



TRITRUST INDUSTRIAL CO., LTD.

Add: No.1215 Hubin South Road, Xiamen, China, 361006

Tel: 86-592-5523949 /Fax: 86-592-3761855

Email: sales@TTTmetalpowder.com

Website: www.TTTmetalpowder.com

MSDS OF Nickel Based Specialty Powder

SECTION 1 – CHEMICAL PRODUCT

Product/Material: IC-101/102

Trade Name: Nickel Based Specialty Powder

Synonym: Nickel Based Alloy Powder

SECTION 2 – COMPOSITION/INFORMATION ON INGREDIENTS

Each alloy contains one or more of the following ingredients. Consult the Technical Data Sheet for the composition of specific alloys.

<u>Ingredients</u>	<u>CAS #</u>	<u>OSHA PEL</u>	<u>ACGIH TLV</u>	
Aluminum	7429-90-5	15 mg/m ³	10 mg/m ³	(Respirable dust, welding fume = 5 mg/m ³)
Carbon	7440-44-0	15 mg/m ^{3*}	NE	*(Respirable dust = 5 mg/m ³)
Chromium	7440-47-3	0.5 mg/m ³	NE	
Cobalt	7440-48-4	0.1 mg/m ³	0.02 mg/m ³	
Columbium	7440-03-1	NE	NE	
Copper	7440-50-8	1 mg/m ³	1 mg/m ³	(Copper fume PEL, 0.1; TLV, 0.2 mg/m ³)
Iron	7439-89-6	10 mg/m ³	5 mg/m ³	(Iron oxide dust and fume)
Manganese	7439-96-5	5 mg/m ³ (C)	0.2 mg/m ³ (B)	(C = ceiling value, B = inorganic compounds)
Molybdenum	7439-98-7	5 (15) mg/m ³	5 (10) mg/m ³	Soluble (Insoluble)
Nickel	7440-02-0	1 mg/m ³	1.5 mg/m ³	
Silicon	7440-21-3	15 mg/m ³	10 mg/m ³	(Respirable dust PEL is 5 mg/m ³)
Titanium	7440-32-6	15 mg/m ³	10 mg/m ³	(Titanium dioxide)
Tungsten	7440-33-7	NE	5 (1) mg/m ³	Soluble (Insoluble)
Vanadium	7440-62-2	0.5 mg/m ³	0.05 mg/m ³	(Vanadium pentoxide, respirable dust)

NE = not established

SECTION 3 – HAZARD INFORMATION

Appearance and Odor: Fine gray powder, no odor.

HMIS Rating:
Health 2

Fire 1

Reactivity 1

Primary Entry Routes: Inhalation of dust, eye/skin contact, incidental or inadvertent ingestion.

Target Organs: Respiratory tract, skin and eyes. Long term exposure to some components may affect the central nervous system (manganese), kidney (cobalt, copper, and manganese), bladder (cobalt), liver (copper), blood (manganese), nasal cavities (chromium, nickel) and pancreas (iron).

Acute (Immediate) Effects

Inhalation: Inhalation of metal powder may cause chills, fever, sweating, nausea and cough (symptoms of metal fume fever). Metal fume fever symptoms typically begin within 4 to 12 hours after the initial exposure and lasts for approximately 24 hours without causing permanent damage. Other effects may include nose and throat irritation, metallic taste, difficulty breathing, wheezing and chest pain. Alloys with high concentrations of chromium may cause headache, coughing, shortness of breath, nasal irritation, pneumoconiosis and fever. Alloys with nickel and/or manganese may cause coughing, difficulty breathing and shortness of breath, rapid breathing and chest tightness.

Eye: May cause eye irritation and/or conjunctivitis. May cause eye discoloration.

Skin: May cause skin irritation and dermatitis especially in creases of the skin where dust may accumulate and rub against skin. Some individuals may become sensitized from repeated contact with metal powders, especially alloys containing copper, nickel and vanadium. Nickel alloys may cause "nickel itch", reddened ulcerated skin and sensitization to nickel.

Ingestion: Ingestion of small amounts may occur through eating, smoking or other hand to mouth contact. Ingestion of small amounts is unlikely to cause significant health effects, but alloys containing high concentrations of chromium may cause severe gastrointestinal irritation, kidney system damage and circulatory shock. Alloys with high concentrations of copper or nickel may cause nausea, vomiting, stomach pain and diarrhea. Ingestion of large amounts of copper dust can lead to gastrointestinal tract ulceration, jaundice and kidney damage.

