

Product Inconel 718 powder
 Revision Date 05/08/2016
 Revision 1



Safety Data Sheet (SDS)

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Product Name Inconel 718 powder
 Synonyms, Trade Names No information available.

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Identified Uses Metal powder for additive layer manufacture.
 Uses Advised Against Any other purpose.

1.3 Details of the Supplier of the Safety Data Sheet

Supplier Renishaw plc
 Brooms Road
 Stone Business Park
 Stone, Staffordshire
 ST15 0SH
 United Kingdom
 Tel: +44 (0) 1785 285000 (during UK office hours 09:00 to 17:00 UTC).
 msds@renishaw.com

Contact Person

1.4 Emergency Telephone Number

Emergency Telephone 999 / 911 or local emergency number.

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the Substance or Mixture

Classification (EC 1272/2008)
 Physical and Chemical Hazards Not classified
 Human Health Resp. Sens 1 - H334, Skin. Sens 1 - H317, Carc. 2 - H351, STOT RE 1 - H372
 Environment Not classified

2.2 Label Elements

Contains nickel
 cobalt

Label in Accordance With (EC) No.
 1272/2008



Signal Word Danger

Hazard Statements
 H317 May cause an allergic skin reaction
 H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
 H351 Suspected of causing cancer of lungs and respiratory tract.
 H372 Causes damage to organs (respiratory tract and lungs) through prolonged or repeated exposure by inhalation

Precautionary Statements
 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.
 P285 In case of inadequate ventilation wear respiratory protection.
 Response
 P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
 P304 + P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
 P308 + P313 IF exposed or concerned: Get medical advice/ attention.
 P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTRE or doctor/physician
 Storage
 P405 Store locked up.

EUH Statements

EUH208 Contains cobalt and nickel. May produce an allergic reaction

2.3 Other Hazards

Dust clouds may be explosive.

Dust can irritate the eyes. High dust levels may irritate the respiratory system.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

Not applicable.

3.2 Mixtures

Name	Product Identifier	GHS Classification	%
nickel	CAS-No.: 7440-02-0 EC No.: 231-111-4	Skin. Sens 1 - H317, Carc. 2 - H351, STOT RE 1 - H372	60-100%
cobalt	CAS-No.: 7440-48-4 EC No.: 231-158-0	Skin. Sens 1 - H317, Resp. Sens 1 - H334, Aquatic Chronic 4 - H413	10-30%
chromium	CAS-No.: 7440-47-3 EC No.: 231-157-5		10-30%
iron	CAS-No.: 7439-89-6 EC No.: 231-096-4		10-30%

The Full Text for all Hazard Statements Are Displayed in Section 16.

Composition Comments

The data shown are in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1 Description of First Aid Measures

General Information

Provide general first aid, rest, warmth and fresh air. As a general rule, in case of doubt or if symptoms persist, always call a doctor. Seek medical attention for all burns and eye injuries, regardless how minor they may seem. First aid personnel must be aware of own risk during rescue.

Inhalation

If inhaled, remove to fresh air. Check for clear airway, breathing, and presence of pulse. If breathing is difficult, provide oxygen. Loosen any tight clothing on neck or chest. Provide cardiopulmonary resuscitation where pulse or respiration are absent. Get prompt medical attention.

Ingestion

DO NOT induce vomiting! Rinse mouth thoroughly. Get medical attention if discomfort occurs. Never give anything by mouth to a person who is unconscious or is having convulsions.

Skin Contact

Remove contaminated clothing, shoes and jewelry and wash before reuse. Wash skin with soap and water for several minutes. Get medical attention if irritation develops or persists.

Eye Contact

Do not rub eye. Avoid contaminating unaffected eye. Remove contact lenses if present and easy to do so. Rinse with a gentle stream of water or saline for at least 15 minutes. Hold eye lids open. Get prompt medical attention.

4.2 Most Important Symptoms and Effects, Both Acute and Delayed

General Information

The severity of the symptoms described will vary dependent on the concentration and the length of exposure. Causes damage to organs through prolonged or repeated exposure.

Inhalation	Suspected of causing cancer.
Ingestion	Inhalation can cause asthma like symptoms.
Skin Contact	Ingestion may cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Eye Contact	Can cause mechanical irritation or allergic skin reaction. Dust can cause mechanical irritation.

4.3 Indication of any Immediate Medical Attention and Special Treatment Needed

Notes to the Physician	Treat symptomatically.
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SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing Media

Extinguishing Media	Use gentle surface application of Class D extinguishing agent or dry inert granular material (e.g., sand) to cover and ring the burning material. Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable Extinguishing Media	Do NOT use water.

