

**Product name:** EM-Tec AG20 conductive silver pen  
**Document Nr.:** SDS0015002520-01

**Date:** February 1st 2022  
**Version:** 2.0

## Section 1: Identification of the substance or mixture and the company

### 1.1. Product Identifier

EM-Tec AG20 conductive silver pen with micro tip

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

For making grounding paths on SEM samples, repairing traces on circuit boards, making contact pads.

### 1.3. Details of the supplier of the Safety Data Sheet

Vof Micro to Nano  
Tappersweg 91  
2031ET Haarlem  
Netherlands  
Tel: +31(0)85-2013155  
E: info@microtonano.com

### 1.4 Emergency telephone number

112 (NLD) or your national emergency telephone number for chemical spills, leaks, fires, exposures or accidents

## Section 2: Hazards identification

### 2.1. Classification of the substance or mixture

<b>Physical:</b>	Flammable liquid, category 2 Highly flammable liquid and vapour
<b>Health:</b>	Aspiration irritation, category 1 Skin corrosion/irritation category 2 Eye irritation, category 2 Reproductive toxicity category 3 May cause drowsiness or dizziness
<b>Environment:</b>	Chronic aquatic hazard category 1
<b>Other hazards:</b>	None

### Classification according to Regulation EC Nr. 1272/2008

F: HIGHLY FLAMMABLE  
Xi: Irritant  
Xn: Harmful



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<b>Health:</b>	R36: Irritating to eyes R38: Irritating to skin R48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation R62 (3): Possible risk of impaired fertility R63 (3): Possible risk of harm to the unborn child R67: Vapours may cause drowsiness and dizziness
<b>Physical Environment:</b>	R11: Highly flammable R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
<b>Other hazards:</b>	Not classified

## 2.2 Labeling elements

### Labelling accordance to Regulation EC Nr. 1272/2008

**Hazard pictogramm(s):**



**Signal word:**

**Danger**

**Hazard statement(s):**

H225: Highly flammable liquid and vapour  
H315: Causes skin irritation  
H319: Causes serious eye irritation  
H336: May cause drowsiness or dizziness  
H361d: Suspected of damage to the unborn child  
H373: May cause damage to organs through prolonged or repeated exposure  
H410: Very toxic to aquatic life with long lasting effects

**Precautionary statement(s)**

**Prevention:**

P102: Keep out of reach of children  
P 201: Obtain special instructions before use  
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking  
P233: Keep container tightly closed  
P260: Do not breath dust/fumes/gas/mist/vapours/spray  
P264: Wash hand thoroughly after handling  
P270: Do not eat, drink or smoke when using this product  
P 271: Use outdoors or in well ventilated area (fume hood)  
P 273: Avoid release to the environment  
P280: Wear protective gloves/protective clothing/eye protection/face protection

**Response:**

P301+P310: If swallowed: Immediately call a poison Center/doctor/physician/first aider  
P308+P313: If exposed or concerned: Get medical attention



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P331: No NOT induce vomiting  
P312: Call a poison center/doctor/physician/first aider if you feel unwell  
P370+P378: In case of fire: Use alcohol resistant foam or protein foam for extinction  
P305+P351+P338: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if easy to do. Continue rinsing.  
P337+P313: If eye irritation persists: Get medical attention  
P302+P352: If on skin: Wash with plenty of water and soap.  
P304+P340: If inhaled: Remove person to fresh air and keep comfortable for breathing  
P332+P313: If skin irritation occurs: Get medical attention  
P362+P364: Take of contaminated clothing and wash before reuse  
P391: Collect spillage  
**Storage:** P403+P235: Store in a well-ventilated place. Keep cool  
P405: Store locked up  
**Disposal:** P501: Dispose of contents/container in accordance to local/regional/international regulations  
**Supplemental hazard info:** none

## 2.3 Other hazards

Skin dryness; repeated exposure may cause skin dryness or cracking

## Section 3: Composition / information on components

### 3.1. Substances

Not applicable

### 3.2 Mixtures

1. CAS Nr 2. EC Nr 3. Index Nr 4. REACH No	% (weight)	Name	Classification according to directive 67/548/EEC [DSD]	Classification according to regulation Nr 1272/2008 [CLP]
108-88-3 203-625-9 601-021-00-3 01-2119471310-51-xxxx	12-14	toluene	R11R38R48/20R63 R65R67	Flam.Liq. 2, Repr. 2, Asp Tox. 1 STOT RE 2, Skin Irrit.2, STOT RE 3, H225, H361d, H304, H373, H315, H336(3)
7440-22-4 231-131-3 not available 01-2119555669-21-xxxx	45-50	silver	R52	Not applicable



