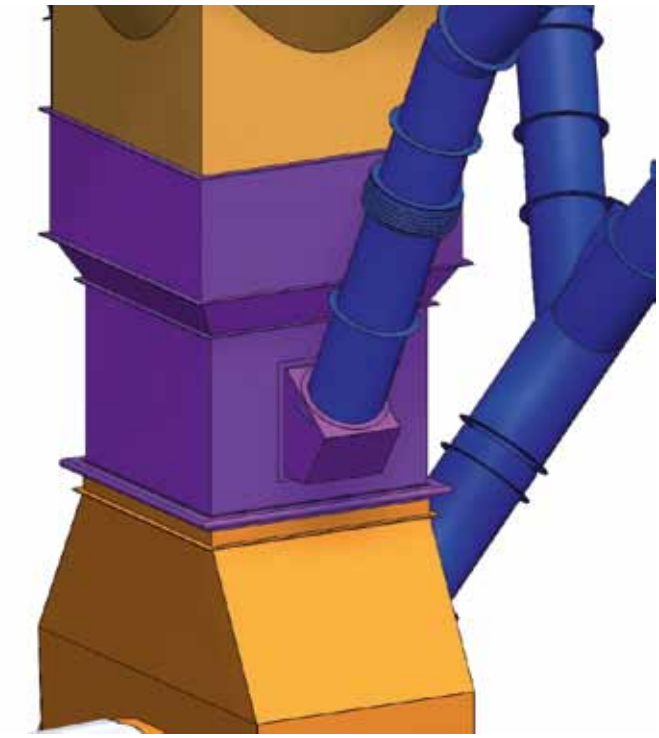
Start each cone section by setting a ring of refractory brick at the narrowest section of the cone. This provides a foundation for subsequent bricking.

Riser duct

The riser ducts recycle heated air from lower cyclone stages and the kiln itself, thus improving thermal efficiency and reducing fuel costs. The refractory choices, which are straightforward, are listed below.

Riser ducts often have build-up problems. In the lower, hotter part of the cyclone system, chemical influences are the cause, and can affect both straight and curved duct sections. Higher up, build-ups are usually caused by a venturi effect, occurring mostly in the curved section of the duct.

The closer the duct is to the 'hot' end of the cyclone system, the greater the risk of alkali penetration and refractory spalling. Where alkalis have penetrated (which they do to a depth of 20-30 mm), the refractory can expand 10 times more than normal, causing spalling. If this process is allowed to continue, the wall can collapse. To keep alkaline vapor from condensing, reduce the amount of insulation used.



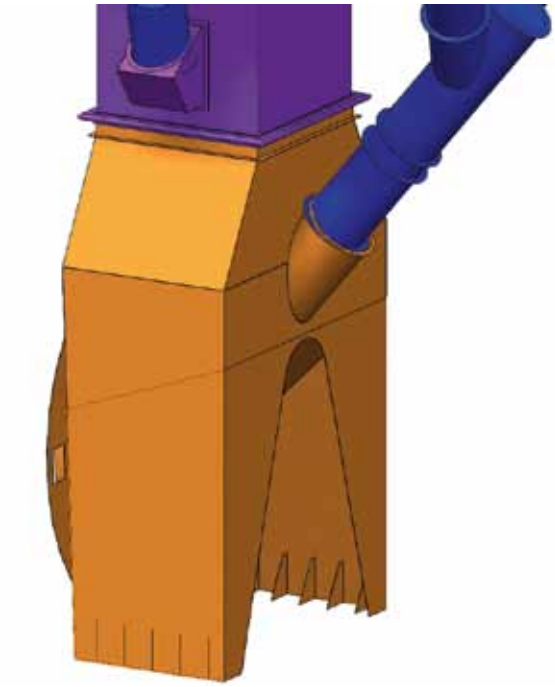
RISER DUCT

Refractory lining thickness: 230 mm
Process temp ~ 1,000 - 1,100 °C
External shell temp ~ 100 - 150 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	114 mm Viking 330/ 114 mm Bjuf SX	H15	114 mm Denscast 50A QF	Stainless steel SIS 2368 and CoroTexPro/Ceramic	75-115 mm Calcium silicate or Porosil 23 or insulation castable
ALTERNATIVE FUELS	114 mm Viking 330/ 114 mm Bjuf SX	H15	114 mm Denscast 50A QF	Stainless steel SIS 2368 and CoroTexPro/Ceramic	Porosil 23 or insulation castable

Smoke chamber

The smoke chamber is subject to all the worst exposure that cement manufacturing can cause, such as alkali attack, build-ups, anchor corrosion and high temperatures (~1300°C). The refractory choice is simple: a high-density, low-cement castable such as Denscast 50 A QF, or Denscast SIC 30, to ensure long and trouble-free operation. In some locations, you can also use Denscast Sicto.



