# XTRweld Steel Solid Wire

## XTRweld

Chemwatch Hazard Alert Code: **2**

Chemwatch: **40-1409**
Version No: **5.1**
Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Issue Date: **12/10/2021**
Print Date: **06/27/2022**
S.GHS.USA.EN

## SECTION 1 Identification

### Product Identifier

| | |
|---|---|
| **Product name** | XTRweld Steel Solid Wire |
| **Chemical Name** | Not Applicable |
| **Synonyms** | A5.28 ER70S-B2L; A5.23 EB2; A5.28 ER80S-B2; A5.23 EB3; A5.28 ER90S-B3; A5.23 EB6; A5.28 ER80S-B6; A5.23 EB8; A5.28 ER80S-B8; A5.23 EB9; A5.28 ER90S-B9; A5.18 ER70S-2; A5.18, ER70S-3; A5.18, ER70S-6; A5.28 ER70S-A1; A5.28 ER80S-B3L; A5.28, ER80S-D2; A5.28 E80S-Ni1; A5.28 E80S-Ni2; A5.28 ER100S-1; A5.28 ER120S-1; A5.2 R60; A5.2 R45; A5.17, EM13K; A5.17, EM12K; A5.23, EM12K |
| **Chemical formula** | Not Applicable |
| **Other means of identification** | Not Available |

### Recommended use of the chemical and restrictions on use

| | |
|---|---|
| **Relevant identified uses** | Use according to manufacturer's directions. |

### Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

| | |
|---|---|
| **Registered company name** | **XTRweld** |
| **Address** | 131 Saundersville Rd, Ste 310 Hendersonville, TN 37075 United States |
| **Telephone** | (615) 206-3500 |
| **Fax** | (615) 206-3499 |
| **Website** | alliancemro.com |
| **Email** | sales@alliancemro.com |

### Emergency phone number

| **Association / Organisation** | **Chemwatch** | **CHEMWATCH EMERGENCY RESPONSE** |
|---|---|---|
| **Emergency telephone numbers** | (877) 715-9305 | +1 855-237-5573 |
| **Other emergency telephone numbers** | Not Available | +61 3 9573 3188 |

**Once connected and if the message is not in your prefered language then please dial 01**

**Una vez conectado y si el mensaje no está en su idioma preferido, por favor marque 02**

## SECTION 2 Hazard(s) identification

### Classification of the substance or mixture

**NFPA 704 diamond**


Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

| | |
|---|---|
| **Classification** | Sensitisation (Skin) Category 1, Serious Eye Damage/Eye Irritation Category 2A, Carcinogenicity Category 2, Specific Target Organ Toxicity - Repeated Exposure Category 1 |

### Label elements

**Page 1 continued...**

| | |
|---|---|
| **Hazard pictogram(s)** |  |
| **Signal word** | **Danger** |

### Hazard statement(s)

| | |
|---|---|
| **H317** | May cause an allergic skin reaction. |
| **H319** | Causes serious eye irritation. |
| **H351** | Suspected of causing cancer. |
| **H372** | Causes damage to organs through prolonged or repeated exposure. |

### Hazard(s) not otherwise classified

Not Applicable

### Precautionary statement(s) Prevention

| | |
|---|---|
| **P201** | Obtain special instructions before use. |
| **P260** | Do not breathe dust/fume. |
| **P280** | Wear protective gloves, protective clothing, eye protection and face protection. |
| **P261** | Avoid breathing dust/fumes. |
| **P270** | Do not eat, drink or smoke when using this product. |
| **P202** | Do not handle until all safety precautions have been read and understood. |
| **P264** | Wash all exposed external body areas thoroughly after handling. |
| **P272** | Contaminated work clothing must not be allowed out of the workplace. |

### Precautionary statement(s) Response

| | |
|---|---|
| **P308+P313** | IF exposed or concerned: Get medical advice/ attention. |
| **P302+P352** | IF ON SKIN: Wash with plenty of water and soap. |
| **P305+P351+P338** | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| **P314** | Get medical advice/attention if you feel unwell. |
| **P333+P313** | If skin irritation or rash occurs: Get medical advice/attention. |
| **P337+P313** | If eye irritation persists: Get medical advice/attention. |
| **P362+P364** | Take off contaminated clothing and wash it before reuse. |

### Precautionary statement(s) Storage

| | |
|---|---|
| **P405** | Store locked up. |

### Precautionary statement(s) Disposal

| | |
|---|---|
| **P501** | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |

Not Applicable

## SECTION 3 Composition / information on ingredients

### Substances

See section below for composition of Mixtures

### Mixtures

| CAS No | %[weight] | Name |
|---|---|---|
| 7440-44-0 | 0.1-0.5 | carbon, activated |
| 7439-96-5 | 0.4-<1.5 | manganese |
| 7440-21-3 | | silicon |
| 7440-50-8 | | copper |
| 7439-98-7 | | molybdenum |
| 7440-47-3 | 0.1-10 | chromium |
| 7440-02-0 | | nickel |
| 7440-32-6 | | titanium |
| 7429-90-5 | <0.15 | aluminium |
| 7440-67-7 | <0.12 | zirconium |
| 7440-62-2 | | vanadium |
| 7439-89-6 | balance | iron |

**Continued...**

## SECTION 4 First-aid measures

### Description of first aid measures

| | |
|---|---|
| **Eye Contact** | ‣ Generally not applicable. |
| **Skin Contact** | If skin contact occurs:<br>‣ Immediately remove all contaminated clothing, including footwear.<br>‣ Flush skin and hair with running water (and soap if available).<br>‣ Seek medical attention in event of irritation. |
| **Inhalation** | ‣ If fumes or combustion products are inhaled remove from contaminated area.<br>‣ Lay patient down. Keep warm and rested.<br>‣ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.<br>‣ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.<br>‣ Transport to hospital, or doctor. |
| **Ingestion** | ‣ If swallowed do **NOT** induce vomiting.<br>‣ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.<br>‣ Observe the patient carefully.<br>‣ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.<br>‣ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.<br>‣ Seek medical advice. |

### Most important symptoms and effects, both acute and delayed

See Section 11

### Indication of any immediate medical attention and special treatment needed

BAL has no apparent therapeutic benefit in vanadium poisoning but edetate calcium disodium and disodium catechol disulfonate are effective antidotes in animals.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

| Determinant | Sampling Time | Index | Comments |
|---|---|---|---|
| Vanadium in urine | End of shift at end of workweek | 50 ug/g creatinine | SQ |

SQ: Semi-quantitative determinant - interpretation may be ambiguous; should be used as a screening test or confirmatory test.
Treat symptomatically.

