Material Safety Data Sheet (MSDS)

1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: HIGH TEMPERATURE ALLOY
DESCRIPTION: ODORLESS, GRAY METALLIC SOLID
PRODUCT FAMILY: HIGH TEMPERATURE ALLOY/SUPER ALLOY

This Material Safety Data Sheet applies to ASKO products: ASKODYNE "H"™, ASKODYNE "HX"™, UNISHEAR 1100™, and UNISHEAR 2200™

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2 – COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	PERCENTAGE BY WEIGHT	OSHA PEL	ACGIH TLV
Iron (Fe)	7439-89-6	19 – 30	10 mg/m^3 as Fe_2O_3 (Fume)	5 mg/m^3 as Fe_2O_3 (Dust and Fume)
Nickel (Ni)	7440-02-0	0 – 55	1 mg/m^3	1.5 mg/m^3 (Inhalable Fraction)
Chromium (Cr)	7440-47-3	0 – 21	0.5 mg/m^3 (Cr III) 5 $\mu g/m^3$ (Cr VI)	0.5 mg/m^3 (Cr, Cr III) 0.05 mg/m^3 (Cr VI Soluble) 0.01 mg/m^3 (Cr VI Insoluble)
Cobalt (Co)	7440-48-4	0 – 16	0.1 mg/m^3 (as Co)	0.02 mg/m^3 (as Co)
Niobium (Nb)	7440-03-1	0 – 5	15 mg/m^3 Total Dust 5 mg/m^3 Resp. Dust (PNOR)	10 mg/m^3 Total Dust (PNOR)
Molybdenum (Mo)	7439-98-7	0 – 5	15 mg/m^3 (Mo Metal)	10 mg/m^3, Inhalable 10 mg/m^3 Resp.
Aluminum (Al)	7429-90-5	0 – 2	15 mg/m^3 Total Dust 5 mg/m^3 Resp. Dust	10 mg/m^3
Titanium (Ti)	7440-44-0	0 – 2	15 mg/m^3 Total Dust 5 mg/m^3 Resp. Dust	10 mg/m^3 Total Dust

*OSHA PEL proposed (1989) and subsequently vacated. (Otherwise apply PNOR PEL – 15 mg/m^3 Total Airborne Dust; 5 mg/m^3 RESP.)

NOTE: 1) The above details encompass the composition range for this series of product grades.
2) All exposure limits are 8-hour TWAs unless otherwise specified.
3) Abbreviations/Acronyms are defined in Section 16.
4) OSHA PEL – Mandatory regulatory exposure standard.
5)ACGIH TLV – Consensus exposure guideline, not a regulatory requirement.

3 – HAZARDS IDENTIFICATION

GENERAL HAZARD STATEMENT: This document is directed toward airborne particulate that may be generated during processing of this product. Solid products prepared from this material are classified as "articles" and are exempt from OSHA MSDS requirements. This product in its normal, as manufactured physical state does not represent a health or fire hazard. It is recognized that user processing can alter the inherent hazardous properties of this product. Hazardous airborne dust may be generated by physical/mechanical means such as grinding, welding, brazing, torch-cutting, sawing, drilling, polishing, and machining.

HAZARD OVERVIEW: Potentially hazardous airborne dust may be generated under certain handling and processing conditions. Processing should be performed in well-ventilated areas. High airborne dust concentrations should be addressed by a Certified Industrial Hygienist or other competent professional. If dust concentrations cannot be effectively limited by procedural improvements or ventilation and other engineering controls, respiratory protection and other PPE must be utilized.

HMIS DESIGNATION/SOLID PRODUCT: HEALTH 0 FLAMMABILITY 0 REACTIVITY 0

The above designation applies to solid product. Health risk and flammability are dependent upon particle size and dust concentration.

HMIS DESIGNATION/AIRBORNE DUST: HEALTH 2 FLAMMABILITY 1 REACTIVITY 0

PRIMARY ROUTE OF ENTRY: Inhalation of airborne dust.

HMIS KEY: 0 = Minimal Hazard; 1 = Slight Hazard; 2 = Moderate Hazard; 3 = Serious Hazard; 4 = Severe Hazard

Acute Effects of Overexposure:

This product in normal solid form does not present an exposure hazard. Airborne dust associated with mechanical processing is hazardous.

