FC 2600 HD Ceramic Boards and Shape Effective Date: January 21st, 2020

1. IDENTIFICATION

A. Product Identifier used on label: FC 2600 HD as Ceramic Boards and Shapes

B. Other means of identification: High Temperature Insulating Ceramic Vacuum-Formed Boards and Shapes; Blend of Refractory Ceramic Fibre and binders; Refractory Ceramic Fibre (RCF) with Zirconia, Ceramic Wool, Man-Made Vitreous Fibre (MMVF).

C. Recommended use of the product: Primary Use: For special high temperature applications - product can with stand continuous operating temperatures up to 2450°F [1345°C] with a melting point of 32000 F [17600 C].Refractory Ceramic Fiber (RCF) materials are used primarily in industrial high temperature insulating applications. Examples include backup insulation for brick or castable linings, high temperature baffles and muffles; flue and chimney linings in furnaces and kilns, infrared element support pads, glass tank side, end wall and port neck insulation, launder lining for conveying molten metals, launder covers, hot gas duct lining, water heater and boiler combustion chamber insulation, heat shields, heat containment, expansion joints, industrial furnaces, ovens, kilns, boilers and other process equipment. RCF based products with zirconia are not intended for direct sale to the general public. While RCFs are used in the manufacture of some consumer products, such as catalytic converter mats and wood burning stoves, the materials are contained, encapsulated, or bonded within the units.

D. Manufacturer Name FibreCast Incorporated, 3264 Mainway, Burlington, Ontario, Canada, L7M 1A7 Phone 905-319-1080; Fax 905-319-7611; email sales@fibrecast.com

E. Emergency Phone #: will provide assistance for chemical emergencies at 1-800-424-9300.

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2. HAZARDS IDENTIFICATION

A. Classification of the chemical: is based in Canada on the 5th revised edition of the Globally Harmonized System of Classification and Labelling of Chemicals from the United Nations Economic Commission for Europe and in the USA. These standards indicate that that the product is considered as IARC Group 2B which corresponds to OSHA HCS 2012 Category 2 carcinogen classification.

B. Signal word: Warning

Hazard Pictogram

Hazard Statements: Suspected of causing cancer by inhalation**.**

Precautionary statements: Do not handle until all safety instructions have been read and understood. Use respiratory protection as required. If concerned about exposure, get medical advice. Store in a manner to minimize airborne dust. Dispose of waste in accordance with local, provincial and federal regulations.

Supplementary Information: May cause temporary mechanical irritation to exposed eyes, skin or respiratory tract. Minimize exposure to airborne dust.

C. Describe any hazards not otherwise classified that have been identified during the classification process: Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure. These effects are usually temporary.

D. Mixture rule: Not applicable.

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3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	% BY WEIGHT
Refractories, Fibres, Aluminosilicate with zirconia	142844-00-6	30 to 60
Colloidal silica	7631-86-9	7 to 13
Silicon Dioxide	14808-60-7	15 to 40
Cationic starch ether	56780-58-6	1 to 5

Impurities and Stabilizing Additives: Not applicable

4. FIRST AID MEASURES

A. Description of necessary measures subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion

SKIN: Handling of this material may generate mild mechanical temporary skin irritation. If this occurs, rinse affected areas with water and wash gently. Do not rub or scratch exposed skin.

EYES: In case of eye contact flush abundantly with water; have eye bath available. Do not rub eyes.

NOSE AND THROAT: If these become irritated move to a dust free area, drink water and blow nose. If symptoms persist, seek medical advice.

B. Most important symptoms/effects, acute and delayed: Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure. These effects are usually temporary.

C. Indication of immediate medical attention and special treatment needed, if necessary:
NOTES TO PHYSICIANS Skin and respiratory effects are the result of temporary, mild mechanical irritation; fiber exposure does not result in allergic manifestations.

5. FIRE FIGHTING MEASURES

A. Suitable (and unsuitable) extinguishing media: Use extinguishing agent suitable for surrounding combustible materials.

B. Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products): Product is considered a non-combustible product. The class of reaction to fire is zero. However, the packaging and surrounding materials may be combustible. Also, there a thermal decomposition of the binder from the initial heat of product at approximately 4500 F or 2320 C. This may release a small amount of organic binder. Once this material has burned off, there is no further off-gassing. Use adequate ventilation or other precautions to eliminate exposure to vapors resulting from this thermal decomposition of the binder. Exposure to thermal decomposition fumes may cause respiratory tract irritation, bronchial hyper-reactivity or an asthmatic-type response

C. Special protective equipment and precautions for fire-fighters NFPA Codes: Flammability: 0 Health: 1 Reactivity: 0 Special: 0

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment, and emergency procedures: Minimize airborne dust. Compressed air or dry sweeping should not be used for cleaning.

