



REFRACTORIES

— FOR —

HEAT TREATING & FORGING



ALLIED
MINERAL
PRODUCTS

Global **Refractory** Solutions



Allied Mineral Products is a world leader in the design and manufacture of monolithic refractories and precast shapes. With strong sales and service teams in the foundry, aluminum, steel, heat treat/forge and industrial markets, our success is based on our dedication to *Being There Worldwide with Refractory Solutions*.

Producing quality, consistent products is top priority at Allied and we have the products to meet your refractory needs. Our extensive product line includes innovative refractory technology and longstanding refractory alternatives.

Allied's focus on quality at every stage in the production process is unparalleled. A stringent raw material standard and global quality control testing before and after each batch is produced, provides customers with consistent products. We provide quick response times to any urgent request through flexible manufacturing systems at all our manufacturing facilities.

Global **Refractory** Solutions





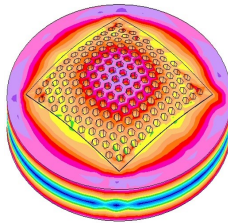
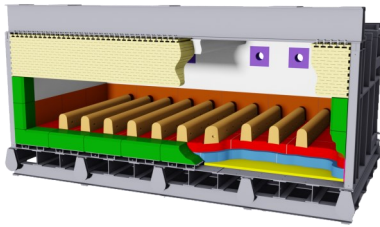
RESEARCH & ENGINEERING

After gaining a detailed understanding of your specific needs, our team evaluates operating criteria and physical design parameters to create a detailed engineered design encompassing:

- Patented technologies
- Optimized product zoning
- Thermal models to optimize and validate designs
- Proven safety lining system designs
- Unique installation properties and techniques
- Leading edge refractory system designs

We're focused on developing new products, improving existing products and perfecting installation techniques. Our product development and testing is conducted in our state of the art research and technology center. We have an on-site gunning and shotcreting lab allowing extensive testing of installation properties.

As an innovative, technology-driven supplier we're devoted to providing customized refractory solutions for various industry operations. We offer a wide variety of high performance refractory products with superior raw material quality.



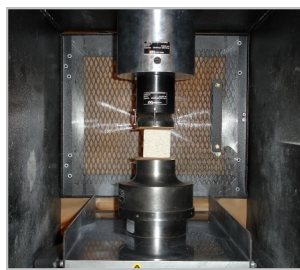
FEA Thermal Analysis



Flow Testing



Contact Tests



Strength Tests





PRODUCT INNOVATION

ARMORMAX®



ARMORMAX® 70SR is a 70% alumina low-cement castable which is part of a family of high needle containing refractories.

ARMORMAX® is ideal for heat treating and forging applications where thermal shock can shorten refractory life.

It's high needle content provides resistance to mechanical impact and abrasion. ARMORMAX® has high fracture toughness allowing it to remain in service long after conventional refractories start to fail.

Product line benefits

- High thermal shock resistance
- Withstands severe impact and abrasion conditions
- High strength retention after repeated thermal cycling



ARMORMAX® sill after 1 month in service



ARMORMAX® sill after 18 months in service



ARMORMAX® sill after 52 months in service



JAMBS

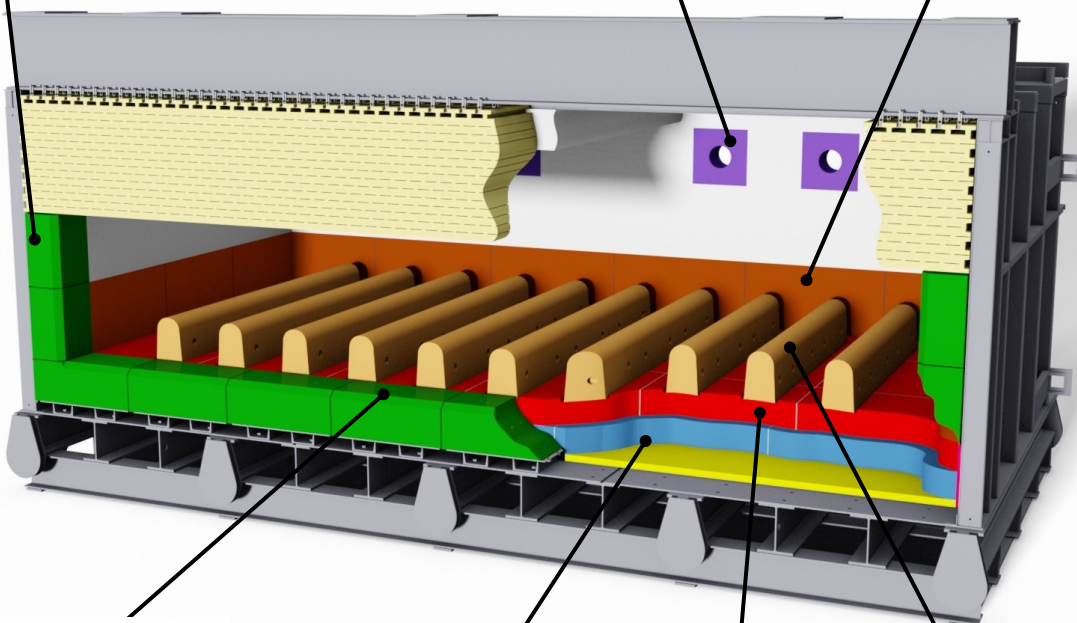
ALAKAST® 50 LC-P+SS
ALAKAST® 50 TSR+SS
ARMORMAX® 70SR
PS SUPER PLASTIC
TUFF-FLO 60A

