



# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

## 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product Detail : 3980 Electrically Conductive Adhesive (Shieldokit)  
 Application of the substance / the preparation: Electrically conductive epoxy adhesive resin part for use with hardeners part A  
 Manufacturer / supplier: Holland Shielding Systems B.V.  
 Jacobus Lipsweg 124  
 3316 BP Dordrecht  
 the Netherlands  
 Ph: +31(0)78- 204 90 00  
 www.hollandshielding.com  
 info@hollandshielding.com

NVIC Netherland, National Poison Information Center, Tel: +31 (0)30 2748888  
 (in case of an emergency only to be reached by a medical person)

## 2. HAZARDS IDENTIFICATION

### 2.1. Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] [1]	H315 - Skin Corrosion/Irritation Category 2, H319 - Eye Irritation Category 2, H317 - Skin Sensitizer Category 1, H410 - Chronic Aquatic Hazard Category 1
Legend:	1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

### 2.2. Label elements

Hazard pictogram	
Signal word	Warning

### Hazard statement(s)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H317	May cause an allergic skin reaction.
H410	Very toxic to aquatic life with long lasting effects.

### Supplementary statement(s)

Not Applicable

### Precautionary statement(s) Prevention

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P261	Avoid breathing dust/fumes.
P273	Avoid release to the environment.
P272	Contaminated work clothing should not be allowed out of the workplace.

### Precautionary statement(s) Response

P302+P352	IF ON SKIN: Wash with plenty of water and soap.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P391	Collect spillage.

### Precautionary statement(s) Storage

Not Applicable

Revision date: 22-05-2015

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## Precautionary statement(s) Disposal

P501 Dispose of contents/container in accordance with local regulations.

## 2.3. Other hazards

REACH- Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substances

See 'Composition on ingredients' in Section 3.2

### 3.2. Mixtures

1. CAS No 2. EC No 3. Index No 4. REACH No	%[weight]	Name	Classification according to regulation (EC) No 1272/2008 [CLP]
1.7440-22-4 2.231-131-3 3. Not Available 4.01-2119555669-21-XXXX 01-2119513211-60-XXXX	67	silver	EUH210 [1]
1.28064-14-4 2. Not Available 3. Not Available 4. Not Available	33	bisphenol F glycidyl ether/ formaldehyde copolymer	Skin Corrosion/Irritation Category 2, Eye Irritation Category 2, Chronic Aquatic Hazard Category 2, Skin Sensitizer Category 1; H315, H319, H411, H317, EUH205, EUH019 [1]

Legend:

1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008- Annex VI; 3. Classification drawn from C&L; \* EU IOELVs available

## 4. FIRST AID MEASURES

### 4.1. Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: -Wash out immediately with fresh running water. -Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. -Seek medical attention without delay; if pain persists or recurs seek medical attention. -Removal of contact lenses after an eye injury should only be undertaken by skilled personnel. <b>-DO NOT attempt to remove particles attached to or embedded in eye .</b> -Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. -Seek urgent medical assistance, or transport to hospital.
Skin Contact	If skin contact occurs: -Immediately remove all contaminated clothing, including footwear. -Flush skin and hair with running water (and soap if available). -Seek medical attention in event of irritation.
Inhalation	-If fumes, aerosols or combustion products are inhaled remove from contaminated area. -Other measures are usually unnecessary.
Ingestion	-Immediately give a glass of water. -First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

### 4.2 Most important symptoms and effects, both acute and delayed

See Section 11

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

Treat symptomatically.

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Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce 'metal fume fever' in workers from an acute or long term exposure.

-Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)

-Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.

-Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.

-The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.

-Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the



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development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology]

## 5. FIREFIGHTING MEASURES

### 5.1. Extinguishing media

-DO NOT use halogenated fire extinguishing agents.

Metal dust fires need to be smothered with sand, inert dry powders.

**DO NOT USE WATER, CO2 or FOAM.**

-Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.

-Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.

-Chemical reaction with CO2 may produce flammable and explosive methane.

-If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.

### 5.2. Special hazards arising from the substrate or mixture

Fire Incompatibility

-Reacts with acids producing flammable / explosive hydrogen (H2) gas  
-Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

### 5.3. Advice for firefighters

Fire Fighting

-Alert Fire Brigade and tell them location and nature of hazard.  
-Wear breathing apparatus plus protective gloves.  
-Prevent, by any means available, spillage from entering drains or water courses.  
-Use water delivered as a fine spray to control fire and cool adjacent area.  
**-DO NOT** approach containers suspected to be hot.  
-Cool fire exposed containers with water spray from a protected location.  
-If safe to do so, remove containers from path of fire.  
-Equipment should be thoroughly decontaminated after use.

**-DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.**  
**-DO NOT use water or foam as generation of explosive hydrogen may result.**

With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained- this means that it will require a lot of heat to ignite a mass of combustible metal. Generally, metal fire risks exist when sawdust, machine shavings and other metal 'fines' are present.

-Metal powders, while generally regarded as non-combustible:  
-May burn when metal is finely divided and energy input is high.  
-May react explosively with water.  
-May be ignited by friction, heat, sparks or flame.  
-May REIGNITE after fire is extinguished.  
-Will burn with intense heat.

Fire/Explosion Hazard

Note:  
-Metal dust fires are slow moving but intense and difficult to extinguish.  
-Containers may explode on heating.  
-Dusts or fumes may form explosive mixtures with air.  
-Gases generated in fire may be poisonous, corrosive or irritating.  
-Hot or burning metals may react violently upon contact with other materials, such as oxidising agents and extinguishing agents used on fires involving ordinary combustibles or flammable liquids.  
-Temperatures produced by burning metals can be higher than temperatures generated by burning flammable liquids  
-Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids would be incapable of burning.

Combustion products include:  
-carbon monoxide (CO)  
-carbon dioxide (CO2)  
-aldehydes  
-other pyrolysis products typical of burning organic material.

## 6. ACCIDENTAL RELEASE MEASURES

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

See section 8

### 6.2. Environmental precautions

See section 12

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## 6.3. Methods and material for containment and cleaning up

Minor Spills	<p>Environmental hazard- contain spillage.</p> <ul style="list-style-type: none"><li>-Clean up all spills immediately.</li><li>-Avoid contact with skin and eyes.</li><li>-Wear impervious gloves and safety glasses.</li><li>-Use dry clean up procedures and avoid generating dust.</li><li>-Vacuum up (consider explosion-proof machines designed to be grounded during storage and use).</li><li>-Do NOT use air hoses for cleaning</li><li>-Place spilled material in clean, dry, sealable, labelled container.</li></ul>
Major Spills	<p>Environmental hazard- contain spillage. If molten:</p> <ul style="list-style-type: none"><li>-Contain the flow using dry sand or salt flux as a dam.</li><li>-All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.</li><li>-Allow the spill to cool before remelting scrap.</li></ul> <p>Moderate hazard.</p> <ul style="list-style-type: none"><li>-<b>CAUTION:</b> Advise personnel in area.</li><li>-Alert Emergency Services and tell them location and nature of hazard.</li><li>-Control personal contact by wearing protective clothing.</li><li>-Prevent, by any means available, spillage from entering drains or water courses.</li><li>-Recover product wherever possible.</li><li>-<b>IF DRY:</b> Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal.</li><li>-<b>IF WET:</b> Vacuum/shovel up and place in labelled containers for disposal.</li><li>-<b>ALWAYS:</b> Wash area down with large amounts of water and prevent runoff into drains.</li><li>-If contamination of drains or waterways occurs, advise Emergency Services.</li></ul>

## 6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## 7. HANDLING AND STORAGE

### 7.1. Precautions for safe handling

Safe handling	<p>For molten metals:</p> <ul style="list-style-type: none"><li>-Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops can lead to violent explosions.</li><li>-All tooling, containers, molds and ladles, which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.</li><li>-Any surfaces that may contact molten metal (e.g. concrete) should be specially coated</li><li>-Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimise the hazard. During melting operations, the following minimum guidelines should be observed:</li><li>-Inspect all materials prior to furnace charging and completely remove surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage.</li><li>-Store materials in dry, heated areas with any cracks or cavities pointed downwards.</li><li>-Preheat and dry large objects adequately before charging in to a furnace containing molten metal. This is typically done by the use of a drying oven or homogenising furnace. The dry cycle should bring the metal temperature of the coldest item of the batch to 200 degree C (400 deg F) and then hold at that temperature for 6 hours.</li></ul> <ul style="list-style-type: none"><li>-Avoid all personal contact, including inhalation.</li><li>-Wear protective clothing when risk of exposure occurs.</li><li>-Use in a well-ventilated area.</li><li>-Prevent concentration in hollows and sumps.</li><li>-DO NOT enter confined spaces until atmosphere has been checked.</li><li>-DO NOT allow material to contact humans, exposed food or food utensils.</li><li>-Avoid contact with incompatible materials.</li><li>-When handling, DO NOT eat, drink or smoke.</li><li>-Keep containers securely sealed when not in use.</li><li>-Avoid physical damage to containers.</li><li>-Always wash hands with soap and water after handling.</li><li>-Work clothes should be laundered separately. Launder contaminated clothing before re-use.</li><li>-Use good occupational work practice.</li><li>-Observe manufacturer's storage and handling recommendations contained within this SDS.</li><li>-Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</li><li>-Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions)</li><li>-Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame.</li><li>-Establish good housekeeping practices.</li><li>-Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds.</li><li>-Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a 'secondary' explosion. According to NFPA Standard 654, dust layers 1/32 in.(0,8 mm) thick can be sufficient to warrant immediate cleaning of the area.</li><li>-Do not use air hoses for cleaning.</li><li>-Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used.</li><li>-Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition.</li><li>-Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance.</li></ul>
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Safe handling	-Do not empty directly into flammable solvents or in the presence of flammable vapors. -The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges.
Fire and explosion protection	Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source. -Do NOT cut, drill, grind or weld such containers. -In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.
Other information	See section 5  -Store in original containers. -Keep containers securely sealed. -Store in a cool, dry area protected from environmental extremes. -Store away from incompatible materials and foodstuff containers. -Protect containers against physical damage and check regularly for leaks. -Observe manufacturer's storage and handling recommendations contained within this SDS.  For major quantities: -Consider storage in bunded areas- ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams). -Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

## 7.2. Conditions for safe storage, including any incompatibilities

Suitable container	-Lined metal can, lined metal pail/ can. -Plastic pail. -Polyliner drum. -Packing as recommended by manufacturer. -Check all containers are clearly labelled and free from leaks. -Bulk bags: Reinforced bags required for dense materials. -Glass container is suitable for laboratory quantities -CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release Heavy gauge metal packages / Heavy gauge metal drums
Storage incompatibility	-WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively. -The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono- or poly-fluorobenzene show extreme sensitivity to heat and are explosive. -Avoid reaction with borohydrides or cyanoborohydrides -Silver or silver salts readily form explosive silver fulminate in the presence of both nitric acid and ethanol. The resulting fulminate is much more sensitive and a more powerful detonator than mercuric fulminate. -Silver and its compounds and salts may also form explosive compounds in the presence of acetylene and nitromethane. -Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid. -Avoid reaction with amines, mercaptans, strong acids and oxidising agents. -Phenols are incompatible with strong reducing substances such as hydrides, nitrides, alkali metals, and sulfides. -Avoid use of aluminium, copper and brass alloys in storage and process equipment. -Heat is generated by the acid-base reaction between phenols and bases. -Phenols are sulfonated very readily (for example, by concentrated sulfuric acid at room temperature), these reactions generate heat. -Phenols are nitrated very rapidly, even by dilute nitric acid. -Nitrated phenols often explode when heated. Many of them form metal salts that tend toward detonation by rather mild shock. -Avoid strong acids, bases.  Glycidyl ethers: -May form unstable peroxides on storage in air, light, sunlight, UV light or other ionising radiation, trace metals- inhibitor should be maintained at adequate levels. -May polymerise in contact with heat, organic and inorganic free radical producing initiators -May polymerise with evolution of heat in contact with oxidisers, strong acids, bases and amines react violently with strong oxidisers, permanganates, peroxides, acyl halides, alkalis, ammonium persulfate, bromine dioxide -attack some forms of plastics, coatings, and rubber  Metals exhibit varying degrees of activity. Reaction is reduced in the massive form (sheet, rod, or drop), compared with finely divided forms. The less active metals will not burn in air but: -can react exothermically with oxidising acids to form noxious gases. -catalyse polymerisation and other reactions, particularly when finely divided -react with halogenated hydrocarbons (for example, copper dissolves when heated in carbon tetrachloride), sometimes forming explosive compounds. -Finely divided metal powders develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air. -Safe handling is possible in relatively low concentrations of oxygen in an inert gas. -Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended. -The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric.  Factors influencing the pyrophoricity of metals are particle size, presence of moisture, nature of the surface of the particle, heat of formation of the oxide, or nitride, mass, hydrogen content, stress, purity and presence of oxide, among others. -Many metals in elemental form react exothermically with compounds having active hydrogen atoms (such as acids and water) to form flammable hydrogen gas and caustic products. -Elemental metals may react with azo/diazo compounds to form explosive products. -Some elemental metals form explosive products with halogenated hydrocarbons.

