



XTRweld Steel Cored FCAW Electrodes

XTRweld

Chemwatch: 5236-24
Version No: 4.1
Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Chemwatch Hazard Alert Code: 4

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S.GHS.USA.EN

SECTION 1 Identification

Product Identifier

Product name	XTRweld Steel Cored FCAW Electrodes
Chemical Name	Not Applicable
Synonyms	70T-1, 70T-4, 71T-1, 71T-1LF, 71TC, 71TMJ, 71T1C02, Superflow 71-T, Superflow AP-CO-2, SUPERFLOW ULTRA, Superflow 71TM, 71T-12MJ, 71T-1M/1C, Eagle-Arc 71T-1C/1M, Eagle-Arc 71T-9C/9M, Eagle-Arc 71T-12C/12M, Eagle-Arc 71, 71T-11, 71T-GS; E70C-3C, E70C-3M, E70C-6C, E70C-6M, Eagle-Arc 70C-6M; 80T1-A1, 80T5-B3L, 80T5-B6, 81T-Ni2, 81T1-1 Ni1, 81T1-A1, 81T1-B2, 81T1-B8L; 81T1-W2, 91T1-B3, 91T1-K2, 110T-K3, 91T1-B9, 110T1-K3, 110T5-K4M, 110C-G
Chemical formula	Not Applicable
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Flux Cored Arc Welding.
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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

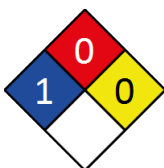
Once connected and if the message is not in your preferred language then please dial 01

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	Carcinogenicity Category 1A, Acute Toxicity (Inhalation) Category 4
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Label elements

XTRweld Steel Cored FCAW Electrodes

Hazard pictogram(s)	
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Signal word	Danger
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Hazard statement(s)

H350	May cause cancer.
H332	Harmful if inhaled.

Hazard(s) not otherwise classified

Not Applicable

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.
P202	Do not handle until all safety precautions have been read and understood.

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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Not Applicable

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
Not Available		carbon & alloy steel flux core, in 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>
69012-64-2		<u>silica welding fumes</u>
7429-90-5.		<u>aluminium fumes</u>
7439-98-7		<u>molybdenum fume</u>
7440-50-8.		<u>copper fume</u>
7440-02-0		<u>nickel fume</u>
7440-47-3		<u>chromium fume</u>
13463-67-7		<u>titanium dioxide</u>
124-38-9		<u>carbon dioxide</u>
630-08-0		<u>carbon monoxide</u>
10028-15-6		<u>ozone</u>
10102-44-0		<u>nitrogen dioxide</u>

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4 First-aid measures

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes:
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XTRweld Steel Cored FCAW Electrodes

	<ul style="list-style-type: none"> ▶ Wash out immediately with fresh running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel. ▶ Particulate bodies from welding spatter may be removed carefully. ▶ DO NOT attempt to remove particles attached to or embedded in eye. ▶ Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. ▶ Seek urgent medical assistance, or transport to hospital. ▶ For "arc eye", i.e. welding flash or UV light burns to the eye: <ul style="list-style-type: none"> ▶ Place eye pads or light clean dressings over both eyes. ▶ Seek medical assistance. <p>For THERMAL burns:</p> <ul style="list-style-type: none"> ▶ Do NOT remove contact lens ▶ Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. ▶ Seek urgent medical assistance, or transport to hospital.
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation. <p>For thermal burns:</p> <ul style="list-style-type: none"> ▶ Decontaminate area around burn. ▶ Consider the use of cold packs and topical antibiotics. <p>For first-degree burns (affecting top layer of skin)</p> <ul style="list-style-type: none"> ▶ Hold burned skin under cool (not cold) running water or immerse in cool water until pain subsides. ▶ Use compresses if running water is not available. ▶ Cover with sterile non-adhesive bandage or clean cloth. ▶ Do NOT apply butter or ointments; this may cause infection. ▶ Give over-the-counter pain relievers if pain increases or swelling, redness, fever occur. <p>For second-degree burns (affecting top two layers of skin)</p> <ul style="list-style-type: none"> ▶ Cool the burn by immerse in cold running water for 10-15 minutes. ▶ Use compresses if running water is not available. ▶ Do NOT apply ice as this may lower body temperature and cause further damage. ▶ Do NOT break blisters or apply butter or ointments; this may cause infection. ▶ Protect burn by cover loosely with sterile, nonstick bandage and secure in place with gauze or tape. <p>To prevent shock: (unless the person has a head, neck, or leg injury, or it would cause discomfort):</p> <ul style="list-style-type: none"> ▶ Lay the person flat. ▶ Elevate feet about 12 inches. ▶ Elevate burn area above heart level, if possible. ▶ Cover the person with coat or blanket. ▶ Seek medical assistance. <p>For third-degree burns Seek immediate medical or emergency assistance.</p> <p>In the mean time:</p> <ul style="list-style-type: none"> ▶ Protect burn area cover loosely with sterile, nonstick bandage or, for large areas, a sheet or other material that will not leave lint in wound. ▶ Separate burned toes and fingers with dry, sterile dressings. ▶ Do not soak burn in water or apply ointments or butter; this may cause infection. ▶ To prevent shock see above. ▶ For an airway burn, do not place pillow under the person's head when the person is lying down. This can close the airway. ▶ Have a person with a facial burn sit up. ▶ Check pulse and breathing to monitor for shock until emergency help arrives. ▶ Generally not applicable.
Inhalation	<ul style="list-style-type: none"> ▶ If fumes or combustion products are inhaled remove from contaminated area. ▶ Lay patient down. Keep warm and rested. ▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▶ 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. ▶ Transport to hospital, or doctor. ▶ Generally not applicable.
Ingestion	<ul style="list-style-type: none"> ▶ If swallowed do NOT induce vomiting. ▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▶ Observe the patient carefully. ▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▶ Seek medical advice. ▶ Generally not applicable.

