

SAFETY DATA SHEET**SECTION 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING****1.1 Product Identifier**

Trade Name	Ni-Cr Bare Wire and Strip Electrodes and Rods
Classification	AWS A5.9/ASME SFA 5.9, ASME SFA 5.9 Section III, MIL-E-19333, ABS, CWB-AWS A5.9 Corrosion Resisting Chromium and Chromium Nickel Steel Bare Wire and Strip Welding Electrodes and Welding Rods.
Product Type	Cr-Ni Bare Wire and Strip Electrodes and Rod for manual, semi-automatic, and automatic welding processes.
Product Identifiers	Refer to Section 16 for full list
SDS Date	January, 2016

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Product Use:	Welding Rods
Uses Advised Against:	Use only as indicated for welding operations

1.3 Details of the Supplier of the Substance or Mixture

Manufacturer:	Sandvik Wire and Heating Technologies P.O. Box 1220 Scranton, PA 18501-1220	Sandvik Materials Technology SE-811 81 Sa Sweden
Telephone:	+1 (570) 585-7500	+46 26 260000
Email:	wire-welding_products.smt@sandvik.com	

1.4 Emergency Telephone Number

Emergency Spill Information	+1 (570) 585-7500 (United States) +46 26 260000 (Sweden)
Other Product Information:	www.smt.sandvik.com

SECTION 2: HAZARDS IDENTIFICATION**2.1 Classification of the Substance or Mixture****CLP/GHS Classification (1272/2008):**

Skin Sensitization Category 1 (H317)
Respiratory Sensitization Category 1 (H334)
Carcinogenicity Category 1A (H350)
Toxic to Reproduction Category 2 (H361)
Specific Target Organ Toxicity – Repeat Exposure Category 1 (H372)
Specific Target Organ Toxicity – Repeat Exposure Category 2 (H373)

2.2 Label Elements**Danger!**

Contains chromium, nickel, cobalt and manganese.

Hazard Phrases

H317 May cause an allergic skin reaction.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H350 May cause cancer.

H361 Suspected of damaging fertility.
H372 Causes damage to respiratory system through prolonged or repeated exposure.
H373 May cause damage to brain and nervous system through prolonged or repeated exposure.

Precautionary Phrases:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe fumes.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves, protective clothing, eye protection and face protection.
P284 In case of inadequate ventilation wear respiratory protection.
P302 + P352 IF ON SKIN: Wash with plenty of water.
P333 + P313 If skin irritation or rash occurs: Get medical attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P304 + P340 IF INHALED: remove person to fresh air and keep comfortable for breathing.
P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor.
P308 + P313 IF exposed or concerned: Get medical attention.
P501 Dispose of contents in accordance with local and national regulations.

2.3 Other Hazards: None

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS
--

3.2 Mixtures

Chemical Name	CAS No. / EINECS No. / REACH Reg. No.	% (w/w)	CLP/GHS Classification (1272/2008)
Iron (Fe)	7439-89-6 / 231-096-4	Bal.	Not hazardous
Nickel (Ni)	7440-02-0 / 231-111-4 / 01-2119438727-29	1-35	Skin Sens 1 (H317) Carc 1B (H350) STOT RE 1 (H372)
Chromium (Cr)	7440-47-3 / 231-157-5 / 01-2119485652-31	1-30	Not hazardous
Manganese (Mn)	7439-96-5 / 231-105-1	1-7	STOT RE 2 (H373)
Molybdenum (Mo) ²⁾	7439-98-7 / 231-107-2 / 01-2119472304-43	1-5	Not hazardous
Copper (Cu) ¹⁾	7440-50-8 / 231-159-6	0-4	Not hazardous
Silicon (Si)	7440-21-3 / 231-130-8	0.4-2	Not Hazardous
Niobium (Nb) ³⁾	7440-03-1 / 231-113-5	0.5-1	Not hazardous
Titanium ⁴⁾	7440-32-6 / 231-142-3	0.1	Not hazardous
Cobalt (Co) ⁵⁾	7440-48-4 231-158-0	0-1.5	Acute Tox. 4 (H302) Resp. Sens. 1B (H334) Skin Sens. 1 (H317) Repr. 2 (H361f) Carc. 1B (H350) Aquatic Chronic 4 (H413)

Chemical Name	CAS No. / EINECS No. / REACH Reg. No.	% (w/w)	CLP/GHS Classification (1272/2008)
Hexavalent Chromium (fume constituent)	1333-82-0 / 215-607-8	Varies	Acute Tox 3 (H301) Acute Tox. 2 (H310, H330) Skin Corr 1A (H314) Resp Sens 1 (H334) Skin Sens 1 (H317) Repr 2 (H360) Muta 1B (H340) Carc 1A (H350) STOT RE 1 (H372) Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410)

See Section 16 for full text of GHS and EU Classifications.

- ¹⁾ Only in Copper alloyed grades.
- ²⁾ Only in Molybdenum alloyed grades.
- ³⁾ Only in Niobium alloyed grades.
- ⁴⁾ Only in Titanium alloyed grades.
- ⁵⁾ Only in Cobalt alloyed grades.

FUME CONSTITUENTS FORMED IN USE

The following are typical constituents of welding fumes and gases. When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form than ingredients listed above. Decomposition products of normal operation include those originating from the volatilization reaction, or oxidation of the materials shown above, plus those from the base metal and coating, etc. which may include paint, plating, galvanizing, or phosphate coatings on steels which would produce phosphine gas and other contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities which may be decomposed by the arc into toxic gases such as phosgene).

