

MATERIAL SAFETY DATA SHEET

In compliance with EEC Directives 93/112/CE dated 12/10/93 and 2001/58/CE dated 07/27/2001
updating Directive 91/155 dated 03/05/1991
and in compliance with ISO standards 11014-1 dated 03/15/94 and ANSI Z400.1 dated 1998

1 - COMPANY – PRODUCTS IDENTIFICATION

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PRODUCT IDENTIFICATION:

"Continuous filaments glass fibres for plastic reinforcement"

Contact in an emergency:

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2 - COMPOSITION – INFORMATION CONSTITUANT PARTS

Glass fibres for reinforcement are basically sold as:

ASSEMBLED ROVINGS	DIRECT ROVINGS RO99®	CAKES	E FABRICS
WOVEN ROVINGS	COMBINATION MATS	ARAVER	
MILLED FIBRES	SPUN ROVINGS	CHOPPED STRANDS	
RESTREND	FIOCCO BITUME	FIOCCO PP-PA	BOROSIL
CHOPPED STRAND MATS	UNIFILO®CONTINUOUS STRAND MATS		PERLEX

On Saint-Gobain Vetrotex product packing, these general names are followed by a code number.

This Material Safety Data Sheet is valid for all these products.

Glass fibres can be considered as ARTICLES, as fibres are defined as articles in the manual of decisions for implementation of the sixth and seventh amendments to directive 67/548/eec on dangerous substances (EU Directives 79/831/eec and 92/32/eec) or in the USA by the American TSCA (Toxic Substances Control Act) or EPA 40 CFR 710.2 and also some other national regulations (DSL in Canada for instance).

These articles are mixtures of E GLASS in the form of continuous strands and a SIZE with, in addition, a BINDER in the case of mats.

The CAS number of glass fibre is 65997-17-3 (corresponding to the oxides used for production).

E GLASS is a glass with a very low alkaline content. Its composition (expressed in oxides) is within the following percentages:

SiO ₂	52-62%
Alkaline Oxides (Na ₂ O, K ₂ O)	< 2%
Alkaline terrous oxides (CaO, MgO....)	16-30%
B ₂ O ₃	0-10%
Al ₂ O ₃	11-16%
TiO ₂	0-3%
Fe ₂ O ₃	0-1%
F ₂	0-2%

SIZE is a mixture of chemicals applied to the glass strands in a maximum quantity of 2.5% - more generally less than 1.5%.

Most of this mixture is made up of basically non reactive high molecular weight polymers not listed as substances in the 1981 European Inventory of Existing Commercial Substances (EINECS) nor in the ELINCS appendices (European List of Notified Chemical Substances) and are generally exempt from registration on the American TSCA lists.

In some cases, sizes are prepared from polymers with reactive sites or containing reactive monomers included in these lists. Most of the reactive sites are polymerised during the manufacturing process. However a very small reactivity may remain which justifies the precautionary measures listed in Chapter 8 below.

A second type of ingredient present in almost all sizes is a member of the organo-silane family. These products account for less than 0.05% of the final weight of sized E glass. These products are included in lists of products requiring 'hazardous product' labelling in a pure state for example in Europe R23/25 toxic if swallowed or inhaled, R21 'harmful in contact with the skin', R36 'irritant for the eyes'. The manufacturer considers this risk as negligible as, although listed as dangerous products, the concentration is extremely low and they are polymerised during the production of E glass fibres.

Other products can be used in sizes. Usually the content is extremely low (under 0.1% of total weight) and as a general rule such products are not on the dangerous product lists or, as they have reacted, any possible risk has been reduced.

BINDERS FOR MATS are high molecular weight polymers deposited in quantities under 10% and polymerised on chopped or continuous glass strand mats. They are not on dangerous products lists.

If so requested by medical authorities, the Chemical Abstract Service (CAS) reference numbers for the ingredients used for a given size or binder can be communicated but must remain for the confidential use of medical authorities.

FINISH FOR FABRICS: in some cases a small amount of finish (less than 5%), made of high molecular weight polymer is deposited on some E glass fabrics. They are not on dangerous products lists.

