MATERIAL SAFETY DATA SHEET

Product Name                     FR-1210
Product id                       8426
Revision date                    07/08/2008
Supersedes                       05/06/2008

Revision: 8

1. Identification of the substance & the company

Chemical name              Decabromodiphenyl oxide
Synonym(s)                  DBDPO (decabromodiphenyl oxide), bis(pentabromophenyl) ether, decabromodiphenyl ether, Deca, Benzene,1,1'-oxybis(2,3,4,5,6-pentabromo-, DBDPE (decabromodiphenyl ether)
Chemical formula           C_{12}Br_{10}O
Chemical family            Polybrominated diphenyl oxides
Molecular weight           959.2
Type of product and use    An inert additive flame retardant for use in a variety of polymers and fibers

Emergency telephone number:
- For Europe                (+31) 115 689000
- For UK and Ireland       (01865)407333
- For Australia & NZ       Marchem (03) 93677733
- For Asia - Pacific       ALERT-SGS
                           24 hr Toll Free Number : +800 ALERTSGS (+800-2537-8747)
                           24 hr Singapore Exchange Number : +65 6542-9595
- For Japan                (03)3552-1611

2. Hazards identification

Adverse human health effects No adverse health effects in human are known

3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>Weight %</th>
<th>Annex No.</th>
<th>-EEC No.</th>
<th>EU Classification</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decabromodiphenyl oxide 1163-19-5</td>
<td>97</td>
<td></td>
<td>214-604-9</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

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4. **First-aid measures**

**Eye contact**  
Holding the eyelids apart, flush eyes promptly with copious flowing water for at least 20 minutes. Get medical attention immediately.

**Skin contact**  
Remove contaminated clothing. Wash skin thoroughly with mild soap and plenty of water for at least 15 minutes. Wash clothing before re-use. Get medical attention if irritation occurs.

**Inhalation**  
In case of dust inhalation or breathing fumes released from heated material, remove person to fresh air. Keep him quiet and warm. Apply artificial respiration if necessary and get medical attention immediately.

**Ingestion**  
If swallowed, wash mouth thoroughly with plenty of water and give water to drink. Get medical attention immediately.

**NOTE:** Never give an unconscious person anything to drink.

---

5. **Fire - fighting measures**

**Suitable extinguishing media**  
Material is not combustible. Use extinguishing media appropriate to surrounding fire conditions.

**Fire fighting procedure**  
Cool containers with water spray. In closed areas, provide fire-fighters with self-contained breathing apparatus in positive pressure mode.

**Unusual fire and explosion hazards**  
When heated to decomposition, may release poisonous and corrosive fumes of Bromine, Carbon Monoxide, Carbon Dioxide and Hydrogen Bromide.

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6. **Accidental release measures**

**Personal precautions**  
Wear respirator, chemical safety goggles, rubber gloves and boots
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Methods for cleaning up
Shovel into intact packaging and hold for waste disposal or possible re-use. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

7. Handling and storage

Handling
Keep containers tightly closed. Avoid bodily contact.

Storage
Store in a dry, cool, well-ventilated area away from incompatible materials (see "materials to avoid").

8. Exposure controls / personal protection

Exposure Limits:

<table>
<thead>
<tr>
<th>Components</th>
<th>ACGIH-TLV Data</th>
<th>OSHA (PEL) Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decabromodiphenyl oxide</td>
<td>Not determined</td>
<td>Not determined</td>
</tr>
<tr>
<td>1163-19-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Exposure Limits:
The American Industrial Hygiene Association (AIHA) recommends Workplace Environmental Exposure Level (WEEL): 8-hr Time-weighted Average (TWA) of 5 mg/m², skin.

Ventilation requirements
Ventilation must be sufficient to maintain atmospheric concentration below recommended exposure limit.