Both dermal and oral toxicity of manganese salts is low because of limited solubility of manganese. No known permanent pulmonary sequelae develop after acute manganese exposure. Treatment is supportive.

[*Ellenhorn and Barceloux: Medical Toxicology*]

In clinical trials with miners exposed to manganese-containing dusts, L-dopa relieved extrapyramidal symptoms of both hypo kinetic and dystonic patients. For short periods of time symptoms could also be controlled with scopolamine and amphetamine. BAL and calcium EDTA prove ineffective.

[*Gosselin et al: Clinical Toxicology of Commercial Products.*]

## SECTION 5 Fire-fighting measures

### Extinguishing media

Metal dust fires need to be smothered with sand, inert dry powders.
**DO NOT** USE WATER, CO2 or FOAM.

- Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- Chemical reaction with CO2 may produce flammable and explosive methane.
- If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.
- **DO NOT** use halogenated fire extinguishing agents.

### Special hazards arising from the substrate or mixture

| | |
|---|---|
| **Fire Incompatibility** | ‣ Reacts with acids producing flammable / explosive hydrogen (H2) gas<br>‣ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result |

### Special protective equipment and precautions for fire-fighters

| | |
|---|---|
| **Fire Fighting** | ‣ Alert Fire Brigade and tell them location and nature of hazard.<br>‣ Wear breathing apparatus plus protective gloves.<br>‣ Prevent, by any means available, spillage from entering drains or water courses.<br>‣ Use water delivered as a fine spray to control fire and cool adjacent area.<br>‣ **DO NOT** approach containers suspected to be hot.<br>‣ Cool fire exposed containers with water spray from a protected location.<br>‣ If safe to do so, remove containers from path of fire.<br>‣ Equipment should be thoroughly decontaminated after use.<br>Slight hazard when exposed to heat, flame and oxidisers. |
| **Fire/Explosion Hazard** | ‣ **DO NOT** disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.<br>‣ **DO NOT** use water or foam as generation of explosive hydrogen may result.<br>With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained - this means that it will require a lot of heat to ignite a mass of combustible metal. Generally, metal fire risks exist when sawdust, machine shavings and other metal 'fines' are present.<br>Metal powders, while generally regarded as non-combustible: |

**Continued...**

| | |
|---|---|
| | ▸ May burn when metal is finely divided and energy input is high.<br>▸ May react explosively with water.<br>▸ May be ignited by friction, heat, sparks or flame.<br>▸ May **REIGNITE** after fire is extinguished.<br>▸ Will burn with intense heat.<br>Note:<br>▸ Metal dust fires are slow moving but intense and difficult to extinguish.<br>▸ Containers may explode on heating.<br>▸ Dusts or fumes may form explosive mixtures with air.<br>▸ Gases generated in fire may be poisonous, corrosive or irritating.<br>▸ Hot or burning metals may react violently upon contact with other materials, such as oxidising agents and extinguishing agents used on fires involving ordinary combustibles or flammable liquids.<br>▸ Temperatures produced by burning metals can be higher than temperatures generated by burning flammable liquids<br>▸ Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids would be incapable of burning.<br>Combustible. Will burn if ignited.<br>Combustion products include:<br>carbon monoxide (CO)<br>carbon dioxide ($CO_2$)<br>silicon dioxide ($SiO_2$)<br>other pyrolysis products typical of burning organic material.<br>When aluminium oxide dust is dispersed in air, firefighters should wear protection against inhalation of dust particles, which can also contain hazardous substances from the fire absorbed on the alumina particles.<br>May emit poisonous fumes.<br>May emit corrosive fumes. |

## SECTION 6 Accidental release measures

### Personal precautions, protective equipment and emergency procedures

See section 8

### Environmental precautions

See section 12

### Methods and material for containment and cleaning up

| | |
|---|---|
| **Minor Spills** | ▸ Clean up all spills immediately.<br>▸ Secure load if safe to do so.<br>▸ Bundle/collect recoverable product.<br>▸ Collect remaining material in containers with covers for disposal. |
| **Major Spills** | ▸ Clear area of personnel and move upwind.<br>▸ Alert Fire Brigade and tell them location and nature of hazard.<br>▸ Wear breathing apparatus plus protective gloves.<br>▸ Prevent, by any means available, spillage from entering drains or water course.<br>▸ Stop leak if safe to do so.<br>▸ Contain spill with sand, earth or vermiculite.<br>▸ Collect recoverable product into labelled containers for recycling.<br>▸ Neutralise/decontaminate residue (see Section 13 for specific agent).<br>▸ Collect solid residues and seal in labelled drums for disposal.<br>▸ Wash area and prevent runoff into drains.<br>▸ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.<br>▸ If contamination of drains or waterways occurs, advise emergency services.<br>If molten:<br>▸ Contain the flow using dry sand or salt flux as a dam.<br>▸ All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.<br>▸ Allow the spill to cool before remelting scrap.<br>▸ Clean up all spills immediately.<br>▸ Wear protective clothing, safety glasses, dust mask, gloves.<br>▸ Secure load if safe to do so. Bundle/collect recoverable product.<br>▸ Use dry clean up procedures and avoid generating dust.<br>▸ Vacuum up (consider explosion-proof machines designed to be grounded during storage and use).<br>▸ Water may be used to prevent dusting.<br>▸ Collect remaining material in containers with covers for disposal.<br>▸ Flush spill area with water.<br><br>Minor hazard.<br>▸ Clear area of personnel.<br>▸ Alert Fire Brigade and tell them location and nature of hazard.<br>▸ Control personal contact with the substance, by using protective equipment as required.<br>▸ Prevent spillage from entering drains or water ways.<br>▸ Contain spill with sand, earth or vermiculite.<br>▸ Collect recoverable product into labelled containers for recycling.<br>▸ Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.<br>▸ Wash area and prevent runoff into drains or waterways.<br>▸ If contamination of drains or waterways occurs, advise emergency services. |