SMOKE CHAMBER

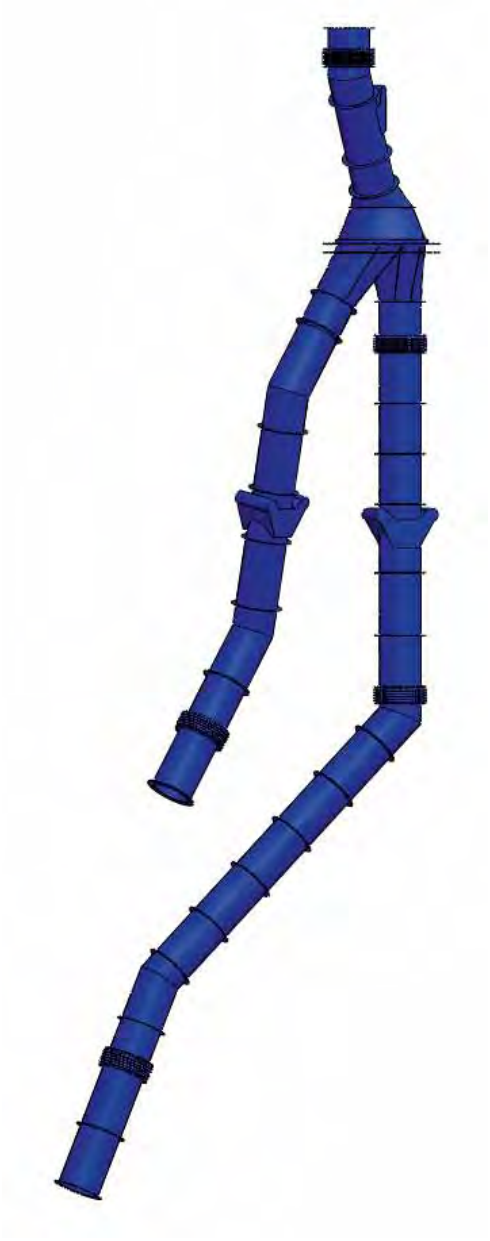
Refractory lining thickness: 254 mm
Process temp ~ 1,100 °C
External shell temp ~ 156 °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15	114 mm Denscast 50 A QF	Stainless steel SIS 2368/ Ceramic and CoroTexPro	65 mm calcium silicate 1100 at the shell, followed by 75 mm Porosil 23
ALTERNATIVE FUELS	150 mm Alsic 500	H15	140 mm Denscast SIC 30 or Denscast Sicto	A-bricks and stainless steel SIS 2368 /Ceramic and CoroTexPro	114 mm Porosil G2

Meal pipes

The meal pipes that connect different cyclone stages usually have small diameters. They may be lined with either brick or castable. Bjuf SX brick and Solcast castable are the natural refractory alternatives.

Because meal pipes usually come in short sections, their refractory lining can be pre-installed, to enable quick installation.

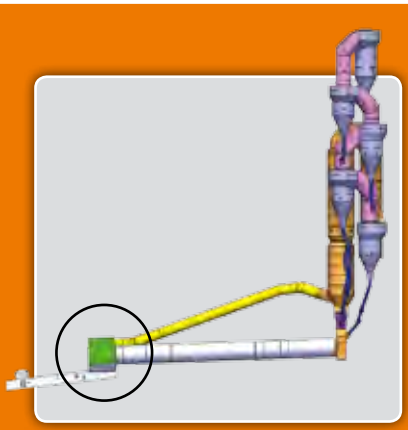


MEAL PIPES

Refractory lining thickness: mm
Process temp ~ °C
External shell temp ~ °C

	BRICK	MORTAR	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Bjuf SX/ Viking 330	H15	Solcast	Stainless steel 2368 (one ring only)	Calcium silicate or nothing
ALTERNATIVE FUELS	Bjuf SX/ Viking 330	H15	Denscast 50 A QF	Stainless steel 2368 (one ring only)	Calcium silicate or nothing

