Seven®
REFRACTORIES

TECHNOLOGY
AHEAD

CEMENT INDUSTRY

ADVANCED REFRACTORIES TECHNOLOGY

Our products have been developed for the special operating conditions required in the cement manufacturing process. Nowadays, more and more alternative fuels are burned and special refractory materials are required.

To date, a refractory material suitable for all the operative conditions does not exist. Thus, each plant should be analyzed to find the best technical solutions.

Our services

We keep a strategic stock of monolithic and insulating castables for the cement customer's need. In addition we keep a wide stock of all complementary products such as steel and ceramic anchors, bio-soluble and ceramic fibres, and insulating bricks.

With the support of our expert technicians, we supply not only top quality refractories but also technical solutions and engineering. In cooperation with selected installation companies, we are able to supply turn-key/new projects, along with all the necessary equipment for the lining maintenance of a cement plant.

Our solutions

Each step of the cement-making process has special requirements regarding the correct choice of refractory materials. The design of the plant, the raw materials used in the process, and the various fuel options, all have a major influence on the refractories required. *Alkali infiltrations, build-ups, abrasion and the use of alternative fuels,* must all be carefully evaluated.

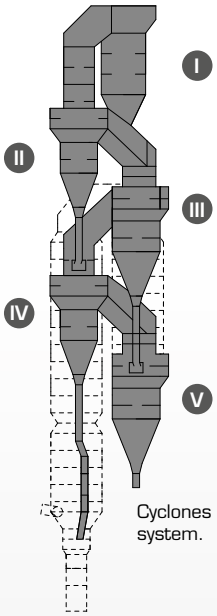
Kiln Burners.
Seven Cast
corrundum.

Kiln Burners.
Seven Cast 80.

1. Burner lance

The burner lance is a critical area with specific needs which depend on kiln and grid cooler design, raw materials used, and fuel type.
Strong thermal load, abrasion, infiltration and chemical attack must be considered in the right choice for the monolithic used to line the burner lance.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 95 RR VK	MCC	Medium
Seven Cast 80 NH	LCC	Hard
Seven Flow 80 NH	SFC	Hard
Seven Cast 50 RD 01 W	MCC	Hard
Seven Plast 90 AKR	PLASTIC	Medium



Cyclones system.

Stage	Process temperature
I	300 °C
II	500 °C
III	650 °C
IV	800 °C
V	900 °C

2. Preheater (Cyclones and connecting ducts)

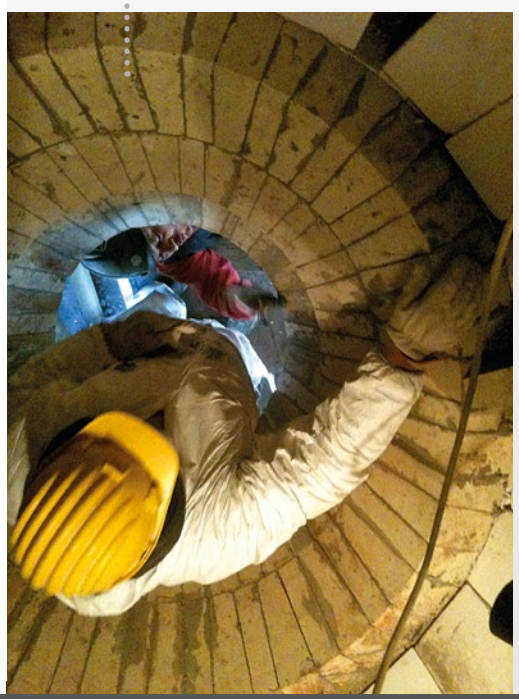
The most important step in the efficiency of a modern cement plant is the cyclones system.

Each pre-heating system design is different and unique, and each cyclone system must be analysed in order to identify the critical refractory zone.

