

## MATERIAL SAFETY DATA SHEET (RAVABER YAPI ÜRÜNLERİ SAN. VE TİC. A.Ş.)

MSDS Number: 02/17

Date of Issue: June 2017

Date of Last Revision: N/A

### **SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Product Group:** Refractory Ceramic Fiber Product.  
**Material/Product Name(s):** Ravatherm Ceramic Fiber (Bulk, Blankets, Board and Modules) This product contains synthetic vitreous alumino-silicate fibers.  
**Chemical family:** RCF, Ceramic Fibers, Man-made vitreous fiber (MMVF), Man-made mineral fiber (MMMF).  
**Synonyms:**  
**General Uses:** Restricted to “professional users” , for application as thermal insulation, Heat shields and containment, gaskets and expansion joints at temperatures from 1000°C to 1600°C in industrial and domestic furnaces, kilns, boilers and other processes equipment. For application in aerospace, automotive, refining and petrochemical industries, steel industry and a passive Fire protection systems and Fire stops.

**Manufacturer/Supplier:** Ravaber Yapı Ürünleri San. Ve Tic. A.Ş.  
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### **SECTION 2. COMPOSITION**

**Description:** Ravatherm Ceramic fiber in the form of bulk, blanket and blanket modules are made of high temperature refractory ceramic fibers.

Component	CAS* Number	%
Refractory Ceramic Fiber (RFC)	142844-00-6	98 -100
Refractory Ceramic Fiber (RFC) (with zircon)	142844-00-6	

Typical compositions by weight % are as follows: SiO<sub>2</sub> 47 – 56%, Al<sub>2</sub>O<sub>3</sub> 33 – 50%, ZrO<sub>2</sub> <19%

\*Chemical Abstract Service Number (CAS)

Ravaber Yapı Ürünleri San. Ve Tic. A.Ş. recommends an exposure limit of 0.5 fibers per cubic centimeter for respirable fiber as an 8- hour time weighted exposure. After service ceramic fiber may contain crystalline silica in the form of cristobalite; refer to Section 16. Fiber concentration is determined by time weighted air samples collected and analyzed using NIOSH Method 7400 (“B” counting rules).

## SECTION 3. HAZARDS IDENTIFICATION

**Chronic effect:** there has been no increased incidence of respiratory disease in studies examining occupationally exposed workers. In animal studies, long term laboratory exposure to doses hundreds of times higher than normal occupational exposures has produced fibrosis, lung cancer and mesothelioma in rats or hamsters. The fibers used in those studies were specially sized to maximize rodent respirability.

### **Other potential effects:**

- **Target organs:** Respiratory tract (nose and throat), eyes, skin.
- **Respiratory Tract (nose and throat) irritation:** if inhaled in sufficient quantity, may cause temporary, mild mechanical irritation to respiratory tract. Symptoms may include scratchiness of the nose or throat, cough or chest discomfort. These effects are usually temporary
- **Eye irritation:** May cause temporary, mild mechanical irritation. Fibers may be abrasive; prolonged contact may cause damage to the outer surface of the eye.
- **Skin irritation:** May cause temporary, mild mechanical irritation. Exposure may also result in inflammation, rash or itching.
- **Gastrointestinal irritation:** Unlikely road of exposure.
- **Medical conditions aggravated by exposure:** pre-existing medical conditions, including dermatitis, asthma or chronic lung disease may be aggravated by exposure; individuals who have a history of allergies may experience greater amounts of skin and respiratory irritation. These effects are usually temporary

**Hazard classification:** although studies, involving occupationally exposed workers, have not identified any increased of respiratory disease, results from animal testing have been used as the basis for the hazard classification. In each of the following cases, the conclusions are qualitative only and do not rest upon any quantitative analysis suggesting that the hazard actually may occur at current occupational exposure levels.

- The **International Agency for Research on Cancer (IARC)** confirmed in October 2001 that group 2B (possible human carcinogen based on sufficient evidence of carcinogenicity in animals but inadequate evidence in humans) continues to be the appropriate classification for refractory ceramic fiber.
- The Seventh Annual Report on Carcinogens (1994), prepared by the **National Toxicology Program (NTP)**, classified respirable RCF and glass wool as substances reasonably anticipated to be carcinogens.
- The **American Conference of Governmental Industrial Hygienists (ACGIH)** has classified RCF as “A2-Suspected Human Carcinogen”.
- The **Commission of the European Communities (DG XI)** has classified RCF as a substance “that should be regarded as if it is carcinogenic to man”.
- The **State of California**, pursuant to Proposition 65, The Safe Drinking Water and Toxic Enforcement Act of 1996, has listed “Ceramic Fibers (airborne fibers of respirable size)” as a chemical known to the State of California to cause Cancer.
- The **Canadian Workplace Hazardous Materials Information System (WHMIS)** – RCF is classified as Class D2A-Materials Causing Other Toxic Effects.
- The **Hazardous Materials Identification System (HMIS)**

