



TECHNOLOGY
AHEAD

FERROUS FOUNDRY



FERROUS FOUNDRY INDUSTRY REQUIREMENTS

Ferrous foundries process a wide range of alloys for a variety of applications which all share a similar purpose: to melt and cast a metal in order to give it new shape and properties.

Foundries keep evolving as they are driven by their downstream applications. Among them the automotive industry is by far the main and most important market. The foundry equipment has therefore evolved to support the needs of the automotive industry as well as other applications.

Aside from the technological aspects of foundry applications, the main drivers of change, innovation, and improvement of foundry equipment are also reduction of emissions, increased efficiency and flexibility.



OUR SOLUTIONS

Seven Refractories has developed a full range of refractories to cover all needs of the foundry industry. Furthermore Seven Refractories is committed to support new market trends, especially those benefiting the environment and efficiency.

Among the different products for foundry users, no cement chemical bond refractories are indispensable for the most demanding applications. They are monolithics based on a non-hydraulic bonding system which allows for higher permeability to gases and therefore much faster dry out.

As crystallized water and low melting phases ($\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$) are eliminated from the matrix, no cement chemical bond refractories also show superior high temperature properties.

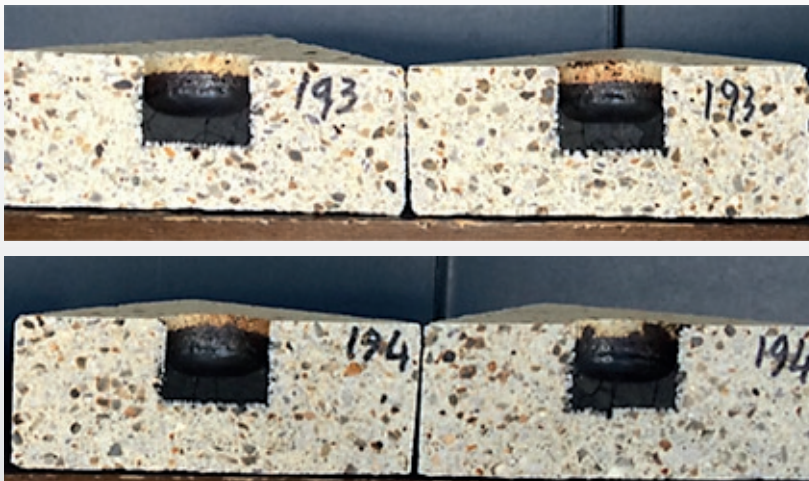
No cement refractories should be considered in any refractory application with urgent need of repair and restart of operation or whenever it is difficult to perform a proper dry out.

Aside from products, Seven Refractories is committed to offer the right technical and economical solution. Our R&D is available for the continuous improvement and fine tuning of products to match the specific needs of the customers' process.

For example, we can run dedicated slag corrosion cup tests for our customers to forecast the behaviour of materials in working conditions as close as possible to the production process.

Our solutions for

- Cupola furnace
- Coreless induction furnace (CIF)
- Channel induction furnace
- Press-pouring furnace
- Channel inductors
- Coreless automatic press-pouring furnace
- Cover
- Rotary furnace
- Ladle

