



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. Allied's presence spans 100 countries with strong sales and service teams in the foundry, aluminum, steel, heat treating, forging and industrial markets. Allied can offer the heat treating and forging industry leading edge refractory solutions to heat treating and forging thanks in part to the following:

- New product development programs
- Extensive product selection
- Manufacturing facilities in 6 countries
- 130 international sales representatives located in more than 22 countries.
- Over 60 sales representatives in North America

Allied's success is based on our dedication to *Being There Worldwide with Refractory Solutions*. Our product line includes innovative refractory technology and a wide range of refractory products. Allied has the refractories to meet your refractory needs.



Corporate Headquarters



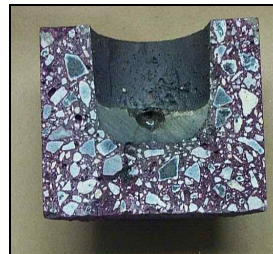
Research and Technology Center

Producing quality, consistent products is top priority at Allied. Allied's focus on quality at every stage of the production process is unparalleled. Allied's stringent raw material standards and quality control testing, before and after each batch is produced, provides customers with consistent products.

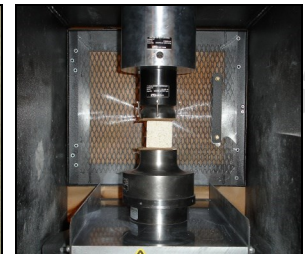
Allied provides quick response times to any urgent product request through flexible manufacturing systems at all 12 of its global manufacturing facilities.

Quality Control:

- Strict raw materials qualifications
- Batch testing
- Global quality management
- ISO certified since 1985, quality focus since 1961



Contact Tests



Strength Testing



A variety of packaging options, extensive stock and flexible manufacturing to meet urgent orders.



ENGINEERING



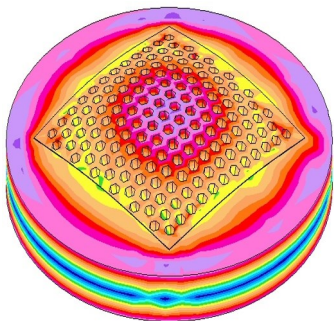
Allied Mineral Products prides itself on *being there worldwide with refractory solutions*. Allied's manufacturing facilities, worldwide sales and service networks and extensive product line formulations enables Allied to provide customers with the best refractory solutions and the fastest response times.

Allied starts the product selection process by first gaining a detailed understanding of your specific needs. Then, Allied's team evaluates operating criteria and physical design parameters to create a detailed Engineered Design encompassing:

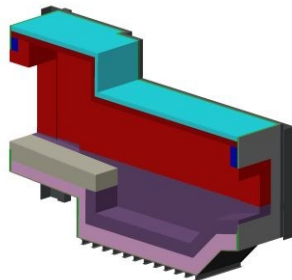
- Patented technologies
- Optimized product zoning
- Thermal models to optimize and validate designs
- Proven safety lining system designs
- Unique installation properties and techniques
- Leading edge refractory designs

Allied is focused on developing new products, improving existing products and perfecting installation techniques. Product testing and development is conducted in Allied's state of the art research and technology center. An on-site gunning and shotcreting lab allows for extensive hands-on testing of installation properties. Allied is an innovative, technology-driven supplier devoted to providing customized refractory solutions for heat treating and forging Industry operations including:

- Wide variety of high performance refractory products
- Superior raw material quality
- Tailored product selection to reduce chemical attack
- Unique installation properties - vibration cast, pump cast, gunning and shotcrete
- Modern laboratory for refractory design and testing
- On-site gunning and shotcreting lab