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110-43-0 203-767-1 606-024-00-3 01-2119902391-49-xxxx	2-4	Amyl/methyl ketone	R10R20/22	Flam. Liq. 3, Acute Tox, 4; H226, H332, H302
67-64-1 200-662-2 606-001-00-8 01-2119471330-49-xxxx	4-5	acetone	R11R36R66R67	Flam. Liq. 2, Eye Irr. 2, STOT SE 3; H225, H319, H336, EUH066
64-17-5 200-578-6 603-002-00-5 01-2119457610-43-xxxx	2-4	ethanol	R11	Flam. Liq. 2; H225
110-19-0 203-745-1 607-026-00-7 01-2119488971-22xxxx	2-4	Isobutyl acetate	R11R66	Flam. Liq. 2; H225, EUH066
123-86-4 204-658-1 607-025-00-1 01-2119485493-29-xxxx	8-10%	N-Butyl acetate	R10R66R67	Flam. Liq. 3; H225 STOT SE3, H336
141-78-6 205-500-4 607-022-00-5 01-2119475103-46-xxxx	1-2	Ethyl acetate	R11R36R66R67	Flam. Liq. 2, Eye Irr. 2, STOT SE 3; H225, H319, H336, EUH066
108-65-6 203-603-9 not available not available	0.1-1%	1-methoxyl-2-propanol acetate	R11	Flam.Liq. 3; H225

(\* Explanation notes: see section 16)

## Section 4: First aid measures

### 4.1. Description of first aid measures

- Contact with eyes:** Rinse cautiously with water for several minutes. If possible, remove contact lenses. Continue rinsing.  
Seek medical attention if irritation persists.
- Contact with skin:** Wash with water and soap.  
Seek medical attention if irritation persists.
- Inhalation:** Fresh air, keep warm and at rest.  
Seek medical attention if ill effects occur
- Ingestion:** If swallowed, do not induce vomiting  
Seek immediate medical advice



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If vomiting appears imminent or occurs hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.  
Never give liquid to a person with reduced awareness  
Give water to rinse out mouth, then provide water slowly as much as casually can comfortably drink  
Avoid giving milk or oils  
Avoid giving alcohol

## 4.2. Important symptoms and effects, either immediate or delayed

**Inhalation:** Excessive inhalation of solvent vapours may give rise to cough, drowsiness, headaches and dizziness  
**Ingestion:** May cause respiratory and digestive tract irritation  
Symptoms: sore throat, abdominal pain, nausea, vomiting  
**Skin contact:** Mildly irritating to skin  
Symptoms: redness, irritation and dry skin  
**Eye contact:** Irritating to eyes  
Symptoms: redness, irritation and pain, impaired vision

## 4.3. Indication of any immediate medical attention and special treatment

**General advise:** If you feel unwell, seek medical advice; show product label if possible  
If symptoms persist, always call a doctor

## Section 5: Firefighting Measures

### 5.1. Extinguishing media

Use dry sand, graphite powder, dry sodium based extinguishers  
**Do not** use water, CO<sub>2</sub>, foam or halogenated fire extinguishing agents

### 5.2 Special hazards arising from the substance or mixture

The vapours are heavier than air and may accumulate in low-lying areas  
Produces CO and CO<sub>2</sub>

### 5.3 Advice to firefighters

In case of fire; do not breathe fumes  
Wear self-contained breathing apparatus for fire fighting



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## Section 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

Shut off all ignition sources  
Avoid breathing fumes/vapours  
Ensure adequate ventilation  
Wear suitable protective clothing including eye/face protection

### 6.2 Environmental precautions

Avoid release to the environment  
Do not allow to enter public sewers and waterways

### 6.3 Methods and material for containment and clean up

Absorb spillage in suitable inert material  
Clean up spills immediately  
Avoid breathing vapours  
Control personal contact with the substance, by using protective equipment  
Collect spillage, absorbed spillage and wipes in a flammable waste container  
Wash spill area with soap and water to remove last traces of residue

### 6.4 Reference to other sections

For further information see section 8

## Section 7: Handling and storage

### 7.1. Precautions for safe handling

Keep out of reach of children  
Keep away from sources of ignition  
Do not breathe aerosols or vapours  
Ensure adequate ventilation  
Avoid contact with skin and eyes  
Wash thoroughly after use  
Wear protective gloves/protective clothing/eye protection/face protection  
Have eyewash bottles available



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## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed, in a cool, well ventilated place  
Store locked up  
Keep cool

## 7.3 Specific end uses(s)

Making grounding paths for SEM samples  
Repairing traces on circuit boards  
Making contact pads