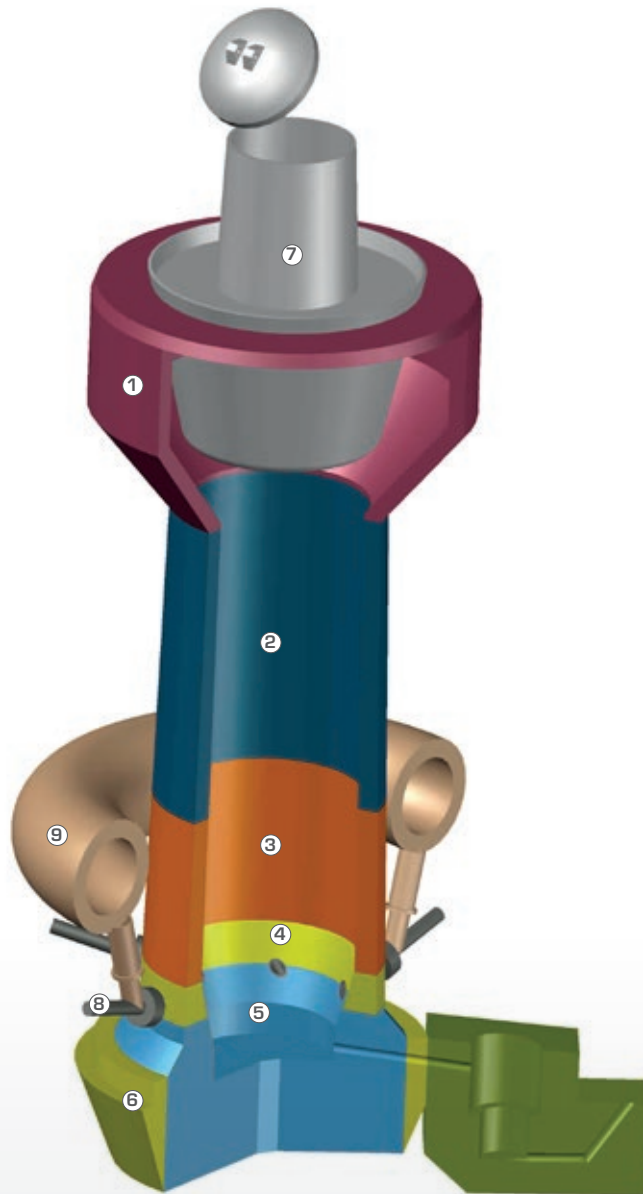


Cup tests

1. Cupola furnace

Cupola furnaces have been the primary if not the only melting equipment used in foundries for a long time. They can remelt pig iron and scrap to produce different types of cast iron.

As coke is burnt to generate heat it also generates relevant emissions to the atmosphere. In recent times considerable efforts have been made towards emission reduction or at least a rethinking of its usage in modern foundries.



USAGE OF CUPOLA

- In terms of refractory linings, there are mainly 2 philosophies: long campaign or daily cupola.
- Daily linings are mainly acid ramming masses that can be easily wrecked out and substituted, partially or totally, every day.
- In a long campaign cupolas linings are made of alumina based refractories that are adapted to the different zones. These can normally be operated one or two weeks before relining.
- Further developments are unlined cupolas where melting zone and stack have a water cooled shell which does not require refractories and can be operated for several weeks.

Color	Zones	Material type		Attention to
		Long campaign	Daily lining	
①	Charging zone	gunning mix, regular castable	gunning mix, regular castable	abrasion , CO resistance
②	Stack	gunning mix, low cement castable	gunning mix, low cement castable	abrasion, thermal shock, CO resistance
③	Melting zone	SiC+ C castable or gunning mix, low cement castable	Silica ramming or gunning mix	liquid metal corrosion, CO resistance
④	Tuyere zone	SiC+ C ramming mix	Silica ramming mix	thermal shock, metal corrosion, CO resistance
⑤	Hearth	SiC+ C castable, SiC+ C ramming mix	Silica ramming mix	liquid metal corrosion
⑥	Siphon	SiC+ C castable, SiC+ C ramming mix	Silica ramming mix	liquid metal corrosion
⑦	Structural components			
⑧	Tuyere			
⑨	Tubes			



Launder
of cupola
furnace

Products for long campaigns	Application areas
Seven Cast 50 RM	charging zone
Seven Cast 71 NB 01 Y -10	stack
Seven Cast 75 NR 04 Y	stack
Seven Cast 98 NR	melting zone
Seven Cast 1472 UB	melting zone, hearth, syphon box, runner
Seven Cast 2372 UB	melting zone, hearth, syphon box
Seven Cast 1772 UX	hearth, runner
Seven Cast 3760 UX	hearth, runner, syphon box
Seven Cast 3462 UR	hearth, syphon box
Seven Gun 60 KH PLAST	charging zone
Seven Gun 82 NX -3	stack
Seven Gun 1570 NB	melting zone
Seven Gun 2272 NB	melting zone
Seven Ram 2264 KX	hearth, runner, syphon box, tuyere zone
Seven Ram 2365 KX	hearth, syphon box, tuyere zone
Seven Ram 65 KX 01 X	hearth, syphon box, tuyere zone
Seven Plast 2565 AKB	tuyere zone

Products for daily lining	Application areas
Seven Cast 40 RM 5	charging zone
Seven Cast 50 NM	stack
Seven Ram 85 K SIL	melting zone, tuyere zone
Seven Ram 75 K SIL 02 X	hearth, syphon box
Seven Gun 88 K SIL	melting zone
Seven Gun 50 NM	stack
Seven Gun 40 RM 5	charging zone

