

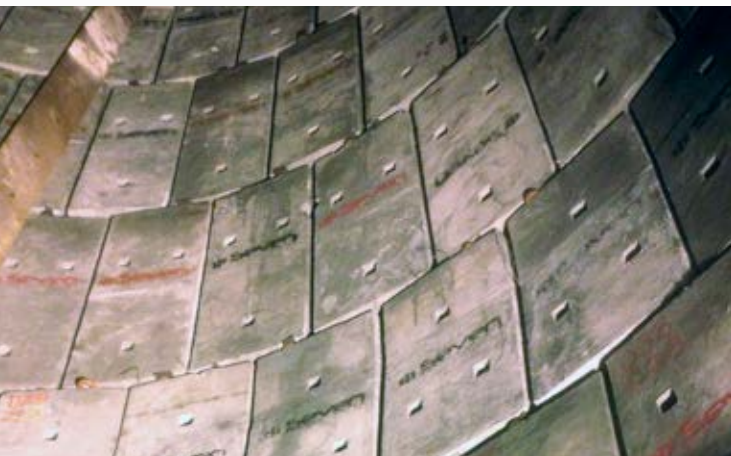
Advanced Technical Vision
in iron-making industry

BLAST FURNACE LINING ENGINEERING

The crucial reason for iron-makers to pursue as long a blast furnace life campaign as possible is the high cost of relining.

While the hearth remains the most critical zone for repair, the stack can always be re-profiled. Robotic repairs or manual installation by lifting platform are today commonplace, well established, techniques used worldwide.

The furnace life extension is nowadays optimized by advanced engineered refractory products.



Seven Refractories offers a complete range of monolithic and precasted shape products suitable for any blast furnace lining or repair.

Thanks to our significant international experience Seven can offer the best engineering support in product selection, and undertake the installation of turn-key projects.

The blast furnace service life extension, related environmental issues, and cost reduction are all common goals to be pursued with the client, in an open and mutual vision.

