Nickel Graphite Conductive Adhesive

Nolato PPT AS-N is a single component electrically conductive adhesive comprising of silicone resin filled with conductive nickel coated graphite particles. It cures on exposure to air at room temperature to form an electrically conductive flexible silicone elastomer. Once cured it adheres strongly to a wide range substrates.

Main features

- Single component – ready to use
- Room temperature cure
- Excellent resistance to ageing
- Neutral cure – does not evolve corrosive by-products on curing
- Safe for use with most common substrates – non tarnishing / discolouring
- Wide service temperature range – remains flexible and conductive at extremes of temperature
- Stable - low bond (joint) resistance through temperature cycling
- Reliable connection to electrically 'poor' surfaces e.g. chromated zinc

Usage Notes

Surfaces to be bonded must be clean, dry and oil free. Typical solvents used to clean substrates are acetone, methyl ethyl ketone, xylene and isopropyl alcohol.

To ensure the highest level of electrical or shielding performance it is essential that the surfaces to be bonded have a low contact resistance. This means than materials that have a naturally occurring oxide layer such as aluminium alloys may need to be lightly abraded and cleaned directly prior to bonding.

Assemble parts as soon as possible and certainly within 5 minutes of adhesive application.

Material cures from its outer exposed surface inwards, therefore avoid bond widths greater than 12mm In most cases parts may be handled after 24 hours but avoid stressing the joint until full cure has been achieved The time for full cure to take place is dependent on both humidity and temperature. Higher levels of temperature and humidity will minimise curing times whilst low levels of humidity and temperature will retard curing. Generally, cure rate may be most conveniently controlled by means of temperature

A priming agent is available for treating some inconsistent or difficult to bond surfaces.

Storage

It is recommended that when not in use that the material is stored in a cool dark, dry place. If the facility exists then some form of refrigerated or freezer storage is ideal. If kept properly sealed and in a suitable location then the material will remain usable for up to 16 weeks.

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ISO 9001 QUALITY MANAGEMENT

Cleaning

Excess material should be removed by means of a spatula or similar implement. Smaller traces of the uncured material may be removed by wiping with a lint free cloth damped with MEK, petroleum spirit etc. taking care to observe the safety precautions required in using flammable/harmful solvents of this type.

Safety

Contact with adhesives is irritating to skin and eyes. In case of contact with skin, the excess should be wiped off with a clean dry cloth or paper towel followed by a waterless hand cleaner such as the type used to clean grease or oil from the skin.

Properties

Specific Gravity	2.1 g/cm³
Skin Over Time	15 minutes
Tack Free Time	90 minutes
Cure Time (10mm bond width @ 23°C with 50% RH)	24 hours 48 hours before stressing bond
Colour	Dark Grey
Hardness	75 Shore A
Adhesion – lap shear (aluminium to aluminium)	150Ncm²
Elongation	75%
Service Temperature Range	-50°C to 150°C
Thermal Conductivity	1.0 Wm^{1} K^{1}
Recommended bond thickness	0.05 – 0.5mm
Volume Resistivity (aluminium to aluminium)	<10m Ω/cm²

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The data contained in this data sheet is applicable to the **uncured** material only
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Trade Name: AS-N Conductive Silicone Adhesive

Description: Viscous single component silicone material filled with electrically conductive nickel coated graphite particles

Formula: Mixture

Composition / Information on Ingredients

Chemical Name	CAS-No.	EC EINECS No.	Symbol(s)	%(W/W)	R-phrase(s)
Nickel (Ni)	7440-02-0	231-111-4	X_n	>50	R36 R37 R38 R40 R42 R43
Graphite	7782-42-5	231-955-3	-	>25	
Amorphous silica (SiO_2)	7631-86-9	231-545-4		<5	R20
Trimethoxyvinyl silane	2768-02-7	220-449-8	X_n	<1	R10, R20
Triethoxy (methyl) silane	1185-55-3	214-685-0	X_n	<1	R22
Methanol	67-56-1	200-659-6	T	<0.1	R23, R24, R25, R39

