

# HYPERMIG / HYPERTIG Stainless Steel Wire

## Welding Guns of Australia Pty Ltd

Chemwatch Hazard Alert Code: 4

Chemwatch: 5674-97

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Safety Data Sheet according to Work Health and Safety Regulations (Hazardous Chemicals) 2023 and ADG requirements

L.GHS.AUS.EN

### SECTION 1 Identification of the substance / mixture and of the company / undertaking

#### Product Identifier

<b>Product name</b>	HYPERMIG / HYPERTIG Stainless Steel Wire
<b>Chemical Name</b>	Not Applicable
<b>Synonyms</b>	Not Available
<b>Chemical formula</b>	Not Applicable
<b>Other means of identification</b>	Not Available

#### Relevant identified uses of the substance or mixture and uses advised against

<b>Relevant identified uses</b>	Use according to manufacturer's directions.
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#### Details of the manufacturer or supplier of the safety data sheet

<b>Registered company name</b>	Welding Guns of Australia Pty Ltd	
<b>Address</b>	112 Christina Road Villawood NSW 2163 Australia	
<b>Telephone</b>	+61 2 9780 4200	
<b>Fax</b>	+61 2 9780 4244	
<b>Website</b>	<a href="http://www.unimig.com.au">www.unimig.com.au</a>	
<b>Email</b>	orders@unimig.com.au	

#### Emergency telephone number


<b>Association / Organisation</b>	Welding Guns of Australia Pty Ltd	<b>CHEMWATCH EMERGENCY RESPONSE (24/7)</b>
<b>Emergency telephone number(s)</b>	+61 2 9780 4200	+61 1800 951 288
<b>Other emergency telephone number(s)</b>	Not Available	+61 3 9573 3188

### SECTION 2 Hazards identification

#### Classification of the substance or mixture

<b>Poisons Schedule</b>	Not Applicable
<b>Classification</b> <sup>[1]</sup>	Acute Toxicity (Inhalation) Category 4, Carcinogenicity Category 1A
<b>Legend:</b>	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

#### Label elements

<b>Hazard pictogram(s)</b>	
<b>Signal word</b>	<b>Danger</b>

#### Hazard statement(s)

H332	Harmful if inhaled.
H350	May cause cancer.

**Precautionary statement(s) Prevention**

P201	Obtain special instructions before use.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves and protective clothing.
P261	Avoid breathing dust/fumes.

**Precautionary statement(s) Response**

P308+P313	IF exposed or concerned: Get medical advice/ attention.
P312	Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

**Precautionary statement(s) Storage**

P405	Store locked up.
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**Precautionary statement(s) Disposal**

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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**SECTION 3 Composition / information on ingredients****Substances**

See section below for composition of Mixtures

**Mixtures**

CAS No	%[weight]	Name
Not Available		wire containing
7439-89-6		<u>iron</u>
7440-47-3		<u>chromium</u>
7440-02-0		<u>nickel</u>
7439-96-5		<u>manganese</u>
7439-98-7		<u>molybdenum</u>
7440-33-7		<u>tungsten</u>
7440-48-4		<u>cobalt</u>
7440-50-8		<u>copper</u>
7440-62-2		<u>vanadium</u>
7440-21-3		<u>silicon</u>
7440-32-6		<u>titanium</u>
7429-90-5		<u>aluminium</u>
7440-03-1		<u>niobium</u>
7704-34-9.		<u>sulfur</u>
7723-14-0		<u>phosphorus, red</u>
7440-31-5		<u>tin</u>
7440-25-7		<u>tantalum</u>
7440-42-8		<u>boron</u>
Not Available		which upon use generates:
Not Available	>60	<u>welding fumes</u>
Not Available		as
1309-37-1.		<u>iron oxide fume</u>
7439-96-5.		<u>manganese fume</u>
Not Available		titanium fume
Not Available		vanadium pentoxide fume
Not Available		sulfur dioxide fume

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CAS No	%[weight]	Name
7440-31-5		<u>tin fume</u>
Not Available		boron oxide fume
Not Available		aluminium oxide fume
7440-02-0		<u>nickel fume</u>
7440-47-3		<u>chromium fume</u>
7439-98-7		<u>molybdenum fume</u>
7440-50-8.		<u>copper fume</u>
Not Available		tungsten fume
Not Available		Action of arc on air may generate
10028-15-6		<u>ozone</u>
Not Available		<u>nitrogen oxides</u>

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; \* EU IOELVs available

## SECTION 4 First aid measures

### Description of first aid measures

<b>Eye Contact</b>	<ul style="list-style-type: none"> <li>▶ Particulate bodies from welding spatter may be removed carefully.</li> <li>▶ <b>DO NOT attempt to remove particles attached to or embedded in eye.</b></li> <li>▶ Lay victim down, on stretcher if available and pad <b>BOTH</b> eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.</li> <li>▶ Seek urgent medical assistance, or transport to hospital.</li> </ul> <p>Arc rays can injure eyes</p>
<b>Skin Contact</b>	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Flush skin and hair with running water (and soap if available).</li> <li>▶ Seek medical attention in event of irritation.</li> </ul> <p>Arc rays can burn skin</p>
<b>Inhalation</b>	<ul style="list-style-type: none"> <li>▶ If fumes or combustion products are inhaled remove from contaminated area.</li> <li>▶ Lay patient down. Keep warm and rested.</li> <li>▶ Protheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ 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.</li> <li>▶ Transport to hospital, or doctor.</li> </ul>
<b>Ingestion</b>	Not normally a hazard due to physical form of product.

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

Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce "metal fume fever" in workers from an acute or long term exposure.

- ▶ Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
- ▶ Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
- ▶ Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
- ▶ The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
- ▶ Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology]

## SECTION 5 Firefighting measures

### Extinguishing media

- ▶ There is no restriction on the type of extinguisher which may be used.

### Special hazards arising from the substrate or mixture

<b>Fire Incompatibility</b>	<p>Welding electrodes should not be allowed to come into contact with strong acids or other substances which are corrosive to metals.</p> <p>Welding arc and metal sparks can ignite combustibles.</p>
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**Advice for firefighters**

<b>Fire Fighting</b>	<ul style="list-style-type: none"> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ Wear breathing apparatus plus protective gloves in the event of a fire.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water courses.</li> <li>▶ Use fire fighting procedures suitable for surrounding area.</li> <li>▶ <b>DO NOT</b> approach containers suspected to be hot.</li> <li>▶ Cool fire exposed containers with water spray from a protected location.</li> <li>▶ If safe to do so, remove containers from path of fire.</li> <li>▶ Equipment should be thoroughly decontaminated after use.</li> </ul>
<b>Fire/Explosion Hazard</b>	<ul style="list-style-type: none"> <li>▶ Non combustible.</li> <li>▶ Not considered to be a significant fire risk, however containers may burn.</li> <li>▶ In a fire may decompose on heating and produce toxic / corrosive fumes.</li> </ul>
<b>HAZCHEM</b>	Not Applicable