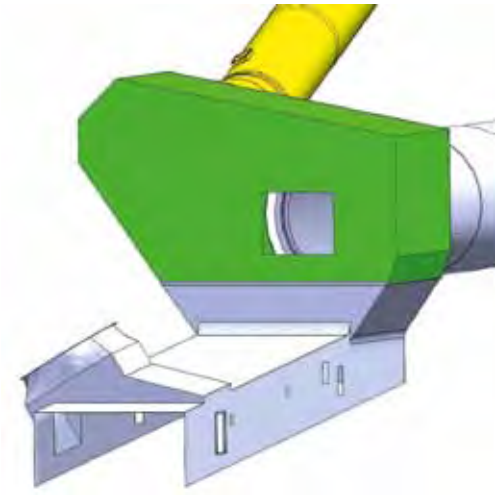
3. Kiln hood



Kiln hood

Low thermal conductivity and abrasion resistance are important for refractories at the kiln hood and burner lead-in. Waste fuels can make chemical resistance necessary too.

An arched brick construction is the best refractory solution. We suggest the high-alumina Victor 60 RK brick. If hood design makes brick installation difficult, a good alternative is Denscast 50 A QF castable (or, when waste fuels are a problem, Denscast SIC 30 castable or Firebolt precast). Anchorex anchoring simplifies anchoring as well as subsequent wrecking.

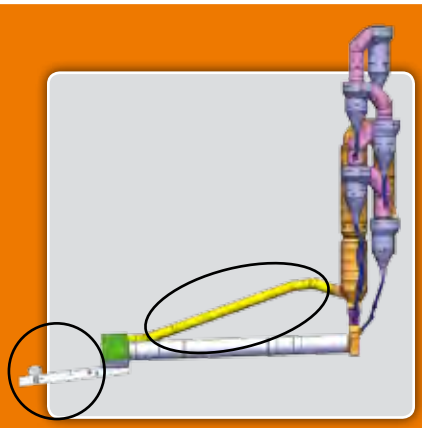


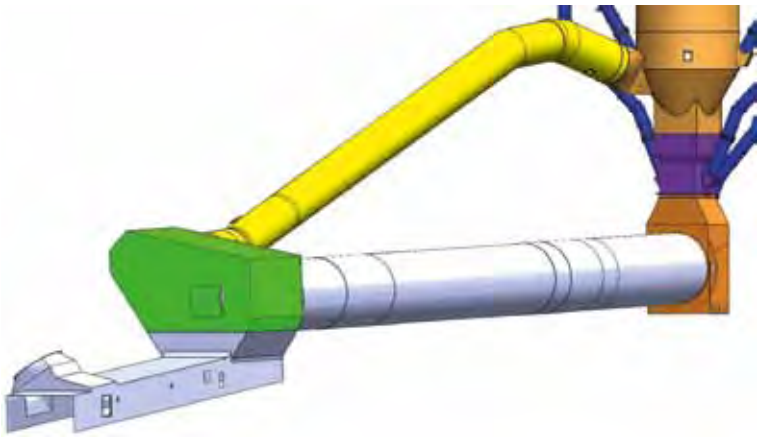
KILN HOOD

Refractory lining thickness: 250 - 350 mm

	BRICK	MORTAR	PRECAST	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Victor 60 RK	H15 or Victor T	Firebolt	Denscast 50 A QF	Stainless steel SIS 2368/ Ceramic	100 mm calcium silicate 1100 followed by 65 mm Porosil 23
ALTERNATIVE FUELS	Viking 450/ Alsic 500	H15 or Victor T		Denscast SIC 30	Stainless steel SIS 2368/ Ceramic	130 mm Porosil G or Porosil G2

4. Cooler and tertiary air duct





The aim of any cooling system is to cool clinker as quickly as possible, to set and maximize C_3S content. Simultaneously, it is important to capture and re-use the heat liberated by this process.

Grate cooler

Clinker enters the cooler at a temperature of around 1,200°C, rapidly spreading its heat into the grate and surrounding refractories. High refractoriness, high abrasion resistance and resistance to thermal shock are necessary, especially at the clinker downfall and bull nose. The cooler walls directly above the grate are also subject to extreme wear.

The partition wall, designed to limit the inflow of cool air to the kiln system, must withstand the abrasive effect of clinker dust entering the tertiary air duct as well as the temperature fluctuations resulting from its exposed position.

Tertiary air duct

Recycling heat from the clinker is important to economical, environment-friendly cement production. In grate cooler kiln systems, the tertiary air duct helps to recover valuable energy.