FEA Thermal Analysis



Refractory Design Engineering



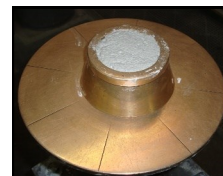
XRF



XRD



Design Engineering



Flow Testing

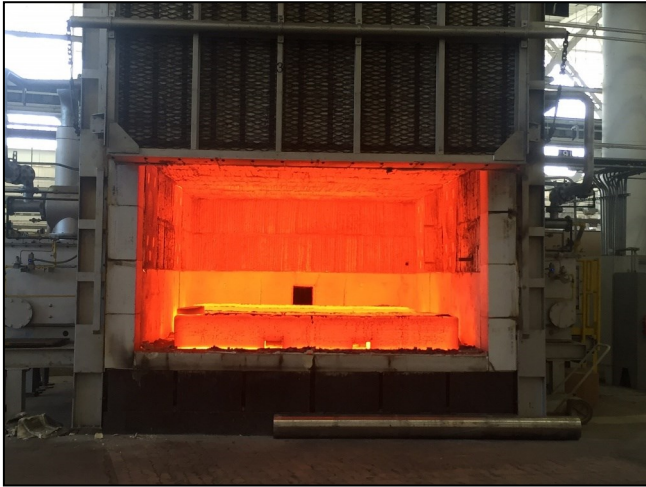




PRODUCT INNOVATIONS



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 36 months in service





BOX FURNACE



JAMBS

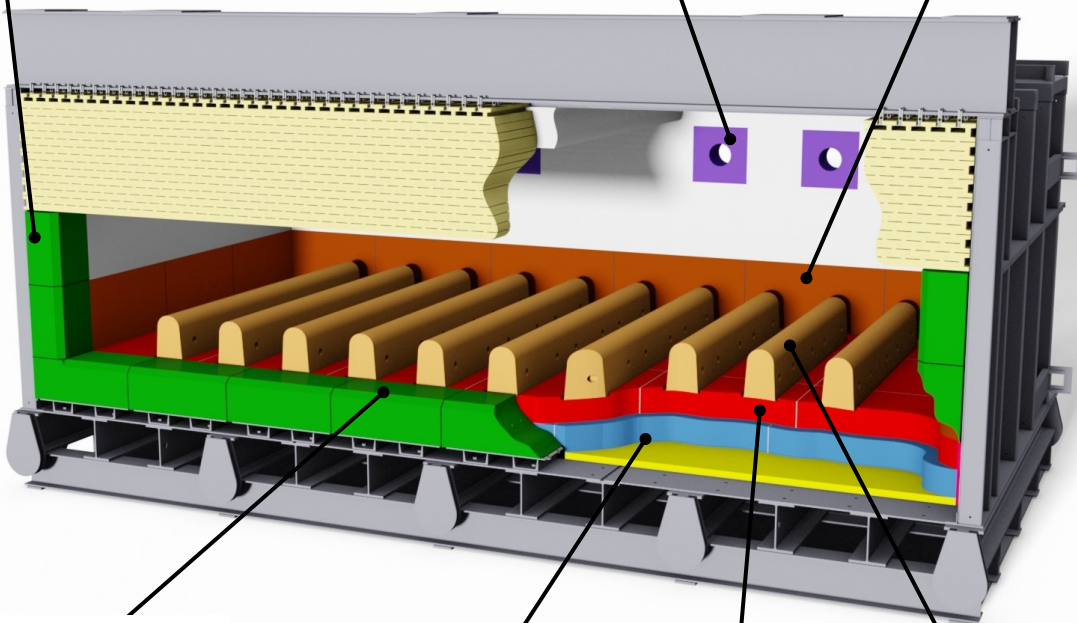
- ARMORMAX® 70SR
- TUFF-FLO 60A
- ALAKAST 50 LC-P+SS
- ALAKAST 50 TSR+SS

BURNERS

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

CURB WALLS

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



SILL

- ARMORMAX® 70SR
- TUFFCRETE® 70X
- ALAKAST 50 TSR
- ALAKAST 98 EZC

SUBHEARTH

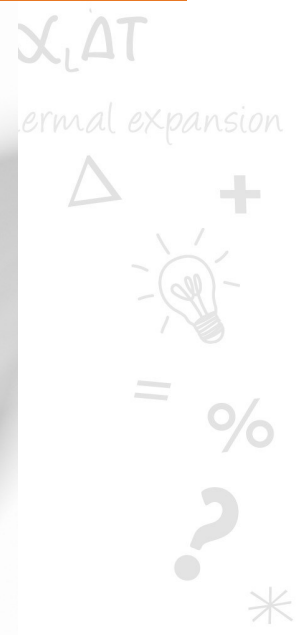
- TUFFCRETE® 47
- MATRILITE 24AC
- INSULMIX 60 LIP
- INSULMIX 80 LIP
- ALAKAST 45-P

