



# MATERIAL SAFETY DATA SHEET

## SECTION I

### PRODUCT IDENTIFICATION

PRODUCT NAME: Hero Alloys; 40, 50, 56 & 60  
PRODUCT TYPE: Continuous Cast, Nickel Based, Hardfacing Rod  
PRODUCTS INTENDED USE: Wear resistant, surfacing applications  
MANUFACTURER: Hero Protective Alloys Inc.  
400 Watt Drive, Fairfield, CA 94534 USA  
Phone: 707-864-3355 Fax: 707-864-2403  
DATE PREPARED: February 26, 2013

## SECTION II

INGREDIENTS IDENTIFIED		HAZARD DATA		
COMPONENT	CAS NUMBER	COMPOSITION % WEIGHT	OSHA PEL mg/m <sup>3</sup>	ACHIH TLV mg/m <sup>3</sup>
NICKEL	7440-02-0	70 - 90	1	1
CHROMIUM	7440-47-3	7 - 16	1	.5
IRON	7439-89-6	0 - 6	5	5
SILICON	7440-21-3	0 - 6	None	5
BORON	7440-42-8	0 - 5	-	-
CARBON	7440-44-0	0 - 2	15	-

## SECTION III

### PHYSICAL DATA

APPEARANCE & ODOR: Solid; metallic color, no odor  
DENSITY g/cm<sup>3</sup>: 7.0 - 9.0 (room temp.)  
MELTING RANGE °F: 2,150 - 2,650  
SOLUBILITY IN WATER: Insoluble (room temp.)



## SECTION IV

### FIRE & EXPLOSION DATA

Metal in bulk form is not combustible. Fire and explosion hazards exist when dust particles are exposed to heat, flames, strong oxidizers, or chemicals that support combustion.

Welding arc and sparks can ignite combustibles and flammables. Refer to American National Standard Z49.1, for fire prevention during the use of welding and allied procedures.

Extinguishing media: Dry chemical or dry sand.

## SECTION V

### REACTIVITY DATA

Avoid damp or wet storage conditions. Molten metal may react violently with water. Avoid contamination with petroleum or flammable products. Dust particles may react with strong acids, bases and oxidizers.

Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, or galvanizing), the number of welders and the volume of work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities).

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Fume and gas decomposition products and not the ingredients in the electrode are important. The concentration of a given fume or gas component may decrease or increase by many times the original concentration in the electrode. New compounds not in the electrodes may form. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section II, plus those from the base metal and coatings.

Reasonably expected decomposition products from normal use of these products include a complex of the oxides of the materials listed in Section II, as well as carbon monoxide, carbon dioxide, ozone and nitrogen oxides.

The fume limit for chromium and nickel may be reached before the general limit for welding fumes ( $5 \text{ mg/m}^3$ ) is reached.

To determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the operator's helmet or breathing zone. Follow the ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes" and "Characterization of Arc Welding Fume" available from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.



## SECTION VI

### HEALTH HAZARD DATA

Electric arc welding or oxyfuel welding may create one or more of the following health hazards:

ARC RAYS can injure eyes and burn skin.

HEAT RAYS (infrared radiation) from flame or hot metal can injure eyes.

ELECTRIC SHOCK can cause sever injury or death.

NOISE can cause hearing damage.

FUMES AND GASES - can be dangerous to your health. Common entry is by inhalation.

SHIELDING GASES - such as argon, helium and carbon dioxide are asphyxiates and adequate ventilation must be provided.

CARCINOGENICITY - chromium, nickel, cobalt and their compounds are on the IARC and NTP list as posing a carcinogenic risk to humans.

SHORT TERM (ACUTE) - over exposure to welding fumes may result in discomfort such as; dizziness, nausea, or dryness or irritation of nose, throat or eyes.

Chromates present in the fume can cause irritation of the respiratory system, damage to lungs and asthma like symptoms.

Nickel compounds in the fume can cause a metallic taste, nausea, tightness in the chest, fever and allergic reactions.

Fluorides can cause pulmonary edema bronchitis.

LONG TERM (CHRONIC) - over exposure to welding fumes can lead to siderosis (iron deposits in the lung) and affect pulmonary function.

Long term over exposure to manganese compounds may affect the central nervous system. Symptoms include muscular weakness and tremors similar to Parkinson's disease. Behavioral changes and changes in handwriting may also appear. Employees exposed to manganese compounds should get quarterly medical examinations for early detection of manganese.

Studies have shown that production workers exposed to hexavalent chromium compounds have an increased incidence of lung cancers. Chromates may cause an ulceration and perforation of the nasal septum. Liver damage and allergic skin rash have been reported. Chromium VI compounds are required by OSHA to be considered carcinogenic.

