




# SAFETY DATA SHEET (SDS)

## Cobalt Alloys

<b>1</b>	<b>Identification</b>
<b>1.1</b>	<b>GHS product identifier</b> Trade names: 1 Coated, 6 Coated, 12 Coated, 21 Coated, FCS 6, FCS 6 MC, 1 Bare, 6 Bare, 12 Bare, 21 Bare
<b>1.2</b>	<b>Other means of identification:</b> N. App.
<b>1.3</b>	<b>Recommended use of the chemical and restriction on use:</b> Used for flux cored metal arc welding, shielded metal arc welding, gas tungsten arc welding and oxyfuel welding, as applicable. Do not weld near flammable or combustible materials.
<b>1.4</b>	<b>Supplier:</b> Arctec Alloys Limited 4304 - 10 St. N.E., Calgary, Alberta, T2E 6K3 Phone: (403) 250-9355
<b>1.5</b>	<b>Emergency phone number:</b> HealthLink 24/7 (Alberta Health Services): 800-624-2356 Out-of-province or internet phone users: 866-408-5465
<b>2</b>	<b>Hazard(s) Identification</b>
<b>2.1</b>	<b>Classification of the substance or mixture:</b> Class: Carcinogenicity Category: 1A Class: Reproductive Toxicity Category: 2 Class: Germ Cell Mutagenicity Category: 1B Class: Respiratory Sensitization Category: 1 Class: Skin Sensitization Category: 1 Class: Specific Target Organ Toxicity – (repeated exposure) Category: 1 Target Organs: Lungs, Kidneys, Liver, Respiratory System, Nerves, Blood, Eyes, Skin 
<b>2.2</b>	<b>GHS label elements:</b> <b>Signal Word:</b> Danger <b>Hazard Statements:</b> H315 Causes skin irritation. H317 May cause an allergic skin reaction. H319 Causes serious eye irritation. H331 Toxic if inhaled. H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled. H340 May cause genetic defects. H350 May cause cancer. H361 Suspected of damaging fertility or the unborn child. H372 Causes damage to organs through prolonged or repeated exposure. H410 Very toxic to aquatic life with long-lasting effects.  <b>Precautionary Statements:</b> P201 Obtain special instructions before use. P202 Do not handle until all safety precautions have been read and understood. P260 Do not breathe dust/fume/gas/mist/vapours/spray. P264 Wash hands thoroughly after handling. P270 Do not eat, drink or smoke when using this product.

	<p>P272 Contaminated work clothing should not be allowed out of the workplace.  P280 Wear protective gloves/protective clothing/eye protection/face protection.  P283 Wear fire resistant or flame retardant clothing.  P284 In case of inadequate ventilation wear respiratory protection.  <b>Response Statements:</b>  P308 + P313 If exposed or concerned, get medical advice/attention.  P314 Get medical attention if you feel unwell.  P332 + P352 IF SKIN irritation occurs: Wash with plenty of water.  P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.  P337 + P313 If eye irritation persists: Get medical attention.</p>											
<b>2.3</b>	<p><b>Other hazards which do not result in classification:</b>  Persons with pacemakers should not go near welding or cutting operations until they have consulted their doctor and obtained information from the manufacturer of the device.  Heat: Spatter and melting metal can cause burn injuries and start fires.  Radiation: Arc rays can severely damage eyes or skin.  Electricity: Electric shock can kill.</p>											
<b>3</b>	<b>Composition/Information on Ingredients</b>											
	<b>SDS# and Weight %</b>									<b>CAS Number</b>	<b>EINECS Number</b>	
<b>Chemical Name</b>	1 Coat	6 Coat	12 Coat	21 Coat	FCS6, FCS6MC	1 Bare	6 Bare	12 Bare	21 Bare			
Aluminum oxide	1-5	1-5	1-5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1344-28-1	215-691-6	
Carbon	<0.1	<0.1	<0.1	01.-1	<0.1	<0.1	<0.1	<0.1	<0.1	7440-44-0	231-153-3	
