



REFRACTORIES

— FOR —

HEAT TREATING & FORGING



Global **Refractory** Solutions



ABOUT ALLIED

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



13 MANUFACTURING FACILITIES
OVER 145 INTERNATIONAL SALES REPRESENTATIVES
3 RESEARCH AND TECHNOLOGY FACILITIES
SALES ACTIVITY IN MORE THAN 100 COUNTRIES
6 PRECAST SHAPES FACILITIES





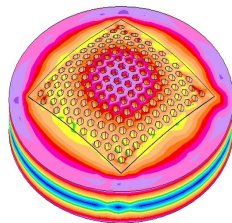
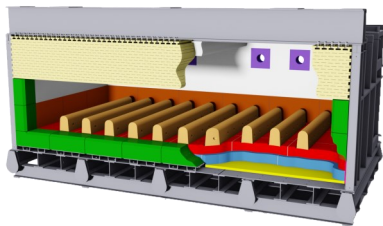
RESEARCH & ENGINEERING

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



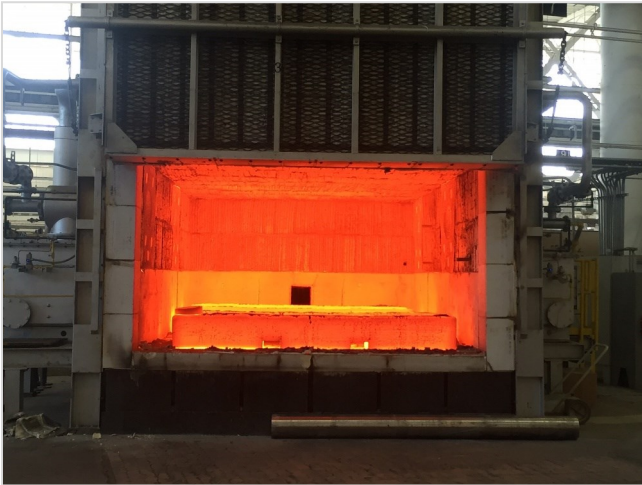
Strength Tests





PRODUCT INNOVATIONS

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.

The high needle content also provides resistance to mechanical impact and abrasion. ARMORMAX has high fracture toughness that allows it to remain in service long after conventional refractories start to fail.

ARMORMAX®

Product line benefits

- High thermal shock resistance
- Can withstand 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



BOX FURNACE

JAMBS

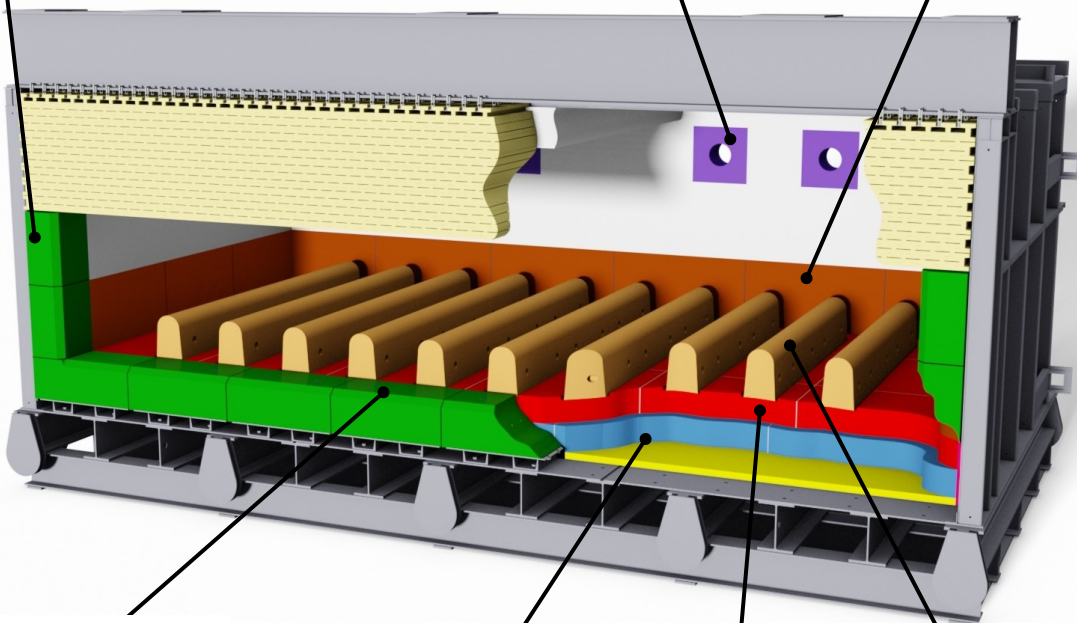
- ALAKAST 50 LC-P+SS
- ALAKAST 50 TSR+SS
- ARMORMAX® 70SR
- PS SUPER PLASTIC
- TUFF-FLO 60A

