This Safety Data Sheet (SDS) is for welding consumables and related products and may be used to comply with OSHA’s Hazard Communication standard, 29 CFR 1910.1200, Superfund Amendments and Reauthorization Act (SARA) of 1986 Public Law 99-499 and Canadian Workplace Hazardous Materials Information System (WHMIS) per Health Canada administrative policy. The OSHA standard must be consulted for specific requirements. This Safety Data Sheet complies with ISO 11014-1 and ANSI Z400.1.

Section 1: Identification

Manufacturer/Supplier: American Filler Metals Company
Address: 6015 Murphy Street, Houston, TX 77033
Web Site: www.amfiller.com
Emergency No.: Chemtrec: (800) 424-9300

Trade Name: AFM ER70S-2, AFM ER70S-3, AFM ER70S-4, AFM ER70S-6, 4130VM (AMS6457), 4140VM (AMS6452)
AFM RG45, AFM RG60

Section 2: Hazard(s) Identification

Hazard Classification:
This product is not classified as hazardous according to applicable GHS hazard classification criteria.

Label Elements:
- Hazard Symbol – No symbol required
- Signal Word – No signal word required
- Hazard Statement – No applicable
- Precautionary Statement – Not Applicable

<table>
<thead>
<tr>
<th>Hazardous Ingredient</th>
<th>CAS</th>
<th>EINCSr</th>
<th>Regulatory Hazard Classification/Designation 67/548/EECΔ</th>
<th>IARC®</th>
<th>NTP®</th>
<th>OSHA®H</th>
<th>65 Θ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>231-159-6</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>231-096-4</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>231-105-1</td>
<td>Xn-R20/22Y</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>231-107-2</td>
<td>Xn-R48/20/22;Xi-R36/37X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>231-130-8</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(Amorphous Silica Fume)</td>
<td>69012-64-2</td>
<td>273-761-5</td>
<td>None</td>
<td>3</td>
<td>K</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

GHS-US Classification
- STOT SE 3 : H336
- STOT SE 3 : H335
- STOT RE 1 : H372

GHS-US Labelling

Signal Word (GHS-US): Danger

Hazard Statements (GHS-US):
- H335 - May cause respiratory irritation
- H336 - May cause drowsiness or dizziness
- H372 - Causes damage to organs through prolonged or repeated exposure

Precautionary statements (GHS-US):
- P260 - Do not breathe dust/fume/gas/mist/vapours/spray
- P261 - Avoid breathing dust/fume/gas/mist/vapours/spray
- P264 - Wash thoroughly after handling
- P270 - Do not eat, drink or smoke when using this product
- P271 - Use only outdoors or in a well-ventilated area
- P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
- P312 - Call a POISON CENTER/doctor if you feel unwell
- P314 - Get medical advice if you feel unwell
- P404+P220 - Store in a well-ventilated place. Keep container tightly closed
- P405 - Store locked up
- P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.
Section 2: Hazard(s) Identification (Continued)

Warning! - Avoid breathing welding fumes and gases, they may be dangerous to your health. Always use adequate ventilation. Always use appropriate personal protective equipment.

- Primary Routes of Entry: Respiratory System, Eyes and/or Skin.
- Electric Shock: Arc welding and associated processes can kill. See Section 8.
- Fumes and Gases: Can be dangerous to your health.

Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedures and electrodes used. Most fume ingredients are present as complex oxides and compounds and not as pure metals. When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in this section, plus those from the base metal and coating, etc., as noted above. Monitor for the materials identified in the list within this section.

Fumes from the use of this product may contain complex oxides or compounds of the following elements and molecules: amorphous silica fume, beryllium, chromium, manganese and nickel. Other reasonably expected constituents of the fume would also include complex oxides of iron and silicon. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. 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 the 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).

One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone.

See ANSI/AWS F1.1, available from the "American Welding Society", P.O. Box 351040, Miami, FL 33135. Also, from AWS is F1.3 "Evaluating Contaminants in the Welding Environment - A Sampling Strategy Guide", which gives additional advice on sampling.