Personal protective equipment:
- Respiratory protection: Dust respirator
- Hand protection: Protective gloves
- Eye protection: Chemical safety goggles
- Skin and body protection: Body covering clothes and boots

Hygiene measures
Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking. Safety shower and eye bath should be provided.
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9. Physical and chemical properties

Appearance: White to off-white, fine, free-flowing powder, odourless
Melting point/range: 300-310°C
Boiling point/range: Not applicable
Flash point: None
Flammable/Explosion limits: Not flammable
Auto-ignition temperature: Not applicable
Vapour pressure: 4.63x10⁻⁶ Pa (21°C)
Vapor density: Not applicable under standard conditions
Evaporation rate (ether=1): Not applicable under standard conditions
Solubility:
- Solubility in water: <0.1ug/l at 25°C
- Solubility in other solvents: Very slightly soluble in common organic solvents
Density: 3.4 g/mL (25°C)
Specific gravity: 3.0
Decomposition temperature: 362°C
Partition coefficient (n-octanol/water): Log Kow - 6.265

10. Stability and reactivity

Stability: Stable under normal conditions
Materials to avoid: Strong oxidants.
Conditions to avoid: Heating above decomposition temperature
Hazardous decomposition products: CO, CO2, HBr & Br₂
Hazardous polymerization: Will not occur

11. Toxicological information

Acute toxicity:
- Rat oral LD50: >5,000 mg/kg
- Rabbit dermal LD50: > 2000 mg/kg
- Rat inhalation LC50: > 48.2 mg/l
- Eye irritation (rabbit): Not irritant
- Dermal irritation (rabbit): Not irritant

Effects of overexposure:
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</tbody>
</table>

- Ocular
  - Not irritant

- Dermal
  - Not irritant

Chronic toxicity
  - No data available

Mutagenicity
  - Not mutagenic by the Ames Test and by mouse lymphoma assay.
  - Negative in chromosome abberation and sister chromatid exchange tests in Chinese hamster ovary cells.

Carcinogenicity
  - IARC Group 3 (animal inadequate evidence, human no data available)
  - NTP 2-year feed studies with decabromodiphenyl ether showed some evidence of liver nodules in male and female rats and equivocal evidence for male mice at very high doses (>25,000 ppm).
  - No evidence for this effect in female mice.
  - Not included in NTP 11th Report on Carcinogens

Developmental toxicity
  - In the oral developmental toxicity study in rats with decabromodiphenyl ether the NOEL (No Observed Effect Level) for maternal and developmental toxicity was 1000 mg/kg/day

12. Ecological information

Information on ecological effects
  - Plastic containing FR-1210 treated in a modern up to date incinerator produces an incineration gas, which is analysed, showed no polybrominated Dibenzo-dioxins and Dibenzo-furans present at a level higher than the limits of quantitation (LOQs) specified by US EPA Toxic Substances Control Act (TSCA) 40 CFR 766.27 and are below the limits specified in the German Ordinance "Chemikalien-Verbotsverordnung".

Environmental fate
  - FR-1210 was determined to be persistent: Not readily biodegradable.
  - Not inherently biodegradable.
  - The high log Kow value (6.27) indicates that the product will adsorb strongly onto sludge and sediments and is not expected to be mobile in soil. The potential for uptake and accumulation of the substance by fish and other aquatic and terrestrial organisms appears to be low.

No effects on aquatic organisms are expected to occur at concentrations up to the substances water solubility.

Reproduction
  - The No Observed Effect Concentration (NOEC) for reproduction in Earthworm after exposure of 28 day is 4910 mg/kg dry soil.
13. Disposal considerations

Waste disposal The recommended method is incineration (see also section 16). Observe all federal, state and local environmental regulations when disposing of this material.

