BRAY PATCH

Ingestion:
Ingestion is unlikely. If ingested, natural gastrointestinal elimination is preferred. Drink extra water. Get medical attention if gastrointestinal symptoms develop, for example, irritation, nausea, vomiting, abdominal pain, and diarrhea.

NOTES TO PHYSICIANS
Decomposition products may include carbon monoxide, carbon dioxide, and oxides of magnesium, aluminum, and silica. Contact with reactive metals (e.g. aluminum) may release hydrogen gas.

5. FIRE FIGHTING MEASURES

Flammable Properties:
Flashpoint: None.
Method: N. App.

Flammable Limits:
Lower Flammable Limit: N. App.
Upper Flammable Limit: N. App.

Autoignition Temperature:
None.

Hazardous Decomposition Products:
Decomposition products may include carbon monoxide, carbon dioxide, and oxides of magnesium, aluminum, and silica.

Extinguishing Media:
Use extinguishing agent suitable for type of surrounding fire.

Fire Fighting Instructions:
See "Extinguishing Media" above.

Unusual Fire and Explosion Hazard:
Contact with reactive metals (e.g. aluminum) may release hydrogen gas.

6. ACCIDENTAL RELEASE MEASURES

Spill Procedures:
Do not walk through spilled material. Shovel into a container for later disposal. Avoid cleanup procedures that may result in water pollution.

7. HANDLING AND STORAGE

Handling and Storage:

Normal conditions of use and application are not expected to release respirable particulates of airborne fibers. Removal of used product, sanding, scraping, or otherwise destroying the integrity of the dried product may result in the release of particulates and fibers. During such operations where fibers could possibly be released, appropriate respiratory protection should be provided as discussed below and/or in Section 8 under Respiratory Protection.

Ceramic fiber should be handled with caution. Care should be taken to minimize the generation of airborne dusts by avoiding the unnecessary disturbance of materials.

Product which has been in service at temperatures above 1800° F will undergo partial conversion to cristobalite, a form of crystalline silica. IARC has classified crystalline silica as a group 2A carcinogen (probable human carcinogen). The amount of cristobalite present will depend on the temperature to which the material was exposed and the length of time it was exposed.

Material exposed to high temperatures becomes more friable and requires extra care in handling to minimize airborne dust generation.

Removal of after service product may result in exposure to a mixture of cristobalite and fiber. Depending on the use of the product, other contaminants may also be present. During the removal process, the exposed material should be frequently misted with water to maintain a slightly wet surface and minimize airborne dust. A surfactant may be added to the water to improve the wetting process. Use only enough water to wet the insulation. Do not allow water to accumulate on floors.

The OSHA permissible exposure limit for cristobalite is 0.05 mg/M^3 (respirable dust)*. The ACGIH threshold limit value (TLV) for cristobalite is 0.05 mg/M^3 (respirable dust) (ACGIH 1994-95). The Carborundum Recommended Exposure Guideline (REG) for refractory ceramic fiber is 1 fiber/cc. Use NIOSH/MSHA approved respiratory protection when airborne exposure limits may be exceeded. The following table outlines the minimum respiratory protection recommended for work with after service product:

Fiber Concentration (after service)	Minimally Acceptable Respiratory Protection
Less than 5 fibers/cc or up to 10 times the OSHA PEL for cristobalite	Half-mask, air-purifying respirator equipped with high-efficiency particulate air (HEPA) filter cartridges.
5-25 fibers/cc or up to 50 times the OSHA PEL for cristobalite	Full facepiece, air-purifying respirator with high-efficiency particulate air (HEPA) filter cartridges or powered air-purifying respirator (PAPR) equipped with HEPA filter cartridges.
Greater than 25 fibers/cc or up to 50 times the OSHA PEL for cristobalite	Full facepiece, positive pressure supplied air respirator.

If airborne fiber or cristobalite concentrations are not known, as minimum protection use a NIOSH/MSHA approved half-mask, air purifying respirator with HEPA filter cartridges.

Following RCF removal, dust-suppressing cleaning methods such as wet sweeping or vacuuming should to clean the work area. If dry vacuuming is used the vacuum must be equipped with a HEPA filter. Compressed

air or dry sweeping should not be used for cleaning. Dust suppressing compounds may be used to clean up light dust.

* OSHA revoked the Final Rule Limits of January 19, 1989 in response to the 11th Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993. See 29 CFR 1910.1000 (58 FR 35338).

Empty Containers:
Product packaging may contain product residue. Do not reuse.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES

Components	OSHA	ACGIH	SUPPLIER
Aluminosilicate fiber (vitreous)	None established.	None established.	1 fiber/cc 8-hr. TWA (Carborundum)*
Silica (amorphous)	6 mg/M³ PEL (< 1% crystalline silica)	10 mg/M³ TLV (total dust, containing < 1% quartz)	
Water	None established.	None established.	
Hydrated magnesium aluminum silicate mineral	5 mg/M³ (resp. dust) 15 mg/M³ (total dust) PEL, an PNOR	10 mg/M³ (total dust) TLV, as PNOC	

* No OSHA or ACGIH exposure limits have been established for these materials. Pending the results of long-term health effects studies, airborne exposures should be controlled at or below the Carborundum Recommended Exposure Guidelines listed above.