Health 1\*      Flamability 0      Reactivity 0      Personal protection index: X(employer determined)

(\* denotes potential of chronic effects)

## **SECTION 4. FIRST AID MEASURES**

**Eye contact:** In the case of eye contamination flush with water. Always have an eye bath within easy reach of personnel using insulation wool products and ensure that the bath is kept clean. Never rub the eye as this may cause damage. If in doubt seek medical advice.

**Skin contact:** In the case of skin irritation rinse affected areas with soap and water and wash gently. Do not rub or scratch the affected area without water or this may increase the irritation.

**Inhalation:** Remove victim from adverse environment to fresh air and blown nose.

**Ingestion:** Ingestion is an unlikely route of exposure. If ingested in sufficient quantity and victim is conscious, give 1-2 glasses of water or milk. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.

See section 8 for additional measures to reduce or eliminate exposure.

**Notes to the physicians:** Skin and respiratory effects are the result of temporary, mild mechanical irritation; Fiber exposure doesn't result in allergic manifestations.

## **SECTION 5. FIRE FIGHTING MEASURES**

**NFPA Codes:** Flammability: 0 Health: 1 Reactivity: 0 Special: 0

**NFPA unusual hazards:** None.

**Flammable properties:** None.

**Flash Point:** None.

**Hazardous Decomposition Products:** None.

**Unusual fire and exposure hazard:** None.

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

## **SECTION 6. ACCIDENTAL RELEASE MEASURES**

**Spill procedures:** Avoid creating airborne dust. Dust suppressing cleaning methods such as wet sweeping or vacuuming should be use to clean the work area. If vacuuming, the vacuum should be equipped with a high efficiency filter (HEPA). Compressed air or dry sweeping should not be use for cleaning.

## **SECTION 7. HANDLING AND STORAGE**

**Handling:** Handle ceramic fiber carefully. Limit use of power tools unless in conjunction with local exhaust. Use hand tools whenever possible. Frequently clean the work area with HEPA filter vacuum or wet sweeping to minimize the accumulation of debris. Do not use compressed air for clean-up.

**Storage:** store in original container in a dry area. Keep container closed when no in use.

**Empty containers:** Product packaging may contain residues. Do not reuse.

## **SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION**

### **Exposure Guidelines:**

<b>COMPONENT</b>	<b>OSHA PEL</b>	<b>ACGIH TLV</b>	<b>MANUFACTURER REG</b>
Refractory, Fibers, Aluminosilicate.	None established *	0.2 f/cc, 8-Hr. TWA	0.5 f/cc, 8-Hr. TWA**

\*Except of in the state of California, there is no specific regulatory standard for RCF in the U.S. OSHA's "Particulate Not Otherwise Regulate (PNOR)" standard [29 CFR 1910.1000, Subpart Z, Air Contaminants] applies generally – Total dust 15mg/m<sup>3</sup>; respirable fraction 5mg/m<sup>3</sup>. The PEL for RCF in California is 0.2 f/cc, 8-Hr TWA.

\*\* The refractory ceramic fibers Coalition (RCFC) has sponsored comprehensive toxicology and epidemiology studies to identify potential RCF – Related Health Effects [see section 11 for more details], consulted experts familiar with fiber and particle science, conducted a thorough review of the RCF – related specific literature, and further evaluated the data in state – of – the – art quantitative risk assessment. Based on des efforts and in the absence of an OSHA PEL, RCFC has adopted a recommended exposure guideline (REG), as measured under NIOSH method 7400 B. The manufacturers REG is intended to promote occupational health and safety through feasible exposure controls and reductions as determined by extensive industrial hygiene monitoring efforts undertaken voluntary and pursuant to an agreement with the U.S. environmental protection agency.

