**MATERIAL SAFETY DATA SHEET**
**THIS MSDS ISEFFECTIVE AS OF JULY 31, 2018 AND SUPERSEDES**
**ALL PREVIOUSLY ISSUED MATERIAL SAFETY DATA SHEETS**

## PRODUCT INFORMATION

Product Name: **ARCTEC® ARMORCLAD 95 CC**
Use: Plasma Transfer Arc Powder
Classification : WHMIS Class D, Division 2
Manufacturer/Processor/Importer : Arctec Alloys Limited
Supplier : Arctec Alloys Limited
Address : 4304 - 10 St. N.E., Calgary, Alberta, T2E 6K3
Emergency Tel : (403) 250-9355
PIN : N.AP.

IMPORTANT: Welding fumes cannot be classified simply. The composition and quantity are dependent upon the metal being welded, the process, procedure and powder used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: 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 powder is consumed, the fume and gas decomposition products are different in percent and form from the ingredients listed in Hazardous Ingredients. The decomposition products, not the ingredients in the powder, are important from a health standpoint. Decomposition products include those originating from the volatilization, reaction or oxidation of the materials shown in Hazardous Ingredients plus those from the 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).

## PHYSICAL DATA

physical state : solid
vapour density: N.AP.
M.P. (degrees C) : 1038
evaporation rate : N.AP
pH: N.AP
water solubility : insoluble
appearance, odor : gray powder, no odor

% volatiles by vol: N.AP.
coef. of water/oil distribution: N.AP.
B.P. (degrees C) : N.AV.
specific gravity : 3.8 - 4.3 g/cm3
vapour pressure : N.AP.
odor threshold : N.AP.

## HAZARDOUS INGREDIENTS

(Note: The term "hazardous" does not necessarily imply the existence of a hazard. It refers to ingredients which must be specified on material safety data sheets according to legislation.)

| Ingredient | Percent Range %wt/wt | CAS # | LC50 | LD50 |
|---|---|---|---|---|
| Chromium | 10 - 30 | 7440-47-3 | N.AV. | N.AV. |
| Iron | 60 - 100 | 7439-89-6 | N.AV. | 5500 mg/kg ipr, rat |
| Silicon | 0.5 – 1.5 | 7440-21-3 | N.AV. | N.AV. |
| Tungsten carbide | 0.5 – 1.5 | 12070-12-1 | N.AV. | N.AV. |
| Boron | 0.5 – 1.5 | 7440-42-8 | N.AV. | 2000 mg/kg mouse, oral |

## TABLE OF EXPOSURE LIMITS OF FUMES AND GASES

| Ingredient | Exposure Limits ACGIH TLV-TWA mg/m3 | ACGIH TLV-STEL mg/m3 | ALBERTA OEL 8 hr. mg/m3 | ALBERTA OEL 15 min. mg/m3 | ALBERTA OEL Ceiling mg/m3 |
|---|---|---|---|---|---|
| Welding fume (total particulate) based on mild steel | 5.0 | N.AV. | 5.0 | 10.0 | N.AV. |
| Chromium metal | 0.5 | N.AV. | 0.5 | 1.5 | N.AV. |
| Chromium II cmpds | 0.5 | N.AV. | 0.5 | 1.5 | N.AV. |
| Chromium III cmpds | 0.5 | N.AV. | 0.5 | 1.5 | N.AV. |
| Chromium VI cmpds | 0.05 | N.AV. | 0.05 | 0.15 | N.AV. |
| Iron metal | 1.0 | 2.0 | 1.0 | 2.0 | N.AV. |
| Iron compounds | 5.0 | 10.0 | 5.0 | 10.0 | NAV. |
| Silica (amorphous) | | | | | |
| respirable mass | N.AV. | N.AV. | 2.0 | N.AV. | N.AV. |
| total mass | N.AV. | N.AV. | 5.0 | N.AV. | N.AV. |
| Nitrogen dioxide | 6.0 | 10.0 | 6.0 | 9.4 | N.AV. |
| Carbon monoxide | 55.0 | 440.0 | 57.0 | 460.0 | N.AV. |
| Boron oxide | 10.0 | 20.0 | 10.0 | 20.0 | N.AV. |
| Tungsten (as W, soluble compounds | 1.0 | N.A.V. | 1.0 | 3.0 | N.AV. |

Gases such as nitrogen dioxide, nitric oxide, and carbon monoxide may be generated.

