SAFETY DATA SHEET

1. Identification

Product identifier **Aluminum Bronze Alloys**

Other means of identification

SDS number 101

Product code C95200, C95210, C95220, C95400, C95420, C95500, C95510, C95800, C95900, AMS-4640, AMS-4870, AMS-4871, AMS-4880, AMS-4881, A380

Recommended use Manufacturing

Recommended restrictions Use in accordance with supplier's recommendations.

Manufacturer / Importer / Supplier / Distributor information

Company Name	Advance Bronze, Inc.
Address	139 Ohio St. - PO Box 280, Lodi, OH 44254
Telephone	330-948-1231
Contact person	John Wenneman
E-mail	johnw@advancebronze.com
Emergency phone number	1-800-424-9300 Chemtrec (24-hrs)

2. Hazard(s) identification

Not classified.

Physical hazards	Sensitization, respiratory	Category 1
Health hazards	Sensitization, skin	Category 1
	Carcinogenicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 1 (Lung, central nervous system)

OSHA hazard(s) Not classified.

Label elements

Hazard symbol

Signal word Danger

Hazard statement May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. Suspected of causing cancer. Causes damage to organs (Lung, centaral nervous system) through prolonged or repeated exposure.

Precautionary statement

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Do not breathe dust/fume/gas/mist/vapors/spray. In case of inadequate ventilation wear respiratory protection. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection.

Response If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center/doctor. If on skin: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse. If exposed or concerned: Get medical advice/attention.

Storage Store locked up.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) Not classified.

3. Composition/information on ingredients

Mixture

Hazardous components Chemical name	Common name and synonyms	CAS number	%
Copper		7440-50-8	71-90
Aluminum		7429-90-5	7-16
Manganese		7439-96-5	0-14
Iron		7439-89-6	2-6.5
Nickel		7440-02-0	0-6
Cobalt		7440-48-4	0-3
Silicon		7440-21-3	0-1.5
Zinc		7440-66-6	<0.5
Tin		7440-31-5	<0.3

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation In case of exposure to fumes or particulates: Move to fresh air. Get medical attention if discomfort persists.

Skin contact Contact with dust: Wash skin with soap and water. In case of allergic reaction or other skin disorders: Seek medical attention and bring along these instructions. In case of contact with hot or molten product, cool rapidly with water and seek immediate medical attention. Do not attempt to remove molten product from skin because skin will tear easily. Cuts or abrasions should be treated promptly with thorough cleansing of the affected area.

Eye contact Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

Ingestion Rinse mouth thoroughly if dust is ingested. Only induce vomiting at the instruction of medical personnel. Get medical attention if any discomfort continues.

Most important symptoms/effects, acute and delayed Irritation of nose and throat. Irritation of eyes and mucous membranes. Cough. Shortness of breath. Wheezing. Sensitization.

Indication of immediate medical attention and special treatment needed Treat symptomatically. Symptoms may be delayed.

General information Get medical attention if any discomfort develops. Seek medical attention for all burns, regardless how minor they may seem. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media Special powder against metal fires. Dry sand.

Unsuitable extinguishing media Do not use water or halogenated extinguishing media. Do not use water on molten metal: Explosion hazard could result.

Specific hazards arising from the chemical During fire, gases hazardous to health may be formed. Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. In a fire, ferronickel may form highly toxic substances: iron carbonyl and nickel carbonyl, a known carcinogen.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire-fighting equipment/instructions Move containers from fire area if you can do it without risk.

Specific methods Move containers from fire area if you can do so without risk.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet.

Methods and materials for containment and cleaning up

Sweep up or vacuum up spillage and collect in suitable container for disposal. Allow spilled material to solidify and scrape up with shovels into a suitable container for recycle or disposal. If not possible, gently moisten dust before it is collected with shovel, broom or the like. Collect dust using a vacuum cleaner equipped with HEPA filter. The vacuum cleaner should be explosion-proofed. Avoid dust formation. This material and its container must be disposed of as hazardous waste.