**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**

<b>Minor Spills</b>	<p>Clean up all spills immediately. Avoid contact with skin and eyes. Wear impervious gloves and safety glasses. Use dry clean up procedures and avoid generating dust. Place in suitable containers for disposal.</p>
<b>Major Spills</b>	<p>Minor hazard.</p> <ul style="list-style-type: none"> <li>▶ Clear area of personnel.</li> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ Control personal contact with the substance, by using protective equipment if risk of overexposure exists.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water courses.</li> <li>▶ Contain spill/secure load if safe to do so.</li> <li>▶ Bundle/collect recoverable product and label for recycling.</li> <li>▶ Collect remaining product and place in appropriate containers for disposal.</li> <li>▶ Clean up/sweep up area. Water may be required.</li> <li>▶ If contamination of drains or waterways occurs, advise emergency services.</li> </ul>

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

**SECTION 7 Handling and storage**

**Precautions for safe handling**

<b>Safe handling</b>	<ul style="list-style-type: none"> <li>▶ Limit all unnecessary personal contact.</li> <li>▶ Wear protective clothing when risk of exposure occurs.</li> <li>▶ Use in a well-ventilated area.</li> <li>▶ Avoid contact with incompatible materials.</li> <li>▶ When handling, <b>DO NOT eat, drink or smoke.</b></li> <li>▶ Keep containers securely sealed when not in use.</li> <li>▶ Avoid physical damage to containers.</li> <li>▶ Always wash hands with soap and water after handling.</li> <li>▶ Work clothes should be laundered separately.</li> <li>▶ Use good occupational work practice.</li> <li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> <li>▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</li> </ul>
<b>Other information</b>	<ul style="list-style-type: none"> <li>▶ Keep dry.</li> <li>▶ Store under cover.</li> <li>▶ Protect containers against physical damage.</li> <li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> </ul>

**Conditions for safe storage, including any incompatibilities**

<b>Suitable container</b>	<ul style="list-style-type: none"> <li>▶ Packaging as recommended by manufacturer.</li> <li>▶ Check that containers are clearly labelled</li> </ul>
<b>Storage incompatibility</b>	Welding electrodes should not be allowed to come into contact with strong acids or other substances which are corrosive to metals.

## SECTION 8 Exposure controls / personal protection

### Control parameters

#### Occupational Exposure Limits (OEL)

#### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	chromium	Chromium (metal)	0.5 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	nickel	Nickel, metal	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	nickel	Nickel, powder	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	manganese	Manganese, fume (as Mn)	1 mg/m <sup>3</sup>	3 mg/m <sup>3</sup>	Not Available	Not Available
Australia Exposure Standards	cobalt	Cobalt, metal dust & fume (as Co)	0.05 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	copper	Copper (fume)	0.2 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	copper	Copper, dusts & mists (as Cu)	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	silicon	Silicon	10 mg/m <sup>3</sup>	Not Available	Not Available	(a) This value is for inhalable dust containing no asbestos and < 1% crystalline silica.
Australia Exposure Standards	aluminium	Aluminium (welding fumes) (as Al)	5 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	aluminium	Aluminium (metal dust)	10 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	aluminium	Aluminium, pyro powders (as Al)	5 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	phosphorus, red	Phosphorus (yellow)	0.1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	tin	Tin, metal	2 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	tantalum	Tantalum, metal & oxide dusts	5 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	welding fumes	Welding fumes (not otherwise classified)	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	iron oxide fume	Iron oxide fume (Fe <sub>2</sub> O <sub>3</sub> ) (as Fe)	5 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	iron oxide fume	Rouge dust	10 mg/m <sup>3</sup>	Not Available	Not Available	(a) This value is for inhalable dust containing no asbestos and < 1% crystalline silica.
Australia Exposure Standards	manganese fume	Manganese, fume (as Mn)	1 mg/m <sup>3</sup>	3 mg/m <sup>3</sup>	Not Available	Not Available
Australia Exposure Standards	tin fume	Tin, metal	2 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	nickel fume	Nickel, metal	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	nickel fume	Nickel, powder	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	chromium fume	Chromium (metal)	0.5 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	copper fume	Copper (fume)	0.2 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	copper fume	Copper, dusts & mists (as Cu)	1 mg/m <sup>3</sup>	Not Available	Not Available	Not Available
Australia Exposure Standards	ozone	Ozone	Not Available	Not Available	0.1 ppm / 0.2 mg/m <sup>3</sup>	Not Available

Ingredient	Original IDLH	Revised IDLH
iron	Not Available	Not Available
chromium	250 mg/m <sup>3</sup>	Not Available

Ingredient	Original IDLH	Revised IDLH
nickel	10 mg/m3	Not Available
manganese	500 mg/m3	Not Available
molybdenum	Not Available	Not Available
tungsten	Not Available	Not Available
cobalt	20 mg/m3	Not Available
copper	100 mg/m3	Not Available
vanadium	Not Available	Not Available
silicon	Not Available	Not Available
titanium	Not Available	Not Available
aluminium	Not Available	Not Available
niobium	Not Available	Not Available
sulfur	Not Available	Not Available
phosphorus, red	5 mg/m3	Not Available
tin	Not Available	Not Available
tantalum	2,500 mg/m3	Not Available
boron	Not Available	Not Available
welding fumes	Not Available	Not Available
iron oxide fume	2,500 mg/m3	Not Available
manganese fume	500 mg/m3	Not Available
tin fume	Not Available	Not Available
nickel fume	10 mg/m3	Not Available
chromium fume	250 mg/m3	Not Available
molybdenum fume	Not Available	Not Available
copper fume	100 mg/m3	Not Available
ozone	5 ppm	Not Available
nitrogen oxides	Not Available	Not Available

**MATERIAL DATA**

for welding fume:

In addition to complying with any individual exposure standards for specific contaminants, where current manual welding processes are used, the fume concentration inside the welder's helmet **should not** exceed 5 mg/m3, when collected in accordance with the appropriate standard (AS 3640, for example).

ES\* TWA: 5 mg/m3

TLV\* TWA: 5 mg/m3, B2 (a substance of variable composition)


OES\* TWA: 5 mg/m3

Most welding, even with primitive ventilation, does not produce exposures inside the welding helmet above 5 mg/m3. That which does should be controlled (ACGIH). Inspirable dust concentrations in a worker's breathing zone shall be collected and measured in accordance with AS 3640, for example. Metal content can be analytically determined by OSHA Method ID25 (ICP-AES) after total digestion of filters and dissolution of captured metals. Sampling of the Respirable Dust fraction requires cyclone separator devices (elutriators) and procedures to comply with AS 2985 (for example).

**Exposure controls**

<p><b>Appropriate engineering controls</b></p>	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>Special ventilation requirements apply for processes which result in the generation of barium, chromium, lead, or nickel fume and in those processes which generate ozone.</p> <p>The use of mechanical ventilation by local exhaust systems is required as a minimum in all circumstances (including outdoor work). (In confined spaces always check that oxygen has not been depleted by excessive rusting of steel or snowflake corrosion of aluminium)</p> <p>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. 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.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Type of Contaminant:</td> <td>Air Speed:</td> </tr> <tr> <td>welding, brazing fumes (released at relatively low velocity into moderately still air)</td> <td>0.5-1.0 m/s (100-200 f/min.)</td> </tr> </table> <p>Within each range the appropriate value depends on:</p>	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.)
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.)				