3 - HAZARD IDENTIFICATION

Continuous strand glass reinforcing fibres are **not significantly hazardous**.

Details about chemical hazards are given in paragraph 2. Toxicological aspects are developed in detail in chapter 11. The essential points to remember are that glass filaments are not

“respirable” as their nominal diameters are over 9 µm, far over the diameter of 3µm defined by the World Health Organisation for “respirable” fibres, and that they have been shown not to cause lung cancer.

Hazards identified are:

- mechanical irritation (itching)
- the formation of non fibrous dusts (broken pieces of different sizes) and non respirable filaments
- extremely rare possibilities of allergy.

4 - FIRST AID

INHALATION: remove from the scene of exposure to fresh air

SKIN CONTACT: wash copiously with lukewarm soapy water without rubbing excessively

EYE CONTACT: flush in running water (for at least 10 minutes) and consult if necessary a doctor

5 - FIRE FIGHTING

In case of fire, glass fibres are not flammable, are incombustible and don't support combustion.

Only the packaging (plastic film, paper, cardboard, wood) and the small amounts of size or binder are likely to burn. Combustion gases are basically carbon dioxide and water vapour. There may be small quantities of carbon monoxide and other unidentified substances which make it necessary to use protective devices in the event of a major fire.

RECOMMENDED EXTINGUISHING MEDIA: water or chemical powder

6 - ACCIDENTAL SPILLAGE

PERSONAL PROTECTION: See Chapter 8.

ENVIRONMENTAL PROTECTION:

In leaching tests glass fibre wastes did not emit any significant quantities of dangerous products and they can therefore be considered as **Inert Industrial Wastes**, or even **Common Industrial Wastes**, as defined by national and local regulations. All waste and scrap material

should be disposed of in accordance with applicable national, federal, state and local regulations (see paragraph 13).

CLEANING:

Vacuum clean, sweep or shovel into containers normally used for glass fibre waste (selective collection).

7 - HANDLING & STORAGE

HANDLING (Technical measures / Precautions / Safe handling advice):

It is preferable to avoid prolonged contact with the skin: wear gloves, garments with sleeves and long leggings or protective overalls, goggles, and dust masks.

Glass filaments and dusts must be removed from work garments with a vacuum cleaner and not blown off with compressed air jets. Wash work garments separately from other clothes.

STORAGE:

Technical measures: respect the stacking procedure recommended for each type of product.

Storage conditions: store away from excessive humidity to prevent damage to the product and to the packing materials which could lead to storage safety problems.

Incompatible material: not relevant.

8 - EXPOSURE CONTROL – PERSONAL PROTECTION

TECHNICAL MEASURES

Use every appropriate means (suction, modification of manufacturing methods to reduce fibre dust...) to try to reduce the concentration of fibres likely to cause irritation.

TEST PARAMETERS

Test ambient atmospheres in which glass fibre is used regularly to determine levels of

- “non respirable” and “respirable” filaments
- “non-respirable” and “respirable” dusts.

Legal requirements for respirable and non-respirable dusts and fibres vary from country to country (or do not even exist). The table below (prepared using the knowledge we currently possess) shows the limits applicable in different countries for Time-Weighted Average (TWA) exposure.

It is recommended to identify the chemical nature of the fibres found in working atmospheres correctly, in particular in insulation wools and mineral fibres like asbestos which are sometimes present and can be confused with continuous glass strands.

Country	Dusts	TWA (Time-Weighted Average concentration) (mg/cu.m. for 8 hours work)	Fibres	TWA (Time-Weighted Average concentration) (Fibres/ml for 8 hours work)
Austria	fine	6	total	0.5
Belgium	total	10	No regulation	
Denmark	respirable total	5 10	total	1
Finland	total	10	total	1
France	total	10	respirable	1
Germany	respirable	3	respirable	0.25
Great Britain	respirable total	5 10	respirable	2
The Netherlands	respirable total	2 10	total	1
Ireland	respirable	5	respirable	2
Italy	respirable total	3 10	total	1
Norway	respirable total	5 10	total	1
Portugal	total	4	total	1
Spain	total	10	total	1
Sweden	respirable total	5 10	total	1
Switzerland	total	6	respirable	0.5
USA	respirable total	5 (OSHA)* 15 (OSHA)*	total	1 (ACGIH)**

* OSHA = Occupational Safety and Health Administration

** ACGIH = American Conference of Governmental Industrial Hygienists

PERSONAL PROTECTION EQUIPMENT:

Respiratory protection: during occasional operations releasing high quantities of dust, wear minimum FP1 or preferably FP2 EEC approved dust masks. Type 3M 8710 or 3M 9900 respirators approved according to American National Institute For Occupational Safety And Health (NIOSH) directives, can be used, for example.