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



PERIMETER

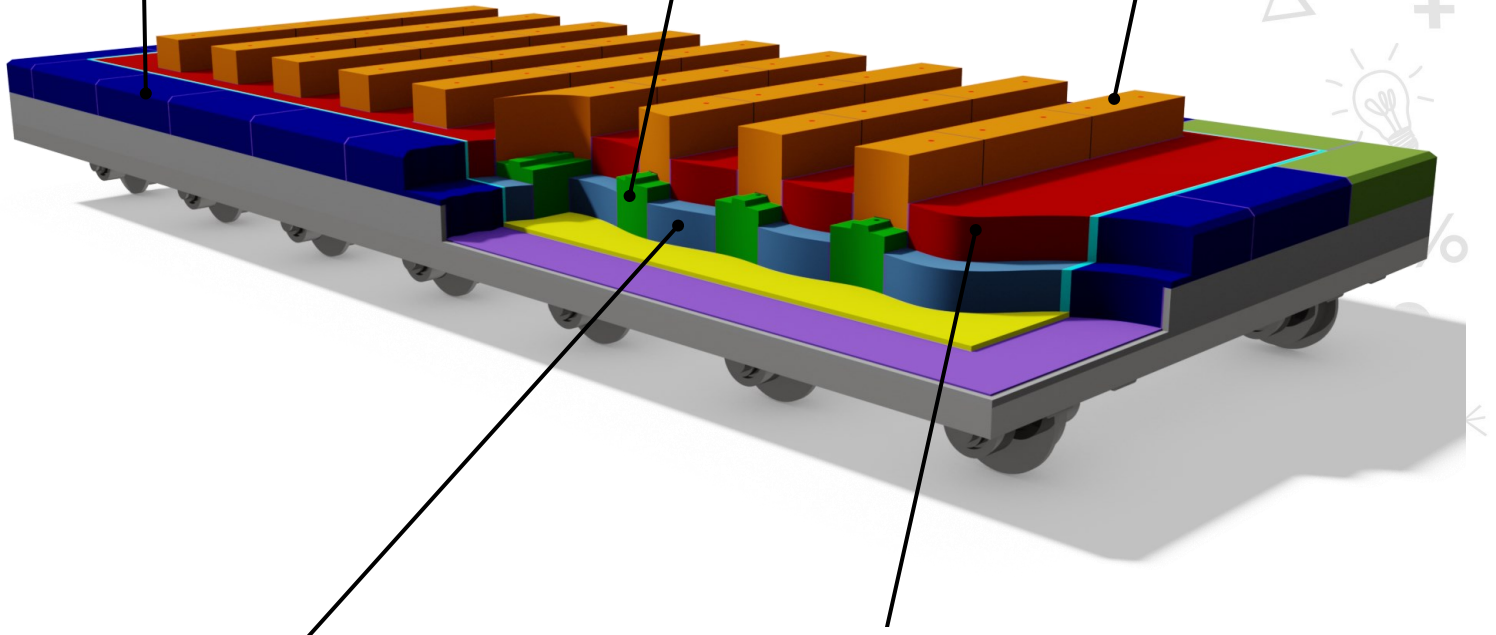
- CAST 2550 LI C
- DURACON[®] 32
- TUFF-FLO 50