7.3. Specific end use(s)  
See section 1.2

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control parameters

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## DERIVED NO EFFECT LEVEL (DNEL)

Not Available

## PREDICTED NO EFFECT LEVEL (PNEC)

Not Available

## OCCUPATIONAL EXPOSURE LIMITS (OEL)

### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Nederland Grens- waarden Voor Beroepsmatige Bloot- stelling (Dutch)	silver	Silver, metallic	0.1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available

### EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
silver	Silver	0.3 mg/m <sup>3</sup>	170 mg/m <sup>3</sup>	990 mg/m <sup>3</sup>
bisphenol F glycidyl ether/ formaldehyde copolymer	Phenol, polymer with formaldehyde, oxiranylmethyl ether	30 mg/m <sup>3</sup>	330 mg/m <sup>3</sup>	2,000 mg/m <sup>3</sup>

  

Ingredient	Original IDLH	Revised IDLH
silver	10 mg/m <sup>3</sup>	Not Available
bisphenol F glycidyl ether/ formaldehyde copolymer	Not Available	Not Available

### MATERIAL DATA

The adopted TLV-TWA for silver dust and fumes is 0.1 mg/m<sup>3</sup> and for the more toxic soluble silver compounds the adopted value is 0.01 mg/m<sup>3</sup>. Cases of argyria (a slate to blue-grey discolouration of epithelial tissues) have been recorded when workers were exposed to silver nitrate at concentrations of 0.1 mg/m<sup>3</sup> (as silver). Exposure to very high concentrations of silver fume

has caused diffuse pulmonary fibrosis. Percutaneous absorption of silver compounds is reported to have resulted in allergy. Based on a 25% retention upon inhalation and a 10 m<sup>3</sup>/day respiratory volume, exposure to 0.1 mg/m<sup>3</sup> (TWA) would result in total deposition of no more than 1.5 gms in 25 years.

## 8.2. Exposure controls

### 8.2.1. Appropriate engineering controls

Metal dusts must be collected at the source of generation as they are potentially explosive.

- Avoid ignition sources.
- Good housekeeping practices must be maintained.
- Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.
- Do not use compressed air to remove settled materials from floors, beams or equipment
- Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.
- Use non-sparking handling equipment, tools and natural bristle brushes. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations.
- Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.
- Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.
- Workshops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.
- Wet scrubbers are preferable to dry dust collectors.
- Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.
- Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted states.
- Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.
- Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuum and electrostatic precipitators must not be used, unless specifically approved for use with flammable/ explosive dusts.

Air contaminants generated in the workplace possess varying 'escape' velocities which, in turn, determine the 'capture velocities' of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
welding, brazing fumes (released at relatively low velocity into moderately still air)	0.5-1.0 m/s (100-200 f/min.)
Within each range the appropriate value depends on:	
Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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## 8.2.2. Personal protection



### Eye and face protection

-Safety glasses with side shields.  
 -Chemical goggles.  
 -Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation- lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

### Skin protection

See Hand protection below

#### NOTE:

-The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.  
 -Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).

-When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.

-When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.

-Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.  
 -Contaminated gloves should be replaced.

### Hands/feet protection

As defined in ASTM F-739-96 in any application, gloves are rated as:

- Excellent when breakthrough time > 480 min
- Good when breakthrough time > 20 min
- Fair when breakthrough time < 20 min
- Poor when glove material degrades

For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.

It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.

Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:

- Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of
- Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

-Protective gloves eg. Leather gloves or gloves with Leather facing

When handling liquid-grade epoxy resins wear chemically protective gloves, boots and aprons.

The performance, based on breakthrough times, of:

- Ethyl Vinyl Alcohol (EVAL laminate) is generally excellent
- Butyl Rubber ranges from excellent to good
- Nitrile Butyl Rubber (NBR) from excellent to fair
- Neoprene from excellent to fair
- Polyvinyl (PVC) from excellent to poor

### Hands/feet protection

- As defined in ASTM F-739-96
- Excellent breakthrough time > 480 min
- Good breakthrough time > 20 min
- Fair breakthrough time < 20 min
- Poor glove material degradation

Gloves should be tested against each resin system prior to making a selection of the most suitable type. Systems include both the resin and any hardener, individually and collectively)

- DO NOT use cotton or leather (which absorb and concentrate the resin), natural rubber (latex), medical or polyethylene gloves (which absorb the resin).
- DO NOT use barrier creams containing emulsified fats and oils as these may absorb the resin; silicone-based barrier creams should be reviewed prior to use.

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Hands/feet protection	Replacement time should be considered when selecting the most appropriate glove. It may be more effective to select a glove with lower chemical resistance but which is replaced frequently than to select a more resistant glove which is reused many times Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present. -polychloroprene. -nitrile rubber. -butyl rubber. -fluorocautchouc. -polyvinyl chloride. Gloves should be examined for wear and/ or degradation constantly.
Body protection	See Other protection below
Other protection	-Overalls. -P.V.C. apron. -Barrier cream. -Skin cleansing cream. -Eye wash unit.

## Respiratory protection

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	A P1 Air-line*	-	A PAPR-P1
up to 50 x ES	Air-line**	A P2	A PAPR-P2
up to 100 x ES	-	A P3 Air-line*	-
100+ x ES	-	Air-line**	A PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow (All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO<sub>2</sub>), G =Agricultural chemicals, K = Ammonia(NH<sub>3</sub>), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure- ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## 8.2.3. Environmental exposure controls

See section 12

## 9. PHYSICAL AND CHEMICAL PROPERTIES

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

Appearance	Silver grey	Relative density (Water = 1)	2.5
Physical state	Solid	Partition coefficient n-octanol / water	Not Available
Odour	Not Available	Auto-ignition temperature (°C)	Not Available
Odour threshold	Not Available	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	>20.5
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available
Flash point (°C)	150	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

### 9.2. Other information

Not Available





# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

## 10. STABILITY AND REACTIVITY

10.1. Reactivity	See section 7.2
10.2. Chemical stability	-Unstable in the presence of incompatible materials. -Product is considered stable. -Hazardous polymerisation will not occur.
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

## 11. TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects

Inhaled	<p>The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting. Not normally a hazard due to non-volatile nature of product.</p> <p>Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in 'metal fume fever'. Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalised feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.</p>
Ingestion	<p>The material has NOT been classified by EC Directives or other classification systems as 'harmful by ingestion'. This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.</p>
Skin Contact	<p>Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. The material may accentuate any pre-existing dermatitis condition. Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p>
Eye	<p>Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.</p>
Chronic	<p>Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals. All glycidyl ethers show genotoxic potential due their alkylating properties. Those glycidyl ethers that have been investigated in long term studies exhibit more or less marked carcinogenic potential. Alkylating agents may damage the stem cell which acts as the precursor to components of the blood. Loss of the stem cell may result in pancytopenia (a reduction in the number of red and white blood cells and platelets) with a latency period corresponding to the lifetime of the individual blood cells. Granulocytopenia (a reduction in granular leukocytes) develops within days and thrombocytopenia (a disorder involving platelets), within 1-2 weeks, whilst loss of erythrocytes (red blood cells) need months to become clinically manifest. Aplastic anaemia develops due to complete destruction of the stem cells. Glycidyl ethers have been shown to cause allergic contact dermatitis in humans. Glycidyl ethers generally cause skin sensitization in experimental animals. Necrosis of the mucous membranes of the nasal cavities was induced in mice exposed to allyl glycidyl ether. A study of workers with mixed exposures was inconclusive with regard to the effects of specific glycidyl ethers. Phenyl glycidyl ether, but not n-butyl glycidyl ether, induced morphological transformation in mammalian cells in vitro. n-Butyl glycidyl ether induced micronuclei in mice in vivo following intraperitoneal but not oral administration. Phenyl glycidyl ether did not induce micronuclei or chromosomal aberrations in vivo or chromosomal aberrations in animal cells in vitro. Alkyl C12 or C14 glycidyl ether did not induce DNA damage in cultured human cells or mutation in cultured animal cells. Allyl glycidyl ether induced mutation in Drosophila. The glycidyl ethers were generally mutagenic to bacteria. On the basis, primarily, of animal experiments, concern has been expressed by at least one classification body that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment. Bisphenol F, bisphenol A, fluorine-containing bisphenol A (bisphenol AF), and other diphenylalkanes were found to be oestrogenic in a bioassay with MCF7 human breast cancer cells in culture Bisphenol F (4,4'-dihydroxydiphenylmethane) has been reported to exhibit oestrogen agonistic properties in the uterotrophic assay. Bisphenol F (BPF) is present in the environment and as a contaminant of food.</p>

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

Chronic

Humans may, therefore, be exposed to BP. BPF has been shown to have genotoxic and endocrine-disruptor properties in a human hepatoma cell line (HepG2), which is a model system for studies of xenobiotic toxicity. BPF was largely metabolised into the corresponding sulfate by the HepG2 cell line. BPF was metabolised into both sulfate and glucuronide by human hepatocytes, but with differences between individuals. The metabolism of BPF in both HepG2 cells and human hepatocytes suggests the existence of a detoxification pathway. Bisphenol F was orally administered at doses 0, 20, 100 and 500 mg/kg per day for at least 28 days, but no clear endocrine-mediated changes were detected, and it was concluded to have no endocrine-mediated effects in young adult rats. On the other hand, the main effect of bisphenol F was concluded to be liver toxicity based on clinical biochemical parameters and liver weight, but without histopathological changes. The no-observed-effect level for bisphenol F is concluded to be under 20 mg/kg per day since decreased body weight accompanied by decreased serum total cholesterol, glucose, and albumin values were observed in the female rats given 20 mg/kg per day or higher doses of bisphenol F. Bisphenol A exhibits hormone-like properties that raise concern about its suitability in consumer products and food containers. Bisphenol A is thought to be an endocrine disruptor which can mimic oestrogen and may lead to negative health effects. More specifically, bisphenol A closely mimics the structure and function of the hormone oestradiol with the ability to bind to and activate the same oestrogen receptor as the natural hormone. Early developmental stages appear to be the period of greatest sensitivity to its effects and some studies have linked prenatal exposure to later physical and neurological difficulties. Regulatory bodies have determined safety levels for humans, but those safety levels are being questioned or are under review. A 2009 study on Chinese workers in bisphenol A factories found that workers were four times more likely to report erectile dysfunction, reduced sexual desire and overall dissatisfaction with their sex life than workers with no heightened bisphenol A exposure. Bisphenol A workers were also seven times more likely to have ejaculation difficulties. They were also more likely to report reduced sexual function within one year of beginning employment at the factory, and the higher the exposure, the more likely they were to have sexual difficulties. Bisphenol A in weak concentrations is sufficient to produce a negative reaction on the human testicle. The researchers found that a concentration equal to 2 ug/ litre of bisphenol A in the culture medium, a concentration equal to the average concentration generally found in the blood, urine and amniotic fluid of the population, was sufficient to produce the effects. The researchers believe that exposure of pregnant women to bisphenol A may be one of the causes of congenital masculinisation defects of the hypospadias and cryptorchidism types the frequency of which has doubled overall since the 70's. They also suggested that 'it is also possible that bisphenol A contributes to a reduction in the production of sperm and the increase in the incidence of testicular cancer in adults that have been observed in recent decades'. One review has concluded that obesity may be increased as a function of bisphenol A exposure, which '...merits concern among scientists and public health officials'. One study demonstrated that adverse neurological effects occur in non-human primates regularly exposed to bisphenol A at levels equal to the United States Environmental Protection Agency's (EPA) maximum safe dose of 50 ug/kg/day. This research found a connection between bisphenol A and interference with brain cell connections vital to memory, learning, and mood. A further review concluded that bisphenol-A has been shown to bind to thyroid hormone receptor and perhaps have selective effects on its functions. Carcinogenicity studies have shown increases in leukaemia and testicular interstitial cell tumours in male rats. However, 'these studies have not been considered as convincing evidence of a potential cancer risk because of the doubtful statistical significance of the small differences in incidences from controls'. Another in vitro study has concluded that bisphenol A is able to induce neoplastic transformation in human breast epithelial cells. [Whilst a further study concluded that maternal oral exposure to low concentrations of bisphenol A, during lactation, increases mammary carcinogenesis in a rodent model. In vitro studies have suggested that bisphenol A can promote the growth of neuroblastoma cells and potentially promotes invasion and metastasis of neuroblastoma cells. Newborn rats exposed to a low-dose of bisphenol A (10 ug/kg) showed increased prostate cancer susceptibility when adults. At least one study has suggested that bisphenol A suppresses DNA methylation which is involved in epigenetic changes. Bisphenol A is the isopropyl adduct of 4,4'-dihydroxydiphenyl oxide (DHDPO). A series of DHDPO analogues have been investigated as potential oestrogen receptor/anti-tumour drug carriers in the development of a class of therapeutic drugs called 'cytostatic hormones'. Oestrogenic activity is induced with 1 to 100 mg/kg body weight in animal models. Bisphenol A sealants are frequently used in dentistry for treatment of dental pits and fissures. Samples of saliva collected from dental patients during a 1-hour period following application contain the monomer. A bisphenol-A sealant has been shown to be oestrogenic in vitro; such sealants may represent an additional source of xenoestrogens in humans and may be the cause of additional concerns in children. Concerns have been raised about the possible developmental effects on the foetus/embryo or neonate resulting from the leaching of bisphenol A from epoxy linings in metal cans which come in contact with food-stuffs. Many drugs, including naproxen, salicylic acid, carbamazepine and mefenamic acid can, in vitro, significantly inhibit bisphenol A glucuronidation

(detoxification).

