BLU-RAM® HS HW
TS LES30955 MX3 MOLD

Monolithic Refractory Product Information

Revision: G.00

Date: 09 Sep 2008

BLU-RAM® HS HW Plastic is a phos-bonded, mullite-based refractory with properties and performance characteristics comparable to 85% and 90% alumina-containing products . BLU-RAM® HS does not require forms during installation where anchors are present except for flat arch constructions.

Service Temperature:	1704 °C	**Material Required:**	2739 kg/m^3
Typical Water Required:	-	**Maximum Grain Size:**	3 mesh US Sieve

Chemical Analysis

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	$Na_2O + K_2O$	P_2O_5	Other
20.4	1.8	72.3	1.0	1.2	4.0	0.2

Typical Physical Properties

Tested in accordance with International and ASTM Standards

Prefired to (°C)	Bulk Density (kg/m^3)	Cold Crushing Strength (N/mm^2)	Cold Modulus of Rupture (N/mm^2)	Permanent Linear Change (%)
110	2451	15.4	4.2	-0.7
816	2419	25.6	7.4	-0.7
1371	2403	40.2	13.3	-0.4
1593	2307	28	15.5	+1.0

Other Physical Properties

Tested in accordance with International and ASTM Standards

Prefired to (°C)	Apparent Porosity (%)	Thermal Conductivity (W/m.K)	Hot Modulus of Rupture (N/mm^2)	Permanent Volume Change (%)
110	18.3	1.5	-	-0.7
816	18.8	1.33	-	-0.7
1371	19.5	1.31	-	-0.4
1593	22.0	1.38	-	-

Formerly:

Drying & Firing:	LES.1801	Installation Method:	N/A	Mixing / Installation:	LES.1301
Shotcreting:	N/A	Pumping:	N/A	MSDS Reference:	LES30955

The physical and/or chemical properties and specifications of the product set forth above represent typical average results obtained in accordance with generally accepted standard test methods conducted under controlled conditions, and are subject to normal manufacturing variations. Vesuvius reserves the right to modify the properties and specifications at any time without prior notice.

BLU-RAM® HS PLASTIC

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Issue date: 10/01/2020 Version: 6.1

SECTION 1: Identification

1.1. Identification

Product form : Mixture

Product name : BLU-RAM® HS PLASTIC

Product code : LES10072

1.2. Recommended use and restrictions on use

Use of the substance/mixture : Steel Industry.
Industrial use

1.3. Supplier

Vesuvius USA
4604 Campbells Run Road
Pittsburgh, PA 15205 - USA
T (412) 788-4441
www.vesuvius.com

1.4. Emergency telephone number

Emergency number : (412) 788-4441
For Chemical Emergency Call
Within USA and Canada: CHEMTREC (800) 424-9300 (USA) - CANUTEC (613) 996-6666 (CANADA)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS US classification

Skin corrosion/irritation, Category 2	H315	Causes skin irritation.
Serious eye damage/eye irritation, Category 2	H319	Causes serious eye irritation.
Carcinogenicity, Category 1A	H350	May cause cancer.

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labelling

Hazard pictograms (GHS US) :

Signal word (GHS US) : Danger

Hazard statements (GHS US) : H315 - Causes skin irritation.
H319 - Causes serious eye irritation.
H350 - May cause cancer.

Precautionary statements (GHS US) : P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P264 - Wash hands, forearms and face thoroughly after handling.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 - If on skin: Wash with plenty of water.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 - If exposed or concerned: Get medical advice/attention.
P321 - Specific treatment (see supplemental first aid instruction on this label).
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P362+P364 - Take off contaminated clothing and wash it before reuse.
P404 - Store in a closed container.
P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

2.3. Other hazards which do not result in classification

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	GHS US classification
Mullite	(CAS-No.) 1302-93-8	≥ 50	Not classified
Aluminium Oxide	(CAS-No.) 1344-28-1	≥ 10 – < 50	Not classified
Cristobalite	(CAS-No.) 14464-46-1	≥ 10 – < 25	Carc. 1A, H350
Quartz (SiO2)	(CAS-No.) 14808-60-7	< 5	Acute Tox. 4 (Oral), H302 Carc. 1A, H350
Phosphoric acid	(CAS-No.) 7664-38-2	< 3	Acute Tox. 4 (Oral), H302 Acute Tox. 2 (Inhalation:vapour), H330 Skin Corr. 1, H314 Eye Dam. 1, H318

Full text of hazard classes and H-statements : see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing.

