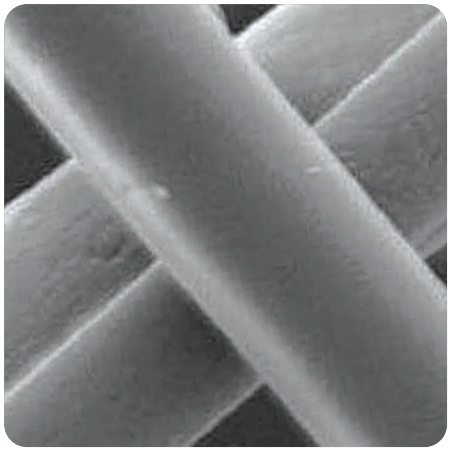
FACT SHEET

KEY HEALTH PROPERTIES



Key health properties - do low biopersistent fibres pose risks?

The key health property of all Superwool® products, including the latest member of the family, is that any fibres that might be breathed in and reach the lungs are rapidly removed. This characteristic is referred to as low biopersistent. The shorter the time a fibre remains in the body the lower the chance it can exert any effect and, by disappearing before being joined by other fibres, any accumulation is minimised.

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Low biopersistency is achieved by producing the fibres out of a glassy material, which partially dissolves and then fragments when it comes into contact with the fluids found in the lungs.

However, does this ensure that these fibres are really as safe as they can be?
Can we be sure that the fibre fragments and dissolved materials do not pose any danger?

Superwool® fibres are made only using chemical elements that are themselves generally regarded as safe. Non-fibrous materials with the same chemical composition as Superwool® are permitted ingredients in foods, medicines and cosmetics as well as having many uses in industry. In none of these applications has this group of compounds been found to be dangerous. Even fibrous calcium silicate is not regarded as carcinogenic by the World Health Organisation and is exonerated under the extremely rigorous German regulations and in the entire EU.

We are all exposed to considerable amounts of dust from environmental as well as industrial sources.

A lot of this dust resembles Superwool® fibres in that, among other components, it contains a great deal of silicates and calcium.

If fine enough to reach the lungs, this dust is removed by cells known as macrophages - the “dust carts” of the body. These cells with their dust content are swept up the airways, swallowed and the dust voided via the gut. Superwool® fibres, which are initially too long to be carried away by the macrophages, are partially dissolved and break into short pieces, which are then cleared in a similar manner to dust particles. Chalk and cement are good examples of dusts, which contain the same elements as Superwool® fibres. These also partially dissolve and their components enter the normal body content of these elements. These calcareous dusts do not cause disease unless they are contaminated by other materials.

Of course the body also needs a regular input, usually from food, of all the major elements making up Superwool®. A simple calculation taking into account Superwool® fibre workplace levels of fibrous dusts, the amount of air breathed and fibre deposition in the lungs, shows that fibre concentrations in the air would have to be hundreds of times greater than they are to provide inputs which even approach those from food.

It is true that the concentrations and distribution of these elements in the blood, tissue and other “compartments” is very carefully controlled by a number of more or less complicated mechanisms.

Maintaining this control is essential for good health.

Could inhaled Superwool® fibres affect these control mechanisms?
This is unlikely as the body can easily handle dusts with similar components. The dissolved elements coming from such dusts are the same as those which dissolve out of Superwool® fibres, and no effect of even large exposure to these materials has been detected.

Conclusion
Although AES fibres, such as Superwool®, are designed to dissolve and fragment after being inhaled, the chemical elements released into the body are the same as those commonly found in nuisance dusts or in food.

The quantity released is very small in comparison to these other sources and so the body's normal systems of regulation are easily able to cope.

These considerations have been central in the development of all Superwool® products.

Prof. R.C.Brown
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Fraunhofer Institut Toxikologie und Experimentelle Medizin

Certificate

The biopersistence of the fibre type Superwool 607 HT was investigated after intratracheal installation within the following study:
Fraunhofer ITEM study no.: 02G03012
Test substance: Superwool 607 HT
Sponsor: Thermal Ceramics Europe

This animal study was conducted in compliance with the Principles of Good Laboratory Practice (German Chemicals Law § 19a Appendix 1 pp. 2119-2129, June 28, 2002). The protocol of the European Commission (ECB/TM 27 Rev. 7, 1998) with slight changes according study protocol was followed.
The treatment of rats was performed in June 2003 by intratracheal instillation of a total dose of 2 mg per rat. The fibre retention data of sacrifice dates up to 3 months after instillation were used for analysis.

For the long fibres fraction (length > 20 µm, L/D>3/1) the halftime calculated by the method according to the protocol of the European Commission was:

< 40 days

According to Directive 67/548/EEC (revised by guideline 97/69/EG of the Commission dated December 5, 1997) Note Q the classification as carcinogenic material is not applicable for mineral wools if the halftime for fibres longer than 20 µm is less than 40 days in the biopersistence test by intratracheal instillation.

Hannover, February 18, 2004

Prof. Dr. Uwe Heinrich
Managing director of Fraunhofer ITEM

Dr. Bernd Bellmann
Study director

Superwool® Plus™

Insulating fibre

Features	Benefits
An engineered solution (unique)	Takes insulation beyond normal performance
Patented technology	Proven chemical formulation
Exonerated from Carcinogen classification under Nota Q of European Directive 67/548	**Restrictions on use do not apply. No special requirements for dust control, supply to the general public or waste disposal**
Lower thermal conductivity	Improves insulation by 20%
Up to 30% more fibres	Efficient prevention of heat transfer and greater strength
Less shot	Cleaner workplace
High Fibre Index	Up to 20% reduction in thermal conductivity giving energy saving
Stronger with good handleability (no tearing)	Ease of installation saving time and waste
Improved handling	Operator satisfaction
Soft & smooth feel	Less mechanical skin irritation
Consistent use of pure raw materials	Higher classification temperature, low shrinkage and consistent quality
Lower density grade for the same result	Material weight savings up to 25%
Thinner lining for the same result	Create more working space within unit
Resistant to vibration	Allows long lifetime under vibration conditions where other products fail
An environmental solution	Potential savings on waste disposal
Worldwide production	Availability

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SUPERWOOL® is a patented technology for high temperature insulation wools which have been developed to have a low bio persistence (information upon request). This product may be covered by one or more of the following patents, or their foreign equivalents:

SUPERWOOL® PLUS™ products are covered by patent numbers:
US5714421, US5994247, US6180546, US7259118, and EP0621858.

SUPERWOOL® 607HT™ products are covered by patent numbers:
US5955389, US6180546, US7259118, US7470641, US7651965, US7875566, EP0710628, EP1544177, and EP1725503

A list of foreign patent numbers is available upon request to The Morgan Crucible Company plc.

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