INHALATION:

Acute exposures to high concentrations of airborne dust may result in respiratory irritation or obstructed airways. Recurring inhalation at high dust levels from any source may result in respiratory system damage.

EYE:

Direct eye contact with airborne dust may cause eye irritation, redness, itching associated with mechanical abrasion.

SKIN:

Prolonged contact with dust may cause skin irritation or sensitization, possibly leading to dermatitis.

INGESTION:

Solid product as manufactured is not a likely ingestion hazard. Ingestion of large quantities of this product (dust) may cause gastrointestinal irritation and pain, nausea and/or vomiting. Other serious effects (diarrhea, convulsions, death) may occur if large amounts of product are swallowed. Ingestion of massive quantities of dust is extremely unlikely under typical processing conditions. Unconfirmed reports from sources outside the Carbide Metal Industry suggest that ingestion of significant quantities of Cobalt can potentially cause cardiovascular disorders.

Chronic Effects of Overexposure:

REPEATED EXCESSIVE EXPOSURES MAY CAUSE:

Allergic skin sensitization/dermatitis
Respiratory irritation, inflammation, permanent respiratory system damage
Eye inflammation, irritation of mucous membranes
Systemic damage to target organs

CARCINOGENICITY:

This product in solid form has not been identified as a known or suspected carcinogen. IARC, NTP, and OSHA have listed Cobalt as a potential carcinogen. Toxic characteristics of individual components are presented in Section 11.

SYNERGISTIC MATERIALS:
None known

SIGNS AND SYMPTOMS OF OVEREXPOSURE:
Redness, swelling, itching, and/or irritation of skin and eyes; dermatitis
Coughing, wheezing, shortness of breath, respiratory irritation; permanent respiratory system damage
Systemic damage to target organs

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:
Pre-existing allergies, respiratory disorders, and skin conditions may be aggravated by exposure to airborne dust. Individuals with prior history of emphysema, asthma, bronchitis, dermatitis, or other pulmonary and skin disorders may exhibit sensitivity to dust.

4 – FIRST AID MEASURES

INHALATION: If overexposure occurs, remove victim from the adverse environment to fresh air. If symptoms of pulmonary involvement persist (coughing, wheezing, shortness of breath), seek medical attention. If breathing has stopped, certified individuals should perform CPR. Keep affected person warm and at rest.

EYE: Immediately flush with large amounts of running water for several minutes. If persistent eye irritation occurs, seek medical attention.

SKIN: If material gets on skin, wash contaminated area with soap and water. Remove and wash contaminated clothing. If a persistent rash or irritation occurs, seek medical attention.

INGESTION: If person is conscious and able to swallow, give large amounts of water to dilute. If victim is unconscious, do not give water, and do not induce vomiting. If vomiting occurs, keep head below hips to help prevent aspiration into lungs. Note: Do not induce vomiting to an unconscious person due to risk of aspiration of stomach contents into the lungs. Seek medical attention.

5 – FIRE FIGHTING MEASURES

FLASH POINT: N/A
FLAMMABLE LIMITS: N/A
AUTOIGNITION TEMPERATURE: N/A
GENERAL FIRE HAZARD: N/A (Non-flammable)

FLAMMABILITY CLASSIFICATION: Solid, as –manufactured product: N/A (Non-flammable). Finely divided airborne particles at extremely high concentration may ignite in contact with a high energy spark. Fine dust accumulations may burn slowly.

EXTINGUISHING METHOD: As appropriate for surrounding combustible materials. For localized metal powder/dust fires, smother with dry sand, sodium chloride or soda ash.

FIRE FIGHTING EQUIPMENT: As appropriate for surrounding material. Positive pressure SCBA and structural firefighter's protective clothing should be used for fighting large fires. Note: Extremely dangerous conditions caused by large indoor fires are oxygen deficiency and carbon dioxide. The combined effects of limited oxygen plus carbon monoxide have resulted in many firefighter deaths.

UNUSUAL FIRE OR EXPLOSION HAZARDS: Solid formed product does not constitute a fire or explosion hazard. Extremely high-airborne concentrations of finely divided particles may present an explosion hazard. Fire and explosion are extremely rare and unusual. Toxic, irritating combustion/decomposition products may be evolved at high temperature. Combustion may result in oxygen deficiency and of emissions of carbon monoxide and other toxic combustion products.