Note: This material is a homogenous polymer mixture and both the nickel metal and silica constituents are fully encapsulated within the polymer. This greatly reduces any harmful effect that might otherwise have as free powders e.g. there is virtually no inhalation risk unless the material is abraded or thermally decomposes

Chip classification risk (R) phrases

R20 – Harmful by inhalation
R22 - Harmful if swallowed
R23 - Toxic by inhalation
R24 - Toxic in contact with skin
R25 - Toxic if swallowed
R39 – Danger of very serious irreversible effects
R36 - Irritating to eyes
R37 - Irritating to respiratory system
R38 - Irritating to the skin
R40 - Limited evidence of a carcinogenic effect
R42 - May cause sensitisation by inhalation
R43 - May cause sensitisation by skin contact

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Hazards Identification - Potential Health Effects

Ingestion	Low order of toxicity
Skin Contact	Prolonged or frequent contact may result in skin sensitization, irritation and dermatitis
Eye Contact	Causes eye irritation – see note below in section 11 concerning contact lenses
Inhalation	No hazard if used as directed – if the cured material is ground or abraded it is recommended that appropriate respiratory protection is used

First-Aid Measures

Obtain medical attention in severe cases or if symptoms persist

Ingestion	Obtain medical attention
Skin Contact	Remove excess with dry cloth or paper towel – then wash with detergent and water
Eye Contact	Immediately flush eyes with plenty of water for at least 15 minutes and obtain medical attention
Inhalation	Remove to fresh air If not breathing, give artificial respiration and obtain immediate medical attention

Fire-Fighting Measures

Extinguishing Media	Carbon dioxide (CO_2), dry chemical or foam
Special Fire-Fighting Procedures	Wear positive pressure, self-contained breathing apparatus and protective clothing. Combustion of this product will generate toxic fumes
Hazardous Combustion Products	Material is essentially non-flammable, however, exposure to fire or flame will result in the generation of a mixture of decomposition products (fumes/gases). The types and concentration of these products will vary depending on the temperature or degree of confinement but are generally likely to contain the following constituents. Carbon dioxide (CO_2), carbon monoxide (CO), hydrocarbons and organic compounds of indeterminate composition, silica (SiO_2), traces of incompletely burned or semi decomposed carbon compounds. Even if this material is not exposed directly to fire, temperatures of approximately 300˚C or greater may cause toxic fumes to be generated

Accidental Release Measures

Action To Be Taken If Material Is Released Or Spilled:

Wear suitable protective clothing, chemical resistant gloves and goggles

Wear appropriate respiratory protection in enclosed areas or if there is insufficient ventilation

Wipe, scrape or soak up in an inert material and put into a container for disposal in accordance with regulations

The container should be sealed, labelled and stored in a cool, well-ventilated area to await disposal

- Warn other personnel of the spill and instruct them to leave the area.
- Wash walking surfaces with detergent and water, after material pickup is complete, to reduce slipping hazard

Handling & Storage

Precautions to Be Taken In Handling & Storage:

- Avoid breathing vapours; if exposed to high vapour concentration, leave area at once
- Avoid contact with skin and eyes
- Use only in a well-ventilated area
- Store in a cool, dry, dark area
- Keep container closed when not in use
- Do not allow contact with acidic, basic or oxidizing material

Exposure Controls / Personal Protection

Occupational exposure limits for methanol
TWA (8 hour exposure limit): 266 mg/m^3 (OES)
STEL (15 minute exposure limit): 333 mg/m^3 (OES)

Engineering Controls	Exhaust ventilation Eye wash stations
Respiratory Protection	Only required if the product is used in large quantities and/or in a confined location, otherwise ensure that the material is used in an open and or well-ventilated area that prevents any build-up of fumes or vapours above the recommended time weighted average (TWA) or maximum short term exposure limits (STEL). If applied engineering controls are inadequate in this respect then appropriate respiratory protection must be worn.
Protective Gloves	Light weight latex or nitrile if necessary
Eye & Face Protection	Safety glasses
Other Protective Equipment	Laboratory coat, apron or good quality disposable protective overalls
Ventilation	Use only in well-ventilated area – use mechanical ventilation if required