DOMES
GUNNING MIX CO RESISTANT

ARMOR PLATE
CASTABLE LOW-IRON
CO RESISTANT

UPPER AND MIDDLE STACK
GUNNING MIX OR SHOTCRETE
ABRASION AND CO RESISTANT

BACK STAVES
INJECTION MATERIAL

LOWER STACK AND BELLY
GUNNING MIX OR SHOTCRETE
ABRASION AND CO RESISTANT

BOSH
GUNNING, CASTABLE
OR SHOTCRETE ABRASION
AND CO RESISTANT

TUYERES BELT
HIGH ALUMINA
PRECASTED BLOCKS

HEARTH
HIGH ALUMINA
OR AGS PRECASTED TILES

SUB-HEARTH
SELF-FLOWING LEVELLING
CASTABLE

IRON STAVES JOINTS
RAMMING ABRASION
RESISTANT

COPPER STAVES JOINTS
HIGH THERMAL CONDUCTIVITY
RAMMING MIX

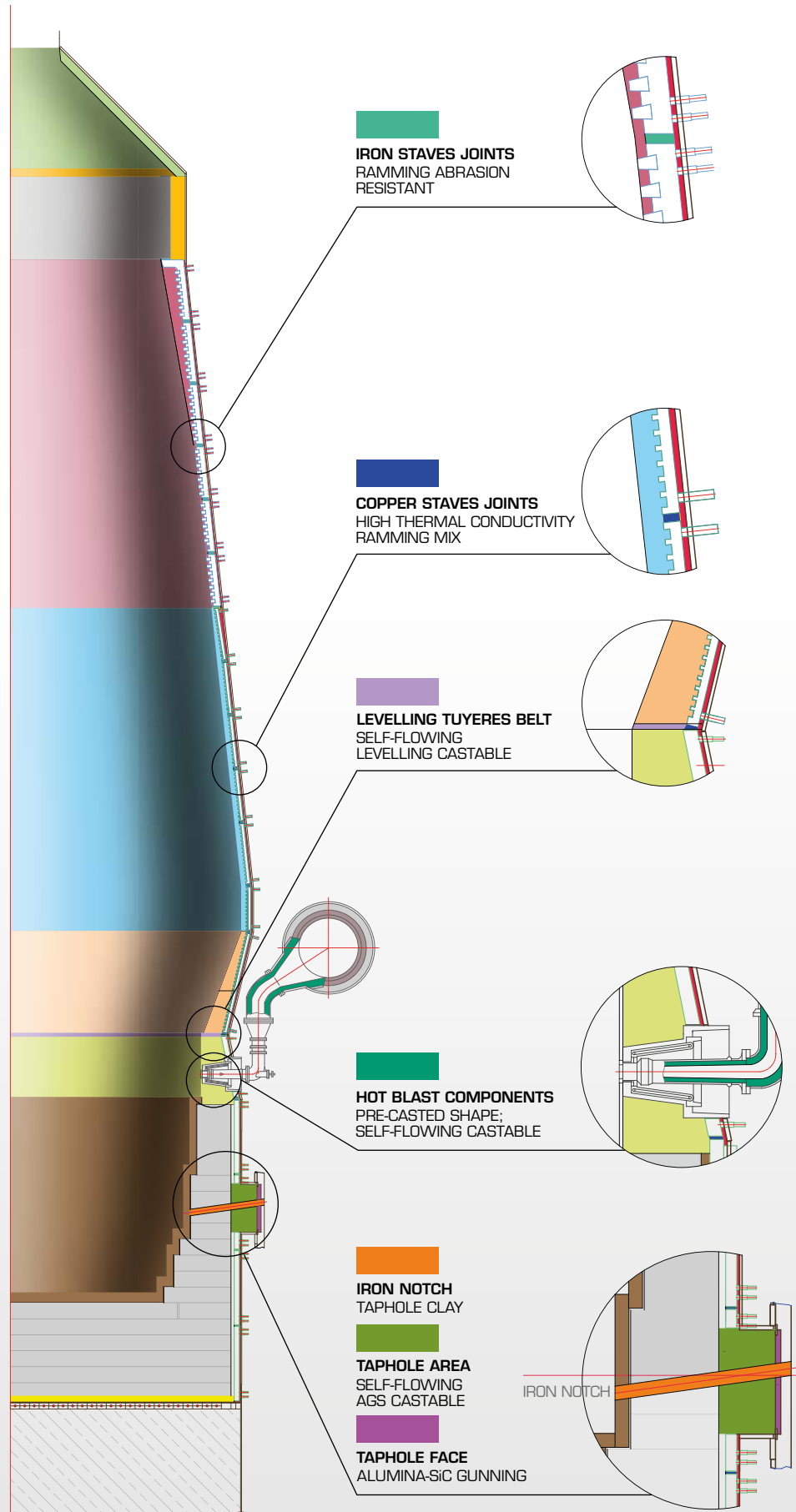
LEVELLING TUYERES BELT
SELF-FLOWING
LEVELLING CASTABLE

HOT BLAST COMPONENTS
PRE-CASTED SHAPE;
SELF-FLOWING CASTABLE

IRON NOTCH
TAPHOLE CLAY

TAPHOLE AREA
SELF-FLOWING
AGS CASTABLE

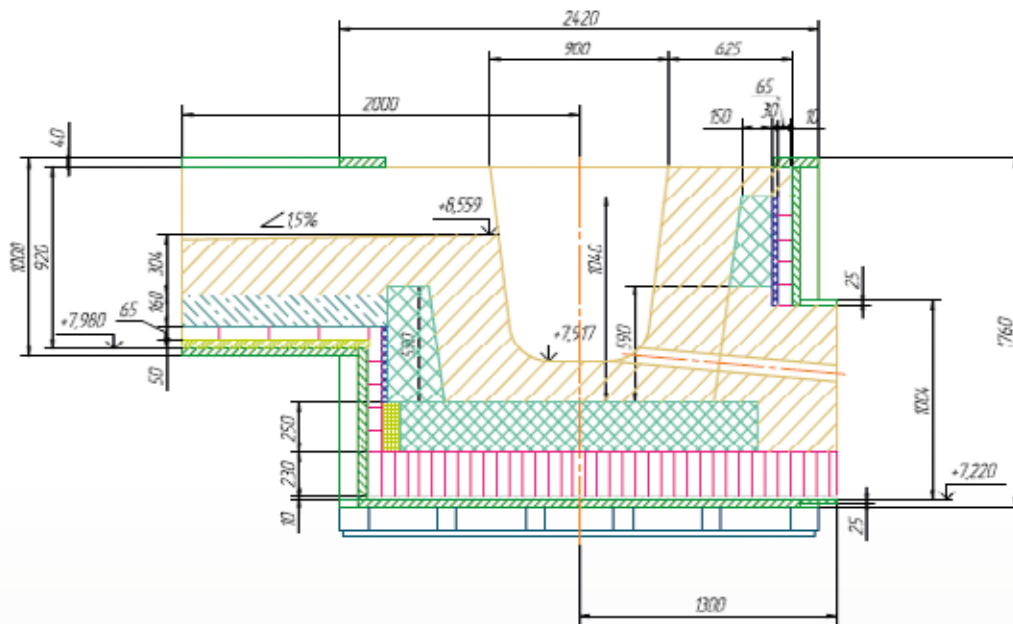
TAPHOLE FACE
ALUMINA-SiC GUNNING



CASTHOUSE ENGINEERING

Runner design, product architecture, and application technology, contribute to determining the performance of the casthouse units.

