SAFETY DATA SHEETS

This SDS packet was issued with item:

070955062

The safety data sheets (SDS) in this packet apply to the individual products listed below. Please refer to invoice for specific item number(s).

070413906 070413914 070413922 070413930 070413948 070413955 070413963 070414094 070415265 070415273 070415281 070415299 070415307 070415315 070415323 070415331 070415349 070415356 070415364 070415372 070415380 070415398 070415406 070415414 070415422 070415430 070415448 070415455 070415463 070415471 070415489 070415497 070415505 070415513 070415521 070415539 070415547 070415554 070415562 070956003 070956011 070956052 070956060 070957308 070957316 070957324 070957332 070957340 070960401 070960419 070960427 070960435 070960443 070960450 070960468 070960476 070960484 070960492

The safety data sheets (SDS) in this packet apply to one or more components included in the items listed below. Items listed below may require one or more SDS. Please refer to invoice for specific item number(s).

070954933 070954941 070954958 070954966 070954982 070954990 070955005 070955096 070955104 070955138 070955146 070955161 070955179

SECTION I – PRODUCT AND COMPANY IDENTIFICATION

Company Name	Emergency telephone number
American Orthodontics	**(920) 457-5051**
1714 Cambridge Ave	Telephone for information
Sheboygan Wisconsin 53081	**(920) 457-5051**

Product Identification:

Product Name	Beta Titanium Wires
Common Name	Beta Titanium Alloy
Associated Catalog Numbers	Various

SECTION II – HAZARDOUS COMPONENTS

Ingredients Considered Hazardous

Common Name	CAS Number	OSHA PEL	ACGIH TLV
Titanium (Ti)	7440-32-6	N/E	N/E
Molybdenum (Mo)	7439-98-7	15.0	10.0
Zirconium (Zr)	7440-67-7	5.0	5.0
Tin (Sn)	7440-31-5	2.0	2.0
		N/E = None Established	

SECTION III – PHYSICAL CHARACTERISTICS

Boiling Point	>2000°C
Specific Gravity	5.06
Solubility in Water	Insoluble
Vapor Pressure	0 at 100°C
Appearance	Silver-gray metal
Odor	Odorless

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

Extinguishing Media	N/A
Unusual Fire & Explosion Hazards	N/A
Special Fire Fighting Procedures	N/A

SECTION V – REACTIVITY DATA

Reactivity	Stable
Incompatible Materials	None
Hazardous Decomposition Products	None
Hazardous Polymerization	Will Not Occur

SECTION VI – HEALTH HAZARD DATA

Acute Hazards	None known
Chronic Hazards	None known
Signs & Symptoms Of Overexposure	None known

Routes of Entry:	Symptom:	Emergency / First Aid Procedures:
Eye Contact	N/A	N/A
Skin Contact	N/A	N/A
Inhalation	N/A	N/A
Ingestion	N/A	N/A

SECTION VII – SPECIAL PROTECTION INFORMATION

Ventilation	Mechanical exhaust
Respiratory Protection	N/A
Protective Gloves	N/A
Eye Protection	N/A
Work / Hygienic Practices	Follow standard laboratory safety practices

SECTION VIII – SAFE HANDLING MEASURES

Precautions In Case Of Spill	Clean up
Waste Disposal Method	Dispose of in accordance with local, state and federal regulations
Handling & Storage Precautions	None

The information contained in the MSDS is believed to be valid and accurate. American Orthodontics, however, makes no warranty, either expressed or implied, as to the completeness of information in all possible conditions. **Reasonable safety precautions must always be observed.**

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifier

Product Name: Beta Titanium Wire
Common Name: Orthodontic Wires
Material: Titanium Alloy
Restrictions on Use: American Orthodontics' products are used for the treatment of malocclusions and craniofacial abnormalities as diagnosed by a trained dental professional or orthodontist. Federal law restricts this device to use by or on the order of a dentist or orthodontist.
EC No.: See Section 3
REACH Registration No.:
Titanium (01-2119484878-14-XXXX)
Molybdenum (01-2119472304-43-XXXX)
Zirconium (01-2119490102-49-XXXX)
Tin (01-2119486474-28-XXXX)
CAS No. / IUPAC: See Section 3