BURNERS

BLAST KAST 70 LC
BRICKMIX 81
KAST TECH 60
LCF 798A
MATRIPHOS 85AC

CURB WALLS

ALAKAST® 68 LC-P
BLAST KAST® 70 LC
PS SUPER PLASTIC
TUFF-FLO 50



SILL

ALAKAST® 98 EZC
ARMORMAX® 70SR
PS SUPER PLASTIC
TUFF-FLO 50

SUBHEARTH

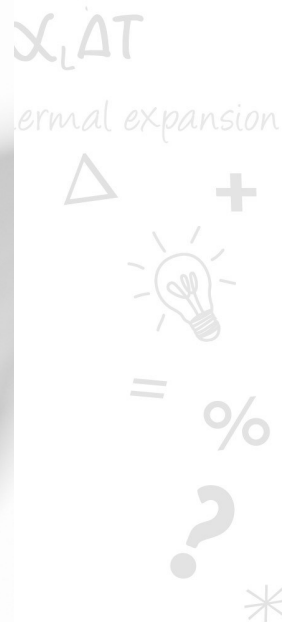
ALAKAST® 45-P
BETAMAX® 24 LT
PUMPLITE 60
TUFFCRETE® 47

HEARTH

ALAKAST® 68 LC-P
ARMORMAX® 70SR
DURACON® 32
TUFF-FLO 50
TUFF-FLO 60A

PIER BLOCKS

ALAKAST® 50 TSR
ALAKAST® 98 EZC
ARMORMAX® 70SR
TUFF-FLO FSM





CAR BOTTOM FURNACE

process



global

refractory

Σ

research



PERIMETER

CAST 2550 LI C

DURACON[®] 32

TUFF-FLO 50

SUB-PIER BLOCKS

DURACON[®] 28

TUFF-FLO 50

PIER BLOCKS

ALAKAST[®] 98 EZC

ARMORMAX[®] 70SR

TUFF-FLO FSM

$$\frac{\Delta L}{L_0} = \alpha_L \Delta T$$

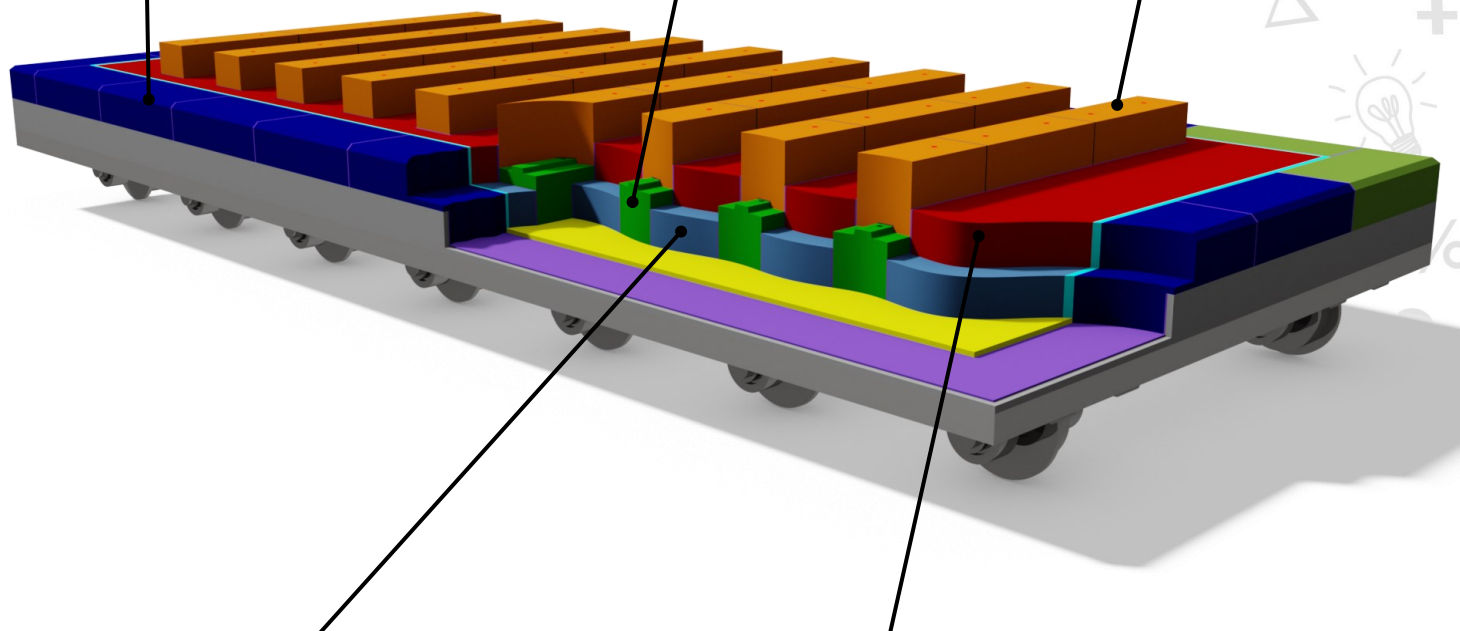
thermal expansion



+



%



SUBHEARTH

BETAMAX[®] 24 AC

DRI-LITE[®] 79 AL-M

PUMPLITE[®] 60

HEARTH

ALAKAST[®] 65 LC-P

DRI-VIBE[®] 434A

DURACON[®] 32

TUFF-FLO 50

TUFF-FLO 60A



