NOVAMET

Material Safety Data Sheet

NOVAMET Silver-Coated Nickel Powders

* THIS DATA SHEET IS PREPARED IN COMPLIANCE WITH EU DIRECTIVE 2001/58/EC**

1. Identification of the Substance/Preparation and the Company/Undertaking

This MSDS covers the family of products identified as: NOVAMET Silver Coated Nickel Powders

This includes the following types:
15% Ag Coated Ni
15% Ag Coated Ni-400
15% Ag Coated Ni Coarse Grade
15% Ag Coated Ni Flake

Company Identification:

NOVAMET Specialty Products Corporation
681 Lawlins Road, Wyckoff, New Jersey, 07481 USA
Tel. No.: 201-891-7976
Fax No.: 201-891-9467
24 hr Emergency Telephone Number:
In North America (Chemtrec) +1-800-424-9300
In Europe Inco Ltd. Clydach Refinery +44(0)1792-84200
Swansea, Wales
SA6 5QR U.K.

NOVAMET is a wholly owned subsidiary of INCO Inc.

2. Composition/Information on Ingredients

Hazardous Ingredients	Typical Composition	EC (EINECS) Number	CAS Number
Nickel	80-90%	231-111-4	7440-02-0
Silver	10-20%	231-131-3	7440-22-4

Classification Carc. Cat3; R40 R43

3. Hazards Identification

Xn – Harmful - Category 3 Carcinogen
R40 - Limited evidence of a carcinogenic effect.
R43 - May cause sensitisation by skin contact.

If user operations change the substance to other physical or chemical forms, whether as end products, intermediates or fugitive emissions, the user must determine the health hazards of such forms.

4. First Aid Measures

Ingestion	Seek medical attention.
Inhalation	Seek medical attention.
Skin	Wash thoroughly with water. For rashes seek medical advice. Show label or data sheet if possible.

EU:
Updated 11/06

Eyes — Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists seek medical attention.

Wounds — Cleanse thoroughly to remove any nickel particles.

5. Fire Fighting Measures

Suitable extinguishing media: Package intact - Any, type to be selected according to materials stored in the immediate neighborhood.
Spilled Powder – Use water mist or fine spray pressurized extinguishants may disperse the powder and spread the fire.

Special Risks: Not classified as flammable for transport purposes. Keep containers cool with water spray.

Special protective equipment for fire fighting: None needed. Wear protective equipment if required for other materials within the immediate vicinity

6. Accidental Release Measures

Person related precautionary measures: Avoid generation of dusty atmospheres. Do not inhale dusts.

Environmental protection measures: No specific measures needed

Procedures for cleaning/ absorption: Collect spills by wet sweeping or vacuuming with the vacuum exhaust passing through a high efficiency particulate arresting (HEPA) filter if exhaust is discharged into the work place. Wear appropriate nationally approved respirators if collection and disposal of spills is likely to cause the concentration limits of airborne nickel to exceed the locally prescribed exposure limits. Silver Coated Nickel containing material is normally collected to recover nickel and silver values.

7. Handling and Storage

Handling: Prevent the generation of inhalable dusts e.g. by the use of suitable ventilation. Do not inhale dusts. Wear appropriate nationally approved respirators if handling is likely to cause the concentration limits of airborne nickel to exceed the locally prescribed exposure limits. Wear suitable protective clothing and gloves. As packed Silver Coated Nickel product may constitute a manual handling risk.

Storage: Keep in the container supplied, in dry conditions and keep the container closed when not in use. Containers should be stored under cover in a clean and dry environment. Local regulations should be followed regarding the storage of this material.

8. Exposure Controls/Personal Protection

Exposure limit values: Maintain airborne levels as low as possible.