We evaluate the effects of *build-up, alkali, chlorine infiltration*, and all other factors which may influence the performance of refractory materials used in the various cyclone systems.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 45 NM	LCC	Soft (Stages I,II)
Seven Cast 50 NM	LCC	*Medium (Stages I,II,III)*
Seven Cast 40 NM 01 W	LCC	*Medium (Stages III,IV,V)*
Seven Cast 30 N SIC M	LCC	*Hard (Stages III,IV,V)*
MONOLITHICS – GUNNING MIXES		
Seven Gun 50 RM **Seven Gun 50 NM**	RCG LCG	Soft/Medium (Stages I,II,III)
Seven Gun 40 RM 01 W **Seven Gun 45 NM 01 W**	RCG LCG	Medium (Stages III,IV,V)
Seven Gun 32 N SIC N **Seven Gun 30 R SIC M**	LCG RCG	Medium/Hard (Stages III,IV,V)
ALUMINA BRICKS		
Seven Brick 38 KM	Fireclay brick	Soft (Stages I,II,III,)
Seven Brick 40 KM A	Fireclay brick	Medium (Stages III, IV, V)
Seven Brick 50 KM A	Alumina brick	Hard (Stages,III, IV, V)

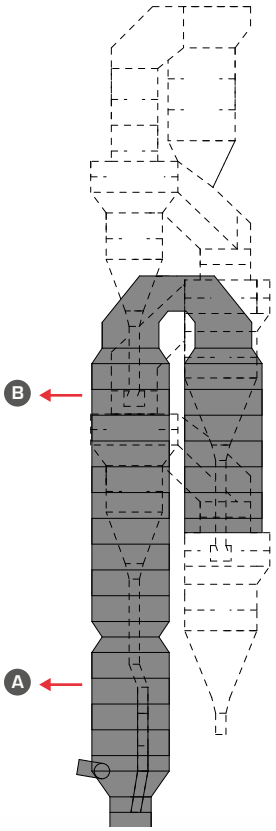
Cyclone – Bricks installation.



3. Calciner

The Calciner plays an important role in the cement manufacturing process being the first step of the clinker production process.
The main property of the calciner's refractory lining is to withstand to the chemical attacks coming from the hot gases of the process.
Refractory materials must have low porosity and good thermal stability.

Brand name	Type of product	Operating condition	Application zone
Process temperatures = ~ 900-1100 °C			
MONOLITHICS – CASTABLES			
Seven Cast 50 NM	LCC	Medium	B
Seven Cast 40 NM 01 W	LCC	Medium	B
Seven Cast 55 NH 01 V -10	LCC	Hard	B
Seven Cast 50 RD 01 W	MCC	Hard	B
Seven Cast 30 NC SIC	LCC	Hard	A
Seven Cast 57 N SIC H	LCC	Hard	A
Seven Cast 50 ND 15 Y	LCC	Hard	A
Seven Cast 45 U ZIR	ULCC	Hard	A
MONOLITHICS – GUNNING MIXES			
Seven Gun 50 RM Seven Gun 50 NM	RCG LCG	Medium	B
Seven Gun 40 RM 01 W Seven Gun 45 NM 01 W	RCG LCG	Medium	B
Seven Gun 57 RH 01 V CO	RCG	Hard	B
Seven Gun 32 N SIC M	LCG	Medium	A
Seven Gun 50 ND 15 Y	LCG	Hard	A
Seven Gun 60 R SIC M	RCG	Hard	A
ALUMINA BRICKS			
Seven Brick 40 KM	Fireclay brick	Soft	B
Seven Brick 50 KM	Alumina brick	Hard	A/B
Seven Brick 60 KM	Alumina brick	Hard	A/B
Seven Brick 40 KM A	Fireclay brick	Hard	A/B
Seven Brick 50 KM A	Alumina brick	Hard	A/B



Calciner.

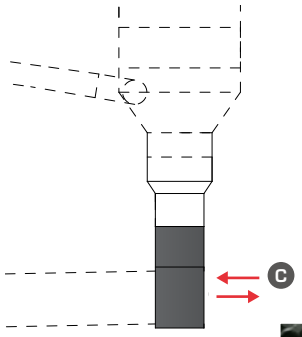

Calciner – Gunning application (Gas Tight)

4. Riser duct

The riser duct is a problematic zone due to: *build-ups*, *alkali infiltration*, and *chemical attack* to the steel anchors.
Following the general rule, we suggest lining the duct with bricks in the round sections and with castables in the square sections.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES AND GUNNING MIXES		
Seven Cast 50 NM	LCC	Medium
Seven Gun 50 RM Seven Gun 50 NM	RCG LCG	Medium
ALUMINA BRICKS		
Seven Brick 40 KM	Fireclay brick	Soft
Seven Brick 40 KM A	Fireclay brick	Medium
Seven Brick 50 KM A	Alumina brick	Hard


Calciner – Shot Creting application



Smoke chamber.

Smoke chamber.
Low cement gunning installation

Smoke chamber anchoring.

