

MATERIAL SAFETY DATA SHEET (MSDS)

For Welding Consumables and Related Products
 Complies with OSHA Hazard Communication Standard 29 C.F.R. 1910.1200

| SECTION I - IDENTIFICATION | |
|---|---|
| Identity: KOBELCO ELECTRODES FOR FLUX CORED ARC WELDING | |
| Manufacture's Name: KOBE STEEL, LTD. Supplier's Name: KOBE STEEL, LTD. | Emergency Telephone No: +81-3-5739-6331 |
| Supplier's Address: 5-9-12 Kitashinagawa Shinagawa-Ku Tokyo JAPAN | Telephone No. for Information: +81-3-5739-6331 Facsimile No. : +81-3-5739-6960 |
| Product Trade Designation DW-G316L | Product Classifications A5.22 E316LT0-1 A5.22 E316LT0-4 |

| SECTION II - HAZARDOUS INGREDIENTS | | | |
|---|------------|--------------|------------------------------|
| <p>IMPORTANT: THIS SECTION COVERS THE MATERIALS FROM WHICH THE PRODUCT IS MANUFACTURED. THE FUMES AND GASES PRODUCED DURING WELDING WITH NORMAL USE OF THIS PRODUCT ARE COVERED IN SECTION V.</p> <p>THE TERM "HAZARDOUS" IN "HAZARDOUS MATERIALS" SHOULD BE INTERPRETED AS A TERM REQUIRED AND DEFINED IN OSHA HAZARD COMMUNICATION STANDARD (29 C.F.R. 1910.1200) AND IT DOES NOT NECESSARILY IMPLY THE EXISTENCE OF ANY HAZARD.</p> | | | |
| Ingredient | (CAS No.) | APPROX wt(%) | TLV (mg/m ³) (1) |
| Iron | 7439-89-6 | Balance | 5 (Oxide) |
| Chromium | 7440-47-3 | 10-30 | 0.5 |
| Nickel | 7440-02-0 | 5-18 | 1.5 |
| Titanium dioxide | 13463-67-7 | ≤10 | 10 |
| Silicon dioxide | 7631-86-9 | ≤5 | (N/A) |
| Manganese | 7439-96-5 | ≤5 | 0.2 |
| Molybdenum | 7439-98-7 | ≤5 | 10 |
| Chromium(IV) | - | - | 0.005 |
| Others (Aluminum oxide, Silicon etc.) | - | ≤5 | - |
| Aluminum oxide | 1344-28-1 | - | (N/A) |
| Silicon | 7440-21-3 | - | (N/A) |
| (1) American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV [R]). | | | |

| SECTION III - PHYSICAL DATA |
|-----------------------------|
| NOT APPLICABLE |

| SECTION IV - FIRE AND EXPLOSION HAZARD DATA |
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| Non-Flammable: Welding arc and sparks can ignite combustibles. See Z-49.1 referenced in Section VII . |

SECTION V - REACTIVITY DATA

HAZARDOUS DECOMPOSITION PRODUCTS:

Welding fumes cannot be classified simply. Their composition and quantity are dependent upon the metal being welded, the process, procedures 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), number of welds and volume of work area, quality and amount of ventilation, position of 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 are different in percent and form from the ingredients listed in Section II. Fume and gas decomposition products, not the ingredients in the electrode, are important. Decomposition products include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II plus those from base metal, coating, etc. as noted above. These components are virtually always present as complex compounds and not as metals (Characterization of Arc Welding Fume: American Welding Society).

Reasonably expected fume constituents from these products would include fluorides and complex oxides of iron, manganese, silicon, and, when present, nickel, chromium, molybdenum, and copper. Monitor for the materials identified in Section II. Fumes from the use of these products may also contain manganese, chromium (Cr(III) and Cr(VI)), nickel, fluorides, calcium oxides, amorphous silica, and copper whose exposure limits lower than the 5mg/m³ PEL/TLV for general welding fume.*

Maximum fume guideline and PEL for this product (based on Cr(VI) content) is 0.2mg/m³

Keep exposure as low as possible. Indoors, use local exhaust; outdoors, a respirator may be required.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

* Occupational Safety and Health Administration (OSHA) states that permissible exposure limit of Cr(VI) is 0.005 mg/m³ as an 8-hour time-weighted average.

One recommended way to determine the composition and quantity of fumes and gases to which 71 workers are exposed is to take an air sample inside the welders helmet, if worn, or in the worker's breathing zone. ANSI/AWS F1.1, available from the American Welding Society, P.O. Box 351040, Miami, FL 33135.

SECTION VI - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for welding fume NOC (Not Otherwise Classified) is 5mg/m³. The ACGIH 1984-1985 preface states: "The TLV-TWA should be used as guides in the control of health hazards and should not be used as firm lines between safe and dangerous concentration." See Section V for specific fume constituents which may modify this TLV.

Effects of Overexposure: FUMES AND GASES can be dangerous to your health.

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

LONG TEAM (CHRONIC) OVEREXPOSURE may lead to siderosis (iron deposits in the lung) and is believed by some investigators to affect pulmonary function.

ARC RAYS can injure eyes and burn skin.

ELECTRIC SHOCK can kill. See Section VII.

Emergency & First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

Carcinogenicity:

Chromium VI and nickel compounds must be considered carcinogens according to OSHA (29 CFR 1910.1200). Chromium VI compounds are classified as IARC Group 1 and NTP Group 1 carcinogens. Nickel compounds are classified as IARC Group 1 and NTP Group 2 carcinogens. Welding fumes must be considered as possible carcinogens under OSHA (29 CFR 1910.1200).

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE/APPLICABLE CONTROL MEASURES

Read and understand the manufacture's instructions and the precautionary label on this product. See American National Standard Z-49.1, Safety in Welding and Cutting, published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Washington, D.C. 20402 for more detail on many of the following:

Ventilation: Use enough ventilation, local exhaust at the arc, or both, to keep the fumes and gases below the TLV's in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes.

Respiratory Protection: Use respirable fume respirator or air supplies respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens. As a rule of thumb, start with a shade which is too dark to see the weld zone. Then go to the next lighter 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 to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. 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 to insulate himself from work and ground.

Procedure for Cleanup of Spills or Leaks: NOT APPLICABLE

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.