Hazardous Ingredients	TRK (mg/m^3*)	TLV (mg/m^3*)	WEL (mg/m^3*)
Nickel	0.5	1.5	0.5
Silver		0.1	0.1

Occupational exposure controls: Ventilation is normally required when handling or using this product keep airborne Silver Coated Nickel below the nationally authorized limits. If ventilation alone cannot control exposure, respiratory protection must be used.

a) Respiratory protection: Do not inhale dust. If ventilation alone cannot control exposure, respiratory protection (selected specifically for the working place, depending on concentration and quantity of the hazardous material) must be used.

b) Eye protection: Avoid contact with eyes. Wear goggles or face shield or approved safety glasses.

c) Hand and skin protection: Avoid skin contact. Wear suitable protective clothing and gloves, which should be selected specifically for the working place, dependant on the concentration and quantity of the hazardous material being handled. Wash skin thoroughly after handling and before eating, drinking or smoking. Launder clothing and gloves as needed. Use of skin protective barrier cream advised.

9. Physical and Chemical Properties

Odourless, milky-coloured, finely divided powder or flake

Ingredient	Mol. Wt.
Ni	58.71
Ag	107.87
Viscosity	N/A
Melting point Ni	1453^0C
Melting point Ag	961^0C
Boiling point Ni	2732^0C
Boiling point Ag	2212^0C
Flash Point	N/A
Auto-flammability	More than 400^0C
Explosive properties	N/A
Bulk density	2.0 – 4.0 g/cm^3
Particle size	10-75 microns (by laser)
Vapor pressure	N/A
Density Ni	8.9 g/cm^3
Solubility Ni	0 g/100 ml H2O
Solubility Ag	0 g/100 ml H2O
Partition coefficient	N/A

10. Stability and Reactivity

Conditions to be avoided: Hazardous exothermic reaction improbable. Not classified as flammable.

Substances to be avoided: This product can react vigorously with acids to liberate hydrogen, which can form explosive mixtures with air. Under special conditions nickel can react with carbon monoxide in reducing atmospheres to form Nickel Carbonyl, $Ni(CO)_4$, a toxic gas. Metal powders when heated in reducing atmospheres may become pyrophoric.

Hazardous decomposition products: None

11. Toxicological Information

NICKEL

Acute Toxicity:

a) Oral: Non toxic - LD_{50} ORAL RAT >9000 mg/kg
The U.S. Food and Drug Administration (FDA) has affirmed that nickel is generally regarded as safe (GRAS) as a direct human food ingredient.

b) Inhalation: One case has been reported of a fatality following extreme exposure at an estimated 382 mg Ni/m3. A plasma spraying operative died of pneumonia 13 days after exposure to nickel powder particles. The post mortem diagnosis was shock lung.

c) Dermal: No information available.

Corrosivity / Irritation:

a) Respiratory Tract: None

b) Skin: Nickel metal is a well-known skin sensitizer. Direct and prolonged skin contact with metallic nickel may induce nickel allergy and elicit nickel allergic skin reactions in those people already sensitized to nickel, so called nickel allergic contact dermatitis.

c) Eyes: Mechanical irritation may be expected.

d)Preexisting conditions: Individuals known to be allergic to nickel should avoid contact with nickel whenever possible to reduce the likelihood of nickel allergic contact dermatitis reactions (skin rashes). Repeated contact may result in persistent chronic palmar/hand dermatitis in a small number of individuals, despite efforts to reduce or avoid nickel exposure.

Sensitization:

a) Respiratory tract: Nickel metal induced asthma is very rare. 3 case reports are available; the data is not sufficient to conclude that nickel metal is classified as a respiratory sensitizer.

b) Skin: Nickel metal is a potent skin sensitizer. Repeated /prolonged contact with metallic nickel may cause nickel sensitivity resulting in skin allergy. Persons with a known history of eczema or nickel dermatitis should avoid such contact.

Repeated dose toxicity:

a) Oral: No information available

b) Inhalation: Animal studies (rats) show that repeated dose inhalation of nickel damages the lung. Chronic inflammation, lung fibrosis and accumulation of nickel particles were observed.

c) Dermal: Direct and prolonged contact with nickel metal may cause nickel sensitivity resulting in skin allergy.