5.2 Special Hazards Arising From the Substance or Mixture

Hazardous Combustion Products	Decomposition of this product may yield metallic oxides.
Unusual Fire & Explosion Hazards	High concentrations of dust may form explosive mixture with air.
Specific Hazards	Fine dust if dispersed in air in sufficient concentrations and if in presence of a ignition source is a potential dust explosion hazard. If heated, harmful vapours may be formed.

5.3 Advice for Firefighters

Special Fire Fighting Procedures	Gently smother burning material with dry sand or other inert substance, or special powder (Class D – Dry Powder) extinguishers with spin applicator. Gently cover and ring the burning material. Apply extinguishing media carefully to avoid creating airborne dust. Do not disturb the material until completely cool. If possible, fight fire from protected position. Keep up-wind to avoid fumes. Avoid breathing fire vapours. Ventilate closed spaces before entering them.
Protective Equipment for Firefighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

Personal Precautions	Wear protective clothing as described in Section 8 of this safety data sheet. Avoid inhalation of vapours and contact with skin and eyes. Provide adequate ventilation. In case of inadequate ventilation, use respiratory protection. Do not smoke, eat or drink while using this product. Eliminate all sources of ignition. Wash hands after use. Read and follow manufacturer's recommendations. Do not touch or walk through spilled material. If necessary evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering.
For Emergency Responders	Follow safe handling advice and personal protective equipment recommendations for normal use of product.

6.2 Environmental Precautions

Environmental Precautions	Prevent any material from entering drains or waterways.
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6.3 Methods and Material for Containment and Cleaning Up

Spill Clean Up Methods	Prevent further leakage or spillage if safe to do so. Eliminate all sources of ignition. Restrict non-essential personnel from the area. Collect any spilled material immediately by vacuuming or shoveling - use non sparking tools or equipment/natural bristle brushes. Use dry cleanup procedures. Take care not to raise dust. Place in labelled, dry, water-tight containers. In case of spills, beware of slippery floors and surfaces.
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6.4 Reference to Other Sections

Reference to Other Sections

See section 1 for emergency contact. For personal protection, see section 8. For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for Safe Handling

Handling

Avoid generation of dust clouds. Use proper personal protection when handling (refer to Section 8). Ensure good dust ventilation during handling. Formation of sparks and static electricity must be prevented. Earth all equipment. Avoid prolonged or repeated contact.

7.2 Conditions for Safe Storage, Including Any Incompatibilities

Storage Precautions

Keep locked up and out of reach of children. Avoid contact with incompatible materials, static, moisture, and flames. Good housekeeping and engineering practices should be employed to prevent the generation and accumulation of dusts. Keep the product in its original container in a well ventilated and fresh place.

Storage Class

Unspecified storage.

7.3 Specific End Use(s)

Specific End Use(s)
Usage Description

The identified uses for this product are detailed in Section 1.2.
Use only according to directions.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters

Component	STD	TWA (8 Hrs)		STEL (15mins)		Notes
nickel	NIOSH		0.015mg/m3			Nickel, metal - total dust.
nickel	WEL		1mg/m3		3mg/m3	Nickel, organic compounds (as Ni).
cobalt	NIOSH		0.05mg/m3			Cobalt metal dust and fume (as Co).
cobalt	WEL		0.1mg/m3			Cobalt and compounds (as Co).
chromium	NIOSH		0.5mg/m3			chromium metal and chromium(II) and chromium(III) compounds.
chromium	WEL		0.5mg/m3			Chromium and Cr(II); Cr(III) compounds.

Ingredient Comments

No information available.

8.2 Exposure Controls

Protective Equipment



Engineering Measures

Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Use with adequate explosion-proof ventilation designed to handle metal particulates.