Chronic (Long Term Effects)

Effects of long term or repeated exposure to metal powders may include respiratory disease, pneumoconiosis, bronchial asthma, lung fibrosis, obstructive airway syndrome and possibly cancer, depending on the alloy components. Alloys that contain **cobalt or nickel** may cause sensitization and allergic dermatitis. **Nickel** may cause hardened, leathery skin upon chronic overexposure. Long term or repeated overexposure to nickel by inhaling nickel-containing dust may cause lung irritation, thickening of the mucous membranes of the nose, sinus inflammation, loss of the sense of smell, and perforation of the nasal septum. Chronic inhalation overexposures to nickel may also cause cancer of the nasal passages, larynx and lung. **Copper** alloys may discolor skin and hair with chronic overexposure. Individuals with Wilson's disease are more susceptible to copper poisoning. Long term or repeated overexposure to **iron** dust can cause siderosis, a "benign" pneumoconiosis. Repeated or long term ingestion of large quantities of iron may result in fibrosis of the pancreas, diabetes mellitus, liver cirrhosis and cardiac poisoning. Chronic overexposures to **manganese** dust and fume may affect the central nervous system and cause headache, restless sleep, personality changes, lack of coordination, irritability, uncontrolled and inappropriate laughing or crying, visual hallucinations, double vision, impulsive behavior, euphoria, excess salivation, mental confusion, impaired walking, trembling in the extremities and head, and other symptoms similar to Parkinson's disease. Excessive ingestion of **molybdenum** may cause a copper deficiency.

Carcinogenicity

OSHA, IARC, or NTP lists components of some alloys as carcinogens. Chromium metal is listed as IARC Class 3 (not classifiable as carcinogenic to humans). Chromium VI is classified as IARC-1, (carcinogenic to humans), and NTP -1 (known to be a human carcinogen). Other Chromium compounds are listed with an IARC-3 (not classifiable as to carcinogenicity to humans). Elemental cobalt is listed as carcinogenic in animal experimentation by the IARC

(Class 2B). Nickel is classified as IARC 2B, possibly carcinogenic to humans, and as NTP-2, reasonably anticipated to be a carcinogen.

The IARC, NTP, or OSHA do not list the following metals used in the alloys as carcinogens – aluminum, carbon, copper, iron, manganese, silicon, titanium, tungsten, vanadium, molybdenum.

May contain trace elements of hexavalent chromium (<0.1%). Local ventilation may be necessary when handling material – especially if material is heated.

SECTION 4 – FIRST AID MEASURES

- Inhalation:** Move the person to fresh air and support breathing as required. Consult a physician if victim has continued difficulty breathing.
- Eye Contact:** Lift eyelids and flush immediately with flooding amounts of water for at least 15 minutes. Do not allow the victim to rub his/her eyes or keep them shut. Consult a physician or ophthalmologist if all material cannot be removed or if there is continuing irritation.
- Skin Contact:** Remove clothing around affected area. Rinse away loose material and wash affected area with soap and water. If there is a severe skin reaction or reddened or blistered skin, consult a physician.
- Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center with information from this MSDS and the Technical Data Sheet on the composition of the material ingested. Unless the poison control center advises otherwise, give the person one or two glasses of water, then induce vomiting. After first aid have the person see a physician for follow up care.