Physical & Chemical Properties

Appearance	Dark grey solid
Odour	Not applicable
pH	Not applicable
Boiling point	Not applicable
Melting point	Not applicable
Flash point	Not applicable
Flammability	Not determined
Auto flammability	Not applicable
Explosive properties	Not explosive
Oxidising properties	Not oxidizing
Partition coefficient	Not applicable
Density	2.0 gcm^{-3}
Magnetic properties	Ferromagnetic
Solubility in water	Insoluble

Stability & Reactivity

Hazardous Thermal Decomposition / Combustion Products:

- Carbon dioxide (CO_2)
- Carbon monoxide (CO)
- Silicon dioxide (SiO_2)
- Nitrogen oxides
- Ammonia
- Methanol
- Hydrocarbons
- Methanal (CH2O, Formaldehyde) may be evolved if the uncured material is exposed to temperatures above 150°C

Incompatibility (Materials to Avoid):

- Acidic agents
- Basic agents(Bases/alkalis)
- Oxidizing agents
- Carbon monoxide
- Contact with water will initiate curing process

Toxilogical Information

Acute Toxicity Nickel metal (Ni) – Oral LD_{50} rat >9000mg/kg

Ingestion	Reacts with moisture to form methanol – risk of serious effects at doses above 200mg/kg
Skin Contact	Some individuals are sensitive to contact with nickel metal. Contact may cause allergic (contact) dermatitis (sometimes known as 'nickel itch'). This is characterised by a burning sensation, reddening of the skin, itching and superficial ulceration of the affected area. If this reaction or condition should develop, medical attention should be immediately sought. Individuals may also develop sensitivity to contact with nickel over a

	period of time. Once sensitisation has occurred it can persist indefinitely. If this should occur immediately cease the direct handling nickel or nickel containing materials and avoid any further contact.
Eye Contact	Temporary irritation/discomfort – metal particles could cause minor scratching of eye surface
Inhalation	May cause dizziness, drowsiness, confusion, headaches, nausea – risk of unconsciousness at high exposure levels
Note For Persons Wearing Contact Lenses	If skin contact has occurred, traces of silicone resin may remain on the skin for several days, even after thorough washing. Contact lenses should be removed *before* working with this product. The lenses should not be handled again until all traces of silicone resin have been removed from the hands, as the silicone resin could transfer to the contact lenses and cause severe eye irritation

Ecological Information

- No data is available at this time

Disposal Considerations

- Waste material should be disposed of in accordance with local, national and community regulations
- Accumulated *cured* waste material may be sent to an appropriate refinery for metal recovery

Transport Information

This product is classified as a non-flammable solid for the purpose of transportation.
This means that AS-N is not considered hazardous for transport and therefore there are no special packaging requirements and no restrictions apply to transportation by any method

Regulatory Information

In Great Britain reference should be made to the requirements of the *Control of Substances Hazardous to Health Regulations (COSHH),* the *Management of Health and Safety at Work Regulations,* and the occupational exposure limits detailed in the current edition of *EH40.* Other legislation may also apply. Elsewhere, local, national and community regulations may apply

Nickel metal is classified as a category 3 carcinogen by the EU in directive 67/548/EEC (possible carcinogenic effect but insufficient evidence to make a satisfactory assessment). Note nickel encapsulated in this material

The chemical Hazard Information and Packaging for Supply Regulations (CHIP 3) require that nickel metal be labelled with the following risk and safety phrases

Xn – Harmful – category 3 carcinogen
R40 - Limited evidence of a carcinogenic effect
R43 - May cause sensitization by skin contact
S36 – Wear suitable protective clothing

Other Information

This data sheet is a compilation of information obtained from the data sheets supplied by the manufacturers of the materials present in this product. This compilation of data is believed to be reliable, but it is supplied without warranty of any kind and P&P Technology Ltd assumes no obligation or liability for its completeness or accuracy. The information may not be valid if the product is mixed with other materials prior to use. The information contained in this data sheet does not constitute the user's own assessment of workplace risk as required by health and safety legislation.

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