Mutagenicity / Reproductive toxicity: No data.

Carcinogencity:

a) Ingestion: The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded that there is no evidence that nickel metal is carcinogenic when ingested.

b) Inhalation: There is limited information available from inhalation and intratracheal studies in animals. To date, there is no evidence that nickel metal causes cancer in humans based on epidemiology data from workers in the nickel producing and nickel consuming industries.

c) Injection: Implants and injections of nickel metal in animals have produced tumors at the local sites. IARC (1999) concluded that there is sufficient evidence in experimental animals for the carcinogenicity of

metallic nickel implants and for nickel alloy powder containing ~66% Ni 13-16% chromium and 7% for nickel alloy powder iron.

SILVER

Inhalation: Inhalation of silver in sufficient quantities to cause localized argyria (permanent ashen-grey discolouration) of the respiratory tract has resulted in mild chronic bronchitis an pneumoconiosis. Generalized argyia of the skin, eyes and nails has also resulted from the inhalation of sufficient quantities of metallic silver.

Skin contact: Localized argyia of the skin may occur from the handling of metallic silver or From particles becoming embedded in the skin.

Eye contact: Contact with metallic silver has caused localized argyria of the conjunctiva.

12. Ecological Information

Biologic degradation: Methods for the determination of biodegradability are not applicable to inorganic substances.

Ecotoxic effects: Non toxic

Biological data: Fish toxicity Br. rerio LC_{50}>100mg/1/96h; Daphnia Toxicity: Daphnia magna EC_{50}:>100mg/1/48h; Algeal Toxicity: Selenastrum capricornatum IC_{50}: 100mg/1/72 (suspension); Bacterial toxicity: Pseudomonas fluorescens EC_{50}: 250mg/1/48h

Further Ecological Data: Due to poor solubility of the product, no harmful effects on aquatic organisms are to be expected when handled and used with due care and attention.

13. Disposal Considerations

Silver Coated Nickel containing material is normally collected to recover silver and nickel values. Should disposal be deemed necessary dispose of as a hazardous waste.

14. Transport Information

International Maritime Dangerous Goods Code	Not Regulated.
International Civil Aviation Organization Technical Instructions for the Carriage of Dangerous Goods by Air	Not Regulated.
U.S. Dept. of Transportation Regulations	Apply to nickel powders if they are less than 100 micron in particle size and if they are packaged in quantities greater than 100 pounds.
Canadian Transportation of Dangerous Goods Act	Not Regulated.
European Agreement Concerning the International Carriage of Dangerous Goods by Road	Not Regulated.

NOVAMET

Material

Safety

Data

Sheet

15. Regulatory Information

Nickel metal is classified as a Category 3 carcinogen "a substance which causes concern for man owing to the possible carcinogenic effect but in respect of which the available information is not adequate for making a satisfactory assessment", by the EU in Directive 67/548/EEC (Classification, Packaging and Labelling Directive) and in the UK in the Chemicals Hazard Information and Packaging for Supply Regulations 2002 and as such the following risk and safety phrases are applicable.

Xn - Harmful - Category 3 Carcinogen
R40 - Limited evidence of a carcinogenic effect.
R43 - May cause sensitisation by skin contact.
S22 - Do not breathe dust.
S36/37 - Wear suitable protective clothing and gloves.
ECC Label - No classification exists for Silver Coated Nickel.

16. Other Information

R40 – Limited evidence of a carcinogenic effect.
R43 – May cause sensitization by skin contact.
Medical staff should note that this data sheet has been lodged with the following Poisons Information Centre :
National Poison Centre Phone line : +44-(0)870-600-6266
E- Mail : wnpu@compuserve.com
Fax : +44-(0)2920-704357

17. Notes and Bibliography

Disclaimer: The information in this Data Sheet is provided in good faith and is accurate to Novamet's best knowledge and belief but except as implied by law, no representation or warranty is given in relation to the information and Novamet accepts no liability.

References are available, on request.

EU:
Updated 11/06