Respiratory Equipment

Where risk assessment shows air-purifying respirators are appropriate a full face respirator conforming to EN 143 should be used, and suitable respirator cartridges as a backup to engineering controls. Use respiratory equipment with particle filter - Type P3. Change filters frequently Use respiratory protection as specified by qualified professional if

	concentrations exceed the limits listed in Section 8.
Hand Protection	Use suitable protective gloves if there is a risk of skin contact. Suggested material: Protect hands with category III (ref. Directive 89/686/EEC and standard EN 374) work gloves, made of PVA, butyl, or fluoroelastomer. Consult manufacturer for specific advice. Selection of the glove material depends on consideration of the penetration times, rates of diffusion and degradation, and concentration specific to the workplace. Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374) is recommended. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Change gloves regularly.
Eye Protection	Wear safety goggles or face shield to prevent any possibility of eye contact. Use equipment for eye protection tested and approved under appropriate government standards such as EN 166(EU).
Other Protection	Wear appropriate clothing to prevent any possibility of skin contact. Suggested PPE: Fire resistant cotton or equivalent full-length overalls with electrically conductive safety shoes or grounding straps. Caution is required to avoid contact with unprotected electrical devices when wearing conductive safety shoes or grounding straps. Protective clothing should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Hygiene Measures	Observe normal hygiene standards. Keep container tightly closed. Do not eat, drink, or smoke while using this product. Immediately take off any contaminated clothing and launder before re-use. Wash hands and / or face before breaks and at the end of the shift. After work, wash the skin and apply skin cream.
Process Conditions	Ensure that eye flushing systems and safety showers are located close by in the work place.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

Appearance	Powder.
Colour	Grey.
Odour	Odourless.
Odour Threshold - Lower	No information available.
Odour Threshold - Upper	No information available.
pH-Value, Conc. Solution	No information available.
pH-Value, Diluted Solution	No information available.
Melting Point	Melting Point (C): >1000.
Initial Boiling Point and Boiling Range	No information available.
Flash Point	No information available.
Evaporation Rate	No information available.
Flammability State	No information available.
Flammability Limit - Lower(%)	No information available.
Flammability Limit - Upper(%)	No information available.
Vapour Pressure	No information available.
Vapour Density (air=1)	No information available.
Relative Density	No information available.
Bulk Density	No information available.
Solubility	Insoluble.
Decomposition Temperature	No information available.

Partition Coefficient; n-Octanol/Water	No information available.
Auto Ignition Temperature (°C)	No information available.
Viscosity	No information available.
Explosive Properties	No information available.
Oxidising Properties	No information available.

9.2 Other Information

Molecular Weight	No information available.
Volatile Organic Compound	No information available.
Other Information	Grey metallic powder < 1.0 mm. Density: 4 - 6 g/cm ³ .

SECTION 10: STABILITY AND REACTIVITY**10.1 Reactivity**

Reactivity	Stable product under recommended storage and handling conditions.
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10.2 Chemical Stability

Stability	Stable product under recommended storage and handling conditions.
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10.3 Possibility of Hazardous Reactions

Hazardous Reactions	Dust clouds may be explosive. Iron will react with oxidising materials, fluorine, chlorine, chlorine trifluoride, and hydrogen peroxide. Chromium will react with bromine pentafluoride. Finely divided chromium will react with carbon dioxide, nitrogen oxides, sulphur dioxide. Contact with acids can generate explosive gasses, e.g. hydrogen.
Hazardous Polymerisation Polymerisation Description	Will not polymerise. Not applicable.

10.4 Conditions to Avoid

Conditions to Avoid	High temperatures and humid conditions can cause oxide formation and / or rust on the particle surfaces.
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10.5 Incompatible Materials

Materials to Avoid	Avoid strong oxidising agents, bases, strong acids. See section 10.3.
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10.6 Hazardous Decomposition Products

Hazardous Decomposition Products	Decomposition of this product may yield metallic oxides. If heated, harmful vapours may be formed.
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SECTION 11: TOXICOLOGICAL INFORMATION**11.1 Information on Toxicological Effects**

Toxicological Information	No toxicological information for the overall finished product. Inhalation of metal fumes may cause metal fume fever.
Acute Toxicity (Oral LD50)	Silicon:Rat: 3160 mg/kg. Nickel:Rat: >9000 mg/kg. Iron: Rat: 984 mg/kg. Cobalt: Rat 6170 mg/kg.
Acute Toxicity (Dermal LD50)	No information available.
Acute Toxicity (Inhalation LD50)	Cobalt: Rat >10 mg/L/1H.
Serious Eye Damage/Irritation	Product is not classified as an eye irritant, however high dust levels in air may cause eye irritation.