Protection of hands and other exposed parts of the body:
gloves for the hands, long-sleeved garments and long leggings to prevent irritation.
People with delicate skin should apply barrier cream to exposed skin areas.

Eye protection: safety goggles (or masks) or safety glasses.

9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid

FORM: continuous or chopped or mats of fibre made up of continuous, parallel filaments glued together.

COLOUR: white or yellowish white

ODOUR: none, except for some products from which a slightly basic or acid odour is sometimes released when a pallet or carton is opened. This odour never indicates that an eventual toxic product has been released in a dangerous amount.

pH: not applicable

SPECIFIC TEMPERATURE AT WHICH CHANGES IN PHYSICAL STATE OCCUR:

Softening point: Littleton point (defined as the temperature for which the viscosity of glass is $10^{7.65}$ Poises): approximately 850°C

Melting point: Not applicable. Glass does not melt, but the viscosity decreases by elevation of temperature and is 10^3 for E glass in a range of temperature between 1150°C and 1250°C (fiberizing temperature).

DECOMPOSITION TEMPERATURE: Sizes and mat binders start to decompose at 200°C

FLASH POINT: none

EXPLOSIVE PROPERTIES: none

DENSITY (molten glass): 2.6 g / cu. cm.

SOLUBILITY: very low solubility in water. Sizes and binders can be partially (and even totally) dissolved in most organic solvents

10 - STABILITY AND REACTIVITY

STABILITY

Stable in normal use and storage conditions, and in normally foreseeable usage conditions.

HAZARDOUS REACTIONS

Glass reinforcement strands are stable and never generate hazardous chemical reactions.

HAZARDOUS DECOMPOSITION PRODUCTS

In continuous combustion conditions, in addition to water vapour and CO₂, small quantities of CO and NO_x may be released from the combustion of the size and/or the binder. Other products may be released in limited quantities, depending on combustion conditions. This is why it is recommended to use high-performance gas masks, when fighting intense fires. (see paragraph 5).

11 - TOXICOLOGICAL INFORMATION

ACUTE TOXICITY: not relevant

LOCALISED EFFECTS: **possible temporary irritations**

This irritation is of a purely mechanical and temporary nature. It disappears when exposure is ended. It can affect the skin, the eyes and the upper respiratory tracts. In Europe, mechanical irritation is not considered to be a health hazard within the terms of European directives 67/548/EEC for hazardous products. This is confirmed by the fact that EC Directive 97/69/EC for mineral fibres does not stipulate the need to use an Xi (irritant) label nor a classification for continuous strand glass fibres (which in this Directive only apply to insulation glass wools in some circumstances).

SENSITISATION: some **allergies** to continuous strand glass fibres have been declared. All sizing mixtures are tested for their wet state sensitising properties when developed by Saint-Gobain Vetrotex and are only adopted if they have no or a very low sensitisation level. In case of the allergy is confirmed, remove the person from the scene of the exposure.

LONG TERM TOXICITY: **CARCINOGENIC RISKS**

Continuous strand glass fibres are not respirable (i.e. do not penetrate the lung alveoli). This is because fibres are over 3µm in diameter (and, mostly, over 9µm). Even after handling, the length of the finest dusts is also well over 5µm and the length / diameter ratio is greater than 3 : 1. These are the values determined by the World Health Organisation (WHO) for the definition of respirable fibres.