First-aid measures after skin contact : Wash skin with plenty of water. Take off contaminated clothing. If skin irritation occurs: Get medical advice/attention.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

First-aid measures after ingestion : Call a poison center or a doctor if you feel unwell.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after skin contact : Irritation.

Symptoms/effects after eye contact : Eye irritation.

4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Water spray. Dry powder. Foam.

5.2. Specific hazards arising from the chemical

Hazardous decomposition products in case of fire : Phosphorus oxides. Metallic oxides.

5.3. Special protective equipment and precautions for fire-fighters

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Mechanically recover the product. Notify authorities if product enters sewers or public waters.

Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Ensure good ventilation of the work station. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Take all necessary technical measures to avoid or minimize the release of the product on the workplace. Limit quantities of product at the minimum necessary for handling and limit the number of exposed workers. Provide local exhaust or general room ventilation. Wear personal protective equipment. Floors, walls and other surfaces in the hazard area must be cleaned regularly. Avoid contact with skin and eyes.

Hygiene measures : Separate working clothes from town clothes. Launder separately. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store locked up. Store in a well-ventilated place. Keep cool.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

BLU-RAM® HS PLASTIC	
No additional information available	
Aluminium Oxide (1344-28-1)	
USA - OSHA - Occupational Exposure Limits	
Local name	alpha-Alumina
OSHA PEL (TWA) (mg/m³)	15 mg/m³ (Total dust) 5 mg/m³ (Respirable fraction)
Regulatory reference (US-OSHA)	OSHA Annotated Table Z-1
Cristobalite (14464-46-1)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Silica crystaline - cristobalite
ACGIH TWA (mg/m³)	0,025 mg/m³ (R - Respirable particulate matter)
Remark (ACGIH)	TLV® Basis: Pulm fibrosis; lung cancer. Notations: A2 (Suspected Human Carcinogen)
Regulatory reference	ACGIH 2020
USA - OSHA - Occupational Exposure Limits	
Local name	Cristobalite (Silica: Crystalline)
Remark (OSHA)	Table Z-3. For OSHA PEL (TWA): Use ½ the value calculated from the count or mass formulae for quartz. CAS No. source: eCFR Table Z-1.
Regulatory reference (US-OSHA)	OSHA Annotated Table Z-3 Mineral Dusts
Quartz (SiO2) (14808-60-7)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Silica crystaline - quartz
ACGIH TWA (mg/m³)	0,025 mg/m³ (R - Respirable particulate matter)
Remark (ACGIH)	TLV® Basis: Pulm fibrosis; lung cancer. Notations: A2 (Suspected Human Carcinogen)
ACGIH chemical category	Suspected Human Carcinogen
Regulatory reference	ACGIH 2020
USA - OSHA - Occupational Exposure Limits	
Local name	Quartz (Respirable) (Silica: Crystalline)
OSHA PEL (TWA) (mg/m³)	50 µg/m³ (Respirable crystalline silica)

Remark (OSHA)	Table Z-3. For OSHA PEL (TWA): Use formulas: (250 / (%SiO2+5)) for mppcf and (10 mg/m3 / (%SiO2+2)) for mg/m3. CAS No. source: eCFR Table Z-1.
Regulatory reference (US-OSHA)	OSHA Annotated Table Z-3 Mineral Dusts
USA - IDLH - Occupational Exposure Limits	
US IDLH (mg/m³)	50 mg/m³ (respirable dust)
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL (TWA) (mg/m³)	0,05 mg/m³ (respirable dust)

Mullite (1302-93-8)	
No additional information available	

Phosphoric acid (7664-38-2)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Phosphoric acid
ACGIH TWA (mg/m³)	1 mg/m³
ACGIH STEL (mg/m³)	3 mg/m³
Remark (ACGIH)	TLV® Basis: URT, eye, & skin irr
Regulatory reference	ACGIH 2020
USA - OSHA - Occupational Exposure Limits	
Local name	Phosphoric acid
OSHA PEL (TWA) (mg/m³)	1 mg/m³
Regulatory reference (US-OSHA)	OSHA Annotated Table Z-1
USA - IDLH - Occupational Exposure Limits	
US IDLH (mg/m³)	1000 mg/m³
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL (TWA) (mg/m³)	1 mg/m³
NIOSH REL (STEL) (mg/m³)	3 mg/m³

8.2. Appropriate engineering controls

Appropriate engineering controls : Ensure good ventilation of the work station.