Fume Constituent (Gases)

Chemical Name	CAS No. / EINECS No. / REACH Reg. No.	CLP/GHS Classification (1272/2008)
Dinitrogen Tetroxide (N ₂ O ₄)	10544-72-6 / 234-126-4	Press. Gas (H280) Oxid. Gas 1 (H270) Acute Tox. 2 (H330) Skin Corr. 1B (H314)
Nitric Oxide (NO)	10102-43-9 / 233-271-0	Press. Gas (H280) Oxid. Gas 1 (H270) Acute Tox. 1 (H330) Skin Corr. 1B (H314)
Nitrogen Dioxide (NO ₂)	10102-44-0 / 233-272-	Press. Gas (H280) Oxid. Gas 1 (H270) Acute Tox. 2(H330) Skin Corr. 1B (H314)
Ozone (O ₃)	10028-15-6 / 233-069-2	Oxid. Gas 1 (H270) Acute Tox. 1(H330) Eye Irrit. 2 (H319) Skin Irrit. 2 (H315) STOT SE 3 (H335) Aquatic Acute 1 (H400)

Chemical Name	CAS No. / EINECS No. / REACH Reg. No.	CLP/GHS Classification (1272/2008)
Phosgene (COCl ₂) *	75-44-5 / 200-870-3	Press. Gas (H280) Acute Tox. 2 (H330) Skin Corr. 1B (H314)
Phosphine (PH ₃) **	7803-51-2 / 232-260-8	Flam. Gas 1 H220) Press. Gas (H280) Acute Tox. 2 (H330) Skin Corr. 1B(H314) Aquatic Acute 1 (H400)

Fume Constituents (Solids)

Chemical Name	CAS No. / EINECS No. / REACH Reg. No.	CLP/GHS Classification (1272/2008)
Chromates (CrO ₃)	1333-82-0 / 215-607-8	Acute Tox 3 (H301) Acute Tox. 2 (H310, H330) Skin Corr 1A (H314) Resp Sens 1 (H334) Skin Sens 1 (H317) Repr 2 (H360) Muta 1B (H340) Carc 1A (H350) STOT RE 1 (H372) Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410)
Copper Oxide (CuO) ¹⁾	1344-70-3 / 215-706-6	Aquatic Chronic 1 (H410)
Cobalt (Co) ⁵⁾	7440-48-4 231-158-0	Acute Tox. 4 (H302) Resp. Sens. 1B H334 Skin Sens. 1 H317 Repr. 2 H361f Carc. 1B H350 Aquatic Chronic 4 H413
Manganese Oxide (MnO)	1317-35-7 / 215-266-5	STOT RE 2 (H373)
Nickel Oxide (NiO)	1314-06-3 / 234-808-1	Skin Sens 1 (H317) Carc 1B (H350) STOT RE 1 (H372)
Iron Oxide (Fe ₂ O ₃)	1309-37-1 / 215-168-2	STOT RE 1 (H372)
Molybdenum Trioxide (MoO ₃) ²⁾	1313-27-5 / 215-204-7	Not hazardous
Niobium Oxide (NbO) ³⁾	12034-57-0 / 234-808-1	Eye Irrit. 2 (H315) Skin Irrit. 2 (H319) STOT SE 3 (H335)
Silicon Dioxide (SiO ₂) (quartz)	14808-60-7 / 238-878-4	STOT RE 1 (H372) Carc 1 (H350)

Chemical Name	CAS No. / EINECS No. / REACH Reg. No.	CLP/GHS Classification (1272/2008)
Titanium Dioxide ⁴⁾ (TiO ₂)	13463-67-7 / 236-675-5	Carc 2 (H351)

See Section 16 for full text of GHS and EU Classifications.

¹⁾ Only in Copper alloyed grades.

²⁾ Only in Molybdenum alloyed grades.

³⁾ Only in Niobium alloyed grades.

⁴⁾ Only in Titanium alloyed grades.

⁵⁾ Only in Cobalt alloyed grades.

* May result from contact with chlorinated hydrocarbon vapors.

** May result from welding on phosphate coated steels.

SECTION 4: FIRST AID MEASURES

4.1 Description of First Aid Measures

First Aid:

No first aid should be needed when handling unused welding consumables. The following first aid should be used when the product is being welded:

Eye contact: If eye irritation occurs, flush eyes immediately with water while holding open eyelids. Get medical attention if irritation persists.

Skin contact: None normally needed. Get immediate medical attention for treatment of burns.

Inhalation: Remove victim to fresh air. Give artificial respiration if needed. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Ingestion: Ingestion is unlikely due to physical form. If swallowed, do not induce vomiting. Rinse mouth with water. Seek medical attention.

See Section 11 for more detailed information on health effects.

4.2 Most important symptoms and effects, both acute and delayed: No adverse effects are expected from welding consumables until they are welded. Inhalation of welding fumes may cause dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Arc rays may injure eyes and burn skin. Hexavalent chromium compounds, and nickel metal and compounds are listed in the National Toxicology Program (NTP) Annual Report on Carcinogens, found to be a human carcinogen in the International Agency for Research on Cancer (IARC) Monographs, or listed by OSHA/ACGIH as potential carcinogens. Cobalt and cobalt compounds are listed by IARC as a suspected animal carcinogen (Group 2B). Prolonged or repeated exposure to welding fumes causes damage to respiratory system. Prolonged or repeated exposure to welding fumes may cause damage to brain and nervous system. Prolonged or repeated exposure to welding fumes may cause siderosis (iron deposits in lungs), liver or kidney damage, skin and respiratory sensitization (allergic reaction) and affect pulmonary function. Cobalt is suspected of causing damage to fertility based on animal data.