EXPLOSION DATA: *Sensitivity/Mechanical Impact*: N/A

SENSITIVITY/STATIC DISCHARGE: Very high airborne dust concentrations may be ignited by high energy static sparking.

HAZARDOUS COMBUSTION PRODUCTS: Combustion may result in oxygen deficiency and may generate carbon monoxide and toxic fumes.

6 – ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED: The following precautions apply to material spills:
Avoid generation of airborne dust.
Contain spillage, vacuum or wet material and scoop into an appropriate container for disposal or recycling.
During cleanup, skin and eye contact, ingestion and inhalation of material should be avoided.
Provide local exhaust or dilution ventilation as required.
Appropriate PPE should be worn during cleanup if exposure limits are exceeded (*see SECTION 8, EXPOSURE CONTROLS/ PERSONAL PROTECTION*).
Comply with federal, state, and local regulations regarding reporting of spills and waste disposal.
Spilled product should be reclaimed and recycled to the extent feasible.

7 – HANDLING AND STORAGE

HANDLING: Avoid dust generation and breathing of airborne dust. If excessive airborne dust is generated during handling, apply exposure control measures noted in Section 8.
Practice good personal hygiene. Wash hands and highly contaminated clothing. Avoid ingestion of material.

STORAGE: Store indoors in a dry, secure area away from incompatible materials (*see SECTION 10, STABILITY AND REACTIVITY).* Maintain good housekeeping practices to prevent excessive dust accumulation.

8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: If airborne dust is generated, provide general dilution ventilation and/or local exhaust ventilation sufficient to maintain personal exposures below OSHA permissible exposure limits.

RESPIRATORY: When engineering or administrative controls cannot maintain exposures below OSHA permissible limits, use an appropriate NIOSH approved respirator. If respiratory protection is required, all requirements as set forth in 29 CFR 1910.134 (1998 revision) must be met. A Certified Industrial Hygienist or other competent health and safety professional should be consulted for respirator selection, fit testing, and training.

GLOVES: Suitable for protection against direct skin contact with fine particles that may be generated during handling and processing.

EYE: Safety glasses or goggles when there is a reasonable probability of projectiles or high airborne particulate concentration.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Adequate footwear (safety shoes if necessary) and clothing that protects skin from prolonged or repeated contact with dust. Change clothing if there is a reasonable probability of excessive dust contamination.

9 – PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point Estimate: >2000°C (4000°F) (non-volatile at ambient conditions)

Vapor Pressure (mm Hg, @ 68°F): N/A

Vapor Density (AIR = 1): N/A (non-volatile)

Melting Point Estimate: >1000°C (2000°F) (no vapor emissions)

Appearance and Odor: Odorless, dark gray, metallic solid

Specific Gravity (H_2O = 1): (approx) 11-16

Evaporation Rate: N/A (non-volatile)

Solubility in water: Essentially Insoluble

pH: N/A (not water soluble)

10 – STABILITY AND REACTIVITY

STABILITY: Stable under normal temperature and pressure conditions.

CONDITIONS TO AVOID: Strong Acids, Bases, Oxidizers

INCOMPATIBLE MATERIALS: Halogens, Metal Oxides, Strong Acids, Bases, Oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Product will not decompose spontaneously. Thermal decomposition is unlikely, but may occur at temperatures above 3000°C (5000°F). Toxic fume emissions may occur during welding, torch-cutting or other high-temperature thermal treatment. May react with oxygen at high temperature, potentially resulting in oxygen deficiency.

HAZARDOUS POLYMERIZATION: Will not occur.

11 – TOXICOLOGICAL INFORMATION

No toxic effects have been reported for solid metallic product. Listed health effects apply to finely divided particles of specific constituents. It should be recognized that all dust from any source represents a respiratory hazard in high-airborne concentrations.

