



# REFRACTORIES

— FOR —

# SUGAR MILLS



Global **Refractory** Solutions



# ABOUT ALLIED

refractory

Allied Mineral Products is a world leader in design and manufacture of monolithic refractories. Our presence spans across 100 countries with strong sales and service teams in the foundry, aluminum, steel, heat treat/forge, cement, power generation, minerals processing. Allied offers leading refractory solutions thanks in part to the following:

- New product development programs
- ISO certified since 1985, quality focus since 1961
- Extensive product selection (more than 1,500)
- Manufacturing facilities in 8 countries
- 145+ international sales representatives located in more than 35 countries.

Our success is based on our dedication to *Being There Worldwide with Refractory Solutions*. Allied's product line includes innovative refractory technology and longstanding refractory alternatives.

Producing quality, consistent products is top priority at Allied and we have the products to meet your refractory needs. Our 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 located at all our manufacturing facilities.



Corporate Headquarters



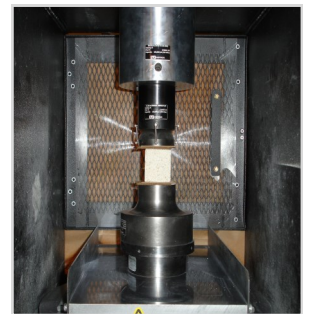
Variety of packaging



Research and Technology Center



Contact Tests



Strength Testing



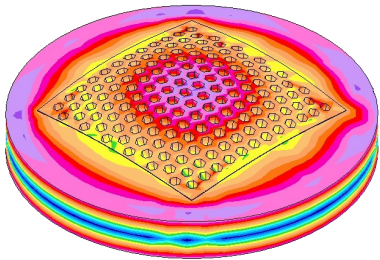
# ENGINEERING & RESEARCH

Allied's manufacturing facilities, worldwide sales and service networks and extensive product line enable us to provide customers with the best refractory solutions and fast response times. We begin by gaining a detailed understanding of your specific needs. Our team evaluates operating criteria and physical design parameters to create a detailed engineered design encompassing:

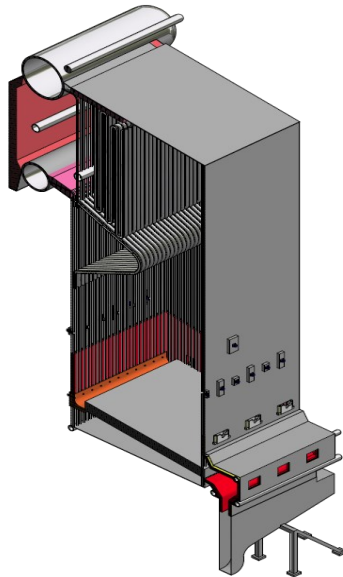
- Patented technologies
- Optimized product zoning
- Thermal models to optimize and validate designs
- Proven safety lining system designs
- Unique installation properties and techniques
- Leading edge refractory system designs

Allied is 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. We're an innovative, technology-driven supplier devoted to providing customized refractory solutions for various 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



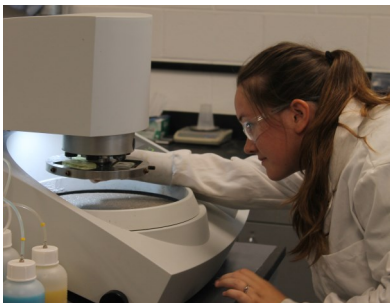
FEA Thermal Analysis



Refractory Design



Flow Testing





# BOILERS

Allied has over 30 years of experience in the power generation industry. We design products based on the common issues with boiler usage and the severity of them. Globally, our results are excellent in carbon based fuels and many types of waste; including, biomass, municipal and construction trash. We offer products for a range of boilers used in agro-industries including:

- Pin hole
- Fluidized bed
- Travelling grate
- Dumping grate
- Cyclones
- Simple combustion

The products below are a small selection of the wide range of products available for boilers. Product recommendations can vary by type of boiler, fuel mix, installation preferences.

Allied also sells a wide range of complementary products including anchors, insulating materials, and equipment.