## Section 8: Exposure control and personal protection

### 8.1. Control parameters

#### Exposure limits

#### Occupational exposure limits (OEL)

Ingredient	Material Name	Source	TWA	STEL	Peak	Notes
toluene	Toulene	UK	191mg/m3	384mg/m3	Not available	Skin
		EU	191mg/m3	384mg/m3	Not available	Skin
Amyl methyl ketone	Heptan-2-one	UK	237mg/m3	475mg/m3	Not available	Skin
		EU	238mg/m3	475mg/m3	Not available	Skin
acetone	Acetone	UK	1210mg/m3	3620mg/m3	Not available	Not available
		EU	1210mg/m3	Not available	Not available	Not available
ethanol	Ethanol	UK	1920mg/m3	Not available	Not available	Not available
Isobutyl acetate	Isobutyl acetate	UK	724mg/m3	903mg/m3	Not available	Not available
N-Butyl acetate	N-Butyl acetate	UK	150ppm	200mg/m3	Not available	Skin
ethyl acetate	Ethyl acetate	UK	200ppm	400ppm	Not available	Not available
Silver flakes	Silver (metal) Ag	UK	0.1mg/m3	Not available	Not available	Not available
1-methyl-2-propanol acetate	1-methyl-2-propanol acetate	UK	50mg/m3	75 mg/m3	Not available	Not available

### 8.2 Exposure controls

**Control procedures:** Ensure adequate ventilation  
Keep away from heat sources and ignition sources



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**Personal protection:** Take precautions to avoid contact with eyes and skin when handling the products  
Ensure adequate ventilation

**Inhalation:** In case of insufficient ventilation, wear suitable respiratory equipment:  
Air purifying respirator with organic gas/vapour cartridge (type A)

**Hands and skin:** Wear suitable gloves against chemicals; recommended gloves:  
Nitrile

**Eyes:** Wear safety goggles or full face protection

## Section 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

**Appearance/physical state:** Liquid  
**Colour:** Metallic silver  
**Odour:** Solvent  
**pH** not applicable  
**Boiling point/range:** 56°C  
**Flash point:** -17°C (closed cup)  
**Evaporation rate:** >1  
**Explosion limits: upper limit:** 13%  
**lower limit:** 1%  
**Vapour pressure:** 68 kPa  
**Relative density:** 1.8 g/cm<sup>3</sup> @ 20°C  
**Solubility in water:** partly miscible  
**Auto-ignition:** >315°C  
**Viscosity:** >34 cSt

### 9.2 Other information

**VOC:** 34% (603g/L)

## Section 10: Stability and reactivity

### 10.1. Reactivity

No hazardous reactions known if used for its intended purposes

### 10.2 Chemical stability

Stable at normal temperatures and pressures





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## 10.3 Possibility of hazardous reactions

No hazardous reactions known if used for its intended purposes

## 10.4 Conditions to avoid

Avoid overheating, ignition sources and incompatible substances

## 10.5 Incompatible materials

Strong oxidising agents, strong acids, strong bases

## 10.6 Hazardous decomposition products

CO, CO2 and smoke

## Section 11: Toxicological information

### 11.1. Information on toxicological effects

#### Information on likely routes of exposure:

**Inhalation:** Inhalation of solvent vapours may give rise to nausea, headaches and dizziness  
**Skin contact:** Prolonged skin contact will result in defatting of the skin, leading to irritation and in some cases to dermatitis  
**Eye contact:** Irritation to eyes

#### Toxicological data:

Ingredient	Toxicity	Irritation
Toluene	Dermal (rabbit) LD: 12124mg/l	Eye (rabbit): 2mg/24h - severe
	Inhalation (rat) LC50: 49mg/l	Eye (rabbit): 100mg/30s - mild
	Oral (rat) LD50: 636 mg/kg	Skin (rabbit): 20mg/24h - moderate
Silver, metal	Oral (rat) LD50: >2000 mg/kg	Not available
Amyl methyl ketone	Dermal (rabbit) LD: 12600mg/l	Skin (rabbit): 14mg/24h - mild
	Inhalation (rat) LC50: 4000ppm/4h	
	Oral (rat) LD50: 1670 mg/kg	
Acetone	Dermal (rabbit) LD: 20000mg/l	Eye (human): 500ppm - irritant
	Inhalation (rat) LC50: 50.1mg/l/8h	Eye (rabbit): 20mg/24h - moderate