Most important symptoms and effects, both acute and delayed

See Section 11

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]

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SECTION 5 Fire-fighting measures

Extinguishing media

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Special protective equipment and precautions for fire-fighters

Fire Fighting	<ul style="list-style-type: none"> ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear breathing apparatus plus protective gloves in the event of a fire. ▸ Prevent, by any means available, spillage from entering drains or water courses. ▸ Use fire fighting procedures suitable for surrounding area. ▸ DO NOT approach containers suspected to be hot. ▸ Cool fire exposed containers with water spray from a protected location. ▸ If safe to do so, remove containers from path of fire. ▸ Equipment should be thoroughly decontaminated after use. <p>Slight hazard when exposed to heat, flame and oxidisers.</p>
Fire/Explosion Hazard	<p>Articles and manufactured articles may constitute a fire hazard where polymers form their outer layers or where combustible packaging remains in place.</p> <p>Certain substances, found throughout their construction, may degrade or become volatile when heated to high temperatures. This may create a secondary hazard.</p> <p>Welding arc and metal sparks can ignite combustibles.</p> <p>May emit poisonous fumes.</p> <p>May emit corrosive fumes.</p>

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	<ul style="list-style-type: none"> ▸ Clean up all spills immediately. ▸ Secure load if safe to do so. ▸ Bundle/collect recoverable product. ▸ Collect remaining material in containers with covers for disposal.
Major Spills	<ul style="list-style-type: none"> ▸ Clean up all spills immediately. ▸ Wear protective clothing, safety glasses, dust mask, gloves. ▸ Secure load if safe to do so. Bundle/collect recoverable product. ▸ Use dry clean up procedures and avoid generating dust. ▸ Vacuum up (consider explosion-proof machines designed to be grounded during storage and use). ▸ Water may be used to prevent dusting. ▸ Collect remaining material in containers with covers for disposal. ▸ Flush spill area with water.

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▸ Avoid all personal contact, including inhalation. ▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ Prevent concentration in hollows and sumps. ▸ DO NOT enter confined spaces until atmosphere has been checked. ▸ DO NOT allow material to contact humans, exposed food or food utensils. ▸ Avoid contact with incompatible materials. ▸ When handling, DO NOT eat, drink or smoke. ▸ Keep containers securely sealed when not in use. ▸ Avoid physical damage to containers. ▸ Always wash hands with soap and water after handling. ▸ Work clothes should be laundered separately. Launder contaminated clothing before re-use. ▸ Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Other information	<ul style="list-style-type: none"> ▸ Store away from incompatible materials.

Conditions for safe storage, including any incompatibilities

Suitable container	<p>Generally packaging as originally supplied with the article or manufactured item is sufficient to protect against physical hazards.</p> <p>If repackaging is required ensure the article is intact and does not show signs of wear. As far as is practicably possible, reuse the original packaging or something providing a similar level of protection to both the article and the handler.</p>
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XTRweld Steel Cored FCAW Electrodes

Storage incompatibility

Welding electrodes should not be allowed to come into contact with strong acids or other substances which are corrosive to metals.

- ▶ **WARNING:** Avoid or control reaction with peroxides. All *transition metal* peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.
- ▶ The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono- or poly-fluorobenzene show extreme sensitivity to heat and are explosive.
- ▶ Avoid reaction with borohydrides or cyanoborohydrides
- ▶ Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions.

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US NIOSH Recommended Exposure Limits (RELs)	welding fumes	Welding fumes	Not Available	Not Available	Not Available	Ca; See Appendix A
US OSHA Permissible Exposure Limits (PELs) Table Z-3	iron oxide fume	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	iron oxide fume	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	iron oxide fume	Rouge- Total dust	15 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	iron oxide fume	Rouge- Respirable fraction	5 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	iron oxide fume	Iron oxide- (fume)	10 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	iron oxide fume	Iron oxide dust and fume (as Fe)	5 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	iron oxide fume	Rouge	Not Available	Not Available	Not Available	See Appendix D
US OSHA Permissible Exposure Limits (PELs) Table Z-3	manganese fume	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	manganese fume	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	manganese fume	Manganese fume (as Mn)	Not Available	Not Available	5 mg/m3	Not Available
US NIOSH Recommended Exposure Limits (RELs)	manganese fume	Particulates not otherwise regulated	Not Available	Not Available	Not Available	See Appendix D
US NIOSH Recommended Exposure Limits (RELs)	manganese fume	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	silica welding fumes	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	silica welding fumes	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	silica welding fumes	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	silica welding fumes	Particulates Not Otherwise Regulated (PNOR)- Total dust	15 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	silica welding fumes	Particulates not otherwise regulated	Not Available	Not Available	Not Available	See Appendix D
US OSHA Permissible Exposure Limits (PELs) Table Z-3	aluminium fumes	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	aluminium fumes	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	aluminium fumes	Aluminum Metal (as Al)- Respirable fraction	5 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	aluminium fumes	Aluminum Metal (as Al)- Total dust	15 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	aluminium fumes	Aluminum (pyro powders and welding fumes, as Al)	5 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	aluminium fumes	Aluminum - total	10 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	aluminium fumes	Aluminum - respirable	5 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-3	molybdenum fume	Inert or Nuisance Dust: Total Dust	15 mg/m3 / 50 mppcf	Not Available	Not Available	Not Available