HEARTH

- DURACON 32
- TUFF-FLO 60A
- TUFFCRETE® 70X
- ALAKAST 68 LC-P
- ALAKAST 50 LC-P

PIER BLOCKS

- TUFF-FLO FSM
- ARMORMAX® 70SR
- DURACON 32
- ALAKAST 50 TSR
- ALAKAST 98 EZC





CAR BOTTOM FURNACE



PERIMETER

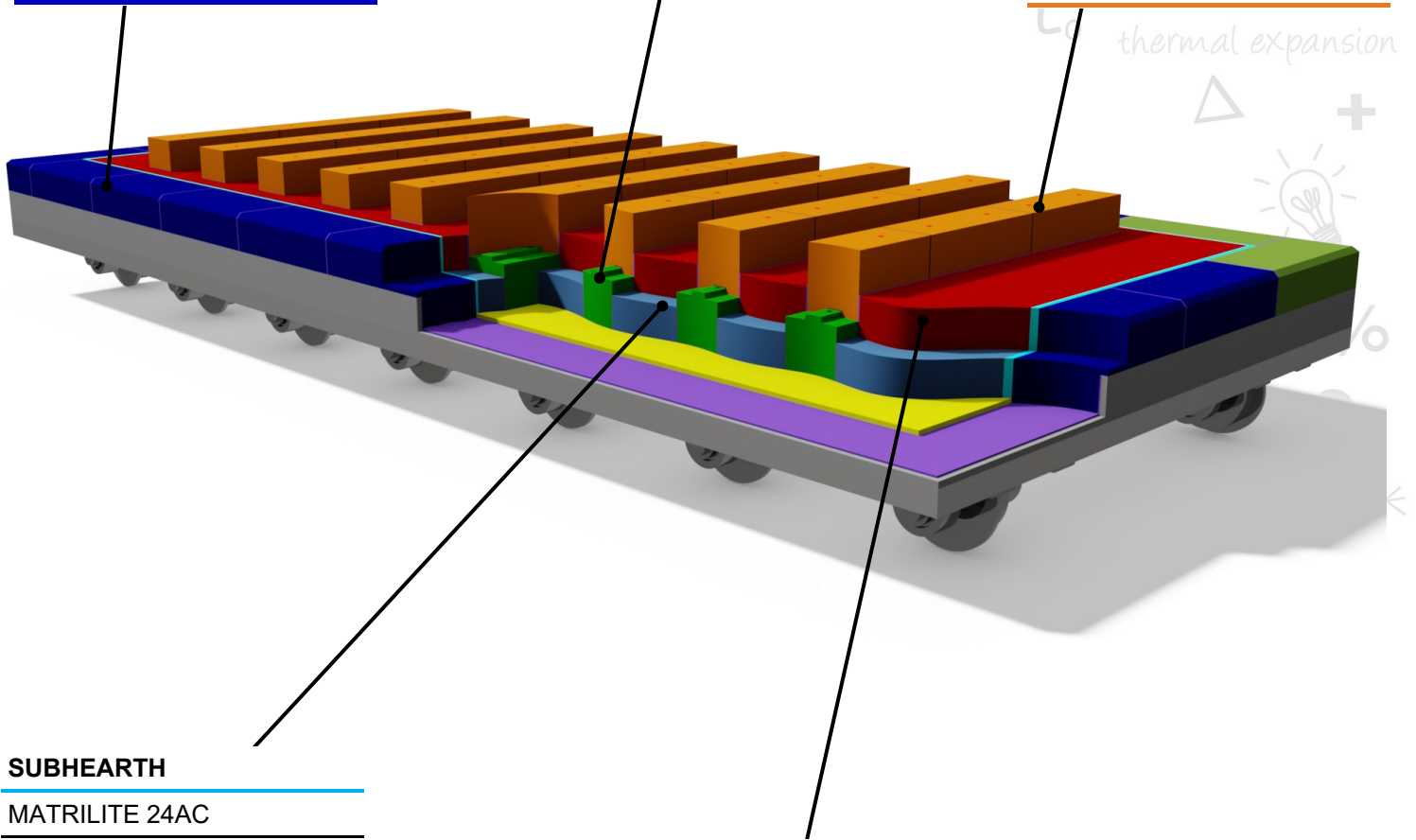
- TUFF-FLO 50
- TUFFCRETE® 70X
- ARMORMAX® 70SR
- ALAKAST 50 TSR
- ALAKAST 50 LC-P