Air from the grate cooler is filled with highly abrasive clinker dust as well as residual alkali vapors. Travelling through the tertiary air duct at a velocity of 25-30 m/s and an initial temperature of about 1050°C, it wears down the lining - particularly at bends and dampers. Abrasion resistance and alkali resistance are both important in tertiary air duct refractories.

Grate cooler

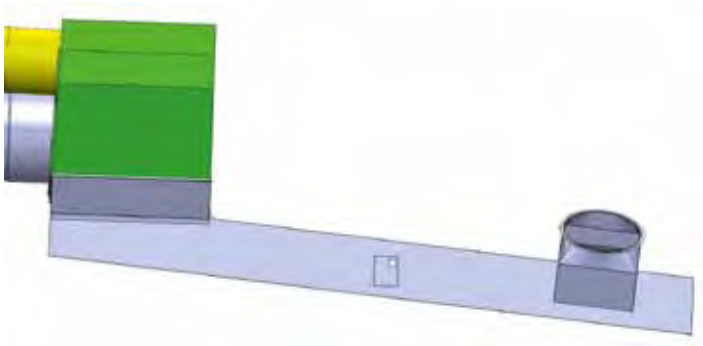
The cooler is effectively divided into two zones – the 'hot' zone and the 'cold' zone.

In the first, from the clinker downfall to the bypass duct and partition wall, the goal is to rapidly liberate heat and route it back to the preheater via the tertiary duct.

In the second, when clinker temperature has dropped below 800°C, it is most important to achieve a uniform temperature decline throughout the clinker body.

For dramatically extended refractory life and the fastest possible installation at the clinker downfall, bull nose, front sidewalls and roof, use Firebolt refractory precasts, which can be quickly bolted into place and just as quickly removed. For brick or monolithic alternatives, refractories should offer high refractoriness, abrasion-resistance and cold crushing strength.

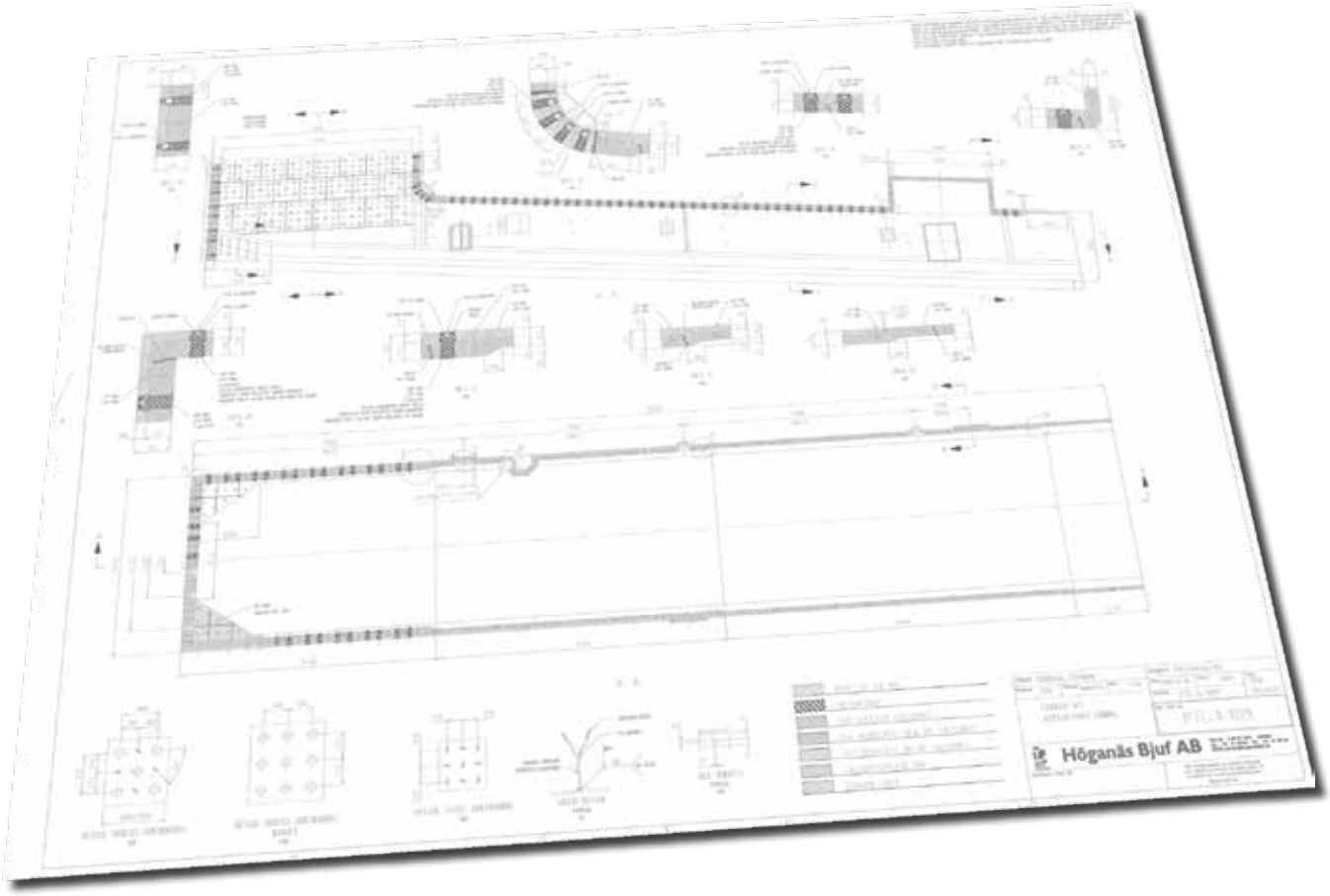
Bypass duct wear linings should be lined with Bjuf SX bricks and Denscast 50A QF castable in order to withstand the abrasive, alkaline effects of the tertiary airstream.