1.2 Relevant Identified Uses/ Uses Advised Against

Relevant identified uses: Dental/Orthodontic use only
Uses advised against: Not for Consumer use. Please see "Restrictions on Use"

1.3 Details of the Supplier of the Safety Data Sheet

Company Name:
American Orthodontics
3524 Washington Avenue
Sheboygan, WI 53081
Phone: 920-457-5051
Fax: 920-457-1485

E-mail: info@americanortho.com
National Contact: Safety Department

1.4 Emergency Telephone Number

Emergency Response Number:
920-457-5051
Only available during office hours: 8:00AM – 5:00PM (Central Time)
Language of Phone Service: English

2. HAZARDS INDENTIFICATION

2.1 Classification of the substance or mixture

Considered Non-Hazardous

2.2 Label Elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard Pictogram(s)

No pictograms.

2.3 Other Hazards

None

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient(s)	CAS No.	EC No.	Wt. % Content (or Range)
Titanium, Ti	7440-32-6	231-142-3	60-85
Molybdenum, Mo	7439-98-7	231-107-2	10-20
Zirconium, Zr	7440-67-7	231-176-9	5-10
Tin, Sn	7440-31-5	231-141-8	1-5

4. FIRST-AID MEASURES

No first aid required for contact with solid product. The following information applies to contact from processing.

Inhalation: If irritation or other symptoms develop, remove to fresh air. Get medical attention if symptoms persist.

Skin Contact: Remove contaminated clothing. Wash skin thoroughly with soap and water. Get medical attention if irritation develops.

Eye Contact: Flush with large quantities of water, holding the eyelids apart to assure that the material is washed out. Get medical attention if irritation persists.

Ingestion/Swallowing: If conscious, wash mouth out with water. Do not induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Get medical attention.

5. FIRE AND EXPLOSION HAZARDS

5.1 Extinguishing Media

This material is not combustible in solid form. Use media that is appropriate for the surrounding fire. Suitable extinguishing media are:

- Dry sand
- Graphite powder
- Lith-A powder
- Dry chemical or other media appropriate for a Class D fire.

Extinguishing Media which should **not** be directly used for fires involving fine dust or filings:

- Water
- CO_2
- Foam

5.2 Special Exposure Hazards from Substance/Mixture

Fine powders or filings may burn with intense heat. Fine dust may present an explosion hazard. Dousing burning metal with water may generate explosive hydrogen gas.

Thermal decomposition or combustion products include oxides or the metals listed in Section 2 which may be highly toxic.

5.3 Advice for Firefighters

Firefighters should wear full emergency equipment and NIOSH approved positive pressure self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment & Emergency Procedures

Avoid contact with eyes, skin or clothing. Do not breathe dust.

6.2 Environmental Precautions

Prevent entry into sewers and waterways

6.3 Methods & Material for Containment & Cleaning Up

Pick up solid material for reuse or disposal. For spills of dust, wear respirator and protective clothing (see Section 8). Vacuum using an explosion-proof, HEPA vacuum and non-sparking tools. Do not breathe dust or allow it to contaminate skin or clothing. Spill and release reporting requirements vary. Consult local authorities regarding requirements.

6.4 Reference to other sections (as applicable)

None

7. HANDLING AND STORAGE

7.1 Precautions for Safe-Handling

Do not breathe dust or fumes from processing. Avoid contact with dust. Wear protective clothing and equipment as described in Section 8. Process only with adequate ventilation. Keep containers closed when not in use. Do not eat, drink or smoke in the work area.

7.2 Conditions for Safe Storage, Including Any Incompatibilities

Store in cool, well ventilated location away from incompatible materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1Control Parameters

Component	OSHA PELs (Permissible Exposure Limits)	ACGIH TLVs (Threshold Limit Values)
Titanium, Ti	Not Established	Not Established
Molybdenum, Mo	15mg/ m^3 TWA (total dust)	3mg/ m^3 TWA (respirable fraction)
Zirconium, Zr	5mg/ m^3 TWA (as Zn compounds)	5mg/ m^3 TWA
Zirconium, Zr	2mg/ m^3 TWA (as Zn compounds)	N/A
Tin, Sn	2mg/ m^3 TWA	2mg/ m^3 TWA

Additional Information:

Zn: 1mg /m^3 TWA DFG MAK; 5 mg /m^3 TWA UK; 10 mg /m^3 TWA STEL UK WEL

Sn: 2 mg /m^3 TWA UK; 4mg /m^3 TWA STEL UK WEL (as tin inorganic compounds)

8.2 Exposure Controls

8.2.1 Appropriate Engineering Controls

None needed under normal use. If dust or fumes are generated during processing, use with adequate local exhaust ventilation to maintain exposures below the occupational exposure limits.