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

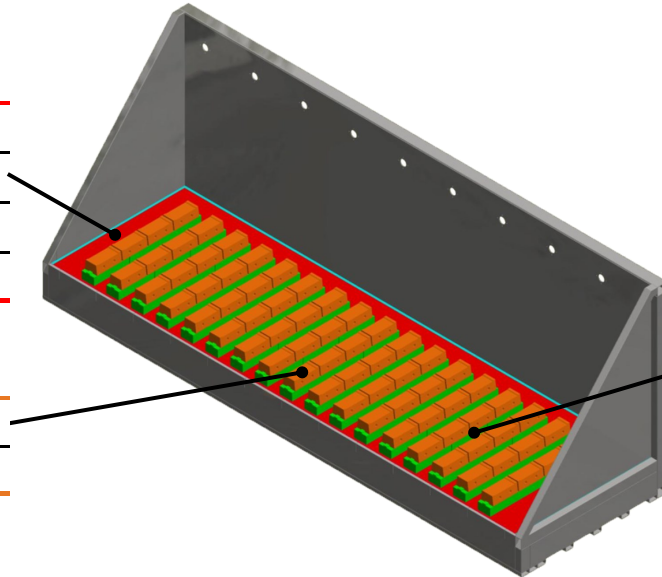
TUFF-FLO 50

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

BLASTKAST 45 LC

BLAST KAST 70 LC

TUFF-FLO 50

CURBS

ALAKAST 50 LC-P

ALAKAST 68 LC-P

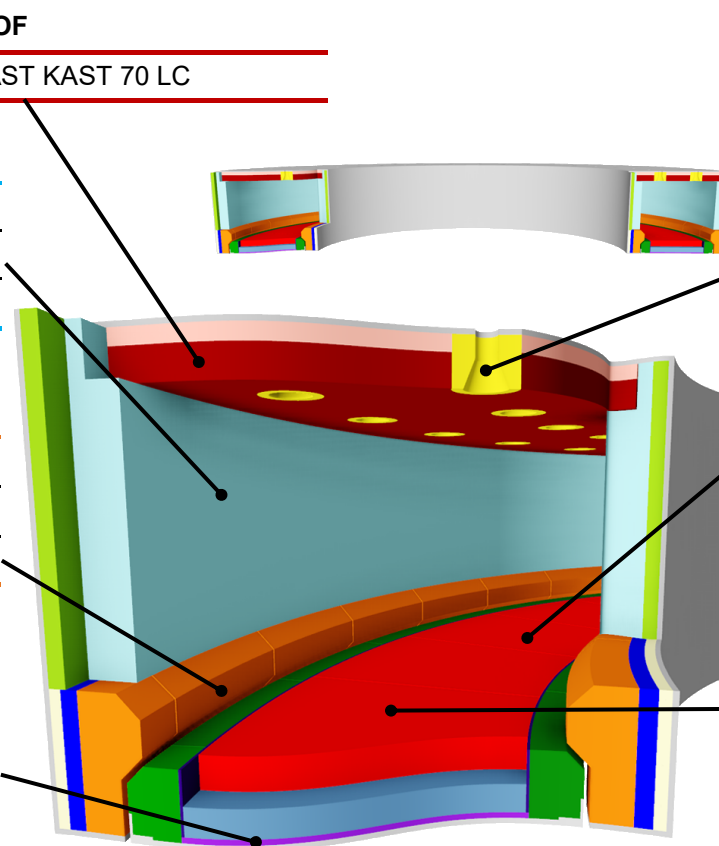
TUFF-FLO 50

SUBHEARTH

ALAKAST 45-P

ALAKAST 50 LC-P

TUFF-FLO 50



BURNER BLOCKS

LCF 798A

BRICKMIX 81

KAST 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

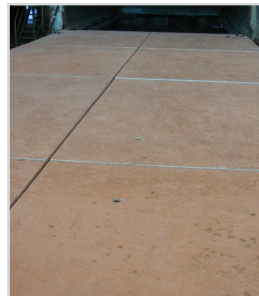
COIL CAST 97A

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

KAST 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

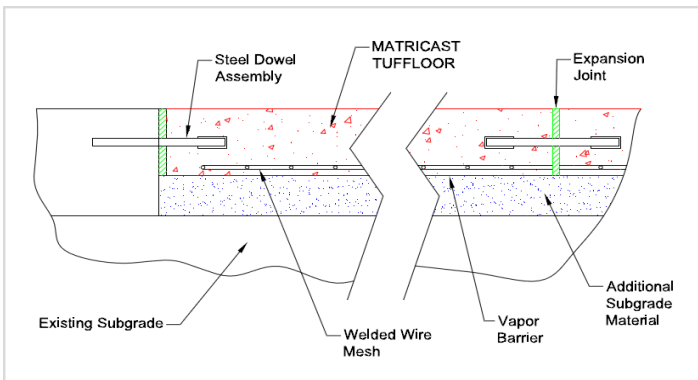
refractory

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)





process
global
refractory
research

MAINTENANCE

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.