## COMBUSTION CHAMBER

- TUFF-FLO 47
- FAST-TURN® 47
- TUFF-FLO 62 M
- TUFF-FLO 608
- TUFF-FLO 80 SiC
- GUNCAST® 28 LI
- CASTMAX® 30 S HR

## NOSE OF ASH DISCHARGE

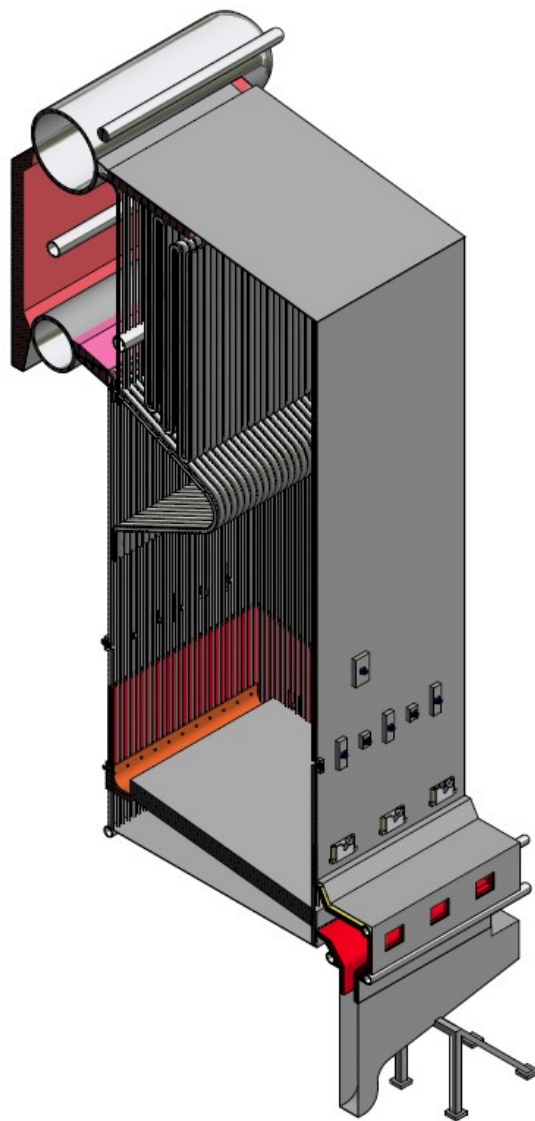
- RAM MAX® 45 AS
- ECONOCAST® 26TR

## ASH HOPPER

- TUFF-FLO 47
- FAST-TURN® 47
- TUFF-FLO 608
- CASTMAX® 30 S HR

## REPAIRS

- QUICK-FIRE® PATCH B
- QUICK-FIRE® PATCH M



## ROOF

- ECONOCAST® 24, 26, 27
- TUFF-FLO 47
- Precast Shapes

## DOORS

- TUFF-FLO 47
- ECONOCAST® 26 TR
- RAM MAX® 45 AS

## BURNERS, AIR DUCTS, CHUTES

- LCF 798A
- ARMORMAX® 70SR

## EXPOSED TUBE PROTECTION

- ECONOSET® SIC 85
- ECONORAM® SIC 75 TR
- ECONORAM® SIC 85

## PROTECTIVE REFRACTORY COATINGS

- MATRIKOTE 90 AC
- MINRO-Z WASH 77 Z



# TECHNICAL DATA & SOLUTIONS

Product	Chemistry			CCS (psi)	Material Required		Installation
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SiC	815°C / 1500°F	g/cm <sup>3</sup>	lb/ft <sup>3</sup>	
TUFF-FLO 47	47.1	46.5	-	11660	2.26	141	Pumping, Vibration
TUFF-FLO 62 M	62.4	32.9		14000	2.48	155	Vibration, Self-flow, Pump
FAST-TURN® 47	47.1	46.5	-	11000	2.18	136	Vibration, Self-flow, Pump, Shot
TUFF-FLO 80 SIC	10.5	6.2	80.1	16700	2.52	157	Pumping, Vibration
TUFF-FLO 608	62.7	24.6	7.4	23100	2.47	154	Pumping, Self-flow, Vibration
GUNCAST® 28 LI	48.0	41.4	-	7350	1.99	124	Pneumatic gunning
CASTMAX® 30 S HR	49.8	35.8	8.8	117-145	2.37-2.43	148-152	Vibration
GUNMAX® M	54.0	40.0		5000-7000	2.10-2.16	131-135	Repairs
QUICK-FIRE® PATCH B	78.5	11.2	-	3060	2.53	158	Vibration, Hand Pack, Trowel
QUICK-FIRE® PATCH M	63.4	26.5	-	4060	2.33	145	Vibration, Hand Pack, Trowel
ECONOCAST® 26TR	-	47.0	-	-	1.76-1.83	110-114	Vibration, Hand Pack, Trowel
RAM MAX® 45 AS	42.2	52.7	-	-	2.24-2.33	140-146	Pneumatic ram
ECONORAM® SIC 75 TR	17.0	4.0	74.0	-	2.56	160	Trowel
ECONORAM® SIC 85	85	-	-	-	-	-	Trowel
LCF 798A	61.5	35.0	-	1000	2.64	165	Casting, Vibration

## Common Refractory Failure Modes

Application	Thermal Shock	Abrasion	Chemical Attack	Mechanical Abuse	Tube Movement
Opposite wall ash discharge	Severe	Severe	Severe	Severe	Poor
Side walls, back walls	Severe	Poor	Severe	Severe	Severe
Doors	Severe	Severe	Poor	Poor	Poor
Nose of ash discharge	Severe	Severe	Severe	Severe	Poor
