1. Chemical Product and Company Identification

Material name: Carbon and Alloy Tool Steels, High Speed and Stainless Steels
Recommended Use: Bar, Sheet, Plate – Solid Product

Distributor:
Bohler Uddeholm Corporation, 2505 Millennium Drive, Elgin, IL 60124
1-800-630-3000

2. Hazards Identification

Solid metallic products, sold by Bohler Uddeholm Corporation are generally classified as "articles" [1910:1200(c)] and do not constitute a hazardous material in solid form under the definition of the OSHA Hazard Communication Standard (29 CFR 1910:1200). GHS-US has not classified material in solid form, labeling is not applicable.

Under normal use and handling of the solid form of this material there are few health hazards. Welding, sawing, cutting, brazing, grinding, milling, machining, and abrasive blasting, etc. of these materials will produce dust, fume or particulate containing the component elements of these materials. Exposure to the dust, fume or particulate of these materials may present significant health hazards, shown below. Exposure to dust or fume may cause irritation of the eyes, skin and respiratory tract. Fine particulates dispersed in air may present an explosion hazard.

OSHA Hazards: Carcinogen
Skin Sensitizer
Target Organ Effect – Lungs

GHS Classification: Carcinogenicity (Category 2)
Skin Sensitization (Category 1)
Specific Target Organ Toxicity-Repeated Exposure (Category 1)

GHS Label:

Signal Word: Danger

Hazard Statement(s)
H317: Dust/fumes may cause an allergic skin reaction.
H350: May cause cancer.
H351: Dust/fumes suspected of causing cancer via inhalation.
H372: Inhalation of dust/fumes causes damage to respiratory tract through prolonged or repeated exposure

Precautionary Statement(s)
P202: Do not handle until all safety precautions have been read and understood.
P261: Avoid breathing dust/fumes
P281: Use personal protective equipment as required.
P308: If exposed or concerned: Get medical advice/attention.
P313: If exposed or concerned: Get medical advice/attention.

Potential Health Effects

Eye Contact: Dusts or particulates may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact: Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.

Inhalation: Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.

Ingestion: Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.

Potential Fire and Explosion Hazards: Under normal conditions, steel products do not present fire or explosion hazards, and dust generated by handling steel products is oxidized and not combustible. Processing of steel product by some individual customers may produce potentially combustible dust that may represent a fire or explosion hazard.

Chronic or Special Toxic Effects: Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur. Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, and beryllium. See Section 11, for additional, specific information on effects noted above.

Target Organs: Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system.

Medical Conditions Aggravated by Exposure: Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

3. Composition / Information on Ingredients

Component	Cas Number	% Weight	Exposure Limits	
			OSHA PEL (mg/m^3) (TWA – 8hrs)	ACGIH TLV (mg/m^3 - TWA 8 hrs) & (if noted NIOSH REL mg/m^3 -TWA 10 hrs)
Iron (Fe)	1309-37-1	0.01 to 0.99	5 TWA (As Iron Oxide fume)	5 TWA (As Iron Oxide dust and fume)
*Aluminum (Al)+	7429-90-5	0.01 to 2.5	15 TWA (dust) 5 TWA (respirable fraction)	10 TWA (dust) 5 TWA (fume)
Carbon (C)	7440-44-0	0.01 to 3.6	Not Established	Not Established
*Chromium (Cr)	7440-47-3	0.01 to 25	1 TWA	0.5 TWA
*Cobalt (Co)	7440-48-4	0.01 to 40	0.01 TWA (dust and fume)	0.02 TWA
*Copper (Cu)	7440-50-8	0.01 to 4	0.1 TWA (fume) 1 TWA (dust & mist)	0.2 TWA (fume) 1 TWA (dust & mist)(NIOSH) 0.1 TWA (fume) (NIOSH)
*Manganese (Mn)	7439-96-5	0.01 to 19.3	5 Ceiling (fume)	0.02 TWA (respirable fraction) 0.1 TWA (inhalable fraction) 1 TWA (fume) (NIOSH)
Molybdenum (Mo)	7439-98-7	0.01 to 20	10 TWA (Insoluble – dust) 3 TWA (Insoluble – respirable) 0.5 TWA (Soluble – respirable)	10 TWA (Insoluble – dust) 3 TWA (Insoluble – respirable) 0.5 TWA (Soluble – respirable)
*Nickel (Ni)	7440-02-0	0.01 to 99	1 TWA	1.5 TWA (inhalable fraction) 0.015 TWA (NIOSH)
Silicon (Si)	7440-21-3	0.01 to 3.0	10 TWA (dust) 5 TWA (respirable fraction)	10 TWA (dust) (NIOSH) 5 TWA (respirable fraction) (NIOSH)
Titanium (Ti)	7440-32-6 13463-67-7 (Titanium Dioxide - Total dust)	0.01 to 3.10	Not Established 15 TWA (titanium dioxide)	Not Established 10 TWA (titanium dioxide) NIOSH 2.4 TWA (fine) 0.3 TWA (ultra fine)
Tungsten (W)	7440-37-7	0.01 to 18	5 TWA (insoluble compounds) 1 TWA (soluble compounds)	5 TWA (insoluble compounds) 10 STEL
Vanadium (V)	7440-62-2	0.01 to 10	0.5 TWA (ceiling, respirable dust) 0.1 TWA (ceiling, fume)	0.05 TWA (dust and fume) as V2O5