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Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US OSHA Permissible Exposure Limits (PELs) Table Z-3	molybdenum fume	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	molybdenum fume	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 fume	Particulates Not Otherwise Regulated (PNOR)- Respirable fraction	5 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	molybdenum fume	Molybdenum	Not Available	Not Available	Not Available	See Appendix D
US OSHA Permissible Exposure Limits (PELs) Table Z-3	copper fume	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	copper fume	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	copper fume	Copper- Fume (as Cu)	0.1 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	copper fume	Copper- Dusts and mists (as Cu)	1 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	copper fume	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	nickel fume	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	nickel fume	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	nickel fume	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 fume	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 fume	Particulates Not Otherwise Regulated (PNOR)- Total dust	15 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	nickel fume	Particulates not otherwise regulated	Not Available	Not Available	Not Available	See Appendix D
US NIOSH Recommended Exposure Limits (RELs)	nickel fume	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 OSHA Permissible Exposure Limits (PELs) Table Z-3	chromium fume	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 fume	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 fume	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 fume	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	chromium fume	Particulates Not Otherwise Regulated (PNOR)- Respirable fraction	5 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	chromium fume	Chromium metal	0.5 mg/m3	Not Available	Not Available	See Appendix C
US OSHA Permissible Exposure Limits (PELs) Table Z-3	titanium dioxide	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	titanium dioxide	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	titanium dioxide	Titanium dioxide - Total dust	15 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	titanium dioxide	Titanium dioxide	Not Available	Not Available	Not Available	Ca; See Appendix A
US OSHA Permissible Exposure Limits (PELs) Table Z-1	carbon dioxide	Carbon dioxide	5000 ppm / 9000 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	carbon dioxide	Carbon dioxide	5000 ppm / 9000 mg/m3	54000 mg/m3 / 30000 ppm	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	carbon monoxide	Carbon monoxide	50 ppm / 55 mg/m3	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	carbon monoxide	Carbon monoxide	35 ppm / 40 mg/m3	Not Available	200 ppm / 229 mg/m3	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	ozone	Ozone	0.1 ppm / 0.2 mg/m3	Not Available	Not Available	Not Available

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Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US NIOSH Recommended Exposure Limits (RELs)	ozone	Ozone	Not Available	Not Available	0.1 ppm / 0.2 mg/m3	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	nitrogen dioxide	Nitrogen dioxide	Not Available	Not Available	5 ppm / 9 mg/m3	Not Available
US NIOSH Recommended Exposure Limits (RELs)	nitrogen dioxide	Nitrogen dioxide	Not Available	1.8 mg/m3 / 1 ppm	Not Available	Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
iron oxide fume	15 mg/m3	360 mg/m3	2,200 mg/m3
manganese fume	3 mg/m3	5 mg/m3	1,800 mg/m3
silica welding fumes	45 mg/m3	500 mg/m3	3,000 mg/m3
molybdenum fume	30 mg/m3	330 mg/m3	2,000 mg/m3
copper fume	3 mg/m3	33 mg/m3	200 mg/m3
nickel fume	4.5 mg/m3	50 mg/m3	99 mg/m3
chromium fume	1.5 mg/m3	17 mg/m3	99 mg/m3
titanium dioxide	30 mg/m3	330 mg/m3	2,000 mg/m3
carbon monoxide	75 ppm	Not Available	Not Available
ozone	0.24 ppm	1 ppm	10 ppm
nitrogen dioxide	Not Available	Not Available	Not Available
nitrogen dioxide	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
welding fumes	Not Available	Not Available
iron oxide fume	2,500 mg/m3	Not Available
manganese fume	500 mg/m3	Not Available
silica welding fumes	Not Available	Not Available
aluminium fumes	Not Available	Not Available
molybdenum fume	Not Available	Not Available
copper fume	100 mg/m3	Not Available
nickel fume	10 mg/m3	Not Available
chromium fume	250 mg/m3	Not Available
titanium dioxide	5,000 mg/m3	Not Available
carbon dioxide	40,000 ppm	Not Available
carbon monoxide	1,200 ppm	Not Available
ozone	5 ppm	Not Available
nitrogen dioxide	20 ppm	13 ppm

Exposure controls

Appropriate engineering controls	<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. 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.</p> <p>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 aluminium, copper, fluoride, manganese or zinc fume.</p> <ul style="list-style-type: none"> ▶ For work conducted outdoors and in open work spaces, the use of mechanical (general exhaust or plenum) ventilation is required as a minimum. (Open work spaces exceed 300 cubic meters per welder) ▶ For indoor work, conducted in limited or confined work spaces, use of mechanical ventilation by local exhaust systems is mandatory. (In confined spaces always check that oxygen has not been depleted by excessive rusting of steel or snowflake corrosion of aluminium) <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>									
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Articles or manufactured items, in their original condition, generally don't require engineering controls during handling or in normal use. Exceptions may arise following extensive use and subsequent wear, during recycling or disposal operations where substances, found in the article, may be released to the environment.

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.

The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk.

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.

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.

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)

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.

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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For manual arc welding operations the nature of ventilation is determined by the location of the work.

- ▶ For outdoor work, natural ventilation is generally sufficient.
- ▶ For indoor work, conducted in open spaces, use mechanical (general exhaust or plenum) ventilation. (Open work spaces exceed 300 cubic metres per welder)
- ▶ For work conducted in limited or confined spaces, mechanical ventilation, using local exhaust systems, is required. (In confined spaces always check that oxygen has not been depleted by excessive rusting of steel or snowflake corrosion of aluminium)

Mechanical or local exhaust ventilation may not be required where the process working time does not exceed 24 mins. (in an 8 hr. shift) provided the work is intermittent (a maximum of 5 mins. every hour). 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.

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Employers may need to use multiple types of controls to prevent employee overexposure.

Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape"

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Personal protection																					
Eye and face protection	<ul style="list-style-type: none"> ▶ 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. ▶ 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] ▶ An approved face shield or welding helmet can also have filters for optical radiation protection, and offer additional protection against debris and sparks. ▶ UV blocking protective spectacles with side shields or welding goggles are considered primary protection, with the face shield or welding helmet considered secondary protection. ▶ 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. ▶ 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. <p>For submerged arc welding use a lens shade which gives just sufficient arc brightness to allow weld pool control.</p>																				
Skin protection	See Hand protection below																				
Hands/feet protection	<p>Wear general protective gloves, eg. light weight rubber gloves.</p> <ul style="list-style-type: none"> ▶ Welding gloves conforming to Standards such as EN 12477:2001, ANSI Z49.1, AS/NZS 2161:2008 produced from leather, rubber, treated cotton, or aluminised ▶ These gloves protect against mechanical risk caused by abrasion, blade cut, tear and puncture ▶ Other gloves which protect against thermal risks (heat and fire) might also be considered - these comply with different standards to those mentioned above. ▶ One pair of gloves may not be suitable for all processes. For example, gloves that are suitable for low current Gas Tungsten Arc Welding (GTAW) (thin and flexible) would not be proper for high-current Air Carbon Arc Cutting (CAC-A) (insulated, tough, and durable) 																				
Body protection	See Other protection below																				
Other protection	<p>Before starting: consider that protection should be provided for all personnel within 10 metres of any open arc welding operation. Welding sites must be adequately shielded with screens of non flammable materials. Screens should permit ventilation at floor and ceiling levels.</p> <ul style="list-style-type: none"> ▶ Overalls. ▶ P.V.C apron. ▶ Barrier cream. ▶ Skin cleansing cream. ▶ Eye wash unit. 																				

Recommended material(s)**GLOVE SELECTION INDEX**

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the **computer-generated** selection:

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Material	CPI
SARANEX-23	A

* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such

Respiratory protection

Type NO Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, 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	NO-AUS	-	NO-PAPR-AUS / Class 1
up to 50 x ES	-	NO-AUS / Class 1	-
up to 100 x ES	-	NO-2	NO-PAPR-2 ^

Continued...

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as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

^ - 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)

Welding of powder coated metal requires good general area ventilation, and ventilated mask as local heat causes minor coating decomposition releasing highly discomforting fume which may be harmful if exposure is regular.

Welding or flame cutting of metals with chromate pigmented primers or coatings may result in inhalation of highly toxic chromate fumes. Exposures may be significant in enclosed or poorly ventilated areas.

Respiratory protection not normally required due to the physical form of the product.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Silver to grey round welding rods that are odourless with flux core varying in colour insoluble in water.		
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
Initial boiling point and boiling range (°C)	Not Applicable	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Applicable	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 Applicable
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 Applicable	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	<p>There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p> <p>Fumes evolved during welding operations may be irritating to the upper-respiratory tract and may be harmful if inhaled.</p> <p>The inhalation of small particles of metal oxide results in sudden thirst, a sweet, metallic foul taste, throat irritation, cough, dry mucous membranes, tiredness and general unwellness. Headache, nausea and vomiting, fever or chills, restlessness, sweating, diarrhoea, excessive urination and prostration may also occur.</p> <p>Bronchial and alveolar exudate are apparent in animals exposed to molybdenum by inhalation. Molybdenum fume may produce bronchial irritation and moderate fatty changes in liver and kidney.</p> <p>Carbon monoxide poisoning results in breathing problems, diarrhoea and shock. It combines with haemoglobin, the carrier of oxygen in the blood, much more easily than oxygen; the complex formed can disturb muscle function, especially the heart.</p> <p>Manganese fume is toxic and produces nervous system effects characterised by tiredness. Acute poisoning is rare although acute inflammation of the lungs may occur. A chemical pneumonia may also result from frequent exposure. 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> <p>Inhalation of dusts, generated by the material, during the course of normal handling, may be harmful.</p>
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Ingestion	Accidental ingestion of the material may be damaging to the health of the individual.														
Skin Contact	<p>Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>Ultraviolet (UV) radiation is generated by the electric arc in the welding process. Skin exposure to UV can result in severe burns, often without prior burning.</p> <p>Exposure to infrared (IR) irritation, 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 are protected by a welder's helmet (or glasses) and protective clothing.</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. 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Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</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.)	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
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4: Large hood or large air mass in motion	4: Small hood-local control only														
Eye	<p>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).</p> <p>Ultraviolet (UV) radiation can damage the lens of the eye. Many arc welders experience the condition known as "arc-eye", which is a sensation of sand in the eyes. The 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>Eye exposure to intense visible light is prevented, for the most part, by the welder's helmet. The arc should never be observed without eye protection.</p>														
Chronic	<p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems.</p> <p>There is some evidence that inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.</p> <p>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.</p> <p>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.</p> <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.</p> <p>Long-term exposure to low levels of carbon monoxide may cause low body oxygen, heart disease and brain damage, low baby birth weight and increased foetal death and birth defects.</p> <p>Metal oxides generated by industrial processes such as welding may cause a number of potential health problems. Particles smaller than 5 microns in diameter (which may be breathed in) may cause reduction in lung function. Particles of less than 1.5 microns can be trapped in the lungs, and, depending on the nature of the particle, may cause further serious health consequences.</p> <p>Exposure to fume containing high concentrations of water-soluble chromium (VI) during the welding of stainless steels in confined spaces has been reported to result in chronic chrome intoxication, dermatitis and asthma. Certain insoluble chromium (VI) compounds have been named as carcinogens (by the ACGIH) in other work environments. Chromium may also appear in welding fumes as Cr₂O₃ or double oxides with iron. These chromium (III) compounds are generally biologically inert.</p> <p>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>Silica and silicates in welding fumes are non-crystalline and believed to be non-harmful.</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</p>														

XTRweld Steel Cored FCAW Electrodes

individuals, however, no confirmatory studies of this effect in welders have been reported.