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 Handling and storage

### Precautions for safe handling

| | |
|---|---|
| **Safe handling** | For molten metals: |

**Continued...**

| | |
|---|---|
| | · Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops can lead to violent explosions.<br>· All tooling, containers, molds and ladles, which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use.<br>· Any surfaces that may contact molten metal (e.g. concrete) should be specially coated<br>· Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimise the hazard.<br>During melting operations, the following minimum guidelines should be observed:<br>· Inspect all materials prior to furnace charging and completely remove surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage.<br>· Store materials in dry, heated areas with any cracks or cavities pointed downwards.<br>· Preheat and dry large objects adequately before charging in to a furnace containing molten metal. This is typically done by the use of a drying oven or homogenising furnace. The dry cycle should bring the metal temperature of the coldest item of the batch to 200 degree C (400 deg F) and then hold at that temperature for 6 hours.<br>▸ Avoid all personal contact, including inhalation.<br>▸ Wear protective clothing when risk of exposure occurs.<br>▸ Use in a well-ventilated area.<br>▸ Prevent concentration in hollows and sumps.<br>▸ **DO NOT** enter confined spaces until atmosphere has been checked.<br>▸ **DO NOT** allow material to contact humans, exposed food or food utensils.<br>▸ Avoid contact with incompatible materials.<br>▸ When handling, **DO NOT** eat, drink or smoke.<br>▸ Keep containers securely sealed when not in use.<br>▸ Avoid physical damage to containers.<br>▸ Always wash hands with soap and water after handling.<br>▸ Work clothes should be laundered separately. Launder contaminated clothing before re-use.<br>▸ Use good occupational work practice.<br>▸ Observe manufacturer's storage and handling recommendations contained within this SDS.<br>▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. |
| **Other information** | ▸ Store away from incompatible materials. |

### Conditions for safe storage, including any incompatibilities

| | |
|---|---|
| **Suitable container** | ▸ Polyethylene or polypropylene container.<br>▸ Packing as recommended by manufacturer.<br>▸ Check all containers are clearly labelled and free from leaks. |
| **Storage incompatibility** | For aluminas (aluminium oxide):<br>Incompatible with hot chlorinated rubber.<br>In the presence of chlorine trifluoride may react violently and ignite.<br>-May initiate explosive polymerisation of olefin oxides including ethylene oxide.<br>-Produces exothermic reaction above 200°C with halocarbons and an exothermic reaction at ambient temperatures with halocarbons in the presence of other metals.<br>-Produces exothermic reaction with oxygen difluoride.<br>-May form explosive mixture with oxygen difluoride.<br>-Forms explosive mixtures with sodium nitrate.<br>-Reacts vigorously with vinyl acetate.<br>Aluminium oxide is an amphoteric substance, meaning it can react with both acids and bases, such as hydrofluoric acid and sodium hydroxide, acting as an acid with a base and a base with an acid, neutralising the other and producing a salt.<br>▸ Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.<br>Metals exhibit varying degrees of activity. Reaction is reduced in the massive form (sheet, rod, or drop), compared with finely divided forms. The less active metals will not burn in air but:<br>▸ can react exothermically with oxidising acids to form noxious gases.<br>▸ catalyse polymerisation and other reactions, particularly when finely divided<br>▸ react with halogenated hydrocarbons (for example, copper dissolves when heated in carbon tetrachloride), sometimes forming explosive compounds.<br><br>▸ Many metals in elemental form react exothermically with compounds having active hydrogen atoms (such as acids and water) to form flammable hydrogen gas and caustic products.<br>▸ Elemental metals may react with azo/diazo compounds to form explosive products.<br>▸ Some elemental metals form explosive products with halogenated hydrocarbons.<br>▸ Reacts with acids producing flammable / explosive hydrogen (H2) gas<br>▸ Avoid reaction with oxidising agents<br>▸ Finely divided metal powders develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air.<br>▸ Safe handling is possible in relatively low concentrations of oxygen in an inert gas.<br>▸ Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended.<br>▸ The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric.<br>Factors influencing the pyrophoricity of metals are particle size, presence of moisture, nature of the surface of the particle, heat of formation of the oxide, or nitride, mass, hydrogen content, stress, purity and presence of oxide, among others. |

## SECTION 8 Exposure controls / personal protection

### Control parameters

**Occupational Exposure Limits (OEL)**

**INGREDIENT DATA**

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|---|---|---|---|---|---|---|
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | carbon, activated | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | carbon, activated | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |

**Continued...**

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|---|---|---|---|---|---|---|
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | carbon, activated | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | carbon, activated | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | carbon, activated | Graphite (synthetic) | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | manganese | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | manganese | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | manganese | Manganese fume (as Mn) | Not Available | Not Available | 5 mg/m3 | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | manganese | Particulates not otherwise regulated | Not Available | Not Available | Not Available | See Appendix D |
| US NIOSH Recommended Exposure Limits (RELs) | manganese | Manganese compounds and fume (as Mn) | 1 mg/m3 | 3 mg/m3 | Not Available | [*Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl, Methyl cyclopentadienyl manganese tricarbonyl, and Manganese tetroxide.] |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | silicon | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | silicon | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | silicon | Silicon- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | silicon | Silicon- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | silicon | Silicon - total | 10 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | silicon | Silicon - respirable | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | copper | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | copper | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | copper | Copper- Fume (as Cu) | 0.1 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | copper | Copper- Dusts and mists (as Cu) | 1 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | copper | Copper (dusts and mists, as Cu) | 1 mg/m3 | Not Available | Not Available | [*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.] |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | molybdenum | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | molybdenum | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | molybdenum | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | molybdenum | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | molybdenum | Molybdenum | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | chromium | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | chromium | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | chromium | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | chromium | Chromium metal and insol. salts (as Cr) | 1 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | chromium | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | chromium | Chromium metal | 0.5 mg/m3 | Not Available | Not Available | See Appendix C |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | nickel | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |

**Continued...**

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|---|---|---|---|---|---|---|
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | nickel | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | nickel | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | nickel | Nickel, metal and insoluble compounds (as Ni) | 1 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | nickel | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | nickel | Nickel metal and other compounds (as Ni) | 0.015 mg/m3 | Not Available | Not Available | Ca; See Appendix A [*Note: The REL does not apply to Nickel carbonyl.] |
| US NIOSH Recommended Exposure Limits (RELs) | nickel | Particulates not otherwise regulated | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | titanium | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | titanium | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | titanium | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | titanium | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | titanium | Particulates not otherwise regulated | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | aluminium | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | aluminium | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | aluminium | Aluminum Metal (as Al)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | aluminium | Aluminum Metal (as Al)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | aluminium | Aluminum (pyro powders and welding fumes, as Al) | 5 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | aluminium | Aluminum - respirable | 5 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | aluminium | Aluminum - total | 10 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | zirconium | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | zirconium | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | zirconium | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | zirconium | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | zirconium | Particulates not otherwise regulated | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | vanadium | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | vanadium | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | vanadium | Particulates Not Otherwise Regulated (PNOR)- Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | vanadium | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | vanadium | Particulates not otherwise regulated | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | iron | Inert or Nuisance Dust: Respirable fraction | 5 mg/m3 / 15 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-3 | iron | Inert or Nuisance Dust: Total Dust | 15 mg/m3 / 50 mppcf | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | iron | Particulates Not Otherwise Regulated (PNOR)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |

**Continued...**

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|---|---|---|---|---|---|---|
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | iron | Particulates Not Otherwise Regulated (PNOR)-Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | iron | Particulates not otherwise regulated | Not Available | Not Available | Not Available | See Appendix D |

**Emergency Limits**

| Ingredient | TEEL-1 | TEEL-2 | TEEL-3 |
|---|---|---|---|
| carbon, activated | 6 mg/m3 | 330 mg/m3 | 2,000 mg/m3 |
| manganese | 3 mg/m3 | 5 mg/m3 | 1,800 mg/m3 |
| silicon | 45 mg/m3 | 100 mg/m3 | 630 mg/m3 |
| copper | 3 mg/m3 | 33 mg/m3 | 200 mg/m3 |
| molybdenum | 30 mg/m3 | 330 mg/m3 | 2,000 mg/m3 |
| chromium | 1.5 mg/m3 | 17 mg/m3 | 99 mg/m3 |
| nickel | 4.5 mg/m3 | 50 mg/m3 | 99 mg/m3 |
| titanium | 30 mg/m3 | 330 mg/m3 | 2,000 mg/m3 |
| zirconium | 10 mg/m3 | 83 mg/m3 | 500 mg/m3 |
| vanadium | 3 mg/m3 | 5.8 mg/m3 | 35 mg/m3 |
| iron | 3.2 mg/m3 | 35 mg/m3 | 150 mg/m3 |

| Ingredient | Original IDLH | Revised IDLH |
|---|---|---|
| carbon, activated | Not Available | Not Available |
| manganese | 500 mg/m3 | Not Available |
| silicon | Not Available | Not Available |
| copper | 100 mg/m3 | Not Available |
| molybdenum | Not Available | Not Available |
| chromium | 250 mg/m3 | Not Available |
| nickel | 10 mg/m3 | Not Available |
| titanium | Not Available | Not Available |
| aluminium | Not Available | Not Available |
| zirconium | 25 mg/m3 | Not Available |
| vanadium | Not Available | Not Available |
| iron | Not Available | Not Available |

## Exposure controls

**Appropriate engineering controls**

Metal dusts must be collected at the source of generation as they are potentially explosive.

- Avoid ignition sources.
- Good housekeeping practices must be maintained.
- Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.
- Do not use compressed air to remove settled materials from floors, beams or equipment
- Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.
- Use non-sparking handling equipment, tools and natural bristle brushes. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations.
- Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.
- Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.
- Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.
- Wet scrubbers are preferable to dry dust collectors.
- Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.
- Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted states.
- Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.
- Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuum and electrostatic precipitators must not be used, unless specifically approved for use with flammable/ explosive dusts.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

| Type of Contaminant: | Air Speed: |
|---|---|
| welding, brazing fumes (released at relatively low velocity into moderately still air) | 0.5-1.0 m/s (100-200 f/min.) |

Within each range the appropriate value depends on:

| Lower end of the range | Upper end of the range |
|---|---|
| 1: Room air currents minimal or favourable to capture | 1: Disturbing room air currents |
| 2: Contaminants of low toxicity or of nuisance value only. | 2: Contaminants of high toxicity |
| 3: Intermittent, low production. | 3: High production, heavy use |
| 4: Large hood or large air mass in motion | 4: Small hood-local control only |

**Continued...**

| | |
|---|---|
| | Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used. |
| **Personal protection** |  |
| **Eye and face protection** | No special equipment required due to the physical form of the product.<br>▸ Safety glasses with side shields.<br>▸ Chemical goggles.<br>▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent] |
| **Skin protection** | See Hand protection below |
| **Hands/feet protection** | ▸ Wear chemical protective gloves, e.g. PVC.<br>▸ Wear safety footwear or safety gumboots, e.g. Rubber<br>**NOTE:**<br>▸ The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.<br>▸ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.<br>Wear general protective gloves, eg. light weight rubber gloves.<br>No special equipment required due to the physical form of the product. |
| **Body protection** | See Other protection below |
| **Other protection** | ▸ Overalls.<br>▸ P.V.C apron.<br>▸ Barrier cream.<br>▸ Skin cleansing cream.<br>▸ Eye wash unit. |

### Respiratory protection

Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.
Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

| Required Minimum Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator |
|---|---|---|---|
| up to 10 x ES | -AUS P2 | - | -PAPR-AUS / Class 1 P2 |
| up to 50 x ES | - | -AUS / Class 1 P2 | - |
| up to 100 x ES | - | -2 P2 | -PAPR-2 P2 ^ |

^ - Full-face
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

· Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
· The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
· Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
· Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
· Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)
· Use approved positive flow mask if significant quantities of dust becomes airborne.
· Try to avoid creating dust conditions.