Part A Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity

silver

bisphenol F glycidyl ether/ formaldehyde copolymer

Legend:

Part A Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity

TOXICITY	IRRITATION
Not Available	Not Available
TOXICITY	IRRITATION
Oral (rat) LD50: >2000 mg/kg[2]	Not Available
TOXICITY	IRRITATION
dermal (rat) LD50: 4000 mg/kg[2]	Eyes * (-) (-) Slight irritant
Oral (rat) LD50: 4000 mg/kg[2]	Skin * (-) (-) Slight irritant

1. Value obtained from Europe ECHA Registered Substances- Acute toxicity 2.\* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS- Register of Toxic Effect of chemical Substances

Oxiranes (including glycidyl ethers and alkyl oxides, and epoxides) exhibit many common characteristics with respect to animal toxicology. One such oxirane is ethyloxirane; data presented here may be taken as representative. for 1,2-butylene oxide (ethyloxirane):

Ethyloxirane increased the incidence of tumours of the respiratory system in male and female rats exposed via inhalation. Significant increases in nasal papillary adenomas and combined alveolar/bronchiolar adenomas and carcinomas were observed in male rats exposed to 1200 mg/m<sup>3</sup> ethyloxirane via inhalation for 103 weeks. There was also a significant positive trend in the incidence of combined alveolar/bronchiolar adenomas and carcinomas. Nasal papillary adenomas were also observed in 2/50 high-dose female rats with none occurring in control or low-dose animals. In mice exposed chronically via inhalation, one male mouse developed a squamous cell papilloma in the nasal cavity (300 mg/m<sup>3</sup>) but other tumours were not observed. Tumours were not observed in mice exposed chronically via dermal exposure. When trichloroethylene containing 0.8% ethyloxirane was administered orally to mice for up to 35 weeks, followed by 0.4% from weeks 40 to 69, squamous-cell carcinomas of the forestomach occurred in 3/49 males (p=0.029, age-adjusted) and 1/48 females at week 106. Trichloroethylene administered alone did not induce these tumours and they were not observed in control animals. Two structurally related substances, oxirane (ethylene oxide) and methyloxirane (propylene oxide), which are also direct-acting alkylating agents, have been classified as carcinogenic

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

BISPHENOL F GLYCIDYL  
ETHER/ FORMALDEHYDE  
COPOLYMER

Part A Silver Conductive  
Epoxy Adhesive: Moderate  
Cure / High Conductivity &  
BISPHENOL F GLYCIDYL  
ETHER/ FORMALDEHYDE  
COPOLYMER

The chemical structure of hydroxylated diphenylalkanes or bisphenols consists of two phenolic rings joined together through a bridging carbon. This class of endocrine disruptors that mimic oestrogens is widely used in industry, particularly in plastics Bisphenol A (BPA) and some related compounds exhibit oestrogenic activity in human breast cancer cell line MCF-7, but there were remarkable differences in activity. Several derivatives of BPA exhibited significant thyroid hormonal activity towards rat pituitary cell line GH3, which releases growth hormone in a thyroid hormone-dependent manner. However, BPA and several other derivatives did not show such activity. Results suggest that the 4-hydroxyl group of the A-phenyl ring and the B-phenyl ring of BPA derivatives are required for these hormonal activities, and substituents at the 3,5-positions of the phenyl rings and the bridging alkyl moiety markedly influence the activities. Bisphenols promoted cell proliferation and increased the synthesis and secretion of cell type-specific proteins. When ranked by proliferative potency, the longer the alkyl substituent at the bridging carbon, the lower the concentration needed for maximal cell yield; the most active compound contained two propyl chains at the bridging carbon. Bisphenols with two hydroxyl groups in the para position and an angular configuration are suitable for appropriate hydrogen bonding to the acceptor site of the oestrogen receptor.

The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

Acute Toxicity

Data Not Available to make classification

Carcinogenicity

Data Not Available to make classification

Skin Irritation/Corrosion

Data available to make classification

Reproductivity

Data Not Available to make classification

Serious Eye Damage/Irritation

Data available to make classification

STOT- Single Exposure

Data Not Available to make classification

Respiratory or Skin  
sensitisation

Data available to make classification

STOT- Repeated Exposure

Data Not Available to make classification

Mutagenicity

Data Not Available to make classification

Aspiration Hazard

Data Not Available to make classification

## 12. ECOLOGICAL INFORMATION

### 12.1. Toxicity

Part A Silver Conductive  
Epoxy Adhesive: Moderate  
Cure / High Conductivity

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

silver

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	0.00148mg/L	2
EC50	48	Crustacea	0.00024mg/L	4
EC50	72	Algae or other aquatic plants	0.000016mg/L	2
BCF	336	Crustacea	0.02mg/L	4
NOEC	72	Algae or other aquatic plants	0.000003mg/L	2

bisphenol F glycidyl ether/  
formaldehyde copolymer

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances- Ecotoxicological Information- Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR)- Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database- Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan)- Bioconcentration Data 7. METI (Japan)- Bioconcentration Data 8. Vendor Data

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. MUST NOT come into contact with surface water or areas below flood water level. Do not contaminate water when cleaning tools or when disposing of the water with which tools are cleaned. Waste from use of the product should be disposed of in the workplace or at designated waste disposal facilities. Environmental toxicity is a function of the n-octanol/water partition coefficient (log Pow. Log kow). Compounds with a log Pow>5 are neutral organic compounds, but at a lower log Pow the toxicity of epoxide-containing polymers greater than predicted for simple narcotics. Environmental toxicity is a function of the n-octanol/water partition coefficient (log Pow. Log kow). Compounds with a log Pow >7.4 have low toxicity in aquatic organisms. But the toxicity of phenols with a lower Pow is variable, from low toxicity (LC50 values > 100mg/l) to very toxic (LC50 values < 1mg/l) depending on log Pow, molecular weight and substitutions on the aromatic ring. Dinitrophenols are more toxic than predicted from QSAR estimates. Information about danger from these groups is not available to everyone.

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

## 12.2. Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

## 12.3. Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

## 12.4. Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

## 12.5. Results of PBT and vPvB assessment

	P	B	T
Relevant available data	Not Applicable	Not Applicable	Not Applicable
PBT Criteria fulfilled?	Not Applicable	Not Applicable	Not Applicable

## 12.6. Other adverse effects

## 13. DISPOSAL CONSIDERATIONS

### 13.1. Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> <li>-Containers may still present a chemical hazard/ danger when empty.</li> <li>-Return to supplier for reuse/ recycling if possible.</li> <li>Otherwise:               <ul style="list-style-type: none"> <li>-If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>-Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> <li>-DO NOT allow wash water from cleaning or process equipment to enter drains.</li> <li>-It may be necessary to collect all wash water for treatment before disposal.</li> <li>-In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>-Where in doubt contact the responsible authority.</li> </ul> </li> </ul>
Waste treatment options	Not Available
Sewage disposal options	Not Available

## 14. TRANSPORT INFORMATION

### Labels Required

	Transport by road (ADR): Not included, Special facilities 375 Air Transport (ICAO-IATA): Not included, Special Facilities A197 Maritime transport (IMDG): Not included, 2.10.2.7 Inland waterway transport (ADN): Not included, Special facilities, 274
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### Land transport (ADR)

14.1. UN number	3077
14.2. UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver and bisphenol f glycidyl ether/ formaldehyde copolymer)
14.3. Transport hazard class(es)	Class 9 Subrisk Not Applicable
14.4. Packing group	III
14.5. Environmental hazard	Environmentally hazardous
14.6 Special precautions for user.	Hazard identification (Kemler) 90 Classification code M7 Hazard Label 9 Special provisions 274 335 375 601 Limited quantity 5 kg

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

## Air transport (ICAO-IATA / DGR)

14.1. UN number	3077
14.2. UN proper shipping name	Environmentally hazardous substance, solid, n.o.s. * (contains silver and bisphenol f glycidyl ether/ formaldehyde copolymer)
14.3. Transport hazard class(es)	ICAO/IATA Class 9 ICAO / IATA Subrisk Not Applicable ERG Code 9L
14.4. Packing group	III
14.5. Environmental hazard	Environmentally hazardous
14.6 Special precautions for user:	Special provisions A97 A158 A179 A197 Cargo Only Packing Instructions 956 Cargo Only Maximum Qty / Pack 400 kg Passenger and Cargo Packing Instructions 956 Passenger and Cargo Maximum Qty / Pack 400 kg Passenger and Cargo Limited Quantity Packing Instructions Y956 Passenger and Cargo Limited Maximum Qty / Pack 30 kg G

## Sea transport (IMDG-Code / GGVSee)

14.1. UN number	3077
14.2. UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver and bisphenol f glycidyl ether/ formaldehyde copolymer)
14.3. Transport hazard class(es)	IMDG Class 9 IMDG Subrisk Not Applicable
14.4. Packing group	III
14.5. Environmental hazard	Marine Pollutant
14.6 Special precautions for user:	EMS Number F-A , S-F Special provisions 274 335 966 967 969 Limited Quantities 5 kg

## Inland waterways transport (ADN)

14.1. UN number	3077
14.2. UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains silver and bisphenol f glycidyl ether/ formaldehyde copolymer)
14.3. Transport hazard class(es)	9 Not Applicable
14.4. Packing group	III
14.5. Environmental hazard	Environmentally hazardous
14.6 Special precautions for user:	Classification code M7 Special provisions 274; 335; 375; 601 Limited quantity 5 kg Equipment required PP, A*** Fire cones number 0

14.7 Transport in bulk according to Annex II of MARPOL and the IBC code  
Not Applicable

## 15. REGULATORY INFORMATION

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

#### SILVER(7440-22-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

- EU European Chemicals Agency (ECHA)- Community Progressive Action Plan (CoRAP) List of Substances
- Europe ECHA Registered Substances- Classification and Labeling- DSD-DPD
- Europe European Chemicals Agency (ECHA) REACH registration numbers
- European Chemicals Agency (ECHA) Classification
- European Customs of Chemicals ECICS (English)
- European Union- the European Inventory of Existing Commercial Chemical Substances (EINECS) (English)
- International WHO List of Proposed Exposure Limit (OEL) Values for synthetic nanomaterials (MNMS)
- Nederland Grenswaarden Voor Beroepsmatige Blootstelling (Dutch)

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

## BISPHENOL F GLYCIDYL ETHER/ FORMALDEHYDE COPOLYMER(28064-14-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

ADN- European Agreement concerning the International Carriage of Dangerous Goods on the inland waterways	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2015, German)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (german)	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, English)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous goods	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, French)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (French)	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR-S 2019, Swedish)
Europe European Agreement concerning the International Carriage of Dangerous Goods across the road	Regulations concerning the International Carriage of Dangerous Goods by Rail- Table A: List of Hazardous Substances- RID 2017 (English)
Europe European Agreement concerning the International Carriage of Dangerous Goods by road- ADR 2017 (Russian)	United Nations Model Regulations for the Transport of Dangerous Goods (Chinese)
European Chemicals Agency (ECHA) Classification	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (English)
European Agreement concerning the International Carriage of Dangerous Goods by the Way (ADR 2011, spanish)	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (spain)

This safety data sheet is in compliance with the following EU legislation and its adaptations- as far as applicable- : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2015/830; Regulation (EC) No 1272/2008 as updated through ATPs.