Regulatory situation:

None of the following official organisations have attributed any risks of cancer during the production and use of continuous filament glass fibres:

During its congress in June, 1987, World Health Organisation (WHO) through the IARC (International Agency of Research on Cancer) examined all laboratory studies using animals and epidemiological studies carried out on continuous strand glass reinforcement fibres. The conclusion was that **glass filaments are not classified as to their carcinogenicity**. They belong to the **Group 3 of IARC**. This classification has been confirmed by the IARC Working Group during his meeting of October 2001 and in the latest issue of the IARC monographs on the evaluation of carcinogenic risks to humans volume 81 on Man-made vitreous fibres, published in 2002.

The International Labour Office (ILO) and the CSIP (Chemical Safety International Program) came to the same conclusions in a congress held in 1987.

European Commission Directive 97/69/EC dated 5/12/97, the 23rd amendment to Directive 67/548/EEC which concerns classification, packing and labelling of hazardous substances did not think it necessary to include glass fibres as having carcinogenic risks.

Most European Union member nations have transposed this Directive into their national law and adopted the same conclusions :

Country	Reference of transposition documents of Directive 97/69/EC
Austria	Chemikalienverordnung 1999
Belgium	French implementation by « Koninklijk Besluit » of 15/1/99 published on 24/2/99
Denmark	BEK N°11/1999.01.09 (Ministry of Environment)
Finland	Landskapforordning 23/04/98 and 24/02/98 and List of Hazardous Chemicals 16.12.98
France	Arrêté ministériel du 28/08/98, Circulaire DRT 99/10 du 13/8/99
Germany	4th adaptation of the German Gefahrstoffverordnung 1999
Great Britain	The chemicals (Hazard Information and packaging for supply) (amendment) Regulations 1998. 6/1/99
Greece	Not available
The Netherlands	Wijzigingsbesluit (Stb. 217,2001)
Ireland	Statuary Instruments S.I. N°513 of 1998. European Communities (Classification, Packaging, Labelling and Notification of Dangerous Substances) Amendment N°2 Regulation 1998. Effect on 22 December 1998.

Country	Reference of transposition documents of Directive 97/69/EC
Italy	Decreto ministeriale del 01/09/98, Gazzetta Ufficiale-Serie generale-del 19/11/98 n271 pag. 16, decreto del 2 feb 1999 , circolare n°4 del 15/03/1999
Luxembourg	Règlement Grand Ducal du 31/10/98
Portugal	Non disponible
Spain	Bulletin Oficial del Estada (11/09/98)
Sweden	KIFS 1998 : 7

OSHA (Occupational Safety and Health Administration) and NTP (U.S. National Toxicology Program), official American organisations, have not listed continuous strand glass fibres as hazardous substances and the ACGIH (American Conference of Governmental Industrial Hygienists) has classified them as A4 (not classified as carcinogenic for Man). They are not concerned by the Canadian Controlled Products regulations (CPR).

No new studies have led the organisations to revise their position on this subject.

Most laws and studies concerning respirable fibres do not apply to continuous filaments reinforcement fibres.

For example,

- The concentration of respirable fibres in the atmosphere (1.5 fibres / cm³, changed to 1 fibre / cu.m in 1997.) fixed by French circular 95/04 dated 12/01/1995 (in addition to that dated 19/07/1982) from the French Ministry for Work does not apply to glass reinforcement fibres (which are not respirable).
- Cancer risk index KI defined in German TRGS 905 does not apply to non-respirable continuous filament glass fibres.

Epidemiological and laboratory studies

No epidemiological and laboratory studies carried out up until now demonstrate in a scientifically significant way any risk of cancer related to reinforcement fibres.

Several recent epidemiological studies (Chiazze 1997, Boffeta 1997) confirmed the absence of excessive mortality due to cancer in people working in glass fibre manufacturing facilities vs. control populations.

A recent study published in 2000 by the IOM (Institute of Occupational Medicine in Edinburgh) addressed the inhalation of E-glass microfibres by animals at concentrations at least 1000 times higher than those encountered when using glass fibres demonstrated carcinogenic risk. These microfibres are not part of the product range produced and sold by

Saint-Gobain Vetrotex and these findings are not likely to change current opinions for the glass fibres described in this MSDS.