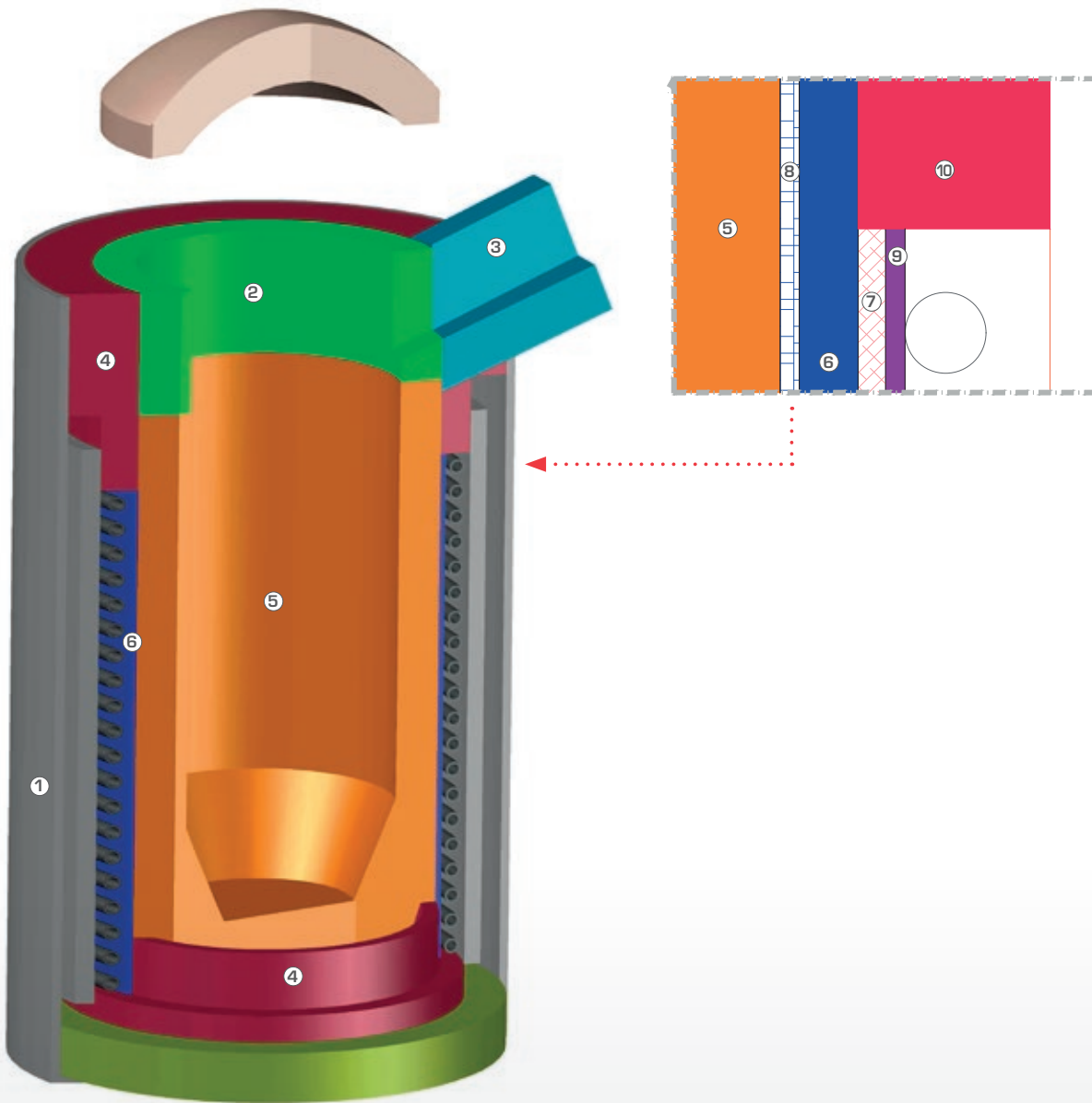
No cement products for fast dry out	Application areas
Seven Cast 2770 CB LCS	melting zone, hearth, syphon box, runner
Seven Cast 2272 CB LCS	melting zone, hearth, syphon box, runner

2. Coreless induction furnace (CIF)

The coreless induction furnace has become the main furnace in modern foundries due to its flexibility, ease of use along with reduced emissions.

Size, power and frequency of these furnaces have increased during the years, they can be used both for melting and holding purposes.

Silica based linings are dominantly used in to melt iron, while alumina based dry mixes are the most common refractory material in CIF used to melt steel.