TIP-UP & ROTARY HEARTH FURNACE

TIP-UP FURNACE

HEARTH

DRI-VIBE® 434A

DURACON® 32

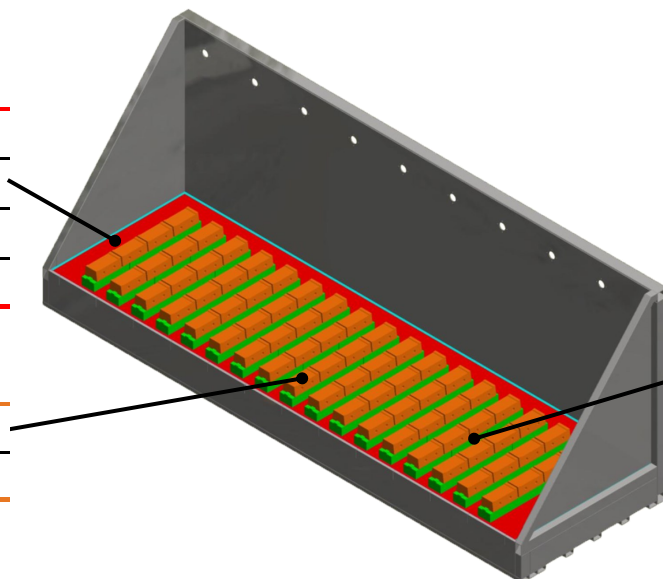
TUFF-FLO 50

TUFF-FLO 60A

PIER BLOCKS

ARMORMAX® 70SR

TUFF-FLO FSM



SUBHEARTH

BETAMAX® 24 AC

DRI-LITE® 79 AL-M

INSULMIX® 2460 LI

PUMPLITE 60

PUMPLITE 80

ROTARY HEARTH

ROOF

BLAST KAST® 70 LC

SIDE WALLS

BLAST KAST® 45 LC

BLAST KAST® 70 LC

TUFF-FLO 50

CURBS

ALAKAST® 50 LC-P

ALAKAST® 68 LC-P

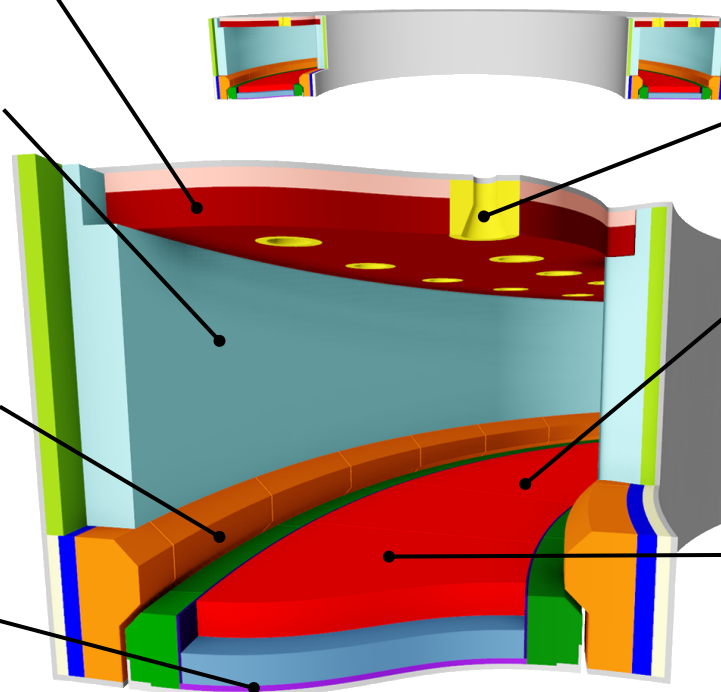
TUFF-FLO 50

SUBHEARTH

ALAKAST® 45-P

ALAKAST® 50 LC-P

TUFF-FLO 50



BURNER BLOCKS

LCF 798A

BRICKMIX 81

CAST TECH 60

MATRIPHOS 85 AC

SKID BLOCKS

ALAKAST® 98 EZC

ALPHAMAX T

ULTRACON 34C

HEARTH

ALAKAST® 50 LC-P

ALAKAST® 68 LC-P

ALAKAST® 90 LC-P

DURACON® 32

TUFF-FLO 60A



INDUCTION HEATING & PRECAST SHAPES

INDUCTION HEATING



PRODUCTS

COIL CAST FS /
COIL CAST FS - FAST

CAST 217 FS /
CAST 217 FS FINE

COIL CAST 97A

COIL CAST M

LCF798 FINE

TUFFLOOR

PRECAST SHAPES



HEARTHES

ALAKAST® 50 LC-P