Environmental precautions

Avoid release to the environment.

7. Handling and storage

Precautions for safe handling

Welding, burning, sawing, brazing, grinding or machining operations may generate fumes and dusts of metal oxides. Provide adequate ventilation. Avoid contact with sharp edges and hot surfaces. Avoid generation and spreading of dust and fumes. Avoid inhalation of dust and contact with skin and eyes. Avoid contact with hot or molten material. Dust clouds may be explosive under certain conditions. Take precautionary measures against static discharges when there is a risk of dust explosion. Use explosion-proof electrical equipment if airborne dust levels are high. To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Wear appropriate personal protective equipment. Do not use water on molten metal. Do not eat, drink or smoke when using the product. Keep the workplace clean. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Keep dry. Store away from incompatible materials.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	PEL	5 mg/m3	Respirable dust.
		15 mg/m3	Total dust.
Cobalt (CAS 7440-48-4)	PEL	0.1 mg/m3	Dust and fume.
Copper (CAS 7440-50-8)	PEL	1 mg/m3	Dust and mist.
		0.1 mg/m3	Fume.
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m3	Fume.
Nickel (CAS 7440-02-0)	PEL	1 mg/m3	
Silicon (CAS 7440-21-3)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Tin (CAS 7440-31-5)	PEL	2 mg/m3	

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Cobalt (CAS 7440-48-4)	TWA	0.02 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Aluminum (CAS 7429-90-5)	REL	5 mg/m3	Respirable.
		5 mg/m3	Welding fume or pyrophoric powder.
		10 mg/m3	Total
Cobalt (CAS 7440-48-4)	REL	0.05 mg/m3	Dust and fume.
Copper (CAS 7440-50-8)	REL	1 mg/m3	Dust and mist.
Manganese (CAS 7439-96-5)	REL	1 mg/m3	Fume.
	STEL	3 mg/m3	Fume.
Nickel (CAS 7440-02-0)	REL	0.015 mg/m3	
Silicon (CAS 7440-21-3)	REL	5 mg/m3	Respirable.
		10 mg/m3	Total
Tin (CAS 7440-31-5)	REL	2 mg/m3	

Biological limit values

US. ACGIH. BEIs. Biological Exposure Indices

Components	Value	Determinant	Sampling Time
Cobalt (CAS 7440-48-4)	1 µg/l	Cobalt	*

* - For sampling details, please see the source document.

Exposure guidelines Follow standard monitoring procedures.

Appropriate engineering controls Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust. Ventilate as needed to control airborne dust. Use explosion-proof ventilation equipment if airborne dust levels are high. Special ventilation should be used to convey finely divided metallic dust generated by grinding, sawing etc., in order to eliminate explosion hazards.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear dust-resistant safety goggles where there is danger of eye contact. In addition to safety glasses or goggles, a welding helmet with appropriate shaded shield is required during welding, burning, or brazing. A face shield is recommended, in addition to safety glasses or goggles, during sawing, grinding, or machining.

Skin protection

Hand protection Wear suitable protective gloves to prevent cuts and abrasions. When material is heated, wear gloves to protect against thermal burns. Suitable gloves can be recommended by the glove supplier.

Other Wear suitable protective clothing.

Respiratory protection In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH approved respirator for dusts. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use. Seek advice from local supervisor.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated uniforms should be laundered separately from other clothing to prevent potential cross-contamination. If possible, an industrial laundry service should be used to eliminate the possibility of contaminating the home environment. Handle in accordance with good industrial hygiene and safety practices. Observe any medical surveillance requirements.

9. Physical and chemical properties

Appearance Shapes, Solids, Tubes & Turnings.

Physical state Solid.

Form Shapes, Solids, Tubes & Turnings.

Color Yellow to red.

Odor None.

