

Material Safety Data Sheet

according to 91/155/EEC for

Thermal Grease elNano[®] thin

1. Substance Identification, Preparation and Company Data

<i>Product:</i>	Carbon Nano-Fiber Polymer Compound Brand Name: elNano [®] thin	
<i>Substance:</i>	Synthetic filamentous Graphite Chemical Formula: C CAS-Number: 7782-42-5 (Graphite) Organic Polymer Matrix (Trade secret)	
<i>Use of the substance/preparation:</i>	Thermal Interface Material	
<i>Company/Undertaking Identification:</i>	Electrovac AG Aufeldgasse 37-39 A-3400 Klosterneuburg AUSTRIA	Telephone Numbers: +43 2243 450-0 +43 2243 450-698 (FAX)
<i>Date Prepared:</i>	June 27, 2005	
<i>Emergency telephone:</i>	+43 2243 450-130	

2. Compositions/Information on Ingredients

Chemical Composition:

	Carbon	Other
Carbon Nanofiber	% by Wt.: ≥ 99.5 Graphite	% by Wt.: < 0.5
Polymer Matrix Composition	Trade Secret	

<i>Hazard Symbol</i>	X	harmful (Company recommendation)
<i>R-Phrases:</i>	10, 20/21/22, 36/38	
<i>S-Phrases:</i>	7, 16, 25, 47	

3. Hazard Identification

Hazard designation: not regulated

According to article 14 of the Council Directive 67/548/EEC: Caution - not completely determined. When used according to the intended purpose no airborne carbon fibers form and no hazardous potential is likely to occur. High temperatures exceeding 150°C cause vapor or mist irritating to respiratory system and eyes; harmful: possible risk of irreversible effects through inhalation and eye contact.

To the best of our knowledge, the information contained herein is accurate. However, all materials may present unknown hazards and should be used with caution. Final determination of the suitability of any material is the sole responsibility of the user.

* Replacement character for product specification

4. First Aid Measures

Eye Contact: Remove paste from the eye and flush with clean water. If irritation occurs / persists, seek medical help.

Skin Contact: Wash skin with mild soap and water to remove material. If a rash develops, seek medical attention.

Inhalation: Remove from exposure. If respiratory irritation persists, seek medical help.

Ingestion: If any symptoms caused by ingestion arise, seek medical help.

5. Fire Extinguishing Instructions

ABC fire extinguisher, large quantities of water may be used to extinguish incipient stage fires. In case of large fires use breathing protection. Gaseous products stemming from burning of organic material must be generally considered as harmful as they contain considerable amounts of toxic CO and NO_x.

Additional Information:

Burning of material results substantial in formation of carbon black.

6. Accidental Release

Personal precautions: Provide for sufficient ventilation. See protective equipment listed in section 8. Remove sources of ignition. Ventilate area of leak or spill.

Environmental precautions: Do not empty into drains. If the product contaminates lakes, rivers or sewages, inform appropriate authorities in accordance with local regulations.

Methods for Cleaning-Up/Collecting: Absorb spillage with a wet cloth. Wipe up large amounts of spillage with a cloth and place in a plastic container for disposal.

Further handling of spillage: See section 13.

7. Handling and Storage

Keep away from sources of ignition; store material in closed containments in dry room-temperature environment. For long term storage keep container at a temperature not higher than 30 °C.

8. Exposure Controls and Personal Protection

Handling the material under ambient conditions does not require special personal protection. Use safety goggles, gloves or protective barrier cream.

9. Physical and Chemical Properties

<i>Appearance:</i>	Black Grease	<i>Odor:</i>	mild	<i>Boiling Range:</i>	180 – 350°C
<i>Vapor Pressure:</i>	N/A	<i>Vapor Density:</i>	N/A	<i>Flash Point:</i>	> 100°C
<i>Evaporation Rate:</i>	N/A	<i>Viscosity:</i>	N/A	<i>Density:</i>	1.3 g/mL

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<i>PAH</i>	<0.1 mg/kg	<i>Solubility in Water:</i>	Partly Soluble (Organic Components)
<i>Percent Solid by Weight:</i>			< 30%
<i>Particle Diameter:</i>			microns
<i>Average Diameter of Individual Single Fiber:</i>			100-200nm

10. Stability and Reactivity

The material as shipped is non-reactive (stable) under ambient conditions.

<i>Thermal Decomposition:</i>	Above 180°C.
<i>Thermal Combustion:</i>	Incomplete combustion/combustion leads to formation of Carbon Dioxide, Carbon Monoxide and Nitric Oxides.
<i>Conditions to Avoid:</i>	Avoid unwanted, uncontrolled reactions with strong oxidizers, concentrated acids and bases.

11. Toxicological Information

Practical Experiences with Humans: To our knowledge so far no hazardous effects occurred using this product.