Seven Refractories provides reliable high alumina - silicon carbide - carbon products for all working and safety runner linings.



Working lining characteristics

- Designed for long campaign service life
- Low and ultra-low cement castable
- Brown fused alumina and silicon carbide base
- High erosion resistant
- Slag resistance
- Thermal cycling resistant
- Low cracking behaviour
- Pitch free and non toxic emission



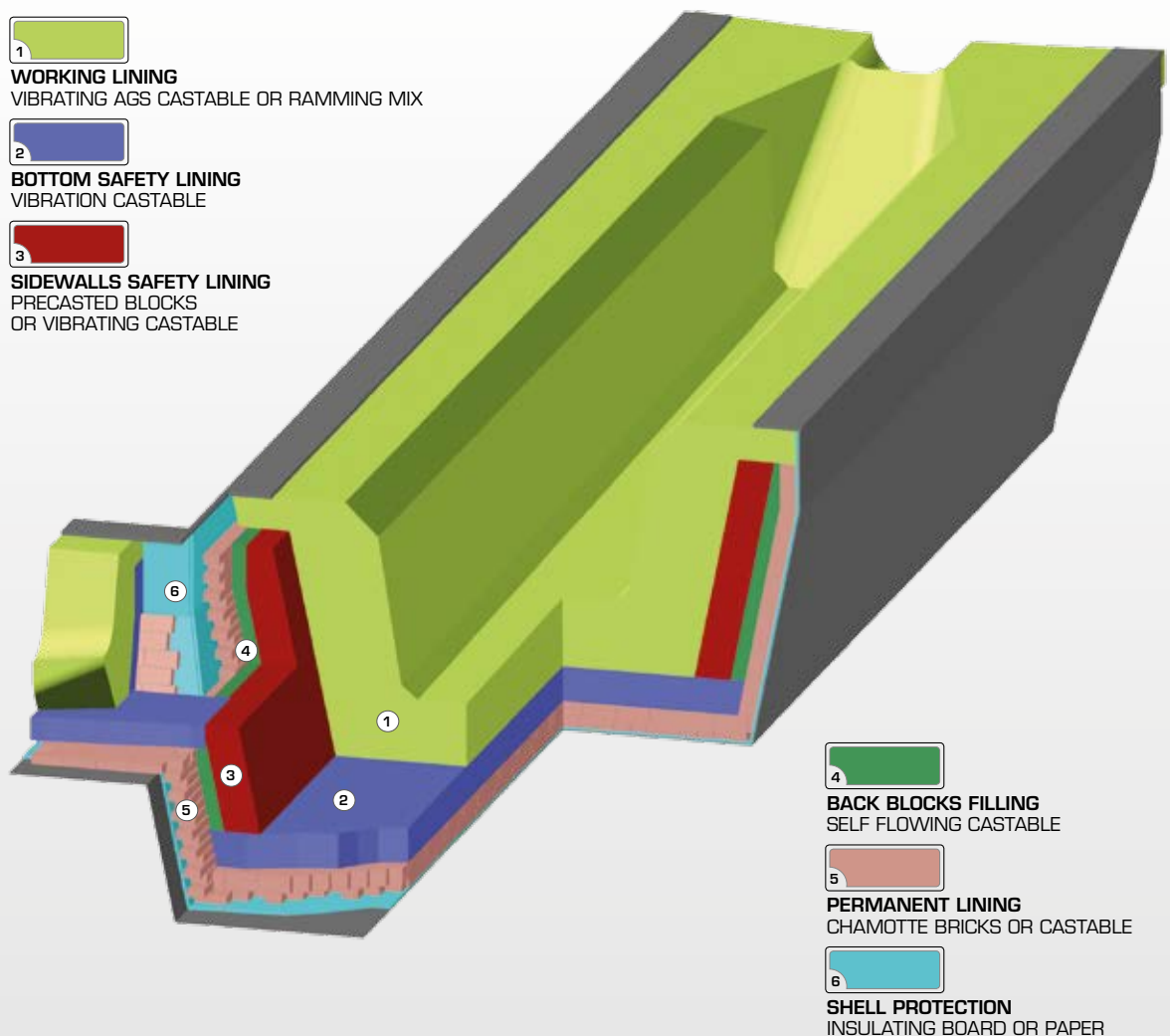
Safety lining characteristics

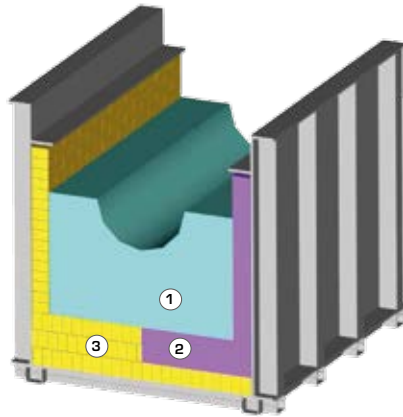
- Long service life
- No crack formations
- Oxidation resistant
- Iron and slag corrosion resistant
- High mechanical properties
- Casted on site or supplied in precast blocks
- Designed for zoned lining
- Pitch-free and no toxic emission



Seven Refractories offers different lining solutions for your casthouse based on layout, installation technique, experience and user preferences.

Seven cast	Regular, low and ultra-low cement vibrating castables for any application
Seven flow	Self-flowing low and ultra-low easy to install castables
Seven gun	Dry dense and regular hydraulic mixes for all general maintenance
Seven ram	Ramming mix chemically and ceramic bonded mixes for any kind of application
Seven plast	Shaped plastic chemically and ceramic bonded mixes for special applications
Seven shot	Low and ultra-low cement spraying castables for dedicated quick lining and repairs
Seven grout	Hydraulic and chemically bonded self-flowing mixes used for hot and cold injection
Seven dry	Special dry chemically bonded mixes for dedicated applications
Seven cem	Special chemically bonded mortar for jointing precasted blocks and bricks lining
Seven shape	Special ready shaped dried blocks for special use