4.3 Indication of any immediate medical attention and special treatment needed: If eye or skin burns occur, get immediate medical attention.

SECTION 5:

5.1 Extinguishing Media: Use media appropriate for the surrounding fire.

5.2 Special Hazards Arising from the Substance or Mixture

Unusual Fire and Explosion Hazards: Welding arc and sparks can ignite combustibles and flammables. Refer to American National Z49.1 for fire prevention during the use of welding and allied procedures.
Combustion Products: Typical combustion products are listed in Section 3.

5.3 Advice for Fire-Fighters: Self-contained breathing apparatus and protective clothing should be worn in fighting fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment and Emergency Procedures:

None needed under normal conditions of use.

6.2 Environmental Precautions:

Avoid release into the environment. Report spill as required by local and national regulations.

6.3 Methods and Material for Containment and Cleaning Up:

Pick up and return to container for use.

6.4 Reference to Other Sections:

Refer to Section 8 for personal protective equipment and Section 13 for disposal information.

SECTION 7: HANDLING and STORAGE

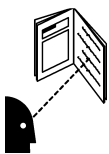
7.1 Precautions for Safe Handling:

Avoid breathing welding fumes. Keep your head out of the fumes. Use with enough ventilation or exhaust at the arc, or both, to keep fumes and gases below the occupational exposure limits in your breathing zone and the general area. Use air sampling to determine the need for corrective action. (Refer to Section 10 for additional information).

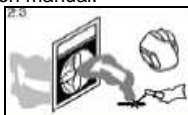
Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Fumes from welding and oxygen depletion can alter the air quality causing injury or death.

Take appropriate precautions to prevent fires and explosion.

Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1, Safety in Welding and Cutting, published by the American Welding Society, P.O. Box 351040, Miami, FL 33135; and OSHA Publication 2206 (29CFR 1910), U.S. Government Printing Office, Washington, DC 20402, for more information. In the United States assure compliance with the OSHA Standard on Chromium (VI), 29CFR 1910.1026. In Germany, see BGV D1 'Provisions for Safety and Health at work'. In the United Kingdom, see WMA Publication 236 and 237, "Hazards from Welding fume". In Canada, see CSA Standard CAN/CSA-W117.2-01 "Safety in Welding, Cutting and Allied Processes".



Before use, read instruction manual.



Use ventilating fan to remove fumes.



Electric shock can kill.



Arc rays can injure eyes and burn skin.



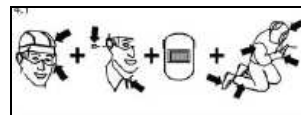
Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or



Fumes and gases can be hazardous to your health.



Sparks and splatter can cause fire or explosion.



Arc rays can burn eyes and injure skin.

damaged gloves.

7.2 Conditions for Safe Storage, Including any Incompatibilities:

Store in a dry area to protect product quality.

7.3 Specific end use(s):

Industrial uses: Welding rods

Professional uses: Welding rods

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters: Refer to country specific regulations for exposure limits not provided below.

Chemical Name	US OSHA PEL	US ACGIH TLV	German OEL	Brazil OEL
Chromium (Cr) (as metal)	1 mg/m ³ TWA	0.5 mg/m ³ TWA	2 mg/m ³ TWA (inhalable fraction)	None Established
Hexavalent Chromium (fume constituent)	0.05 mg/m ³ TWA	0.01 mg/m ³ TWA (insoluble compounds) 0.05 mg/m ³ TWA (water soluble compounds)	None Established	None Established
Cobalt (Co) ⁵⁾	0.1 mg/m ³ TWA	0.02 mg/m ³ TWA	None Established	None Established
Copper (Cu) ¹⁾	1 mg/m ³ TWA	1 mg/m ³ TWA	0.1 mg/m ³ TWA (inhalable fraction) 0.2 mg/m ³ STEL (inhalable fraction)	None Established
Iron (Fe)	10 mg/m ³ TWA (as fume)	5 mg/m ³ TWA (respirable) (as iron oxide)	None Established	None Established
Manganese (Mn)	5 mg/m ³ Ceiling Limit	0.02 mg/m ³ (respirable) 0.1 mg/m ³ (inhalable)	0.2 mg/m ³ TWA (inhalable) 0.02 mg/m ³ TWA (respirable fraction)	None Established
Molybdenum (Mo) ²⁾	15 mg/m ³ TWA (total dust)	3 mg/m ³ TWA (respirable fraction) 10 mg/m ³ TWA (inhalable)	None Established	None Established
Nickel (Ni) (elemental)	1 mg/m ³ TWA	1.5 mg/m ³ TWA (inhalable)	None Established	None Established
Niobium (Nb) ³⁾	None Established	None Established	None Established	None Established
Silicon (Si)	5 mg/m ³ TWA (respirable) 15 mg/m ³ TWA (total dust)	None Established	None Established	None Established
Titanium ⁴⁾	None Established	None Established	None Established	None Established