Handling glass fibres

When glass fibres are chopped, milled or sanded they are cut perpendicular to strand length and no smaller diameters filaments are generated. Conversely, significant quantities of dust can be generated which is why it is recommended to use personal protection. In dusts, also present in some products (chopped strands, crushed fibres) some studies have shown very low quantities of particles with fibrous aspects ($l/d > 3$), short (but nevertheless longer than $5\mu\text{m}$) and with an apparent diameter of under $3\mu\text{m}$. Quantities measured in work atmospheres are 50 to 100 times lower than all the limits fixed for respirable fibres, but when there is a high risk of dust generation it is strongly recommended to wear masks.

MUTAGENIC RISKS, TERATOGENIC RISKS, RISKS FOR REPRODUCTION: continuous strand glass reinforcement fibres have no known risks.

12 - ECOTOXICOLOGICAL INFORMATION

E glass is not biodegradable.

Sizes or binders are organic materials slowly and only partial dissolved by natural agents like water. As the concentration of the ingredients in the mixture and ingredient solubility are low and as they have not been classified as hazardous, glass reinforcement strands are considered to have no adverse eco-toxicological effects.

Glass fibres and sizing products **were not listed as products** likely to destroy the **ozone layer** by the 1987 Montreal Protocol (Class 1 or Class 2). These lists are included in EC Regulation n° 3093/94 and in section VI of amendments to the "Clean Air Act " by the American Environmental Agency (EPA).

Glass fibre sizes and binders do **not contain PCB** (Polychlorinated biphenyl) or and other polyaromatic products of the same type.

13 – WASTE DISPOSAL

Depending on local regulations, glass fibre wastes can either be considered as **inert waste** or as **common industrial waste**. As such they can be buried in landfills approved for these categories.

Glass fibres waste cannot be destroyed by incineration – and can damage incinerators by the formation of a vitrified mass.

Clean cardboard, wood, plastic (film or bags) and packaging can be eliminated in units specific to these products (i.e. for recycling or use as fuels).

14 - TRANSPORT

INTERNATIONAL REGULATIONS:

Glass reinforcement fibres are not considered as hazardous goods by transport regulations. They are not part of one of the hazardous classes listed in international regulations.

They do not need special procedures under any regulations. For international transport in Europe by land (new restructured version of ADR applicable as from July 1st 2001, RID, ADNR), sea (OMI) or air (OAC/IATA or to the USA (DOT) or Canada (TDG), they are not shown as a risk category nor qualified by a UNO number or a packing group.

15 – REGULATORY INFORMATION

Continuous filaments glass reinforcements do not require hazardous product labelling (see Chapter 11).

General hygiene and work safety regulations apply (see Chapter 8).

Continuous filaments glass reinforcement for plastics are articles and for this reason they have not to be listed in most of the countries, for instance in the list EINECS in Europe, ELINCS, TSCA for the USA, DSL and NDSL for Canada ...

16 - OTHER INFORMATION

FOOD ENVIRONMENTS: Appendix III of European Directive 90/128/CEE and its most recent amendment 96/11/CE dated 5/03/96 defines the compatibility of pure glass fibres with food environments as additives to plastics. However the fact that sizing products should be shown on the current list of European Commission approved products, the BGVV LII list in Germany or the Food and Drugs Administration lists (FDA) in the USA means that a case by case study must be made if a Saint-Gobain Vetrotex range product is used to reinforce a plastic material in contact with food. Consult the Saint-Gobain Vetrotex Service for further information.

CONTACT WITH POTABLE WATER: As differ from country to country, every question must be examined individually with the relevant Saint-Gobain Vetrotex Services.

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This Material Safety Data Sheet is in addition to the Product Specification file and other technical documents issued by SAINT-GOBAIN VETROTEX, but does not replace them.

The information given by this document is based on the best knowledge at the date shown. It is given in good faith.

Furthermore, users attention is drawn to the possible risks run when the product is used for any purpose other than the one for which it was designed.

This MSDS does not exempt users from knowing and applying the rules regulating their activities. Users assume full responsibility for applying the appropriate safety measures when the product is used.

For all additional information, users should contact their local Saint-Gobain Vetrotex agent or the Saint- Gobain Vetrotex International Environment Health and Safety Director.

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