SUB-PIER BLOCKS

- DURACON 28
- TUFF-FLO 50
- ALAKAST 50 LC-P

PIER BLOCKS

- TUFF-FLO FSM
- ARMORMAX® 70SR
- DURACON 32
- ALAKAST 50 TSR
- ALAKAST 98 EZC

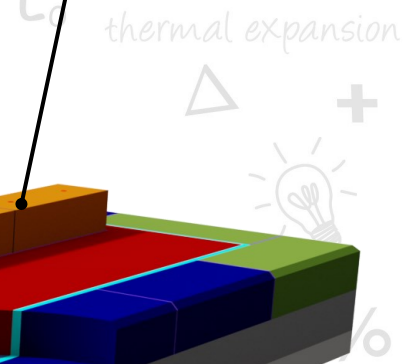


SUBHEARTH

- MATRILITE 24AC
- INSULMIX 60 LIP
- INSULMIX 80 LIP
- DRI-LITE 79AL-M
- ALALITE 2460 PUMP
- ALALITE 2675 PUMP
- SUPER FIRETEMP X BOARD

HEARTH

- DURACON 32
- DRI-VIBE® 434A
- TUFF-FLO 50
- TUFFCRETE® 70X
- ALAKAST 50 LC-P
- ALAKAST 65 LC-P





TIP-UP AND ROTARY HEARTH FURNACE

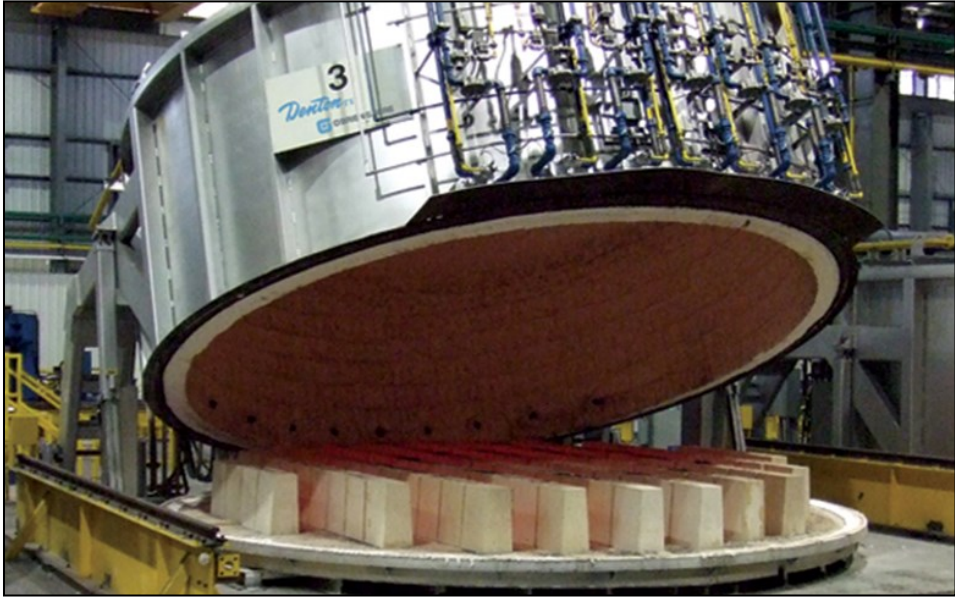
process

global

refractory

research

TIP-UP



HEARTH

- DURACON 32
- DRI-VIBE® 434A
- TUFF-FLO 50
- ALAKAST 50 LC-P

SUBHEARTH

- DRI-LITE® 79AL-M
- MATRILITE 24AC
- INSULMIX 60
- INSULMIX 80
- ALALITE 2460 PUMP
- ALALITE 2675 PUMP

ROTARY HEARTH



HEARTH

- DURACON 32
- TUFF-FLO 60A
- ARMORMAX® 70SR
- ALAKAST 50 LC-P
- ALAKAST 68 LC-P
- ALAKAST 85 LC-P-ES

SUBHEARTH

- MATRILITE 24AC
- INSULMIX 60
- INSULMIX 80
- ALAKAST 45-P



INDUCTION HEATING & PRECAST SHAPES



INDUCTION HEATING



PRODUCTS

- COIL CAST FS /
- COIL CAST FS - FAST

- CAST 217 FS /
- CAST 217 FS FINE

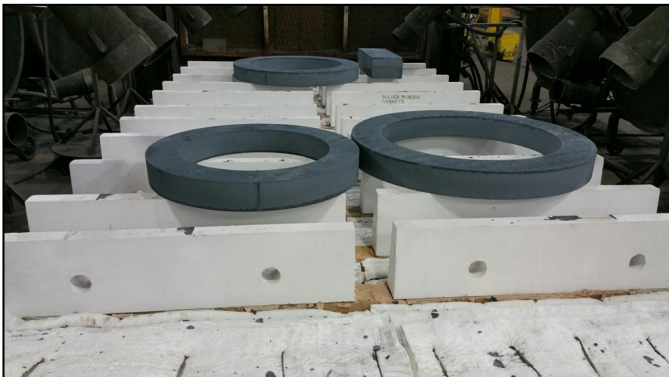
- COIL CAST M

- LCF798 FINE

- COIL CAST 97A

- TUFFLOOR

PRECAST SHAPES



HEARTHES

- DURACON 32

- TUFFCRETE FS

- ARMORMAX® 70SR

- ALAKAST 50 LC-P

- ALAKAST 68 LC-P

CAR PERIMETERS

- TUFF-FLO 50

- TUFF-FLO 60A

- ALAKAST 50 TSR

JAMBS / LINTELS

- ARMORMAX® 70SR