Skin Corrosion/Irritation	No information available.
Respiratory Sensitisation	Cobalt: Repeated exposure may cause allergic respiratory reaction (asthma). Nickel: May result in allergic lung sensitization reactions.
Skin Sensitisation	Cobalt: Prolonged and/or repeated contact may cause irritation and/or dermatitis. May cause skin sensitization. Nickel: Allergic skin sensitization reactions are the most frequent effect of exposure.
Germ Cell Mutagenicity Genotoxicity - In Vitro Genotoxicity - In Vivo	
Carcinogenicity	Nickel is a possible human carcinogen. Chromium: May cause cancers of the lungs, nasal cavity and paranasal sinuses.
Specific Target Organ Toxicity - Single Exposure: STOT - Single Exposure	No information available.
Specific Target Organ Toxicity - Repeated Exposure: STOT - Repeated Exposure	No information available.
Inhalation	Inhalation can cause asthma like symptoms.
Ingestion	Ingestion may cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Skin Contact	Can cause mechanical irritation or allergic skin reaction.
Eye Contact	Dust can cause mechanical irritation.
Waste Management	When handling waste, consideration should be made to the safety precautions applying to handling of the product.
Routes of Entry	No information available.
Target Organs	Skin. Respiratory system, lungs. Effects of overexposure to cobalt include lung effects (irritation, fibrosis, asthma), cardiovascular effects (cardiomyopathy), liver and kidney congestion. Industrial exposure to chromium may cause dermatitis, skin ulcers, perforation of the nasal septum, as well as cancers of the lungs, nasal cavity and paranasal sinuses. Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis. This is considered benign pneumoconiosis and does not ordinarily cause significant physiologic impairment. Systemic effects from ingestion of nickel salts include capillary damage, kidney damage, myocardial weakness and central nervous system depression.
Aspiration Hazards:	No information available.
Reproductive Toxicity:	No information available.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Ecotoxicity	No Ecological information on the finished product.
Eco Toxicological Information	No ecological toxicity available on the overall finished product.

12.2 Persistence and Degradability

Degradability	No information available.
Biological Oxygen Demand	No information available.
Chemical Oxygen Demand	No information available.

12.3 Bioaccumulative Potential

Bioaccumulative Potential	No data available on bioaccumulation.
Bioaccumulation Factor	
Partition Coefficient; n- Octanol/Water	No information available.

12.4 Mobility in Soil

Mobility	No information available.
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12.5 Results of PBT and vPvB Assessment

Results of PBT and vPvB Assessment	No information available.
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12.6 Other Adverse Effects

Other Adverse Effects	No information available.
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SECTION 13: DISPOSAL CONSIDERATIONS

Waste Management	When handling waste, consideration should be made to the safety precautions applying to handling of the product.
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13.1 Waste Treatment Methods

Disposal Methods	Dispose of waste and residues in accordance with local authority requirements.
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SECTION 14: TRANSPORT INFORMATION

14.1 UN Number

UN No. (ADR)	Not applicable.
UN No. (IMDG)	Not applicable.
UN No. (IATA)	Not applicable.

14.2 UN Proper Shipping Name

ADR Proper Shipping Name	Not applicable.
IMDG Proper Shipping Name	Not applicable.
IATA Proper Shipping Name	Not applicable.

14.3 Transport Hazard Class(es)

ADR Class	Not applicable.
IMDG Class	Not applicable.
IATA Class	Not applicable.

Transport Labels	Not applicable
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14.4 Packing Group

ADR/RID/ADN Packing Group	Not applicable.
IMDG Packing Group	Not applicable.
IATA Packing Group	Not applicable.

14.5 Environmental Hazards

ADR	No
IMDG	No
IATA	No

14.6 Special Precautions for User

EMS	Not applicable.
Emergency Action Code	Not applicable.
Hazard No. (ADR)	Not applicable.
Tunnel Restriction Code	Not applicable.

14.7 Transport in Bulk According to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture

EU Legislation	Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments. The UN Globally Harmonized System (GHS) Safety Data Sheet format (Annex IV) is implemented as Annex II of REACH EU No 453/2010 of 20th May 2010 amending regulation (EC) No 1907/2006.
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Approved Code of Practice	Workplace Exposure Limits Guidance Note EH40/2005.
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Chemical Safety Assessment

No chemical safety assessment has been carried out.

SECTION 16: OTHER INFORMATION

General Information	This Safety Data Sheet is in accordance with Reach Regulation (EC) No 453/2010.
Revision Comments	This is a first issue.
Revision Date	05/08/2016
Revision	1
Safety Data Sheet Status	Approved.

Hazard Statements In Full

H317	May cause an allergic skin reaction
H351	Suspected of causing cancer [*].
H372	Causes damage to organs [*] through prolonged or repeated exposure [*].
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H413	May cause long lasting harmful effects to aquatic life.
EUH208	Contains [*]. May produce an allergic reaction

Disclaimer

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.