Long term over exposure to nickel compounds may cause lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers. Nickel and its compounds are required to be considered as carcinogenic by OSHA.

Repeated over exposure to fluoride fumes may cause serious bone erosion and excessive calcification of the bones and ligaments of the ribs, pelvis and spinal column. Fluorides may also cause skin rash.



## SECTION VII

### PRECAUTIONS FOR SAFE HANDLING AND USE / APPLICABLE CONTROL MEASURES

For detailed safety procedures regarding the welding, brazing or torch cutting of any type of material; read, understand and follow the American National Standard Z49.1; Safety in Welding and Cutting published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, D.C. 20402.

#### VENTILATION AND ENGINEERING CONTROLS

Use enough ventilation, local exhaust at the arc, or both, to keep the fumes and gases below TLV's in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. The use of a Dust / Fume Collection System is required when welding, brazing, torch cutting, melting, abrasive cutting, grinding, sanding, polishing, milling, crushing, or otherwise heating or abrading the surface of this material in a manner which generates particulate or fume. The Dust / Fume Collector must be a high efficiency particulate air (HEPA) filtration system exhausting out side of the building. The use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne particulate. Where utilized, exhaust inlets to the collection system must be positioned as close as possible to the source of airborne generation. A professionally engineered system, with HEPA filters, exhausting out of the building to open air is required. Avoid disruption of the airflow in the area of a local exhaust inlet by equipment such as a man cooling fan. Check system equipment regularly to ensure it is functioning properly. Provide training on the use, operation and maintenance of ventilation to all users. Use qualified professionals to design and install dust / fume collection and ventilation systems.

#### RESPIRATORY PROTECTION

The use of a respirator is required when welding, brazing, torch cutting, melting, abrasive cutting, grinding, sanding, polishing, milling, crushing, or otherwise heating or abrading the surface of this material in a manner which generates particulate or fume. Only use an approved respirator specified by an Industrial Hygienist or other qualified professional. Follow the National Institute for Occupational Safety and Health (NIOSH) guide lines and requirements regarding respirator use, selection, fit testing, maintenance, employing training, medical evaluation, storage etc.

#### EYE PROTECTION

Wear safety glasses, goggles, face shield, or welder's helmet when risk of eye injury is present, particularly during welding, brazing, torch cutting, melting, abrasive cutting, grinding, sanding, polishing, milling, crushing melting, machining, grinding, etc. Wear helmet or use face shield with filter lens. As a general rule, start with a shade that is too dark to see the weld zone. Then go to the next shade which gives sufficient view of the weld zone. Provide protective screens and flash goggles, if necessary, to shield others.

#### PROTECTIVE CLOTHING

Wear head, hand and body protection which help prevent injury from radiation, sparks, and electrical shock. See ANSI Z49.1 At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Train the welder not to touch live electrical parts and insulate himself from work and ground.



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## SECTION VII (Continued)

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#### WORK PRACTICES

Develop work practices and procedures that prevent particulate from coming in contact with worker skin, hair, or personal clothing. If work practices and/or procedures are ineffective in controlling airborne exposure or visual particulate from deposition on skin, hair or clothing, provide appropriate cleaning/washing facilities. Procedures should be written that clearly communicate the facility's requirements for protective clothing and personal hygiene. These clothing and personal hygiene requirements help keep particulate from being spread to non production areas or from being taken home by the worker. Never use compressed air to clean work clothing or other surfaces.

Fabrication processes may leave a residue of particulate on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. As necessary, clean loose particulate from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking.

To prevent exposure, remove surface scale or oxidation formed on cast or heat treated products in an adequately ventilated process prior to working the surface.

#### HOUSEKEEPING

Use vacuum and wet cleaning methods for particulate removal from surfaces. Be certain to de-energize electrical systems, as necessary, before beginning wet cleaning. Use vacuum cleaners with high efficiency particulate air (HEPA). Do not use compressed air, brooms, or conventional vacuum cleaners to remove particulate from surfaces as this activity can result in elevated exposures to airborne particulate. Follow the manufacturer's instructions when performing maintenance on HEPA filtered vacuums used to clean hazardous materials. Wear a respirator and protective clothing when performing maintenance on your vacuum.

#### MAINTENANCE

During repair or maintenance activities the potential exists for exposures to particulate in excess of the occupational standards. Under these circumstances, protecting workers can require the use of specific work practices or procedures involving the combined use of ventilation, wet and vacuum cleaning methods, respiratory protection, decontamination, special protective clothing, and when necessary, restricted work zones.

#### WASTE DISPOSAL METHOD

Prevent waste from contaminating surrounding environment. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

#### PROCEDURE FOR CLEANUP OF SPILLS OR LEAKS

Not applicable.

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