Section 3: Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS</th>
<th>EINECS</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (1)</td>
<td>7440-50-8</td>
<td>231-159-6</td>
<td>0.1 – 5</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>231-096-4</td>
<td>80 – 90</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>231-105-1</td>
<td>0.1 – 10</td>
</tr>
</tbody>
</table>

(1) - Copper, if contained in the product, is clearly visible and only present as a surface coating.

Section 4: First Aid Measures

Inhalation: If breathing is difficult provide fresh air and contact physician.

Eye/Skin Injuries: For radiation burns, see physician.

Section 5: Fire and Explosion Hazard Data

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded. Welding arcs and sparks can ignite combustibles and flammable products. Unused welding consumables may remain hot for a period of time after completion of a welding process. See American National Standard (ANSI) Z49.1 for further general safety information on the use and handling of welding consumables and associated procedures.

Section 6: Accidental Release Measures

Solid objects can be picked up and placed into a container. Wear proper personal protective equipment while handling. Do not discard as general trash.

Section 7: Handling and Storage

Handling: No specific requirements in the form supplied. Handle with care to avoid cuts. Wear gloves when handling welding consumables. Avoid exposure to dust. Do not ingest. Some individuals can develop an allergic reaction to certain materials. Retain all warning and product labels.

Storage: Keep separate from acids and strong bases to prevent possible chemical reactions.

Section 8: Exposure Control and Personal Protection

Read and understand the instructions and the labels on the packaging. Welding fumes do not have a specific OSHA PEL or ACGIH TLV.

The OSHA PEL for Particulate – Not Otherwise Classified (PNOC) is 5 mg/m³ – Respirable Fraction, 15 mg/m³ – Total Dust. The ACGIH TLV for Particles – Not Otherwise Specified (PNOS) is 3 mg/m³ – Respirable Particles, 10 mg/m³ – Inhalable Particles.

The individual compound within the fume may have a lower OSHA PEL or ACGIH TLV than the OSHA Particulate – Not Otherwise Classified (PNOC) and ACGIH Particles – Not Otherwise Specified (PNOS). An Industrial Hygienist, the OSHA Permissible Exposure Limits for Air Contaminants (29 CFR 1910.1000), and the ACGIH Threshold Limit Values should be consulted to determine the specific fume constituents present and their respective exposure limits. All exposure limits are in milligrams per cubic meter (mg/m³).
### Section 8: Exposure Control and Personal Protection (Continued)

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS</th>
<th>EINECS</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>EU OEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>231-159-6</td>
<td>0.1 (Fume), 1 (Dust)</td>
<td>0.2 (Fume), 1 (Dust)</td>
<td>0.1 I* (Aerosol); 0.2 I** (Aerosol) - Germany 0.1; 0.2 I*** - Denmark</td>
</tr>
<tr>
<td>Iron+</td>
<td>7439-89-6</td>
<td>231-096-4</td>
<td>5 R*</td>
<td>5 R* (FeO2) (A4)</td>
<td>3 R* (Aerosol as FeO2) - Switzerland 7*** (as FeO2) - Denmark</td>
</tr>
<tr>
<td>Manganese#</td>
<td>7439-96-5</td>
<td>231-105-1</td>
<td>5 CL ** (Fume)</td>
<td>1, 3 STEL***</td>
<td>0.1 I* (A4)</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-97-8</td>
<td>231-107-2</td>
<td>5 R*</td>
<td>3 R*; 10 I* (Ele and Insol)</td>
<td>0.5 R* (Sol Cpnds) (A3)</td>
</tr>
<tr>
<td>Silicon+</td>
<td>7440-21-3</td>
<td>231-130-8</td>
<td>5 R*</td>
<td>3 R*</td>
<td>4 R* (Aerosol); 10 I* (Aerosol) - Denmark</td>
</tr>
<tr>
<td>(Amorphous Silica Fume)</td>
<td>69012-64-2</td>
<td>273-781-5</td>
<td>0.8</td>
<td>3 R*</td>
<td>2 I*; 4 I*** - Denmark</td>
</tr>
</tbody>
</table>