Chemical Name	EU IOELV	UK OEL	French OEL	China OEL
Chromium (Cr)	2 mg/m ³ TWA	0.5 mg/m ³ TWA	2 mg/m ³ TWA	2 mg/m ³ TWA (inhalable fraction)
Hexavalent Chromium (fume constituent)	None Established	0.05 mg/m ³ TWA	0.05 mg/m ³ TWA 0.1 mg/m ³ STEL	0.05 mg/m ³ TWA
Cobalt (Co) ⁵⁾	None Established	0.1 mg/m ³ TWA	None Established	0.05 mg/m ³ TWA
Copper (Cu) ¹⁾	None Established	1 mg/m ³ TWA 2 mg/m ³ STEL	1 mg/m ³ TWA (dust) 2 mg/m ³ STEL (dust)	1 mg/m ³ TWA (as dust)
Iron (Fe)	None Established	5 mg/m ³ TWA 10 mg/m ³ STEL (as iron oxide)	None Established	None Established
Nickel (Ni)	None Established	0.5 mg/m ³ TWA (as insoluble nickel) 0.1 mg/m ³ TWA (as soluble nickel)	1 mg/m ³ TWA	1 mg/m ³ TWA
Manganese (Mn)	None Established	0.5 mg/m ³ TWA	1 mg/m ³ TWA	0.15 mg/m ³ TWA
Molybdenum (Mo) ²⁾	None Established	10 mg/m ³ TWA (inhalable fraction)	5 mg/m ³ TWA (inhalable fraction)	6 mg/m ³ TWA

Chemical Name	EU IOELV	UK OEL	French OEL	China OEL
		20 mg/m ³ STEL (inhalable fraction)	10 mg/m ³	
Silicon (Si)	None Established	4 mg/m ³ TWA (respirable fraction) 10 mg/m ³ TWA (inhalable fraction)	10 mg/m ³ TWA (respirable fraction)	None Established
Niobium (Nb) ³⁾	None Established	None Established	None Established	None Established
Titanium ⁴⁾	None Established	None Established	None Established	None Established

The following are the occupational exposure limits for the typical decomposition products.

GASES				
Fume Constituent	US OSHA PEL	US ACGIH TLV	German OEL	Brazil OEL
Dinitrogen Tetroxide (N ₂ O ₄)	None Established	None Established	None Established	None Established
Nitric Oxide (NO)	25 ppm TWA	25 ppm TWA	0.5 ppm TWA	20 ppm TWA
Nitrogen Dioxide (NO ₂)	5 ppm Ceiling Limit	0.2 ppm TWA	0.5 ppm TWA	4 ppm Ceiling
Ozone (O ₃)	0.1 ppm TWA	0.1 ppm TWA ***	None Established	0.08 ppm TWA
Phosgene (COCl ₂) *	0.1 ppm TWA	0.1 ppm TWA	0.1 ppm TWA	0.08 ppm TWA
Phosphine (PH ₃) **	0.3 ppm TWA	0.3 ppm TWA 1 ppm STEL	0.1 ppm TWA	0.23 ppm TWA

GASES				
Fume Constituent	EU IOELV	UK OEL	French OEL	China OEL
Dinitrogen Tetroxide (N ₂ O ₄)	None Established	None Established	None Established	None Established
Nitric Oxide (NO)	25 ppm TWA	1 ppm STEL	25 ppm TWA	15 mg/m ³ TWA
Nitrogen Dioxide (NO ₂)	None Established	None Established	3 ppm STEL	5 mg/m ³ TWA 10 mg/m ³ STEL
Ozone (O ₃)	None Established	0.2 ppm STEL	0.1 ppm TWA 0.2 ppm STEL	0.3 mg/m ³ TWA
Phosgene (COCl ₂) *	0.02 ppm TWA 0.4 ppm STEL	0.02 ppm TWA, 0.06 ppm STEL	0.02 ppm TWA 0.1 ppm STEL	0.5 mg/m ³ Ceiling
Phosphine (PH ₃) **	0.1 ppm TWA 0.2 ppm STEL	0.1 ppm TWA, 0.2 ppm STEL	0.1 ppm TWA 0.2 ppm STEL	0.3 mg/m ³ Ceiling

SOLIDS				
Fume Constituents	US OSHA PEL	US ACGIH TLV	German OEL	Brazil OEL
Chromates (CrO ₃) (CrVI)	0.005 mg/m ³ TWA (as CrVI) 0.0025 mg/m ³ action level	0.05 mg/m ³ TWA water soluble(as Cr) 0.01 mg/m ³ TWA certain water insoluble (as Cr)	None Established	None Established
Chromium (III) Compounds	0.5 mg/m ³ TWA (as Cr)	0.5 mg/m ³ TWA (as Cr)	None Established	None Established
Cobalt (Co) ⁵⁾	0.1 mg/m ³ TWA	0.02 mg/m ³ TWA	None Established	None Established
Copper Oxide (CuO) ¹⁾ (as Cu fume)	0.1 mg/m ³ TWA	0.2 mg/m ³ TWA	None Established	None Established
Iron Oxide	10 mg/m ³ TWA (as fume)	5 mg/m ³ TWA (respirable)	None Established	None Established
Manganese Oxide (MnO) (as Mn)	5 mg/m ³ Ceiling Limit	0.02 mg/m ³ TWA (respirable fraction) 0.1 mg/m ³ TWA (inhalable fraction)	0.2 mg/m ³ TWA (inhalable fraction) 0.02 mg/m ³ TWA (respirable fraction)	None Established
Molybdenum Trioxide	15 mg/m ³ TWA (total)	3 mg/m ³ TWA	None Established	None Established