B. Methods and materials for containment and cleaning up: Frequently clean the work area with vacuum or wet sweeping to minimize the accumulation of debris. Do not use compressed air for clean-up.

EMPTY CONTAINERS: Product packaging may contain residue. Do not reuse

7. HANDLING AND STORAGE

A. Precautions for safe handling: Handle fiber carefully to minimize airborne dust. Limit use of power tools unless in conjunction with local exhaust ventilation. Use hand tools whenever possible.

B. Conditions for safe storage, including any incompatibilities: Store in a manner to minimize airborne dust.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

A. Ontario Occupational exposure limits [OEL] Occupational Exposure Limits for Refractory Ceramic Fibre [RCF]: Ontario OEL is 0.5 f/cc, 8-hr. TWAEV. Note! Unlike Canada, which recommends 0.2 to 1 f/cc as the TWAEV for RCF (dependent on the province), there is no specific regulatory standard for refractory ceramic fibre in the U.S. It uses the OSHA "Particulate Not otherwise Regulated (PNOR)" standard (29CFR 1910.1000 Subpart Z, Air Contaminants) that considers it as part of a Total Dust TWAEV of 15 mg/m 3 with a Respirable Fraction of 5 mg/m 3.

Exposure Guidelines – Other Ingredients: The occupational exposure limits vary widely and are under constant review. Refer to those that apply currently to the location where the product is in use or being removed from service. The engineering controls or personal protective equipment employed to reduce exposure to ceramic fibre will also control worker exposure to the following ingredients. The following time weighted average occupational levels for the other ingredients are based on current good industrial hygiene practices:

COMPONENTS	Ontario TWAEV
Amorphous silica	10 mg/m3 (as inhalable particles) 2 mg/m3 (as respirable particles)
Cationic starch ether	10 mg/m3 (as inhalable particles) 3 mg/m3 (as respirable particles)
Silica (after use)	0.05 mg/m3 as respirable particles (from tear out activities)

B. Appropriate engineering controls: Use engineering controls such as local exhaust ventilation, point of generation dust collection, emission controlling tool designs, and materials handling equipment designed to minimize airborne fiber emissions.

C. Individual protection measures, such as personal protective equipment

Skin Protection: Wear personal protective equipment (e.g. gloves, disposable coveralls), to prevent skin irritation. Washable or disposable clothing may be used. If possible, do not take unwashed clothing home. If soiled work clothing must be taken home, employees should be informed on best practices to minimize non-work dust exposure (e.g., vacuum clothes before leaving the work area, wash work clothing separately, and rinse washer before washing other household clothes).

Eye Protection: As necessary, wear goggles or safety glasses with side shields or better still, a full-face piece air purifying respirator equipped with P100 cartridges such as 3M7093 bayonet particulate cartridge or a 3M2097 snap-on particulate cartridge.

Respiratory Protection: When engineering and/or administrative controls are insufficient to maintain workplace concentrations below the 0.5 f/cc TWAEV, the use of appropriate respiratory is recommended. A NIOSH certified respirator with a filter efficiency of at least 95% should be used. The 95% filter efficiency recommendation is based on NIOSH respirator selection logic sequence for exposure to man-made mineral fibers

The evaluation of workplace air-borne hazards and the identification of appropriate respiratory protection is best performed, on a case by case basis, by a qualified Industrial Hygienist.

Other Information: Concentrations are based upon an eight-hour time weighted average (TWAEV) as determined by air samples collected and analyzed pursuant to NIOSH method 7400 (B) for airborne fibers. Note! 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 to control the removal of airborne fiber and to control exposures to the potential of airborne silica.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE White, fibrous wool manufactured into a board or shape	**EVAPORATION PONT** Not applicable
ODOUR TRESHOLD Not applicable	**FLAMMABILITY** Not applicable
ODOUR Odourless	**UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS** Not applicable
Ph Not applicable	**VAPOR PRESSURE** Not applicable
MELTING POINT 1760° C (3200° F)	**VAPOUR DENSITY** Not applicable
INITIAL BOILING POINT AND BOILING RANGE Not applicable	**DENSITY [#/ft3]** 24 to 26
FLASH POINT Not applicable	**SOLUBILITY** Insoluble
PARTITION COEFFECIENT: n-octanol/water Not applicable	**AUTO-IGNITION TEMPERATURE** Not applicable
DECOMPOSITON TEMPERATURE Not applicable	**VISCOSITY** Not applicable

10. STABILITY AND REACTIVITY

A. Reactivity	RCF is non-reactive.
B. Chemical stability	As supplied fibre is stable and inert.
C. Possibility of hazardous reactions	None
D. Conditions to avoid	Please refer to handling and storage advice in Section 7
E. Incompatible materials	None
F. Hazardous decomposition products	None.