Color	Zones	Material type	Attention to
①	Shell		
②	Top cap	dry mix, low cement castable, patching material	sintering behavior, liquid metal corrosion
③	Spout	low, ultra low cement castable	thermal shock, liquid metal corrosion
④	Upper ring and bottom	low, ultra low cement castable	thermal shock, liquid metal corrosion
⑤	Working lining	dry mix	sintering behavior, liquid metal corrosion
⑥	Safety lining	low cement castable	thermal shock, liquid metal corrosion
⑦	Slip plane	mica foil	
⑧	Slip plane	mica + fiber foil	
⑨	Coil grout	trowelling material	sticking and sealing behavior
⑩	Structural components		

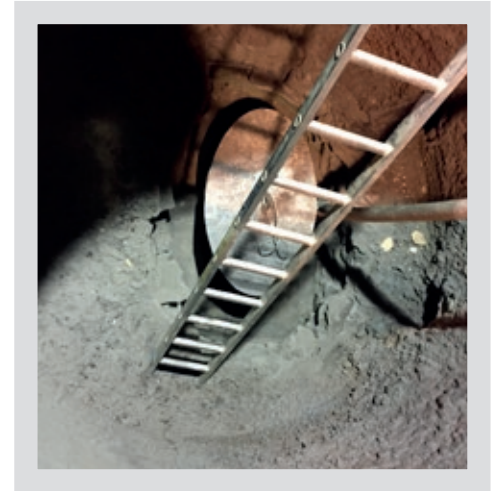
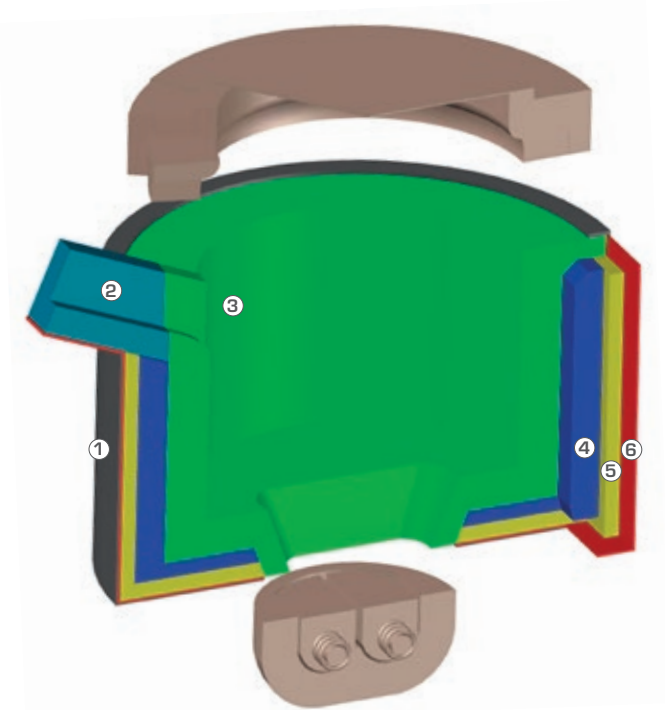


CIF after lining
with silica

Products iron	Application areas
Seven Dry 98 CK SIL 08	working lining
Seven Dry 98 CK SIL 08 F	working lining
Seven Dry 94 CK SIL	top cap
Seven SET 95 A SIL	repair
Seven Trow 80 RX -1	repair
Steel products	Application areas
Seven Dry 82 KP	working lining
Seven Dry 86 KW 09 X	working lining
Seven Dry 85 CW 09 X	working lining
Seven Dry 85 KR 93 X	working lining
Seven Dry 90 CKW 01 V	top cap
Seven Trow 92 RR 08 Z -1	repair
Common products	Application areas
Seven Cast 60 UD	upper ring, spout, pusher
Seven Flow 97 RR -03	safety lining
Seven Trow 92 RR 08 Z -1	coil grout
No cement products for fast dry out	Application areas
Seven Cast 99 CF LCS	repair
Seven Cast 90 CR LCS	safety lining
Seven Cast 95 C SIL	repair

3. Channel induction furnace (body)

It is the typical furnace used for holding purpose as a buffer between the casting line and the melting (cupola) furnace. The power is induced through the inductor in the bottom around a loop of molten metal, where failures of refractory lining are most likely to occur. The furnace is operated 24 hours per day.



