MATERIAL SAFETY DATA SHEET

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COMPANY NAME: **Keo Cutters, Inc.**
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Betzinger / KCT
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Product Name: Keo Cutters ZErO Flute Countersinks, Kounterbores
M35 High Speed Steel Cutting Tools.

Hazardous Ingredients

Material	Percent by Weight
Chromium	< 5%
Vanadium	< 2%
Molybdenum	< 6%*
Iron	Balance
Nickel	< 1%
Cobalt	5%
Manganese	< 1%
Tungsten	< 7%

Steps to be Taken in Case Material is Released or Spilled:
Clean up area using methods that avoid dust generation such as a high efficiency particulate air (HEPA) vacuum, wet dust mop, or wet clean-up. Use an appropriate National Institute of Occupational Safety and Health (NIOSH)-approved respirator whenever airborne concentrations of hazardous components exceed exposure limits described on Page 1.

Physical Data

Appearance and Odor:	Solid Metal, Odorless	**Specific Gravity (H_2O=1):**	Not applicable
Boiling Point:	2760C	**Percent Volatile by Volume:**	Not applicable
Melting Point:	1371C	**Evaporation Rate:**	Not applicable
Vapor Pressure (mm Hg):	Not applicable	**Solubility in Water:**	Insoluble
Vapor Density (Air=1):	Not applicable		

Health Hazard Data

During normal operation and usage, M35 High Speed Steel products do not present inhalation, ingestion, or other chemical hazards. However, operations such as grinding, cutting, burning, and welding of such products may release dusts, fumes, or vapors which may present health hazards, if the exposure limits described on Page 1 are exceeded. The health hazards described below relate to these non-routine operations, as well as exposure to component materials.

Primary Routes of Entry: Inhalation, and eye contact

Wet or dry grinding of steel will produce dusts of potentially hazardous ingredients that can be inhaled or come in contact with the eyes.

Health Effects:
The effects of overexposure to the various metal fumes and dusts which may be generated from this product and the associated health efforts from overexposure area as follows:

ACUTE: Excessive inhalation of metallic fumes and dusts may be irritating to respiratory passages. Excessive inhalation of fumes from any metal can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar and easily confused with flu symptoms), a metallic taste in the mouth, and dryness and irritation of the throat. The symptoms will present themselves in a few hours after excessive exposure and usually last from 12 to 48 hours. Long-term efforts from metal fume fever have not been noted.
High concentrations of metallic fumes and dusts can result in irritation of the eyes, skin, mucous membranes, and other forms of physical irritation.

CHRONIC: Chronic inhalation of high concentrations of metallic fumes and dusts are associated with the following conditions:

ALUMINIUM: Excessive exposures to aluminum metal fumes and dust have been associated with scarring of the lung tissue, and respiratory irritation, but this effect may be due to simultaneous silica exposure.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO

CARBON: Elemental carbon, as it exists in this product, is of very low toxicity. Health hazard data presented here is based on exposures to carbon black, not carbon as it is found in this product. Chronic inhalation exposure to carbon black may result in temporary or permanent damage to the lungs and heart. Pneumoconiosis has been found in workers engaged in the production of carbon black. Skin conditions such as inflammation of the hair follicles, and oral mucosal lesions have also been reported from skin exposure.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	3*
OSHA REGULATED:	NO

* (for Carbon Black)

CHROMIUM: The health hazards associated with exposure to chromium are dependent on its oxidation state. The metal form (chromium as it exists in this product0 is of very low toxicity. Welding fume generated from high chromium stainless steel may contain hexavalent chromium. This water-soluble hexavalent form is considerably more toxic. Adverse effects of the hexavalent form on the skin may include ulcerations, dermatitis and allergic skin reactions. Inhalation of hexavlanet chromium compounds can result in ulceration and perforation of the mucous membranes of the nasal septum, irritation of the pharynx and larynx, asthmatic bronchitis, bronchospasm and edema. Respiratoir symptoms may include coughing and wheezing, shortness of breath and nasal itch. Eye irritation or inflammation may also result. The NTP lists hexavalent chromium as a known human carcinogen. Chromium metal is listed as not classifiable as to carcinogenicity to humans.