8.2.2 Personal Protective Equipment

8.2.2.1 Eye & Face Protection

Wear safety glasses or other eye protection consistent with industrial safety practice for the process being performed.

8.2.2 Skin Protection

Wear protective gloves if needed to prevent cuts or other injuries.

8.2.2.3 Respiratory Protection

None needed under normal use. If the occupational exposure limits are exceeded during processing, an approved respirator with high efficiency particulate filters may be used. For higher exposures (greater than 10 times the exposure limit) a supplied air respirator may be required. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 or local authority regulations and good Industrial Hygiene practice.

8.2.2.4 Thermal Hazards

Thermal decomposition or combustion products include oxides or the metals listed in Section 2 which may be highly toxic.

Reference Section 5 for specific personal protective equipment advice

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Basic Physical & Chemical Properties

Appearance:	Silver wire
Odor:	Odorless
pH:	N/A
Melting Point/Freezing Point:	3050°F / 1676.7°F
Initial Boiling Point & Boiling Range:	N/A
Flash Point:	N/A
Evaporation Rate:	N/A
Flammability (solid, gas):	N/A
Solubility (H2O):	Insoluble

9.2 Other Information

None

10. STABILITY AND REACTIVITY

10.1 Reactivity
N/A
10.2 Chemical Stability
Stable
10.3 Conditions of Instability
None known
10.4 Possibility of Hazardous Reactions
None known
10.5 Conditions to Avoid
None known
10.6 Incompatible Materials
Acids, alkalis, oxidizing agents, potassium nitrate and turpentine.
10.7 Hazardous Decomposition Products
Metal fumes and oxides are emitted when product is heated above the melting point
10.8 Hazardous Polymerization
N/A

11. TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Information

Chronic Health Effects: Prolonged inhalation of dust may cause lung damage, fibrotic lung disease and effects on the cardiovascular system. Chronic exposure to tin oxide dusts and fumes may result in stannosis (benign pneumonconiosis). Repeated skin contact with zirconium compounds may cause allergic skin sensitization.

Serious Eye Damage/Irritation: Dust or fines may cause mechanical irritation

Respiratory/Skin Sensitization: Dust may cause skin irritation

Ingestion: No acute effects expected from swallowing small amounts

Carcinogenicity: None of the components are listed as carcinogens by IARC, NTP, ACGIH, OSHA or the EU Directive.

Aspiration Hazard: Dust or fumes may cause irritation of the mucous membranes and upper respiratory tract

Medical Conditions Generally Aggravated by Exposure: Individuals with pre-existing skin disorders may be at increased risk from exposure.

11.1.1 Acute Toxicity

No data available

12. ECOLOGICAL INFORMATION

No data available at this time

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with national and local regulations

14. TRANSPORTATION INFORMATION

None, not regulated for Transport of Dangerous Goods (DOT, IATA, IMDG)

15. REGULATORY INFORMATION

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

EU Regulations

European Community Labeling: This product is a manufactured article as defined under REACH. No labeling is required for finished products.

European Inventory of New and Existing Chemicals Substances (EINECS): This product is a medical device and not subject to chemical notification requirements.

National Regulations (USA):

SARA TITLE III:

Hazard Category for Section 311/312: Not hazardous unless processing creates dust or fumes

Section 313 Toxic Chemicals: This product contains the following chemicals subject to Annual Release Reporting Requirements under SARA Title III, Section 313 (40CFR372): None

Section 302 Extremely Hazardous Substances (TPQ): None

EPA Toxic Substance Control Act (TSCA) Status: This product is a medical device and not subject to chemical notification requirements

International Regulations:

Canadian WHMIS Classification: Medical devices are not subject to WHMIS

15.2 Chemical Safety Assessment:

No chemical safety assessment has been carried out for this substance/mixture by the supplier.