## SECTION 9 Physical and chemical properties

### Information on basic physical and chemical properties

| | |
|---|---|
| **Appearance** | Odourless copper coated or bare, solid steel wire or rod. |

| | | | |
|---|---|---|---|
| **Physical state** | Manufactured | **Relative density (Water = 1)** | Not Available |
| **Odour** | Not Available | **Partition coefficient n-octanol / water** | Not Available |
| **Odour threshold** | Not Available | **Auto-ignition temperature (°C)** | Not Available |
| **pH (as supplied)** | Not Applicable | **Decomposition temperature (°C)** | Not Available |
| **Melting point / freezing point (°C)** | Not Available | **Viscosity (cSt)** | Not Applicable |

**Continued...**

| | | | |
|---|---|---|---|
| **Initial boiling point and boiling range (°C)** | Not Applicable | **Molecular weight (g/mol)** | Not Applicable |
| **Flash point (°C)** | Not Available | **Taste** | Not Available |
| **Evaporation rate** | Not Available | **Explosive properties** | Not Available |
| **Flammability** | Not Available | **Oxidising properties** | Not Available |
| **Upper Explosive Limit (%)** | Not Available | **Surface Tension (dyn/cm or mN/m)** | Not Applicable |
| **Lower Explosive Limit (%)** | Not Available | **Volatile Component (%vol)** | Not Available |
| **Vapour pressure (kPa)** | Not Applicable | **Gas group** | Not Available |
| **Solubility in water** | Immiscible | **pH as a solution (Not Available%)** | Not Applicable |
| **Vapour density (Air = 1)** | Not Available | **VOC g/L** | Not Available |

## SECTION 10 Stability and reactivity

| | |
|---|---|
| **Reactivity** | See section 7 |
| **Chemical stability** | Product is considered stable and hazardous polymerisation will not occur. |
| **Possibility of hazardous reactions** | See section 7 |
| **Conditions to avoid** | See section 7 |
| **Incompatible materials** | See section 7 |
| **Hazardous decomposition products** | See section 5 |

## SECTION 11 Toxicological information

### Information on toxicological effects

| | |
|---|---|
| **Inhaled** | Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.<br>The inhalation of vanadium dust can cause irritation of the respiratory tract and eyes, with cough, wheezing, bronchitis, phlegm with blood stains, and blackening of the tongue. Internal symptoms may include loss of appetite, anaemia, nausea, headache, sleep difficulties, nervousness, dizziness, kidney damage, tremor, psychic disturbances and blindness. |
| **Ingestion** | Accidental ingestion of the material may be damaging to the health of the individual. |
| **Skin Contact** | The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.<br>Open cuts, abraded or irritated skin should not be exposed to this material<br>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected. |
| **Eye** | Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn). |
| **Chronic** | There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.<br>Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems.<br>Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.<br>Harmful: danger of serious damage to health by prolonged exposure through inhalation.<br>This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects.<br>Animal testing shows long term exposure to aluminium oxides may cause lung disease and cancer, depending on the size of the particle. The smaller the size, the greater the tendencies of causing harm.<br>Vanadium is an essential trace element. Poisoning can cause stomach upset, emphysema and wheezing.<br>Manganese is an essential trace element. Chronic exposure to low levels of manganese can include a mask-like facial expression, spastic gait, tremors, slurred speech, disordered muscle tone, fatigue, anorexia, loss of strength and energy, apathy and poor concentration.<br>High levels of molybdenum can cause joint problems in the hands and feet with pain and lameness. Molybdenum compounds can also cause liver changes with elevated levels of enzymes and cause over-activity of the thyroid gland. |

| | | |
|---|---|---|
| **XTRweld Steel Solid Wire** | **TOXICITY** | **IRRITATION** |
| | Not Available | Not Available |
| **carbon, activated** | **TOXICITY** | **IRRITATION** |
| | Oral (Rat) LD50; >2000 mg/kg[1] | Eye: no adverse effect observed (not irritating)[1] |
| | | Skin: no adverse effect observed (not irritating)[1] |
| **manganese** | **TOXICITY** | **IRRITATION** |
| | Inhalation(Rat) LC50; >5.14 mg/l4h[1] | Eye (rabbit): 500 mg/24h - mild |
| | Oral (Rat) LD50; >2000 mg/kg[1] | Eye: no adverse effect observed (not irritating)[1] |
| | | Skin (rabbit): 500 mg/24h - mild |
| | | Skin: no adverse effect observed (not irritating)[1] |
| **silicon** | **TOXICITY** | **IRRITATION** |
| | Dermal (rabbit) LD50: >5000 mg/kg[1] | Eye: no adverse effect observed (not irritating)[1] |

**Continued...**

| | | |
|---|---|---|
| | Oral (Rat) LD50; 3160 mg/kg[2] | Skin: no adverse effect observed (not irritating)[1] |
| **copper** | **TOXICITY** | **IRRITATION** |
| | dermal (rat) LD50: >2000 mg/kg[1] | Eye: no adverse effect observed (not irritating)[1] |
| | Inhalation(Rat) LC50; 0.733 mg/l4h[1] | Skin: no adverse effect observed (not irritating)[1] |
| | Oral (Mouse) LD50; 0.7 mg/kg[2] | |
| **molybdenum** | **TOXICITY** | **IRRITATION** |
| | dermal (rat) LD50: >2000 mg/kg[1] | Not Available |
| | Inhalation(Rat) LC50; >1.93 mg/l4h[1] | |
| | Oral (Rat) LD50; >2000 mg/kg[1] | |
| **chromium** | **TOXICITY** | **IRRITATION** |
| | Inhalation(Rat) LC50; >5.41 mg/l4h[1] | Not Available |
| | Oral (Rat) LD50; >5000 mg/kg[1] | |
| **nickel** | **TOXICITY** | **IRRITATION** |
| | Oral (Rat) LD50; 5000 mg/kg[2] | Eye: no adverse effect observed (not irritating)[1] |
| | | Skin: no adverse effect observed (not irritating)[1] |
| **titanium** | **TOXICITY** | **IRRITATION** |
| | Oral (Rat) LD50; >2000 mg/kg[1] | Not Available |
| **aluminium** | **TOXICITY** | **IRRITATION** |
| | Inhalation(Rat) LC50; >2.3 mg/l4h[1] | Eye: no adverse effect observed (not irritating)[1] |
| | Oral (Rat) LD50; >2000 mg/kg[1] | Skin: no adverse effect observed (not irritating)[1] |
| **zirconium** | **TOXICITY** | **IRRITATION** |
| | Inhalation(Rat) LC50; >4.3 mg/l4h[1] | Eye: adverse effect observed (irreversible damage)[1] |
| | Oral (Rat) LD50; >5000 mg/kg[1] | Eye: adverse effect observed (irritating)[1] |
| | | Skin: no adverse effect observed (not irritating)[1] |
| **vanadium** | **TOXICITY** | **IRRITATION** |
| | Inhalation(Rat) LC50; >5.05 mg/l4h[1] | Not Available |
| | Oral (Rat) LD50; >2000 mg/kg[1] | |
| **iron** | **TOXICITY** | **IRRITATION** |
| | Oral (Rat) LD50; 98600 mg/kg[2] | Not Available |
| ***Legend:*** | *1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances* | |

