SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Trade name/designation:

FK9931M-200

Other means of identification:
AgPd Widerstandspaste für AlN FK9931M-200

Article No.:
10093

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture:
Dickschichtpaste

Relevant identified uses:
- Sector of uses [SU]
  - SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
- Product Categories [PC]
- Process categories [PROC]
- Environmental release categories [ERC]
- Article categories [AC]

1.3. Details of the supplier of the safety data sheet

Supplier (manufacturer/importer/only representative/downstream user/distributor):
Fraunhofer IKTS
Intelligente Mikrosysteme
Winterbergstraße 28
01277 Dresden
Germany

Telephone: +49-351-2553-7916
Telefax: +49-351-2554-236
E-mail: service@ikts-tfc.de
Website: www.ikts.fraunhofer.de
E-mail (competent person): service@ikts-tfc.de

1.4. Emergency telephone number

Richard Schmidt, +49-351-2553-7916/-7518 (Only available during office hours.)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 [CLP]:

<table>
<thead>
<tr>
<th>Hazard classes and hazard categories</th>
<th>Hazard statements</th>
<th>Classification procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous to the aquatic environment (Aquatic Acute 1)</td>
<td>H400: Very toxic to aquatic life.</td>
<td></td>
</tr>
<tr>
<td>Hazardous to the aquatic environment (Aquatic Chronic 2)</td>
<td>H411: Toxic to aquatic life with long lasting effects.</td>
<td></td>
</tr>
</tbody>
</table>
2.2. Label elements
Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms:

GHS09
Environment

Signal word: Warning

<table>
<thead>
<tr>
<th>hazard statements for environmental hazards</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H400</td>
<td>Very toxic to aquatic life.</td>
</tr>
<tr>
<td>H411</td>
<td>Toxic to aquatic life with long lasting effects.</td>
</tr>
</tbody>
</table>

Supplemental Hazard information (EU):

- 

Precautionary statements Prevention

P260
Do not breathe dust/fume/gas/mist/vapours/spray.

P273
Avoid release to the environment.

P281
Use personal protective equipment as required.

Precautionary statements Response

P302 + P352.1
IF ON SKIN: Wash with plenty of soap and water.

P305 + P351 + P38
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Precautionary statements Storage

P403 + P233
Store in a well-ventilated place. Keep container tightly closed.

Precautionary statements Disposal

P501
Dispose of contents/container to Dispose of waste according to applicable legislation.

Special rules for supplemental label elements for certain mixtures:
77.3% percent of the mixture consists of ingredient(s) of unknown acute toxicity (oral).
77.3% percent of the mixture consists of ingredient(s) of unknown acute toxicity (dermal).
77.3% percent of the mixture consists of ingredient(s) of unknown acute toxicity (inhalative).
53.0% percent of the mixture consists of components of unknown hazards to the aquatic environment.

2.3. Other hazards
No data available

SECTION 3: Composition / information on ingredients

3.2. Mixtures

Description:
Precious metals, glass and inorganic additives embedded in an organic vehicle.

Hazardous ingredients / Hazardous impurities / Stabilisers:

<table>
<thead>
<tr>
<th>product identifiers</th>
<th>Substance name</th>
<th>Classification according to Regulation (EC) No 1272/2008 [CLP]</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS No.: 7440-22-4</td>
<td>silver</td>
<td>Aquatic Acute 1, Aquatic Chronic 1</td>
<td>14 – 25 Wt %</td>
</tr>
<tr>
<td>EC No.: 231-131-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Full text of H- and EUH-phrases: see section 16.
SECTION 4: First aid measures

4.1. Description of first aid measures

General information:
In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible). Remove victim out of the danger area. Remove contaminated, saturated clothing. If unconscious place in recovery position and seek medical advice. Do not leave affected person unattended.

Following inhalation:
Provide fresh air.

After eye contact:
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

After ingestion:
Rinse mouth. Let water be drunken in little sips (dilution effect). Get medical advice/attention if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed
No data available

4.3. Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water spray jet, alcohol resistant foam, Extinguishing powder, Carbon dioxide (CO2). Co-ordinate firefighting measures to the fire surroundings.

Unsuitable extinguishing media:
High power water jet

5.2. Special hazards arising from the substance or mixture

Combustible

Hazardous combustion products:
In case of fire: Gases/vapours, toxic

5.3. Advice for firefighters

Wear a self-contained breathing apparatus and chemical protective clothing.

5.4. Additional information

Collect contaminated fire extinguishing water separately. Do not allow entering drains or surface water.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Personal precautions:
Remove persons to safety.

Protective equipment:
Wear protective gloves/protective clothing/eye protection/face protection.

6.1.2. For emergency responders

Personal protection equipment:
Personal protection equipment: see section 8

6.2. Environmental precautions

Do not allow to enter into surface water or drains.
6.3. Methods and material for containment and cleaning up

For containment:
Collect spillage. Measures to prevent aerosol and dust generation. Wet clean or vacuum up solids.