**Other occupational exposure levels (OEL):** RCF – Related Occupational Exposure Limits vary internationally. Regulatory OEL examples include: Australia – 0.5 f/cc; Austria – 0.5 f/cc; Canada 0.2 to 1 f/cc; Denmark – 1 f/cc; French - 0.5 f/cc; Germany – 0.2 f/cc; United Kingdom 1.0 f/cc. Non - regulatory OEL examples include: ACGIH TLV – 0.2 f/cc; RCFC REG – 0.5 f/cc. The objectives and criteria underlying each of these OEL decisions also vary. The evaluation of occupational exposure limits and their relative applicability to the work place is best performed, on a case – by – case basis, by a qualify industrial hygienist.

**Engineering controls:** use feasible engineering controls such as local exhaust ventilation, point of generation dust collection, down draft workstations, emission controlling tool designs, and materials handling equipment designed to minimize airborne fiber emissions.

### **Personal Protective Equipment:**

**Skin Protection:** Wear gloves (e.g. Cotton), Heat coverings and full body clothing as necessary to prevent skin irritation. Washable or disposable clothing may be used. If possible, do not take unwashed work clothing home. If soiled work clothing must be taken home, employers should ensure employees are trained on the best practices to minimize or avoid non-work dust exposure (e.g., Vacuum clothes before leaving the work area wash work clothing separately, rinse washer before washing other household clothes, etc.).

**Eye Protection:** Wear goggles or safety glasses with side shields or other forms of eye protection in compliance with appropriate OSHA standards to prevent eye irritation. The use of contact lenses is not recommended, unless used in conjunction with appropriate eye protection. Do not touch eyes with soiled body parts of materials. If possible, have eye washing facilities readily available when eye irritation can occur.

**Respiratory Protection:** RCF when engineering and/or administrative controls are insufficient to maintain workplace exposures within 0.5 f/cc REG, the use of appropriate respiratory protection, pursuant to the requirements OSHA standards 29 CFR 1910.134 and 29 CFR 1926.103 is recommended. The following information is provided as an example of appropriate respiratory protection for alumino-silicate fibers. The evaluation of workplace hazard and the identification of appropriate respiratory protection is best performed, on a case by case basis, by a qualify industrial hygienist.

<b>MANUFACTURERS RESPIRATORY PROTECTION RECOMMENDATIONS WHEN HANDLING RCF PRODUCTS</b>	
<b>Respirable Airborne Fiber Concentration</b>	<b>Respirator Recommendation<sup>1</sup></b>
Not yet determined but expected to be below 5.0 f/cc based on operation.	Half-face, air-purifying respirator equipped with a NIOSH-certified P100 particulate filter cartridge.
“Reliably” less than REG/PEL/OEL	See recommendation below for individual worker requests.
Up to 10 times of REG/PEL/OEL	Half-face, air-purifying respirator equipped with a NIOSH-certified P100 particulate filter cartridge.
Up to 50 times of REG/PEL/OEL	Full-face piece, air-purifying respirator equipped with a NIOSH-certified P100 particulate filter cartridge or PAPR
Greater than 50 times of REG/PEL/OEL	PAPR with tight-fitting full-face piece or a supplier air-respirator in continuous flow mode.
When individual workers request respiratory protection as a matter of personal comfort or choice and exposures are “reliable” below REG/PEL/OEL (8 – Hr. TWA)	A NIOSH-certified respirator, such as a disposable particulate respirator or respirators with filter cartridges rated N95 or better.

<sup>1</sup> The P100 recommendation is a conservative default choice; in some cases, solid arguments can be made that other respirator types (N 95, R 99, etc.) may be suitable for some tasks or work environments. The P100 recommendation is not designed to limit informed choices, provided that respiratory protection decisions comply with 29 CFR 1910.134.

**Other information:**

- Concentration based upon an eight-hour time weighted average (TWA) as determined by air samples collected and analyzed pursuant to NIOSH method 7400 B for airborne fibers.
- The manufacturer recommends the use of a full-face piece, air-purifying respirator equipped with an appropriate particulate filter cartridge during furnace tear-out events and the removal of used RCF to control exposures to airborne fiber and the potential presence of crystalline silica. If exposure levels are known, the respiratory protection chart provided above may be applied.
- Potential exposure to other airborne contaminants should be evaluated by a qualified industrial hygienist for the selection of appropriate respiratory protection and air monitoring.
- In the absence of other objective data or when concentration are unknown, the manufacturer recommends the use of the half-face, air-purifying respirator equipped with a NIOSH- certified P100 particulate filter cartridge (See above note).