16. ADDITIONAL INFORMATION

16.1 Indication of changes/revision to SDS:

1. New format
2. Inclusion of EC Requirements
3. **Revision Date:** 04/22/2015

16.2 Abbreviations and acronyms:

None

16.3 Key literature references and sources for data

1. Guidance on the Compilation of Safety Data Sheets; European Chemical Agency (ECHA); Version 2.1, February 2014
2. Regulation (EC) No 1272/2008 of the European Parliament and the Council of 16 December 2008 on classification, labelling, and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

16.4 Classification and procedure used to derive classification for mixtures according to Regulation (EC) 1272/2008[CLP]:

None

Some of the information presented and conclusions drawn herein are from sources other than direct test data on the product itself. The information in the SDS was obtained from sources that we believe are reliable and is believed to be valid and accurate. American Orthodontics, however, makes no warranty, express or implied, regarding its correctness of the information provided. The conditions or method of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. If the product is used as a component in another product or used in a way other than recommended by the Company, this SDS information may not be applicable. **Reasonable safety precautions must always be observed.**

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifier

Product Name: Stainless Steel Brackets**;** Empower; T3; Master Series; Mini Master Series; Low Profile (LP); Forever Gold™; iFit; Slim Tube; Wraparound; Inconel; Maximum Retention MR™ Bands; Contoured Bands; Bondable Retainer; Bite Blocks; Tongue Director; Diastema Closer; Sheaths; Eyelets; Eruption Appliance; Cleats; Lugs; Hooks; Stops; Weldable Tubes; Stainless Steel Wires; Stainless Steel Springs; Wrap Around Hawley; Stainless Steel Retainer Wire; Ball Retainer Clasps; Kobayashi Hooks; Ligature Wires; Springs;Powerscope ™; Herbst Appliances; Miniscope ™Telescoping Herbst; Hanks Telescoping Herbst ™; Rollo Bands; Mini Skirt™ Crowns; Jasper Jumper; Gentle Jumper; Jones Jig; Rapid Molar Intruder; Distal Jet; Spring Jet; Mesial Jet; Uprighter Jet; Palatal Arch; Quad Helix; Expansion Screws; Quick Fix; Alexander Lip Bumper; Lip Bumper; Korn Lip Bumper; Mandibular Advancer; M.A.P.; IOA; 300 Series Facebows; 400 Series Facebows; Luno

Common Name: Fixed & Functional, Stainless Steel Brackets, Buccal Tubes, Wires, Stops & Hooks, Wire Spring, Bands, Lingual Attachments, Extraoral, Instruments

Material: Stainless Steels (Austenitic, Ferritic, Precipitation Hardening, Martensitic)

Restrictions on Use: American Orthodontics' products are used for the treatment of malocclusions and craniofacial abnormalities as diagnosed by a trained dental professional or orthodontist. Federal law restricts this device to use by or on the order of a dentist or orthodontist.

EC No.: See Below

REACH Registration No.: Nickel (01-2119438727-29-XXXX)
Cobalt (01-2119517392-44-XXXX)
Aluminum (01-2119529243-XXXX)
Niobium (01-2119489003-42-XXXX)
Carbon (01-2119966900-32-XXXX)
Tantalum (01-2119974241-40-XXXX)

CAS No. / IUPAC: See Below

1.2 Relevant Identified Uses/ Uses Advised Against

Relevant identified uses: Dental/Orthodontic use only
Uses advised against: Not for Consumer use. Please see "Restrictions on Use"

1.3 Details of the Supplier of the Safety Data Sheet

Company Name:

American Orthodontics
3524 Washington Avenue
Sheboygan, WI 53081
Phone: 920-457-5051
Fax: 920-457-1485

E-mail: info@americanortho.com
National Contact: Safety Department

1.4 Emergency Telephone Number

Emergency Response Number:

920-457-5051
Only available during office hours: 8:00AM – 5:00PM (Central Time)
Language of Phone Service: English

2. HAZARDS INDENTIFICATION

General Hazard Statement:
Solid metallic products are generally classified as “articles” and do not constitute a hazardous materials in solid form under the definitions of the OSHA Hazard Communication Standard (29 CFR 1910.1200). Any articles manufactured from these solid products would be generally classified as non-hazardous. However some hazardous elements contained in these products can be emitted under certain processing conditions such as but not limited to: burning, melting, cutting, sawing, brazing, grinding, machining, milling, and welding. Products in the solid state present no fire or explosion hazard. Small chips, fines, and dust may ignite readily, though. The following classification information is for the hazardous elements which may be released during processing.