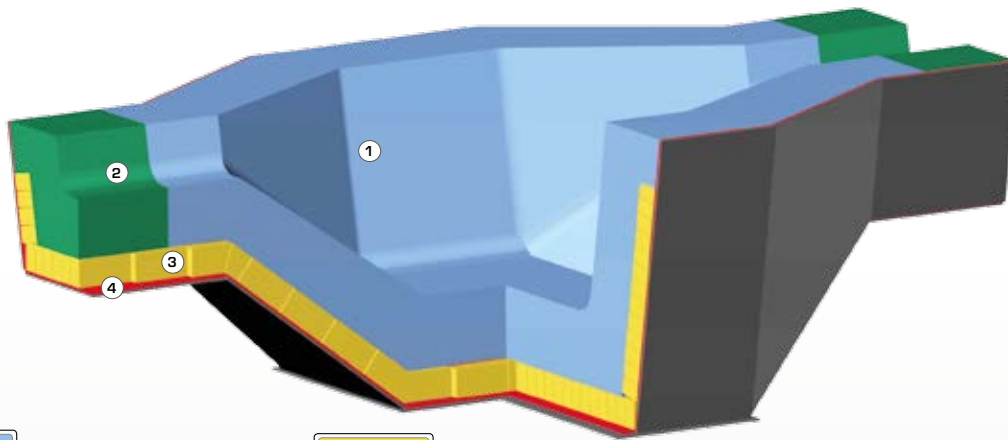
WORKING LINING
VIBRATING AGS CASTABLE
OR PRICASTED SHAPES
OR RAMMING MIX



SAFETY LINING
VIBRATING CASTABLE



SAFETY LINING
CHAMOTTE BRICKS



WORKING LINING
VIBRATING AGS CASTABLE
OR RAMMING MIX



WORKING LINING
VIBRATING AGS REINFORCED CASTABLE



PERMANENT LINING
CHAMOTTE BRICKS OR CASTABLE



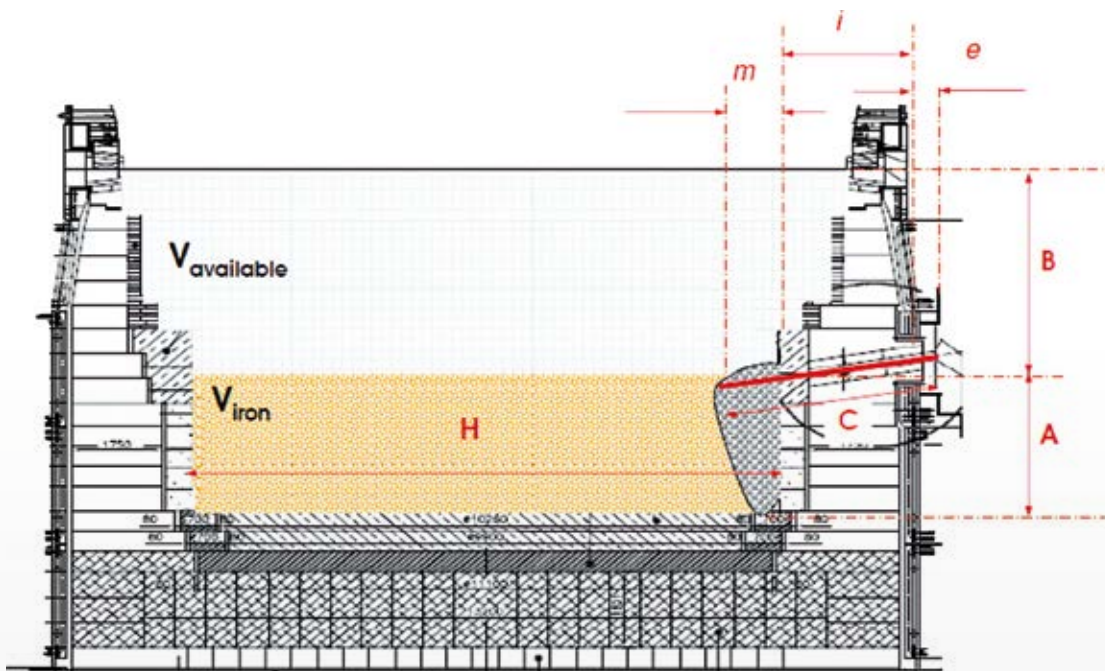
SHELL PROTECTION
INSULATING BOARD OR PAPER



TAPHOLE CLAYS

Cast rate, corrosion resistance and balancing the taphole wear and the renewal of the “mushroom” are all aspects creating synergy between the user’s demand and the producer’s capability.

Special attention is paid to the product design and manufacturing to ensure stable furnace operation and hearth walls protection.



Seven Refractories taphole clay is the answer to:

- Daily iron production of up to 12,000 t/d
- Short intermediate tapping time, 20 mins
- Long operation on the same hole, more than 20 days
- Easy drilling at the scheduled time, no O₂
- Long stable taphole length, >1/3 H
- Low plugging consumption: 3 times ($r \cdot r \cdot \pi \cdot L$)
- Long cast duration, up to 200 mins
- Low emission into the atmosphere
- Controlled cast rate

Four families of products for different requirements have been designed:

Seven tap 100	suitable for little blast furnace.
Seven tap 200	is engineered for consistent performance in small and medium sizes blast furnaces.
Seven tap 300	a higher content for anti-abrasives increases the taphole performance and makes it more suitable for medium and large blast furnaces.
Seven tap 400	is the top grades of the range where the high content of SiC, Si ₃ N ₄ and carbon make the products suited to extreme operating blast furnace conditions.

Brand name	BF typology	Mineral base	BF daily productivity	Si ₃ N ₄ addition	SiC+Si ₃ N ₄ +C %
Seven TAP 180	Small size	Chamotte Bauxite	< 3.000 t	no	28
Seven TAP 200	Small size	BFA Bauxite	< 3.000 t	no	29
Seven TAP 225	Medium size	BFA Bauxite	3.000 - 5.000 t	no	32
Seven TAP 300	Large size	BFA	3.000 - 5.000 t	yes	34
Seven TAP 375	Large size	BFA	5.000 - 13.000 t or higher	yes	38
Seven TAP 400	Large size	BFA	5.000 - 13.000 t or higher	yes	40
Special applications					
Seven TAP 055 PL		BFA		yes	42
Seven TAP HB 30		BFA		yes	34



All Seven taphole clay products are resin bonded and ecologically compatible.

The fast curing and the low atmospheric emission ensure the clay adheres to the current EC legislation. No warning labelling is required.

Seven clays are designed for any type of mudgun. Their binding system has an improved temperature threshold preventing hardening in the mudgun barrel and cone.



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 castable
 - Regular and dense low-cement gunning mix
 - Ramming
 - Shotcreting
 - Taphole clays
 - Grouting, patching and dry vibrating products
- Provision 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 targetting of results
- Technical advice from experts



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