CARCINOGENICITY:	YES
NTP:	NO*
IARC:	3*
OSHA REGULATED:	NO

- (Hexavalanet Chromium NTP: 1, IARC: 1)
- ACGIH A4

COBALT: Inhalation of cobalt metal fumes and dust causes irritation of the nose and throat. Cobalt dust may cause an asthma-like disease with symptoms ranging from cough, chronic bronchitis, shortness of breath and labored breathing,

to decreased pulmonary function, nodular scarring of the lung tissues, permanent disability and death. Exposure to cobalt may cause weight loss, dermatitis (inflammation of the skin) and respiratory hypersensitivity. Although cobalt is not listed by NTP or OSHA as a carcinogen, some data suggests that cobalt is an experimental carcinogen in laboratory animals. The author finds that the current OSHA limit of 0.1 mg/m^3 is not protective of worker health.

CARCINOGENICITY:	NA
NTP:	NO*
IARC:	2B
OSHA REGULATED:	NO
ACGIH A3	

COLUMBIUIM (NIOBIUM): columbium, when inhaled, is retained mainly in the lungs, and secondarily in bones. It interferes with calcium as an activator of enzyme systems. In laboratory animals, inhalation of niobium nitride and/or pentoxide leads to scarring of the lungs at exposure levels of 40 mg/m^3. Columbium is a moderate eye irritant and a powerful skin irritant in laboratory animals.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO

IRON: Iron oxide can be generated during arc welding of this product. Chronic inhalation of excessive concentrations of iron oxide fumes and dusts may result in development of benign pneumoconiosis, called siderosis, which is observable as an x-ray change. Inhalation of excessive concentrations of iron oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Acute exposure to the eyes may result in mild conjunctivitis.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	3
OSHA REGULATED:	NO
TLVA4	

MANGANESE: Chronic exposure to high concentrations of manganese fumes and dusts may increase the incidence of pneumonia and lung damage and may adversely affect the central nervous system with symptoms including sleepiness, weakness, emotional disturbances, spastic walk, mask-like facial expressions and paralysis.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO
EPA - D	

MOLYBDENUM: Dust of metallic molybdenum has caused difficulty breathing , general weakness, dizziness, chest pain, expectoration, fatigue, headache, anorexia, and joint and muscle pain. Molybdenum has caused anemia and poor growth in experimental animals. Molybdenum may also cause pneumoconiosis and irritation to the lungs and eyes. In rates, dusts of metallic molybdenum have caused growth depression and thickening of intraalveolar septa, which contained connective tissue fibers.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO

NICKEL: Nickel fumes are respiratory irritants and have been a known cause of asthma, pneumonia, pulmonary edema and pulmonary fibrosis in welders using nickel alloys. Airborne nickel contaminated dusts are regarded as capable of producing lung cancer. The risk is higher for workers at primary nickel smelters and refineries than for workers exposed to nickel alloys. Skin contact may cause an allergic rash. Nickel itch is the dermatitis resulting from sensitization to nickel. Itching can occur up to 7 days before skin eruption occurs. The primary skin eruption is reddening, or infection of the hair follicles, which may be followed by skin ulceration. Nickel sensitivity, once acquired, is apparently not lost.

CARCINOGENICITY:	YES
NTP:	2
IARC:	2B
OSHA REGULATED:	NO

SELENIUM: Overexposure of selenium fumes may produce accumulations of fluid in the lungs, garlic breath, bronchitis, pneumonitis, bronchial asthma, nausea, chills, fever, headache, sore throat, shortness of breath, conjunctivitis, vomiting, abdominal pain, diarrhea and enlarged liver. Selenium is an eye and upper respiratory irritant and a sensitizer. Overexposure may result in red staining of the nails, teeth and hair. Selenium dioxide reacts with moisture to form seleniuous acid that is corrosive to the skin and eyes.