Chromium	10-30	10-30	10-30	25-50	10-30	15-40	15-40	15-40	10-30	7440-47-3	231-157-5	
Cobalt	15-40	30-60	15-40	>50	60-100	30-60	40-70	40-70	40-70	7440-48-4	231-158-0	
Iron	1-5	1-5	1-5	1-2.5	1-5	1-5	1-5	1-5	1-5	7439-89-6	231-096-4	
Manganese	1-5	1-5	1-5	0.1-1	0.1-1	1-5	<0.1	1-5	<0.1	7439-96-5	231-105-1	
Molybdenum	<0.1	<0.1	<0.1	5-10	<0.1	1-5	1-5	1-5	3-7	7439-98-7	231-107-2	
Nickel	1-5	1-5	1-5	2.5-3	01.-1	1-5	1-5	1-5	1-5	7440-02-0	231-111-4	
Silicon	<0.1	<0.1	<0.1	1-2.5	<0.1	1-5	1-5	1-5	0.1-1	7439-98-7	231-107-2	
Titanium dioxide	10-30	10-30	10-30	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	13463-67-7	236-675-5	
Tungsten	5-10	1-5	5-10	0.1-1	1-5	10-30	3-7	5-10	0.1-1	7440-33-7	231-143-9	
<b>4</b>	<b>First Aid Measures</b>											
<b>4.1</b>	<b>Description of necessary first-aid measures:</b>											
	<b>Inhalation:</b>	If breathing has stopped, perform artificial respiration. If no detectable pulse, begin Cardio Pulmonary Resuscitation (CPR). Obtain emergency medical assistance immediately! If breathing is difficult, provide fresh air and call Poison Center/doctor.										
	<b>Eye:</b>	For radiation burns due to arc flash, see doctor. To remove dusts or fumes, flush cautiously with water for at least fifteen minutes. Remove contact lenses if present and easy to do. If irritation persists, see a doctor.										
	<b>Skin:</b>	For skin burns from arc radiation, promptly flush with cool water. Get medical attention for burns or irritations that persist. To remove dust or particles wash with water.										
	<b>Ingestion:</b>	Not applicable										
	<b>Electric Shock:</b>	Disconnect and turn off the power. Use a nonconductive material to pull victim away from contact with live parts or wires. If not breathing, begin artificial respiration. If no detectable pulse, begin Cardio Pulmonary Resuscitation (CPR). Obtain emergency medical assistance immediately!										
<b>4.2</b>	<b>Most important symptoms/effects, acute and delayed:</b> Asthma, chest pain, cough, wheezing, chest tightness.											
<b>4.3</b>	<b>Indication of immediate medical attention and special treatment needed:</b> Asthma, chest pain, cough, wheezing, chest tightness. For severe inhalation exposure, watch person for at least 48 hours in case pulmonary oedema develops.											
<b>4.4</b>	<b>General:</b> Move to fresh air and get medical assistance.											

<b>5</b>	<b>Fire Fighting Measures</b>				
<b>5.1</b>	<b>Suitable extinguishing media:</b> No specific recommendations for welding consumables. Welding arcs and sparks can ignite combustible and flammable materials. Use the extinguishing media recommended for the burning materials and fire situation.				
<b>5.2</b>	<b>Specific hazards arising from the substance or mixture:</b> Depends on burning materials. Smoke may contain toxic metal fumes such as chromium, cobalt, nickel, manganese from welding consumables.				
<b>5.3</b>	<b>Special protective equipment or actions for fire-fighters:</b> Wear self-contained breathing apparatus.				
<b>6</b>	<b>Accidental Release Measures</b>				
<b>6.1</b>	<b>Personal precautions, protective equipment and emergency procedures:</b> Refer to Section 8				
<b>6.2</b>	<b>Environmental precautions:</b> Refer to Section 13				
<b>6.3</b>	<b>Methods and materials for containment and cleaning up:</b> Place in suitable container for appropriate disposal.				
<b>7</b>	<b>Handling and Storage</b>				
<b>7.1</b>	<b>Precautions for safe handling:</b> Wear gloves when handling welding consumables. Avoid exposure to fume and dust. Retain all warning and identity labels.				
