

SECTION 1 - IDENTIFICATION**COMPANY ADDRESS:**

The Virtual Foundry, Inc
211 S Water St
Stoughton, WI 53589
USA

PRODUCT NAME: **Inconel® 718-35 Filamet™**

PRODUCT USE: Manufacture of metal parts by extrusion, injection-moulding, or 3D printing.

SECTION 2 - HAZARDS IDENTIFICATION SUMMARY

(As defined by OSHA Hazard Communication Standard, 29 CFR 1910.1200)

CARCINOGENICITY - Category 2



Note: The components of this product are embedded in a polymer matrix and are therefore considered to present a negligible exposure risk under normal conditions of processing and handling, unless they are liberated during processing (fumes from melting, dusts). No toxicological studies have been performed so far on this compound (polymer mixture). This material is NOT intended to be used for medical applications, and NOT intended to be used for applications in contact with food and/or drinking water.

PHYSICAL HAZARDS: No information available.

HAZARD STATEMENTS: No information available.

OTHER HAZARDS: Material processing under extreme conditions above 240°C may result in fumes irritating to the eyes, nose and throat. Furthermore, there is a danger of burns while handling the heated or molten product.

SECTION 3 - COMPOSITION, INFORMATION OF INGREDIENTS

| Base Metal | CAS No. | %by Weight |
|------------|-----------|-------------|
| Nickel | 7440-02-0 | 45.0 - 60.0 |
| Chromium | 7440-47-3 | 5.0 - 18.0 |
| Iron | 7439-89-6 | 5.0 - 18.0 |

| Niobium | 7440-03-1 | < 3.0 |
|---|-------------|------------|
| Molybdenum | 7439-98-7 | < 3.0 |
| Titanium | 7440-32-6 | < 1.0 |
| Aluminum | 7429-90-5 | < 1.0 |
| Carbon | 7440-44-0 | < 1.0 |
| Chemical Name | CAS No. | %by Weight |
| 2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene | 9003-56-9 | trace |
| Binding Additive | Proprietary | trace |
| Polylactic Acid | 9051-89-2 | < 20% |

SECTION 4 - FIRST AID MEASURES

IF SWALLOWED: Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

IF ON SKIN OR CLOTHING: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

IF IN EYES: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

MAIN SYMPTOMS: Redness, coughing and/or wheezing.

NOTE TO PHYSICIAN: Treat symptomatically.

SECTION 5 - FIRE FIGHTING MEASURES**FLAMMABILITY**

AUTOIGNITION TEMPERATURE: 388°C

SUITABLE EXTINGUISHING MEDIA: Use an extinguishing agent suitable for the surrounding fire.

UNSUITABLE EXTINGUISHING MEDIA: No information available.

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: No specific fire or explosion hazard.

HAZARDOUS COMBUSTION PRODUCTS:

EXPLOSION DATA

SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

SENSITIVITY TO STATIC DISCHARGE: No information available.

FIRE FIGHTING INSTRUCTIONS AND FIRE FIGHTING EQUIPMENT: No information available.

ADDITIONAL INFORMATION: Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

PERSONAL PROTECTIVE EQUIPMENT: Full protective clothing and self contained breathing apparatus.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: Avoid inhalation. Sources of ignition should be kept well clear. Methods for cleaning up or taking up.

ENVIRONMENTAL PRECAUTIONS: Sweep/shovel up. Avoid raising dust. Ensure adequate ventilation.

METHODS FOR CLEANING UP: Avoid ingress of material into sewer systems.

SECTION 7 - HANDLING AND STORAGE

HANDLING: Processing machines must be fitted with local exhaust ventilation. Earth/ground all equipment. Protection against fire and explosion. Avoid dust formation. Dust can form an explosive mixture with air. Provide exhaust ventilation. When the product is ground (chopped), dust explosion regulations should be noted.

STORAGE: Protect against moisture. Store material in dry rooms and always carefully seal again after portions of material have been withdrawn. Store at ambient temperatures. Avoid all sources of ignition: heat, sparks, open flame.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS

| Base Metal | CAS No. | %by Weight | ACGIH TLV (Mg/M ³) | OSHA PEL (Mg/M ³) |
|------------|-----------|-------------|--------------------------------|-------------------------------|
| Nickel | 7440-02-0 | 45.0 - 60.0 | 1.5 (Resp.) | 1.0 (Total) |
| Chromium | 7440-47-3 | 5.0 - 18.0 | 0.5 (Resp.) | 1.0 (Total) |
| Iron | 7439-89-6 | 5.0 - 18.0 | - | - |
| Niobium | 7440-03-1 | < 3.0 | - | - |
| Molybdenum | 7439-98-7 | < 3.0 | 3.0 (Resp.) | - |
| Titanium | 7440-32-6 | < 1.0 | - | - |
| Aluminum | 7429-90-5 | < 1.0 | 1.0 (Resp.) | 15.0 (Total) 5.0 (Resp.) |
| Carbon | 7440-44-0 | < 1.0 | - | - |

| COMPONENT | OSHA PEL | ACIGH TLV | NIOSH IDLH |
|---|----------|-----------|------------|
| 2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene 9003-56-9 | - | - | - |

TLV: Threshold Limit Value over 8 hours of work.