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	<p>Lower end of the range</p> <p>1: Room air currents minimal or favourable to capture</p> <p>2: Contaminants of low toxicity or of nuisance value only.</p> <p>3: Intermittent, low production.</p> <p>4: Large hood or large air mass in motion</p>	<p>Upper end of the range</p> <p>1: Disturbing room air currents</p> <p>2: Contaminants of high toxicity</p> <p>3: High production, heavy use</p> <p>4: Small hood-local control only</p>
	<p>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 m/s (200-400 f/min.) for extraction of welding or brazing fumes generated 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.</p> <p>If risk of inhalation or overexposure exists, wear SAA approved respirator or work in fume hood.</p>	
Individual protection measures, such as personal protective equipment		
Eye and face protection	<p>Welding helmet with suitable filter. Welding hand shield with suitable filter.</p> <ul style="list-style-type: none"> <li>▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens 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 1337.1, EN166 or national equivalent]</li> <li>▶ Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations. Spectacles without side shields, with suitable filter lenses are permitted for use during gas welding operations on light work, for torch brazing or for inspection.</li> <li>▶ For most open welding/brazing operations, goggles, even with appropriate filters, will not afford sufficient facial protection for operators. Where possible use welding helmets or handshields corresponding to EN 175, ANSI Z49:12005, AS 1336 and AS 1338 which provide the maximum possible facial protection from flying particles and fragments. [WRIA-WTIA Technical Note 7]</li> <li>▶ An approved face shield or welding helmet can also have filters for optical radiation protection, and offer additional protection against debris and sparks.</li> <li>▶ UV blocking protective spectacles with side shields or welding goggles are considered primary protection, with the face shield or welding helmet considered secondary protection.</li> <li>▶ The optical filter in welding goggles, face mask or helmet must be a type which is suitable for the sort of work being done. A filter suitable for gas welding, for instance, should not be used for arc welding.</li> <li>▶ Face masks which are self dimming are available for arc welding, MIG, TIG and plasma cutting, and allow better vision before the arc is struck and after it is extinguished.</li> </ul>	
Skin protection	See Hand protection below	
Hands/feet protection	Welding Gloves Safety footwear	
Body protection	See Other protection below	
Other protection	<p>Overalls</p> <ul style="list-style-type: none"> <li>▶ Eyewash unit.</li> </ul> <p>Aprons, sleeves, shoulder covers, leggings or spats of pliable flame resistant leather or other suitable materials may also be required in positions where these areas of the body will encounter hot metal.</p>	

## Respiratory protection

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	NO-AUS P2	-	NO-PAPR-AUS / Class 1 P2
up to 50 x ES	-	NO-AUS / Class 1 P2	-
up to 100 x ES	-	NO-2 P2	NO-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(SO<sub>2</sub>), G = Agricultural chemicals, K = Ammonia(NH<sub>3</sub>), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

## SECTION 9 Physical and chemical properties

## Information on basic physical and chemical properties

Continued...

<b>Appearance</b>	Solid wire with no odour; insoluble in water.		
<b>Physical state</b>	Manufactured	<b>Relative density (Water = 1)</b>	Not Available
<b>Odour</b>	Not Available	<b>Partition coefficient n-octanol / water</b>	Not Available
<b>Odour threshold</b>	Not Available	<b>Auto-ignition temperature (°C)</b>	Not Applicable
<b>pH (as supplied)</b>	Not Applicable	<b>Decomposition temperature (°C)</b>	Not Available
<b>Melting point / freezing point (°C)</b>	Not Available	<b>Viscosity (cSt)</b>	Not Applicable
<b>Initial boiling point and boiling range (°C)</b>	Not Applicable	<b>Molecular weight (g/mol)</b>	Not Applicable
<b>Flash point (°C)</b>	Not Applicable	<b>Taste</b>	Not Available
<b>Evaporation rate</b>	Not Applicable	<b>Explosive properties</b>	Not Available
<b>Flammability</b>	Not Applicable	<b>Oxidising properties</b>	Not Available
<b>Upper Explosive Limit (%)</b>	Not Applicable	<b>Surface Tension (dyn/cm or mN/m)</b>	Not Applicable
<b>Lower Explosive Limit (%)</b>	Not Applicable	<b>Volatile Component (%vol)</b>	Not Applicable
<b>Vapour pressure (kPa)</b>	Not Applicable	<b>Gas group</b>	Not Available
<b>Solubility in water</b>	Immiscible	<b>pH as a solution (1%)</b>	Not Applicable
<b>Vapour density (Air = 1)</b>	Not Applicable	<b>VOC g/L</b>	0
<b>Heat of Combustion (kJ/g)</b>	Not Available	<b>Ignition Distance (cm)</b>	Not Available
<b>Flame Height (cm)</b>	Not Available	<b>Flame Duration (s)</b>	Not Available
<b>Enclosed Space Ignition Time Equivalent (s/m<sup>3</sup>)</b>	Not Available	<b>Enclosed Space Ignition Deflagration Density (g/m<sup>3</sup>)</b>	Not Available

## SECTION 10 Stability and reactivity

<b>Reactivity</b>	See section 7
<b>Chemical stability</b>	<ul style="list-style-type: none"> <li>▶ Unstable in the presence of incompatible materials.</li> <li>▶ Product is considered stable.</li> <li>▶ Hazardous polymerisation will not occur.</li> </ul>
<b>Possibility of hazardous reactions</b>	See section 7
<b>Conditions to avoid</b>	See section 7
<b>Incompatible materials</b>	See section 7
<b>Hazardous decomposition products</b>	See section 5

## SECTION 11 Toxicological information

### Information on toxicological effects

<b>a) Acute Toxicity</b>	There is sufficient evidence to classify this material as acutely toxic.
<b>b) Skin Irritation/Corrosion</b>	Based on available data, the classification criteria are not met.
<b>c) Serious Eye Damage/Irritation</b>	Based on available data, the classification criteria are not met.
<b>d) Respiratory or Skin sensitisation</b>	Based on available data, the classification criteria are not met.
<b>e) Mutagenicity</b>	Based on available data, the classification criteria are not met.
<b>f) Carcinogenicity</b>	There is sufficient evidence to classify this material as carcinogenic
<b>g) Reproductivity</b>	Based on available data, the classification criteria are not met.
<b>h) STOT - Single Exposure</b>	Based on available data, the classification criteria are not met.
<b>i) STOT - Repeated Exposure</b>	Based on available data, the classification criteria are not met.
<b>j) Aspiration Hazard</b>	Based on available data, the classification criteria are not met.
<b>Inhaled</b>	Harmful levels of ozone may be found when working in confined spaces. Symptoms of exposure include irritation of the upper membranes of the respiratory tract and lungs as well as pulmonary (lung) changes including irritation, accumulation of fluid