14. Transportation information

IMO Not regulated
ADR/RID Not regulated
ICAO/IATA Not regulated
DOT Not regulated

15. Regulatory information

EU EU risk assessment under Regulation 793/93/EC conducted on Deca-BDE confirms that there are no significant risks to the environment or human health which would justify risk reduction measures.
In contradiction to this publication, commercial deca-BDE is restricted under the European Union Directive 2002/95/EC, "Restriction on Use of Hazardous Substances" (RoHS) restrictions in electronics and electrical equipment.
-EEC No. 214-604-9
- Indication of danger Not subject to labelling in accordance with EEC Directives.
USA Reported in the EPA TSCA Inventory. TSCA Section 12b - Export notification is required per a final test rule under Section 4(a).
Australia Listed in AICS
This substance is on the National Pollutant Inventory (NPI) of Australia.
This substance is listed under PART 1, Group 1 Substances
Canada Listed in DSL
This substance is listed under Part 1, Group 1 Substances in the National Pollutant Release Inventory (NPRI) for 2008. Information about this substance must be reported to the Minister of the Environment in accordance with subsection 46(1) of the Canadian Environmental Protection Act, 1999.
Not listed in WHMIS.
China inventory Listed
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Japan
Type II Minitoring Chemical Substances. ISHL No. 4-(14)-149

Japanese METI
ENCS No.3-2846

Korea
Listed in ECL (KE-27715)

New Zealand Inventory
Listed in NZIoC

Philippines
Listed in PICCS

Singapore
Listed in the Hazardous Substances Control List as a member of the generic group; Polybrominated diphenyl ethers.

Switzerland
Listed in Giftliste 1 (G-8308)

Taiwan
Taiwan Toxic Chemical Substances List. This is Class IV toxic chemical. Minimum control level is 30 w/w%.
TAIWAN No.:91-01

16. Other information

This data sheet contains changes from the previous version in section(s)
12, 13, 15, 16

The product FR-1210 is not classified as a dangerous chemical under the criteria of Directive 67/548/EC (see § 15). The product FR-1210 was investigated in an EU Risk Assessment and no risks for human health or the environment were identified.
However, the product is persistent, therefore, manufacturers using FR-1210 should adopt good working practice during processing and avoid any emissions to the environment. It is recommended that FR-1210 waste should be incinerated under appropriate conditions.
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1. Norway and the European Union, have prohibited the manufacture, import, and commercialisation of electrical and electronic equipment (the scope of such equipment is to be determined in accordance with every such country’s applicable law) containing Deca-BDE.

2. The use of Deca-BDE must be in conformity with the applicable law including the aforesaid prohibition. It is the responsibility of the holder of this Safety Data Sheet to verify the existence of any such prohibition and not to sell, import, commercialise or otherwise use of Deca-BDE in products, articles, preparations and other objects designated for electrical and electronic equipment in any jurisdiction where regulations prohibiting such sale, import, commercialisation or other such use are in application.

3. It is the responsibility of the holder of this Safety Data Sheet to ensure that its customers or any other party receiving from it products containing Deca-BDE are prohibited to the same extent mentioned above in sections 1 and 2.

Health, Safety & Environment Policy
We will strive to ensure that our operations and products meet the needs of the present global community without compromising the ability of future generations to meet their needs.
We accept that the success of our business is dependent on the supply of products and services that will benefit society whilst ensuring human safety and protection of the environment and natural resources.
Within the framework of our commitment to the Responsible Care program, we will provide a healthy and safe work environment for employees and will responsibly manage our products at all stages of their life cycle in order to protect human health and the environment whilst maintaining high production standards of operation.

TO MEET THIS COMMITMENT WE WILL:
Comply with or exceed applicable national and international regulatory requirements and other requirements to which we subscribe.
Communicate openly and actively encourage dialogue with employees, customers and community concerning our products and operations.
Implement documented management systems consistent with and for promotion of the Responsible Care ethics.
Develop and supply products that can be manufactured, transported, used and disposed of safely whilst best meeting the needs of our customers.
Regularly assess, continually improve and responsibly manage health, safety and environmental risks associated with products and processes throughout their life-cycles.
Share knowledge and expertise with others and seek to learn from and incorporate improved practices into our own operations.
Educate and train employees, contractors and customers to improve their HSE performance.
Communicate up-to-date information to enable our workers, customers and other interested parties to handle our products in a safe and environmentally responsible manner.
Endeavor to work with customers, suppliers, distributors and contractors to foster the safe use, transport and disposal of our chemicals.
Support Product Stewardship programs in cooperation with customers, distributors and transporters.
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End of safety data sheet