



*Advanced Technical Vision*  
**in 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.

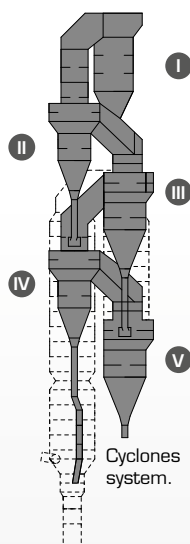




Kiln Burners.  
Sevenscast  
corundum.



Kiln Burners.  
Sevenscast 80.



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

Cyclone – Bricks installation.



## 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
<b>MONOLITHICS – CASTABLES</b>		
Sevenscast Corundum	RCC	Medium
Sevenscast 59 ND	LCC	Medium
Sevenscast 80	LCC	Hard
Sevenflow 80	SFC	Hard
Sevenscast AS 10	LCC	Hard

## 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
<b>MONOLITHICS – CASTABLES</b>		
Sevenscast 45	LCC	Soft (Stages I,II)
Sevenscast 50	LCC	Medium (Stages I,II,III)
Sevenscast SIC 10	LCC	Medium (Stages III,IV,V)
Sevenscast SIC 30	LCC	Hard (Stages III,IV,V)
<b>MONOLITHICS – GUNNING MIXES</b>		
Sevengun 50	RCG	Soft/Medium (Stages I,II,III)
Sevengun 50 D	LCG	
Sevengun SIC 10	RCG	Medium (Stages III,IV,V)
Sevengun SIC 10 D	LCG	
Sevengun SIC 30	RCG	Medium/Hard (Stages III,IV,V)
Sevengun SIC 30 D	LCG	
<b>ALUMINA BRICKS</b>		
Seven Brick 38	Fireclay brick	Soft (Stages I,II,III,)
Seven Brick 40 AR	Fireclay brick	Medium (Stages III, IV, V)
Seven Brick 50 AR	Alumina brick	Hard (Stages,III, IV, V)

### 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.

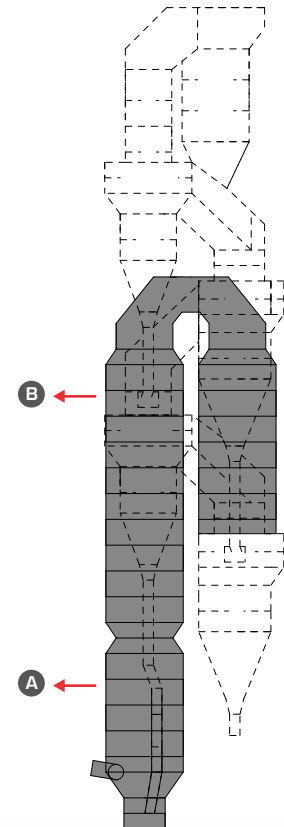
Brand name	Type of product	Operating condition	Application zone
Process temperatures = ~ 900-1100 °C			
<b>MONOLITHICS – CASTABLES</b>			
Sevencast 50	LCC	Medium	B
Sevencast SIC 10	LCC	Medium	B
Sevencast MU 60	LCC	Hard	B
Sevencast AS 10	LCC	Hard	B
Sevencast SIC 30	LCC	Medium	A
Sevencast AS 30	LCC	Hard	A
Sevencast SIC 60	LCC	Hard	A
Sevencast 50 SZ	LCC	Hard	A
Sevencast AZ 40	LCC	Hard	A
<b>MONOLITHICS – GUNNING MIXES</b>			
Sevengun 50	RCG	Medium	B
Sevengun 50 D	LCG		
Sevengun SIC 10	RCG	Medium	B
Sevengun SIC 10 D	LCG		
Sevengun MU 60	RCG	Hard	B
Sevengun SIC 30	RCG	Medium	A
Sevengun SIC 30 D	LCG		
Sevengun 50 SZ D	LCG	Hard	A
Sevengun SIC 60	RCG	Hard	A
<b>ALUMINA BRICKS</b>			
Seven Brick 40	Fireclay brick	Soft	B
Seven Brick 50	Alumina brick	Hard	A/B
Seven Brick 60	Alumina brick	Hard	A/B
Seven Brick 40 AR	Fireclay brick	Hard	A/B
Seven Brick 50 AR	Alumina brick	Hard	A/B