	<p>(congestion and oedema) and in some cases haemorrhage. Exposure may aggravate any pre-existing lung condition such as bronchitis, asthma or emphysema.</p> <p>Shielding gases may act as simple asphyxiants if significant levels are allowed to accumulate. Oxygen monitoring may be necessary.</p> <p>Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in "metal fume fever". Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalised feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.</p>
<b>Ingestion</b>	Not normally a hazard due to physical form of product.
<b>Skin Contact</b>	<p>Ultraviolet radiation (UV) is generated by the electric arc in the welding process. Skin exposure to UV can result in severe burns, in many cases without prior warning.</p> <p>Exposure to infrared radiation (IR), produced by the electric arc and other flame cutting equipment may heat the skin surface and the tissues immediately below the surface. Except for this effect, which can progress to thermal burns in some situations, infrared radiation is not dangerous to welders. Most welders protect themselves from IR (and UV) with a welder's helmet (or glasses) and protective clothing.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds 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.</p> <p>Skin contact does <b>not</b> normally present a hazard, though it is always possible that occasionally individuals may be found who react to substances usually regarded as inert.</p>
<b>Eye</b>	<p>Ultraviolet (UV) radiation can also damage the lens of the eye. Many arc welders are aware of the condition known as "arc-eye," a sensation of sand in the eyes. This condition is caused by excessive eye exposure to UV. Exposure to ultraviolet rays may also increase the skin effects of some industrial chemicals (coal tar and cresol compounds, for example).</p> <p>Exposure of the human eye to intense visible light can produce adaptation, pupillary reflex, and shading of the eyes. Such actions are protective mechanisms to prevent excessive light from being focused on the retina. In the arc welding process, eye exposure to intense visible light is prevented for the most part by the welder's helmet. However, some individuals have sustained retinal damage due to careless "viewing" of the arc. At no time should the arc be observed without eye protection.</p> <p>Fumes from welding/brazing operations may be irritating to the eyes.</p>
<b>Chronic</b>	<p>Principal route of exposure is inhalation of welding fumes from electrodes and workpiece. Reaction products arising from electrode core and flux appear as welding fume depending on welding conditions, relative volatilities of metal oxides and any coatings on the workpiece. Studies of lung cancer among welders indicate that they may experience a 30-40% increased risk compared to the general population. Since smoking and exposure to other cancer-causing agents, such as asbestos fibre, may influence these results, it is not clear whether welding, in fact, represents a significant lung cancer risk. Whilst mild steel welding represents little risk, the stainless steel welder, exposed to chromium and nickel fume, may be at risk and it is this factor which may account for the overall increase in lung cancer incidence among welders. Cold isolated electrodes are relatively harmless. Welding fume with high levels of ferrous materials may lead to particle deposition in the lungs (siderosis) after long exposure. This clears up when exposure stops. Chronic exposure to iron dusts may lead to eye disorders.</p> <p>Ozone is suspected to produce lung cancer in laboratory animals; no reports of this effect have been documented in exposed human populations.</p> <p>Other welding process exposures can arise from radiant energy UV flash burns, thermal burns or electric shock</p> <p>The welding arc emits ultraviolet radiation at wavelengths that have the potential to produce skin tumours in animals and in over-exposed individuals, however, no confirmatory studies of this effect in welders have been reported.</p> <p>Metal oxides generated by industrial processes such as welding, give rise to a number of potential health problems. Particles smaller than 5 micron (respirables) articles may cause lung deterioration. Particles of less than 1.5 micron can be trapped in the lungs and, dependent on the nature of the particle, may give rise to further serious health consequences.</p>

<b>HYPERMIG / HYPERTIG Stainless Steel Wire</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Not Available	Not Available
<b>iron</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (Rat) LD50: 98600 mg/kg <sup>[2]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup> Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
<b>chromium</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.41 mg/4h <sup>[1]</sup> Oral (Rat) LD50: >5000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup> Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
<b>nickel</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (Rat) LD50: 5000 mg/kg <sup>[2]</sup>	Not Available
<b>manganese</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.14 mg/4h <sup>[1]</sup> Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye (Rodent - rabbit): 500mg/24H - Mild Eye: no adverse effect observed (not irritating) <sup>[1]</sup>

		Skin (Rodent - rabbit): 500mg/24H - Mild
		Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
molybdenum	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: >1.93 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
tungsten	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye (Rodent - rabbit): 500mg/24H - Mild
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: adverse effect observed (irritating) <sup>[1]</sup>
		Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
		Skin (Rodent - rabbit): 500mg/24H - Mild
		Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
cobalt	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: adverse effect observed (irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: <=0.05 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: ~550 mg/kg <sup>[1]</sup>	
copper	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: 0.733 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Mouse) LD50: 0.7 mg/kg <sup>[2]</sup>	
vanadium	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.05 mg/4h <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
silicon	<b>TOXICITY</b>	<b>IRRITATION</b>
	Dermal (rabbit) LD50: >5000 mg/kg <sup>[1]</sup>	Eye (Rodent - rabbit): 3mg - Mild
	Oral (Rat) LD50: 3160 mg/kg <sup>[2]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
		Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
titanium	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
		Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
aluminium	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >2.3 mg/4h <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
niobium	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: >2.07 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
sulfur	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye (Human): 8ppm
	Inhalation (Rat) LC50: >5.43 mg/L4h <sup>[1]</sup>	
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
phosphorus, red	<b>TOXICITY</b>	<b>IRRITATION</b>

## HYPERMIG / HYPERTIG Stainless Steel Wire

	dermal (rat) LD50: ~100 mg/kg <sup>[2]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: >5.75 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
tin	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: >4.75 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
tantalum	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.18 mg/4h <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
boron	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.08 mg/4h <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Cat) LD50: 250 mg/kg <sup>[2]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
welding fumes	<b>TOXICITY</b>	<b>IRRITATION</b>
	Not Available	Not Available
iron oxide fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (Rat) LD50: >5000 mg/kg <sup>[1]</sup>	Not Available
manganese fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.14 mg/4h <sup>[1]</sup>	Eye (Rodent - rabbit): 500mg/24H - Mild
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	Skin (Rodent - rabbit): 500mg/24H - Mild
tin fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: >4.75 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
nickel fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	Oral (Rat) LD50: 5000 mg/kg <sup>[2]</sup>	Not Available
chromium fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: >5.41 mg/4h <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >5000 mg/kg <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
molybdenum fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Eye: no adverse effect observed (not irritating) <sup>[1]</sup>
	Inhalation (Rat) LC50: >1.93 mg/4h <sup>[1]</sup>	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>	
copper fume	<b>TOXICITY</b>	<b>IRRITATION</b>
	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>	Not Available
	Inhalation (Rat) LC50: 0.733 mg/4h <sup>[1]</sup>	
	Oral (Mouse) LD50: 0.7 mg/kg <sup>[2]</sup>	
ozone	<b>TOXICITY</b>	<b>IRRITATION</b>
	Inhalation (Rat) LC50: 3.6 ppm4h <sup>[1]</sup>	Eye (Rodent - rabbit): 2ppm/4H
		Eye: adverse effect observed (irreversible damage) <sup>[1]</sup>
		Skin: adverse effect observed (corrosive) <sup>[1]</sup>