5. Smoke chamber

The smoke chamber is a critical area, where build-ups and frequent use of high pressure water pump which causes thermal shock make it necessary to use special refractories.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 30 N SIC M	LCC	Medium
Seven Cast 30 NC SIC	LCC	Hard
Seven Cast 57 N SIC H	LCC	Hard
Seven Cast 45 U ZIR	ULCC	Hard
Seven Cast 50 ND 15Y	LCC	Hard
MONOLITHICS – GUNNING MIXES		
Seven Gun 32 N SIC M	LCG	Medium
Seven Gun 50 ND 15Y	LCG	Hard
Seven Gun 60 R SIC M	RCG	Hard

Smoke chamber.
Low cement gunning application

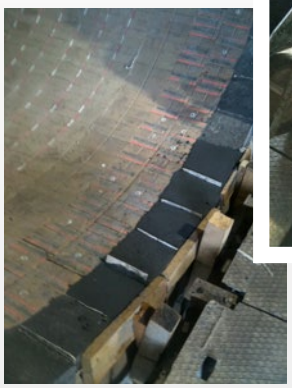
6. Nose ring

The nose ring is also a critical area, requiring special monolithic refractory material which has an excellent resistance to:

- High Thermal Shock
- Mechanical Resistance
- Chemical Attack Resistance.

Our “Seven Cast 30 NC SIC”, has been developed by our R&D department, to ensure the best performance for this critical area, along with a very fast installation time.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 50 RD 01 W	MCC	Medium
Seven Cast 30 NC SIC	LCC	Hard
Seven Cast 78 NB	LCC	Medium
Seven Cast 80 NX	LCC	Hard



Casting the nose ring.

7. Tertiary air duct

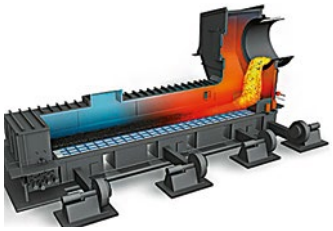
For the tertiary air duct we suggest abrasion resistant castables for most stressed areas. For other areas we suggest to use fireclay bricks.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 80 NH	LCC	Hard
Seven Flow 80 NH	SFC	Hard
Seven Cast 55 NH 01 V -10	LLC	Hard
ALUMINA BRICKS		
Seven Brick 40 KM	Fireclay brick	Soft

Tertiary air duct.
Lined with fireclay bricks.

8. Grate cooler

The formed clinker falls from the kiln into the grate cooler. The cooler area is also a problematic zone due to high thermal shock and abrasion. We use high quality raw materials and special binders in our monolithics, which are capable of resisting severe conditions in the grate cooler.



Grate cooler.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 50 NM	LCC	Soft
Seven Cast 57 ND	LCC	Medium
Seven Cast 55 NH 01 V -10	LCC	Hard
Seven Cast 50 RD 01 W	MCC	Hard
Seven Cast 30 NC SIC	LCC	Hard
Seven Cast 78 NB	LCC	Hard
Seven Cast 80 NH	LCC	Hard
Seven Flow 80 NH SFC	LCC	Hard
MONOLITHICS – GUNNING MIXES		
Seven Gun 50 RM Seven Gun 50 NM	RCG LCG	Medium Medium
Seven Gun 32 N SIC M	LCG	Hard
Seven Gun 57 RH 01 V CO	RCG	Hard
ALUMINA BRICKS		
Seven Brick 40 KM	Fireclay brick	Soft
Seven Brick 50 KY	Alumina brick	Medium
Seven Brick 60 KX	Alumina brick	Hard

Grate cooler.

Standard Seven Refractories packaging. 1200 kg pallets in EPAL 80x120.

9. Kiln hood

For this area we suggest refractories with low thermal conductivity, good abrasion resistance and good resistance to chemical attack.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 50 NM	LCC	Soft
Seven Cast 40 NM 01 W	LCC	Soft
Seven Cast 59 ND	LCC	Medium
Seven Cast 30 N SIC M	LCC	Hard
Seven Cast 55 NH 01 V -10	LCC	Hard
MONOLITHICS – GUNNING MIXES		
Seven Gun 50 NM	LCG	Soft
Seven Gun 32 N SIC M	LCG	Hard
Seven Gun 57 RH 01 V CO	RCG	Hard
ALUMINA BRICKS		
Seven Brick 40 KM	Fireclay brick	Soft
Seven Brick 50 KX	Alumina brick	Medium
Seven Brick 60 KX	Alumina brick	Hard

Kiln hood.