### 15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

### National Inventory Status

National Inventory	Status
Australia- AICS	Y
Canada- DSL	Y
Canada- NDSL	N (bisphenol F glycidyl ether/ formaldehyde copolymer; silver)
China- IECSC	Y
Europe- EINEC / ELINCS / NLP	N (bisphenol F glycidyl ether/ formaldehyde copolymer)
Japan- ENCS	N (silver)
Korea- KECI	Y
New Zealand- NZIoC	Y
Philippines- PICCS	Y
USA- TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

## 16. OTHER INFORMATION

### Full text Risk and Hazard codes

H411	Toxic to aquatic life with long lasting effects.
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### Other information

#### Ingredients with multiple cas numbers

Name	CAS No
bisphenol F glycidyl ether/ formaldehyde copolymer	28064-14-4, 42616-71-7, 59029-73-1, 94422-39-6

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

- EN 166 Personal eye-protection
- EN 340 Protective clothing
- EN 374 Protective gloves against chemicals and micro-organisms
- EN 13832 Footwear protecting against chemicals
- EN 133 Respiratory protective devices



## SHIELDOKIT CONDUCTIVE GLUE (COMPONENT A) 3980

### Definitions and abbreviations

PC-TWA: Permissible Concentration-Time Weighted Average

PC-STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors





# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product Detail : 3980 Electrically Conductive Adhesive (Shieldokit)  
 Application of the substance / the preparation: Electrically conductive epoxy adhesive hardener part for use with resins part B  
 Manufacturer / supplier: Holland Shielding Systems B.V.  
 Jacobus Lipsweg 124  
 3316 BP Dordrecht  
 the Netherlands  
 Ph: +31(0)78- 204 90 00  
 www.hollandshielding.com  
 info@hollandshielding.com

NVIC Netherland, National Poison Information Center, Tel: +31 (0)30 2748888  
 (in case of an emergency only to be reached by a medical person)

## 2. HAZARDS IDENTIFICATION

### 2.1. Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] [1]	H302 - Acute Toxicity (Oral) Category 4, H314 - Skin Corrosion/Irritation Category 1C, H317 - Skin Sensitizer Category 1, H361 - Reproductive Toxicity Category 2, H410 - Chronic Aquatic Hazard Category 1
Legend:	1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

### 2.2. Label elements

Hazard pictogram	
Signal word	DANGER

### Hazard statement(s)

H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H361	Suspected of damaging fertility or the unborn child.
H410	Very toxic to aquatic life with long lasting effects.

### Supplementary statement(s)

Not Applicable

### Precautionary statement(s) Prevention

P201	Obtain special instructions before use.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P272	Contaminated work clothing should not be allowed out of the workplace.

### Precautionary statement(s) Response

P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical advice/ attention.
P310	Immediately call a POISON CENTER/doctor/physician/first aider.
P302+P352	IF ON SKIN: Wash with plenty of water and soap.
P363	Wash contaminated clothing before reuse.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.

Revision date: 22-05-2015



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P391	Collect spillage.
P301+P312	IF SWALLOWED: Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

## Precautionary statement(s) Storage

P405	Store locked up.
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## Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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## 2.3. Other hazards

Inhalation may produce health damage\*.  
 Cumulative effects may result following exposure\*.  
 May produce discomfort of the respiratory system\*.  
 Limited evidence of a carcinogenic effect\*.  
 Possible respiratory sensitizer\*.

4-nonylphenol, branched	Listed in the European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern for Authorisation
bisphenol A	Listed in the European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern for Authorisation
bisphenol A	Listed in the Europe Regulation (EC) No 1907/2006- Annex XVII (Label should state: 'Restricted to professional users.')

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1.Substances

See 'Composition on ingredients' in Section 3.2

### 3.2.Mixtures

1.CAS No 2.EC No 3.Index No 4.REACH No	%[weight]	Name	Classification according to regulation (EC) No 1272/2008 [CLP]
1.7440-22-4 2.231-131-3 3.Not Available 4.01-2119555669-21-XXXX 01-2119513211-60-XXXX	67	silver	EUH210 [1]
1.84852-15-3 2.284-325-5 3.601-053-00-8 4.01-2119510715-45-XXXX	22	4-nonylphenol, branched	Reproductive Toxicity Category 2, Acute Toxicity (Oral) Category 4, Chronic Aquatic Hazard Category 1, Acute Aquatic Hazard Category 1, Skin Corrosion/Irritation Category 1B; H361fd, H302, H410, H314 [2]
1.140-31-8 2.205-411-0 3.612-105-00-4 4.01-2119471486-30-XXXX	7	N-aminoethylpiperazine	Acute Toxicity (Dermal) Category 4, Acute Toxicity (Oral) Category 4, Chronic Aquatic Hazard Category 3, Skin Sensitizer Category 1, Skin Corrosion/Irritation Category 1B; H312, H302, H412, H317, H314 [2]
1.68411-71-2 2.270-141-2 3.Not Available 4.Not Available	1	bisphenol A diglycidyl ether diethylenetriamine reaction products	Acute Toxicity (Oral) Category 4, Acute Toxicity (Inhalation) Category 4, Serious Eye Damage Category 1, Skin Sensitizer Category 1, Skin Corrosion/Irritation Category 1B; H302, H332, H317, H314, EUH019 [1]
1.111-40-0 2.203-865-4 3.612-058-00-X 4.01-2119473793-27-XXXX	1	diethylenetriamine	Acute Toxicity (Dermal) Category 4, Skin Sensitizer Category 1, Skin Corrosion/Irritation Category 1B, Acute Toxicity (Oral) Category 4; H312, H317, H314, H302 [2]
1.80-05-7 2.201-245-8 3.604-030-00-0 4.01-2119457856-23-XXXX	1	bisphenol A	Reproductive Toxicity Category 2, Skin Sensitizer Category 1, Serious Eye Damage Category 1, Specific target organ toxicity- single exposure Category 3 (respiratory tract irritation); H361f, H317, H318, H335 [2]

Legend: 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008- Annex VI; 3. Classification drawn from C&L; \* EU IOELVs available



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## 4. FIRST AID MEASURES

### 4.1. Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>-Immediately hold eyelids apart and flush the eye continuously with running water.</li> <li>-Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.</li> <li>-Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.</li> <li>-Transport to hospital or doctor without delay.</li> <li>-Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> <li>-<b>DO NOT attempt to remove particles attached to or embedded in eye.</b></li> <li>-Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.</li> <li>-Seek urgent medical assistance, or transport to hospital.</li> </ul>
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> <li>-Immediately flush body and clothes with large amounts of water, using safety shower if available.</li> <li>-Quickly remove all contaminated clothing, including footwear.</li> <li>-Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.</li> <li>-Transport to hospital, or doctor.</li> </ul>
Inhalation	<ul style="list-style-type: none"> <li>-If fumes or combustion products are inhaled remove from contaminated area.</li> <li>-Lay patient down. Keep warm and rested.</li> <li>-Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>-Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> <li>-Transport to hospital, or doctor, without delay.</li> <li>-Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.</li> <li>-Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).</li> <li>-As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.</li> <li>-Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.</li> <li>-<b>This must definitely be left to a doctor or person authorised by him/her.</b> (ICSC13719)</li> </ul>
Ingestion	<ul style="list-style-type: none"> <li>-For advice, contact a Poisons Information Centre or a doctor at once.</li> <li>-Urgent hospital treatment is likely to be needed.</li> <li>-<b>If swallowed do NOT induce vomiting.</b></li> <li>-If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>-Observe the patient carefully.</li> <li>-Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>-Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>-Transport to hospital or doctor without delay.</li> </ul>

### 4.2 Most important symptoms and effects, both acute and delayed

See Section 11

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

Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce 'metal fume fever' in workers from an acute or long term exposure.

-Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)

-Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.

-Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.

-The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.

-Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology]

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For acute or short-term repeated exposures to highly alkaline materials:

-Respiratory stress is uncommon but present occasionally because of soft tissue edema.

-Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.

-Oxygen is given as indicated.

-The presence of shock suggests perforation and mandates an intravenous line and fluid administration.

-Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilisation of proteins allow deep penetration into the tissue.

Alkalis continue to cause damage after exposure.

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## INGESTION:

- Milk and water are the preferred diluents
- No more than 2 glasses of water should be given to an adult.
- Neutralising agents should never be given since exothermic heat reaction may compound injury.
- \* Catharsis and emesis are absolutely contra-indicated.
- \* Activated charcoal does not absorb alkali.
- \* Gastric lavage should not be used.

Supportive care involves the following:

- Withhold oral feedings initially.
- If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
- Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
- Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

## SKIN AND EYE:

- Injury should be irrigated for 20-30 minutes.
- Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology]

For acute or short term repeated exposures to phenols/ cresols:

- Phenol is absorbed rapidly through lungs and skin. [Massive skin contact may result in collapse and death]\*
- [Ingestion may result in ulceration of upper respiratory tract; perforation of oesophagus and/or stomach, with attendant complications, may occur. Oesophageal stricture may occur.]\*
- An initial excitatory phase may present. Convulsions may appear as long as 18 hours after ingestion. Hypotension and ventricular tachycardia that require vasopressor and antiarrhythmic therapy, respectively, can occur.
- Respiratory arrest, ventricular dysrhythmias, seizures and metabolic acidosis may complicate severe phenol exposures so the initial attention should be directed towards stabilisation of breathing and circulation with ventilation, intubation, intravenous lines, fluids and cardiac monitoring as indicated.
- [Vegetable oils retard absorption; do NOT use paraffin oils or alcohols. Gastric lavage, with endotracheal intubation, should be repeated until phenol odour is no longer detectable; follow with vegetable oil. A saline cathartic should then be given.]\* ALTERNATIVELY: Activated charcoal (1g/kg) may be given. A cathartic should be given after oral activated charcoal.
- Severe poisoning may require slow intravenous injection of methylene blue to treat methaemoglobinaemia.
- [Renal failure may require haemodialysis.]\*
- Most absorbed phenol is biotransformed by the liver to ethereal and glucuronide sulfates and is eliminated almost completely after 24 hours. [Ellenhorn and Barceloux: Medical Toxicology]
- \*[Union Carbide]

## BIOLOGICAL EXPOSURE INDEX- BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed to the Exposure Standard (ES or TLV):

Determinant	Index Sampling	Time	Comments
1. Total phenol in blood	250 mg/gm creatinine	End of shift	B, NS

B: Background levels occur in specimens collected from subjects NOT exposed

NS: Non-specific determinant; also seen in exposure to other materials

## 5. FIREFIGHTING MEASURES

### 5.1. Extinguishing media

Metal dust fires need to be smothered with sand, inert dry powders.

**-DO NOT USE WATER, CO<sub>2</sub> or FOAM.**

- Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- Chemical reaction with CO<sub>2</sub> may produce flammable and explosive methane.
- If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.
- DO NOT use halogenated fire extinguishing agents.



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## 5.2. Special hazards arising from the substrate or mixture

Fire Incompatibility	-Reacts with acids producing flammable / explosive hydrogen (H2) gas -Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
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## 5.3. Advice for firefighters

Fire Fighting	<ul style="list-style-type: none"> <li>-Alert Fire Brigade and tell them location and nature of hazard.</li> <li>-Wear full body protective clothing with breathing apparatus.</li> <li>-Prevent, by any means available, spillage from entering drains or water course.</li> <li>-Use fire fighting procedures suitable for surrounding area.</li> <li>-Do not approach containers suspected to be hot.</li> <li>-Cool fire exposed containers with water spray from a protected location.</li> <li>-If safe to do so, remove containers from path of fire.</li> <li>-Equipment should be thoroughly decontaminated after use.</li> </ul>
Fire/Explosion Hazard	<ul style="list-style-type: none"> <li>-DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.</li> <li>-DO NOT use water or foam as generation of explosive hydrogen may result.</li> </ul> <p>With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained- this means that it will require a lot of heat to ignite a mass of combustible metal. Generally, metal fire risks exist when sawdust, machine shavings and other metal 'fines' are present.</p> <ul style="list-style-type: none"> <li>-Metal powders, while generally regarded as non-combustible:</li> <li>-May burn when metal is finely divided and energy input is high.</li> <li>-May react explosively with water.</li> <li>-May be ignited by friction, heat, sparks or flame.</li> <li>-May REIGNITE after fire is extinguished.</li> <li>-Will burn with intense heat.</li> </ul> <p>Note:</p> <ul style="list-style-type: none"> <li>-Metal dust fires are slow moving but intense and difficult to extinguish.</li> <li>-Containers may explode on heating.</li> <li>-Dusts or fumes may form explosive mixtures with air.</li> <li>-Gases generated in fire may be poisonous, corrosive or irritating.</li> <li>-Hot or burning metals may react violently upon contact with other materials, such as oxidising agents and extinguishing agents used on fires involving ordinary combustibles or flammable liquids.</li> <li>-Temperatures produced by burning metals can be higher than temperatures generated by burning flammable liquids</li> <li>-Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids would be incapable of burning.</li> </ul> <p>Combustible. Will burn if ignited. Combustion products include: carbon monoxide (CO) carbon dioxide (CO2) other pyrolysis products typical of burning organic material. May emit corrosive fumes.</p>

## 6. ACCIDENTAL RELEASE MEASURES

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

See section 8

### 6.2. Environmental precautions

See section 12

### 6.3. Methods and material for containment and cleaning up

Minor Spills	<ul style="list-style-type: none"> <li>-Remove all ignition sources.</li> <li>-Clean up all spills immediately.</li> <li>-Avoid contact with skin and eyes.</li> <li>-Control personal contact with the substance, by using protective equipment.</li> <li>-Use dry clean up procedures and avoid generating dust.</li> <li>-Place in a suitable, labelled container for waste disposal.</li> <li>-Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.</li> <li>-Check regularly for spills and leaks.</li> </ul>
Major Spills	<p>If molten:</p> <ul style="list-style-type: none"> <li>-Contain the flow using dry sand or salt flux as a dam.</li> <li>All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.</li> <li>-Allow the spill to cool before remelting scrap.</li> <li>-Clear area of personnel and move upwind.</li> <li>-Alert Fire Brigade and tell them location and nature of hazard.</li> <li>-Wear full body protective clothing with breathing apparatus.</li> <li>-Prevent, by any means available, spillage from entering drains or water course.</li> <li>-Consider evacuation (or protect in place).</li> <li>-Stop leak if safe to do so.</li> <li>-Contain spill with sand, earth or vermiculite.</li> <li>-Collect recoverable product into labelled containers for recycling.</li> <li>-Neutralise/decontaminate residue (see Section 13 for specific agent).</li> <li>-Collect solid residues and seal in labelled drums for disposal.</li> <li>-Wash area and prevent runoff into drains.</li> <li>-After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.</li> <li>-If contamination of drains or waterways occurs, advise emergency services.</li> </ul>