2.1 Classification of the substance or mixture

Serious Eye Damage/Irritation - Category 2B
Respiratory Sensitizer - Category 1
Skin Sensitizer - Category 1
Germ Cell Mutagenicity - Category 2
Carcinogenicity - Category 1B
Toxic to reproduction - Category 1B
Specific target organ toxicity - Single exposure - Category 1 (kidneys, respiratory system)
Specific target organ toxicity - Repeated exposure - Category 1 (respiratory system, skin)
Hazardous to aquatic environment - Acute Hazard - Category 1
Hazardous to aquatic environment - Chronic Hazard - Category 1

2.2 Label Elements

Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard Pictogram(s)

Signal Word(s): Danger

Hazard Statements:

Causes eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
Suspected of causing genetic defects
Suspected of causing cancer
Causes damage to organs (kidneys, respiratory system)
Causes damage to organs through prolonged or repeated exposure (respiratory system)
Very toxic to aquatic life
Very toxic to aquatic life with long lasting effects

Supplemental Hazard information (EU):

Do not breathe dust/fume/gas/mist/vapors/spray.
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace.
Wash thoroughly after handling
Wear protective gloves
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 eat, drink or smoke when using this product.
Avoid release to the environment

Response

IF exposed or concerned: Get medical advice/attention
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists get medical advice/attention.
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
If exposed or concerned: Get medical advice/attention.
Collect spillage

Storage

Store locked up

Disposal

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

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient(s)	CAS No.	EC No.	Wt. % Content (or Range)
Iron	7439-89-6	N/A	Balance
Nickel	7440-02-0	231-111-4	0-15
Chromium	7440-47-3	N/A	11.5-20
Silicon	7440-21-3	N/A	0-2
Manganese,	7439-96-5	N/A	0-2
Molybdenum	7439-98-7	N/A	0-6.5
Titanium	7440-32-6	N/A	0-0.7
Copper	7440-50-8	N/A	0-5
Aluminum	7429-90-5	231-072-3	0-4
Niobium	7440-03-1	231-113-5	0-0.6
Carbon	7440-44-0	231-153-3	0-1.2
Tantalum	7440-25-7	231-135-5	0-0.5

Other trace elements may also be present in minute amounts. These small quantities (less than 0.1%) are frequently referred to as “trace” or “residual” elements; generally they originate in the raw material used.

4. FIRST-AID MEASURES

4.1 Description of First-Aid Measures

Inhalation: Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Consult a physician.

Skin Contact: Wash skin with soap and water. In the case of skin irritation or allergic reactions see a physician.

Eye Contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. Consult a physician.

Ingestion/Swallowing: Do NOT induce vomiting. Call a physician or Poison Control Center immediately. Drink plenty of water. Never give anything by mouth to an unconscious person.

5. FIRE AND EXPLOSION HAZARDS

General Fire Hazards

See Section 9 for Flammability Properties.

This product does not present fire or explosion hazards as shipped. Small chips, fines, and dust from processing may be explosive or readily ignitable.

Hazardous Combustion Products

Thermal decomposition can lead to release of irritating gases and vapors. In the event of fire and/or explosion do not breathe fumes. May cause sensitization by inhalation and skin contact.

Extinguishing Media

Class D extinguishing agents on fines, dust or molten metal. Use coarse water spray on chips and fines.

Unsuitable Extinguishing Media

DO NOT use halogenated extinguishing agents on small chips or fines. DO NOT use water for fires involving molten metal. These fire extinguishing agents will react with burning material.