## **SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance:** white fibrous material

**Boiling point:** N.A.

**Flash point:** N.A.

**Auto inflammability:** N.A.

**Oxidizing properties:** N.A.

**Bulk density (Kg/m<sup>3</sup>):** 64-160

**Partition coefficient:** N.A.

**Length weighted geometric mean diameter of fiber:** < 3.0µm

**Odour:** None

**Melting point:** >1760 °C

**Flammability:** N.A.

**Explosive properties:** N.A.

**Vapour pressure:** N.A.

**Water Solubility:** No soluble in water.

## **SECTION 10. STABILITY AND REACTIVITY**

**Chemical stability:** stable under conditions of normal use.

**Chemical Incompatibilities:** Soluble in Hydrofluoric acid, strong acid and alkali vapors.

**Hazardous Polymerization:** Will not occur.

**Hazardous Decomposition Products:** None

## **SECTION 11. TOXICOLOGICAL INFORMATION**

### **11.1.1 BASIC TOXICOKINETICS**

**Health data summary:** Epidemiological studies that include most people who have ever worked in domestic RCF production have indicated no increased incidence of respiratory disease or other significant health effects in occupationally exposed workers. In animal studies, long-term, high-dose inhalation exposure resulted in the development of respiratory disease in rats and hamsters.

**Epidemiology:** Industry epidemiologic investigations of RCF production workers and surveillance of customer's employees using RCF is ongoing. Preliminary interim results<sup>1</sup>, obtained from employees in RCF manufacturing facilities, are as follows:

1. - There is no evidence of any fibrotic lung disease (interstitial fibrosis) evaluated on chest x-ray.
2. - There is no evidence of any lung disease among those employees exposed to RCF that have never smoked.
3. - A statistical trend was observed in 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

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<sup>1</sup>Lockey, J.E., Lemasters, G.K., Rice, C.M., McKay, R.T., et al, (1994) Epidemiological Study Assessing Respiratory Effects of workers exposed to Ceramics Fibers, Department of Environmental Health, University of Cincinnati, College of Medicine

words, if these observations were made on an individual employee, the results would be interpreted as being within the normal range. A more recent longitudinal study of employees with five or more pulmonary function tests refutes the early observation, finding no effect on lung function associated with RCF production experience. Initial data (circa 1987) seemed to indicate an interactive effect between smoking and RCF exposure; more recent data, however, found no interactive effect. Nevertheless, to promote good health, RCF employees are still actively encouraged not to smoke.

4. – Pleural plaques (thickening along the chest wall) have been observed in a small number of RCF 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 effects on lung function.

**Toxicology:** The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made vitreous fibers (including ceramic fiber, glasswool, rockwool, and slagwool) and classified MMVF as a possible human carcinogen (Group 2B). IARC's 2B classification was based on sufficient evidence of carcinogenicity in the experimental animals and inadequate evidence (no data) of the carcinogenicity in the experimental of ceramic fiber to the humans.

A number of studies conducted by the Research and Consulting Company (Geneva Switzerland) on the health effects of inhalation exposure of rats and hamster to specially-prepared RCF for 6 hours/day, 5 days/week, for up to 24 months have recently been completed. In a lifetime nose-only inhalation study<sup>2,3</sup>, rats and hamsters were exposed to a Maximum Tolerated Dose of 30 mg/m<sup>3</sup> (approximately 200 fibers /cc), rats developed progressive lung damage and cancers of the lung and of the pleura (lining of the chest wall and lung). In contrast, hamsters similarly exposed developed interstitial fibrosis and pleural cancer, but no lung cancer. Cancer of the pleura is called mesothelioma.

In another lifetime nose-only inhalation study<sup>4,5</sup>, rats were exposed to three different concentrations of RCF (3,9, and 16 mg/m<sup>3</sup>, approximately 25, 75 and 115 fibers per cc respectively). The data from this study demonstrated a dose-response relationship in the biological affects of RCF in rats. There is no RCF related increase in lung tumors at 3, 9, or 16 mg/m<sup>3</sup>. A pleural fibrosis and mesothelioma were seen in single rat in the mid-dose (9 mg/m<sup>3</sup>) group. In addition, no consistently diagnosed fibrosis was seen below 9 mg/m<sup>3</sup>. Pulmonary fibrosis was observed at 9 and 16 mg/m<sup>3</sup>.

Other toxicological studies have been conducted which utilized non-physiological exposure methods such as intrapleural, intraperitoneal and intratracheal implantation or injection. Some of these studies have found that RCF is a potential carcinogen. Some experts however, suggest that these tests have limited relevance because they bypass many of the biological mechanism that prevent fiber deposition or facilitated fiber clearance.