SECTION 5 – FIRE FIGHTING MEASURES

- Flash Point:** None reported.
- Autoignition Temperature:** None reported for alloy but metal powders can burn and form explosive mixtures in air. Some components of the alloy do have autoignition temperatures – Chromium dust cloud 1076 °F (580 °C), dust layer 752 °F (400 °C); Aluminum dust cloud 1202 °F (650 °C), dust layer 1400 °F (760 °C); Vanadium dust cloud 932°F (500 °C), dust layer 914 °F (490 °C).
- Lower Explosive Limit:** None reported for alloy but some component powders do have reported limits – Chromium 0.23 oz/ft³, Aluminum >0.04 oz/ft³, Vanadium 0.22 oz/ft³.
- Upper Explosive Limit:** None reported.
- Extinguishing Media:** Do not use water or halon. Use dry sand, dry dolomite, or dry graphite powder or other dry chemical extinguishing agent formulated for metal fires.
- Unusual Fire or Explosion Hazards:** Powder may burn. Dust is an explosion hazard.
- Hazardous Combustion Products:** Toxic metal oxides, carbon and nitrogen oxides may be produced during a fire involving metal alloys. Alloys with nickel may also produce toxic nickel carbonyl.
- Fire Fighting:** Wear a self-contained breathing apparatus (SCBA) with full facepiece operated in the pressure demand or positive pressure mode. Do not allow runoff from fire fighting to enter roadways or sewers. Material may dry out and present additional fire/explosion hazards.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Wear appropriate protective clothing and respiratory protection for the situation. Collect spilled material and place in sealed containers for reclamation or disposal. Use clean up measures that minimize dust. Avoid inhalation of dust. Remove sources of heat or ignition as dust clouds can burn or explode. Recycle or dispose of material according to local, state and federal regulations.

SECTION 7 – HANDLING AND STORAGE

- Handling:** Use local exhaust ventilation to protect against dust and fume inhalation. If workers are exposed to dust, provide appropriate respiratory, eye and skin protection. An eyewash station should be readily available to areas of use.
- Storage:** Store in a closed container when possible to prevent accidental dust generation and to prevent possible product contamination. Protect containers from physical damage. Keep dry and isolated from acids, caustics, halogenated compounds and oxidizers. Do not store near combustible materials. Guard against dust accumulation and dust becoming airborne.

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

- Engineering Control and Ventilation:** Where feasible, enclose processes to prevent dust dispersion into the work area. Provide local exhaust when possible, and general ventilation as necessary, to keep airborne concentrations below exposure limits and as low as possible.
- Respiratory Protection:** Wear NIOSH/MSHA approved respirators if there is a potential for exposure to dust above exposure limits for individual components of the powder and the additive effects of the components. Use NIOSH respiratory protection guidelines to select proper respiratory protection.
- Eye Protection:** Wear safety glasses with side shields and /or goggles as necessary to prevent dust from entering eyes.
- Skin Protection:** Use impervious gloves such as neoprene, nitrile or rubber for hand protection.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

- Physical State:** Fine gray powder.
- Appearance/Odor:** No odor.
- Solubility:** Insoluble in water.
- Specific Gravity (H₂O=1):** 7.5-9.3

SECTION 10 – STABILITY AND REACTIVITY

- Stability:** Product is stable.
- Polymerization:** Hazardous polymerization will not occur.
- Chemical Incompatibilities:** Reacts with strong acids and caustics to form flammable and explosive hydrogen gas. Contact with sulfur may cause evolution of heat. Contact with halogenated compounds and oxidizers may produce violent reactions and fires.

Conditions to Avoid: Contamination from other materials.

Hazardous Decomposition Products: Toxic metal oxides and carbon and nitrogen oxides may be produced during a fire involving metal alloys. Alloys with nickel may also produce poisonous nickel carbonyl.

SECTION 11 – TOXICOLOGICAL INFORMATION

Toxicological data is not available for most pure metals and metal powders. Information may be available for metal oxides, metal salts and other metal compounds. Refer to toxicological reference sources such as NIOSH RTECS for information if client use of this alloy creates metal compounds. Select information on metals and metal powders is listed below:

Carbon	Acute oral, small lab animals	LD _{Lo} = > 5 gm/kg
Chromium	Acute oral effect, human	LD _{Lo} = 71 mg/kg
Cobalt	Acute oral, human	LD _{Lo} = 0.28 mg/kg
Copper	Acute oral, human	TD _{Lo} = 0.1mg/kg
Iron	Acute oral, human	20-60 ug/kg
Manganese	Acute inhalation, human	TC _{Lo} = 2300 ug/m ³
Molybdenum	Acute oral, rat	TD _{Lo} = 5800 ug/kg
Nickel	Acute oral, guinea pig	LD _{Lo} = 5 mg/kg
Nickel	Acute inhalation, guinea pig	TC _{Lo} = 15 mg/m ³
Silicon	Acute oral, rat	LD = 3160 mg/kg
Tungsten	Acute intraperitoneal, rat	LD = 5 gm/kg
Vanadium	Acute inhalation, human	TC _{Lo} = 346 mg/m ³

SECTION 12 – ECOLOGICAL INFORMATION

Data not available for metal and metal powder. Metal powders may cause ecological damage through silting or sedimentation effect in water depriving organisms of habitat and mobility, and/or fouling of gills, lungs and skin thus limiting oxygen uptake. Metal powders in water or soil may form metal oxides or other metal compounds that could become bioavailable and harm aquatic or terrestrial organisms. Metal powder would be relatively immobile in soils but some metal compounds may be transported with groundwater.