OSHA revoked the Final Rule Limits of January 19, 1989 in response to the 11th Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993. See 29 CFR 1910.1000 (58 FR 35338).

ENGINEERING CONTROLS

PERSONAL PROTECTION EQUIPMENT

Respiratory Protection:
Properly designed and operated engineering controls are the most effective methods for minimizing airborne dust and fiber. If exposures exceed our Recommended Exposure Guideline of 1 fiber/cc of air (8-hour TWA) and engineering controls are not feasible, respiratory protection (as described below) must be used. Respiratory protection must also be used if respiratory irritation is experienced, when airborne concentrations are unknown, or the material has been exposed to temperatures greater than 982°C (1800°F) (see Section 7 - Handling and Storage). When handling RCF products in monitored areas, Carborundum recommends that NIOSH/MSHA approved respirators be worn as outlined in the following table:

Concentration (8-hour TWA)	Minimum Acceptable Respirator Type
0-1 fiber/cc	Optional disposable dust respirator.
1-5 fibers/cc	Half-mask, air-purifying respirator equipped with high-efficiency particulate air (HEPA) filter cartridges.
5-25 fibers/cc	Full facepiece, air-purifying respirator with high-efficiency particulate air (HEPA) filter cartridges or powered air-purifying respirator (PAPR) equipped with HEPA filter cartridges.
Greater than 25 fibers/cc	Full facepiece, positive pressure supplied air respirator.

If airborne fiber levels are unknown, as minimum protection use half-mask air-purifying respirator equipped with high-efficiency particulate air (HEPA) filter cartridges. If respirators are used, a respiratory protection program, as defined in OSHA regulations, must be established (See 29 CFR 1910.134).

Skin Protection:
Wear gloves, head coverings and full body clothing as necessary to prevent skin irritation. Washable or disposable clothing may be used. Do not take unwashed clothing home. Work clothes should be washed separately from other clothing and the washing machine rinsed thoroughly following use. Inform the launderer of the proper procedures. Store work clothes and street clothes separately to prevent contamination.

Eye Protection:
Wear safety glasses or chemical goggles to prevent eye contact. Contact lenses should not be worn unless chemical goggles are also used and care is taken not to touch the eyes with contaminated body parts or materials. Have eye washing facilities readily available where eye contact can occur.

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point:	N. App.	% Solubility in Water:	N. App.
Melting Point:	1760°C (3200°F)	Specific Gravity:	2.73
Vapor Pressure:	N. App.	pH:	N. App.
Vapor Density (Air=1):	N. App.	Octanol/Water Partition Coefficient:	N. App.
% Volatile:	N. App.	Evaporation Rate (water=1):	N. App.
Viscosity:	N. App.		
Molecular Weight:	N. App.		
Molecular Formula:	$Al_2O_3.SiO_2$ (Amorphous)		

Odor and Appearance: Off-white putty like material with no odor.

10. STABILITY AND REACTIVITY

Chemical Stability:
Stable under conditions of normal use.

Incompatibility:
Incompatible with hydrofluoric acid, phosphoric acid, concentrated alkali, and strong oxidizers.

Conditions to Avoid:
Contact with reactive metals (e.g. aluminum) may release hydrogen gas.

Hazardous Decomposition Products:
Decomposition products may include carbon monoxide, carbon dioxide, and oxides of magnesium, aluminum, and silica.

Hazardous Polymerization:
N. App.

11. TOXICOLOGICAL INFORMATION

The existing toxicology and epidemiology data bases for RCFs are still preliminary. Carborundum is continuing to support the necessary investigations and will make all data available to interested parties. Information will be updated as studies are completed and reviewed. The following is a review of the results to date:

EPIDEMIOLOGY
At this time there are no known published reports demonstrating negative health outcomes of workers exposed to refractory ceramic fiber (RCF). Epidemiologic investigations of RCF production workers are ongoing.

The preliminary evidence, obtained from employees in RCF manufacturing facilities, is as follows:

1) There is no evidence of any fibrotic lung disease (interstitial fibrosis) whatsoever on x-ray.

2) There is no evidence of any lung disease among those employees exposed to RCF that had never smoked.

3) A statistical "trend" was observed in the exposed population between the duration of exposure to RCF and a decrease in some measures of pulmonary function. These observations are clinically insignificant. In other words, if these observations were made on an individual employee, the results would be interpreted as being within the normal range.

4) Pleural plaques (thickening along the chest wall) have been observed in a small number of employees who had a long duration of employment. There are several occupational and non-occupational causes for pleural plaque. It should be noted that plaques are not "pre-cancer" nor are they associated with any measurable effect on lung function.

TOXICOLOGY
A number of studies on the health effects of inhalation exposure of rats and hamsters are available. Rats were exposed to RCF in a series of lifetime nose-only inhalation studies. The animals were exposed to 30, 16, 9, and 3 mg/m^3, which corresponds with approximately 200, 150, 75, and 25 fibers/cc.