	TOXICITY	IRRITATION
XTRweld Steel Cored FCAW Electrodes	Not Available	Not Available
welding fumes	Not Available	Not Available
iron oxide fume	Oral (Rat) LD50; >5000 mg/kg ^[1]	Not Available
manganese fume	Inhalation(Rat) LC50; >5.14 mg/4h ^[1]	Eye (rabbit) 500mg/24H Mild
	Oral (Rat) LD50; >2000 mg/kg ^[1]	Eye: no adverse effect observed (not irritating) ^[1]
		Skin (rabbit) 500mg/24H Mild
		Skin: no adverse effect observed (not irritating) ^[1]
silica welding fumes	Dermal (rabbit) LD50: >5000 mg/kg ^[2]	Eye: no adverse effect observed (not irritating) ^[1]
	Oral (Rat) LD50; 3160 mg/kg ^[2]	Skin: no adverse effect observed (not irritating) ^[1]
aluminium fumes	Inhalation(Rat) LC50; >2.3 mg/4h ^[1]	Eye: no adverse effect observed (not irritating) ^[1]
	Oral (Rat) LD50; >2000 mg/kg ^[1]	Skin: no adverse effect observed (not irritating) ^[1]
molybdenum fume	dermal (rat) LD50: >2000 mg/kg ^[1]	Not Available
	Inhalation(Rat) LC50; >1.93 mg/4h ^[1]	
	Oral (Rat) LD50; >2000 mg/kg ^[1]	
copper fume	dermal (rat) LD50: >2000 mg/kg ^[1]	Eye: no adverse effect observed (not irritating) ^[1]
	Inhalation(Rat) LC50; 0.733 mg/4h ^[1]	Skin: no adverse effect observed (not irritating) ^[1]
	Oral (Mouse) LD50; 0.7 mg/kg ^[2]	
nickel fume	Oral (Rat) LD50; 5000 mg/kg ^[2]	Eye: no adverse effect observed (not irritating) ^[1]
		Skin: no adverse effect observed (not irritating) ^[1]
chromium fume	Inhalation(Rat) LC50; >5.41 mg/4h ^[1]	Not Available
	Oral (Rat) LD50; >5000 mg/kg ^[1]	
titanium dioxide	dermal (hamster) LD50: >=10000 mg/kg ^[2]	Eye: no adverse effect observed (not irritating) ^[1]
	Inhalation(Rat) LC50; >2.28 mg/4h ^[1]	Skin (human): 0.3 mg /3D (int)-mild *
	Oral (Rat) LD50; >=2000 mg/kg ^[1]	Skin: no adverse effect observed (not irritating) ^[1]
carbon dioxide	Not Available	Not Available
carbon monoxide	Inhalation(Rat) LC50; 1807 ppm4h ^[2]	Not Available
ozone	Inhalation(Rat) LC50; 3.6 ppm4h ^[1]	Eye: adverse effect observed (irreversible damage) ^[1]
		Skin: adverse effect observed (corrosive) ^[1]
nitrogen dioxide	Inhalation(Guinea) LC50; 15 ppm4h ^[2]	Eye: adverse effect observed (irreversible damage) ^[1]
		Skin: adverse effect observed (corrosive) ^[1]

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
WELDING FUMES	WARNING: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS. Not available. Refer to individual constituents.
SILICA WELDING FUMES	<p>For silica amorphous: Derived No Adverse Effects Level (NOAEL) in the range of 1000 mg/kg/d. In humans, synthetic amorphous silica (SAS) is essentially non-toxic by mouth, skin or eyes, and by inhalation. Epidemiology studies show little evidence of adverse health effects due to SAS. Repeated exposure (without personal protection) may cause mechanical irritation of the eye and drying/cracking of the skin. When experimental animals inhale synthetic amorphous silica (SAS) dust, it dissolves in the lung fluid and is rapidly eliminated. If swallowed, the vast majority of SAS is excreted in the faeces and there is little accumulation in the body. Following absorption across the gut, SAS is eliminated via urine without modification in animals and humans. SAS is not expected to be broken down (metabolised) in mammals. After ingestion, there is limited accumulation of SAS in body tissues and rapid elimination occurs. Intestinal absorption has not been calculated, but appears to be insignificant in animals and humans. SASs injected subcutaneously are subjected to rapid dissolution and removal. There is no indication of metabolism of SAS in animals or humans based on chemical structure and available data. In contrast to crystalline silica, SAS is soluble in physiological media and the soluble chemical species that are formed are eliminated via the urinary tract without modification. Both the mammalian and environmental toxicology of SASs are significantly influenced by the physical and chemical properties, particularly those of solubility and particle size. SAS has no acute intrinsic toxicity by inhalation. Adverse effects, including suffocation, that have been reported were caused by the presence of high numbers of respirable particles generated to meet the required test atmosphere. These results are not representative of exposure to commercial SASs and should not be used for human risk assessment. Though repeated exposure of the skin may cause dryness and cracking, SAS is not a skin or eye irritant, and it is not a sensitiser. Repeated-dose and chronic toxicity studies confirm the absence of toxicity when SAS is swallowed or upon skin contact. Long-term inhalation of SAS caused some adverse effects in animals (increases in lung inflammation, cell injury and lung collagen content), all of which subsided after exposure. Numerous repeated-dose, subchronic and chronic inhalation toxicity studies have been conducted with SAS in a number of species, at airborne concentrations ranging from 0.5 mg/m³ to 150 mg/m³. Lowest-observed adverse effect levels (LOAELs) were typically in the range of 1 to 50 mg/m³. When available, the no-observed adverse effect levels (NOAELs) were between 0.5 and 10 mg/m³. The difference in values may be explained by different particle size, and therefore the number of particles administered per unit dose. In general, as particle size decreases so does the NOAEL/LOAEL. Neither inhalation nor oral administration caused neoplasms (tumours). SAS is not mutagenic in vitro. No genotoxicity was detected in in vivo assays. SAS does not impair development of the foetus. Fertility was not specifically studied, but the reproductive organs in long-term studies were not affected. For Synthetic Amorphous Silica (SAS) Repeated dose toxicity Oral (rat), 2 weeks to 6 months, no significant treatment-related adverse effects at doses of up to 8% silica in the diet. Inhalation (rat), 13 weeks, Lowest Observed Effect Level (LOEL) =1.3 mg/m³ based on mild reversible effects in the lungs. Inhalation (rat), 90 days, LOEL = 1 mg/m³ based on reversible effects in the lungs and effects in the nasal cavity. For silane treated synthetic amorphous silica: Repeated dose toxicity: oral (rat), 28-d, diet, no significant treatment-related adverse effects at the doses tested. There is no evidence of cancer or other long-term respiratory health effects (for example, silicosis) in workers employed in the manufacture of SAS. Respiratory symptoms in SAS workers have been shown to correlate with smoking but not with SAS exposure, while serial pulmonary function values and chest radiographs are not adversely affected by long-term exposure to SAS. Reports indicate high/prolonged exposures to amorphous silicas induced lung fibrosis in experimental animals; in some experiments these effects were reversible. [PATTYS]</p>
NICKEL FUME	<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. Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen [National Toxicology Program: U.S. Dep. of Health & Human Services 2002]</p>
CHROMIUM FUME	<p>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.</p>
TITANIUM DIOXIDE	<p>* IUCLID Laboratory (in vitro) and animal studies show, exposure to the material may result in a possible risk of irreversible effects, with the possibility of producing mutation. Exposure to titanium dioxide is via inhalation, swallowing or skin contact. When inhaled, it may deposit in lung tissue and lymph nodes causing dysfunction of the lungs and immune system. Absorption by the stomach and intestines depends on the size of the particle. It penetrated only the outermost layer of the skin, suggesting that healthy skin may be an effective barrier. There is no substantive data on genetic damage, though cases have been reported in experimental animals. Studies have differing conclusions on its cancer-causing potential. The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. 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.</p>
CARBON MONOXIDE	- central nervous system effects
OZONE	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].
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.
XTRweld Steel Cored FCAW Electrodes & MOLYBDENUM FUME & CHROMIUM FUME & TITANIUM DIOXIDE	No significant acute toxicological data identified in literature search.