## FIRE AND EXPLOSION HAZARD

| | |
|---|---|
| flash point: N.AP. | autoignition temp: N.AP. |
| lower explosive limit (%): N.AP. | upper explosive limit (%): N.AP. |
| conditions of flammability: non-combustible except at high temps | extinguishing agents: N.AP. |
| hazardous combustion products: | oxides of nitrogen, chromium, boron, iron, tungsten, silicon, and carbon monoxide |
| sensitivity to mechanical impact: N.AP. | sensitivity to static discharge: N.AP. |
| oxidizing material: No | |

## REACTIVITY

| | |
|---|---|
| Conditions of stability/reactivity: | product is stable and non-reactive at normal temperatures except as shown below. |
| Incompatible substances: | acids, bases, oxidizers |
| Hazardous decomposition products: | oxides of nitrogen, chromium, boron, iron, tungsten, silicon, and carbon monoxide |

## STORAGE

Store in dry location away from acids and bases

## TOXICOLOGY - HEALTH EFFECTS

Inhalation: Exposure to powder, fumes and gases may result in dizziness, nausea, dryness or irritation of nose, throat and lungs. Repeated exposure to welding fumes may cause a progressive lung disease (mixed-dust pneumoconiosis)which impairs breathing.
Allergic asthma and bronchitis may occur due to exposure to chromium and nickel compounds. CHROMIUM COMPOUNDS ARE SUSPECTED CARCINOGENS.
Ingestion: N.AP.
Eye: Fine dust from the powder, fumes, and gases may cause eye irritation. Excessive concentrations of fumes, flash or sparks may cause eye damage.
Skin: May cause irritation and sensitization of exposed skin. Repeated exposure may cause allergic dermatitis.
Note: The above health effects only apply to the fumes generated by welding. If the base metal is other than mild steel, or if painted, coated or solvent cleaned, other health effects may occur.

## HANDLING AND SPECIAL PROTECTION

Handling procedures: Avoid inhalation of powder dust, fumes, and gases. Do not weld in wet conditions. Allow cleaning solvents to dry off work before welding. Thermal decomposition products of halogenated cleaning solvents may be highly poisonous.
Special Shipping information: No special requirements
Engineering Controls: Due to the toxicity of the fumes, natural or general dilution ventilation is not likely to provide adequate protection. Use effective LOCAL EXHAUST ventilation to remove fumes and gases at the source. Moveable local exhaust designs are available for use where welding must be performed in different locations in the shop. Effective ventilation is especially important in confined areas.
Respiratory Protection: Respiratory protection is required in the absence of effective ventilation. Use positive pressure air-line respirator or self-contained breathing apparatus when welding in confined spaces, or in other situations where oxygen deficiency or buildup of fume may occur. Elsewhere, air purifying respirators approved by NIOSH/MSHA for toxic dusts and fumes may be adequate. Check with Occupational Hygienist and CSA Standard Z94.4 for proper selection.
Eye Protection: Welding helmets or goggles with filter lenses in accordance with CSA standards must be worn. It is recommended that a flash curtain be positioned around the welding zone to protect other workers. The bottom of the curtain should be at a height of about 2 feet above the ground so as not to restrict air flow.
Skin Protection: Flameproof gauntlet style gloves must be worn. Ear protection is recommended. Coveralls required. (Leather and wool are preferred materials for clothing.)