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## 6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## 7. HANDLING AND STORAGE

### 7.1. Precautions for safe handling

Safe handling	<p>For molten metals:</p> <ul style="list-style-type: none"><li>-Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops can lead to violent explosions.</li><li>-All tooling, containers, molds and ladles, which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.</li><li>-Any surfaces that may contact molten metal (e.g. concrete) should be specially coated</li><li>-Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimise the hazard.</li></ul> <p>During melting operations, the following minimum guidelines should be observed:</p> <ul style="list-style-type: none"><li>-Inspect all materials prior to furnace charging and completely remove surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage.</li><li>-Store materials in dry, heated areas with any cracks or cavities pointed downwards.</li><li>-Preheat and dry large objects adequately before charging in to a furnace containing molten metal. This is typically done by the use of a drying oven or homogenising furnace. The dry cycle should bring the metal temperature of the coldest item of the batch to 200 degree C (400 deg F) and then hold at that temperature for 6 hours.</li><li>-Avoid all personal contact, including inhalation.</li><li>-Wear protective clothing when risk of exposure occurs.</li><li>-Use in a well-ventilated area.</li><li>-<b>WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.</b></li><li>-Avoid smoking, naked lights or ignition sources.</li><li>-Avoid contact with incompatible materials.</li><li>-When handling, <b>DO NOT eat, drink or smoke.</b></li><li>-Keep containers securely sealed when not in use.</li><li>-Avoid physical damage to containers.</li><li>-Always wash hands with soap and water after handling.</li><li>-Work clothes should be laundered separately. Launder contaminated clothing before re-use.</li><li>-Use good occupational work practice.</li></ul> <p>Observe manufacturer's storage and handling recommendations contained within this SDS. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</p>
Fire and explosion protection	See section 5
Other information	<ul style="list-style-type: none"><li>-Store in original containers.</li><li>-Keep containers securely sealed.</li><li>-Store in a cool, dry, well-ventilated area.</li><li>-Store away from incompatible materials and foodstuff containers.</li><li>-Protect containers against physical damage and check regularly for leaks.</li><li>-Observe manufacturer's storage and handling recommendations contained within this SDS.</li><li>-<b>DO NOT store near acids, or oxidising agents</b></li><li>-No smoking, naked lights, heat or ignition sources.</li></ul>

### 7.2. Conditions for safe storage, including any incompatibilities

Suitable container	<ul style="list-style-type: none"><li>-Glass container is suitable for laboratory quantities</li><li>-<b>CARE:</b> Packing of high density product in light weight metal or plastic packages may result in container collapse with product release Heavy gauge metal packages / Heavy gauge metal drums</li><li>-Lined metal can, lined metal pail/ can.</li><li>-Plastic pail.</li><li>-Polyliner drum.</li><li>-Packing as recommended by manufacturer.</li><li>-Check all containers are clearly labelled and free from leaks.</li></ul> <p>For low viscosity materials</p> <ul style="list-style-type: none"><li>-Drums and jerricans must be of the non-removable head type.</li><li>-Where a can is to be used as an inner package, the can must have a screwed enclosure.</li></ul> <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):</p> <ul style="list-style-type: none"><li>-Removable head packaging;</li><li>-Cans with friction closures and</li><li>-low pressure tubes and cartridges may be used.</li></ul> <p>Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.</p>
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## Storage incompatibility

-WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.

-The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono- or poly-fluorobenzene show extreme sensitivity to heat and are explosive.

-Avoid reaction with borohydrides or cyanoborohydrides

-Silver or silver salts readily form explosive silver fulminate in the presence of both nitric acid and ethanol. The resulting fulminate is much more sensitive and a more powerful detonator than mercuric fulminate.

-Silver and its compounds and salts may also form explosive compounds in the presence of acetylene and nitromethane.

-Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.

-Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.

N-aminoethylpiperazine:

-is a strong base in aqueous solutions

-is incompatible with strong oxidisers, organic anhydrides, acrylates, alcohols, aldehydes, alkylene oxides, substituted allyls, cellulose nitrate, cresols, caprolactam solution, epichlorohydrin, ethylene dichloride, isocyanates, ketones, glycols, nitrates, organic halides, phenols, vinyl acetate

-decomposes exothermically with maleic anhydride

-may increase the explosive sensitivity of nitromethane

attacks aluminium, copper, magnesium, nickel, zinc, or their alloys, and galvanised steel

-Phenols are incompatible with strong reducing substances such as hydrides, nitrides, alkali metals, and sulfides.

-Avoid use of aluminium, copper and brass alloys in storage and process equipment.

-Heat is generated by the acid-base reaction between phenols and bases.

-Phenols are sulfonated very readily (for example, by concentrated sulfuric acid at room temperature), these reactions generate heat.

-Phenols are nitrated very rapidly, even by dilute nitric acid.

-Nitrated phenols often explode when heated. Many of them form metal salts that tend toward detonation by rather mild shock.

-Avoid strong acids, bases.

-Avoid contact with copper, aluminium and their alloys.

Metals exhibit varying degrees of activity. Reaction is reduced in the massive form (sheet, rod, or drop), compared with finely divided forms. The less active metals will not burn in air but:

-can react exothermically with oxidising acids to form noxious gases.

-catalyse polymerisation and other reactions, particularly when finely divided

-react with halogenated hydrocarbons (for example, copper dissolves when heated in carbon tetrachloride), sometimes forming explosive compounds.

-Finely divided metal powders develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air.

-Safe handling is possible in relatively low concentrations of oxygen in an inert gas.

-Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended.

-The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric.

Factors influencing the pyrophoricity of metals are particle size, presence of moisture, nature of the surface of the particle, heat of formation of the oxide, or nitride, mass, hydrogen content, stress, purity and presence of oxide, among others.

-Many metals in elemental form react exothermically with compounds having active hydrogen atoms (such as acids and water) to form flammable hydrogen gas and caustic products.

-Elemental metals may react with azo/diazo compounds to form explosive products.

-Some elemental metals form explosive products with halogenated hydrocarbons.

## 7.3. Specific end use(s)

See section 1.2

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control parameters

#### DERIVED NO EFFECT LEVEL (DNEL)

Not Available

#### PREDICTED NO EFFECT LEVEL (PNEC)

Not Available

#### OCCUPATIONAL EXPOSURE LIMITS (OEL)

##### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Nederland Grens- waarden Voor Beroepsmatige Bloot- stelling (Dutch)	silver	Silver, metallic	0.1 mg/m3	Not Available	Not Available	Not Available
EU Consolidated List of Indicative Occupational Expo- sure Limit Values (IOELVs)	bisphenol A	Bisphenol A (inhalable dust)	10 mg/m3	Not Available	Not Available	Not Available
EU Consolidated List of Indicative Occupational Expo- sure Limit Values (IOELVs)	bisphenol A	Bisphenol A; 4,4'-Iso- propylidenediphenol	2 mg/m3	Not Available	Not Available	Not Available
Nederland Grens- waarden Voor Beroepsmatige Bloot- stelling (Dutch)	bisphenol A	Bisphenol A	2 mg/m3	Not Available	Not Available	Not Available

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
silver	Silver	0.3 mg/m3	170 mg/m3	990 mg/m3
4-nonylphenol, branched	Nonyl phenol, 4- (branched)	0.2 mg/m3	2.3 mg/m3	260 mg/m3
N-aminoethylpiperazine	Aminoethylpiperazine, N-	6.4 mg/m3	71 mg/m3	420 mg/m3
diethylenetriamine	Diethylenetriamine	3 ppm	8.5 ppm	51 ppm
bisphenol A	Bisphenol A; (4,4'-Isopropylidenediphenol)	15 mg/m3	110 mg/m3	650 mg/m3

  

Ingredient	Original IDLH	Revised IDLH
silver	10 mg/m3	Not Available
4-nonylphenol, branched	Not Available	Not Available
N-aminoethylpiperazine	Not Available	Not Available
bisphenol A diglycidyl ether diethylenetriamine reaction products	Not Available	Not Available
diethylenetriamine	Not Available	Not Available
bisphenol A	Not Available	Not Available

### MATERIAL DATA

The adopted TLV-TWA for silver dust and fumes is 0.1 mg/m3 and for the more toxic soluble silver compounds the adopted value is 0.01 mg/m3. Cases of argyria (a slate to blue-grey discolouration of epithelial tissues) have been recorded when workers were exposed to silver nitrate at concentrations of 0.1 mg/m3 (as silver). Exposure to very high concentrations of silver fume has caused diffuse pulmonary fibrosis. Percutaneous absorption of silver compounds is reported to have resulted in allergy. Based on a 25% retention upon inhalation and a 10 m3/day respiratory volume, exposure to 0.1 mg/m3 (TWA) would result in total deposition of no more than 1.5 gms in 25 years.

## 8.2. Exposure controls

- Metal dusts must be collected at the source of generation as they are potentially explosive.
- Avoid ignition sources.
  - Good housekeeping practices must be maintained.
  - Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.
  - Do not use compressed air to remove settled materials from floors, beams or equipment
  - Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.
  - Use non-sparking handling equipment, tools and natural bristle brushes. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations.
  - Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.
  - Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.
  - Workshops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.
  - Wet scrubbers are preferable to dry dust collectors.
  - Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.
  - Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted states.
  - Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.
  - Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuum and electrostatic precipitators must not be used, unless specifically approved for use with flammable/ explosive dusts.

### 8.2.1. Appropriate engineering controls

Air contaminants generated in the workplace possess varying 'escape' velocities which, in turn, determine the 'capture velocities' of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
welding, brazing fumes (released at relatively low velocity into moderately still air)	0.5-1.0 m/s (100-200 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### 8.2.2. Personal protection



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Eye and face protection	<ul style="list-style-type: none"> <li>-Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk-quantities, where there is a danger of splashing, or if the material may be under pressure.</li> <li>-Chemical goggles whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted.</li> <li>-Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection.</li> <li>-Alternatively a gas mask may replace splash goggles and face shields.</li> <li>-Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation- lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]</li> </ul>
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> <li>-Elbow length PVC gloves</li> <li>NOTE: <ul style="list-style-type: none"> <li>-The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.</li> <li>-Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.</li> <li>-Protective gloves eg. Leather gloves or gloves with Leather facing</li> </ul> </li> </ul>
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> <li>-Overalls.</li> <li>-PVC Apron.</li> <li>-PVC protective suit may be required if exposure severe.</li> <li>-Eyewash unit.</li> <li>-Ensure there is ready access to a safety shower.</li> </ul>

Recommended material(s)

## GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

'Forsberg Clothing Performance Index'.