QUICK-FIRE® 65 perimeter repair



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



TECHNICAL DATA

Name	Al ₂ O ₃ %	SiO ₂ %	Density	Max. Temp
ARMORMAX [®] 70SR	70.1	25.5	2.66 g/cm ³ (166 lb./ft ³)	1430°C (2600°F)
BETAMAX [®] 24 LT	42.4	39.7	1.23 g/cm ³ (77 lb./ft ³)	1345°C (2450°F)
BRICKMIX 81	80.9	14.9	2.72 g/cm ³ (170 lb./ft ³)	1760°C (3200°F)
CAST 2550 LI C	46.1	39.9	2.13 g/cm ³ (133 lb./ft ³)	1400°C (2550°F)
COIL-CAST FS	68.7	27.5	2.03 g/cm ³ (127 lb./ft ³)	1316°C (2400°F)
COIL-CAST FS FAST	68.7	27.5	2.03 g/cm ³ (127 lb./ft ³)	1316°C (2400°F)
COIL-CAST 217FS	80.5	16.5	1.89 g/cm ³ (118 lb./ft ³)	1316°C (2400°F)
COIL-CAST 217 FS FINE	76.0	20.5	1.81 g/cm ³ (113 lb./ft ³)	1316°C (2400°F)
COIL-CAST M	66.3	26.7	2.37 g/cm ³ (148 lb./ft ³)	1650°C (3000°F)
COIL-CAST 97A	96.6	0.1	3.03 g/cm ³ (189 lb./ft ³)	1650°C (3000°F)
DRI-VIBE [®] 434A	54.9	38.3	2.32 g/cm ³ (145 lb./ft ³)	1650°C (3000°F)
DURACON [®] 28	45.3	48.7	2.31 g/cm ³ (144 lb./ft ³)	1540°C (2800°F)
DURACON [®] 32	63.1	31.6	2.54 g/cm ³ (158 lb./ft ³)	1760°C (3200°F)
INSULMIX [®] 2460 LI	43.8	36.0	1.00 g/cm ³ (62 lb./ft ³)	1315°C (2400°F)
PUMPLITE 60	40.7	43.3	0.91 g/cm ³ (57 lb./ft ³)	1315°C (2400°F)
PUMPLITE 80	41.6	43.7	1.25 g/cm ³ (78 lb./ft ³)	1425°C (2600°F)
LCF 798 FINE	61.3	34.9	2.75 g/cm ³ (173 lb./ft ³)	1705°C (3100°F)
LCF 798A	61.5	35.0	2.64 g/cm ³ (165 lb./ft ³)	1705°C (3100°F)
MATRIPHOS 70AC	73.0	19.7	2.59 g/cm ³ (162 lb./ft ³)	1650°C (3000°F)
MATRIPHOS 85AC	80.7	12.2	2.80 g/cm ³ (175 lb./ft ³)	1650°C (3000°F)
QUICK CAST [®] 62	66.1	27.2	2.64 g/cm ³ (165 lb./ft ³)	1705°C (3100°F)
QUICK-FIRE [®] 65	64.7	27.2	2.48 g/cm ³ (155 lb./ft ³)	1650°C (3000°F)
TUFFCRETE [®] 47	47.1	46.5	2.21 g/cm ³ (138 lb./ft ³)	1540°C (2800°F)
TUFFCRETE [®] 70X	68.0	25.8	2.63 g/cm ³ (164 lb./ft ³)	1650°C (3000°F)
TUFF-FLO 50	50.2	44.4	2.32 g/cm ³ (145 lb./ft ³)	1650°C (3000°F)
TUFF-FLO 60A	59.6	36.2	2.58 g/cm ³ (161 lb./ft ³)	1700°C (3100°F)
TUFFLOOR	35.1	42.5	2.11 g/cm ³ (132 lb./ft ³)	1040°C (1900°F)
TUFFLOOR HT	45.3	39.2	2.08 g/cm ³ (130 lb./ft ³)	1370°C (2500°F)

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