<b>7.2</b>	<b>Conditions for safe storage, including any incompatibilities:</b> Store in a dry place. Keep separate from chemical substances such as acids and strong bases, which could cause chemical reactions.				
<b>7.3</b>	<b>Specific end use(s):</b> Welding.				
<b>8</b>	<b>Exposure Controls/Personal Protection</b>				
<b>8.1</b>	<b>Control parameters:</b>				
Exposure limits: Use industrial hygiene monitoring equipment to ensure that exposures do not exceed applicable regulatory exposure limits (see below). ACGIH TLVs are recommended limits – not regulatory limits. Unless noted, all values apply to 8-hour time weighted average exposures (TWA).					
	<b>Substance</b>	<b>CAS#</b>	<b>ACGIH TLV mg/m<sup>3</sup></b>	<b>Alberta OEL mg/m<sup>3</sup></b>	<b>BC EL mg/m<sup>3</sup></b>
	Aluminum - insoluble compounds	7429-90-5	1(R)	N.Av.	1(R)
	Aluminum metal	7429-90-5	1(R)	N.Av.	1(R)
	Aluminum oxide	1344-28-1	N.Av.	10	N.Av.
	Aluminum soluble compounds and alkyl	7429-90-5	N.Av.	2	N.Av.
	Chromium (Cr) metal	7440-47-3	0.5(I)	0.5	0.5
	Chromium CrIII compounds	7440-47-3	0.003(I) (water-soluble)	0.5	0.5
	Chromium CrVI compounds - Water insoluble	7440-47-3	N.Av.	0.01	0.01
	Chromium CrVI compounds - Water soluble	7440-47-3	0.0002(I)	0.05	0.025
	Cobalt	7440-48-4	0.02	0.02	0.02
	Iron oxide	1309-37-1	5(R)	5(R)	5
	Manganese	7439-96-5	0.02(R), 0.1(I)	0.2	0.02(R), 0.1(I)
	Molybdenum (metal and insoluble compounds)	7439-98-7	3(R), 10(I)	5	3(R), 10(I)
	Nickel compounds - Soluble inorganic	7440-02-0	0.1(I)	0.1	0.05
	Nickel metal	7440-02-0	1.5(I)	1.5	0.05
	Silica - amorphous fume	69012-64-2	N.Av.	N.Av.	4.0, 1.5(R)
	Titanium dioxide	13463-67-7	10	10	10
	Tungsten - metal and insoluble compounds	7440-33-7	3(R)	5	5
	Tungsten - metal compounds	7440-33-7	3(R)	5 (insoluble) 1 (soluble)	5 (insoluble) 1 (soluble)
ACGIH TLVs: Threshold Limit Values according to American Conference of Governmental Industrial Hygienists.					
Alberta OELs: Alberta Occupational Exposure Limits					
BC ELs: British Columbia Exposure Limits					
(R) Respirable fraction, (I) Inhalable fraction. If no (R) or (I) designation is shown, values refer to total particulate.					
<b>8.2</b>	<b>Appropriate engineering controls:</b> Ensure sufficient local exhaust and general ventilation to keep exposures to welding fumes and gases below regulatory exposure limits. Use special care when welding painted or coated steels since hazardous substances from the coating may be emitted. If coating contains lead or mercury, remove before welding.				

<b>8.3</b>	<b>Individual protection measures:</b> Wear hand, head, eye, hearing and body protection such as welder's gloves, helmet or face shield with filter lens, ear muffs/plugs, safety boots, apron, arm and shoulder protection. Keep protective clothing clean and dry. Check condition of protective clothing and equipment on a regular basis. Use respiratory protection (P100 air purifying or supplied air respirator as appropriate) where ventilation is not sufficient to keep exposures below regulatory limits. Never use air purifying respirators in oxygen deficient atmospheres.	
<b>9</b>	<b>Physical and Chemical Properties</b>	
<b>9.1</b>	Information on basic physical and chemical properties:	
	Appearance, colour:	Solid (wire or rod), non-volatile with varying color.