Fire Fighting Equipment/Instructions

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

General
No notable environmental hazard is anticipated from the “release” of this material in bulk solid form on land. This material should be recovered from aquatic environments.

Recovery and Neutralization
Avoid dust formation. Collect scrap for recycling.

Materials and Methods for Clean-Up
If product is molten, contain the flow using dry sand or salt flux as a dam. All tools and containers which come in contact with molten metal must be preheated or specially coated and rust free. Allow the spill to cool before remelting as scrap.

Emergency Measures
Keep people away from and upwind of spill/leak.

Personal Precautions and Protective Equipment
Wear appropriate protective clothing and respiratory protection for the situation.

Environmental Precautions
Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. Do not flush into surface water or sanitary sewer system.

7. HANDLING AND STORAGE

Handling, storage and decontamination procedures:

Avoid contact with skin, eyes, and clothing. Wear personal protective equipment when handling. Avoid dust creation. Keep material dry. Avoid contact with sharp edges, corners, hot metal. Good housekeeping must be practiced during storage, transfer, handling and use to avoid excessive dust accumulation.

Incompatible Products:

May react in contact with strong acids to release gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen. Use of strong oxidizers (high pH) on stainless steel may cause Cr(VI) compounds to form at ambient temperatures. Decomposition: Fumes generated during welding, brazing, or thermal cutting may contain: chromium compounds, including hexavalent chromium Cr(VI); nickel; manganese; iron; molybdenum; and silicon compounds.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control Parameters

Exposure Guidelines: Chemicals are not readily available as they are bound within the alloy. Occupational exposure limits apply to some components resulting from grinding, polishing, abrasive blasting, hot rolling, hot forging, thermal cutting, or welding which may produce stainless steel dust or fumes.

Component	OSHA PELs (Permissible Exposure Limits)	ACGIH TLVs (Threshold Limit Values)
Nickel	1mg/ m^3 TWA (vacated) 1mg/ m^3 TWA	1.5 mg/ m^3 TWA
Silicon	15 mg/ m^3 TWA (total dust) 5 mg/ m^3 TWA resiprable fraction (vacated) 10 mg/ m^3 TWA total dust (vacated) 5 mg/ m^3 TWA respirable fraction	N/A
Manganese	1 mg/ m^3 TWA (vacated) 3 mg/ m^3 STEL funem (vacated) 5 mg/ m^3 Ceiling 5 mg/ m^3 Ceiling (fume)	0.2 mg/ m^3 TWA
Molybdenum	10 mg/ m^3 TWA (vacated)	10 mg/ m^3 TWA (inhaled fraction) 3 mg/ m^3 TWA (respirable fraction)
Copper	0.1 mg/ m^3 TWA (fume) 1 mg/ m^3 TWA dust & mist (vacated)	0.2 mg/ m^3 TWA

	0.1 mg/ m^3 TWA dust, fume, mist	
Aluminum	10 mg/ m^3 TWA (as metal dust) 5.0 mg/ m^3 (as welding fume)	10 mg/ m^3 TWA (as metal dust) 5.0 mg/ m^3 TWA (as welding fume)

NIOSH IDLH:
Nickel: IDLH (10mg/m^3); TWA (0.015 mg/m^3)
Silicon: TWA (10mg/m^3 total dust); TWA (5 mg/m^3 respirable dust)
Manganese: IDLH (500mg/m^3); TWA (1 mg/m^3 fume); STEL (3mg/m^3)
Molybdenum: IDLH (5000mg/m^3)
Copper: IDLH (100mg/m^3 dust, fume & mist); TWA (1 mg/m^3 dust & mist); TWA (0.1mg/m^3fume)
Aluminum: IDLH (10mg/m^3 total dust); IDLH (5mg/m^3 as respirable dust)

8.2 Exposure Controls

8.2.1 Appropriate Engineering Controls

Ensure adequate ventilation, especially in confined area (i.e. showers, eyewash stations, etc.).

8.2.2 Personal Protective Equipment

8.2.2.1 Eye & Face Protection

When processing the metal alloy wear: Tightly fitting safety goggles.

8.2.2 Skin Protection

When processing the metal alloy: Wear protective gloves/clothing.