nitrogen oxides	TOXICITY Not Available	IRRITATION Not Available
<b>Legend:</b>	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	
<b>CHROMIUM</b>	Gastrointestinal tumours, lymphoma, musculoskeletal tumours and tumours at site of application recorded. Tenth Annual Report on Carcinogens: Substance known to be Carcinogenic [National Toxicology Program: U.S. Dep. of Health and Human Services 2002]	
<b>NICKEL</b>	Oral (rat) TDLo: 500 mg/kg/5D-I Inhalation (rat) TCLo: 0.1 mg/m <sup>3</sup> /24H/17W-C	
<b>TUNGSTEN</b>	Substance has been investigated as a reproductive effector in female rodents- Oral TDLo 1.16 mg/kg Tungsten toxicology has been investigated principally by administration of sodium tungstate. Subcutaneous administration produces severe rectal temperature drops in rats. Parenteral doses are almost completely eliminated in the urine within 12 hours. Parenteral, but not oral, routes show an enlargement of adrenals and kidneys. Tungsten powder but not tungsten carbide is toxic by intraperitoneal administration - fatalities occur within 24 hours with survivors showing minor gross changes in liver and spleen.	
<b>COBALT</b>	Allergic reactions which develop in the respiratory passages as bronchial asthma or rhinoconjunctivitis, are mostly the result of reactions of the allergen with specific antibodies of the IgE class and belong in their reaction rates to the manifestation of the immediate type. In addition to the allergen-specific potential for causing respiratory sensitisation, the amount of the allergen, the exposure period and the genetically determined disposition of the exposed person are likely to be decisive. Factors which increase the sensitivity of the mucosa may play a role in predisposing a person to allergy. They may be genetically determined or acquired, for example, during infections or exposure to irritant substances. Immunologically the low molecular weight substances become complete allergens in the organism either by binding to peptides or proteins (haptens) or after metabolism (prohaptens). Particular attention is drawn to so-called atopic diathesis which is characterised by an increased susceptibility to allergic rhinitis, allergic bronchial asthma and atopic eczema (neurodermatitis) which is associated with increased IgE synthesis. Exogenous allergic alveolitis is induced essentially by allergen specific immune-complexes of the IgG type; cell-mediated reactions (T lymphocytes) may be involved. Such allergy is of the delayed type with onset up to four hours following exposure.	
<b>COPPER</b>	<p>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.</p> <p>for copper and its compounds (typically copper chloride):</p> <p><b>Acute toxicity:</b> 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. 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.</p> <p><b>Repeat dose toxicity:</b> 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 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.</p> <p><b>Genotoxicity:</b> 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.</p> <p><b>Carcinogenicity:</b> there was insufficient information to evaluate the carcinogenic activity of copper monochloride.</p> <p>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).</p>	
<b>SILICON</b>	Intraperitoneal injection of silicon produced only minor local trauma and foreign body reaction. Parenterally administered elemental silica is considered biologically inert. Dogs and rats fed 800 mg silicon/kg/day (as the dioxide) for 1 month showed no clinical signs or histological changes. The compound was largely eliminated in the faeces. Normal human cerebral cortex tissue contains about 3.8 ug/g silicon	
<b>BORON</b>	Elemental boron produces lower foetal body weight in rats. As dose levels increase the effects seen include rib effects, increased foetal cardiovascular malformations in the rabbit and severe testicular pathology in the rat, including testicular atrophy and sterility. Reduced foetal weight also occurs in mice.	