11. TOXICOLOGICAL INFORMATION

(a) through (d)

TOXICOKINETICS, METABOLISM AND DISTRIBUTION

A. **Basic Toxicokinetics:** Exposure is predominantly by inhalation or ingestion. Man-made vitreous fibers of a similar size to RCF have not been shown to migrate from the lung and/or gut and do not become located in other organs of the body.

B. **Human Toxicological Data/Epidemiology Data:** In order to determine possible human health effects following RCF exposure, the University of Cincinnati has been conducting medical surveillance studies on RCF workers in the U.S.A; this epidemiological study has been ongoing for > 25 years and the medical surveillance of RCF workers continues. The Institute of Occupational Medicine (IOM) has conducted medical surveillance studies on RCF workers in European manufacturing facilities. Pulmonary morbidity studies among production workers in the U.S.A. and Europe have demonstrated an absence of interstitial fibrosis. In the European study a reduction of lung capacity among smokers has been identified, however, based on the latest results from a longitudinal study of workers in the U.S.A. with over 17-year follow-up, there has been no accelerated rate of loss of lung function (McKay et al. 2011). A statistically significant correlation between pleural plaques and cumulative RCF exposure was evidenced in the U.S.A. longitudinal study. The U.S.A. mortality study showed no excess mortality related to all deaths, all cancer, or malignancies or diseases of the respiratory system including mesothelioma (LeMasters et al. 2003).

C. **Irritant Properties:** Negative results have been obtained in animal studies (EU method B 4) for skin irritation. Inhalation exposures using the nose only route produce simultaneous heavy exposures to the eyes, but no reports of excess eye irritation exist. Animals exposed by inhalation similarly show no evidence of respiratory tract irritation. Human data confirm that only mechanical irritation, resulting in itching, occurs in humans. Screening at manufacturers' plants in the UK has failed to show any human cases of skin conditions related to fiber exposure.

(e) International Agency for Research on Cancer and National Toxicology Program

IARC, in 1988, Monograph v.43 (and later reaffirmed in 2002, v.81), classified RCF as possibly carcinogenic to humans (group 2B). IARC evaluated the possible health effects of RCF as follows: There is inadequate evidence in humans for the carcinogenicity of RCF. There is sufficient evidence in experimental animals for the carcinogenicity of RCF. The Annual Report on Carcinogens (latest edition), prepared by NTP, classified respirable RCF as "reasonably anticipated" to be a carcinogen). Not classified by OSHA.

12. ECOLOGICAL INFORMATION (Non-mandatory)

A. Ecotoxicity (aquatic and terrestrial, where available)	No known aquatic toxicity..
B. Persistence and degradability	These products are insoluble materials that remain stable over time and are chemically identical to inorganic compounds found in the soil and sediment; they remain inert in the natural environment.
C. Bioaccumulative potential	No bioaccumulative potential.
D. Mobility in soil	No mobility in soil.
E. Other adverse effects (such as hazardous to the ozone layer)	No adverse effects of this material on the environment are anticipated.

13. ECOLOGICAL INFORMATION (Non-mandatory)

A. **WASTE MANAGEMENT:** To prevent waste materials from becoming airborne during waste storage, transportation and disposal, a covered container or plastic bagging is recommended.

B. **DISPOSAL:** This product, as manufactured, is not classified as a hazardous waste according to Federal regulations. Any processing, use, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under Federal regulations, it is the waste generator's responsibility to properly characterize a waste material, to determine if it is a "hazardous" waste. Check local, regional, state or provincial regulations to identify all applicable disposal requirement.