Environmental exposure controls : Avoid release to the environment.

8.3. Individual protection measures/Personal protective equipment

Hand protection:

Protective gloves

Eye protection:

Safety glasses

Skin and body protection:

Wear suitable protective clothing

Respiratory protection:

[In case of inadequate ventilation] wear respiratory protection.

Personal protective equipment symbol(s):

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Solid

Colour : Mixture contains one or more component(s) which have the following colour(s):
Blue white Colourless clear

Odour	:	Pungent
Odour threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Freezing point	:	Not applicable
Boiling point	:	No data available
Flash point	:	Not applicable
Relative evaporation rate (butylacetate=1)	:	No data available
Flammability (solid, gas)	:	Non flammable.
Vapour pressure	:	No data available
Relative vapour density at 20 °C	:	No data available
Relative density	:	No data available
Solubility	:	No data available
Partition coefficient n-octanol/water (Log Pow)	:	No data available
Auto-ignition temperature	:	Not applicable
Decomposition temperature	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive limits	:	Not applicable
Explosive properties	:	No data available
Oxidising properties	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

No additional information available

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral)	:	Not classified
Acute toxicity (dermal)	:	Not classified
Acute toxicity (inhalation)	:	Not classified

Aluminium Oxide (1344-28-1)	
LD50 oral rat	> 5000 mg/kg

Quartz (SiO2) (14808-60-7)	
ATE US (oral)	500 mg/kg bodyweight

Phosphoric acid (7664-38-2)	
LD50 oral rat	1530 mg/kg
LD50 dermal rabbit	2740 mg/kg

Phosphoric acid (7664-38-2)	
LC50 Inhalation - Rat	> 850 mg/m³ (Exposure time: 1 h)
ATE US (oral)	1530 mg/kg bodyweight
ATE US (dermal)	2740 mg/kg bodyweight
ATE US (vapours)	0,5 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.
Serious eye damage/irritation : Causes serious eye irritation.
Respiratory or skin sensitisation : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : May cause cancer.

Quartz (SiO2) (14808-60-7)	
IARC group	1 - Carcinogenic to humans
National Toxicity Program (NTP) Status	Known Human Carcinogens
In OSHA Hazard Communication Carcinogen list	Yes

Reproductive toxicity : Not classified

STOT-single exposure : Not classified

STOT-repeated exposure : Not classified

Aspiration hazard : Not classified
Viscosity, kinematic : No data available

Symptoms/effects after skin contact : Irritation.
Symptoms/effects after eye contact : Eye irritation.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms nor to cause long-term adverse effects in the environment.

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Not applicable

Transportation of Dangerous Goods

Not applicable

Transport by sea

Not applicable

Air transport

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

Aluminium Oxide (1344-28-1)

Listed on the United States TSCA (Toxic Substances Control Act) inventory
Subject to reporting requirements of United States SARA Section 313

Quartz (SiO2) (14808-60-7)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

Phosphoric acid (7664-38-2)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

CERCLA RQ	5000 lb

15.2. International regulations

CANADA

Aluminium Oxide (1344-28-1)

Listed on the Canadian DSL (Domestic Substances List)

Quartz (SiO2) (14808-60-7)

Listed on the Canadian DSL (Domestic Substances List)

Phosphoric acid (7664-38-2)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Aluminium Oxide (1344-28-1)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Quartz (SiO2) (14808-60-7)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Phosphoric acid (7664-38-2)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National regulations

Aluminium Oxide (1344-28-1)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on KECL/KECI (Korean Existing Chemicals Inventory)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on the TCSI (Taiwan Chemical Substance Inventory)

Quartz (SiO2) (14808-60-7)
Listed on IARC (International Agency for Research on Cancer) Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Japanese ISHL (Industrial Safety and Health Law) Listed on KECL/KECI (Korean Existing Chemicals Inventory) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed as carcinogen on NTP (National Toxicology Program) Listed on INSQ (Mexican National Inventory of Chemical Substances) Listed on the TCSI (Taiwan Chemical Substance Inventory)

Phosphoric acid (7664-38-2)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Japanese ISHL (Industrial Safety and Health Law) Listed on KECL/KECI (Korean Existing Chemicals Inventory) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on INSQ (Mexican National Inventory of Chemical Substances) Listed on the TCSI (Taiwan Chemical Substance Inventory)

15.3. US State regulations

No additional information available

SECTION 16: Other information

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Full text of H-statements:

H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H350	May cause cancer.

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.