8.2.2.3 Respiratory Protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Basic Physical & Chemical Properties

Appearance:	Varies from dull to very light grey, to shiny metallic light grey or bright mirror finish
Odor:	Odorless
Odor Threshold:	No Information Available
pH:	No Data Available
Melting Point:	2498-2768°F (1370-1520°C)
Flash Point:	No Data Available
Evaporation Rate:	No Data Available
Flammability (solid, gas):	No Data Available
Upper/Lower Flammability or Explosive Limits:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Relative Density:	No Data Available

Solubility(ies):	Insoluble
Partition Coefficient: n-octanol/water):	No Data Available
Auto-Ignition Temperature:	No Data Available
Decomposition Temperature:	No Data Available
Viscosity:	No Data Available
Specific Gravity:	0.27-0.30 lbs./in^3 (7.7-8.1 kg/dm^3)

9.2 Other Information

Thermal Expansion (ambient at 100°C)	10-16x10^6 m/m°C
Thermal Conductivity (ambient temperature):	12-30 W/m°C

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical Stability
Stable under recommended storage conditions

10.3 Conditions of Instability
N/A

10.4 Possibility of Hazardous Reactions
None under normal processing

10.5 Conditions to Avoid
Dust formation

10.6 Incompatible Materials
May react in contact with strong acids to release gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen. Use of strong oxidizers (high pH) on stainless steel may cause Cr(VI) compounds to form at ambient temperatures. Decomposition: Fumes generated during welding, brazing, or thermal cutting may contain: chromium compounds, including hexavalent chromium Cr(VI); nickel; manganese; iron; molybdenum; and silicon compounds.

10.7 Hazardous Decomposition Products
None known based on information supplied

10.8 Hazardous Polymerization
Will not occur.

11. TOXICOLOGICAL INFORMATION

In its solid form stainless steel does not present an inhalation, absorption, or ingestion hazard. Grinding, polishing, abrasive blasting, hot rolling, hot forging, thermal cutting, or welding may produce stainless steel dust or fumes containing complex or mixed oxides of its components. Metal dust particles may cause eye, skin and/or respiratory system irritation. The below information is for these instances.

Toxicity Overview:
This product contains the following components which in their pure form have the following characteristics:

Target Organs: Respiratory System. Skin.

Chronic Health Effects: Elevated temperature processing such as welding and plasma arc cutting may release hazardous fumes. Overexposure to metal fumes may cause pulmonary edema (fluid in the lungs) and methemaglobinemia. May also cause pulmonary fibrosis and lung cancer.

Chronic exposure to manganese may cause impairment to the central nervous system including sluggishness, sleepiness, muscle weakness, loss of facial muscle control, edema, emotional disturbances, spastic gait, and falling. Chronic exposure to aluminum flake has been reported to cause pneumoconiosis in workers. Repeat oral exposure to aluminum results in decrements in neurobehavioral function and development.

Serious Eye Damage/Irritation: Contact with eyes may cause irritation.

Respiratory/Skin Sensitization: Contact with dust can cause mechanical irritation or drying of the skin. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.

Reproductive Toxicity: No Information Available

STOT-Repeated Exposure: Causes damage to organs through prolonged or repeated exposure

Inhalation Hazard: May cause irritation of respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Other Potential Health Effects: May cause sensitization by inhalation and skin contact

Ingestion: May cause irritation

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Iron	= 984 mg/kg (Rat)	-	-
Nickel	> 9000 mg/kg (Rat)	-	-
Silicon	= 3160 mg/kg (Rat)	-	-
Manganese	= 9 g/kg (Rat)	-	-
Aluminum	Unknown	-	-

Carcinogenicity: Below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Nickel		Group 2B	Reasonably Anticipated	X
Chromium		Group 3		

Numerical measures of toxicity • - Product

The following values are calculated based on chapter 3.1 of the GHS document:

LD50 Oral 389 mg/kg; Acute toxicity estimate 7500

12. ECOLOGICAL INFORMATION

Chemicals are not readily available as they are bound within the alloy. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water
Iron	-	LC50 96 h: = 0.56 mg/L semi-static (Cyprinus carpio) LC50 96 h: = 13.6 mg/L	-	-
Nickel	EC50 96 h: 0.174 - 0.311 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: = 0.18 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 1.3 mg/L semi-static (Cyprinus carpio) LC50 96 h: = 10.4 mg/L static (Cyprinus carpio) LC50 96 h: > 100 mg/L	-	EC50 48 h: = 1 mg/L Static (Daphnia magna) EC50 48 h: > 100 mg/L (Daphnia magna)
Copper	EC50 96 h: 0.031 - 0.054 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: 0.0426 - 0.0535 mg/L static (Pseudokirchneriella subcapitata)	LC50 96 h: 0.0068 - 0.0156 mg/L (Pimephales promelas) LC50 96 h: < 0.3 mg/L static (Pimephales promelas) LC50 96 h: = 0.052 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 0.112 mg/L flow-through (Poecilia reticulata) LC50 96 h: = 0.2 mg/L flow-through (Pimephales promelas) LC50 96 h: = 0.3 mg/L	-	EC50 48 h: = 0.03 mg/L Static (Daphnia magna)
Aluminum	-	LC50 96 h = 0.16 mg/l Rainbow Trout		EC50 24 h: = 3.5 mg/l Static (Daphnia

13. DISPOSAL CONSIDERATIONS

The generator of waste material has the responsibility for proper waste classification, transportation and disposal with accordance applicable federal, state/provincial and local regulations.

Chemical Name	RCRA	RCRA - Basis for	RCRA - D Series Wastes	RCRA - U Series Wastes
Nickel – 7440-02-0	(hazardous constituent -	Included in waste streams: F006,	N/A	N/A
Chromium – 7440-47-3	N/A	Included in waste streams: F032, F034, F035, F037, F038,	5.0 mg/L regulatory level	N/A
Aluminum – 7429-90-5	N/A	Included in waste streams: F006, F019, F039	N/A	N/A

Chemical Name	California Hazardous Waste
Nickel	Toxic powder Ignitable
Chromium	Toxic Corrosive Ignitable
Manganese	Ignitable powder
Molybdenum	Ignitable powder
Titanium	Ignitable powder
Copper	Toxic

14. TRANSPORTATION INFORMATION

DOT Not Regulated

15. REGULATORY INFORMATION

International Inventories

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory: Complies

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List: Complies

U.S. Federal Regulations

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Nickel	7440-02-0	37	0.1
Chromium	7440-47-3	26	1.0
Manganese	7439-96-5	2	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Nickel		X	X	
Copper		X	X	

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302):

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	RQ
Nickel	100 lb		RQ 100 lb final RQ RQ 45.4 kg
Chromium			RQ 5000 lb final RQ RQ 2270 kg
Copper	5000 lb		RQ 5000 lb final RQ RQ 2270 kg

U.S. State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals:

Chemical Name	CAS-No	California Prop. 65
Nickel	7440-02-0	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania	Illinois	Rhode Island
Nickel	X	X	X	X	X
Chromium		X			X
Silicon	X	X	X		X
Manganese	X	X	X	X	X
Molybdenum	X	X	X		X
Titanium	X				

U.S. EPA Label Information

EPA Pesticide Registration Number: Not applicable

16. ADDITIONAL INFORMATION

16.1 Indication of changes/revision to SDS:

1. New format
2. Inclusion of EC Requirements
3. ***Revision Date:*** 05/15/2015

16.2 Abbreviations and acronyms:

None

16.3 Key literature references and sources for data

1. Guidance on the Compilation of Safety Data Sheets; European Chemical Agency (ECHA); Version 2.1, February 2014
2. Regulation (EC) No 1272/2008 of the European Parliament and the Council of 16 December 2008 on classification, labelling, and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

16.4 Classification and procedure used to derive classification for mixtures according to Regulation (EC) 1272/2008[CLP]:

None

Some of the information presented and conclusions drawn herein are from sources other than direct test data on the product itself. The information in the SDS was obtained from sources that we believe are reliable and is believed to be valid and accurate. American Orthodontics, however, makes no warranty, express or implied, regarding its correctness of the information provided. The conditions or method of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. If the product is used as a component in another product or used in a way other than recommended by the Company, this SDS information may not be applicable. **Reasonable safety precautions must always be observed.**