For cleaning up:
Water (with cleaning agent)

6.4. Reference to other sections
Safe handling: see section 7
Personal protection equipment: see section 8
Disposal: see section 13

6.5. Additional information
Use appropriate container to avoid environmental contamination.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Protective measures

Advices on safe handling:
Wear personal protection equipment (refer to section 8).

Measures to prevent aerosol and dust generation:
Dust should be exhausted directly at the point of origin.

Advices on general occupational hygiene
When using do not eat, drink or smoke. Avoid contact with eyes and skin.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions:
Keep container tightly closed in a cool, well-ventilated place.

Storage class: 10 – Combustible liquids that cannot be assigned to any of the above storage classes.

7.3. Specific end use(s)
No data available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1. Occupational exposure limit values

<table>
<thead>
<tr>
<th>Limit value type (country of origin)</th>
<th>Substance name</th>
<th>① long-term occupational exposure limit value</th>
<th>② short-term occupational exposure limit value</th>
<th>③ Instantaneous value</th>
<th>④ Monitoring and observation processes</th>
<th>⑤ Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRGS 900 (DE)</td>
<td>silver CAS No.: 7440-22-4</td>
<td>① 0.1 mg/m³</td>
<td>② 0.8 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOELV (EU)</td>
<td>silver CAS No.: 7440-22-4</td>
<td>① 0.1 mg/m³</td>
<td>② 0.8 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.1.2. Biological limit values
No data available
8.1.3. DNEL-/PNEC-values

<table>
<thead>
<tr>
<th>Substance name</th>
<th>DNEL value</th>
<th>① DNEL type</th>
<th>② Exposure route</th>
</tr>
</thead>
<tbody>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>49 mg/m³</td>
<td>① DNEL worker</td>
<td>② DNEL long-term inhalative (systemic)</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>13.9 mg/kg</td>
<td>① DNEL worker</td>
<td>② DNEL long-term dermal (systemic)</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>8.3 mg/kg</td>
<td>① DNEL worker</td>
<td>② DNEL long-term oral (repeated)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Substance name</th>
<th>PNEC Value</th>
<th>① PNEC type</th>
</tr>
</thead>
<tbody>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>0.015 mg/l</td>
<td>① PNEC aquatic, freshwater</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>0.0015 mg/l</td>
<td>① PNEC aquatic, marine water</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>0.017 mg/kg</td>
<td>① PNEC sediment, freshwater</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>0.0017 mg/kg</td>
<td>① PNEC sediment, marine water</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>0.13 mg/kg</td>
<td>① PNEC soil, freshwater</td>
</tr>
<tr>
<td>isobutyric acid, monoester with 2,2,4-trimethylpentane-1,3-diol CAS No.: 25265-77-4</td>
<td>7.5 mg/l</td>
<td>① PNEC sewage treatment plant (STP)</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

8.2.1. Appropriate engineering controls
No data available

8.2.2. Personal protection equipment

Eye/face protection:
Eye glasses with side protection

Skin protection:
Tested protective gloves must be worn DIN EN 374 Suitable material: PVC (Polyvinyl chloride). Breakthrough time (maximum wearing time) 60 min. In the case of wanting to use the gloves again, clean them before taking off and air them well.

Respiratory protection:
If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn. Particle filter device (DIN EN 143)

8.2.3. Environmental exposure controls
No data available

8.3. Additional information
No data available

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance
Physical state: solid
Odour: not determined
Colour: dark grey
**SAFETY DATA SHEET**
according to Regulation (EC) No. 1907/2006 (REACH)

**Revision date:** 17-Sep-2015  
**Print date:** 18-Sep-2015  
**Version:** 3  
Page 6/9

**FK9931M-200**

### Safety relevant basis data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>at °C</th>
<th>Method</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>&lt; -70 °C</td>
<td></td>
<td>Overtaken from organic solvent of the paste (CAS#25265-77-4)</td>
</tr>
<tr>
<td>Freezing point</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>≥ 255 – ≤ 261.5 °C</td>
<td>(102.4 kPa)</td>
<td>Overtaken from organic solvent of the paste (CAS#25265-77-4)</td>
</tr>
<tr>
<td>Decomposition temperature (°C):</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>122 °C</td>
<td>closed cup</td>
<td>Overtaken from organic solvent of the paste (CAS#25265-77-4)</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition temperature in °C</td>
<td>393 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>= 0.006 mbar</td>
<td>20 °C</td>
<td>Overtaken from organic solvent of the paste (CAS#25265-77-4)</td>
</tr>
<tr>
<td>Vapour density</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>= 2.68 g/cm³</td>
<td>25 °C</td>
<td>calculated from ingredients</td>
</tr>
<tr>
<td>Bulk density</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water solubility (g/L)</td>
<td>≥ 0.5 – ≤ 3.79 g/l</td>
<td>25 °C</td>
<td>Overtaken from organic solvent of the paste (CAS#25265-77-4)</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>= 3.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>not determined</td>
<td>40 °C</td>
<td></td>
</tr>
</tbody>
</table>

**9.2. Other information**  
No data available

### SECTION 10: Stability and reactivity

#### 10.1. Reactivity  
Risk of explosion if heated under confinement. Combustible

#### 10.2. Chemical stability  
The mixture is chemically stable under recommended conditions of storage, use and temperature.