SECTION 13 – DISPOSAL CONSIDERATIONS

Collect spilled material and place in sealed containers for reclamation or disposal. Use clean up measures that minimize dust. Avoid inhalation of dust - use respiratory protection as necessary. Remove sources of heat or ignition as dust clouds can burn or explode. Recycle or dispose of material according to local, state and federal regulations.

SECTION 14 – TRANSPORT INFORMATION

U.S. Department of Transportation (DOT) regulations - 49 Code of Federal Regulations (CFR)

NON-BULK (shipped in packages less than or equal to 400 kg gross weight):

Shipping Name: UN 3077, Environmentally Hazardous Substance Solid, N.O.S., Class 9, PG III

Marking and Labeling Packages:

- Text: "Environmentally Hazardous Substance, Solid, N.O.S. UN 3077 RQ (contains nickel)"
- Label: Class 9

- List Consignor or Consignee's name and address

Placarding:

- Not required for domestic non-bulk shipments of Class 9 materials [49 CFR 172.504(f)(9)]. Hazardous substances are not regulated internationally so it would never be necessary to placard a non-bulk shipment.

BULK (shipped in packages greater than 400 kg gross weight):

Shipping Name: UN 3077, Environmentally Hazardous Substance Solid, N.O.S., Class 9, PG III

Marking and Labeling Packages:

Intermediate bulk container (IBC) packages must show the following markings and labels on 2 opposing sides if IBC capacity is > 450 L.

- Text: "Environmentally Hazardous Substance, Solid, N.O.S. UN 3077 RQ (contains nickel)"
- Label: Class 9 and UN Number Marking 3077 (orange panel) or Class 9 placard with the UN Number 3077.
- List Consignor or Consignee's name and address

SECTION 15 – REGULATORY INFORMATION

Component	CERCLA Hazardous Substance [Section 102]	CERCLA Reportable Quantity (lbs)	CWA NPDES Discharge [Section 307(a)]	CAA [Section 112]	SARA Toxic Chemical [40 CFR 372]	SARA Extremely Hazardous Substance [40 CFR 355]
Aluminum	---	---	---	---	X	---
Carbon	---	---	---	---	---	---
Chromium	X	5,000**	X	X	X	---
Cobalt	---	---	---	X	X	---
Columbium	---	---	---	---	---	---
Copper	X	5,000**	X	---	X	---
Iron	---	---	---	---	---	---
Manganese	---	---	---	X	X	---
Molybdenum	---	---	---	---	---	---
Nickel	X	100**	X	X	X	---
Silicon	---	---	---	---	---	---
Titanium	---	---	---	---	---	---
Tungsten	---	---	---	---	---	---
Vanadium	---	---	---	---	X	*

* Vanadium pentoxide fume or dust is listed as an Extremely Hazardous Substance with a Reportable Quantity of 1,000 Lbs. and a Threshold Planning Quantity of 100/1,000 Lbs.

** Following the RQ indicates that no release reporting is required if the diameter of the pieces of the solid metal released is 100 micrometers (0.004 inches) or more.

The listed components by themselves are not classified as RCRA hazardous wastes. However, certain compounds containing some components, or certain processing of some components, may produce hazardous wastes. Consult 40 CFR 261 for classification and lists of hazardous wastes.

Components listed as OSHA air contaminants are found in Section 2 of this MSDS.

SECTION 16 – OTHER INFORMATION

“Although the information and recommendations set forth herein (hereinafter “Information”) are presented in good faith and believed to be correct as of the date hereof, TTT Engineers makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will TTT Engineers be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, THAT THE PRODUCTS TO WHICH THE INFORMATION REFERS MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS, OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS. IN NO CASE SHALL THE INFORMATION BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE.”

TRITRUST