SDS – Ni-Cr Bare Wire and Strip Electrodes and Rods
Issue Date: January, 2016

(MoO ₃) ² (as Mo)	dust)	(respirable fraction) 10 mg/m ³ TWA (inhalable)		
Nickel Oxide (NiO) (as nickel)	1 mg/m ³ TWA	0.2 mg/m ³ TWA (inhalable)	None Established	None Established
Niobium Oxide (NbO) ³	None Established	None Established	None Established	None Established
Silica (SiO ₂) (quartz)	10 _____ (respirable %SiO ₂ +2 fraction) TWA 30 _____ (total dust) %SiO ₂ +2 TWA	0.025 mg/m ³ TWA (respirable fraction)	None Established	None Established
Titanium Dioxide (TiO ₂) ⁴	15 mg/m ³ TWA (total dust)	10 mg/m ³ TWA	None Established	None Established

SOLIDS				
Fume Constituents	EU IOELV	UK OEL	French OEL	China OEL
Chromates (CrO ₃) (CrVI)	None Established	0.05 mg/m ³ TWA	0.001 mg/m ³ TWA 0.005 mg/m ³ STEL	0.05 mg/m ³ TWA
Chromium (III) Compounds	2 mg/m ³ TWA	0.5 mg/m ³ TWA	2 mg/m ³ TWA	None Established
Copper Oxide ¹ (CuO) (as Cu fume)	None Established	0.2 mg/m ³ TWA (as fume)	0.2 mg/m ³ TWA (as fume)	0.2 mg/m ³ TWA (as fume)
Cobalt (Co) ⁵	None Established	0.1 mg/m ³ TWA	None Established	0.05 mg/m ³ TWA
Iron Oxide	None Established	5 mg/m ³ TWA 10 mg/m ³ STEL	None Established	None Established
Manganese Oxide (MnO) (as Mn)	None Established	0.5 mg/m ³ TWA	1 mg/m ³ TWA	0.15 mg/m ³ TWA
Molybdenum Trioxide (MoO ₃) ² (as Mo)	None Established	10 mg/m ³ TWA (inhalable fraction) 20 mg/m ³ STEL (inhalable fraction)	5 mg/m ³ TWA 10 mg/m ³ STEL (as M soluble compounds)	4 mg/m ³ TWA (as soluble compounds)
Nickel Oxide (NiO) (as nickel)	None Established	0.5 mg/m ³ TWA (as insoluble nickel) 0.1 mg/m ³ TWA (as soluble nickel)	1 mg/m ³ TWA	1 mg/m ³ TWA
Niobium Oxide (NbO) ³	None Established	None Established	None Established	None Established
Silica (SiO ₂) (quartz)	None Established	0.1 mg/m ³ TWA (respirable fraction)	0.1 mg/m ³ TWA (respirable fraction)	0.5 mg/m ³ TWA 0.2 mg/m ³ STEL
Titanium Dioxide (TiO ₂) ⁴	None Established	4 mg/m ³ TWA (respirable fraction) 10 mg/m ³ TWA (inhalable fraction)	10 mg/m ³ TWA	8 mg/m ³ TWA

¹) Only in Copper alloyed grades.

²) Only in Molybdenum alloyed grades.

³) Only in Niobium alloyed grades.

⁴) Only in Titanium alloyed grades.

⁵) Only in Cobalt alloyed grades.

* May result from contact with chlorinated hydrocarbon vapors.

** May result from welding on phosphate coated steels.

*** For light work: 0.1ppm; for moderate work: 0.08ppm; and for heavy work: 0.05ppm of O₃.

Definitions:

Ceiling Limit – The concentration that should not be exceeded during any part of the working exposure.

OEL – Occupation Exposure Limit - An occupational exposure limit is an upper limit on the acceptable concentration of a hazardous substance in the workplace. It is typically set by national authorities and enforced by legislation to protect occupational safety and health.

IOELV - Indicative Occupational Exposure Limit Values – An exposure limit established by the European Union under Article 3 of the Chemical Agents Directive (98/24/EC). Member states are required to consider IOELVs when establishing national occupational exposure limits.

PEL - Permissible Exposure Limit - OSHA (29CFR 1910) – An exposure limit that is published and enforced by OSHA as a legal standard.

STEL - Short Term Exposure Limit -OSHA (29CFR 1910) – A 15-minute time weighted average exposure which should not be exceeded at any time during a work day.

TLV - Threshold Limit Value – American Conference of Governmental Industrial Hygienists – Time weighted average (TWA) concentration for a normal 8-hour work day and a 40-hour work week to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

8.2 Exposure Controls:

Recommended Monitoring Procedures: Particulates are collected on filters and analyzed by AA or ICP. Refer to professional industrial or occupational hygienist for sampling and analytical methods. Certain regulations require periodic monitoring.

Appropriate Engineering Controls: Use enough ventilation, local exhaust at the arc, or both, to keep the fumes and gases below occupational exposure limits in the workers' breathing zone and the general area. Train each welder to keep his/her head out of the fumes. Refer to ANSI Z49.1 and other applicable regulations for additional information.

Personal Protective Measurers

Eye/face Protection: Wear helmet or use face shield with filter lens. Lens filter should be as dark as possible without obstructing view of the weld zone. Provide protective screens and flash goggles, if necessary, to shield others.