To maximize heat recovery, line the grate cooler and bypass duct with proper insulation materials.

To achieve exceptionally long life in the partition wall separating the two zones, use Denscast 50 A QF refractory precast.

Abrasion is the worst problem in the second section. The optimal refractory alternative is a brick such as Viking 330 or Bjuf SX, complemented by Denscast 50 A QF castable.



GRATE COOLER - "HOT" ZONE

Refractory lining thickness: 250 - 350 mm
Process temp ~ 1,000 - 1,200 °C

	BRICK	MORTAR	PRECAST	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Victor 60 RK/ Victor 80 RK/ Alex	H15/ Victor T		Denscast 80 QF	Stainless steel SIS 2368/ Ceramic	Calcium silicate 1100 at the shell, followed by Porosil 23
ALTERNATIVE FUELS	Victor 60 RK/ Alsic 500	H15	Firebolt, Sicto, Denscast 80 Firebolt Denscast 50 A	Denscast SIC 30	Stainless steel SIS 2368/ Ceramic	Porosil 23/ Porosil G

BULL NOSE

Refractory lining thickness: 300 - 400 mm
Process temp ~ 1,000 - 1,200 °C

	BRICK	MORTAR	PRECAST	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Victor 60 RK	H15/ Victor T	Firebolt, Sicto, Firebolt Denscast 50 A	Denscast 80 QF	Stainless steel SIS 2368/ Ceramic	Calcium silicate 1100 at the shell, followed by Porosil 23
ALTERNATIVE FUELS	Victor 60 RK	H15	Firebolt, Sicto, Firebolt Denscast 50 A	Denscast SIC 30	Stainless steel SIS 2368/ Ceramic	Porosil 23/ Porosil G

GRATE COOLER - "COLD" ZONE

Refractory lining thickness: 200 - 250 mm
Process temp < 800 °C

	BRICK	MORTAR	PRECAST	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330	H15		Denscast 50 A QF	Stainless steel SIS 2368	Calcium silicate 1100
ALTERNATIVE FUELS	Viking 330	H15	Firebolt (lower side walls)	Denscast 50 A QF/ Denscast SIC 30	Stainless steel SIS 2368/ Ceramic	Porosil 23/ Porosil G

COOLER ROOF

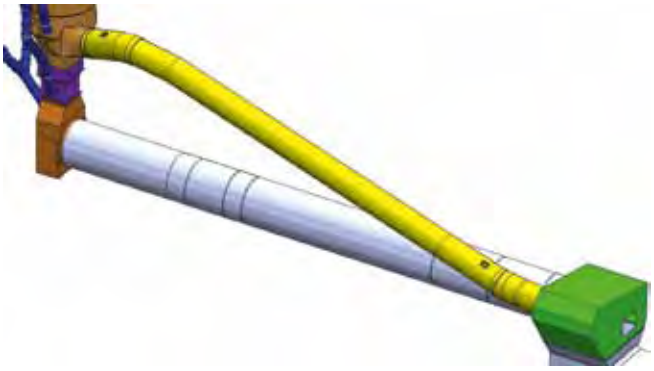
Refractory lining thickness: 200 - 250 mm
Process temp < 800 °C