The effect(s) of the following substance(s) are taken into account in the computergenerated selection:

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity

Material	CPI
BUTYL	A
NEOPRENE	C
PVC	C
VITON	C

\* CPI- Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation.-

\* Where the glove is to be used on a short term, casual or infrequent basis, factors such as 'feel' or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Respiratory protection

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	A P1 Air-line*	-	A PAPR-P1
up to 50 x ES	Air-line**	A P2	A PAPR-P2
up to 100 x ES	-	A P3 Air-line*	-
100+ x ES	-	Air-line**	A PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

## 8.2.3. Environmental exposure controls

See section 12



# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## 9. PHYSICAL AND CHEMICAL PROPERTIES

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

Appearance	Silver grey	Relative density (Water = 1)	2,4
Physical state	Solid	Partition coefficient n-octanol / water	Not Available
Odour	Not Available	Auto-ignition temperature (°C)	Not Available
Odour threshold	Not Available	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	>20,5
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available
Flash point (°C)	93,3	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

### 9.2. Other information

Not Available

## 10. STABILITY AND REACTIVITY

10.1. Reactivity	See section 7.2
10.2. Chemical stability	-Unstable in the presence of incompatible materials. -Product is considered stable. -Hazardous polymerisation will not occur.
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

## 11. TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects

Inhaled	<p>Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Inhalation of alkaline corrosives may produce irritation of the respiratory tract with coughing, choking, pain and mucous membrane damage. Pulmonary oedema may develop in more severe cases; this may be immediate or in most cases following a latent period of 5-72 hours. Symptoms may include a tightness in the chest, dyspnoea, frothy sputum, cyanosis and dizziness. Findings may include hypotension, a weak and rapid pulse and moist rales. Not normally a hazard due to non-volatile nature of product.</p> <p>Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in 'metal fume fever'. Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalised feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.</p>
Ingestion	<p>Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Ingestion of alkaline corrosives may produce immediate pain, and circumoral burns. Mucous membrane corrosive damage is characterised by a white appearance and soapy feel; this may then become brown, oedematous and ulcerated. Profuse salivation with an inability to swallow or speak may also result. Even where there is limited or no evidence of chemical burns, both the oesophagus and stomach may experience a burning pain; vomiting and diarrhoea may follow. The vomitus may be thick and may be slimy (mucous) and may eventually contain blood and shreds of mucosa. Epiglottal oedema may result in respiratory distress and asphyxia. Marked hypotension is symptomatic of shock; a weak and rapid pulse, shallow respiration and clammy skin may also be evident. Circulatory collapse may occur and, if uncorrected, may produce renal failure. Severe exposures may result in oesophageal or gastric perforation accompanied by mediastinitis, substernal pain, peritonitis, abdominal rigidity and fever. Although oesophageal, gastric or pyloric stricture may be evident initially, these may occur after weeks or even months and years. Death may be quick and results from asphyxia, circulatory collapse or aspiration of even minute amounts. Death may also be delayed as a result of perforation, pneumonia or the effects of stricture formation.</p>

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Skin Contact

The material can produce severe chemical burns following direct contact with the skin. Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Skin contact with alkaline corrosives may produce severe pain and burns; brownish stains may develop. The corroded area may be soft, gelatinous and necrotic; tissue destruction may be deep. Open cuts, abraded or irritated skin should not be exposed to this material. Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

Eye

When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation. Direct contact with alkaline corrosives may produce pain and burns. Oedema, destruction of the epithelium, corneal opacification and iritis may occur. In less severe cases these symptoms tend to resolve. In severe injuries the full extent of the damage may not be immediately apparent with late complications comprising a persistent oedema, vascularisation and corneal scarring, permanent opacity, staphyloma, cataract, symblepharon and loss of sight. Contact with the eye, by metal dusts, may produce mechanical abrasion or foreign body penetration of the eyeball.

Chronic

Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.

Exposure to the material may cause concerns for human fertility, generally on the basis that results in animal studies provide sufficient evidence to cause a strong suspicion of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

On the basis, primarily, of animal experiments, concern has been expressed by at least one classification body that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment. Silver is one of the most physically and physiologically cumulative of the elements. Chronic exposure to silver salts may cause argyria, a permanent ashen-grey discolouration of the skin, conjunctiva and internal organs (due to the deposit of an insoluble albuminate of silver). The respiratory tract may also be a site of local argyria (following chronic inhalation exposures) with a mild chronic bronchitis being the only obvious symptom.

Metallic dusts generated by the industrial process give rise to a number of potential health problems. The larger particles, above 5 micron, are nose and throat irritants. Smaller particles however, may cause lung deterioration. Particles of less than 1.5 micron can be trapped in the lungs and, dependent on the nature of the particle, may give rise to further serious health consequences. Metals are widely distributed in the environment and are not biodegradable. Biologically, many metals are essential to living systems and are involved in a variety of cellular, physiological, and structural functions. They often are cofactors of enzymes, and play a role in transcriptional control, muscle contraction, nerve transmission, blood clotting, and oxygen transport and delivery. Although all metals are potentially toxic at some level, some are highly toxic at relatively low levels. Moreover, in some cases the same metal can be essential at low levels and toxic at higher levels, or it may be toxic via one route of entry but not another. Toxic effects of some metals are associated with disruption of functions of essential metals. Metals may have a range of effects, including cancer, neurotoxicity, immunotoxicity, cardiotoxicity, reproductive toxicity, teratogenicity, and genotoxicity. Biological half lives of metals vary greatly, from hours to years. Furthermore, the half life of a given metal varies in different tissues. Lead has a half life of 14 days in soft tissues and 20 years in bone. In considering how to evaluate the toxicity of metals of potential concern, a number of aspects of metal toxicity should be kept in mind:

Different species vary in their responses to different metals; in some cases, humans are more sensitive than rodents. Thus, there is a need for broad-based testing of metals;

-The route of exposure may affect the dose and site where the metal concentrates, and thus the observed toxic effects;

-Metal-metal interactions can reduce or enhance toxicity; biotransformation can reduce or enhance toxicity;

-It is difficult to predict the toxicity of one metal based on the adverse effects of another; in trying to evaluate the toxicity of one particular metal compound, predictions based on similar compounds of the same metal may be valid.

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity

silver

4-nonylphenol, branched

N-aminoethylpiperazine

bisphenol A diglycidyl ether diethylenetriamine reaction products

diethylenetriamine

TOXICITY

Not Available

IRRITATION

Not Available

TOXICITY

Oral (rat) LD50: >2000 mg/kg[2]

IRRITATION

Not Available

TOXICITY

Dermal (rabbit) LD50: >2000 mg/kg[2]

Oral (rat) LD50: =580 mg/kg[2]

IRRITATION

Eye (rabbit): 100 mg- SEVERE

Skin (rabbit): 500 mg/24h-SEVERE

TOXICITY

Dermal (rabbit) LD50: 880 mg/kg[2]

Oral (rat) LD50: 2410 mg/kg[2]

IRRITATION

Eye (rabbit): 20 mg/24h- mod

Skin (rabbit): 0.1 mg/24h- mild

Skin (rabbit): 5 mg/24h- SEVERE

TOXICITY

Not Available

IRRITATION

Not Available

TOXICITY

Dermal (rabbit) LD50: ~672 mg/kg[2]

Oral (rat) LD50: =819-1430 mg/kg[2]

IRRITATION

Skin (rabbit): 10 mg/24h- SEVERE

Skin (rabbit): 500 mg open moderate

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	TOXICITY	IRRITATION
bisphenol A	Dermal (rabbit) LD50: 3000 mg/kg[2]	Eye (rabbit): 0.25 mg/24h-SEVERE
	Inhalation (rat) LC50: >0.255 mg/l/6H[2]	Skin (rabbit): 250 mg open- mild
	Oral (rat) LD50: 1200 mg/kg[2]	Skin (rabbit): 500 mg/24h- mild

Legend: 1. Value obtained from Europe ECHA Registered Substances- Acute toxicity 2.\* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS- Register of Toxic Effect of chemical Substances

4-NONYLPHENOL, BRANCHED	Gastrointestinal changes, liver changes, effects on newborn recorded.
N-AMINOETHYLPIPERAZINE	<p>for piperazine:</p> <p>Exposure to piperazine and its salts has clearly been demonstrated to cause asthma in occupational settings. No NOAEL can be estimated for respiratory sensitisation (asthma). Although the LD50 levels indicate a relatively low level of oral acute toxicity (LD50 1-5 g/kg bw), signs of neurotoxicity may appear in humans after exposure to lower doses. Based on exposure levels of up to 3.4 mg/kg/day piperazine base and a LOAEL of 110 mg/kg, there is no concern for acute toxicity. In pigs, piperazine is readily absorbed from the gastrointestinal tract, and the major part of the resorbed compound is excreted as unchanged piperazine during the first 48 hours. The principal route of excretion of piperazine and its metabolites is via urine, with a minor fraction recovered from faeces (16%). In humans the kinetics of the uptake and excretion of piperazine and its metabolites with urine appear to be roughly similar to that in the pig, and the nature and extent of conversion to metabolites has not been determined. Piperazine has demonstrated a low acute toxicity (LD50 = 1-5 g/kg bw) by the oral, dermal, and subcutaneous route of administration to rodents, whereas adequate inhalation toxicity data have not been found. However, there are findings of EEG (electroencephalogram) changes in 37% of 89 children administered 90-130 mg/kg piperazine (two doses during one day), corroborated by a proposed GABA (gamma-aminobutyric acid) receptor agonism exerted by piperazine. Since clinical symptoms of neurotoxicity may occur after exposure to higher doses, a LOAEL of 110 mg/kg piperazine base for acute neurotoxicity in humans after acute exposure is proposed. Piperazine, as concentrated aqueous solution, has strongly irritating properties with regard to skin, and should be regarded as corrosive with respect to the eye. Exposure to piperazine and its salts has been demonstrated to cause allergic dermatitis as well as respiratory sensitisation in humans. As shown by the LLNA, piperazine has a sensitising potential in animals. Although piperazine is clearly sensitising, no NOAEL can be set for this effect from the present database. A NOAEL of 25 mg/kg/day of piperazine for liver toxicity in the beagle dog has been chosen after repeated exposure. A LOAEL of 30 mg/kg/day of piperazine for neurotoxicity is proposed based on documentation of (rare cases) of neurotoxicity from human clinical practice. Neurotoxicity also appears in other species (e.g., rabbits, dogs, cats, tigers, and horses), but not in rodents. For reproductive effects of piperazine, there is a NOAEL of 125 mg/kg/day for effects on fertility, i.e., reduced pregnancy index, decreased number of implantation sites, and decreased litter sizes in rats. The teratogenic properties have been investigated in rats and rabbits in adequate studies. In rabbit, such effects may be elicited at a dose level that is also toxic to the dam. The LOAEL is 94 mg/kg/day, and the NOAEL 42 mg/kg/day piperazine base (maternal and embryotoxic). In the rat study, there were decreases in body weight of both dams and offspring at the top dose (2,100 mg/kg/day piperazine base), but there were no signs of any malformations. The genotoxic properties have been investigated both in vitro (in the Ames test, in a nonstandard study on <i>Saccharomyces cerevisiae</i> and in Chinese hamster ovary cells) and in vivo, in a micronuclei assay on mice, all with negative results. There are no solid indications of a carcinogenic effect of piperazine, neither in animal studies, nor from the investigation on humans. In view of lack of genotoxic action, it appears unlikely that piperazine poses a carcinogenic risk. There seems to be an additional cancer risk due to the formation of N-monomitrosopiperazine (NPZ) from piperazine. It is possible to calculate a hypothetical additional cancer risk posed by NPZ after exposure to piperazine, but the calculation would depend on several assumptions. We conclude that there seems to be an additional cancer risk due to the formation of NPZ from piperazine, and although it is difficult to estimate, it is probably small. The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>No significant acute toxicological data identified in literature search. Oxiranes (including glycidyl ethers and alkyl oxides, and epoxides) exhibit many common characteristics with respect to animal toxicology. One such oxirane is ethyloxirane; data presented here may be taken as representative.</p> <p>for 1,2-butylene oxide (ethyloxirane):</p> <p>Ethyloxirane increased the incidence of tumours of the respiratory system in male and female rats exposed via inhalation. Significant increases in nasal papillary adenomas and combined alveolar/bronchiolar adenomas and carcinomas were observed in male rats exposed to 1200 mg/m<sup>3</sup> ethyloxirane via inhalation for 103 weeks. There was also a significant positive trend in the incidence of combined alveolar/bronchiolar adenomas and carcinomas. Nasal papillary adenomas were also observed in 2/50 high-dose female rats with none occurring in control or low-dose animals. In mice exposed chronically via inhalation, one male mouse developed a squamous cell papilloma in the nasal cavity (300 mg/m<sup>3</sup>) but other tumours were not observed. Tumours were not observed in mice exposed chronically via dermal exposure. When trichloroethylene containing 0.8% ethyloxirane was administered orally to mice for up to 35 weeks, followed by 0.4% from weeks 40 to 69, squamous-cell carcinomas of the forestomach occurred in 3/49 males (p=0.029, age-adjusted) and 1/48 females at week 106. Trichloroethylene administered alone did not induce these tumours and they were not observed in control animals. Two structurally related substances, oxirane (ethylene oxide) and methyloxirane (propylene oxide), which are also direct-acting alkylating agents, have been classified as carcinogenic</p>
BISPHENOL A DIGLYCIDYL ETHER DIETHYLENETRIAMINE REACTION PRODUCTS	<p>For alkyl polyamines:</p> <p>The alkyl polyamines cluster consists of organic compounds containing two terminal primary amine groups and at least one secondary amine group. Typically these substances are derivatives of ethylenediamine, propylenediamine or hexanediamine. The molecular weight range for the entire cluster is relatively narrow, ranging from 103 to 232.</p> <p>Acute toxicity of the alkyl polyamines cluster is low to moderate via oral exposure and a moderate to high via dermal exposure. Cluster members have been shown to be eye irritants, skin irritants, and skin sensitizers in experimental animals. Repeated exposure in rats via the oral route indicates a range of toxicity from low to high hazard. Most cluster members gave positive results in tests for potential genotoxicity. Limited carcinogenicity studies on several members of the cluster showed no evidence of carcinogenicity. Unlike aromatic amines, aliphatic amines are not expected to be potential carcinogens because they are not expected to undergo metabolic activation, nor would activated intermediates be stable enough to reach target macromolecules. Polyamines potentiate NMDA induced whole-cell currents in cultured striatal neurons</p>
DIETHYLENETRIAMINE	

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## BISPHENOL A

For bisphenol A (BPA)