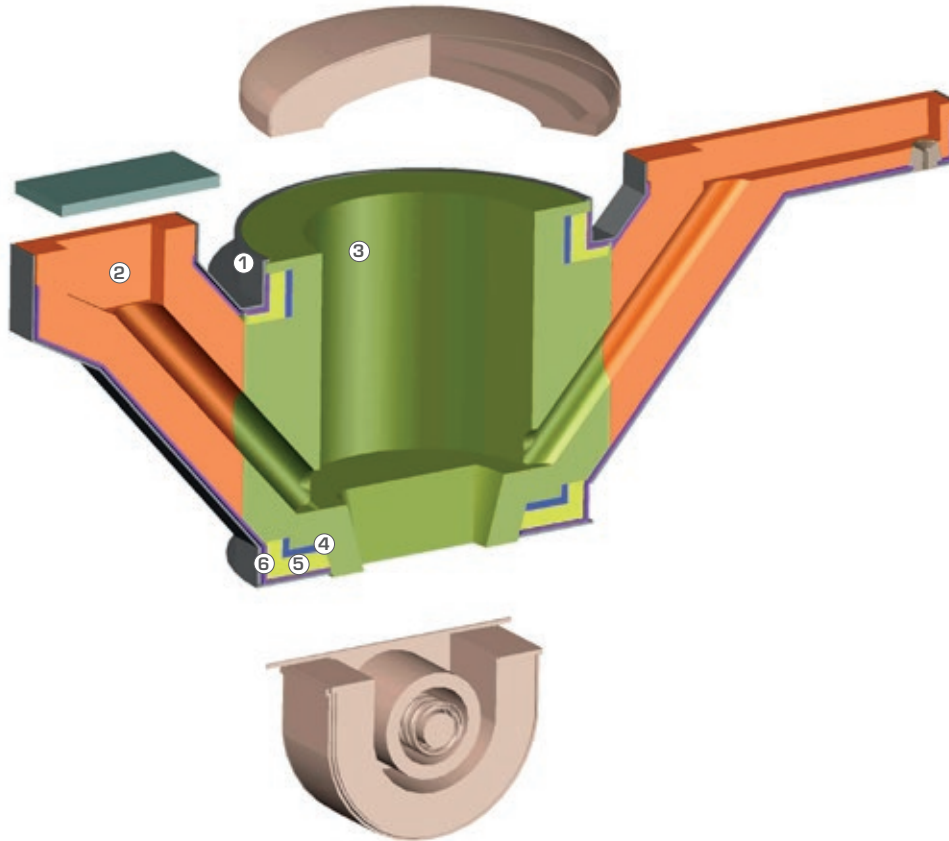
Color	Zones	Material type	Attention to
①	Shell		
②	Spout	low, ultra low, no cement castable	resistance against molten metal, strength, thermal shock
③	Pot working lining	low, ultra low, no cement castable	resistance against molten metal, sintering behavior
④	Pot safety lining	regular castable, gunning mix	strength, resistance against molten metal
⑤	Pot insulation	insulating bricks, MW insulating castable	thermal conductivity, strength
⑥	Insulation second layer	insulating boards	thermal conductivity

Products	Application areas
Seven Cast 94 UR	pot working lining
Seven Cast 85 UX	pot working lining
Seven Cast 98 UR	pot working lining
Seven Cast 90 UB	pot working lining
Seven Cast 90 NR 09 W -10	pot working lining
Seven Cast 59 ND	spout
Seven Cast 80 NX 03 V -10	spout
Seven Cast 88 NR 03 W	spout
Seven Cast 80 RX 01 V	spout
Seven Cast 1182 UB	spout
Fireclay Brick 45	pot safety lining
Sevenlite 1450 LI	pot insulation
Sevenlite 1300	pot insulation
IFB ASTM 23/26	pot insulation
Micro porous board	insulation second layer
Ceramic fiber board	insulation second layer

No cement products for fast dry out	Application areas
Seven Cast 80 CX LCS	pot working lining
Seven Cast 90 CR LCS	pot working lining
Seven Cast 76 CB 01 X LCS	spout

4. Press-pouring furnace (body)

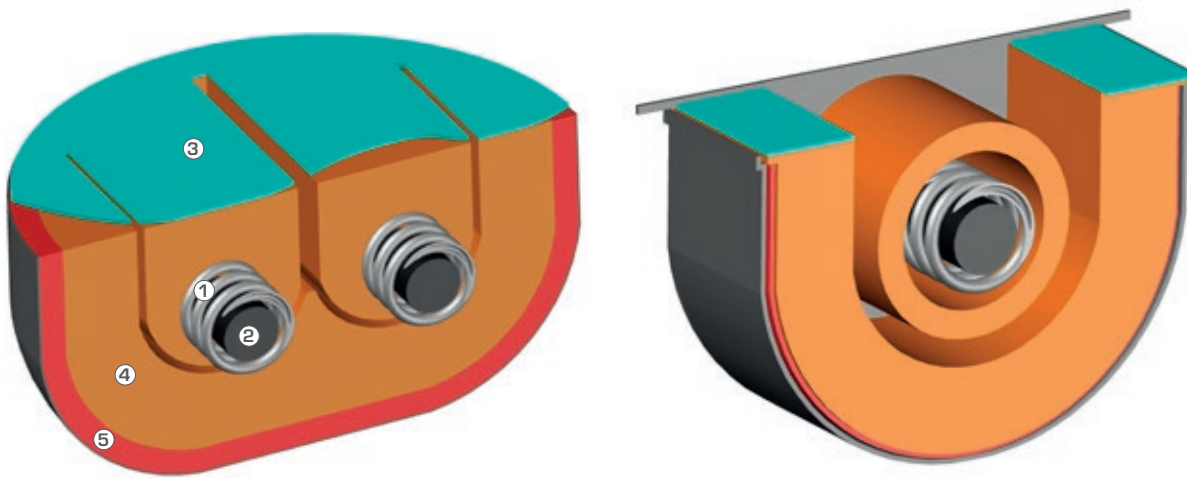
This evolution of the channel furnace is operated in inert atmosphere and allows for the finest control over temperature and poured volume along with high flexibility.