	BRICK	MORTAR	PRECAST	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330 Suspended roof	H15		Denscast 50 A QF	Stainless steel SIS 2368	Calcium silicate 1100
ALTERNATIVE FUELS	Viking 330 Suspended roof	H15	Firebolt,	Denscast 50 A QF/ Denscast SIC 30	Stainless steel SIS 2368/ Ceramic	Porosil 23/ Porosil G

Tertiary air duct

Our refractory suggestion for the tertiary air duct is straightforward:

- Alkali- and abrasion-resistant brick in straight sections
- Alkali- and abrasion-resistant low-cement castable in curved sections and venturi parts
- Calcium silicate / Porosil 23 insulation



TERTIARY AIR DUCT

Refractory lining thickness: < 180 mm
Process temp ~ 1,000 - 1,100 °C

	BRICK	MORTAR	PRECAST	MONOLITHICS	ANCHORS	INSULATION
STANDARD	Viking 330/ Bjuf SX	H15		Denscast 50 A QF	Stainless steel SIS 2368/ Ceramic	65 mm calcium silicate 1100
ALTERNATIVE FUELS	Viking 330/ Bjuf SX	H15	Firebolt	Denscast 50 A QF	Stainless steel SIS 2368/ Ceramic	Porosil 23

Installing Bjuf SX bricks in a TAD

Coro Tex Pro

Coro Tex Pro is an inorganic binder for use as surface coating.

Typical properties:

- The binder adheres to a great variety of materials including stainless steel and forms a very hard ceramic.
- Cures at room temperature or at elevated temperature.
- When cured the binder is acid- and moisture proof and withstands alkali up to pH10.
- The binder is non-toxic, releasing only water vapour during hardening or when heated.

Application:

Coro Tex Pro is a viscose liquid. The Coro Tex Pro is applied by brush, roller or by spraying.

One typical application for Coro Tex Pro is as ceramic protection of stainless stell anchors when there is agressive atmosphere caused by burning alternative fuels.

Storage:

Coro Tex Pro may be stored for five months in closed container at room temperature.

NB!

Coro Tex Pro must be protected from freezing. This product freezes at 0 °C.

Protect anchors against alkali attack

Test conditions
48 hours
950 °C atmosphere
K_2C0_3 + 10 % graphite

Unprotected
15-18 % weight loss

Coro Tex Pro-Coated
0-2 % weight loss

Test piece of anchors can be seen to the left.

Fire Bolt

Höganäs Bjuf AB has registered the name FIRE BOLT® as trade mark for our Prefab

Areas such as:

- Preheater
- Riser
- Cooler (Clinker down fall area) (Bull nose)
- Kilnhood

FIRE BOLT® Bull Nose

FIRE BOLT® Roof

FIRE BOLT® After 14 months

Conversion tools

MEASUREMENTS

Metric to Imperial

Multiply	**By**	**To obtain**
cm	0.393	inch
meter (m)	3.281	feet
meter (m)	1.094	yard
liter	0.2642	us gallon
kg	2.205	pound (lb)
metric ton	1.102	short ton
m/sec	1.94	knots
^{0}C + 17.78	1.8	^{0}F
kg/m^3	0.06242	lbs./cu.ft.(pcf.)
Mpa	142.23	lbs./sq.in.(psi.)
kp/cm^2	14.223	lbs./cu.ft.(pcf.)
(W/mK)	6.9347	Btu/(sq.ft.x h x ^{0}F/in)

Imperial to Metric

Multiply	**By**	**To obtain**
inch	2.540	cm
feet	0.304	meter (m)
yard	0.914	meter (m)
us gallon	3.785	liter
pound (lb)	0.454	kg
short ton	0.907	metric ton
knots	0.515	m/sec
^{0}F - 32	0.556	^{0}C + 17.78
lbs./cu.ft.(pcf.)	16.02	kg/m^3
lbs./sq.in.(psi.)	7.03 x 10^{-3}	Mpa
lbs./cu.ft.(pcf.)	7.03 x 10^{-3}	kp/cm^2
Btu/(sq.ft.x h x ^{0}F/in)	0.144	(W/mK)

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Refractories