Skin Protection: Impervious clothing is recommended to avoid skin contact.

Hands: Welders gloves required to protect hands and arms from radiation, sparks, and electric shock.

Respiratory Protection: Use a respirable fume respirator or air-supplied respirator when welding in confined area, or where local exhaust or ventilation does not keep exposure below occupational exposure limits. Respirator selection and use should be based on contaminant type, form and concentration. Follow applicable regulations and good Industrial Hygiene practice.

Other protection: Wear head, hand, and body protection to help prevent injury from radiation, sparks, and electric shock. At a minimum, this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, and dark substantial clothing. Train each welder not to touch live electrical parts, and to insulate his/her person from work and ground.

SECTION 9: PHYSICAL and CHEMICAL PROPERTIES

9.1 Information on basic Physical and Chemical Properties

Chromium-Nickel bare wire and electrodes and strip are welding consumables which are either solid wire or strip.

Appearance: Solid metal wire or strip
Odor Threshold: Not applicable
Melting/Freezing Point: Not applicable
Flash Point: Not flammable
Lower Flammability Limit: Not applicable
Upper Flammability Limit: Not applicable
Vapor Density(Air=1): Not applicable
Solubility: Insoluble in water

Autoignition Temperature: Not applicable
Viscosity: Not applicable
Oxidizing Properties: Not applicable
Molecular Formula: Mixture

Odor: Odorless
pH: Not applicable
Boiling Point: Not applicable
Evaporation Rate: Not applicable
Vapor Pressure: Not applicable

Relative Density: Not available
Octanol/Water Partition Coefficient: Not applicable
Decomposition Temperature: Not applicable
Explosive Properties: None
Specific Gravity (H₂O= 1): Not available
Molecular Weight: Mixture

9.2 Other Information: None

SECTION 10: STABILITY and REACTIVITY

10.1 Reactivity: Not reactive under normal conditions.

10.2 Chemical Stability: Stable.

10.3 Possibility of Hazardous Reactions: None known.

10.4 Conditions to Avoid: None known.

10.5 Incompatible Materials: None known. Welding arc and sparks can ignite combustibles and flammables. Refer to American National Z49.1 for fire prevention during the use of welding and allied procedures.

10.6 Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, and the process, procedures, and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, galvanizing, or phosphate coatings on steels which would produce phosphine gas), the number of welders and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities which may be decomposed by the arc into toxic gases such as phosgene).

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form than ingredients in the manufactured product. Typical decomposition is also listed in Section 3. Decomposition products of normal operation include those originating from the volatilization reaction, or oxidation of the materials shown in Section 3, plus those from the base metal and coating, etc., as noted above.

One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet, if worn, or in the worker's breathing zone. See ANSI/AWS F1.1, available from the American Welding Society, P.O. Box 351040, Miami, FL 33135.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Effects:

Potential Health Effects: Welding consumables are not hazardous until welded. When this product is used for welding, hazardous fumes and gases may be created. Other factors to consider include the base metal and the base metal coatings (such as paint, plating, galvanizing, or phosphate coatings).

Electric arc welding may create one or more of the following health hazards:

Eye Contact: Arc rays (ultraviolet light) can cause eye injury.

Skin contact: Arc rays may cause skin burns. Electric shock can kill. Skin contact with metal powder residue may cause irritation or skin sensitization.

Inhalation: Inhalation of gas and fumes may be hazardous. Over exposure to welding fumes may result in discomfort, such as dizziness, nausea, or dryness or irritation of nose, throat, or eyes.

Ingestion: Swallowing may cause gastrointestinal disturbances or obstruction.

Chronic Toxicity: Prolonged or repeated exposure to welding fumes causes damage to respiratory system. Prolonged or repeated to welding fumes may cause damage to brain and nervous system. Prolonged or repeated exposure to welding fumes may cause siderosis (iron deposits in lungs), liver or kidney damage, skin and respiratory sensitization (allergic reaction), and affect pulmonary function. Cobalt is suspected of causing damage to fertility based on animal data.

Acute toxicity: No acute toxicity data available for the product.

Ingredient Toxicity Values

Chromium: Oral rat LD50 >5000 mg/kg; Inhalation rat LC50 > 5.41 mg/L (structurally similar chemical)

Hexavalent Chromium: Oral rat LD50 52 mg/kg; Inhalation rat LC50 167 mg/m³/4 hr, Dermal rabbit 57 mg/kg

Copper: Oral rat LD50 >2000 mg/kg; Dermal rat LD50 >2000 mg/kg (structurally similar chemical) Inhalation rat LC50 >5.11 mg/L/4 hr

Cobalt: Oral rat LD50 550 mg/kg, Inhalation rat LC50 0.05 mg/L/4 hr, Dermal rat LC50 >2000 mg/kg

Iron: Oral rat LD50 98.6 g/kg

Manganese: Oral rat LD50 > 2000 mg/kg; Inhalation rat LC50 > 5.14 mg/L/4 hr;

Molybdenum: Oral rat LD50 4461 mg/kg; Inhalation rat LC50 5.1 mg/L/4 hr; Dermal rabbit LD50 > 2000 mg/kg

Nickel: Oral rat LD50 >9000 mg/kg; Inhalation rat LC50 >10.2 mg/L/1 hr

Niobium: No toxicity data available

Silicon: Oral rat LD50 >5000 mg/kg; Inhalation rat LC50 > 2.08 mg/L (highest attainable concentration); Dermal rabbit LD50 >5000 mg/kg (structurally similar chemical)

Titanium: Oral rat LD50 >5000 mg/kg (structurally similar chemical)

Skin corrosion/irritation: Hexavalent chromium is corrosive to rabbit skin. None of the other components are irritating or corrosive to rabbit skin.