	Physical state:	Solid
	Auto-ignition temperature:	Not available
	Decomposition temperature:	Not available
	Evaporation rate:	Not applicable
	Explosive properties:	Not applicable
	Flammability (solid, gas):	Not applicable
	Flash point:	Not applicable
	Initial boiling point and boiling range:	Not available
	Melting point:	>1300 °C / >2300 °C
	Freezing Point:	>1300 °C / >2300 °C
	Odour:	None
	Odour threshold:	Not applicable
	Oxidising Properties:	Not applicable
	Partition coefficient (n-octanol/water):	Not available
	pH:	Not available
	Relative density:	Not available
	Solubility:	Not applicable
	Upper / Lower flammability or explosive limits:	Not applicable
	Vapour density:	Not applicable
	Vapour pressure:	Not applicable
	Viscosity:	Not applicable
<b>10</b>	<b>Stability and Reactivity</b>	
<b>10.1</b>	<b>Reactivity:</b> May react with acids and strong bases producing gas.	
<b>10.2</b>	<b>Chemical stability:</b> This product is stable under normal conditions.	
<b>10.3</b>	<b>Possibility of hazardous reactions:</b> May react with acids and strong bases producing gas.	
<b>10.4</b>	<b>Conditions to avoid:</b> Wet, acids, bases	
<b>10.5</b>	<b>Incompatible materials:</b> Acids, bases	
<b>10.6</b>	<b>Hazardous decomposition products:</b> When this product is used in a welding process, hazardous decomposition products include those from the volatilization, reaction or oxidation of the materials listed in Section 2 and those from the base metal coating. Carbon oxides, nitrogen oxides and ozone may also be produced. Allow cleaning solvents to dry off work before welding. Thermal decomposition products of halogenated cleaning solvents may be highly poisonous. The amount of fumes generated from manual metal arc welding varies with welding parameters and dimensions, but is generally no more than 5 to 15 g/kg consumable.	
<b>11</b>	<b>Toxicological Information</b>	
<b>11.1</b>	Likely Routes of Exposure: <u>  </u> Inhalation <u>  </u> Skin contact <u>  </u> Eye contact <u>  </u> Ingestion	
	<b>Acute Toxicity:</b> Overexposure to welding fumes can cause irritation of eyes, nose, throat and lungs. It may result in metal fume fever (chills, fever, upset stomach, vomiting, throat irritation, muscle aches), dizziness, nausea, dryness or irritation of the nose, throat, lungs and eyes. Airway restriction with tightening of chest and cough may occur. Excessive exposure may cause delayed pulmonary oedema (after 24-48 hours), which may be fatal.	
	Skin corrosion/irritation: Irritation	
	Serious eye damage/ irritation: Irritation	

Respiratory and/or skin sensitization: Yes				
Germ cell mutagenicity: Not available				
Genotoxicity: Yes				
Carcinogenicity: Yes				
Reproductive toxicity: Yes				
STOT – Single Exposure: Not available				
STOT – Repeated Exposure: Yes – lungs and skin				
Harmful if inhaled: Yes				
Single exposure: Yes				
Aspiration hazard: No				
Repeated exposure: Yes				
Interactive effects: Not available				
Chemical Name	CAS Number	EINECS Number	LC50, inhalation, 4 Hours	LD50, oral
Aluminum oxide	1344-28-1	215-691-6	N.Av.	N.Av.
Chromium metal and Chromium III Compounds	7440-47-3	231-157-5	N.Av.	>2000 mg/kg, rat
Chromium VI Compounds	N.Av.	N.Av.	N.Av.	46-113 mg/kg, rat
Cobalt	7440-48-4	231-158-0	N.Av.	N.Av.