ALAKAST® 68 LC-P

ARMORMAX® 70SR

DURACON® 32

TUFFCRETE® FS

CAR PERIMETERS

ALAKAST® 50 TSR

TUFF-FLO 50

TUFF-FLO 60A

JAMBS / LINTELS

ALAKAST® 50 LC-P

ARMORMAX® 70SR

DURACON® 32

LCF798A

BURNERS

ALAKAST® 85 ULC

KAIST TECH 60

LCF798A

MATRICAST 3110C

CURB WALLS

ALAKAST® 68 LC-P

BLAST KAST® 70 LC

DURACON® 32

TUFFCRETE® 47

TUFF-FLO 50

PIER BLOCKS

ALAKAST® 65 LC-P

ARMORMAX® 70SR

DURACON® 32

TUFF-FLO FSM



FLOORING

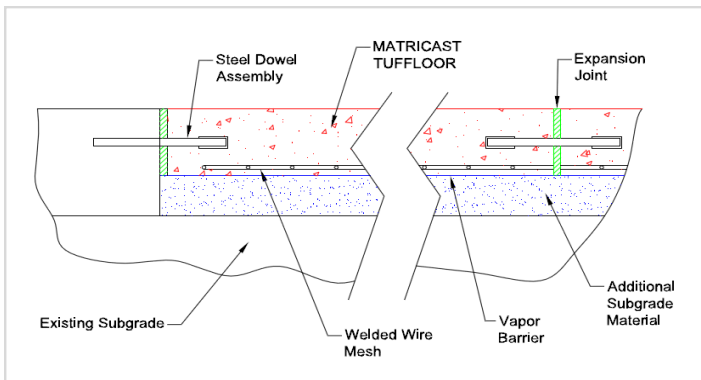
refractory

TUFFLOOR® is designed for areas exposed to extreme thermal cycling and intermittent exposure to scale, liquid metal spills, dross and slag. It is a versatile product that can be installed as a complete floor, over existing (or new) concrete, or as precast tiles.

TUFFLOOR® has over 20 years of proven performance in forging and heat treating plants, primary metal production facilities (aluminum, steel, iron, zinc, copper, ferro-alloys), rolling mills and many other hot flooring applications.