Eye damage/ irritation: Hexavalent chromium is corrosive to rabbit eye. None of the other components are irritating or corrosive to rabbit eyes.

Respiratory Irritation: No data available. Dust may cause mechanical irritation.

Respiratory Sensitization: Hexavalent chromium has been shown to cause respiratory sensitization in humans. Cobalt is known to cause respiratory sensitization in humans.

Skin Sensitization: Hexavalent chromium is known to cause sensitization in guinea pig maximization tests and in the mouse ear swelling test. Nickel has been shown to cause skin sensitization in humans. Cobalt has been shown to cause skin sensitization in a mouse local lymphnode assay and guinea pig maximization test.

Germ Cell Mutagenicity: Hexavalent chromium has been shown to cause mutagenic activity in in vitro and in vivo assays.

Carcinogenicity: Hexavalent chromium compounds and nickel metal and compounds are listed in the National Toxicology Program (NTP) Annual Report on Carcinogens, found to be a human carcinogen in the International Agency for Research on Cancer (IARC) Monographs, or listed by OSHA/ACGIH as potential carcinogens. Cobalt metal has been classified by IARC as "Possibly Carcinogenic to humans, Group 2B".

Reproductive Toxicity: Studies with hexavalent chromium with mice have shown significant developmental effects at levels that were not maternally toxic. In animal studies, cobalt has been shown to cause testicular atrophy, decreased sperm motility, and an increased length of the estrus cycle. Oral exposure to cobalt metal at levels causing maternal toxicity produced stunted growth and decreased survival of newborn pups.

Specific Target Organ Toxicity:

Single Exposure: No data available.

Repeat Exposure: Nickel was shown to cause serious effects of the lung, including chronic inflammation and fibrosis, alveolar proteinosis and granulomatous inflammation and increased nickel blood levels. Prolonged overexposure to manganese may cause damage to the brain and nervous system with symptoms of muscle stiffness, lack of coordination, tremors, and difficulties with breathing or swallowing.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity: No toxicity data available for the product.

Ingredient Aquatic Toxicity Values

Chromium: No data available

Copper: No data available

Cobalt: 96 hr NOEC Danio rerio 2 mg/L, 48 hr NOEC daphnia magna 3.2 mg/L, 70 hr EC50 Pseudokirchnerella subcapitata 20 ug/L

Iron: No data available

Manganese: 96 hr LC50 Oncorhynchus mykiss > 3.6 mg/L; 48 hr EC50 daphnia magna >1.6 mg/L; 72 hr EC50 desmodesmus subspicatus 4.5 mg/L

Molybdenum: 96 hr LC50 Pimephales promelas 609.1 mg/L; 48 hr LC50 daphnia magna 2729.4 mg/L

Nickel: 96 hr LC50 Oncorhynchus mykiss 15.3 mg/L

Niobium: No data available

Silicon: No data available

Titanium: 72 hr EC50 Skeletonema costatum >10000 mg/L (structurally similar chemical)

12.2 Persistence and degradability: Biodegradation is not applicable to inorganic substances.

12.3 Bioaccumulative Potential: No data available.

12.4 Mobility in Soil: No data available.

12.5 Results of PVT and vPvB assessment: Not required.

2.6 Other Adverse Effects: No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods:

Dispose in accordance with local and national regulations. Prevent waste from contaminating the surrounding environment. Discard any product, residue, disposable container, or liner in an environmentally accepted manner, in full compliance with federal, state, and local regulations

SECTION 14: TRANSPORTATION INFORMATION

	14.1 UN Number	14.2 UN Proper Shipping Name	14.3 Hazard Class(s)	14.4 Packing Group	14.5 Environmental Hazards
US DOT		Not Regulated			
Canadian TDG		Not Regulated			
EU ADR/RID		Not Regulated			
IMDG		Not Regulated			
IATA/ICAO		Not Regulated			

14.6 Special Precautions for User: None

14.7 Transport in Bulk According to Annex III MARPOL 73/78 and the IBC Code: Not applicable – product is transported only in packaged form.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture

US Regulations

CERCLA 103 Reportable Quantity: These products are not subject to CERCLA reporting requirement.

SARA Hazard Category (311/312): Acute Health Hazard, Chronic Health Hazard

SARA 313: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements:

Chromium*	7440-47-3	1-30%
Copper*	7440-50-8	0-4%
Cobalt*	7440-48-4	0-1.5%
Manganese*	7440-96-5	1-7%
Nickel*	7440-02-0	1-35%

* This includes all compounds of these elements.

Section 302 Extremely Hazardous Substances (TPQ): None

California Proposition 65: This product contains chromium and nickel which are known to the State of California to cause cancer.

EU Regulations:

EU RoHS: Finished welds using Sandvik welding consumables are RoHS compliant. Sandvik Stainless Steel Welding Products contain Chromium. When welded Sandvik Stainless Steel Welding Products will produce Cr VI (hexavalent chrome), however, the weld deposit does not contain Cr VI as it will all be in the zero valent state or as Cr III as an oxide. Finished products manufactured using Sandvik Stainless Steel Welding Products will not contain Cr VI.