Following oral administration absorption of BPA is rapid and extensive while dermal absorption is limited. Extensive first pass metabolism occurs following absorption from the gastrointestinal tract with glucuronide conjugation being the major metabolic pathway. Bisphenol A is of low acute toxicity (rodent oral LD50 values from 3300-4100 mg/kg, a rabbit oral LD50 value 2230 mg/kg and a rat acute inhalation 6-hour LC50 value >170 mg/m<sup>3</sup>). Bisphenol A is not a skin irritant, however, it is severely irritating to the eyes. BPA was negative in gene mutation and clastogenicity assays in cultured mammalian cells, as well as in a micronucleus test for clastogenicity in vivo; therefore, BPA is considered not to present a genotoxic concern for human health. BPA results in minimal effects on the liver and kidney (LOAEL from chronic exposure in the diet was 50 mg/kg/day). For reproductive toxicity, data from a three-generation study in the rat, BPA was not a selective reproductive toxicant at doses ranging from 0.001 to 500 mg/kg/day. BPA is not a developmental toxicant in rats or Mice. Inconsistent findings are reported in the 'low dose' literature for bisphenol A. The inherent challenge of conducting these types of studies may be exacerbated with bisphenol A because the endpoints of concern are endocrine-mediated and potentially impacted by factors that include phytoestrogen content of the animal feed, extent of bisphenol A exposure from caging or water bottles, and the alleged sensitivity of the animal model to oestrogens. High-dose studies are less susceptible to these types of influences because the toxicologic response should be more robust and less variable. Several large, robust, well designed studies with multiple dose groups using several strains of rats and mice have been conducted and none of these detected any adverse reproductive effects at low to moderate dosage levels of BPA administered via the relevant route of human exposures. Further, none of these studies detected changes in prostate weight, age at puberty (rat), pathology or tumors in any tissue, or reproductive tract malformations. Every chemical that produces low dose cellular and molecular alterations of endocrine function also produces a cascade of effects increasing in severity resulting in clearly adverse alterations at higher doses, albeit the effects can be different from those seen at low doses. With these endocrine disruptors, but not BPA, the low dose effects are often causally linked to the high-dose adverse effects of the chemical. This is true for androgens like testosterone and trenbolone, estrogens like DES, 17beta-oestradiol and ethinyl oestradiol, xenoestrogens like methoxychlor and genistein, and antiandrogens like vinclozolin, for example. Hence, the failure of BPA to produce reproducible adverse effects via a relevant route of exposure, coupled with the lack of robustness of the many of the low dose studies (sample size, dose range, statistical analyses and experimental design, GLP) and the inability to reproduce many of these effects of any adverse effect strains the credibility of some of these study results. The lack of reproducibility of the low dose effects, the absence of toxicity in those low-dose-affected tissues at high-doses, and the uncertain adversity of the reported effects lead to the conclusion that there is 'minimal' concern for reproductive effects. In contrast, the literature on bisphenol A effects on neural and behavioral response is more consistent with respect to the number of 'positive' studies although it should be noted that the high-dose studies that proved to be the most useful for evaluating reproductive effects did not adequately assess neural and behavioral responses. In addition, even though different investigators assessed different neural and behavioral endpoints, an expert Panel concluded that the overall findings suggest that bisphenol A may be associated with neural changes in the brain and behavioral alterations related to sexual dimorphism in rodents. For this reason, the Panel expressed 'some' concern for these effects even though it is not clear the reported effects constitute an adverse toxicological response. In summary: For pregnant women and fetuses, the Expert Panel has different levels of concern for the different developmental endpoints that may be susceptible to bisphenol A disruption, as follows:

- For neural and behavioral effects, the Expert Panel has some concern;
- For prostate effects, the Expert Panel has minimal concern;
- For the potential effect of accelerated puberty, the Expert Panel has minimal concern; and
- For birth defects and malformations, the Expert Panel has negligible concern.

For infants and children, the Expert Panel has the following levels of concern for biological processes that might be altered by Bisphenol A, as follows:

- Some concern for neural and behavioral effects; and
- Minimal concern for the effect of accelerated puberty.

For adults, the Expert Panel has negligible concern for adverse reproductive effects following exposures in the general population to Bisphenol A. For highly exposed subgroups, such as occupationally exposed populations, the level of concern is elevated to minimal. NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Bisphenol A National Toxicology Program US Department of Health and Human Services September 2008 NTP Publication No 08-5994 The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

The chemical structure of hydroxylated diphenylalkanes or bisphenols consists of two phenolic rings joined together through a bridging carbon. This class of endocrine disruptors that mimic oestrogens is widely used in industry, particularly in plastics Bisphenol A (BPA) and some related compounds exhibit oestrogenic activity in human breast cancer cell line MCF-7, but there were remarkable differences in activity. Several derivatives of BPA exhibited significant thyroid hormonal activity towards rat pituitary cell line GH3, which releases growth hormone in a thyroid hormone-dependent manner. However, BPA and several other derivatives did not show such activity. Results suggest that the 4-hydroxyl group of the A-phenyl ring and the B-phenyl ring of BPA derivatives are required for these hormonal activities, and substituents at the 3,5-positions of the phenyl rings and the bridging alkyl moiety markedly influence the activities. Bisphenols promoted cell proliferation and increased the synthesis and secretion of cell type-specific proteins. When ranked by proliferative potency, the longer the alkyl substituent at the bridging carbon, the lower the concentration needed for maximal cell yield; the most active compound contained two propyl chains at the bridging carbon. Bisphenols with two hydroxyl groups in the para position and an angular configuration are suitable for appropriate hydrogen bonding to the acceptor site of the oestrogen receptor.

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity & 4-NONYLPHENOL, BRANCHED & N-AMINOETHYLPIPERAZINE & BISPHENOL A DIGLYCIDYL ETHER DIETHYLENTRIAMINE REACTION PRODUCTS & DIETHYLENTRIAMINE & BISPHENOL A

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity & N-AMINOETHYLPIPERAZINE & BISPHENOL A DIGLYCIDYL ETHER DIETHYLENTRIAMINE REACTION PRODUCTS & DIETHYLENTRIAMINE & BISPHENOL A

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity & BISPHENOL A DIGLYCIDYL ETHER DIETHYLENTRIAMINE REACTION PRODUCTS & BISPHENOL A

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity & N-AMINOETHYLPIPERAZINE & DIETHYLENETRIAMINE

Handling ethyleneamine products is complicated by their tendency to react with other chemicals, such as carbon dioxide in the air, which results in the formation of solid carbamates. Because of their ability to produce chemical burns, skin rashes, and asthma-like symptoms, ethyleneamines also require substantial care in handling. Higher molecular weight ethyleneamines are often handled at elevated temperatures further increasing the possibility of vapor exposure to these compounds. Because of the fragility of eye tissue, almost any eye contact with any ethyleneamine may cause irreparable damage, even blindness. A single, short exposure to ethyleneamines, may cause severe skin burns, while a single, prolonged exposure may result in the material being absorbed through the skin in harmful amounts. Exposures have caused allergic skin reactions in some individuals. Single dose oral toxicity of ethyleneamines is low. The oral LD50 for rats is in the range of 1000 to 4500 mg/kg for the ethyleneamines. In general, the low-molecular weight polyamines have been positive in the Ames assay, increase sister chromatid exchange in Chinese hamster ovary (CHO) cells, and are positive for unscheduled DNA synthesis although they are negative in the mouse micronucleus assay. It is believed that the positive results are based on its ability to chelate copper

4-NONYLPHENOL, BRANCHED & DIETHYLENETRIAMINE

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

4-NONYLPHENOL, BRANCHED & N-AMINOETHYLPIPERAZINE & DIETHYLENETRIAMINE

The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.

Acute Toxicity

Data available to make classification

Carcinogenicity

Data Not Available to make classification

Skin Irritation/Corrosion

Data available to make classification

Reproductivity

Data available to make classification

Serious Eye Damage/Irritation

Data Not Available to make classification

STOT- Single Exposure

Data Not Available to make classification

Respiratory or Skin sensitisation

Data available to make classification

STOT- Repeated Exposure

Data Not Available to make classification

Mutagenicity

Data Not Available to make classification

Aspiration Hazard

Data Not Available to make classification

## 12. ECOLOGICAL INFORMATION

### 12.1. Toxicity

Part B Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

silver

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	0.00148mg/L	2
EC50	48	Crustacea	0.00024mg/L	4
EC50	72	Algae or other aquatic plants	0.000016mg/L	2
BCF	336	Crustacea	0.02mg/L	4
NOEC	72	Algae or other aquatic plants	0.000003mg/L	2

4-nonylphenol, branched

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	0.017mg/L	2
EC50	48	Crustacea	0.0844mg/L	2
EC50	96	Algae or other aquatic plants	0.027mg/L	2
BCF	24	Fish	0.193mg/L	4
EC10	96	Algae or other aquatic plants	0.012mg/L	4
NOEC	2688	Fish	>=0.00127mg/L	2

N-aminoethylpiperazine

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	2-190mg/L	2
EC50	48	Crustacea	=32mg/L	1
EC50	72	Algae or other aquatic plants	=495mg/L	1
NOEC	48	Crustacea	=18mg/L	1

bisphenol A diglycidyl ether diethylenetriamine reaction products

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	diethylenetriamine	LC50	96	Fish	1014mg/L
EC50		48	Crustacea	=16mg/L	1
EC50		96	Algae or other aquatic plants	345.6mg/L	4
EC0		48	Crustacea	=2mg/L	1
NOEC		504	Crustacea	=5.6mg/L	1
	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	bisphenol A	LC50	96	Fish	=3.9mg/L
EC50		48	Crustacea	=3.9mg/L	1
EC50		96	Algae or other aquatic plants	=1mg/L	1
BCF		288	Fish	0.556mg/L	4
NOEC		Not Available	Fish	0.001-0.179mg/L	2

Legend: Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information- Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database- Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan)- Bioconcentration Data 7. METI (Japan)- Bioconcentration Data 8. Vendor Data

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. MUST NOT come into contact with surface water or areas below flood water level. Do not contaminate water when cleaning tools or when disposing of the water with which tools are cleaned. Waste from use of the product should be disposed of in the workplace or at designated waste disposal facilities. By all means, avoid spillage through drains or watercourses. DO NOT throw removed product into sewer or surface water.

## 12.2. Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
4-nonylphenol, branched	HIGH	HIGH
N-aminoethylpiperazine	HIGH	HIGH
diethylenetriamine	LOW	LOW
bisphenol A	HIGH (Half-life = 360 days)	LOW (Half-life = 0.31 days)

## 12.3. Bioaccumulative potential

Ingredient	Bioaccumulation
4-nonylphenol, branched	LOW (BCF = 271)
N-aminoethylpiperazine	LOW (LogKOW = -1.5677)
diethylenetriamine	LOW (BCF = 1.7)
bisphenol A	LOW (BCF = 100)

## 12.4. Mobility in soil

Ingredient	Mobility
4-nonylphenol, branched	LOW (KOC = 56010)
N-aminoethylpiperazine	LOW (KOC = 171.7)
diethylenetriamine	LOW (KOC = 87.53)
bisphenol A	LOW (KOC = 75190)

## 12.5. Results of PBT and vPvB assessment

	P	B	T
Relevant available data	Not Applicable	Not Applicable	Not Applicable
PBT Criteria fulfilled?	Not Applicable	Not Applicable	Not Applicable

12.6. Other adverse effects  
No data available

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## 13. DISPOSAL CONSIDERATIONS

### 13.1. Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> <li>-Containers may still present a chemical hazard/ danger when empty.</li> <li>-Return to supplier for reuse/ recycling if possible.</li> <li>Otherwise: <ul style="list-style-type: none"> <li>-If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>-Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> <li>-<b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li> <li>-It may be necessary to collect all wash water for treatment before disposal.</li> <li>-In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>-Where in doubt contact the responsible authority.</li> <li>-Recycle wherever possible.</li> <li>-Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.</li> <li>-Treat and neutralise at an approved treatment plant.</li> <li>-Treatment should involve: Mixing or slurring in water; Neutralisation with suitable dilute acid followed by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material).</li> <li>-Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.</li> </ul> </li> </ul>
Waste treatment options	Not Available
Sewage disposal options	Not Available

## 14. TRANSPORT INFORMATION

### Labels Required



### Land transport (ADR)

14.1. UN number	3263	
14.2. UN proper shipping name	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (contains silver and nonylphenol and n-aminoethylpiperazine)	
14.3. Transport hazard class(es)	Class	8
	Subrisk	Not Applicable
14.4. Packing group	II	
14.5. Environmental hazard	Environmentally hazardous	
14.6 Special precautions for user.	Hazard identification (Kemler)	80
	Classification code	C8
	Hazard Label	8
	Special provisions	274
	Limited quantity	1 kg