PEL: Permissible Exposure Limit

ADDITIONAL PROTECTION: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.

ENGINEERING CONTROLS

Engineering Measures: Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

EXPOSURE MONITORING

Exposure Limits: See table above.

Hygiene Measures: Avoid contact with eyes.

PERSONAL PROTECTIVE EQUIPMENT

Eye protection: Safety glasses with side-shields.

Skin protection: Avoid skin contact with molten polymer. Wear appropriate protective clothing to minimize risk of injury to the skin from contact with dust or physical abrasion. Long sleeved/impervious clothing if contact is probable and skin is sensitive. Protect contact with skin when processing; while material is hot, wear insulated safety gloves; wash hands after handling. Coveralls should be made from fire resistive materials which tend to not accumulate static charges. They should be designed in such a way as to avoid accumulation of dust in cuffs, pockets, etc.

Respiratory protection: No information available.

Hand protection: While material is hot, wear insulated safety gloves; wash hands after handling.

Hygiene measures: Provide regular cleaning of equipment, work area and clothing. Handle in accordance with good industrial hygiene and safety practices. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product. Avoid contact with eyes. Do not breathe dust. Use personal protective equipment as required.

Special hazard: No information available.

Environmental Protection: No information available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--------------------------------|---------------------------|
| Physical State: | Solid |
| Appearance: | Filament, Pellets |
| Color: | ish |
| Odor: | Slight |
| Odor Threshold: | No information available. |
| Melting/Freezing Point: | 150-180°C (302- 356°F) |
| Boiling Point: | No information available. |
| Flash Point: | No information available. |
| Evaporation Rate: | No information available. |
| Flammability: | No information available. |
| Flammability Limits: | No information available. |
| Vapor Pressure: | Not applicable |
| Vapor Density: | Not applicable |

| | |
|--|---|
| Specific gravity: | 2.7 - 3.95 (H2O=1) |
| Relative Density: | No information available. |
| Water Solubility: | Negligible (<0.1%), Insoluble in cold and hot water |
| Percent Volatile (v/v): | 0% |
| Chemical Stability: | No information available. |
| Conditions to avoid: | No information available. |
| Solubility in other solvents: | Insoluble |
| Partition Coefficient: | No information available. |
| Auto-Ignition Temperature: | 388°C |
| Hazardous Decomposition Products: | No information available. |
| Possibility of Hazardous Reactions: | No information available. |
| Hazardous Polymerization: | No information available. |
| Decomposition Temperature: | 250°C |
| Viscosity: | No information available. |
| Explosive Properties: | No information available. |
| Oxidizing Properties: | No information available. |
| Other Information: | |
| Softening Point: | 80-100°C |
| VOC Content (%) | negligible |
| Bulk Density: | 0.8-1.3 g/cc (50-80 lb/ft ³) |
| MEC: | 45-120 (g/m ³) |
| MIE: | 4-13 (mJ) |
| KST: | 90-300 (bar-m/sec) |
| MIT (layer): | 650°C |

SECTION 10 - STABILITY AND REACTIVITY

INCOMPATIBILITY: No information available.

CHEMICAL STABILITY: Stable under recommended storage conditions.

HAZARDOUS POLYMERIZATION: Will not undergo hazardous polymerization.

CONDITIONS & MATERIALS TO AVOID: Avoid moisture absorption. Avoid all sources of ignition: heat, sparks, open flame.

HAZARDOUS DECOMPOSITION PRODUCTS: Burning produces noxious and toxic fumes, Carbon monoxide (CO), Carbon Dioxide (CO₂). Exothermic reaction with water, acids, alkalis, to generate hydrogen and heat.

SECTION 11 - TOXICOLOGICAL INFORMATION

Principal routes of exposure: Skin contact.

PRODUCT INFORMATION:

Acute toxicity: None established.

Chronic toxicity: None established.

Specific effects: None established.

Long term toxicity: None established.

Mutagenic effects: None established.

Reproductive toxicity: None established.

Carcinogenic effects: This product contains one or more substances which are classified by IARC as carcinogenic to humans (Group I), probably carcinogenic to humans (Group 2A) or possibly carcinogenic to humans (Group 2B).

| COMPONENT | ACGIH | IARC | NTP | OSHA |
|---|-------|---------|-----|------|
| 2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene 9003-56-9 | - | Group 3 | - | -- |

Target organ effects: Eyes, Respiratory system.

Ingestion: May cause gastrointestinal discomfort if consumed in large amounts. Not an expected route of exposure.

Inhalation: Inhalation of dust in high concentration may cause irritation of the respiratory system.

Eye Contact: Dust contact with the eyes can lead to mechanical irritation.