NOTE: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. The above listing is a summary of elements used in the product. Various grades of steel will contain different combinations of these elements and/or trace materials..
Consult appropriate data sheets or test reports for the specific ordered analysis or contact Böhler-Uddeholm.

4. First Aid Measures

Eye Contact: In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.

Skin Contact: In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.

Inhalation: In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this SDS develop.

Ingestion: Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.

Notes to Physician: Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self-limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. Fire-Fighting Measures

Flash Point (Method): Not applicable

Flammable Limits (% volume in air): Not applicable

Auto ignition Temperature: Not applicable

Extinguishing Media: For molten metal, use dry powder or sand. For steel dust use or dry sand, water, Foam, argon or nitrogen.

Special Fire Fighting Procedures: Do not use water on molten metal. Do not use Carbon Dioxide (CO 2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

Unusual Fire or Explosion Hazards: Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

6. Accidental Release Measures

Precautions if Material is Spilled or Released: Emergency response is unlikely unless in the form of combustible dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this SDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways.

Fire and Explosion Hazards: Some customer processes may generate combustible dust that may require specific precautions when cleaning spills or releases of dust.

Environmental Precautions: Some grades of steel may contain reportable quantities of alloying elements.

Waste Disposal Methods: Dispose used or unused product in accordance with applicable Federal, State, and Local regulations. Please recycle.

7. Handling and Storage

Handling Precautions: Use care during processing to minimize dust generation. Where excessive dust may result, use approved respiratory protection equipment. Heating of product may release toxic or irritating fumes; ensure proper ventilation is employed, proper precautions are enforced, and applicable regulations are followed. Handle in accordance with good industrial hygiene and safety procedures.

Storage Requirements: Store away from strong acids, strong bases, strong oxidizers. Alkalis. Metal oxides. Water and humidity. Corrosive substances in contact with metals may produce flammable hydrogen gas.

8. Exposure Controls / Personal Protection

Exposure Guidelines: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 3 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.
Consult a Professional Industrial Hygienist and /or Qualified Safety professional to determine whether work processes are within the permissible exposure limits.

Engineering Measures: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Provide local exhaust when possible, and general ventilation as necessary, to keep airborne concentrations below exposure limits and as low as possible.

Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Seek professional advice prior to respirator selection and use. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen.

Protective Clothing/Equipment: For operations, which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, gloves and safety glasses to prevent skin and eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations. Protective gloves should be worn as required for welding, burning or handling operations. Where the surface treatments are applied to the product, wear gloves when handling. Do not continue to use gloves or work clothing that has become saturated or soaked through with oil coating. Wash skin that has been exposed to oil with soap and water or waterless hand cleaner.

Hygiene Measures: Do not breathe vapors/dust. When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Keep away from food, drink and animal feeding stuffs.

9. Physical and Chemical Properties

Physical State:	Solid	Appearance:	Metallic
Odor:	Odorless	Odor Threshold:	Not available
pH:	Not available	Evaporation Rate:	Not available
Melting Point:	~ (2372 ~ 2800) °F	Freezing Point:	Not available
Boiling Point:	Not available	Flash Point:	Not applicable
Auto-ignition Temp:	Not available	Specific Gravity:	7.5 ~ 8.5
Relative Density:	Not available	Vapor Pressure:	Not available
Solubility:	Insoluble in water	Viscosity:	Not available
Lower Flammable Limit:	Not available	Upper Flammable Limit:	Not available
Flammability (solid, gas):	Not available		

Relative Vapor Density at 20 °C:	Not available
Partition Coefficient: N-octanol/water:	Not available
Decomposition Temperature:	Not available

10. Stability and Reactivity

Reactivity: Hazardous reactions will not occur under normal conditions.

Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Avoid creating or spreading dust. Sparks, heat, open flame and other sources of ignition.

Incompatible Materials: Strong acids, strong bases, strong oxidizers. Alkalis. Metal oxides. Moisture. Corrosive substances in contact with metals may produce flammable hydrogen gas. When molten: water.

Hazardous Decomposition Products: Oxides of iron and carbon. Organic acid vapors. Chromium (VI) compounds. Sulfur compounds.