XTRweld Steel Cored FCAW Electrodes

XTRweld Steel Cored FCAW Electrodes & NICKEL FUME & TITANIUM DIOXIDE	WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.
XTRweld Steel Cored FCAW Electrodes & WELDING FUMES	Most welding is performed using electric arc processes. There has been considerable evidence linking welding activities and cancer risk. Several case-control studies reported excess risk of melanoma of the eye 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. There is consensus that some welding environments, notably in stainless steel welding, carry risks of lung cancer. This may be due to exposure to nickel and chromium (VI) compounds. There is generally an excess risk of lung cancer among welders of around 20-40%. Welders are exposed to a range of fumes and gases (evaporated metal, metal oxides, hydrocarbons, nanoparticles, ozone, oxides of nitrogen) as well as electric and magnetic fields, and ultraviolet radiation. Welders who weld painted mild steel can also be exposed to a range of organic compounds produced by pyrolysis. Ozone is formed during electric arc welding, and exposure levels can exceed limits. Especially in shipyards, welders can be exposed to asbestos dust.
SILICA WELDING FUMES & CHROMIUM FUME	The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.
MOLYBDENUM FUME & TITANIUM DIOXIDE & OZONE & NITROGEN DIOXIDE	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.

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

	Endpoint	Test Duration (hr)	Species	Value	Source
XTRweld Steel Cored FCAW Electrodes	Not Available	Not Available	Not Available	Not Available	Not Available
welding fumes	Not Available	Not Available	Not Available	Not Available	Not Available
iron oxide fume	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	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
silica welding fumes	NOEC(ECx)	504h	Crustacea	100mg/l	2
	LC50	96h	Fish	>100mg/l	2
	EC50	72h	Algae or other aquatic plants	~250mg/l	2
aluminium fumes	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

Continued...

XTRweld Steel Cored FCAW Electrodes

	Endpoint	Test Duration (hr)	Species	Value	Source
molybdenum fume	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
copper fume	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
nickel fume	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
chromium fume	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
titanium dioxide	EC50	72h	Algae or other aquatic plants	3.75-7.58mg/l	4
	BCF	1008h	Fish	<1.1-9.6	7
	NOEC(ECx)	504h	Crustacea	0.02mg/l	4
	EC50	48h	Crustacea	1.9mg/l	2
	EC50	96h	Algae or other aquatic plants	179.05mg/l	2
	LC50	96h	Fish	1.85-3.06mg/l	4
carbon dioxide	Endpoint	Test Duration (hr)	Species	Value	Source
	LC50	96h	Fish	35mg/l	1
carbon monoxide	Endpoint	Test Duration (hr)	Species	Value	Source
	EC50(ECx)	96h	Algae or other aquatic plants	124.4mg/l	2
	EC50	96h	Algae or other aquatic plants	124.4mg/l	2
	LC50	96h	Fish	672.6mg/l	2
ozone	Endpoint	Test Duration (hr)	Species	Value	Source
	NOEC(ECx)	2160h	Fish	0.002mg/L	5
	LC50	96h	Fish	0.17mg/l	2
nitrogen dioxide	Endpoint	Test Duration (hr)	Species	Value	Source
	NOEC(ECx)	720h	Fish	58mg/l	2
	LC50	96h	Fish	>100mg/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				

For Manganese and its Compounds:

Environmental Fate: Manganese is a naturally occurring element in the environment occurring as a result of weathering of geological material. It also occurs from its use in steel manufacture/ coal mining. The most commonly occurring of 11 possible oxidation states are +2, (e.g. manganese chloride or sulfate), +4, (e.g. manganese dioxide), and +7 (e.g. potassium permanganate), although the latter is unstable in the environment.

Atmospheric Fate: Elemental/inorganic manganese compounds may exist in air as suspended particulates from industrial emissions or soil erosion. Manganese-containing particles are mainly removed from the atmosphere by gravitational settling - large particles tend to fall out faster than small particles. The half-life of airborne particles is usually on the order of days, depending on the size of the particle and atmospheric conditions. Some removal by washout mechanisms such as rain may also occur, although it is of minor significance in comparison to dry deposition.