Color	Zones	Material type	Attention to
①	Shell		
②	Spouts working lining	low, ultra low, no cement castable	resistance against molten metal, strength, thermal shock
③	Pot working lining	low, ultra low, no cement castable	resistance against molten metal, strength
④	Pot safety lining	regular castable, gunning mix	strength, resistance against molten metal
⑤	Pot first insulation	insulating bricks, MW insulating castable	thermal conductivity, strength
⑥	Insulation	insulation boards	thermal conductivity

Products	Application areas
Seven Cast 94 UR	pot and spout working lining
Seven Cast 85 UX	pot and spout working lining
Seven Cast 98 UR	pot working lining
Seven Cast 90 NR 09 W -10	pot and spout working lining
Seven Cast 88 NR 03 W	pot and spout working lining
Seven Gun 82 NX	pot safety lining
Sevenlite 1450 LI	pot insulation
Sevenlite 1300	pot insulation
IFB ASTM 23/26	pot insulation
Micro porous board	insulation second layer
Ceramic fiber board	insulation second layer
No cement products for fast dry out	Application areas
Seven Cast 80 CX LCS	pot and spout working lining
Seven Cast 90 CR LCS	pot and spout working lining

5. Channel inductors



Color	Zones	Material type	Attention to
①	COIL > Coil		
②	CORE > Core		
③	Inductor couplig	patching or mouldable mix	resistance against molten metal, patching behavior
④	Inductor working lining	dry mix	sintering behavior, resistance against molten metal
⑤	Inductor insulation	insulating boards	density, thermal conductivity



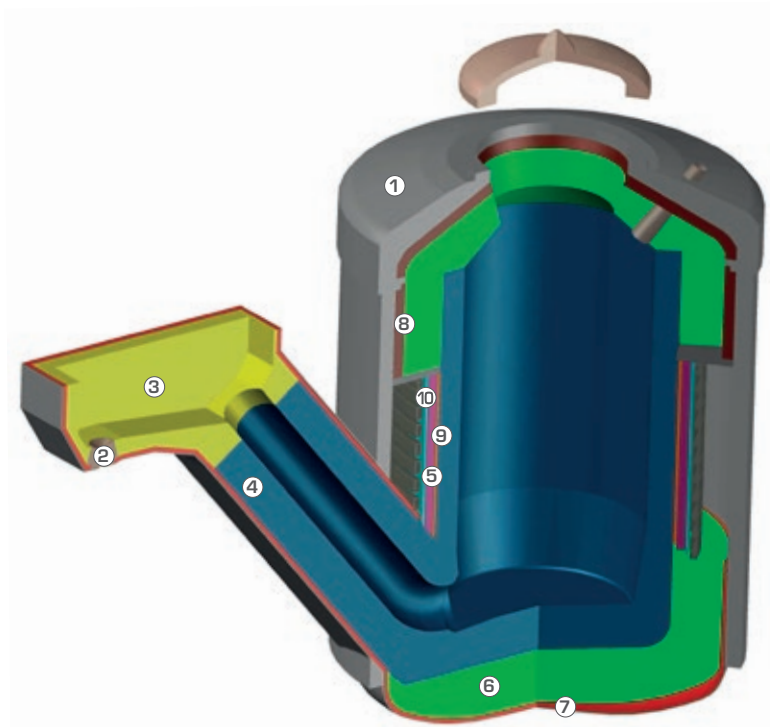
Installation of channel inductor



Products	Application areas
Seven Dry 85 K MAG 11 X	working lining
Seven Coat 88 CR -2	inductor coupling
Seven Patch 62 C ZIR	inductor coupling
Seven Cem 99 K CRO	inductor coupling, separating mass
Micro porous board	insulation
Ceramic fiber paper	insulation