Symptoms related to the physical, chemical, and toxicological characteristics: Redness.

Coughing and/or wheezing.

Delayed and immediate effects and also chronic effects from short and long term exposure:

Irritation: Product dust may be irritating to eyes, skin, and respiratory system.

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity: Pellets may be eaten by wildlife and should be swept up and placed in closed containers. EC50/72h/algae > 1100 mg/L

Persistence and degradability: Not readily biodegradable.

Bioaccumulation: Not expected to bioconcentrate or bioaccumulate.

Mobility: Is not likely mobile in the environment.

Other adverse effects: This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).

Ozone: Not applicable.

SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS: Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Incineration or landfill should only be considered when recycling is not feasible. Do not allow the material to enter water courses or the sewage system.

CONTAMINATED PACKAGING: Remove all packaging for recovery or disposal in line with the local authority regulations and EWC.

SECTION 14 - TRANSPORT INFORMATION

DOT: Not regulated.

MEX: Not regulated.

ICAO: Not regulated.

IATA: Not regulated.

IMDG: Not regulated.

UN NUMBER: N/A.

SECTION 15 - REGULATORY INFORMATION

DOT: This product is not regulated by USDOT as a Hazardous Material (49 CFR 172.101). No UN code assigned. No placard required for transportation.

SARA (TITLE III): Under applicable definitions, this material may meet the criteria for a delayed

(chronic) health hazard.

SARA (SECTION 313): Not Listed.

CALIFORNIA PROP. 65: Not Listed.

TSCA: Not Listed.

DSCL (EEC): Listed on the DSCL inventory.

RCRA HAZARDOUS WASTE NUMBER: Not Listed.

| COMPONENT | SARA 313 – Threshold Values % |
|------------------------|-------------------------------|
| 1,3-butadiene 106-99-0 | 0.1 |

Electrical equipment must be suitable for use in hazardous atmospheres involving Group E combustible dusts in accordance with 29CFR1910.307. Refer to the National Electrical Code (NFPA 70) for guidance in determining the type and design of equipment and installation which meets this requirement.

CLEAN AIR ACT, TITLE VI (1990): This product does not contain, nor was it manufactured using ozone depleting chemicals.

CALIFORNIA PROPOSITION 65: This product contains the following Proposition 65 chemicals:

| COMPONENT | CALIFORNIA Prop. 65 |
|---------------|--|
| Nickel | Carcinogen |
| 1,3-butadiene | Carcinogen Developmental Female Reproductive |

SARA Title III:

Section 311/312: Delayed (chronic) health hazard (nickel).
Section 313 Toxic Chemicals: Nickel
Chromium

State Regulations:

Massachusetts: The following components are listed: NICKEL; NICKEL CATALYST; CHROMIUM; MOLYBDENUM

New York: The following components are listed: Nickel; Chromium

New Jersey: The following components are listed: NICKEL; CHROMIUM; MOLYBDENUM

Pennsylvania: The following components are listed: NICKEL CATALYST; CHROMIUM COMPOUNDS; MOLYBDENUM

Inventory Status:

TSCA (USA): Listed*

DSL (Canada): Listed*

NDSL (Canada): Not Listed

EINECS (Europe): Listed*

AICS (Australia): Listed*

ENCS (Japan): Not determined**

IECSC (People's Republic of China): Listed*

PICCS (Philippines): Listed*

ECL (Korea): Listed*

ECN (Taiwan): Listed*

**"Listed" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).

** Pure metals are not specifically identified by CAS or ENCS number.

SECTION 16 - OTHER INFORMATION, INCLUDING THE DATE OF PREPARATION OF THE LAST REVISION

LABEL REQUIREMENTS: Not expected to produce significant adverse health effects when the recommended instructions for use are followed.

| | | |
|---------------------------|--|---|
| NFPA HAZARD RATINGS | HEALTH | 0 |
| | FLAMMABILITY | 1 |
| | PHYSICAL HAZARD | 0 |
| | INSTABILITY | - |
| | 4=Severe 3=Serious 2=Moderate 1=Slight 0=Minimal | |

| | | |
|---------------------------|--|---|
| HMIS HAZARD RATINGS | HEALTH | 0 |
| | FLAMMABILITY | 1 |
| | PHYSICAL HAZARD | 0 |
| | PERSONAL PROTECTION | X |
| | 4=Severe 3=Serious 2=Moderate 1=Slight 0=Minimal | |

DISCLAIMER: The information provided in this SDS is based on available data from reliable sources and is correct to the best of The Virtual Foundry, Inc's knowledge. The Virtual Foundry, Inc makes no warranty, express or implied, regarding the accuracy of the data or the results obtained from the use of this product. Nothing herein may be construed as recommending any practice or any product in violation of any law or regulations. The user is solely responsible for determining the suitability of any material or product for a specific purpose and for adopting any appropriate safety precautions. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

REVISED DATE:

March 2020