CARCINOGENICITY:	NA
NTP:	R
IARC:	3
OSHA REGULATED:	NO
EPA - D	

SILICON: Elementary silicon is an inert material. Slight pulmonary lesions have been reported in laboratory animals from injections of silicon dust within the trachea. Silicon dust has little adverse affect on lungs and does not appear to produce significant organic disease or toxic effects when exposures are kept under the TLV. Silicon may cause chronic respiratory effects if repeated overexposure occurs

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO

TITANIUM: Elemental titanium is an inert material. Titanium dioxide may be generated in welding fumes from this product. At extremely high concentrations titanium dioxide has induced lung cancer in rates. Titanium dioxide dust is a mild pulmonary, eye and skin irritant. Rates exposed to titanium dioxide developed small focal areas of emphysema which were attributable to large deposits of dust. Excessive exposure in humans may result in slight chances in the lungs. The dusts of titanium dioxide can be placed in the nuisance category.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	3*
OSHA REGULATED:	NO
* (for Titanium Dioxide)	

TUNGSTEN: Chronic exposure to tungsten dust has been reported to cause pulmonary fibrosis, characterized by cough, labored breathing, and wheezing. Dermatitis (inflammation of the skin), primarily on the sides of the neck, inner forearm, and the backs of the hands, was also reported. Dusts of tungsten pose a hazard considered to be somewhat greater than that of nuisance dust.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO

VANADIUM: The health hazards associated with exposure to vanadium are dependent on its oxidation state. This product contains elemental vanadium. Elemental vanadium could be oxidized to vanadium pentoxide during welding. The pentoxide form is more toxic than the elemental form. Chronic exposure to vanadium pentoxide dust and fumes may cause severe irritation of the eyes, skin, upper respiratory tract, persistent inflammation of the trachea and bronchi, pulmonary edema, and systemic poisoning. Signs of symptoms of overexposure include: conjunctivitis, nasopharyngitis, cough, labored breathing, rapid heart beat, lung changes, chronic bronchitis, skin pallor, greenish-black tongue and an allergic skin rash.

CARCINOGENICITY:	NA
NTP:	NO
IARC:	NO
OSHA REGULATED:	NO

THIS PRODUCT AS A MIXTURE HAS NOT BEEN DETERMINED TO BE CARCINOGNEIC. HOWEVER, INDIVIDUAL COMPONENTS, NICKEL, CERTAIN CHROMIUM AND COBALT COMPOUNDS, AND TITANIUM DIOXIDE HAVE BEEN ASSOCIATED WITH CARCINOGENICITY.

NTP = NATIONAL TOXICOLOGY PROGRAM

1. Known to be carcinogenic sufficient evidence from human studies.
2. Reasonably anticipated to be a carcinogen; limited evidence from studies in humans or sufficient evidence from studies in experimental animals.

IARC = INTERNATIONAL AGENCY FOR RESEARCH ON CANCER
1. Carcinogenic to humans; sufficient evidence of carcinogenicity.
2A. Probably carcinogenic to humans; limited human evidence, sufficient evidence in experimental animals.
2B. Possible carcinogenic to humans; limited evidence in human in the absence of sufficient evidence in experimental animals.0
3. Not classified as to carcinogenicity to humans.
4. Probably no carcinogenic to humans.

EPA - D
Not classifiable as to human carcinogenicity. Inadequate human and animal evidence of carcinogenicity or no data available.

TLV
A3. Confirmed animal carcinogen with unknown relevance to humans.
A4. Not classified as human carcinogen.

First Aid:

Inhalation:
If symptoms of pulmonary involvement develop (coughing, wheezing, dyspnea, etc.), remove to fresh air. If symptoms persist, seek medical attention.

Eye Contact:
Remove contact lenses at once. Flush eyes with water for at least fifteen minutes. If irritation persists, seek medical attention.