Iron	7439-89-6	231-096-4	N.Av.	750 mg/kg, rat
Manganese	7439-96-5	231-105-1	>1500 mg/m <sup>3</sup>	9000 mg/kg, rat
Molybdenum	7439-98-7	231-107-2	>5840 mg/m <sup>3</sup> , rat, 4H	2689 mg/kg, rat
Nickel	7440-02-0	231-111-4	N.Av.	>9000 mg/kg, rat
Silicon	7439-98-7	231-107-2	N.Av.	3160 mg/kg, rat
Titanium dioxide	13463-67-7	236-675-5	>6800 mg/m <sup>3</sup> , rat, 4H	>5000 mg/kg, rat
Tungsten	7440-33-7	231-143-9	N.Av.	5000 mg/kg, rat
<b>Chronic Toxicity:</b>				
<p>Repeated exposure to welding fumes may cause a progressive lung disease (mixed-dust pneumoconiosis) which impairs breathing. Lung fibrosis has been reported in workers after long term aluminum exposure. HEXAVALENT CHROMIUM COMPOUNDS AND CERTAIN NICKEL COMPOUNDS ARE CONFIRMED OR SUSPECTED CARCINOGENS. Kidney and liver damage may also occur. Chromium and nickel compounds can cause allergic skin rash. Inhalation of hexavalent chromium compounds can cause asthma and bronchitis. Cobalt dust or fume inhalation can cause bronchial asthma, progressive lung disease, and possibly lung cancer. Cobalt is classified as possibly carcinogenic to humans by the IARC (Group 2B), and animal carcinogen by the ACGIH (A3). Skin contact can cause sensitization and rash. Although inhalation of iron is not especially toxic in comparison to many other metals, it will deposit in the lungs possibly causing siderosis. This may lead to breathlessness, coughing and decreased lung function. Deposition can also occur in the eyes, and in some cases may lead to cataracts and night blindness. Manganese exposure can cause neurological damage including: slowness, changes in gait, changes in handwriting, muscle spasm, cramps, tremors, slurred speech, and behavioral changes. These may become permanent with long term overexposure. Molybdenum trioxide is classified as probably carcinogenic to humans by the IARC (Group 2A). Soluble molybdenum compounds are classified as animal carcinogens by the ACGIH (A3). Animal experiments and human experience suggest that inhalation of molybdenum and compounds can cause lung inflammation and damage. Silica fume may cause "ferro-alloy disease", which is characterized by recurrent fever over a period of 3 to 12 weeks. Lung damage may occur, but is thought not to progress further unlike silicosis produced by crystalline silica. Crystalline silica exposure can lead to progressive irreversible lung damage (silicosis) and increase the risk of lung cancer. Titanium dust and fume may cause irritation of eyes, nose, throat and lungs. Titanium dioxide is classified by the IARC as possibly carcinogenic to humans (Group 2B). Tungsten may cause lung fibrosis, with cough and difficulty breathing.</p>				
<b>12</b>	<b>Ecological Information</b>			
<b>12.1</b>	<b>Toxicity:</b> Not available			
<b>12.2</b>	<b>Persistence and degradability:</b> Not available			
<b>12.3</b>	<b>Bioaccumulative potential:</b> Not available			
<b>12.4</b>	<b>Mobility in soil:</b> Not available			

<b>12.5</b>	<b>Results of PBT and vPvB assessment:</b> Not available
<b>12.6</b>	<b>Other adverse effects:</b> Not available
<b>12.7</b>	<b>Other:</b> Welding consumables and materials could degrade / weather into components originating from the consumables or from the materials used in the welding process. Avoid exposure to conditions that could lead to accumulation in soils or groundwater. Nickel is harmful to the environment, harmful to aquatic organisms, and may cause long-term adverse effects in the aquatic environment.
<b>13</b>	<b>Disposal Considerations</b>
<b>13.1</b>	<b>Disposal and waste treatment methods:</b> Reuse or recycle where possible. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, provincial and local regulations. Use recycling procedures if available. <b>USA RCRA:</b> Unused products or product residue containing chromium are considered hazardous wastes if discarded: RCRA Hazardous Waste Codes D007. Nickel and Manganese Hazardous waste Codes N.Av. Residues from welding consumables and processes could degrade and accumulate in soils and groundwater. See also Section 8 for exposure controls while handling.