Odor threshold Not available.

pH Unknown.

Melting point/freezing point 1814 - 1929.2 °F (990 - 1054 °C)

Initial boiling point and boiling range Not available.

Flash point Not available.

Evaporation rate Not available.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure Not available.

Vapor density Not available.

Relative density 7.5 - 9

Solubility(ies) Insoluble in water.

Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Bulk density	0.27 - 0.323 lb/in³ @ 68 F

10. Stability and reactivity

Reactivity	Stable at normal conditions.
Chemical stability	Massive metal is stable and non reactive under normal conditions of use, storage and transport.
Possibility of hazardous reactions	Hazardous polymerization does not occur. Hot molten material will react violently with water resulting in spattering and fuming.
Conditions to avoid	Contact with incompatible materials. Contact with acids will release flammable hydrogen gas. Avoid dust formation. Dust clouds may be explosive under certain conditions.
Incompatible materials	Acids. Ammonium nitrate. Fluoride. Halogens. Nitrates. Phosphorus. Strong oxidizing agents. Sulfur.
Hazardous decomposition products	Welding, burning, sawing, brazing, grinding or machining operations may generate dusts and fumes of metal oxides.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Not relevant, due to the form of the product. However, ingestion of dusts generated during working operations may cause nausea and vomiting.
Inhalation	May cause allergic respiratory reaction. Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the mucous membranes and respiratory tract. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.
Skin contact	May cause an allergic skin reaction. Hot or molten material may produce thermal burns. Workers allergic to nickel may develop eczema or rashes. Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.
Eye contact	Molten material will produce thermal burns. Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye. Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes.
Symptoms related to the physical, chemical and toxicological characteristics	Irritation of nose and throat. Irritation of eyes and mucous membranes. Coughing. Wheezing. Shortness of breath. Sensitization.

Information on toxicological effects

Acute toxicity	Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea. Ingestion of cobalt may cause nausea, vomiting, diarrhea, and a sensation of hotness. High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever.

Components	**Species**	**Test Results**
Silicon (CAS 7440-21-3)		
Acute		
Oral		
LD50	Rat	3150 mg/kg

Skin corrosion/irritation	Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye, mucous membranes and respiratory tract. Hot or molten material may produce thermal burns.
Serious eye damage/eye irritation	Dust from machining operation in the eyes will cause irritation.
Respiratory sensitization	May cause sensitization by inhalation.
Skin sensitization	Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. May cause sensitization by skin contact. Pre-existing skin conditions including dermatitis might be aggravated by exposure to this product.
Germ cell mutagenicity	Suspected of causing genetic defects.
Carcinogenicity	Possible cancer hazard - may cause cancer based on animal data. Suspected of causing cancer. Limited evidence of a carcinogenic effect.

IARC Monographs. Overall Evaluation of Carcinogenicity

Cobalt (CAS 7440-48-4)	2B Possibly carcinogenic to humans.
Nickel (CAS 7440-02-0)	1 Carcinogenic to humans.

NTP Report on Carcinogens

Nickel (CAS 7440-02-0)	Known To Be Human Carcinogen. Reasonably Anticipated to be a Human Carcinogen.

Reproductive toxicity In experimental animal studies, cobalt produces adverse developmental effects at doses that produce maternal toxicity. There are no human data on cobalt exposure during pregnancy. Nickel: Has shown teratogenic effects in laboratory animals.

Specific target organ toxicity - single exposure High concentrations: May cause respiratory irritation.

Specific target organ toxicity - repeated exposure Not available.

Aspiration hazard Not applicable.

Chronic effects Harmful: danger of serious damage to health by prolonged exposure through inhalation. Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Prolonged and repeated overexposure to dust and fumes can lead to benign pneumoconiosis (stannosis). Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in “manganism,” a disease of the central nervous system similar to Parkinson’s Disease, gait impairment, muscle spasms and behavioral changes. Chronic inhalation of metallic oxide dust/fume may cause metal fume fever.