| R - Respirable Fraction R*** - Respirable Fraction - Short Term Exposure Limit I* - Inhaleable Fraction I*** - Inhaleable Fraction - Short Term Exposure Limit II - Ceiling Limit *** - Short Term Exposure Limit + | As a nuisance particulate covered under "Particulates Not Otherwise Regulated" by OSHA or "Particulates Not Otherwise Classified" by ACGIH + | Crystalline silica is bound within the product as it exists in the package. However, research indicates silica is present in welding fume in the amorphous (noncrystalline) form + Reportable material under Section 313 of SARA as dust or fume R - NIOSH REL, TWA and STEL R Listed under ACGIH Notice of Intended Changes for Mn in 2010 R - Limit of 0.02 mg/m³ is proposed for Respirable Mn in 2011 by ACGIH R - Listed under ACGIH Notice of Intended Changes for Mn in 2010 R - Limit of 0.02 mg/m³ is proposed for Respirable Mn in 2011 by ACGIH R - Listed under ACGIH Notice of Intended Changes for Mn in 2010 R - Limit of 0.02 mg/m³ is proposed for Respirable Mn in 2011 by ACGIH |
| Procedure for Cleanup of Spills or Leaks: | Not applicable |
| Special Precautions (IMPORTANT): | Maintain exposure below the PEL/TLV/OELs in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. |
| Respiratory Protection: | Use NIOSH approved or equivalent fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below the regulatory limits. |
| Eye Protection: | Wear helmet or use face shield with filter lens. As a rule of thumb begin with Shade Number 14. Adjust if needed by selecting the next lighter and/or darker shade number. Provide protective screens and flash goggles, if necessary, to shield others from the weld arc flash. |
| Protective Clothing: | Wear head, hand and body protection which help to 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 nonsynthetic 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 |
| Special Precautions (IMPORTANT): | Maintain exposure below the PEL/TLV/OEL. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures which exceed PEL/TLV/OEL. Always use exhaust ventilation. Refer to the following sources for important additional information: American National Standard (ANSI) Z49.1; Safety in Welding and Cutting published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29 CFR 1910), U.S. Government Printing Office, Washington, DC 20402. |

### Section 9: Physical and Chemical Properties

- Physical State: Solid Wire
- Odor: N/A
- Color: Metallic
- Form: Round Wire

### Section 10: Stability and Reactivity

GENERAL: Welding consumables applicable to this sheet are solid and nonvolatile as shipped. This product is only intended for use per the welding parameters it was designed for. When this product is used for welding, hazardous fumes may be created. Other factors to consider include the base metal, base metal preparation and base metal coatings. All of these factors can contribute to the fume and gases generated during welding. The amount of fume varies with the welding parameters.

Stability: This product is stable under normal conditions.

Reactivity: Contact with acids or strong bases may cause generation of gas.

### Section 11: Toxicological Information

#### Short-Term (Acute) Overexposure Effects: Welding Fumes
- May result in discomfort such as dizziness, nausea or dizziness or irritation of nose, throat or eyes.
- Copper - Metal fume fever characterized by metallic taste, tightness of chest and fever. Symptoms may last 24 to 48 hours following overexposure.
- Iron, Iron Oxide - None are known. Treat as nuisance dust or fume.
- Manganese - Metal fume fever characterized by chills, fever, upset stomach, vomiting, irritation of the throat and aching of body. Recovery is generally complete within 48 hours of the overexposure.
- Molybdenum - Irritation of the eyes, nose and throat.
- Silica (Amorphous) - Dust and fumes may cause irritation of the respiratory system, skin and eyes.