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	Oral (rat) LD50: 5800 mg/kg	Skin (rabbit): 500mg/24hr - mild
ethanol	Dermal (rabbit) LD: 17100mg/l	Eye (rabbit): 500mg - severe
	Inhalation (rat) LC50: 64000ppm/4h	Eye (rabbit): 100mg/24h - moderate
	Oral (rat) LD50: 11872769 mg/kg	Skin (rabbit): 20mg/24hr - moderate
Isobutyl acetate	Dermal (rabbit) LD: >5000 mg/kg	moderate
	Oral (rat) LD50: 134000 mg/kg	Skin (rabbit): 500mg open mild
n-Butyl-acetate	Dermal (rabbit) LD: 14.080 mg/kg	Nil reported
	Inhalation (rat) LC50: 2000 ppm/4h	
	Oral (rat) LD50: 7400 mg/kg	
Ethyl acetate	Dermal (rabbit) LD: >18000mg/kg	Eye (human):400ppm
	Inhalation (rat) LC50: >6000ppm/6h	
	Oral (rat) LD50: >10170 mg/kg	
1-methyl-2-propanol-acetate	Dermal (rabbit) LD: 5000mg/kg	
	Oral (rat) LD50: 8532 mg/kg	
EM-Tec AG20 conductive silver pen	Not available	Not available

## Section 12: Ecological information

### 12.1. Toxicity

Not available

### 12.2 Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence:Air
toluene	LOW (Half-life = 28 days)	LOW (Half-life = 4.33 days)
amyl methyl ketone	LOW	LOW
acetone	LOW (Half-life = 14 days)	Medium (Half-life = 116.25 days)
ethanol	LOW (Half-life = 2.17 days)	LOW (Half-life = 5.08 days)
Isobutyl acetate	LOW	LOW
n-Butyl-acetate	LOW	LOW
Ethyl acetate	LOW (Half-life = 14 days)	LOW (Half-life = 14.71 days)
1-methoxy-2-propanol acetate	LOW	LOW



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## 12.3 Bioaccumulative potential

Ingredient	Bioaccumulation
toluene	LOW (BCF = 90)
amyl methyl ketone	LOW (logKOW = 1.98)
acetone	LOW (BCF = 90)
ethanol	LOW (logKOW = 0.31)
Methanol	LOW
Isobutyl acetate	LOW (logKOW = 1.78)
n-Butyl-acetate	LOW
Ethyl acetate	High (BCF = 90)
1-methoxy-2-propanol acetate	LOW

## 12.4 Mobility in soil

Ingredient	Bioaccumulation
toluene	LOW (KOC = 268)
amyl methyl ketone	LOW (KOC = 24)
acetone	HIGH (KOC = 1.981)
ethanol	HIGH (KOC = 1)
methanol	HIGH (KOC = 1)
Isobutyl acetate	LOW (KOC = 17.48)
n-Butyl-acetate	HIGH
Ethyl acetate	LOW (KOC = 6.131)
1-methoxy-2-propanol acetate	HIGH

## 12.5 Results of PBT and vPvB assessment

No information available

## 12.6 Hazardous decomposition products

No experimental data available

## Section 13: Disposal considerations



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## 13.1. Waste treatment methods

**Product:** This material and its container must be disposed of in a safe way.  
Containers may still present a chemical hazard when empty  
Do not discharge into drains or the environment, dispose to an authorised waste collection point.

**National regulations:** Disposal should be in accordance with local, state or national legislation.

## Section 14: Transport information

Labels required:



### 14.1. UN number

**UN-number:** 1263

### 14.2 UN proper shipping name

**Proper shipping name:** PAINT

### 14.3 Transport hazard class(es)

**Class:** 3  
**ADR/RID-Classification code:** F1

### 14.4 Packing group

**Packing:** II  
**Limited Quantity:** 5L

### 14.5 Incompatible materials

**ADR/RID- Environmentally hazardous:** Not applicable  
**IMDG-Marine pollutant:** Yes  
**IATA/ICAO-Environmentally hazardous:** No relevant data

### 14.6 Special precautions for user

**ADR/RID-Tunnelcode:** (D/E)  
**IMDG-EMS:** F-E, S-E



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IATA/ICAO-PAX:	353
IATA/ICAO-CAO:	364
IATA/ICAO-DGR:	Y341

## 14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC code

Not applicable

## Section 15: Regulatory information

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

UN-number: 1263

### 15.2 Chemical safety assessment

No information available

## Section 16: Other information

### RoHS Directive Compliant

This product is fully compliant with the directive 2100/65/EU Annex II (RoHS). It does not contain any lead, cadmium, mercury, hexavalent chromium, PBB's or PBDE's.