### 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
<b>MONOLITHICS – CASTABLES AND GUNNING MIXES</b>		
Sevencast 50	LCC	Medium
Sevengun 50	RCG	Medium
Sevengun 50 D	LCG	
<b>ALUMINA BRICKS</b>		
Seven Brick 40	Fireclay brick	Soft
Seven Brick 40 AR	Fireclay brick	Medium
Seven Brick 50 AR	Alumina brick	Hard



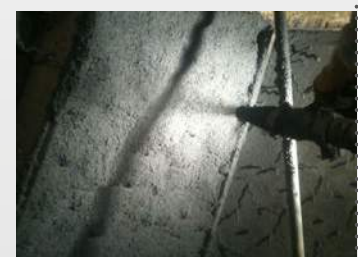
Calciner.



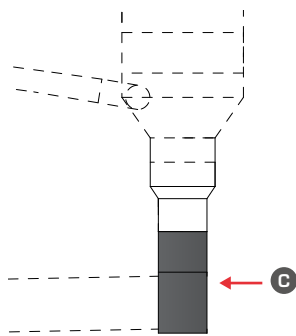
Calciner – Gunning application (Gas Tight)



Calciner – Gunning application.



Calciner – Shot Creting application



Smoke chamber.



Smoke chamber anchoring.



Smoke chamber. Low cement gunning installation



Smoke chamber. Low cement gunning application



Casting the nose ring.



Tertiary air duct. Lined with fireclay bricks.

## 5. Smoke chamber

The smoke chamber is a critical area, where build-ups, 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
<b>MONOLITHICS - CASTABLES</b>		
Sevencast SIC 30	LCC	Medium
Sevencast AS 30	LCC	Hard
Sevencast SIC 60	LCC	Hard
Sevencast AZ 40	LCC	Hard
Sevencast 50 SZ	LCC	Hard
<b>MONOLITHICS - GUNNING MIXES</b>		
Sevengun SIC 30	RCG	Medium
Sevengun SIC 30 D	LCG	Medium
Sevengun 50 SZ D	LCG	Hard
Sevengun SIC 60	RCG	Hard

## 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 "Sevencast AS 30", 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
<b>MONOLITHICS - CASTABLES</b>		
Sevencast AS 10	Low cement	Medium
Sevencast AS 30	Low cement	Hard

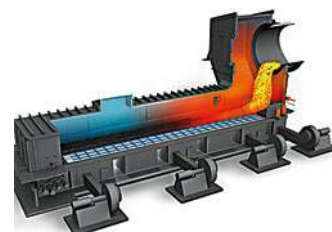
## 7. Tertiary air duct

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

Brand name	Type of product	Operating condition
<b>MONOLITHICS - CASTABLES</b>		
Sevencast 80	Low cement	Hard
Sevenflow 80	Self flowing	Hard
Sevencast MU 60	Low cement	Hard
<b>ALUMINA BRICKS</b>		
Seven Brick 40	Fireclay brick	Soft

## 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 the severe conditions in the grate cooler.



Grate cooler.