<p><b>WELDING FUMES</b></p>	<p>Most welding is performed using electric arc processes - manual metal arc, metal inert gas (MIG) and tungsten inert gas welding (TIG) – and most welding is on mild steel.</p> <p>In 2017, an IARC working group has determined that "sufficient evidence exists that welding fume is a human lung carcinogen (Group 1).</p> <p>A complicating factor in classifying welding fumes is its complexity. Generally, welding fume is a mixture of metal fumes (i.e., iron, manganese, chromium, nickel, silicon, titanium) and gases (i.e., carbon monoxide, ozone, argon, carbon dioxide). Welding fume can contain varying concentrations of individual components that are classified as human carcinogens, including hexavalent chrome and nickel. However the presence of such metals and the intensity of exposure to each differ significantly according to a number of variables, including the type of welding technique used and the composition of the base metal and consumable. Nonetheless, IARC did not differentiate between these variables in its decision.</p> <p>There has been considerable evidence over several decades regarding cancer risks in relation to welding activities. Several case-control studies reported excess risks of ocular melanoma in welders. This association may be due to the presence in some welding environments of fumes of thorium-232, which is used in tungsten welding rods</p> <p>Different welding environments may present different and complex profiles of exposures. In one study to characterise welding fume aerosol nanoparticles in mild steel metal active gas welding showed a mass median diameter (MMMD) of 200-300 nm. A widespread consensus seems to have formed to the effect that some welding environments, notably in stainless steel welding, do carry risks of lung cancer. This widespread consensus is in part based on empirical evidence regarding risks among stainless steel welders and in part on the fact that stainless steel welding entails moderately high exposure to nickel and chromium VI compounds, which are recognised lung carcinogens. The corollary is that welding without the presence of nickel and chromium VI compounds, namely mild-steel welding, should not carry risk. But it appears that this line of reasoning is not supported by the accumulated body of epidemiologic evidence. While there remained some uncertainty about possible confounding by smoking and by asbestos, and some possible publication bias, the overwhelming evidence is that there has been an excess risk of lung cancer among welders as a whole in the order of 20%-40%. The most begrudging explanation is that there is an as-yet unexplained common reason for excess lung cancer risks that applies to all types of welders. It has been have proposed that iron fumes may play such a role, and some Finnish data appear to support this hypothesis, though not conclusively. This hypothesis would also imply that excess lung cancer risks among welders are not unique to welders, but rather may be shared among many types of metal working occupations.</p> <p>Welders are exposed to a range of fumes and gases (evaporated metal, metal oxides, hydrocarbons, nanoparticles, ozone, oxides of nitrogen (NOx) ) depending on the electrodes, filler wire and flux materials used in the process, but also physical exposures such as electric and magnetic fields (EMF) and ultraviolet (UV) radiation. Fume particles contain a wide variety of oxides and salts of metals and other compounds, which are produced mainly from electrodes, filler wire and flux materials. Fumes from the welding of stainless-steel and other alloys contain nickel compounds and chromium[VI] and [III].</p> <p>Ozone is formed during most electric arc welding, and exposures can be high in comparison to the exposure limit, particularly during metal inert gas welding of aluminium. Oxides of nitrogen are found during manual metal arc welding and particularly during gas welding. Welders who weld painted mild steel can also be exposed to a range of organic compounds produced by pyrolysis.</p> <p>In one study particle elemental composition was mainly iron and manganese. Ni and Cr exposures were very low in the vicinity of mild steel welders, but much higher in the background in the workshop where there presumably was some stainless steel welding.</p> <p>Personal exposures to manganese ranged from 0.01-4.93 mg/m3 and to iron ranged from 0.04-16.29 mg/m3 in eight Canadian welding companies. Types of welding identified were mostly (90%) MIG mild steel, MIG stainless steel, and TIG aluminum. Carbon monoxide levels were less than 5.0 ppm (at source) and ozone levels varied from 0.4-0.6 ppm (at source). Welders, especially in shipyards, may also be exposed to asbestos dust. Physical exposures such as electric and magnetic fields (EMF) and ultraviolet (UV) radiation are also common.</p> <p>In all, the in vivo studies suggest that different welding fumes cause varied responses in rat lungs in vivo , and the toxic effects typically correlate with the metal composition of the fumes and their ability to produce free radicals. In many studies both soluble and insoluble fractions of the stainless steel welding fumes were required to produce most types of effects, indicating that the responses are not dependent exclusively on the soluble metals</p> <p>Lung tumorigenicity of welding fumes was investigated in lung tumour susceptible (A/J) strain of mice. Male mice were exposed by pharyngeal aspiration four times (once every 3 days) to 85 ug of gas metal arc-mild steel (GMA-MS), GMA-SS, or manual metal arc-SS (MMA-SS) fume. At 48 weeks post-exposure, GMA-SS caused the greatest increase in tumour multiplicity and incidence, but did not differ from sham exposure. Tumour incidence in the GMA-SS group versus sham control was close to significance at 78 weeks post exposure. Histopathological analysis of the lungs of these mice showed the GMA-SS group having an increase in preneoplasia/tumour multiplicity and incidence compared to the GMA-MS and sham groups at 48 weeks. The increase in incidence in the GMA-SS exposed mice was significant compared to the GMA-MS group but not to the sham-exposed animals, and the difference in incidence between the GMA-SS and MMA-SS groups was of border-line significance (p = 0.06). At 78 week s post-exposure, no statistically significant differences</p> <p>A significantly higher frequency of micronuclei in peripheral blood lymphocytes (binucleated cell assay) and higher mean levels of both centromere-positive and centromere-negative micronuclei was observed in welders (n=27) who worked without protective device compared to controls (n=30).The rate of micronucleated cells did not correlate with the duration of exposure</p> <p><b>WARNING:</b> This substance has been classified by the IARC as Group 1: <b>CARCINOGENIC TO HUMANS.</b> Not available. Refer to individual constituents.</p>
<p><b>OZONE</b></p>	<p>NOTE: Ozone aggravates chronic obstructive pulmonary diseases. Ozone is suspected also of increasing the risk of acute and chronic respiratory disease, mutagenesis and foetotoxicity. In animals short-term exposure to ambient concentrations of less than 1 ppm results in reduced capacity to kill intrapulmonary organisms and allows purulent bacteria to proliferate [Ellenhorn etal].</p>
<p><b>NITROGEN OXIDES</b></p>	<p>Data for nitrogen dioxide: Substance has been investigated as a mutagen and reproductive effector. NOTE: Interstitial edema, epithelial proliferation and, in high concentrations, fibrosis and emphysema develop after repeated exposure.</p>
<p><b>CHROMIUM &amp; CHROMIUM FUME</b></p>	<p>For chrome(III) and other valence states (except hexavalent):</p> <p>For inhalation exposure, all trivalent and other chromium compounds are treated as particulates, not gases.</p> <p>The mechanisms of chromium toxicity are very complex, and although many studies on chromium are available, there is a great deal of uncertainty about how chromium exerts its toxic influence. Much more is known about the mechanisms of hexavalent chromium toxicity than trivalent chromium toxicity. There is an abundance of information available on the carcinogenic potential of chromium compounds and on the genotoxicity and mutagenicity of chromium compounds in experimental systems. The consensus from various reviews and agencies is that evidence of carcinogenicity of elemental, divalent, or trivalent chromium</p>

	<p>compounds is lacking. Epidemiological studies of workers in a number of industries (chromate production, chromate pigment production and use, and chrome plating) conclude that while occupational exposure to hexavalent chromium compounds is associated with an increased risk of respiratory system cancers (primarily bronchogenic and nasal), results from occupational exposure studies to mixtures that were mainly elemental and trivalent (ferrochromium alloy worker) were inconclusive. Studies in leather tanners, who were exposed to trivalent chromium were consistently negative. In addition to the lack of direct evidence of carcinogenicity of trivalent or elemental chromium and its compounds, the genotoxic evidence is overwhelmingly negative. The lesser potency of trivalent chromium relative to hexavalent chromium is likely related to the higher redox potential of hexavalent chromium and its greater ability to enter cells.</p> <p>The general inability of trivalent chromium to traverse membranes and thus be absorbed or reach peripheral tissue in significant amounts is generally accepted as a probable explanation for the overall absence of systemic trivalent chromium toxicity. Elemental and divalent forms of chromium are not able to traverse membranes readily either. This is not to say that elemental, divalent, or trivalent chromium compounds cannot traverse membranes and reach peripheral tissue, the mechanism of absorption is simply less efficient in comparison to absorption of hexavalent chromium compounds. Hexavalent chromium compounds exist as tetrahedral chromate anions, resembling the forms of other natural anions like sulfate and phosphate which are permeable across nonselective membranes. Trivalent chromium forms octahedral complexes which cannot easily enter through these channels, instead being absorbed via passive diffusion and phagocytosis. Although trivalent chromium is less well absorbed than hexavalent chromium, workers exposed to trivalent compounds have had detectable levels of chromium in the urine at the end of a workday. Absorbed chromium is widely distributed throughout the body via the bloodstream, and can reach the foetus. Although there is ample in vivo evidence that hexavalent chromium is efficiently reduced to trivalent chromium in the gastrointestinal tract and can be reduced to the trivalent form by ascorbate and glutathione in the lungs, there is no evidence that trivalent chromium is converted to hexavalent chromium in biological systems. In general, trivalent chromium compounds are cleared rapidly from the blood and more slowly from the tissues. Although not fully characterized, the biologically active trivalent chromium molecule appears to be chromodulin, also referred to as (GTF). Chromodulin is an oligopeptide complex containing four chromic ions. Chromodulin may facilitate interactions of insulin with its receptor site, influencing protein, glucose, and lipid metabolism. Inorganic trivalent chromium compounds, which do not appear to have insulin-potentiating properties, are capable of being converted into biologically active forms by humans and animals.</p> <p>Chromium can be a potent sensitiser in a small minority of humans, both from dermal and inhalation exposures. The most sensitive endpoint identified in animal studies of acute exposure to trivalent chromium appears to involve the respiratory system. Specifically, acute exposure to trivalent chromium is associated with impaired lung function and lung damage.</p> <p>Based on what is known about absorption of chromium in the human body, its potential mechanism of action in cells, and occupational data indicating that valence states other than hexavalent exhibit a relative lack of toxicity the toxicity of elemental and divalent chromium compounds is expected to be similar to or less than common trivalent forms.</p> <p>The substance is classified by IARC as Group 3:  <b>NOT</b> classifiable as to its carcinogenicity to humans.  Evidence of carcinogenicity may be inadequate or limited in animal testing.</p>
<p><b>CHROMIUM &amp; MOLYBDENUM &amp; SILICON &amp; TITANIUM &amp; ALUMINIUM &amp; NIOBIUM &amp; TIN &amp; TIN FUME &amp; CHROMIUM FUME &amp; MOLYBDENUM FUME &amp; NITROGEN OXIDES</b></p>	<p>No significant acute toxicological data identified in literature search.</p>
<p><b>NICKEL &amp; COBALT &amp; COPPER &amp; NICKEL FUME</b></p>	<p>The following information refers to contact allergens as a group and may not be specific to this product. 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.</p>
<p><b>NICKEL &amp; COBALT &amp; NICKEL FUME</b></p>	<p><b>WARNING:</b> This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.</p>
<p><b>NICKEL &amp; NICKEL FUME</b></p>	<p>Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen  <i>[National Toxicology Program: U.S. Dep. of Health &amp; Human Services 2002]</i></p>
<p><b>MANGANESE &amp; TUNGSTEN &amp; SILICON</b></p>	<p>The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p>
<p><b>MANGANESE &amp; TUNGSTEN</b></p>	<p>The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.</p>
<p><b>SILICON &amp; TANTALUM &amp; BORON &amp; MOLYBDENUM FUME &amp; OZONE &amp; NITROGEN OXIDES</b></p>	<p>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.</p>
<p><b>Acute Toxicity</b></p>	<p>✓</p>
<p><b>Skin Irritation/Corrosion</b></p>	<p>✗</p>
<p><b>Carcinogenicity</b></p>	<p>✓</p>
<p><b>Reproductivity</b></p>	<p>✗</p>