<sup>2</sup> Mast, R.W., McConnell, E.E., Anderson, R., et al, (1993) Studies on the Chronic Toxicity (Inhalation) of four types of Refractory ceramic Fiber in Male Fisher 344 Rats. Submitted for publication.

<sup>3</sup> Glass, L. E., Mast, R. W., Hesterberg, T. H., et al. Inhalation Oncogenicity of Refractory Ceramic Fiber (RCF) in Rats Final Results. (1992) The Toxicologist.

<sup>4</sup> Mast, R.W., McConnell, Hesterberg, T. H., et al, (1993) A Multiple Dose Chronic Inhalation Toxicity of Size Selected Kaolin Refractory Ceramic Fiber (RCF) in Male Fisher 344 Rats. Submitted for publication.

<sup>5</sup> Mast, R.W., McConnell, E.E., Glass, L. R., al. A Multiple Dose Chronic Inhalation Toxicity Study of Kaoline in Refractory Ceramic Fiber (RCF) in Male Fisher 344 Rats. (1993). The Toxicologist.



## **SECTION 12. ECOLOGICAL INFORMATION**

No adverse ecological effects of this material on the environment are anticipated.

## **SECTION 13. DISPOSAL INFORMATION**

**Waste Management:** This product does not exhibit any characteristics of a hazardous waste. It is recommended that the product should be contained in bags or suitable closed containers to prevent creating any airborne dust during disposal.

**Disposal:** RCF, as manufactured, is not classified as a hazardous waste according to Federal Regulations (40 CFR 261). As manufactured, RCF was tested using EPA's Toxicity Characteristic Leaching Procedure (TCLP). Results showed there were no detectable contaminants or detectable leachable contaminants that exceeded the regulatory levels. Any processing, use, alteration or chemical additions to the products, as purchased, may alter the disposal requirements. Under federal regulations, it is the waste generator's responsibility to properly characterize a waste, to determine if it is a "Hazardous" waste. Check local, regional, state or provincial regulations to identify all applicable disposal requirements.

## **SECTION 14. TRANSPORT INFORMATION**

### **US Department of transportation:**

Not regulated by DOT as a hazardous material. No hazard class, no label or placard required, no UN or NA number assigned.

**International Canadian TDG hazard Class & PIN:** Not regulated.

No classified as dangerous goods under ADR (Road), RID (Train) or IMDG (Ship).

## **SECTION 15. REGULATORY INFORMATION**

### **United States regulations:**

- EPA:** **Superfund Amendments and Reauthorization Act (SARA)** title III – This product does not contain any substances reportable under sections 302, 304, 313, (40 CFR 372). Section 311 and 312 (40 CFR 370) apply (delayed hazard).  
**Toxic Substances Control Act (TSCA)** – RCF has been assigned a CAS number; however, it is not required to be listed on the TSCA inventory.  
**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** and the **Clean Air Act (CAA)** – RCF contains fibers with an average diameter greater than one micron and thus is not considered a hazardous air pollutant.
- OSHA:** Comply with **Hazard Communication Standards** 29 CFR 1910.1200 and 29 CFR 1926.59 and the **Respiratory Protection Standards** 29 CFR 1910.134 and 29 CFR 1926.103.
- CALIFORNIA:** Ceramic Fibers (airborne particles or respirable size) is listed in **Proposition 65, The Safe Drinking Water and Toxic Enforcement Act of 1986** as a chemical known to the State of California to cause cancer.

**OTHER STATES:** RCF products are not known to be regulated by States other than California; however, State and local OSHA and EPA regulations may apply to these products. If in doubt, contact your local regulatory agency.

## **INTERNATIONAL REGULATIONS:**

**Canada:** **Canadian Workplace Hazardous Materials Information System (WHMIS)** – RCF is classified as Class D2A – Materials Causing Other Toxic Effects.  
**Canadian Environmental Protection Act (CEPA)** – All substances in this product are listed, as required, on the Domestic Substances List (DSL).

**European Union:** **European Directive 97/69/EC** classified RCF as a category 2 carcinogen; that is it “should be regarded as if it is carcinogenic to men”.

## **SECTION 16. OTHER INFORMATION**

**RCF devitrification:** As produced, all RCF fibers are vitreous (glassy) materials that do not contain crystalline silica. Continued exposure to elevated temperatures may cause these fibers to devitrify (become crystalline). The first crystalline formation (mullite) begins to occur to approximately 985°C (1805°F). Crystalline silica (cristobalite) formation may begin at temperatures of approximately 1200°C (2192°F). The occurrence and extent of crystalline phase formation is dependent on the duration and temperature of exposure, fiber Chemistry and/or the presence of fluxing agents. The presence of crystalline phases can be confirmed only through laboratory analysis of the hot-face fiber.