| | |
|---|---|
| **MANGANESE** | The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. |
| **SILICON** | Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.<br>Injection of silicon into the peritoneal cavity produced only minor local trauma and foreign body reaction. In animal testing, silicon dioxide given by mouth did not cause clinical signs or cell changes. Silicon dioxide was largely eliminated in the faeces. |
| **COPPER** | WARNING: Inhalation of high concentrations of copper fume may cause "metal fume fever", an acute industrial disease of short duration. Symptoms are tiredness, influenza like respiratory tract irritation with fever.<br>for copper and its compounds (typically copper chloride):<br>**Acute toxicity:** There are no reliable acute oral toxicity results available. In an acute dermal toxicity study (OECD TG 402), one group of 5 male rats and 5 groups of 5 female rats received doses of 1000, 1500 and 2000 mg/kg bw via dermal application for 24 hours. The LD50 values of copper monochloride were 2,000 mg/kg bw or greater for male (no deaths observed) and 1,224 mg/kg bw for female. Four females died at both 1500 and 2000 mg/kg bw, and one at 1,000 mg/kg bw. Symptom of the hardness of skin, an exudation of hardness site, the formation of scar and reddish changes were observed on application sites in all treated animals. Skin inflammation and injury were also noted. In addition, a reddish or black urine was observed in females at 2,000, 1,500 and 1,000 mg/kg bw. Female rats appeared to be more sensitive than male based on mortality and clinical signs.<br>No reliable skin/eye irritation studies were available. The acute dermal study with copper monochloride suggests that it has a potential to cause skin irritation.<br>**Repeat dose toxicity:** In repeated dose toxicity study performed according to OECD TG 422, copper monochloride was given orally (gavage) to Sprague-Dawley rats for 30 days to males and for 39 - 51 days to females at concentrations of 0, 1.3, 5.0, 20, and 80 mg/kg bw/day. The NOAEL |

**Continued...**

| | |
|---|---|
| | value was 5 and 1.3 mg/kg bw/day for male and female rats, respectively. No deaths were observed in male rats. One treatment-related death was observed in female rats in the high dose group. Erythropoietic toxicity (anaemia) was seen in both sexes at the 80 mg/kg bw/day. The frequency of squamous cell hyperplasia of the forestomach was increased in a dose-dependent manner in male and female rats at all treatment groups, and was statistically significant in males at doses of =20 mg/kg bw/day and in females at doses of =5 mg/kg bw/day doses. The observed effects are considered to be local, non-systemic effect on the forestomach which result from oral (gavage) administration of copper monochloride.<br>**Genotoxicity:** An in vitro genotoxicity study with copper monochloride showed negative results in a bacterial reverse mutation test with Salmonella typhimurium strains (TA 98, TA 100, TA 1535, and TA 1537) with and without S9 mix at concentrations of up to 1,000 ug/plate. An in vitro test for chromosome aberration in Chinese hamster lung (CHL) cells showed that copper monochloride induced structural and numerical aberrations at the concentration of 50, 70 and 100 ug/mL without S9 mix. In the presence of the metabolic activation system, significant increases of structural aberrations were observed at 50 and 70 ug/mL and significant increases of numerical aberrations were observed at 70 ug/mL. In an in vivo mammalian erythrocyte micronucleus assay, all animals dosed (15 - 60 mg/kg bw) with copper monochloride exhibited similar PCE/(PCE+NCE) ratios and MNPCE frequencies compared to those of the negative control animals. Therefore copper monochloride is not an in vivo mutagen.<br>**Carcinogenicity:** there was insufficient information to evaluate the carcinogenic activity of copper monochloride.<br>Reproductive and developmental toxicity: In the combined repeated dose toxicity study with the reproduction/developmental toxicity screening test (OECD TG 422), copper monochloride was given orally (gavage) to Sprague-Dawley rats for 30 days to males and for 39-51 days to females at concentrations of 0, 1.3, 5.0, 20, and 80 mg/kg bw/day. The NOAEL of copper monochloride for fertility toxicity was 80 mg/kg bw/day for the parental animals. No treatment-related effects were observed on the reproductive organs and the fertility parameters assessed. For developmental toxicity the NOAEL was 20 mg/kg bw/day. Three of 120 pups appeared to have icterus at birth; 4 of 120 pups appeared runted at the highest dose tested (80 mg/kg bw/day). |
| **CHROMIUM** | Gastrointestinal tumours, lymphoma, musculoskeletal tumours and tumours at site of application recorded.<br>On skin and inhalation exposure, chromium and its compounds (except hexavalent) can be a potent sensitiser, as particulates. Studies show that they have a complex toxicity mechanism with hexavalent chromium associated with an increased risk of lung damage and respiratory cancers (primarily bronchogenic and nose cancers). However, there is no evidence that elemental, divalent, or trivalent chromium compounds causes cancer or genetic toxicity.<br>Tenth Annual Report on Carcinogens: Substance known to be Carcinogenic<br>[*National Toxicology Program: U.S. Dep. of Health and Human Services 2002*] |
| **NICKEL** | Oral (rat) TDLo: 500 mg/kg/5D-I Inhalation (rat) TCLo: 0.1 mg/m3/24H/17W-C<br><br>**WARNING:** This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.<br>Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen<br>[*National Toxicology Program: U.S. Dep. of Health & Human Services 2002*] |
| **XTRweld Steel Solid Wire & NICKEL** | The following information refers to contact allergens as a group and may not be specific to this product.<br>Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested. |
| **XTRweld Steel Solid Wire & CARBON, ACTIVATED & SILICON & MOLYBDENUM & CHROMIUM & TITANIUM & ALUMINIUM & ZIRCONIUM** | No significant acute toxicological data identified in literature search. |
| **CARBON, ACTIVATED & CHROMIUM** | The substance is classified by IARC as Group 3:<br>**NOT** classifiable as to its carcinogenicity to humans.<br>Evidence of carcinogenicity may be inadequate or limited in animal testing. |
| **MANGANESE & SILICON** | The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. |

| | | | |
|---|---|---|---|
| **Acute Toxicity** | ✗ | **Carcinogenicity** | ✓ |
| **Skin Irritation/Corrosion** | ✗ | **Reproductivity** | ✗ |
| **Serious Eye Damage/Irritation** | ✓ | **STOT - Single Exposure** | ✗ |
| **Respiratory or Skin sensitisation** | ✓ | **STOT - Repeated Exposure** | ✓ |
| **Mutagenicity** | ✗ | **Aspiration Hazard** | ✗ |