Fire Fighting Measures

Flash Point: Not applicable **Lower Explosive Limit:** Not applicable **Upper Explosive Limit:** Not applicable

M35 High Speed Steel products are not a fire hazard under normal conditions of use. However, dusts generated in grinding may be sensitive to static discharge or ignite if allowed to accumulate, then be exposed to an ignition source.

Extinguishing Media:
For dust fires, smother with dry sand, dry dolomite, ABC type fire extinguisher, or flood with water

Disposal

DISPOSAL METHOD: Dusts, etc. -- follow Federal, State, and Local regulations regarding disposal.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Use good housekeeping practices to prevent accumulations of dusts and to keep airborne dust concentrations at a minimum.

Handling

Always consult a Professional Hygienist

RESPIRATORY PROTECTION: If fumes, misting or dust conditions occur, consult a professional industrial hygienist. Provide NIOSH approved respirators.

VENTILATION: Use general or local exhaust ventilation to keep airborne concentrations of dust and fumes below the TLV. Consult a professional industrial hygienist.

GLOVES: Gloves and barrier creams may be necessary to prevent skin sensitization and dermatitis (inflammation of the skin).

EYE PROTECTION: Safety glasses should be worn when grinding or cutting; face shields should be worn when welding or burning.

WORK/HYGIENCI PRACTICES: As required.

Stability and Reactivity

Stability: Stable
Conditions to Avoid: Avoid exposure to generated dust and/or fume
Incompatibility: Reacts with strong acids to generate hydrogen gas.
Hazardous Decomposition Products: Metalic oxides
Hazardous Polymerization: Will Not Occur

Precautions to be Taken in Handling and Storage:
Maintain good housekeeping procedures to prevent dust accumulation during grinding. Avoid dust inhalation and direct skin contact with dust.

Regulatory Information

OSHA
This product, under normal conditions of use, is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dust generated while grinding, cutting, burning or welding this product may be hazardous .

TSCA
Components of this product are listed on the TSCA inventory.

SARA:
Chromium and cobalt are subject to the requirements of Section 313 of Title III of Superfund Amendment and Reauthorization Act of 1986.

State Regulatory Information:
The products referred to herein contains or produces chemicals known to the State of California to cause cancer and birth defects (or other reproductive harm) (California Health & Safety Code Section 25249.5).

Other Information

Users Responsibilities
This Material Safety Data Sheet provides information consistent with recommended applications of these products and anticipated non-routine activities involving the product. It is the user's responsibility to identify and protect against health and safety hazards presented by modification of cemented carbide products after manufacture. Individuals handling cemented carbide products should be informed of all relevant hazards and recommended safety precautions, and should have access to the information contained in this MSDS.

Disclaimer
The information contained herein is based upon data provided by manufacturers and suppliers of raw materials used in the manufacture of cemented carbide products. The information is offered in good faith as accurate and correct, but no representations, guarantees, or warranties of any kind are made as to its accuracy or completeness, suitability for particular applications, hazards connected with the use of the product, or the results to be obtained from the use thereof. User assumes all risk and liability of any use or handling of any material beyond Keo Cutters, Inc. control. Variations in methods, conditions, equipment used to store, handle, or process the material, and hazards connected with the use of the product are solely the responsibility of the user and remain at its sole discretion.

When applicable, the products described in this MSDS are considered to be "articles" within the meaning of Title 29 of the Code of Federal Regulations, Section 1910.1200 *et seq.* This MSDS is intended to be used solely for the purpose of satisfying informational requests made pursuant to that requirement. It is not intended to pre-empt, replace, or expand the terms contained in the Keo Cutters, Inc. Conditions of Sale. Compliance with all applicable federal, state, and local laws and regulations remains the responsibility of the user, and the user has the responsibility to provide a safe workplace, to examine all aspects of its operation, and to determine if or where precautions, in addition to those described herein, are required. This information may not be valid for these products when manufactured with alternate materials meeting the special requirements of a particular user.

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