Burners, Air Ducts, Chutes	Severe	Poor	Poor	Poor	Poor
Roof	Severe	Poor	Poor	Poor	Poor

Key: Poor Severe



# BRICKS VS MONOLITHICS

Factor	Monolithics	Bricks	Explanation
Cost	Green	Yellow	The product cost of a monolithic/concrete lining is often less than a brick lining. Total installation cost is often a more cost effective option due to faster installation and less manpower required.
Performance	Green	Yellow	Improved performance due to consistent surface with fewer joints/weak points, anchored to steel structure. Ability to utilize a wide range of compositions not available in bricks and zone products according to unique demands of each refractory utilizing area. Repairs are fewer, faster and easier.
Installation	Green	Yellow	Wide variety of installation methods depending on product. Adaptable to all shapes and areas. <i>Installation time of monolithics vs bricks:</i> <ul style="list-style-type: none"> <li>Gunning or shotcreting decreases time by up to 75%.</li> <li>Cast in place or pumped decreases time by up to 25%</li> </ul>
Dry out & sintering	Yellow	Green	Many monolithics require water or other liquid binder which requires a dry-out and sintering period.
Scheduled Maintenance	Green	Red	Maintenance for monolithic linings are much easier and faster as repair is limited strictly to area damaged or worn versus replacing entire areas of brick.
Emergency Maintenance	Green	Red	Chemically bonded products can be installed, dried out and sintered in the same day. Difficult to find skilled workers in a short amount of time, especially in rural areas. Unskilled labor can easily install emergency maintenance products.
Manufacturing Time	Green	Red	Manufacturing of monolithic products is almost immediate and with shorter lead times. Bricks often require a longer manufacturing process, longer lead times and depend on inventory. Can easily substitute products.

Key: Excellent OK Poor





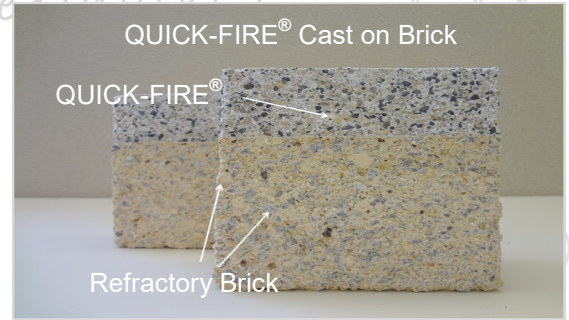
# INNOVATIVE TECHNOLOGY

The **QUICK-FIRE®** product family is designed for use in a wide variety of applications. Our technology utilizes a liquid phosphate bonding system improving performance and reducing downtime.