6. Coreless automatic press-pouring furnace

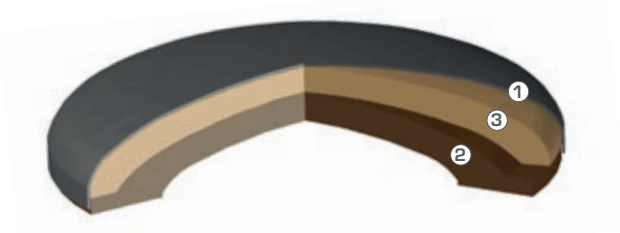
This furnace combines the features of CIF furnaces and channel press the furnace in the same set of equipment. Refractories for this application also meet a compromise of properties. The press pour channel is created inside the refractory lining.



Color	Zones	Material type	Attention to
①	Shell		
②	Casting nozzle	ultra low cement castable, precast shape	liquid metal corrosion, thermal shock
③	Inlet outlet basin	regular, low cement and ultra low cement castable	liquid metal corrosion, thermal shock
④	Bath and press pour channel	dry mix, ramming mix	sintering behavior, liquid metal corrosion
⑤	Bath safety lining	self flowing castable	patching behavior; resistance to liquid metal
⑥	Supporting ring	low and ultra low cement castable	strength, liquid metal corrosion
⑦	Lower insulation	ceramic paper, micro porous board	thermal conductivity
⑧	Upper insulation	gunning mix, micro porous	thermal conductivity, strength
⑨	Slip layer 1	mica foil	
⑩	Slip layer 2	mica foil	

Products	Application areas
Seven Dry 65 KD 01 V	bath and press pour channel working lining
Seven Ram 65 KX 01 X	bath and press pour channel working lining
Seven Cast 80 RX 01 V	repair of inlet outlet basin, cover, supporting rings
Seven Cast 88 RBX	supporting rings
Seven Cast 94 UR	inlet outlet basin working lining
Seven Cast 80 UB -10	inlet outlet basin working lining
Seven Cast 60 UD	supporting rings, spout
Seven Cast 1772 UX	inlet outlet basin working lining
Seven Flow 80 NB	inlet outlet basin working lining, bath safety ling
Seven Flow 85 UX	inlet outlet basin working lining, bath safety ling, supporting rings, nozzle
Seven Flow 60 ND 04 W	bath safety lining, inlet outlet basin working lining
Seven Plast 85 CX -3	repair of inlet outlet basin
Seven Gun 63 RH CO	repair of inlet outlet basin
Seven Gun 57 RH 01 V CO	repair of inlet outlet basin
Sevenlite 1300	upper insulation
Micro porous board	upper and lower insulation

5. Cover

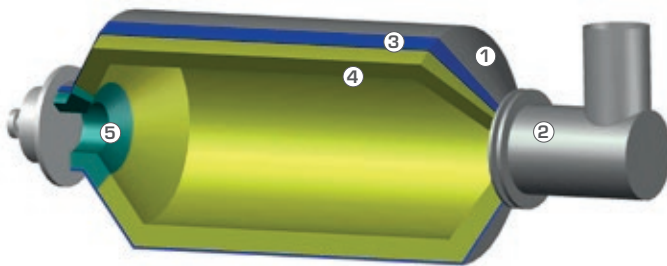


Color	Zones	Material type	Attention to
①	Shell		
②	Working lining	regular, low, ultra low cement castable	thermal shock
③	Insulation	LW, MW insulating castable	thermal conductivity, strength

Products	Application areas
Seven Cast 59 ND	working lining
Seven Cast 60 UD	working lining
Seven Cast 95 RR	working lining
Seven Cast 65 NH CO	working lining
Seven Cast 1500 LW	working lining, special product for improved insulation
Sevenlite 1450 LI	insulation
Sevenlite 1300	insulation
Ceramic fiber board	insulation

6. Rotary furnace

This simple furnace has become popular in some countries as a simple alternative to the cupola furnace in order to reduce emissions to the atmosphere, but without using electrical power.