Benefits include:

- Fast project turn around time due to its early strength development
- Exceeds the cold crushing strength of conventional concrete
- Reduced maintenance time and expense
- Safer working surfaces
- Minimizes wear on mobile equipment
- Custom colors available
- Excellent freeze-thaw properties



Engineering Design for a High-Load Application

A variety of colors

TUFFLOOR Standard Concrete
Thermal Cycling to 1400°F (760°C)





MAINTENANCE

process
global
refractory
research

ALAGUN	General purpose gunite castable for a wide range of applications. Ranging from 10% to 70% alumina.
BLAST KAST®	Shotcrete refractory mixes ranging from 45% to 70% alumina
DRI-VIBE®	Dry vibratable, heat-set refractories for restoring hearth hot face
MATRIGUN	Gunite refractories ranging from super duty to 70% alumina
MATRIPHOS	Phosphate-bonded plastics for repairing most types of refractory surfaces
QUICK-FIRE®	Two component phosphate bonded castables & gun mixes. Product ranges from 55% - 90% alumina.
TUFFCRETE®	Shotcrete refractories ranging from 50% to 70% alumina

$\Delta T = \alpha L \Delta T$
thermal expansion



QUICK-FIRE® 65 perimeter repair



Lower jamb and curb wall repair with TUFFCRETE® 70X shotcrete



SUPPORTING PRODUCTS

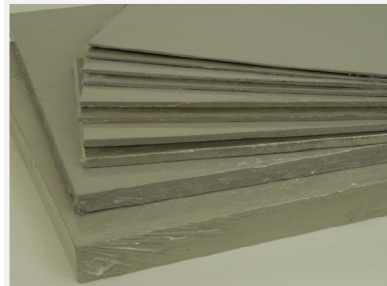
Ceramic Fiber Insulation

- 2300°F, 2600°F and 3000°F blanket
- Board
- Modules
- Paper
- Bulk
- Soluble (non RCF) Fiber
- Hardware
- Ropes
- Textiles
- Vacuum formed shapes



Insulating Board

- Microporous board
- Super Firetemp Cal-Sil
- Durablock
- Fireboard HS & LD
- *Thermal Ceramics* Insulating Board
- Cal-Sil Board
- Vermiculite Board
- Mineral Wool Board
- Marinite Board
- Transite Board
- CS-85 Cal-Sil Board



Stainless & Ceramic Anchors

- 60%, 70% and 85% alumina anchor tile
- Stainless steel and alloy anchors
- C-clips



Firebrick

- Medium duty firebrick
- High heat duty firebrick
- Super duty firebrick
- 70%, 85%, 90% alumina brick
- Insulating Firebrick
- SiC and nitride bonded brick
- Square edge tile
- High alumina anchor brick



Insulating Firebrick

- 1600°F-3250°F
- AMP series IFB
- BNZ IFB
- Moler

Skamol Products

Moler Insulating Brick

- M-Extra
- Supra
- Hipor 450
- Poros



Calcium Silicate Board

- S-1100E
- Super-Isol

Vermiculite Board

- V-1100
- VIP-12 HS
- Clickboard



Headquarters:

Allied Mineral Products, LLC

Columbus, Ohio, U.S.A.

614-876-0244 - info@alliedmin.com

USA Manufacturing Locations:

Allied Mineral Products, LLC
Columbus, Ohio, USA
614-876-0244 - info@alliedmin.com

Allied Mineral Products
Chehalis, Washington, USA
614-876-0244 - info@alliedmin.com

Allied Mineral Products
Pell City, Alabama, USA
614-876-0244 - info@alliedmin.com

Allied Mineral Products
Brownsville, Texas, USA
956-831-2022 - info@alliedmin.com

International Manufacturing Locations:

Allied Mineral Products Brazil
Poços de Caldas, Brazil
614-876-0244 - info@alliedmin.com

Allied Mineral Products Europe B.V.
Tholen, Netherlands
31-166 601200 - customer.service@alliedmin.com

Allied Mineral Products (Foshan) Co., Ltd.
Foshan City, China
86-22-252-10378 - chinasales@alliedmin.com

Allied Mineral Products (Tianjin) Co., Ltd.
Tianjin, China
86-22-252-10378 - chinasales@alliedmin.com

Allied Mineral Products South Africa (Pty) Ltd.
Johannesburg, South Africa
27-11-902-2900 - southafricasales@alliedmin.com

Allied Refractory Products India Private Ltd.
Ahmedabad, Gujarat, India
91-2717-616800 - india@alliedmin.com

Allied Mineral Products Russia
Yelabuga, Tatarstan, Russia
79-16-585-2753 - info@alliedmin.com

Licensees:

Refractarios lunge Limitada
Santiago, Chile
56-22-745-3613 - info@alliedmin.com

Nippon Crucible Co., Ltd.
Tokyo, Japan
614-876-0244 - japan@alliedmin.com

Shinagawa Refractories Australasia
Unanderra NSW Australia
+61-2-4222-3834 - info@alliedmin.com

Visit alliedmineral.com for more information.