As shipped, the material has no known toxicological properties other than causing allergic reactions in individuals sensitive to substances contained in the product. However, user generated spill may on contact with the skin or eyes produce irritation. Chronic exposure could cause dermatitis (skin) or conjunctivitis (eyes). Excessive inhalation of user generated vapors may pose a health hazard.

The following information is directed to the ingredients of the material listed in Section 2.

Carbon Nanofiber:

Animal Toxicity Studies: Chronic inflammation, lung fibrosis and lung tumors have been observed in some rats experimentally exposed, for long periods of time, to very high concentrations of carbon black and several other insoluble fine dust particles. Tumors have not been observed in other animal species (i.e. mouse and hamster) under similar circumstances and study conditions. Researchers conducting the rat inhalation studies believe that these effects most likely result from the massive accumulation of small dust particles in the lung which overwhelm the natural lung clearance mechanisms, known as the "lung overload" phenomenon, rather than from a specific chemical effect of the dust particles in the lung.

Human studies: In Monograph 65, issued in April 1996, the International Agency for Research on Cancer (IARC) re-evaluated carbon black and concluded that, "Although one cohort study on the carbon black production industry showed slight excesses of cancer, the totality of the epidemiology studies, both in the carbon black production industry and in some user industries, suggested that there is inadequate evidence for the carcinogenicity in humans of carbon black".

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Carcinogenicity: Based on an IARC conclusion that there is "sufficient evidence in experimental animals for the carcinogenicity of carbon black" and inadequate evidence of carcinogenicity in humans, IARC's overall evaluation is that "carbon black is possibly carcinogenic to humans" (Group 2B).

Carbon black has not been listed as a carcinogen by the National Toxicology Program (NTP) or the Occupational Safety and Health Administration (OSHA). The National Institute of Occupational Safety & Health (NIOSH) criteria document on carbon black recommends that only carbon blacks with PAH levels greater than 0.1 % be considered suspect carcinogens.

Polymer/Organic Matrix Constituents:

Use of the product as intended does not provide any risk and/or health hazard.

To the best of our knowledge the chemical, physical and toxicological properties have not been fully investigated. Contact may cause irritation to eyes, skin and respiratory tract. Absorption through skin or inhalation of heated vapor and mist may result in central nervous system and adverse reproductive effects.

Acute Toxicity Values:

LD50 oral rat 10g/kg
LD50 skin rabbit 5 mL/kg

Skin/eye irritation data according to RTECS:

Skin rabbit 500 mg 24 h weak irritation
Eyes rabbit 50 mg strong irritation
Eyes rabbit 20 mg 24 h moderate irritation

Potential Health Effects:

Routes of Entry:	Inhalation, Eyes, Skin, Ingestion.
Target Organs:	Central Nervous System, Gastrointestinal Tract, Reproductive System.
Irritancy:	Skin, Eyes.
Sensitizing Capability:	None known.
Reproductive Effects:	Animal studies indicate high doses may cause adverse reproductive effects.
Cancer Information:	Not known to be carcinogenic.

12. Ecological Information

Do not discharge product unmonitored into the environment.

13. Disposal Considerations

Recommendations for Product:

The product may be disposed under controlled incineration and/or in agreement with local and national regulation.

Recommendations for Packaging:

Empty used and/or contaminated packaging may be recycled after appropriate cleaning procedure. Packaging which can not be cleaned requires disposal as the product itself.

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14. Transportation Information

<i>General information:</i>	This product is not considered hazardous for transportation.	
<i>Road transport:</i>	ADR/RID/GGVS/GGVE:	No hazardous goods.
<i>Marine transport:</i>	IMDG/GGVSee:	No hazardous goods.
<i>Air transport:</i>	ICAO/IATA-DGR:	No hazardous goods.

15. Regulatory Information

Hazard Symbol "X" harmful (Company recommendation)
Risk- and Safety-phrases according to directive 67/548/EEC

R-Phrase Labeling

R10	Flammable
R36/38	Irritating to skin and eyes
R20/21/22	Harmful by inhalation, in contact with skin and if swallowed

S-Phrase Labeling

S7	Keep container tightly closed
S16	Keep away from sources of ignition - No smoking
S25	Avoid contact with eyes
S47	Keep container at temperature not exceeding 50°C

Special training: No special training is anticipated, however, the worker should be well instructed for the execution of his task, have knowledge of this Safety Data Sheet and normal training in use of personal protective equipment.

16. Other Information

Disclaimer: The data and information presented herein corresponds to the present state of our knowledge and experience and is intended to describe our product with respect to possible occupational safety and health concerns. The user of this product has sole responsibility to determine the suitability of the product for any use and manner of use in the relevant jurisdiction. This MSDS is updated on a periodic basis in accordance with applicable health and safety standards.

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