Brand name	Type of product	Operating condition
<b>MONOLITHICS – CASTABLES</b>		
Sevencast 50	LCC	Soft
Sevencast 59 ND	LCC	Medium
Sevencast MU 60	LCC	Hard
Sevencast AS 10	LCC	Hard
Sevencast AS 30	LCC	Hard
Sevencast 68	LCC	Hard
Sevencast 80	LCC	Hard
Sevenflow 80	LCC	Hard

<b>MONOLITHICS – GUNNING MIXES</b>		
Sevengun 50	RCG	Medium
Sevengun 50 D	LCG	Medium
Sevengun SIC 30	RCG	Hard
Sevengun SIC 30 D	LCG	Hard
Sevengun MU 60	RCG	Hard

<b>ALUMINA BRICKS</b>		
Seven Brick 40	Fireclay brick	Soft
Seven Brick 50 B	Alumina brick	Medium
Seven Brick 60 B	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
<b>MONOLITHICS – CASTABLES</b>		
Sevencast 50	LCC	Soft
Sevencast SIC 10	LCC	Soft
Sevencast 59 ND	LCC	Medium
Sevencast SIC 30	LCC	Hard
Sevencast MU 60	LCC	Hard
<b>MONOLITHICS – GUNNING MIXES</b>		
Sevengun 50	RCG	Soft
Sevengun 50 D	LCG	Soft
Sevengun SIC 30	RCG	Hard
Sevengun SIC 30 D	LCG	Hard
Sevengun MU 60	RCG	Hard

<b>ALUMINA BRICKS</b>		
Seven Brick 40	Fireclay brick	Soft
Seven Brick 50 B	Alumina brick	Medium
Seven Brick 60 B	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
<b>MONOLITHICS - CASTABLES</b>		
Sevencast 59 ND	Precast shapes	Medium
Sevencast AS 10	Precast shapes	Hard
Sevencast AS 30	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 K.



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
<b>STEEL ANCHORS</b>		
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)
<b>ANCHOR BRICKS</b>		
A 228 mm A 305 mm A 355 mm		Seven Brick 60 K (60% Al <sub>2</sub> O <sub>3</sub> )

## Insulating products

Brand name	Type of product	M.O.T (°C)	Chemical composition %			Bulk density (kg/m <sup>3</sup> )
			Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	F <sub>2</sub> O <sub>3</sub>	
<b>INSULATING BRICKS</b>						
Seven Brick LW 450	Light weight insulating brick	900	15	67-	4,1	450
Seven Brick LW 23	Light weight insulating brick	1260	45	50	0,9	600
Seven Brick LW 26	Light weight insulating brick	1430	56	40	0,8	800

Brand name	Type of product	M.O.T (°C)	Chemical composition %			Bulk density (kg/m <sup>3</sup> )
			Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	CaO (MgO)	
<b>INSULATING COMPLEMENTARY PRODUCTS</b>						
Calcium silicate 1000	Light weight insulating slabs	1000	-	45	45	225
Calcium silicate 1100	Light weight insulating slabs	1100	-	45	47	225
Seven Board 1260	Ceramic fibre boards	1260	45	55	-	300
Seven Blanket 1260	Ceramic fibre blanket	1260	45	55	-	64,96,128,160
Seven Bio Blanket 1200	Biosoluble fibre blanket	1200	-	65	29	64,96,128,160
Seven Bio Blanket 1300	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



GUNNING  
INSTALLATION  
GUNNING  
MACHINE  
ASSEMBLY



Shot Creting installation.  
Quality inspection



## 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 fully electrically independent by using renewable energy sources, but in the entire manufacturing process cycle and quality control.

The 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.



100%  
ENERGY

TESTING

PRODUCTION



## SERVICES PROVIDED

- Preliminary study and investigation for the project edition
- Design and architecture, bill of materials, thermal calculation
- Full range of products for lining and maintenance
  - Regular, low, ultra-low and no-cement castables
  - Regular and dense low-cement gunning mix
  - Ramming
  - Shotcreting
  - Grouting, patching and dry vibrating products
- Insulating castables
- Fireclay and Alumina Bricks for static parts and Rotary Kiln
- Steel Anchors and Anchor Bricks
- Insulating firebricks, Biosoluble Fibers and insulating boards
- Supply of mixer, gunning machines, pump, etc.
- Training on mixing, gunning and maintenance techniques
- Training on equipment usage
- Supervision and monitoring by experienced technicians
- Global Research & Development
- Monitoring and targeting of results
- Technical advice from experts



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