EU SVHC: These products do not contain substances identified as Substances of Very High Concern when sold. Hexavalent chromium may be produced during the welding process but is not present in the finished weld.

International Chemical Inventories

US EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory or exempt.

Australia: All of the components in this product are listed on the Australian Inventory of Chemical Substances (AICS) or exempt.

Canadian Environmental Protection Act: All of the components in this product are listed on the Domestic Substances List (DSL) or exempt.

China: All of the components in this product are listed on the Inventory of Existing Chemical Substances in China (IECSC) or exempt.

European Union: All the components in this product are listed on the EINECS inventory or exempt.

Japan: All of the components in this product are listed on the Japanese Existing and New Chemical Substances (ENCS) inventory or exempt.

Korea: All of the components in this product are listed on the Korean Existing Chemicals List (KECL) or exempt.

New Zealand: All of the components in this product are listed on the New Zealand Inventory of Chemicals (NZIoC) or exempt.

Philippines: All of the components of this product are listed on the Philippines Inventory of Chemicals and Chemical Substances (PICCS) or exempt.

Taiwan: All of the components of this product are listed on the National Existing Chemical Inventory (NECI) in Taiwan or exempt.

SECTION 16: OTHER INFORMATION

Product Identifiers:

18Cb(18.LNb), 308/308L(19.9.L), 308LSi(19.9.LSi), 308/308H(19.9), 347(19.9Nb), 347Si(19.9NbSi), 316/316L(19.12.3.L), 316LSi(19.12.3.LSi), 316/316H(19.12.3), 317L(19.13.4.L), 318(19.12.3Nb), 318Si(19.12.3.NbSi), 309L(24.13.L)(23.12.L)(22.11.L), 309Si(24.13.Si), 309LCb(24.13.LNb)(23.11.LNb)(21.11.LNb), 309LHF(24.13.LHF), 309LSi(24.13.LSi), 309MoL(22.15.3.L)(24.16.3.L)(21.13.3.L), 310(25.20.C), 312(29.9), 320, 330, 409Cb(12.LNb), 410, 410NiMo, 420(13.HC), 430(18.L), 630, 383(27.31.4.LCu), 385(20.25.5.LCu)(24.29.5.LCu), 25.22.2.LMn, 22.12.HT, 28.34.HT, 2209(22.8.3.L)(22.8.3.LSi)(22.6.3.L), 25.20.L, 2594(25.10.4.L), 27.7.5.L, 29.8.2.L, 442, 439Ti, 439, 430LCb(18.LNb), 430LCbTi(19.LNbTi), Sandvik Sanweld[®] AXT(18.8.Mn),Safurex

SDS Date of Preparation/Revision: December 2015

SDS Revision History: New Formulation – All Sections revised.

CLP/GHS Classification and H Phrases for Reference (See Section 3)

Press Gas Gases Under Pressure

Flam Gas 1 Flammable Gas Category 1

Oxid Gas 1 Oxidizing Gas Category 1

Acute Tox. 1 Acute Toxicity Category 1

Acute Tox. 2 Acute Toxicity Category 2

Acute Tox. 3 Acute Toxicity Category 3

Acute Tox. 4 Acute Toxicity Category 4

Eye Irrit. 2 Eye Irritation Category 2

Skin Corr 1A Skin Corrosion Category 1A

Skin Corr 1B Skin Corrosion Category 1B

Skin Irrit. 2 Skin Irritation Category 2

Resp Sens 1 Respiratory Sensitization Category 1

Skin Sens 1 Skin Sensitization Category 1

Repr 2 Reproductive Toxicity Category 2

Muta 1B Germ Cell Mutagenicity Category 1B

Carc 1A Carcinogenicity Category 1A

Carc 1B Carcinogenicity Category 1B

Carc 1 Carcinogenicity Category 1

Carc 2 Carcinogenicity Category 2

STOT RE 1 Specific Target Organ Toxicity – Repeat Exposure Category 1

STOT RE 2 Specific Target Organ Toxicity – Repeat Exposure Category 2

STOT RE 3 Specific Target Organ Toxicity – Single Exposure Category 3

Aquatic Acute 1 Aquatic Acute Toxicity Category 1

Aquatic Chronic 1 Aquatic Chronic Toxicity Category 1

Aquatic Chronic 4 Aquatic Chronic Toxicity Category 4

H220 Extremely flammable gas

H270 May cause or intensify fire; oxidizer

H280 Contains gas under pressure; may explode if heated.

H301 Toxic if swallowed.

H302 Harmful if swallowed.

H310 Fatal in contact with skin.

H314 Causes severe skin burns and eye damage.

H315 Causes skin irritation.

- H317 May cause an allergic skin reaction.
- H319 Causes serious eye irritation.
- H330 Fatal if inhaled.
- H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H335 May cause respiratory irritation.
- H340 May cause genetic defects.
- H350 May cause cancer.
- H351 Suspected of causing cancer.
- H360 May damage fertility or the unborn child.
- H372 Causes damage to organs through prolonged or repeated exposure.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting results.
- H413 May cause long lasting harmful effects to aquatic life.

DISCLAIMER: This product is intended for use only by qualified individuals experienced and trained in welding safety. Conditions of use and suitability of the product for particular uses are beyond our control, and while the information herein is given in good faith, SANDVIK MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Nor does Sandvik assume any liability arising out of use of the product described herein. In no event shall Sandvik be liable for any special, incidental, or consequential damages in connection with this SDS.