#### Long-Term (Chronic) Overexposure Effects: Welding Fumes
- Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or “siderosis.”
- Copper - Copper poisoning has been reported in the literature from exposure to high levels of copper. Liver damage can occur due to copper accumulating in the liver characterized by cell destruction and cirrhosis. High levels of copper may cause anemia and jaundice. High levels of copper may cause central nervous system damage characterized by nerve fiber separation and cerebral degeneration. Iron, Iron Oxide Fumes - Can cause siderosis (deposits of iron in lungs) which some researchers believe may affect pulmonary function. Lungs will clear in time when exposure to iron and its compounds ceases. Iron and magnetite (Fe3O4) are not regarded as fibrogenic materials. Manganese - Long-term overexposure to manganese compounds may affect the central nervous system. Symptoms may be similar to Parkinson's disease and may include slowness, changes in handwriting, gait impairment, muscle spasms and cramps and less commonly, tremor and behavioral changes. Employees who are overexposed to manganese compounds should be seen by a physician for early detection of neurologic problems. Overexposure to manganese and manganese compounds above safe exposure limits can cause irreversible damage to the central nervous system, including the brain, symptoms of which may include slurred speech, lethargy, tremor, muscular weakness, psychological disturbances and spastic gait. Molybdenum - Prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing and anemia. Silica (Amorphous) - Research indicates that silica is present in welding fume in the amorphous form. Long term overexposure may cause pneumoconiosis. Noncrystalline forms of silica (amorphous silica) are considered to have little fibrotic potential.
Section 11: Toxicological Information (Continued)

Medical Conditions Aggravated by Exposure: Persons with pre-existing impaired lung functions (asthma-like conditions). Persons with a pacemaker should not go near welding and cutting operations unless they have consulted their doctor and obtained information from the manufacturer of the device. Respirators should be worn only after being medically cleared by a company-designated physician.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross. If irritation or flash burns develop after exposure, consult a physician.

Carcinogenicity: Beryllium, chromium VI compounds and nickel compounds are classified as IARC Group 1 and NTP Group K carcinogens. Chromium VI compounds and welding fumes must be considered as carcinogens under OSHA (29 CFR 1910.1200).

California Proposition 65: WARNING: These products contain or produce a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code Section 25249.5 et seq.)

Section 12: Ecological Information

Welding processes can release fumes directly to the environment. Welding wire can degrade if left outside and unprotected. Residues from welding consumables and processes could degrade and accumulate in the soil and groundwater.

Section 13: Disposal Considerations

Use recycling procedures if available. Discard any product, residue, packaging, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

Section 14: Transport Information

No international regulations or restrictions are applicable. No special precautions are necessary.

Section 15: Regulatory Information

Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label and the material safety data sheet. Observe all local and federal rules and regulations. Take all necessary precautions to protect yourself and others.

United States EPA Toxic Substance Control Act: All constituents of these products are on the TSCA inventory list or are excluded from listing.

CERCLA/SARA TITLE III: Reportable Quantities (RQs) and/or Threshold Planning Quantities (TPQs):

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>RQ (Lb)</th>
<th>TPQ (Lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products on this SDS are a solid solution in the form of a solid article.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Spills or releases resulting in the loss of any ingredient at or above its RQ require immediate notification to the National Response Center and to your Local Emergency Planning Committee.

Section 16: Other Information

The following Risk and Safety Phrase Texts and Hazard Statements correspond with the columns labeled - EU 67/548/EEC within Section 2 of this safety data sheet. Take appropriate precautions and protective measures to eliminate or limit the associated hazard.

Cadmium Statement: Cadmium is not a normal contaminant in aluminum alloys and neither it nor any of its compounds are used in the manufacture of this product


R20/22 : Harmful by inhalation and if swallowed
R36/37 : Irritating to eyes and respiratory system
R48/20/22 : Harmful - danger of serious damage to health by prolonged exposure through inhalation and if swallowed

For additional information please refer to the following sources:

**Section 16: Other Information (Continued)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>WMA Publication 236 and 237, “Hazards from Welding Fume”, “The arc welder at work, some general aspects of health and safety”.</td>
</tr>
<tr>
<td>Canada</td>
<td>CSA Standard CAN/CSA-W117.2-01 “Safety in Welding, Cutting and Allied Processes”.</td>
</tr>
</tbody>
</table>

**Liability-Disclaimer:** American Filler Metals does not assume liability whatsoever for the accuracy or completeness of the information contained in this SDS. The information contained is accurate to the best of our knowledge. The final suitability of any material is the responsibility of the user. Materials may present unknown hazards and are intended for use by qualified individuals experienced and trained in welding safety.