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

HYPERMIG / HYPERTIG Stainless Steel Wire	Endpoint	Test Duration (hr)	Species	Value	Source
	Not Available	Not Available	Not Available	Not Available	Not Available

iron	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50	72h	Algae or other aquatic plants	18mg/l	2
	NOEC(ECx)	48h	Algae or other aquatic plants	0.1-4mg/l	4
	EC50	48h	Crustacea	>100mg/l	2
	LC50	96h	Fish	0.005-0.008mg/L	4

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

nickel	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50	72h	Algae or other aquatic plants	0.18mg/l	1
	EC50	96h	Algae or other aquatic plants	0.174-0.311mg/L	4
	EC50(ECx)	72h	Algae or other aquatic plants	0.18mg/l	1
	EC50	48h	Crustacea	>100mg/l	1
LC50	96h	Fish	0.06mg/L	4	

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

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

tungsten	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50	72h	Algae or other aquatic plants	7.35mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	0.812mg/l	2
	EC50	48h	Crustacea	>163mg/l	2
LC50	96h	Fish	>181mg/l	2	

cobalt	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50	72h	Algae or other aquatic plants	0.029mg/L	2

Continued...

## HYPERMIG / HYPERTIG Stainless Steel Wire

	EC50	96h	Algae or other aquatic plants	23.8mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	0.01-0.015mg/l	1
	EC50	48h	Crustacea	0.241mg/L	2
	LC50	96h	Fish	0.8mg/l	2
copper	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	0.011-0.017mg/L	4
	EC50	96h	Algae or other aquatic plants	0.03-0.058mg/l	4
	NOEC(ECx)	48h	Fish	<0.001mg/L	4
	EC50	48h	Crustacea	<0.001mg/L	4
	LC50	96h	Fish	0.003mg/L	2
vanadium	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	0.989mg/L	2
	NOEC(ECx)	72h	Algae or other aquatic plants	0.017mg/L	2
	EC50	48h	Crustacea	0.349mg/L	2
silicon	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	~250mg/l	2
	EC10(ECx)	1.28h	Algae or other aquatic plants	>=66<=88mg/l	2
titanium	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	13mg/l	2
	NOEC(ECx)	48h	Crustacea	<=1mg/l	2
	EC50	48h	Crustacea	>100mg/l	2
aluminium	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	0.017mg/L	2
	EC50	96h	Algae or other aquatic plants	0.005mg/L	2
	NOEC(ECx)	72h	Algae or other aquatic plants	>100mg/l	1
	EC50	48h	Crustacea	0.736mg/L	2
niobium	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	>100mg/l	2
	NOEC(ECx)	72h	Algae or other aquatic plants	10mg/l	2
sulfur	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	NOEC(ECx)	504h	Crustacea	>0.003mg/L	2
	EC50	48h	Crustacea	>0.005mg/L	2
	LC50	96h	Fish	>207mg/L	4
phosphorus, red	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	~1.3mg/l	2
	NOEC(ECx)	5784h	Fish	0.0004mg/l	1
	EC50	48h	Crustacea	0.025-0.037mg/L	4
	LC50	96h	Fish	0.001-0.004mg/L	4
tin	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	>0.019mg/L	2
	NOEC(ECx)	168h	Crustacea	<0.005mg/L	2
	LC50	96h	Fish	>0.012mg/L	2

Continued...

## HYPERMIG / HYPERTIG Stainless Steel Wire

tantalum	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	LC50	96h	Fish	>0.002mg/L	2
boron	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	40.2mg/l	2
	EC50	96h	Algae or other aquatic plants	15.4mg/l	2
	NOEC(ECx)	768h	Fish	0.009mg/l	2
	LC50	96h	Fish	74mg/l	2
welding fumes	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	Not Available	Not Available	Not Available	Not Available	Not Available
iron oxide fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	18mg/l	2
	NOEC(ECx)	504h	Fish	0.52mg/l	2
	EC50	48h	Crustacea	>100mg/l	2
	LC50	96h	Fish	0.05mg/l	2
manganese fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	2.8mg/l	2
	NOEC(ECx)	504h	Algae or other aquatic plants	0.05-3.7mg/l	4
	EC50	48h	Crustacea	>1.6mg/l	2
	LC50	96h	Fish	>3.6mg/l	2
tin fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	>0.019mg/L	2
	NOEC(ECx)	168h	Crustacea	<0.005mg/L	2
	LC50	96h	Fish	>0.012mg/L	2
nickel fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	0.18mg/l	1
	EC50	96h	Algae or other aquatic plants	0.174-0.311mg/L	4
	EC50(ECx)	72h	Algae or other aquatic plants	0.18mg/l	1
	EC50	48h	Crustacea	>100mg/l	1
	LC50	96h	Fish	0.06mg/L	4
chromium fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	0.026-0.208mg/L	4
	EC50	96h	Algae or other aquatic plants	36mg/L	4
	EC50(ECx)	48h	Crustacea	<0.001mg/l	2
	EC50	48h	Crustacea	<0.001mg/l	2
	LC50	96h	Fish	0.106mg/L	4
molybdenum fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	26mg/l	2
	NOEC(ECx)	48h	Algae or other aquatic plants	0.5-80mg/l	4
	EC50	48h	Crustacea	130.9mg/l	2
	LC50	96h	Fish	211mg/l	2
copper fume	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	EC50	72h	Algae or other aquatic plants	0.011-0.017mg/L	4
	EC50	96h	Algae or other aquatic plants	0.03-0.058mg/l	4
	NOEC(ECx)	48h	Fish	<0.001mg/L	4

Continued...