Toxicity characteristics of individual components are listed below:

Iron: Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in development of a benign pneumoconiosis, known as siderosis, which is observable as an x-ray opacity. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of ferric oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

Nickel: Nickel fumes are respiratory irritants and may cause pneumonitis. Exposure to nickel and its compounds may result in the development of a dermatitis known as "nickel itch" in sensitized individuals. The first symptom is usually itching, which occurs up to 7 days before skin eruption occurs. The primary skin eruption is erythematous (skin redness), or follicular, which may be followed by skin ulceration. Nickel sensitivity, once acquired, appears to persist indefinitely.

Carcinogenicity - Nickel and certain nickel compounds have been listed by NTP as being reasonably anticipated to be carcinogens. IARC has listed nickel compounds within group 1 (there is sufficient evidence for carcinogenicity in humans) and nickel within group 2B (agents which are possibly carcinogenic to humans). Nickel is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). Based upon recent epidemiological data, ACGIH has designated elemental nickel as a category A5, not a suspected human carcinogen.

Chromium: The health hazards associated with exposure to chromium are dependent on its oxidation state. The elemental metal form present in this alloy is of low toxicity. The hexavalent form and some trivalent compounds are toxic. Adverse effects of the hexavalent form on the skin may include ulcerations, dermatitis, allergic skin reactions, or malignant lesions. Inhalation of hexavalent chromium compounds can result in ulceration and perforation on the mucous membranes of the nasal septum, irritation of the pharynx and larynx, asthmatic bronchitis, bronchospasms and edema. Respiratory symptoms may include coughing and wheezing, shortness of breath, and nasal itch.

Carcinogenicity - Elemental chromium and most trivalent compounds have been listed by NTP as having inadequate evidence for carcinogenicity in experimental animals. According to NTP, there is sufficient evidence for carcinogenicity in experimental animals for the following hexavalent chromium compounds: calcium chromate, chromium trioxide, lead chromate, strontium chromate and zinc chromate. IARC has listed chromium metal and its trivalent compounds within Group 3 (The agent is not classifiable as to its carcinogenicity to humans). Chromium is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). ACGIH has classified chromium metal and trivalent chromium compounds as A4, not classifiable as a human carcinogen. Water soluble hexavalent chromium compounds have been classified by ACGIH as A1, confirmed human carcinogen. The chromium metal form (Cr^{o}) appearing in this alloy is not water soluble.

Cobalt: Exposure to airborne cobalt dust is reported to cause shortness of breath and dyspnea (breathing difficulty), decreased pulmonary function, nodular fibrosis, respiratory hypersensitivity, weight loss and permanent disability. Repeated prolonged excessive inhalation can result in permanent disability. Prolonged skin contact may cause sensitization and dermatitis. Ingestion of excessive quantities may cause gastrointestinal irritation, stomach pain, cardiovascular disorders, nausea, convulsions, death.

Carcinogenicity - IARC has listed cobalt and cobalt compounds with group 2B (possibly carcinogenic to humans). ACGIH has placed cobalt and inorganic compounds in category A3 (experimental animal carcinogen - carcinogenic in experimental animals at a relatively high dose, by routes, histologic types, or by mechanisms that are not considered relevant to occupational exposure).

Niobium: (previously named Columbium) Niobium metal has not been assigned an OSHA PEL or a NIOSH TWA. Accordingly, Niobium Metal is regulated as PNOR. This metal (airborne particulate) is expected to exhibit mechanical abrasive eye irritation and will cause respiratory irritation.

Molybdenum: Though molybdenum has caused toxicity (anemia and poor growth) in farm animals, there is very little data documenting toxicity to humans due to industrial exposure High airborne concentrations of molybdenum are believed to cause lung disease and irritation.

Aluminum: Mildly irritating nuisance dust to eyes, skin and respiratory system in airborne concentrations greater than 15 mg/m3. Ingestion is not a likely exposure pathway. There are unconfirmed reports associating aluminum ingestion with Alzheimer's Disease.

Titanium: Elemental titanium has been assigned no OSHA PEL, and no ACGIH TLV. Accordingly, Titanium Metal is classified as PNOR. This metal (airborne particulate) is considered as nuisance dust and mechanical abrasive eye irritant. Inhalation of high airborne concentrations may block air passageways and cause respiratory irritation.

