

# **BIOSOLUBLE MAN-MADE GLASS FIBRES AND PREVENTION OF THEIR HEALTH EFFECTS**

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In Spain a Ministerial Order was passed on 11 September 1998 to implement Directive 97/69/EC. Ever since that date those man-made glass fibres that fulfil any of the physico-chemical conditions laid down in note Q of said Directive are no longer classified as a carcinogenic.

As we all know these requisites are based on biopersistence tests of the fibres within the organism. Why has biopersistence been chosen as the factor indicating the possible carcinogenic effect of the fibres? The current theories about the toxicity of the fibres consider the carcinogenic potential to be determined not only by the length and diameter of the fibres and their consequent capacity to penetrate to the alveolar region, but also the time they remain in the lungs. The longer they remain in the lungs the higher is the chance of tissue damage. We can to some extent control this new factor by varying the composition of the raw material used to make the fibre, i.e., replacing traditional glass by biosoluble glass. We then find that the half life of the fibres in the biopersistence tests is brought below the levels laid down in Note Q of said Ministerial Order.

Man-made glass fibres are the manufacturing material of a group of products whose most familiar representatives are insulation mineral wools (glass wool and rock wool).

For over a year now, the manufacturers of these products in Spain have had to obtain a certificate proving fulfilment by their products of the requirements laid down in said note Q. This certificate is issued by EUCEB (European Certification Board for Mineral Wool Products), an independent European watchdog body. This body carries out the corresponding inspections for granting of the certificates, thereby ensuring that the insulation mineral wools currently made in Spain are products not classified as carcinogenic.

Furthermore, Monograph 81 (Lyon/2002) of the IARC (International Agency for Research on Cancer), corresponding to this agency's Lyon meeting (Oct. 2001) concluded after carrying out numerous studies that «there is no evidence of any cancer risk to people caused by insulating mineral wool». It therefore concluded that these materials were «not classifiable as to carcinogenic to humans».

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As a result of all the above, the fibres of «insulating mineral wools» are now considered as «particles not otherwise classifiable». The threshold values applied to them will therefore be 10 mg/m<sup>3</sup> for the inhaled fraction and 3 mg/m<sup>3</sup> for the breathable fraction, in due accordance with the occupational exposure limits of chemical agents in Spain of the National Institute for Health and Safety at Work, 2003.

The aim of Act 31/95 is to establish the proper level of health protection for workers against risks deriving from working conditions. The right to be given information, to be consulted and trained in preventive and health surveillance matters forms part of the gamut of workers' rights to effective protection in terms of health and safety at work.

To this end the employer should in principle use two information sources: safety data sheets and the manufacturer's product labels. Furthermore, the prevention of occupational risks should be ensured by taking as many measures as might be necessary to protect workers' health and safety.

As regards the information to be given to the user of man-made glass fibres, Directive 97/69EC on the classification, packaging and labelling of dangerous substances lays it down that it is the obligation of the manufacturer or supplier to ensure that the product's packaging contains a label specifying the name of the substance and identification of the risks inherent thereto, plus the prudence recommendations to be

observed. This information is topped up by the product safety data sheet that has to accompany all products affected by Directive 2001/58/EC. The various sections of these safety data sheets deal with the following features more exhaustively than the labels: the identity of the product and of the manufacturer or supplier, its composition and classification, the risks involved in handling and storing the product, the necessary measures to be taken into account during the work in terms of personal safety and first aid and action to be taken in the event of emergency or fire. There is also a section on the disposal of waste.

Diverse measures will be applied to further ensure proper protection of the worker from occupational risks while handling the fibre, broken down into four levels of priority.

First and foremost, the ideal situation is for action to be taken either in the design stage of a product or the project phase of a productive process, whenever this is possible. The preventive measures will hence be more efficient and easier to adopt. They will also be cheaper than later action taken on the production plant or productive process.

As for manufacturers the action they can take is to modify the design of the product by using biosoluble glass fibre, thereby eliminating the exposure risk at source. Nonetheless the fibre might still have residual action on skin, eyes and mucous membranes, so preventive measures will have to be taken to avoid this effect on workers (it should be made clear here that any irritant

action of the manmade glass fibres has a mechanical and never chemical action).

Action on the source of the emission constitutes the second level of preventive measures. The user of these products can employ measures to substantially reduce the generation of dust, such as the replacement of saw-cutting systems by more modern water-cutting systems, which produce less dust, or measures to minimise the level of fibres in the air breathed by the worker, such as the installation of extraction systems at the particular points requiring same.

A third level of action involves measures taken on the fibre propagation medium.

During the production process of these materials there is always a fraction of fine fibres suspended in the air, to which the worker is exposed. The same goes for secondary handling by users. It is vital to prevent as far as possible the dispersion of these fibres in the air. This can be achieved by applying the following measures:

- Elimination of waste and off-cuts as soon as they are produced, using specific containers distributed along the whole production line.
- Cleaning the area if possible with absolute filter aspirators and moistening of the area if cleaning is by way of sweeping.
- Whenever a machine with insulating material or covered with fibre dust has to be repaired, the cleaning systems used must avoid any increase in the concentration of

fibres in the air. An example of such a system would be aspiration equipment with absolute filters.

- The fibre product should be packaged as it is being manufactured to cut down the time it can release fibres into the air. Similarly, the packaging should not be opened until the product is to be used by the users.

Lastly, the fourth level of action involves measures taken on the workers themselves or the users of these products. Training of the worker and user is vital here and also the furnishing of sufficient information on the product. During induction training all workers have to be informed of the risks bound up with their workplace and the measures to be followed to control these risks as far as they are capable of doing so. These measures include:

**Health measures:** supply of suitable facilities and measures for cleaning, changing and keeping clothes, and setting up of places specially fitted out for eating and drinking.

**Toxicological safety data sheets:** each workplace has to be furnished with safety data sheets on all chemical products and substances used in the work carried out; the worker involved has to be instructed in the way of obtaining and using the information shown in these data sheets.

**Work clothes:** it is important for the work clothes to cover as much of the body as possible. The material should favour respiration and the sleeves be closed off at the wrist to avoid penetration of the fibre.

**Use of personal protection equipment:** this is a key factor in avoiding the irritant action of the fibre. The use of gloves is essential to prevent contact of the fibre panels or pieces handled by the worker with the skin of the hands. Goggles prevent most of the dust from getting into the eyes. In special situations when the fibre levels are high, during cleaning operations for example, respiratory protection equipment will have to be used, specifically filtering equipment against dust particles. The ideal protection equipment is the classic dust mask with FFP1 protection and EC marking to assure its quality. If the environmental levels exceed the permitted exposure limit by a factor of 4, 10 or 50, the protection equipment used would have to be, respectively, a half-face mask with FFP2 protection, a half-face mask with FFP3 protection and a full face mask with FFP3 protection. It should be noted here that the employer is legally bound to furnish workers with the personal protection equipment and instruct them how to use it but the workers

themselves are bound to use it properly, make sure it is properly maintained and give notice when it needs to be replaced.

All the above can be summed up in the following conclusions:

- The insulating mineral wools made in Spain are not carcinogenic and the levels of occupational exposure are determined in terms of environmental dust, also called «particles not otherwise classified».
- In compliance with good prevention practices it is necessary to establish preventive measures in product design and the handling and environmental propagation processes.
- Following on from the indications given in the previous paragraph, and even on the understanding that the risks arising from insulating mineral wools are currently minimal, workers and users of these products should adopt personal protection measures while they are being handled, such as work clothes, gloves, goggles, etc. ■