14. TRANSPORT INFORMATION (Non-mandatory)

A. UN number	Not Applicable
B. UN proper shipping name	Not Regulated.
C. Transport hazard class	Not Applicable
D. Packing group, if applicable	Not Applicable
E. Environmental hazards (e.g., Marine pollutant -Yes/No)	Not a marine pollutant
F. Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)	Not Applicable
G. Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises	Not Applicable

Canadian TDG Hazard Class & PIN: Not regulated Not classified as dangerous goods under ADR (road), RID (train) or IMDG (ship). Canadian TDG Hazard Class & PIN: Not regulated

Not classified as dangerous goods under ADR (road), RID (train) or IMDG (ship).

Note!! NATURALLY OCCURRING RADIOACTIVE MATERIAL(NORM)

This product is manufactured with zirconium compounds which may contain trace quantities (<500ppm) of naturally occurring radioactive material (NORM) consisting of uranium, thorium, and/or radium. The quantity of radioactive materials in the zirconium compounds is below the regulatory level of 0.05% established by the Nuclear Regulatory Commission (NRC). Check your local, regional and state or provincial regulations for specific applicable handling and disposal requirements.

15. REGULATORY INFORMATION

CANADIAN REGULATIONS
Canada Canadian Workplace Hazardous Materials Information System (WHMIS 2015) – 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 Substance List (DSL)

USA

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.

16. OTHER INFORMATION

16.1 Devitrification: Precautionary measures to be taken after service upon removal: High temperature insulating wool (HTIW) is typically used in insulation applications to keep temperature exposure at 900°C or above in a closed space. The exposure temperature maximum occurs at the hot face surface of the insulation. The heat exposure on the insulation decreases from the hot face to the cold face as the insulation "insulates itself". As a result, only thin layers of the hot face surface of the insulation become devitrified and respirable dust generated during removal operations typically do not contain detectable levels of crystalline silica. Toxicological evaluation of the effect of the presence of crystalline silica in artificially heated HTIW material has not shown any increased toxicity in vitro and in vivo. The results from different factor combinations such as increased brittleness of fibres or micro crystals embedded in the glass structure of the fibre and therefore not biologically available, may explain the lack of toxicological effects.

16.2 Hazardous Materials Identification System: This (HMIS) Hazard Rating [this rating system dates back to early 1960's]: HMIS Health 1* (* denotes potential for chronic effects);HMIS Flammability 0;HMIS Reactivity 0 HMIS Personal Protective Equipment X (To be determined by user).

16.3 Definitions

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	Carriage of Dangerous Goods by Road (International Regulation)
AES	Alkaline Earth Silicate Wools
ASW	Alumino-Silicate Wools
CAA	Clean Air Act
CAS	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
HTIW	North American high temperature insulation wool industry
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods Code
mg/m³	Milligrams per cubic meter of air

16.2 Definitions Continued…

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 1910.1200 & 1926.59	OSHA Respiratory Protection Standards
29 CFR 1910.1200 & 1926.59:	OSHA Hazard Communication Standards
PCW	Polycrystalline Wools
PEL	Permissible Exposure Limit (OSHA)
PIN	Product Identification Number
PNOC	Particulates Not Otherwise Classified
PNOR	Particulates Not Otherwise Regulated
PSP	Product Stewardship Program
RCFA	Refractory Ceramic Fiber Association
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
RID	Carriage of Dangerous Goods by Rail (International Regulations)
SARA	Superfund Amendments and Reauthorization Act
SARA Title III	Emergency Planning and Community Right to Know Act
SARA Section 302	Extremely Hazardous Substances
SARA Section 304	Emergency Release
SARA Section 311	MSDS/List of Chemicals and Hazardous Inventory
SARA Section 312	Emergency and Hazardous Inventory
SARA Section 313	Toxic Chemicals and Release Reporting
STEL	Short Term Exposure Limit
SVF	Synthetic Vitreous Fiber
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
WHMIS	Workplace Hazardous Materials Information System (Canada)

16.3 Revision Summary: Updated SDS to align with the new WHMIS 2015 Regulation introduced, Feb 11th, 2015. SDS

Revision Date: January 21st, 2020; SDS Prepared By: G.E. Menzies P. Eng. ROH

16.4 DISCLAIMER:

The information presented herein is presented in good faith and believed to be accurate as of the effective date of this Safety Data Sheet. Employers may use this SDS to supplement other information gathered by them in their efforts to assure the health and safety of their employees and the proper use of the product. This summary of the relevant data reflects professional judgment; employers should note
that information perceived to be less relevant has not been included in this SDS. Therefore, given the summary nature of this document, FibreCast Inc. does not extend any warranty (expressed or implied), assume any responsibility, or make any representation regarding the completeness of this information or its suitability for the purposes envisioned by the user.