Terrestrial Fate: Manganese in soil can migrate as particulate matter to air or water and soluble manganese compounds can be leached from the soil. High soil pH reduces manganese availability while low soil pH will increase availability, even to the point of toxicity. Soils high in organic matter tie up manganese such that high organic matter soils can be manganese deficient. Fertilization with materials containing chlorine, nitrate, and/or sulfate, can also enhance manganese uptake, (termed the anion effect). Adsorption of soluble manganese to soil/sediments increases as positive ions increase, (cation), and organic matter increases. In some cases, adsorption of manganese to soils may not be a readily

reversible process. At low concentrations, manganese may be fixed by clays and will not be released into solution readily. Bacteria and microflora can increase the mobility of manganese.

Aquatic Fate: Most manganese salts, with the exception of phosphates, carbonates, and oxides, are soluble in water. Solubility is controlled by the precipitation of insoluble forms, (species). In most oxygenated waters, the most common form is insoluble manganese oxide. Manganese chloride is the dominant form at pH 4-7, but may oxidize at pH>8 or 9.

Ecotoxicity: While lower organisms, (plankton, aquatic plants, and some fish), can significantly bioconcentrate manganese, higher organisms, (including humans), tend to maintain manganese balance. Manganese in water may be significantly concentrated at lower levels of the food chain.

Uptake of manganese by aquatic invertebrates and fish increases with temperature and decreases with pH. Fish and crustaceans appear to be the most sensitive to acute and chronic exposures. The substance has low toxicity to trout but, is moderately toxic to Coho salmon. The substance is toxic to Daphnia water fleas and moderately toxic to freshwater algae *Pseudomonas putida* and *Photobacterium phosphoreum* bacteria.

For Molybdenum:

Environmental Fate: Molybdenum is an essential micronutrient in plants and animals. It is commonly used in the manufacture of steel alloys. Based on the high concentration of molybdenum in all analyzed waste types, the exposure of the environment to molybdenum is regarded as significant. The limited amount of data regarding its toxicity makes it impossible to evaluate the potential for adverse environmental and health effects from molybdenum exposure. Molybdenum is generally found in two oxidation states in nature, Mo(IV) and Mo(VI). In oxidizing environments, Mo(VI) dominates and it is commonly present as molybdate. Natural molybdenum contains seven isotopes. Molybdenum oxidizes at elevated temperatures.

Atmospheric Fate: Molybdenum can be deposited via dry/wet deposition; however, atmospheric exposure has been identified as a minor source to terrestrial and aquatic habitats.

Terrestrial Fate: Molybdenum is a naturally occurring substance in soil. Soil molybdenum is a potentially toxic element, but no cases have been reported of molybdenum toxicity to animals from consumption of forage grown on sludge-amended soils. Microbes are expected to transform the substance.

Aquatic Fate: Molybdenum disulfide is sparingly soluble in water but oxidizes to more soluble molybdates, which are stable in water. At pH 3-5, molybdate frequently shifts to hydrogen molybdate. Low pH molybdenum is usually adsorbed to sediment composed of clay, or other minerals that are prone to weathering. Molybdenum in the water is expected to be taken up by aquatic organisms. Concentrations of the substance in sediments are by site-specific factors like flow rate, and other factors, (e.g. organic content, pH)

Ecotoxicology: Molybdenum cause adverse effects in ruminant animals. Livestock have been injured by forage grown on soils containing the element. The substance s toxicological properties in mammals are governed, to a large extent, by its interaction with copper and sulfur; residues of molybdenum alone are not sufficient to diagnose poisoning by the substance. Domestic ruminants, especially cattle, are especially sensitive to molybdenum poisoning, when copper and inorganic sulfate are deficient. The resistance of small laboratory animals, and wildlife, is at least 10X that of cattle. Mule deer are not adversely affected by the substance. The substance may have a negative impact on reproduction in domestic birds and there is inadequate data on its effects on waterfowl and most mammals.

For Nickel: Transport and distribution of nickel particulates between different environmental compartments, is strongly influenced by particle size. Fine particulate matter has a longer residence time in the environment and is carried a long distance from its source; larger particles are deposited near the emission source.

Atmospheric Fate: Atmospheric residence time for nickel particulates is estimated to be 5.4-7.9 days.

Aquatic Fate: Drinking Water Standards: Nickel 50 ug/l (UK max.) 20 ug/l (WHO guideline).

Terrestrial Fate: Water solubility and bioavailability is affected by soil pH; decrease in pH generally mobilizes nickel, thus acid rain can mobilize nickel from the soil and increase nickel concentrations in ground water. Soil Guidelines - Dutch Criteria: 35 mg/kg (target) 210 mg/kg (intervention).

Ecotoxicity: Nickel bioaccumulates in the food chain but is not bioconcentrated.

For carbon monoxide:

Environmental fate:

Although carbon monoxide is not considered a greenhouse gas, it is a precursor to greenhouse gases. Carbon monoxide elevates the concentrations of methane (a greenhouse gas) and ozone in the atmosphere. It eventually oxidises into carbon dioxide. Greenhouse gases are linked to global warming. Very high levels of carbon monoxide will cause the same problems to birds and animals that are experienced by people, although these levels are very unlikely to be encountered in the environment except during extreme events like bushfires.

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
titanium dioxide	HIGH	HIGH
carbon dioxide	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
titanium dioxide	LOW (BCF = 10)
carbon dioxide	LOW (LogKOW = 0.83)

Mobility in soil

Ingredient	Mobility
titanium dioxide	LOW (KOC = 23.74)
carbon dioxide	HIGH (KOC = 1.498)

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ Recycle wherever possible or consult manufacturer for recycling options. ▶ Consult State Land Waste Management Authority for disposal.
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SECTION 14 Transport information

Labels Required

Marine Pollutant	NO
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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

Continued...