### WEEE

This product is not a piece of electrical or electronic equipment, and it therefore not governed by Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)

### Abbreviations:

Asp. Tox	Aspiration hazard
Carc.	Carcinogenicity
Exp.	Exposure
Flam.	Flammable
GHS	Global Harmonised System of Classification of Labelling Chemicals
Irrit.	Irritant
LC50	Lethal Concentration 50%
LCLo	Lowest published lethal concentration
LD50	Lethal Dose 50%
N/A	Not applicable
N/E	Not estimated
PBT	Persistent Bioaccumulative and Toxic
WEL	Workplace Exposure Limit



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Repr.	Reproductive toxicant
RoHS	Restriction of Hazardous Substance
SEM	Scanning Electron Microscope
STEL	Short-Term Exposure Limit
STOT	Specific Target Organ Toxicity
TCLo	Lowest published toxic concentration
vPvB	very Persistent and very Bioaccumulative
WEEE	Waste Electrical and Electronic Equipment

## DSD / DPD label elements



## Full Text Risk and Hazard codes

H220 – Extremely flammable gas.  
H226 – Flammable liquid and vapour.  
H228 – Flammable solid  
H301 – Toxic if swallowed.  
H302 – Harmful if swallowed.  
H304 - May be fatal if swallowed and enters airways.  
H311 – Toxic in contact with skin.  
H314 – Causes severe skin burn and eye damage.  
H317 – May cause an allergic skin reaction.  
H331 – Toxic if inhaled.  
H332 – Harmful if inhaled.  
H335 – May cause respiratory irritation.  
H340 – May cause genetic defects.  
H350 – May cause cancer.  
H351 – Suspected of causing cancer.  
H360 – May damage fertility or the unborn child.  
H361 – Suspected of damaging fertility or the unborn child.  
H362 – May cause harm to breast-fed children.  
H370 – Causes damages to organs.  
H371 – May cause damage to organs.  
H372 – Causes damage to organs through prolonged or repeated exposure.  
H400 – Very toxic to aquatic life.  
H410 – Very toxic to aquatic life with long lasting effects.  
H411 – Toxic to aquatic life with long lasting effects.  
H413 – May cause long lasting harmful effects to aquatic life.

R10 – Flammable.  
R20- Harmful by inhalation.  
R20/22 – Harmful by inhalation and if swallowed.



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R36 – Irritating to eyes.  
R37 – Irritating respiratory system.  
R38 – Irritating to skin.  
R52 – Harmful to aquatic organisms  
R63 – Possible risk of harm to the unborn child.  
R65 – Harmful – May cause long damage if swallowed  
R66 – Repeated exposure may cause skin dryness and cracking.

## Safety advice:

S02 – Keep out of reach of children.  
S09 – Keep container in a well ventilated place.  
S13 – Keep away from food, drink and animal feeding stuff.  
S16 – Keep away from sources of ignition. No smoking.  
S23 – Do not breath gas/fumes/vapour/spray.  
S26 – In case of contact with eyes, rinse with plenty of water and seek medical help.  
S281 – After contact with skin, wash immediately with detergent and plenty of waterways.  
S29 – Do not empty in drains.  
S33 – Take precautionary measures against static discharges.  
S35 – This materials and its container must be disposed of in a safe way.  
S36 – Wear suitable protective clothing.  
S37 – Wear suitable gloves.  
S38 – In case of insufficient ventilation, wear suitable respiratory equipment.  
S39 - Wear eye / face protection.  
S40 – In case of insufficient ventilation, wear suitable respiratory equipment.  
S41 – In case of fire and/or explosion; DO NOT breathe fumes.  
S43 – In case of fire use....  
S45 – In case of accident or if you feel unwell, immediately contact Doctor or Poisons information center (show label if possible).  
S46 – If swallowed, seek immediate medical advice and show label if possible.  
S52 – Not recommended for interior use on large surfaces.  
S53 – Avoid exposure – obtain special instructions before use.  
S56 – Dispose of this materials and its container at hazardous or special waste collection point.  
S57 – Use appropriate container to avoid environment contamination.  
S61 – Avoid release to the environment  
S63 – In case of accident by inhalation, remove casualty to fresh air and keep at rest.  
S64 – If swallowed, rinse mouth with water (only if person is conscious)

This product should be stored, handled and used in accordance with good industrial hygiene practices and in accordance with any legal regulation.

The information contained herewith is based on the present state of our knowledge and is intended to describe the product from the point of view of safety requirements. It does not guarantee any specific properties.

It is the responsibility of the user to query and verify any information seeming suspect or where doubt on the validity may exist. The buyer assumes all responsibility of using and handling the product in accordance with local, state, federal and international regulations.