12 – ECOLOGICAL INFORMATION

Material is stable and essentially insoluble in water. The solid formed product will not readily migrate into soil and groundwater, and does not present an ecological hazard. Finely divided particles may present an airborne dust and environmental-ecological hazard. Under prolonged environmental exposure, some constituents may undergo oxidation and hydrolysis. This product is composed of elements that constitute the earth’s crust. Elemental constituents and associated compounds will prevail in the environment indefinitely.

13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Solid formed product would not be classified as hazardous waste. Potential hazard level increases with decreasing particle size. Waste should be classified by a competent environmental professional and disposed, processed, or recycled in accordance with federal, state and local regulations. Reclamation and recycling of waste material is recommended.

14 - TRANSPORT INFORMATION

HAZARDOUS MATERIALS DESCRIPTION/PROPER SHIPPING NAME: N/A

HAZARD CLASS: N/A

LABEL REQUIRED: N/A - No special labeling is required for the solid product as manufactured. Some transportation guidelines may classify finely divided metallic powders as “flammable solid.” Appropriate labeling placarding and documentation must accompany shipment of any material that is subject to labeling requirements.

PACKING GROUP: N/A

15 - REGULATORY INFORMATION

SARA TITLE III HAZARD CATEGORIZATION: Total composition has not been categorized.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (EHSs): No components are listed as extremely hazardous substances.

SARA TILE III SECTION 313 REPORTABLE SUBSTANCES: Chromium, Cobalt, Nickel

CERCLA HAZARDOUS SUBSTANCES: Chromium, Cobalt, Nickel; N/A for sold product. Material at particle size of less than 100 micrometers may require reporting if thresholds are exceeded.

16 – OTHER INFORMATION

ABBREVIATIONS/ACRONYMS:
Following are some abbreviations and acronyms that may appear on MSDSs:

ACGIH	- American Conference of Governmental Industrial Hygienists
AL	- Action Level
ANSI	- American National Standards Institute
C	- Ceiling Concentration (OSHA) – not to be exceeded
CAS	- Chemical Abstracts Service
CEIL	- Ceiling Limit (OSHA) – Exposure Limit not to be exceeded
CERCLA	- Comprehensive Environmental Response, Compensation and Liability Act
CFR	- Code of Federal Regulations
CPR	- Cardiopulmonary Resuscitation
DOT	- US Department of Transportation
EPA	- Environmental Protection Agency
EST	- Eastern Standard Time
HEPA	-High Efficiency Particle Arrestor (Filter)
HMIS	- Hazardous Materials Identification System
IARC	- International Agency for Research on Cancer
mg/m3	- milligrams per cubic meter of air
mg/kg	-milligrams per kilogram (=parts per million by weight)
mppcf	- million particles per cubic foot
MSDS	- Material Safety Data Sheet
MSHA	- Mine Safety and Health Administration
N/A	- Not Applicable
NFPA	- National Fire Protection Association
NIA	- No Information Available
NIF	- No Information Found
NIOSH	- National Institute for Occupational Safety and Health
NTP	- National Toxicology Program
OSHA	- Occupational Safety and Health Administration
PEL	- Permissible Exposure Limit
pH	-Negative Logarithm of Hydrogen Ion Concentration
PNOR	- Particulate Not Otherwise Regulated
PNOC	- Particulate Not Otherwise Classified
POTW	- Publicly Owned Treatment Works
PPE	- Personal Protective Equipment
ppm	- parts per million
RCRA	-Resource Conservation and Recovery Act
resp	- respirable
SARA	-Superfund Amendments and Reauthorization Act
SCBA	- Self-contained Breathing Apparatus
STEL	- Short-term Exposure Limit
TLV	- Threshold Limit Value
TWA	- Time-weighted Average
µg/m3	- Micrograms per cubic meter of air
<	- Less than
>	- Greater than

DISCLAIMER:
Details presented in this MSDS were derived from literature sources and regulatory documents believed to be accurate and authoritative. The purpose of this MSDS is to serve as a general guide to users of this product. It is the user's responsibility to define acceptability of this product for their application, to ensure safe usage of this product, and to comply with all applicable federal, state and local regulations. The user must satisfy requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and any other applicable occupational health and environmental regulations. This MSDS is not intended as a total regulatory compliance document, nor should it be construed as a license or a recommendation to violate any law or infringe on any patent.

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