Further information Welding or plasma arc cutting of metal and alloys can generate ozone, nitric oxides and ultraviolet radiation. Ozone overexposure may result in mucous membrane irritation or pulmonary discomfort. UV radiation can cause skin erythema and welders flash.

12. Ecological information

Ecotoxicity Alloys in massive forms present a limited hazard for the environment. The product contains a substance which may cause long-term adverse effects in the environment.

Components		Species	Test Results
Iron (CAS 7439-89-6)			
Aquatic			
Fish	LC50	Channel catfish (Ictalurus punctatus)	> 500 mg/l, 96 hours

Persistence and degradability The product is not biodegradable.

Bioaccumulative potential The product contains potentially bioaccumulating substances.

Mobility in soil Alloys in massive forms are not mobile in the environment.

Mobility in general Alloys in massive forms are not mobile in the environment.

Other adverse effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. Disposal considerations

Disposal instructions This material and its container must be disposed of as hazardous waste. Dispose in accordance with all applicable regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code Z110: Inorganic compounds n.o.s.

Waste from residues / unused products Recover and recycle, if practical. Solid metal and alloys in the form of particles may be reactive. Its hazardous characteristics, including fire and explosion, should be determined prior to disposal.

Contaminated packaging Not applicable.

14. Transport information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as a dangerous good.

IMDG

Not regulated as a dangerous good.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not on regulatory list.

CERCLA Hazardous Substance List (40 CFR 302.4)

Cobalt (CAS 7440-48-4)	LISTED
Copper (CAS 7440-50-8)	LISTED
Manganese (CAS 7439-96-5)	LISTED
Nickel (CAS 7440-02-0)	LISTED
Zinc (CAS 7440-66-6)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - Yes

SARA 302 Extremely hazardous substance: No

SARA 311/312 Hazardous chemical: Yes

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Cobalt (CAS 7440-48-4)
Manganese (CAS 7439-96-5)
Nickel (CAS 7440-02-0)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA): Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Not listed.

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Not regulated.

DEA Exempt Chemical Mixtures Code Number

Not regulated.

Food and Drug Administration (FDA): Not regulated.

US state regulations: WARNING: This product contains a chemical known to the State of California to cause cancer.

US. Massachusetts RTK - Substance List

Aluminum (CAS 7429-90-5)
Cobalt (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Manganese (CAS 7439-96-5)
Nickel (CAS 7440-02-0)
Silicon (CAS 7440-21-3)
Tin (CAS 7440-31-5)
Zinc (CAS 7440-66-6)

US. New Jersey Worker and Community Right-to-Know Act

Aluminum (CAS 7429-90-5)	500 LBS
Copper (CAS 7440-50-8)	500 LBS
Manganese (CAS 7439-96-5)	500 LBS
Nickel (CAS 7440-02-0)	500 LBS
Zinc (CAS 7440-66-6)	500 LBS

US. Pennsylvania RTK - Hazardous Substances

Aluminum (CAS 7429-90-5)
Cobalt (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Manganese (CAS 7439-96-5)
Nickel (CAS 7440-02-0)
Silicon (CAS 7440-21-3)
Tin (CAS 7440-31-5)
Zinc (CAS 7440-66-6)

US. Rhode Island RTK

Aluminum (CAS 7429-90-5)
Cobalt (CAS 7440-48-4)
Copper (CAS 7440-50-8)
Manganese (CAS 7439-96-5)
Nickel (CAS 7440-02-0)
Silicon (CAS 7440-21-3)
Tin (CAS 7440-31-5)
Zinc (CAS 7440-66-6)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Cobalt (CAS 7440-48-4)
Nickel (CAS 7440-02-0)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

16. Other information, including date of preparation or last version

Issue date June 01, 2015

Version: 1.0

Further information Not available.

References

HSDB® - Hazardous Substances Data Bank
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

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