Kiln Hood.
Gunning installation

Precast Shapes:
Grate cooler
roof application

10. Pre-cast Shapes

For critical areas such as the grate cooler roof and bull nose we can produce monolithic precast shapes in order to provide to our customers quicker start-ups.

Brand name	Type of product	Operating condition
MONOLITHICS – CASTABLES		
Seven Cast 30 NC SIC	Precast shapes	Medium
Seven Cast 50 RD 01 W	Precast shapes	Hard
Seven Cast 59 ND	Precast shapes	Hard

11. Complementary products

The anchoring systems

Our anchoring systems help to improve the life expectancy of the monolithic areas. We can offer tailor made solutions dependent on the customer's requirements:

- Steel anchors (AISI 304 (1.4301), AISI 310 S (1.4845), AISI 309 (1.4828) and AVESTA 253 MA.
- Anchor bricks (228 mm, 305 mm and 355 mm) in our quality Seven Brick 60 KB.

For the different areas within the cement plant, we suggest a combination of steel and brick anchors be used, to maximise efficiency for the various conditions that are encountered.

Anchor name	Sketch	Material Available
STEEL ANCHORS		
V		AISI 304 (1.4301) AISI 310 S (1.4845) AVESTA 253 MA
CV		AISI 304 (1.4301) AISI 310 S (1.4845) AVESTA 253 MA
CBH		AISI 304 (1.4301) AISI 310 S (1.4845) AVESTA 253 MA
Cast anchor		AISI 309 CAST (1.4828 cast)
ANCHOR BRICKS		
A 228 mm **A 305 mm** **A 355 mm**		Seven Brick 60 K (60 % Al_2O_3)

Insulating products

Type of product	M.O.T (°C)	Chemical composition (%)			Bulk density (kg/m³)
		Al_2O_3	SiO_2	F_2O_3	
INSULATING BRICKS					
Light weight insulating brick dens 450	900	15	67	4,1	450
Light weight insulating brick type 23	1260	45	50	0,9	600
Light weight insulating brick type 26	1430	56	40	0,8	800

Type of product	M.O.T (°C)	Chemical composition (%)			Bulk density (kg/m³)
		Al_2O_3	SiO_2	CaO (MgO)	
INSULATING COMPLEMENTARY PRODUCTS					
Light weight insulating slabs	1000	-	45	45	225
Light weight insulating slabs	1100	-	45	47	225
Ceramic fibre boards	1260	45	55	-	300
Ceramic fibre blanket	1260	45	55	-	64,96,128,160
Biosoluble fibre blanket	1200	-	65	29	64,96,128,160
Biosoluble fibre blanket	1300	-	75	22	64,96,128,160

12. Engineering and technical support

Seven Refractories have the resources able to provide turn-key projects.

- Our engineering department develops new complete projects.
- We are able to supply the Refractory materials along with the necessary engineering for the refractory linings.
- Our supervisors, supervise the complete installation of our products from start to finish on a worldwide basis.

Gunning installation
Tuning of the gunning machine

Shot Creting installation.
Quality inspection

GUNNING INSTALLATION

GUNNING MACHINE ASSEMBLY

RESEARCH AND SUSTAINABLE DEVELOPMENT

Seven Refractories has incorporated environmental concerns about climate change in its innovative approach to the market; not only in making our factory more electrically independent by using renewable energy sources, but in the entire manufacturing process cycle and quality control.

Respect of the environment is a core value of Seven Refractories.

Selection of the raw materials, dedicated and oriented research, composition architecture and on the field technical experts are the key-points for outstanding efficiency and reliability of the refractory linings, excellent control of the thermal load distribution and low product variability in time.

TESTING

PRODUCTION

SERVICES PROVIDED

- Preliminary study and investigation for the entire project
- Design and architecture including bill of materials and thermal calculation
- Full range of products for lining and maintenance
  - Regular, low, ultra-low and no-cement castable
  - Regular and dense low-cement gunning mix
  - Ramming
  - Shotcreting
  - Self flowing
- Supply of mixers, gunning machines, pumps, etc.
- Training on mixing, gunning and maintenance techniques
- Training on equipment usage
- Supervision and monitoring by experienced technicians
- Global research & development
- Technical advice by experts
- Monitoring and targeting of results

Seven REFRACTORIES

ISO 9001 ISO 14001

09-2019

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