The **QUICK-FIRE® ONE** product line is the single component version of QUICK-FIRE® with the similar versatile properties and fast installation times.

## Product line benefits:

- Rapid dry-out characteristics
- Designed to bond to existing refractory
- Fast setting properties
- Excellent non-wetting characteristics
- Superior thermal shock resistance
- Available in gunning formulations
- Long shelf life (2 years+)
- Global availability



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

thermal expansion



**BEFORE:** Competitive material



**AFTER:** QUICK-FIRE® PATCH M



**BEFORE:** Installation of QUICK-FIRE® PATCH M



**AFTER:** QUICK-FIRE® PATCH M



# GUNNING TECHNOLOGY

process  
refractory

## Efficient installation for industrial applications

Allied has developed a comprehensive and innovative line of monolithic refractories for the Industrial industry. These products are subjected to the strictest quality standards in the industry and all gunning and shotcreting materials undergo in-lab trials during development.

Our pumping mixes can reach a vertical height of 340 ft (103 m) with 460 ft (140 m) of pipe and hose allowing successful installation throughout the tower.





## Blasch Precision Ceramics + Allied Mineral Products Partnership

Precision ceramic solutions replace steel or iron castings with exact refractory castings selected based on the application. Refractory materials must be chemically and physically stable at high temperatures. Depending on the operating environment, they must also be resistant to thermal shock and abrasion, chemically inert, and have specific ranges of thermal conductivity and expansion.

### Benefits:

- Superior performance (often 3-5 times greater)
- Minimal maintenance
- Lighter weight (up to 1/3 of steel)
- Smoother finish, more efficient
- Higher temperature limits
- Exact replacement



### Blasch SiClone™ Mechanical Dust Collectors

Blasch high performance ceramic dust collector components are engineered to mount in place of existing iron or steel components. Blasch's highly abrasion-resistant refractory compositions far outlast traditional cast iron or Nihard, resulting in optimal separation efficiencies, maximum cyclone life and elimination of maintenance and dramatically lower replacement costs compared with metallic components.



### CeraLine™ Lined Elbows, Pipe, and Spool Linings

Available as a turnkey unit with steel pipe and flanges. Blasch precast tight tolerance shapes are used to line pipe with diameters ranging from 1/2 inch to several feet. CeraLine's engineered joints and smooth bore eliminate premature wear and interrupted flow. It also reduces pressure drop and flow restriction.



### Tubular Air Preheater Inserts

Reliable wear-resistant inserts are designed for air pre-heater tubes, both in the inlet and outlet ends. Engineered with thin walls, flanges and precise tolerances, these inserts protect the weld integrity and tube surface while absorbing abrasion from the ash. Blasch inserts are custom-designed and available in several abrasion-resistant materials. Blasch inserts can be installed to seal existing holes or in new tubes, allowing maintenance engineers to keep the plant online and minimize repairs of tubes.



### Blasch Burner and CFB Nozzles

Available in several materials that thrive in oxidizing or reducing environments, burner nozzles help improve heat cycles while reducing energy consumption.

### Blasch Custom Shapes

Blasch's reliable, high-performance ceramic shapes are custom engineered to replace monolithic hexmesh structures or metallic fabrications. Superior dimensional control results in closely toleranced net shape parts like valves, sleeves, nozzles, elbows, impact pads, thermowell sleeves, injectors and other ancillary parts that minimize process variability and maintenance.





# GLOBAL CAPABILITIES

- 12 MANUFACTURING FACILITIES**
- 160+ INTERNATIONAL SALES REPRESENTATIVES**
- 3 RESEARCH AND TECHNOLOGY FACILITIES**
- SALES ACTIVITY IN OVER 100 COUNTRIES**
- 7 PRECAST SHAPE FACILITIES**



Global **Refractory** Solutions

## Headquarters

### Allied Mineral Products, LLC

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