## SPILL AND DISPOSAL

Spill: N.AP.
Disposal: Dispose of in accordance with applicable environmental regulations.

## ADDITIONAL INFORMATION

Air monitoring for total fume, chromium and nickel should be performed if reason to believe that Occupational Exposure Limits may be exceeded. Air monitoring for fluoride may also be justified.

## FIRST AID

Inhalation: Remove worker to fresh air to prevent further exposure to fumes. In doing this, the rescuer should ensure his own safety by using suitable precautions, such as wearing protective clothing or respirator if necessary. Breathing and heart function must be maintained until medical attention arrives. Give artificial respiration if necessary. ADMINISTER CPR ONLY IF TRAINED. Get immediate medical attention. See Notes to Physician.
Ingestion: N.AP.
Eye Contact: For eye irritation caused by fumes or dust: remove contact lenses if worn. Flush using a gentle stream of lukewarm, water for at least 15 minutes, opening upper and lower lids at intervals. Cover eye with a dry protective dressing. Get immediate medical attention. For "flash burns", sparks or molten metal in the eye: do not rub eye. Cover with a dry protective dressing. Get immediate medical attention.
Skin: Flush contaminated area with large amounts of water, then wash with mild soap and water. Apply a sterile dressing.
For thermal burns: If skin is not broken, immerse burn part in clean cold water or apply ice. Do not disturb blisters. Bandage loosely with a clean dry dressing. Get immediate medical attention.
Notes to Physician: Due to the possibility of exposure to nitrogen oxides, watch for development of pulmonary oedema up to several days after exposure. In case of illness, question worker as to whether base metal was painted, coated or had been cleaned with a halogenated solvent (thermal decomposition may produce phosgene).

| ABBREVIATIONS AND TERMS: | |
|---|---|
| **N.AP.** | Not Applicable |
| **N.AV.** | No Data Available |
| **CAS** | Chemical Abstracts Number |
| **TLV** | Threshold Limit Value: Airborne exposure limit recommended by the American Conference of Governmental Industrial Hygienists. Although widely adopted, these are recommended limits only. |
| **TLV-TWA** | Time-weighted Average concentration for a normal 8-hour workday and a 40 hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. |
| **TLV-STEL** | Threshold Limit Value - Short Term Exposure Limit is defined as a 15-minute time-weighted average exposure which should not be exceeded at any time during a work day even if the 8 hour time-weighted average is within the TLV. |
| **Alberta OEL** | Alberta Occupational Exposure Limit: Exposure limits for airborne contaminants specified in the Chemical Hazards Regulation (Alberta Reg. 8/82 and 242/83. |
| **8 hr. OEL** | 8 hour Occupational Exposure Limit means the time-weighted average concentration of an airborne substance listed in Schedule A (of the Chemical Hazards Regulation) for an 8 hour period |
| **15 min. OEL** | 15 minute Occupational Exposure Limit means the time-weighted average concentration of an airborne substance listed in Schedule A (of the Chemical Hazards Regulation) for a 15 minute period. |
| **Ceiling OEL** | Ceiling Occupational Exposure Limit means the maximum concentration of an airborne substance listed in Schedule A (of the Chemical Hazards Regulation). |
| **LD50** | Lethal Dose, 50$^{th}$ percentile. |
| **LC50** | Lethal Concentration, 50$^{th}$ percentile. (Note: The LD50 and LC50 indicate the short term toxicity of a chemical to test animals. The smaller the LD50 or LC50, the greater the toxicity.) |
| **LDLO** | Lowest Lethal Dose. Lowest dose demonstrated to cause death in prescribed species (animal or human). |
| **TCLO** | Lowest Toxic Dose. Lowest dose demonstrated to cause toxic effects in prescribed species (animal or human) |

**PREPARATION INFORMATION**

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|---|---|
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| MSDS published by: | Arctec Alloys Limited<br>Calgary, Alberta , Canada.(403) 250-9355 |

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