***Legend:*** ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

## SECTION 12 Ecological information

### Toxicity

**XTRweld Steel Solid Wire**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| Not Available | Not Available | Not Available | Not Available | Not Available |

**carbon, activated**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| NOEC(ECx) | 72h | Algae or other aquatic plants | 50mg/L | 4 |

**manganese**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| EC50 | 72h | Algae or other aquatic plants | 2.8mg/l | 2 |
| EC50 | 48h | Crustacea | >1.6mg/l | 2 |
| LC50 | 96h | Fish | >3.6mg/l | 2 |
| NOEC(ECx) | 504h | Algae or other aquatic plants | 0.05-3.7mg/l | 4 |

**Continued...**

**silicon**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| EC10(ECx) | 1.28h | Algae or other aquatic plants | >=66<=88mg/l | 2 |
| EC50 | 72h | Algae or other aquatic plants | ~250mg/l | 2 |

**copper**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| EC50(ECx) | 24h | Algae or other aquatic plants | <0.001mg/L | 4 |
| EC50 | 72h | Algae or other aquatic plants | 0.011-0.017mg/L | 4 |
| EC50 | 48h | Crustacea | <0.001mg/L | 4 |
| EC50 | 96h | Algae or other aquatic plants | 0.03-0.058mg/l | 4 |
| LC50 | 96h | Fish | 0.005-0.06mg/l | 4 |

**molybdenum**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| NOEC(ECx) | 48h | Algae or other aquatic plants | 0.5-80mg/l | 4 |
| EC50 | 72h | Algae or other aquatic plants | 26mg/l | 2 |
| EC50 | 48h | Crustacea | 130.9mg/l | 2 |
| LC50 | 96h | Fish | 211mg/l | 2 |

**chromium**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| EC50(ECx) | 48h | Crustacea | <0.001mg/l | 2 |
| EC50 | 72h | Algae or other aquatic plants | 0.026-0.208mg/L | 4 |
| EC50 | 48h | Crustacea | <0.001mg/l | 2 |
| EC50 | 96h | Algae or other aquatic plants | 36mg/L | 4 |
| LC50 | 96h | Fish | 0.106mg/L | 4 |

**nickel**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| EC50(ECx) | 72h | Algae or other aquatic plants | 0.18mg/l | 1 |
| EC50 | 72h | Algae or other aquatic plants | 0.18mg/l | 1 |
| EC50 | 48h | Crustacea | >100mg/l | 1 |
| EC50 | 96h | Algae or other aquatic plants | 0.36mg/l | 2 |
| LC50 | 96h | Fish | 0.168mg/L | 4 |

**titanium**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| NOEC(ECx) | 48h | Crustacea | <=1mg/l | 2 |
| EC50 | 72h | Algae or other aquatic plants | 13mg/l | 2 |
| EC50 | 48h | Crustacea | >100mg/l | 2 |
| LC50 | 96h | Fish | >100mg/l | 2 |

**aluminium**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| LC50 | 96h | Fish | 0.078-0.108mg/l | 2 |
| NOEC(ECx) | 48h | Crustacea | >100mg/l | 1 |
| EC50 | 72h | Algae or other aquatic plants | 0.2mg/l | 2 |
| EC50 | 48h | Crustacea | 1.5mg/l | 2 |
| EC50 | 96h | Algae or other aquatic plants | 0.024mg/l | 2 |

**zirconium**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| EC50(ECx) | 96h | Algae or other aquatic plants | 2.6mg/l | 2 |
| EC50 | 96h | Algae or other aquatic plants | 2.6mg/l | 2 |
| LC50 | 96h | Fish | >20mg/l | 2 |

**vanadium**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| NOEC(ECx) | 48h | Algae or other aquatic plants | 0.5-18mg/l | 4 |
| LC50 | 96h | Fish | 1.8mg/l | 4 |

**iron**

| Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---|---|---|---|
| NOEC(ECx) | 48h | Algae or other aquatic plants | 0.1-4mg/l | 4 |
| EC50 | 72h | Algae or other aquatic plants | 18mg/l | 2 |
| EC50 | 48h | Crustacea | >100mg/l | 2 |
| LC50 | 96h | Fish | 0.05mg/l | 2 |

***Legend:*** *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

Harmful to aquatic organisms.

**Continued...**

**DO NOT** discharge into sewer or waterways.

### Persistence and degradability

| Ingredient | Persistence: Water/Soil | Persistence: Air |
|---|---|---|
| | No Data available for all ingredients | No Data available for all ingredients |

### Bioaccumulative potential

| Ingredient | Bioaccumulation |
|---|---|
| | No Data available for all ingredients |

### Mobility in soil

| Ingredient | Mobility |
|---|---|
| | No Data available for all ingredients |

## SECTION 13 Disposal considerations

### Waste treatment methods

| | |
|---|---|
| **Product / Packaging disposal** | ▸ Containers may still present a chemical hazard/ danger when empty.<br>▸ Return to supplier for reuse/ recycling if possible.<br>Otherwise:<br>▸ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.<br>▸ Where possible retain label warnings and SDS and observe all notices pertaining to the product.<br>▸ Recycle wherever possible or consult manufacturer for recycling options.<br>▸ Consult State Land Waste Authority for disposal.<br>▸ Bury or incinerate residue at an approved site.<br>▸ Recycle containers if possible, or dispose of in an authorised landfill. |

## SECTION 14 Transport information

### Labels Required

| | |
|---|---|
| **Marine Pollutant** | NO |

**Land transport (DOT): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

**Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

**Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

### Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

### Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name | Group |
|---|---|
| carbon, activated | Not Available |
| manganese | Not Available |
| silicon | Not Available |
| copper | Not Available |
| molybdenum | Not Available |
| chromium | Not Available |
| nickel | Not Available |
| titanium | Not Available |
| aluminium | Not Available |
| zirconium | Not Available |
| vanadium | Not Available |
| iron | Not Available |

### Transport in bulk in accordance with the ICG Code

| Product name | Ship Type |
|---|---|
| carbon, activated | Not Available |
| manganese | Not Available |
| silicon | Not Available |
| copper | Not Available |
| molybdenum | Not Available |
| chromium | Not Available |
| nickel | Not Available |
| titanium | Not Available |