Animals exposed to 30 and 16 mg/m^3 were observed to have developed a pleural and parenchymal fibrosis; animals exposed to 9 mg/m^3 had developed a mild parenchymal fibrosis; animals exposed to the lowest dose were found to have had the response typically observed any time a material is inhaled into the deep lung. While a statistically significant increase in lung tumors was observed following exposure to the highest dose, there was no excess lung cancers at the other doses. Two rats exposed to 30 mg/m^3 and one rat exposed to 9 mg/m^3 developed mesotheliomas.

The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made vitreous fibers (including ceramic fiber, glasswool, rockwool, and slagwool) in 1987. IARC classified ceramic fiber, fibrous glasswool and mineral wool (rockwool and slagwool) as possible human carcinogens (Group 2B).

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:
None.

Distribution:
None.

Chemical Fate Information:
None.

13. DISPOSAL CONSIDERATIONS

Disposal:
As purchased, this product, when discarded or disposed, is not a listed or characteristic hazardous waste according to Federal regulations (40 CFR 261). Check local, regional, state or provincial regulations for applicable requirements for disposal. Any processing, using, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under Federal regulations, it is the generator's responsibility to determine if a waste is a hazardous waste.

Empty Containers:
Product packaging may contain product residue. Do not reuse.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

BILL OF LADING DESCRIPTION (49 CFR 172.202): FIBERFRAX® QF-180 (NON-REGULATED)

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA):
As purchased, releases of this product to the environment are not reportable under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA - 40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA - 40 CFR 355). Check local, regional, state or provincial regulations for specific release reporting requirements.

Constituent	RQ in Pounds
No ingredients listed in this section	

Clean Water Act (CWA):

This product, as supplied, contains the following substances which are regulated pollutants under the Clean Water Act (40 CFR 122.21 & 122.42 with reference to Appendix D, Tables II-V). Facilities must notify the appropriate permitting agency prior to introducing this product into its storm water and process waste water discharges.

Chemical Name
Aluminum, total, as aluminosilicate (vitreous) fiber
Magnesium, total as magnesium silicate
Aluminum, total as aluminum silicate

Clean Air Act (CAA):

This product, as supplied, contains the following substances regulated as hazardous air pollutants under Section 112 of the Clean Air Act Amendments of 1990.

Chemical Name
No ingredients listed in this section

Toxic Substances Control Act (TSCA):

This product is manufactured in compliance with TSCA. While refractory ceramic fiber has been assigned a CAS number, it is a simple mixture and therefore not required to be listed on the TSCA inventory.

This product contains refractory ceramic fiber and is subject to EPA Section 12(b) Export Notification Regulation.

Superfund Amendments and Reauthorization Act (SARA) Title III Information:

SARA Hazard Category:

Listed below are the hazard categories for the Superfund Amendments and Reauthorization Act (SARA) Section 311/312 (40 CFR 370):

Immediate Hazard:	-	Fire Hazard:	-	Reactivity Hazard:	-
Delayed Hazard:	X	Pressure Hazard:	-		

SARA 313 Information:

This product contains the following toxic chemical(s) subject to the annual reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) Section 313 (40 CFR 372):

Chemical Name	CAS Number	Concentration
No ingredients listed in this section		

SARA 302/311/12 Information:

This product contains the following extremely hazardous substances subject to the notification and inventory reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) Section 302 (40 CFR 355) and Section 311/312 (40 CFR 370) respectively.

Chemical Name	CAS Number	Concentration
No ingredients listed in this section		

STATE REGULATIONS

California:

This product contains the following substance(s) listed by the State of California on Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986:

Chemical Name	CAS Number
Ceramic fibers (airborne particles of respirable size)	142844-00-6

Massachusetts:
This product contains the following chemical(s) which are listed as an extraordinarily hazardous substance as defined in Massachusetts Right-to-Know Law, Department of Health, Chapter 105, Section 670.005:

Chemical Name	CAS Number
No ingredients listed in this section	

Pennsylvania:
This product contains the following chemical(s) which are listed as a special hazardous substance as defined in Pennsylvania Right-to-Know Law, Section 3800:

Chemical Name	CAS Number
No ingredients listed in this section	

INTERNATIONAL REGULATIONS

Canadian Workplace Hazardous Materials Information System (WHMIS):
The following Canadian Workplace Hazardous Materials Information System (WHMIS) categories apply to this product:

Compressed Gas:	-	Flammable/Combustible:	-	Oxidizer:	-	Acutely Toxic:	-
Other Toxic Effects:	X	Biohazardous:	-	Corrosive:	-	Dangerously Reactive:	-

Canadian Environmental Protection Act (CEPA):
This product contains the following chemical(s) which are listed on the Domestic Substances List:

Chemical Name	CAS Number
Aluminum oxide	1344-28-1
Silica, amorphous, fumed	7631-86-9
Silica, amorphous, fumed	7631-86-9

This product contains the following chemical(s) which are listed on the Non-Domestic Substances List:

Chemical Name	CAS Number
Smectite-group minerals	12199-37-0

16. OTHER INFORMATION

Revision Summary:

Prepared By: CARBORUNDUM HSEQ DEPARTMENT

DISCLAIMER

The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license.

In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.