IARC’s evaluation of crystalline silica states “crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to human (group 1)” and additionally notes “In making the overall evaluation, the working group noted that carcinogenicity in humans was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs”. (IARC monograph vol. 68, 1997). NTP lists on polymorphs of crystalline silica (respirable size) amongst substances “known to be a human carcinogen”.

IARC and NTP did not evaluate after service RCF, which may contain various crystalline phases. However, an analysis of after service RCF samples obtained pursuant to an exposure monitoring agreement with the EPA, found that in the furnace condition sampled, most did not contain detectable levels of crystalline silica. Other relevant RCF studies found that (1) simulated after service RCF showed little, or no, activity where exposure was by inhalation or by intraperitoneal injection; and (2) after service RCF was not cytotoxic to macrophage – like cells at concentrations up to 320 µg/cm<sup>2</sup> – by comparison, pure quartz or cristobalite where significantly active at much lower levels (circa 20 µg/cm<sup>2</sup>).

**RCF after service removal:** Respiratory protection should be provided in compliance with the Product Stewardship Program and OSHA standards. During removal operations, a FULLFACE RESPIRATOR is recommended to reduce inhalation exposure along with eye and respiratory tract irritation. A specific evaluation of workplace hazards and the identification of appropriate respiratory protection is best performed, on a case by case basis, by a qualified industrial hygienist professional.

**Labeling:** As product information labels may be required on RCF packages, check local destination regulation before shipping.

## SARA Title III Hazard Categories:

Acute Health: NO  
Chronic Health: NO  
Fire Hazard: NO

Pressure Hazard: NO  
Reactivity Hazard: NO

## Acronyms and References Used in Preparation of MSDS:

ACGIH:	American Conference of Governmental Industrial Hygienists
ADR:	Carriage of Dangerous Goods by Road (International Regulation).
CAA:	Clean Air Act
CAS#:	CAS Re Number is assigned number to identify a material. CAS stands for Chemical Abstracts Service.
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act.
DSL:	Domestic Substances List.
EPA:	Environmental Protection Agency.
EU:	European Union.
f/cc:	Fibers per cubic centimeter.
HEPA:	High Efficiency Particulate Air.
HMIS:	Hazardous Materials Identification system (National Paint & Coatings Association).
IARC:	International Agency for Research on Cancer.
IATA:	International Air Transport Association.
IMDG:	International Maritime Dangerous Goods Code.
mg/m <sup>3</sup> :	Milligrams per cubic meter of air.
mmpcf:	Million particles per cubic meter.
NFPA:	National Fire Protection Association.
NIOSH:	National Institute for Occupational Safety and Health.
OSHA:	Occupational Safety and Health Administration.
29 CFR 1910.134 & 1926.103:	OSHA Respiratory Protection Standards.
29 CFR 1910.1200 & 1926.59:	OSHA Hazard Communication Standards.
PEL:	Permissible Exposure Limit (OSHA).
PIN:	Product Identification Number.
PNOC:	Particulates Not Otherwise Classified.
PNOR:	Particulates Not Otherwise Regulated.
PSP:	Product Stewardship Program.
RCFC:	Refractory Ceramic Fiber Coalition.
RCRA:	Resource Conservation and Recovery Act.
REG:	Recommended Exposure Guideline (RCFC).
REL:	Recommended Exposure Limit (NIOSH).
RID:	Carriage of Dangerous Goods by Rail (International Regulations).
SARA:	Superfund Amendments and Reauthorization Act.
TITLE III:	Emergency Planning and Community Right to Know Act.
Section 302:	Extremely Hazardous Substance.
Section 304:	Emergency Release.
Section 311:	MSDS/ List of Chemicals and Hazardous Inventory.
Section 312:	Emergency and Hazardous Inventory.
Section 313:	Toxic Chemical and Release Reporting.
STEL:	Short Term Exposure Limit.
SVF:	Synthetic Vitreous Fiber.

TDG: Transportation of Dangerous Goods.  
TLV: Threshold Limit Values (ACGIH).  
TSCA: Toxic Substances Control Act.  
TWA: Time weighted Average.  
WHMIS: Workplace Hazardous Materials Information System (Canada).

**NOTICE:**

*Although reasonable care has been taken in the preparation of the information contained herein, Ravaber extends no warranties, makes no representation and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.*

**Last Revised: N/A**