<b>14</b>	<b>Transportation Information</b>
<b>14.1</b>	<b>UN number:</b> Not applicable
<b>14.2</b>	<b>UN proper shipping name:</b> Not applicable
<b>14.3</b>	<b>Transport hazard class(es):</b> Not applicable
<b>14.4</b>	<b>Packing group:</b> Not applicable
<b>14.5</b>	<b>Environmental hazards:</b> Not applicable
<b>14.6</b>	<b>Special precautions for user:</b> Not applicable
<b>14.7</b>	<b>Transport in bulk according to Annex II of MARPOL and the IBC Code:</b> Not applicable
<b>15</b>	<b>Regulatory Information</b>
<b>15.1</b>	<b>Safety health and environmental regulations /legislation specific for the substance or mixture (applies to the airborne emissions during use).</b> <b>Canada:</b> Class: Carcinogenicity Category: 1A Class: Reproductive Toxicity Category: 2 Class: Germ Cell Mutagenicity Category: 1B Class: Respiratory Sensitization Category: 1 Class: Skin Sensitization Category: 1 Class: Specific Target Organ Toxicity – (repeated exposure) Category: 1 Target Organs: Lungs, Kidneys, Liver, Respiratory System, Nerves, Blood, Eyes, Skin Canadian Environmental Protection Act (CEPA): All constituents of this product are on the Domestic Substances List (DSL). <b>USA:</b> Under the OSHA Hazard Communication Standard, this product is considered hazardous. This product contains or produces a chemical known to the state of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code § 25249.5 et seq.) United States EPA Toxic Substance Control Act: All constituents of this product are on the TSCA inventory list or are excluded from listing. <b>CERCLA/SARA Title III Reportable Quantities (RQs):</b> Product is a solid solution in the form of a solid article: Nickel RQ 100 lbs; Chromium RQ 5000 lbs; manganese RQ N.Av. Spills or releases resulting in the loss of any ingredient at or above its RQ require immediate notification to the National Response Center and to your Local Emergency Planning Committee. The following metallic components are listed as SARA 313 “Toxic Chemicals” and potentially subject to annual SARA 313 reporting (shown with de minimis concentrations): Manganese, 1.0%; Chromium, 1.0%; Nickel, 0.1%. See Section 3 for weight %.
<b>15.2</b>	<b>Other:</b> Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label. Observe all applicable regulations. Take precautions when welding and

	protect yourself and others. WARNING: Welding fumes and gases are hazardous to your health and may damage lungs and other organs. Use adequate ventilation. ELECTRIC SHOCK can kill. ARC RAYS and SPARKS can injure eyes and burn skin. Wear correct hand, head, eye and body protection.
<b>16</b>	<b>Other Information</b>
<b>16.1</b>	<p><b>USA:</b> American National Standard Z49.1. "Safety in Welding and Cutting", ANSI/AWS F1.5. Methods for Sampling and analyzing Gases from Welding and Allied Processes., ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes", AWSF3.2M/F3.2 "Ventilation Guide for Weld Fume", American Welding Society, 550 North Le Jeune Road, Miami Florida, 33135. Safety and Health Fact Sheets available from AWS at <a href="http://www.aws.org">www.aws.org</a></p> <p>OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.</p> <p>American Conference of Governmental Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices, 6500 Glenway Ave., Cincinnati, Ohio 45211, USA.</p> <p>NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work" published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169</p> <p><b>Canada:</b> CSA Standard CAN/CSA-W117.2-01 "Safety in Welding, Cutting and Allied Processes"</p>
<b>16.2</b>	This SDS has been prepared by Arctec Alloys Limited based on information obtained from sources believed to be accurate and reliable. However, this information is provided without any representation or warranty, expressed or implied, regarding accuracy or completeness thereof. The conditions or methods of handling, storage, use and disposal of the product are beyond the control and knowledge of Arctec Alloys Limited. For this and other reasons Arctec Alloys Limited does not assume responsibility, and expressly disclaims liability for loss, damage or expense arising from it or in any way connected with the handling, storage, use or disposal of the product.