- LCF798A

- ALAKAST 50 LC-P

- DURACON® 32

BURNERS

- LCF798A

- ALAKAST 85 ULC

- KAST TECH 60

- MATRICAST 3110C

CURB WALLS

- TUFF-FLO 50

- ALAKAST 68 LC-P

- BLAST KAST 70 LC

- TUFFCRETE 47

- DURACON 32

PIER BLOCKS

- TUFF-FLO FSM

- DURACON 32

- ALAKAST 65 LC-P

- ARMORMAX® 70SR

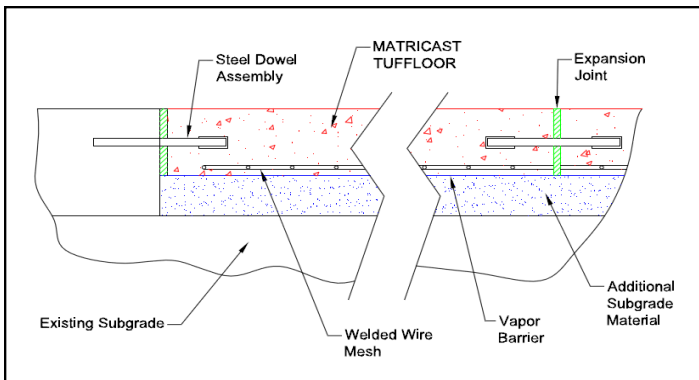
in our element FLOORING

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



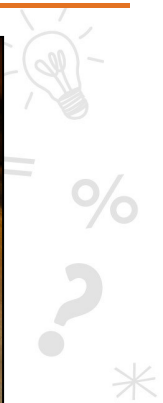
DRI-VIBE®	Dry vibratable, heat-set refractories for restoring hearth hot face.
TUFFCRETE®	Shotcrete refractories ranging from 50% to 70% alumina.
MATRIGUN	Gunite refractories ranging from super duty to 70% alumina.
MATRIPHOS	Phosphate-bonded plastics for repairing most types of refractory surfaces.
QUICK-FIRE®	Two component phosphate bonded castables & gun mixes. Product ranges from 55% - 90% alumina.
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.



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)
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 3A	40.0	39.1	1.18 g/cm ³ (74 lb./ft ³)	1315°C (2400°F)
INSULMIX 60 LIP	39.7	47.7	1.02 g/cm ³ (64 lb./ft ³)	1370°C (2500°F)
INSULMIX 80 LIP	42.4	46.8	1.28 g/cm ³ (80 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)
MATRILITE 24AC	41.8	39.3	1.23 g/cm ³ (77 lb./ft ³)	1345°C (2450°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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