#### 10.3. Possibility of hazardous reactions  
This material is considered to be non-reactive under normal use conditions.

#### 10.4. Conditions to avoid  
Do not store at temperatures above 35 °C

#### 10.5. Incompatible materials  
Oxidising agent

#### 10.6. Hazardous decomposition products  
In case of fire: Gases/vapours, toxic

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects  
No data available
SECTION 12: Ecological information

12.1. Toxicity

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Substance name</th>
<th>Toxicological information</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-22-4</td>
<td>silver</td>
<td>( \text{LC}_{50} = 0.0102 \text{ mg/l} \ 4 \text{ d (anguilla anguilla)} ) Partikelgröße &lt; 1 µm</td>
</tr>
</tbody>
</table>

Aquatic toxicity:
Very toxic to aquatic life with long lasting effects.

12.2. Persistence and degradability

No data available

12.3. Bioaccumulative potential

Partition coefficient: n-octanol/water:
\[ = 3.54; \text{Remark: Overtaken from organic solvent of the paste (CAS#25265-77-4)} \]

12.4. Mobility in soil

No data available

12.5. Results of PBT and vPvB assessment

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Substance name</th>
<th>Results of PBT and vPvB assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-22-4</td>
<td>silver</td>
<td>—</td>
</tr>
</tbody>
</table>

12.6. Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

13.1.1. Product/Packaging disposal

Waste codes/waste designations according to EWC/AVV

<table>
<thead>
<tr>
<th>Waste code product</th>
<th>Laboratory chemicals consisting of or containing dangerous substances including mixtures of laboratory chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 05 06 *</td>
<td></td>
</tr>
</tbody>
</table>

*: Evidence for disposal must be provided.

Waste code packaging:

Remark:
Handle contaminated packages in the same way as the substance itself.

Waste treatment options

Appropriate disposal / Product:
Dispose of waste according to applicable legislation. Consult the appropriate local waste disposal expert about waste disposal.

Appropriate disposal / Package:
Completely emptied packages can be recycled.

13.2. Additional information

No data available

SECTION 14: Transport information

No dangerous good in sense of these transport regulations.

14.1. UN-No.

not relevant

14.2. UN proper shipping name

not relevant
14.3. Transport hazard class(es)  
not relevant  

14.4. Packing group  
not relevant  

14.5. Environmental hazards  
not relevant  

14.6. Special precautions for user  
not relevant  

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code  
not relevant  

SECTION 15: Regulatory information  

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture  

15.1.1. EU legislation  
No data available  

15.1.2. National regulations  
[DE] National regulations  

Restrictions of occupation  
5 MuSchRiV. 22 JArbSchG.  

Water hazard class (WGK)  
WG:  
2 - deutlich wassergefährdend  

Source:  
Classification according to VwVwS, Annex 4.  

15.2. Chemical Safety Assessment  
Chemical safety assessments for substances in this mixture were not carried out.  

15.3. Additional information  
No data available  

SECTION 16: Other information  

16.1. Indication of changes  
Classification according to Regulation (EC) No 1272/2008 [CLP]  

16.2. Abbreviations and acronyms  
No data available  

16.3. Key literature references and sources for data  
No data available  

16.4. Classification for mixtures and used evaluation method according to regulation (EC) No 1272/2008 [CLP]  
Classification according to Regulation (EC) No 1272/2008 [CLP]:  

<table>
<thead>
<tr>
<th>Hazard classes and hazard categories</th>
<th>Hazard statements</th>
<th>Classification procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous to the aquatic environment (Aquatic Acute 1)</td>
<td>H400: Very toxic to aquatic life.</td>
<td></td>
</tr>
<tr>
<td>Hazardous to the aquatic environment (Aquatic Chronic 2)</td>
<td>H411: Toxic to aquatic life with long lasting effects.</td>
<td></td>
</tr>
</tbody>
</table>
16.5. Relevant R-, H- and EUH-phrases (Number and full text)

<table>
<thead>
<tr>
<th>Hazard statements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H400</td>
<td>Very toxic to aquatic life.</td>
</tr>
<tr>
<td>H410</td>
<td>Very toxic to aquatic life with long lasting effects.</td>
</tr>
</tbody>
</table>

16.6. Training advice

No data available

16.7. Additional information

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new made-up material.