### Air transport (ICAO-IATA / DGR)

14.1. UN number	3263	
14.2. UN proper shipping name	Corrosive solid, basic, organic, n.o.s. * (contains silver and nonylphenol and n-aminoethylpiperazine)	
14.3. Transport hazard class(es)	ICAO/IATA Class	8
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	8L
14.4. Packing group	II	
14.5. Environmental hazard	Environmentally hazardous	
14.6 Special precautions for user.	Special provisions	A3 A803
	Cargo Only Packing Instructions	863
	Cargo Only Maximum Qty / Pack	50 kg
	Passenger and Cargo Packing Instructions	859
	Passenger and Cargo Maximum Qty / Pack	15 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Y844
	Passenger and Cargo Limited Maximum Qty / Pack	5 kg

### Sea transport (IMDG-Code / GGVSee)

14.1. UN number	3263	
14.2. UN proper shipping name	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (contains silver and nonylphenol and n-aminoethylpiperazine)	
14.3. Transport hazard class(es)	IMDG Class	8
	IMDG Subrisk	Not Applicable
14.4. Packing group	II	
14.5. Environmental hazard	Marine Pollutant	
14.6 Special precautions for user.	EMS Number	F-A, S-B
	Special provisions	274
	Limited Quantities	1 kg

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## Inland waterways transport (ADN)

14.1. UN number	3263	
14.2. UN proper shipping name	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S. (contains silver and nonylphenol and n-aminoethylpiperazine)	
14.3. Transport hazard class(es)	8	Not Applicable
14.4. Packing group	II	
14.5. Environmental hazard	Environmentally hazardous	
14.6 Special precautions for user.	Classification code	C8
	Special provisions	274
	Limited quantity	1 kg
	Equipment required	PP, EP
	Fire cones number	0

## 14.7 Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

## 15. REGULATORY INFORMATION

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

#### SILVER(7440-22-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

EU European Chemicals Agency (ECHA)- Community Progressive Action Plan (CoRAP) List of Substances	European Customs of Chemicals ECICS (English)
Europe ECHA Registered Substances- Classification and Labeling- DSD-DPD	European Union- the European Inventory of Existing Commercial Chemical Substances (EINECS) (English)
Europe European Chemicals Agency (ECHA) REACH registration numbers	International WHO List of Proposed Exposure Limit (OEL) Values for synthetic nanomaterials (MNMS)
European Chemicals Agency (ECHA) Classification	Nederland Grenswaarden Voor Beroepsmatige Blootstelling (Dutch)

#### 4-NONYLPHENOL, BRANCHED(84852-15-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

ADN- European Agreement concerning the International Carriage of Dangerous Goods on the inland waterways	European Chemicals Agency (ECHA) Classification
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (german)	European Trade Union Confederation (ETUC) priority list for REACH authorization
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (English)	European Customs of Chemicals ECICS (English)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (French)	European Agreement concerning the International Carriage of Dangerous Goods by the Way (ADR 2011, spanish)
The European Union (EU) in Annex I to Council Directive 67/548/EEC on the Classification and Labeling of Hazardous Substances- Updated by ATP: 31	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2015, German)
The European Union (EU) Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures- Annex VI	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, English)
EU European Chemicals Agency (ECHA)- Community Progressive Action Plan (CoRAP) List of Substances	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, French)
EU REACH Regulation (EC) No. 1907/2006- Proposals for identifying highly substances of concern: Annex XV reports for stakeholder comment Previous consultation	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR-S 2019, Swedish)
EU REACH Regulation (EC) 1907/2006 Annex XVII- Restrictions on the production, placing on the market and use of certain hazardous substances, mixtures and objects	European Union- the European Inventory of Existing Commercial Chemical Substances (EINECS) (English)
Europe Aerospace and Defense Industries Association of Europe (ASD) REACH Implementation working group Priority List Substances (PDSL)	European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labeling and packaging of substances and mixtures- Annex VI- Chemwatch Standard Format
Europe ECHA Registered Substances- Classification and Labeling- DSD-DPD	Netherlands Non-exhaustive list of reproductive toxicants containing additional registration obligation pursuant to Article 4.2a applies, second paragraph of the Working Conditions Decree (Dutch)
Europe European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern for Authorization	Regulations concerning the International Carriage of Dangerous Goods by Rail- Table A: List of Hazardous Substances- RID 2017 (English)
Europe European Chemicals Agency (ECHA) REACH registration numbers	United Nations Recommendations for the Transport of Dangerous Goods Model Regulations (Chinese)
Europe European Agreement concerning the International Carriage of Dangerous Goods across the road	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (English)
Europe European Agreement concerning the International Carriage of Dangerous Goods by road- ADR 2017 (Russian)	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (Spanish)



# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## N-AMINOETHYLPIPERAZINE(140-31-8) IS FOUND ON THE FOLLOWING REGULATORY LISTS

ADN- European Agreement concerning the International Carriage of Dangerous Goods on the inland waterways	European Customs of Chemicals ECICS (English)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (german)	European Agreement concerning the International Carriage of Dangerous Goods by the Way (ADR 2011, spanish)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (English)	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2015, German)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (French)	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, English)
The European Union (EU) in Annex I to Council Directive 67/548/EEC on the Classification and Labeling of Hazardous Substances- Updated by ATP: 31	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, French)
The European Union (EU) Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures- Annex VI	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR-S 2019, Swedish)
Europe the European Customs List of Chemicals EDCS (Bulgarian)	European Union- the European Inventory of Existing Commercial Chemical Substances (EINECS) (English)
Europe the European Customs List of Chemicals EDCS (Romanian)	European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labeling and packaging of substances and mixtures- Annex VI- Chemwatch Standard Format
Europe the European Customs List of Chemicals EDCS (Czech)	GESAMP / EHS Composite List- GESAMP Risk Profile
Europe ECHA Registered Substances- Classification and Labeling- DSD-DPD	IMO IBC Code Chapter 17: Overview of minimum requirements
Europe European Chemicals Agency (ECHA) REACH registration numbers	IMO MARPOL (Annex II)- List of Harmful Liquid Substances Transported in Bulk
Europe European Agreement concerning the International Carriage of Dangerous Goods across the road	Regulations concerning the International Carriage of Dangerous Goods by Rail- Table A: List of Hazardous Substances- RID 2017 (English)
Europe European Agreement concerning the International Carriage of Dangerous Goods by road- ADR 2017 (Russian)	United Nations Recommendations for the Transport of Dangerous Goods Model Regulations (Chinese)
European Chemicals Agency (ECHA) Classification	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (English)
European Trade Union Confederation (ETUC) priority list for REACH authorization	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (Spanish)
European Customs of Chemicals- EDCS (Slovak)	

## BISPHENOL A DIGLYCIDYL ETHER DIETHYLENTRIAMINE REACTION PRODUCTS(68411-71-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

European Union- European Inventory of Existing Commercial Chemical Substances (EINECS) (English)	European Chemicals Agency (ECHA) Classification
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## DIETHYLENTRIAMINE(111-40-0) IS FOUND ON THE FOLLOWING REGULATORY LISTS

ADN- European Agreement concerning the International Carriage of Dangerous Goods on the inland waterways	European Customs of Chemicals ECICS (English)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (german)	European Agreement concerning the International Carriage of Dangerous Goods by the Way (ADR 2011, spanish)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (English)	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2015, German)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (French)	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, English)
The European Union (EU) in Annex I to Council Directive 67/548/EEC on the Classification and Labeling of Hazardous Substances- Updated by ATP: 31	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, French)
The European Union (EU) Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures- Annex VI	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR-S 2019, Swedish)
Europe the European Customs List of Chemicals EDCS (Bulgarian)	European Union- the European Inventory of Existing Commercial Chemical Substances (EINECS) (English)
Europe the European Customs List of Chemicals EDCS (Romanian)	European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labeling and packaging of substances and mixtures- Annex VI- Chemwatch Standard Format
Europe the European Customs List of Chemicals EDCS (Czech)	GESAMP / EHS Composite List- GESAMP Risk Profile
Europe ECHA Registered Substances- Classification and Labeling- DSD-DPD	IMO IBC Code Chapter 17: Overview of minimum requirements
Europe European Chemicals Agency (ECHA) REACH registration numbers	IMO MARPOL (Annex II)- List of Harmful Liquid Substances Transported in Bulk
Europe European Agreement concerning the International Carriage of Dangerous Goods across the road	International FOSFA List of Prohibited Immediate Previous Loads
Europe European Agreement concerning the International Carriage of Dangerous Goods by road- ADR 2017 (Russian)	Regulations concerning the International Carriage of Dangerous Goods by Rail- Table A: List of Hazardous Substances- RID 2017 (English)
European Chemicals Agency (ECHA) Classification	United Nations Recommendations for the Transport of Dangerous Goods Model Regulations (Chinese)
European Trade Union Confederation (ETUC) priority list for REACH authorization	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (English)
European Customs of Chemicals- EDCS (Slovak)	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (Spanish)

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## BISPHENOL A(80-05-7) IS FOUND ON THE FOLLOWING REGULATORY LISTS

ADN - European Agreement concerning the International Carriage of Dangerous Goods on the inland waterways	European Chemicals Agency (ECHA) Classification
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (german)	European Trade Union Confederation (ETUC) priority list for REACH authorization
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (English)	European Customs of Chemicals- EDCS (Slovak)
European Union (EU) Transport of Dangerous Goods by Road- List Dangerous Goods (French)	European Customs of Chemicals ECICS (English)
The European Union (EU) in Annex I to Council Directive 67/548/EEC on the Classification and Labeling of Hazardous Substances- Updated by ATP: 31	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2011, spanish)
The European Union (EU) Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures- Annex VI	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2015, German)
EU European Chemicals Agency (ECHA)- Community Progressive Action Plan (CoRAP) List of Substances	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, English)
EU REACH Regulation (EC) No. 1907/2006- Proposals for identifying highly substances of concern: Annex XV reports for stakeholder comment previous consultation	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR 2017, French)
EU REACH Regulation (EC) 1907/2006 Annex XVII- Restrictions on the production, placing on the market and use of certain hazardous substances, mixtures and objects	European Agreement concerning the International Carriage of Dangerous Goods by the road (ADR-S 2019, Swedish)
EU REACH Regulation (EC) 1907/2006 Annex XVII (Annex 6) Toxic for reproduction: category 1B (Table 3.1)/category 2 (Table 3.2)	European Union- the European Inventory of Existing Commercial Chemical Substances (EINECS) (English)
Europe the European Customs List of Chemicals EDCS (Bulgarian)	European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labeling and packaging of substances and mixtures- Annex VI- Chemwatch Standard Format
Europe the European Customs List of Chemicals EDCS (Romanian)	Consolidated EU List of Indicative Exposure Limit Values (IOELVs)
Europe the European Customs List of Chemicals EDCS (Czech)	Netherlands Occupational Exposure Limits (Dutch)
Europe ECHA Registered Substances- Classification and Labeling- DSD-DPD	Netherlands Non-exhaustive list of reproductive toxicants containing additional registration obligation pursuant to Article 4.2a applies, second paragraph of the Working Conditions Decree (Dutch)
Europe European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern for Authorization	Regulations concerning the International Carriage of Dangerous Goods by Rail- Table A: List of Hazardous Substances- RID 2017 (English)
Europe European Chemicals Agency (ECHA) REACH registration numbers	United Nations Recommendations for the Transport of Dangerous Goods Model Regulations (Chinese)
Europe European Agreement concerning the International Carriage of Dangerous Goods across the road	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (English)
Europe European Agreement concerning the International Carriage of Dangerous Goods by road- ADR 2017 (Russian)	UN Recommendations for the Transport of Dangerous Goods Model of Regulations (Spanish)

This safety data sheet is in compliance with the following EU legislation and its adaptations- as far as applicable- : Directives 98/24/EC,- 92/85/EEC,- 94/33/EC,- 2008/98/EC,- 2010/75/EU;

### 15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

### National Inventory Status

National Inventory	Status
Australia- AICS	Y
Canada- DSL	Y
Canada- NDSL	N (4-nonylphenol, branched; N-aminoethylpiperazine; bisphenol A diglycidyl ether diethylenetriamine reaction products; bisphenol A; diethylenetriamine; silver)
China- IECSC	Y
Europe- EINEC / ELINCS / NLP	Y
Japan- ENCS	N (4-nonylphenol, branched; bisphenol A diglycidyl ether diethylenetriamine reaction products; silver)
Korea- KECI	Y
New Zealand- NZIoC	Y
Philippines- PICCS	Y
USA- TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

# SHIELDOKIT CONDUCTIVE GLUE (COMPONENT B) 3980

## 16. OTHER INFORMATION

### Full text Risk and Hazard codes

H312	Harmful in contact with skin.
H318	Causes serious eye damage.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H361f	Suspected of damaging fertility
H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child.
H412	Harmful to aquatic life with long lasting effects.

### Other information

#### Ingredients with multiple cas numbers

Name	CAS No
bisphenol A diglycidyl ether diethylenetriamine reaction products	68411-71-2, 68515-86-6, 68609-13-2
bisphenol A	80-05-7, 27360-89-0, 28106-82-3, 37808-08-5, 137885-53-1

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

### Definitions and abbreviations

PC-TWA: Permissible Concentration-Time Weighted Average

PC-STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index