**Continued...**

| Product name | Ship Type |
|---|---|
| aluminium | Not Available |
| zirconium | Not Available |
| vanadium | Not Available |
| iron | Not Available |

## SECTION 15 Regulatory information

### Safety, health and environmental regulations / legislation specific for the substance or mixture

**carbon, activated is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US DOE Temporary Emergency Exposure Limits (TEELs)
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**manganese is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - California - Biomonitoring - Priority Chemicals
US - California Hazardous Air Pollutants Identified as Toxic Air Contaminants
US - Massachusetts - Right To Know Listed Chemicals
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US Clean Air Act - Hazardous Air Pollutants
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Integrated Risk Information System (IRIS)
US EPCRA Section 313 Chemical List
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**silicon is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - Massachusetts - Right To Know Listed Chemicals
US DOE Temporary Emergency Exposure Limits (TEELs)
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**copper is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - Massachusetts - Right To Know Listed Chemicals
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US CWA (Clean Water Act) - Priority Pollutants
US CWA (Clean Water Act) - Toxic Pollutants
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Integrated Risk Information System (IRIS)
US EPCRA Section 313 Chemical List
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**molybdenum is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - California - Biomonitoring - Priority Chemicals
US - Massachusetts - Right To Know Listed Chemicals
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Integrated Risk Information System (IRIS)
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**chromium is found on the following regulatory lists**

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - Massachusetts - Right To Know Listed Chemicals
US Clean Air Act - Hazardous Air Pollutants
US CWA (Clean Water Act) - Priority Pollutants
US CWA (Clean Water Act) - Toxic Pollutants
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Drinking Water Treatability Database
US EPCRA Section 313 Chemical List
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**nickel is found on the following regulatory lists**

**Continued...**

Chemical Footprint Project - Chemicals of High Concern List
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 2B: Possibly carcinogenic to humans
International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - California Proposition 65 - Carcinogens
US - California Safe Drinking Water and Toxic Enforcement Act of 1986 - Proposition 65 List
US - California Substances Identified As Toxic Air Contaminants
US - Massachusetts - Right To Know Listed Chemicals
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US Clean Air Act - Hazardous Air Pollutants
US CWA (Clean Water Act) - Priority Pollutants
US CWA (Clean Water Act) - Toxic Pollutants
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPCRA Section 313 Chemical List
US National Toxicology Program (NTP) 15th Report Part B. Reasonably Anticipated to be a Human Carcinogen
US NIOSH Carcinogen List
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**titanium is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US DOE Temporary Emergency Exposure Limits (TEELs)
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**aluminium is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - Massachusetts - Right To Know Listed Chemicals
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US Department of Homeland Security (DHS) - Chemical Facility Anti-Terrorism Standards (CFATS) - Chemicals of Interest
US EPCRA Section 313 Chemical List
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**zirconium is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - Massachusetts - Right To Know Listed Chemicals
US DOE Temporary Emergency Exposure Limits (TEELs)
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**vanadium is found on the following regulatory lists**

Chemical Footprint Project - Chemicals of High Concern List
International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US - Massachusetts - Right To Know Listed Chemicals
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPCRA Section 313 Chemical List
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

**iron is found on the following regulatory lists**

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US DOE Temporary Emergency Exposure Limits (TEELs)
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US TSCA Chemical Substance Inventory - Interim List of Active Substances

## Federal Regulations

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

**Section 311/312 hazard categories**

| | |
|---|---|
| Flammable (Gases, Aerosols, Liquids, or Solids) | No |
| Gas under pressure | No |
| Explosive | No |
| Self-heating | No |
| Pyrophoric (Liquid or Solid) | No |
| Pyrophoric Gas | No |
| Corrosive to metal | No |
| Oxidizer (Liquid, Solid or Gas) | No |
| Organic Peroxide | No |

**Continued...**

| | |
|---|---|
| Self-reactive | No |
| In contact with water emits flammable gas | No |
| Combustible Dust | No |
| Carcinogenicity | Yes |
| Acute toxicity (any route of exposure) | No |
| Reproductive toxicity | No |
| Skin Corrosion or Irritation | No |
| Respiratory or Skin Sensitization | Yes |
| Serious eye damage or eye irritation | Yes |
| Specific target organ toxicity (single or repeated exposure) | Yes |
| Aspiration Hazard | No |
| Germ cell mutagenicity | No |
| Simple Asphyxiant | No |
| Hazards Not Otherwise Classified | No |

**US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)**

| Name | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
|---|---|---|
| copper | 5000 | 2270 |
| chromium | 5000 | 2270 |
| nickel | 100 | 45.4 |

### State Regulations

**US. California Proposition 65**

**WARNING:** This product can expose you to chemicals including **nickel**, which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov.

### National Inventory Status

| National Inventory | Status |
|---|---|
| Australia - AIIC / Australia Non-Industrial Use | Yes |
| Canada - DSL | Yes |
| Canada - NDSL | No (carbon, activated; manganese; silicon; copper; molybdenum; chromium; nickel; titanium; aluminium; zirconium; vanadium; iron) |
| China - IECSC | Yes |
| Europe - EINEC / ELINCS / NLP | Yes |
| Japan - ENCS | No (carbon, activated; manganese; silicon; copper; molybdenum; chromium; nickel; titanium; aluminium; zirconium; vanadium; iron) |
| Korea - KECI | Yes |
| New Zealand - NZIoC | Yes |
| Philippines - PICCS | Yes |
| USA - TSCA | Yes |
| Taiwan - TCSI | Yes |
| Mexico - INSQ | Yes |
| Vietnam - NCI | Yes |
| Russia - FBEPH | Yes |
| ***Legend:*** | *Yes = All CAS declared ingredients are on the inventory*<br>*No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.* |

## SECTION 16 Other information

| | |
|---|---|
| **Revision Date** | 12/10/2021 |
| **Initial Date** | 01/08/2014 |

### SDS Version Summary

| Version | Date of Update | Sections Updated |
|---|---|---|
| 4.1 | 08/19/2021 | Classification change due to full database hazard calculation/update. |
| 5.1 | 12/09/2021 | Classification change due to full database hazard calculation/update. |

### Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

### Definitions and abbreviations

**Continued...**

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
ES: Exposure Standard
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index
AIIC: Australian Inventory of Industrial Chemicals
DSL: Domestic Substances List
NDSL: Non-Domestic Substances List
IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances
NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas
NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances



**end of SDS**