11. Toxicological Information

The primary component of this product is iron. Long-term exposure to iron dusts or fumes can result in a condition called siderosis, which is considered a benign pneumoconiosis. Symptoms may include chronic bronchitis, emphysema, and shortness of breath upon exertion. Penetration of iron particles in the skin or eye may cause an exogenous or ocular siderosis that may be characterized by a red-brown pigmentation of the affected area. Ingestion overexposures to iron may affect the gastrointestinal, nervous, and hematopoietic system and the liver.
Iron and steel founding, but not iron or iron oxide, has been listed as **carcinogenic (Group 1) by IARC.**

When this product is welded, fumes are generated. Welding fumes may be different in composition from the original welding product, with the chief component being ordinary oxides of the metal being welded. Chronic health effects (including cancer) have been associated with the fumes and dusts of individual component metals (see above), and **welding fumes** as a general category have been listed as a **carcinogen (Group 2B) by IARC.** There is also limited evidence that welding fumes may cause adverse reproductive and fetal effects. Evidence is stronger where welding materials contain known reproductive toxins, e.g., lead which may be present in the coating material of this product.

Breathing fumes or dusts of this product may result in metal fume fever, which is an illness produced by inhaling metal oxides. These oxides are produced by heating various metals including cadmium, zinc, magnesium, copper, antimony, nickel, cobalt, manganese, tin, lead, beryllium, silver, chromium, aluminum, selenium, iron, and arsenic. The most common agents involved are zinc and copper.

This product may contain small amounts of manganese. Prolonged exposure to manganese dusts or fumes is associated with manganism", a Parkinson-like syndrome characterized by a variety of neurological symptoms including muscle spasms, gait disturbances, tremors, and psychoses.

This product may contain small amounts of chromium. Prolonged and repeated overexposure to chromium dusts or fumes may cause skin ulcers, nasal irritation and ulceration, kidney damage and cancer of the respiratory system. Chromium is skin sensitizer. Cancer is generally attributed to the **hexavalent (+6) form of chromium** which is listed as a **carcinogen (Group 1) by NTP and IARC**

This product may contain small amounts of nickel. Prolonged and repeated contact with nickel may cause sensitization dermatitis. Inhalation of nickel compounds has caused lung damage as well as sinus, nasal and lung cancer in laboratory animals. **Nickel** is a listed **carcinogen (Group 1) by NTP and IARC**

This product may contain small amounts of vanadium. Adverse effects from dermal, inhalation or parenteral exposure to various vanadium compounds have been reported. The major target for vanadium pentoxide toxicity is the respiratory tract. Fumes or dust can cause severe eye and respiratory irritation, and systemic effects. Chronic bronchitis, green tongue, conjunctivitis, pharyngitis, rhinitis, rales, chronic productive cough, and tightness of the chest have been reported following overexposure. Allergic reactions resulting from skin and inhalation exposures have also been reported. A statistical association between vanadium air levels and lung cancer has been suggested, but vanadium currently is not regarded as a human carcinogen.

The product may contain small amounts of copper. Copper dust and fumes can irritate the eyes, nose and throat causing coughing, wheezing, nosebleeds, ulcers and metal fume fever. Other effects from repeated inhalation of copper fumes include a metallic or sweet taste, and discoloration of skin, teeth or hair. Copper also may cause an allergic skin reaction. Overexposure to copper can affect the liver.

12. Ecological information

Aquatic Ecotoxicological Data: No specific information available on this product.
Environmental Fate Data: No specific information available on this product.

13. Disposal Considerations

Steel scrap should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.

14. Transport Information

There are no special requirements for the shipping of this product

DOT Proper Shipping Name:	Not regulated
DOT Hazard Classification:	Not regulated
UN/NA Number:	Not applicable
DOT Packing Group:	Not applicable
Labeling Requirements:	Not applicable
Placards:	Not applicable
DOT Hazardous Substance:	Not applicable
DOT Marine Pollutant:	Not applicable

15. Regulatory Information

OSHA Regulations: This product is not hazardous under the criteria of the OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.
EPA Regulations: RCRA (40CFR261): Steel scrap is not regulated as a solid waste or a hazardous waste under this act. If product dusts and/or fumes from processing operations are not recycled, they are considered a solid waste and may be classified as a hazardous waste depending on the toxicity characteristics of the dust as defined within 40CFR261.24.

16. Other information

SDS History:

Supersedes:	Jun 29 2006
Revision:	Mar 17 2016

Key-Legend:

ACGIH	American Conference of Governmental Industrial Hygienists
CAS	Chemical Abstract Service
DOT	Department of Transportation
EPA	Environmental Protection Act
IARC	International Agency for Research on Cancer
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-Contained Breathing Apparatus
SDS	Safety Data Sheet
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average
UN/NA	United Nations/North American
mg	milligram

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This document has been prepared solely for the intent of compliance in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910:1200.