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

Product name	Group
welding fumes	Not Available
iron oxide fume	Not Available
manganese fume	Not Available
silica welding fumes	Not Available
aluminium fumes	Not Available
molybdenum fume	Not Available
copper fume	Not Available
nickel fume	Not Available
chromium fume	Not Available
titanium dioxide	Not Available
carbon dioxide	Not Available
carbon monoxide	Not Available
ozone	Not Available
nitrogen dioxide	Not Available

Transport in bulk in accordance with the ICG Code

Product name	Ship Type
welding fumes	Not Available
iron oxide fume	Not Available
manganese fume	Not Available
silica welding fumes	Not Available
aluminium fumes	Not Available
molybdenum fume	Not Available
copper fume	Not Available
nickel fume	Not Available
chromium fume	Not Available
titanium dioxide	Not Available
carbon dioxide	Not Available
carbon monoxide	Not Available
ozone	Not Available
nitrogen dioxide	Not Available

SECTION 15 Regulatory information**Safety, health and environmental regulations / legislation specific for the substance or mixture****welding fumes is found on the following regulatory lists**

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

US NIOSH Carcinogen List

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 1: Carcinogenic to humans

US NIOSH Recommended Exposure Limits (RELs)

iron oxide fume is found on the following regulatory lists

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

US NIOSH Recommended Exposure Limits (RELs)

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

US OSHA Permissible Exposure Limits (PELs) Table Z-1

US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5

US OSHA Permissible Exposure Limits (PELs) Table Z-3

US - Massachusetts - Right To Know Listed Chemicals

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US DOE Temporary Emergency Exposure Limits (TEELs)

US TSCA Chemical Substance Inventory - Interim List of Active Substances

manganese fume is found on the following regulatory lists

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

US EPA Integrated Risk Information System (IRIS)

US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5

US EPCRA Section 313 Chemical List

US - California - Biomonitoring - Priority Chemicals

US NIOSH Recommended Exposure Limits (RELs)

US - California Hazardous Air Pollutants Identified as Toxic Air Contaminants

US OSHA Permissible Exposure Limits (PELs) Table Z-1

US - Massachusetts - Right To Know Listed Chemicals

US OSHA Permissible Exposure Limits (PELs) Table Z-3

US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US Clean Air Act - Hazardous Air Pollutants

US TSCA Chemical Substance Inventory - Interim List of Active Substances

US DOE Temporary Emergency Exposure Limits (TEELs)

silica welding fumes 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)

aluminium fumes 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

molybdenum fume 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)

copper fume 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)

nickel fume is found on the following regulatory lists

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

chromium fume 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)

titanium dioxide is found on the following regulatory lists

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

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

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

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

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

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

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 - Massachusetts - Right To Know Listed Chemicals

carbon dioxide is found on the following regulatory lists

FEI Equine Prohibited Substances List - Controlled Medication
 FEI Equine Prohibited Substances List (EPSL)
 US - Massachusetts - Right To Know Listed Chemicals
 US NIOSH Recommended Exposure Limits (RELs)

carbon monoxide is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List
 US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
 US - California Proposition 65 - Reproductive Toxicity
 US - California Safe Drinking Water and Toxic Enforcement Act of 1986 - Proposition 65 List
 US - Massachusetts - Right To Know Listed Chemicals

ozone is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
 US DOE Temporary Emergency Exposure Limits (TEELs)
 US EPCRA Section 313 Chemical List
 US NIOSH Recommended Exposure Limits (RELs)

nitrogen dioxide is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
 US CWA (Clean Water Act) - List of Hazardous Substances
 US Department of Homeland Security (DHS) - Chemical Facility Anti-Terrorism Standards (CFATS) - Chemicals of Interest
 US DOE Temporary Emergency Exposure Limits (TEELs)
 US EPA Integrated Risk Information System (IRIS)
 US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule

US DOE Temporary Emergency Exposure Limits (TEELs)
 US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule
 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

US OSHA Permissible Exposure Limits (PELs) Table Z-1
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

US DOE Temporary Emergency Exposure Limits (TEELs)
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Limits (PELs) Table Z-1
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

US OSHA Permissible Exposure Limits (PELs) Table Z-1
 US SARA Section 302 Extremely Hazardous Substances
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Limits (PELs) Table Z-1
 US SARA Section 302 Extremely Hazardous Substances
 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
Self-reactive	No
In contact with water emits flammable gas	No
Combustible Dust	No
Carcinogenicity	Yes
Acute toxicity (any route of exposure)	Yes
Reproductive toxicity	No
Skin Corrosion or Irritation	No
Respiratory or Skin Sensitization	No
Serious eye damage or eye irritation	No
Specific target organ toxicity (single or repeated exposure)	No
Aspiration Hazard	No
Germ cell mutagenicity	No
Simple Asphyxiant	No

XTRweld Steel Cored FCAW Electrodes

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 fume	5000	2270
nickel fume	100	45.4
chromium fume	5000	2270
nitrogen dioxide	10	4.54
nitrogen dioxide	10	4.54

State Regulations

US. California Proposition 65

WARNING: This product can expose you to chemicals including **nickel fume**, **titanium dioxide**, which are known to the State of California to cause cancer, and **carbon monoxide**, which is known to the State of California to cause birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	No (ozone)
Canada - DSL	No (ozone)
Canada - NDSL	No (iron oxide fume; manganese fume; silica welding fumes; aluminium fumes; molybdenum fume; copper fume; nickel fume; chromium fume; carbon dioxide; carbon monoxide)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (manganese fume; aluminium fumes; molybdenum fume; copper fume; nickel fume; chromium fume; ozone)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	No (ozone)
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	No (silica welding fumes)
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory 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	04/15/2021
Initial Date	12/15/2016

SDS Version Summary

Version	Date of Update	Sections Updated
3.1	10/31/2019	One-off system update. NOTE: This may or may not change the GHS classification
4.1	04/14/2021	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

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

Continued...

XTRweld Steel Cored FCAW Electrodes

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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