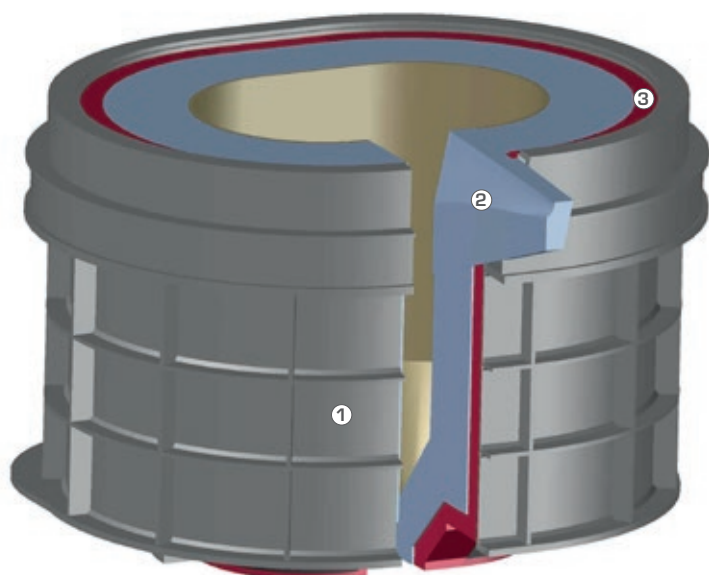


Color	Zones	Material type	Attention to
①	Shell		
②	Cap		
③	Insulation	insulating board	thermal conductivity
④	Working lining	wet ramming mix, gunning mix	sintering behavior, resistance to molten metal
⑤	Rim	low, no cement castable, wet ramming mix	sintering behavior, resistance to molten metal

Products	Application areas
Seven Ram 90 K SIL	working lining
Seven Gun 88 K SIL	repair, working lining
Seven Trow 80 RX -1	repair
Seven SET 95 A SIL	repair
Seven Cast 95 C SIL	rim, repair
Ceramic fibre board	insulation
Micro porous board	insulation

No cement products for fast dry out	Application areas
Seven Cast 99 CF LCS	rim, repair

7. Ladle



Precasted ladle

Color	Zones	Material type	Attention to
①	Shell		
②	Working lining	low, ultra low, no cement castable, self flowing, dry mix	resistance to molten metal, strength
③	Insulation	insulating board	thermal conductivity, strength

Products iron

Products iron	Application areas
Seven Cast 59 ND	working lining
Seven Cast 60 UD	working lining
Seven Cast 50 ND 15 Y	working lining
Seven Flow 60 ND 04 W	working lining
Seven Flow 50 ND 51 Z	working lining
Seven Cast 85 UX	working lining

Products steel

Products steel	Application areas
Seven Cast 90 NR 09 W -10	working lining
Seven Cast 94 UR	working lining

Common products

Common products	Application areas
Seven Trow 80 RX -1	repair
Seven Trow 92 RR 08 Z -1	repair
Seven Plast 85 CX -3	repair
Seven Trow 60 RM -3	repair
Micro porous board	insulation
Ceramic fibre board	insulation

No cement products for fast dry out

No cement products for fast dry out	Application areas
Seven Cast 50 CD 15 Y LCS	working lining
Seven Cast 90 CR LCS	working lining
Seven Dry 55 KD	working lining, special product

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



05-2019

▶ SLOVENIA

Seven Refractories d.o.o.
Poslovna cona Risnik 40
6215 Divača
Tel. +386 5 739 57 60

▶ AUSTRIA

Seven Refractories GesmbH
Am Heumarkt 10
1030 Vienna
Tel. +43 1 343 01 64

▶ RUSSIA

Seven Refractories LLC
Liteyny prospekt, 26, liter A,
premise 475, office 522
191028 Saint-Petersburg
Tel. 0078 12 616 13 73(4)
Fax 0078 12 616 13 73(4) 105

▶ UKRAINE

Seven Refractories Ukraine LLC
Glinki str., 7, office 1102
49000 Dnipro
Tel. +38 067 612 6346

▶ ITALY

Seven Refractories Srl
Via Carlo Mussa 832
15073 Castellazzo Bormida
Tel. +39 013 127 8868
Fax +39 013 129 3911

▶ KAZAKHSTAN

Seven Refractories Asia
Karaganda region
Doskey village, Block 028
Building 1655
Tel. +7 721 240 4777

▶ INDIA

CORPORATE OFFICE
Dalmia Seven Refractories Limited.
4, Scindia House, Connaught Place
New Delhi - 110001
Tel +91 11 23457100

PLANT DALMIASEVEN KATNI
Dalmia Seven Refractories Limited.
Plot No 8 & 13
Phase-III, Lamtara Industrial Area
Katni - 483501, Madhya Pradesh
Tel : +91 7622 266259/266306

▶ GERMANY

Seven Refractories Deutschland GmbH
Düsseldorf:
Becherstraße 20
40476 Düsseldorf
Tel. +49 211 544 770 25
Fax +49 211 544 793 50

Neuwied:
Dierdorfer Straße 411
56566 Neuwied
Tel. +49 2631 511 98 98