## HYPERMIG / HYPERTIG Stainless Steel Wire

	EC50	48h	Crustacea	<0.001mg/L	4
	LC50	96h	Fish	0.003mg/L	2
ozone	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	NOEC(ECx)	2160h	Fish	0.002mg/L	2
	LC50	96h	Fish	0.008-0.011mg/L	4
nitrogen oxides	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	Not Available	Not Available	Not Available	Not Available	Not Available
<b>Legend:</b>	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				

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

## Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
sulfur	LOW	LOW

## Bioaccumulative potential

Ingredient	Bioaccumulation
iron	LOW (LogKOW = -0.77)
nickel	LOW (LogKOW = -0.57)
cobalt	LOW (LogKOW = 0.23)
vanadium	LOW (LogKOW = 0.23)
silicon	LOW (LogKOW = 0.53)
titanium	LOW (LogKOW = 0.23)
aluminium	LOW (LogKOW = 0.33)
niobium	LOW (LogKOW = 0.23)
sulfur	LOW (LogKOW = -1.38)
phosphorus, red	HIGH (BCF = 2310000)
tin	LOW (LogKOW = 1.29)
tantalum	LOW (LogKOW = 0.23)
boron	LOW (LogKOW = 0.23)
tin fume	LOW (LogKOW = 1.29)
nickel fume	LOW (LogKOW = -0.57)

## Mobility in soil

Ingredient	Mobility
sulfur	LOW (Log KOC = 14.3)

## SECTION 13 Disposal considerations

## Waste treatment methods

<b>Product / Packaging disposal</b>	<ul style="list-style-type: none"> <li>▶ Recycle wherever possible or consult manufacturer for recycling options.</li> <li>▶ Consult State Land Waste Management Authority for disposal.</li> <li>▶ Bury residue in an authorised landfill.</li> <li>▶ Recycle containers if possible, or dispose of in an authorised landfill.</li> </ul>
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## SECTION 14 Transport information

## Labels Required

<b>Marine Pollutant</b>	NO
<b>HAZCHEM</b>	Not Applicable

Continued...

**Land transport (ADG): 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**

#### 14.7. Maritime transport in bulk according to IMO instruments

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

Not Applicable

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

Product name	Group
iron	Not Available
chromium	Not Available
nickel	Not Available
manganese	Not Available
molybdenum	Not Available
tungsten	Not Available
cobalt	Not Available
copper	Not Available
vanadium	Not Available
silicon	Not Available
titanium	Not Available
aluminium	Not Available
niobium	Not Available
sulfur	Not Available
phosphorus, red	Not Available
tin	Not Available
tantalum	Not Available
boron	Not Available
welding fumes	Not Available
iron oxide fume	Not Available
manganese fume	Not Available
tin fume	Not Available
nickel fume	Not Available
chromium fume	Not Available
molybdenum fume	Not Available
copper fume	Not Available
ozone	Not Available
nitrogen oxides	Not Available

##### 14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
iron	Not Available
chromium	Not Available
nickel	Not Available
manganese	Not Available
molybdenum	Not Available
tungsten	Not Available
cobalt	Not Available
copper	Not Available
vanadium	Not Available
silicon	Not Available
titanium	Not Available
aluminium	Not Available
niobium	Not Available

Product name	Ship Type
sulfur	Not Available
phosphorus, red	Not Available
tin	Not Available
tantalum	Not Available
boron	Not Available
welding fumes	Not Available
iron oxide fume	Not Available
manganese fume	Not Available
tin fume	Not Available
nickel fume	Not Available
chromium fume	Not Available
molybdenum fume	Not Available
copper fume	Not Available
ozone	Not Available
nitrogen oxides	Not Available

## SECTION 15 Regulatory information

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

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

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 2  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6  
 Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)  
 International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Not Classified as Carcinogenic  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
 Australian Inventory of Industrial Chemicals (AIIC)  
 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)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
 Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

#### tungsten is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

#### cobalt is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4  
 Australian Inventory of Industrial Chemicals (AIIC)  
 Chemical Footprint Project - Chemicals of High Concern List  
 FEI Equine Prohibited Substances List - Controlled Medication  
 FEI Equine Prohibited Substances List (EPSL)

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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 2A: Probably carcinogenic to humans

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)

Chemical Footprint Project - Chemicals of High Concern List

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

**phosphorus, red is found on the following regulatory lists**

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

**welding fumes is found on the following regulatory lists**

Not Applicable

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

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6

Australian Inventory of Industrial Chemicals (AIIC)

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
 Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

**tin fume is found on the following regulatory lists**

Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
 Australian Inventory of Industrial Chemicals (AIIC)  
 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)

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

Australian Inventory of Industrial Chemicals (AIIC)  
 International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Not Classified as Carcinogenic  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5  
 Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6  
 Australian Inventory of Industrial Chemicals (AIIC)  
 International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

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

Not Applicable

**nitrogen oxides is found on the following regulatory lists**

Not Applicable

**Additional Regulatory Information**

Not Applicable

**National Inventory Status**

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	No (ozone)
Canada - DSL	No (ozone)
Canada - NDSL	No (iron; chromium; nickel; manganese; molybdenum; tungsten; cobalt; copper; vanadium; silicon; titanium; aluminium; niobium; sulfur; phosphorus, red; tin; tantalum; boron; iron oxide fume; manganese fume; tin fume; nickel fume; chromium fume; molybdenum fume; copper fume)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (iron; chromium; nickel; manganese; molybdenum; tungsten; cobalt; copper; vanadium; silicon; titanium; aluminium; niobium; sulfur; phosphorus, red; tin; tantalum; boron; manganese fume; tin fume; nickel fume; chromium fume; molybdenum fume; copper fume; ozone)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	No (niobium; ozone)
USA - TSCA	All chemical substances in this product have been designated as TSCA Inventory 'Active'
Taiwan - TCSI	Yes
Mexico - INSQ	No (niobium)
Vietnam - NCI	Yes

National Inventory	Status
Russia - FBEPH	Yes
<b>Legend:</b>	<p>Yes = All CAS declared ingredients are on the inventory</p> <p>No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</p>

## SECTION 16 Other information

<b>Revision Date</b>	31/05/2024
<b>Initial Date</b>	31/05/2024

### 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

- 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
- DNEL: Derived No-Effect Level
- PNEC: Predicted no-effect concentration
- MARPOL: International Convention for the Prevention of Pollution from Ships
- IMSBC: International Maritime Solid Bulk Cargoes Code
- IGC: International Gas Carrier Code
- IBC: International Bulk Chemical Code
  
- 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

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