



MATERIAL SAFETY DATA SHEET

This Material Safety Data Sheet (MSDS) is for welding consumables and related products and may be used to comply with OSHA's Hazard Communication standard, 29 CFR 1910.1200, and Superfund Amendments and Reauthorization Act (SARA) of 1986 Public Law 99-499. The OSHA standard must be consulted for specific requirements. This Safety Data Sheet complies with European Commission Directive 89/106/EEC, 91/155/EEC, ISO 11014-1 and ANSI Z400.1. This document is translated in several languages and available on our website at www.hobartbrothers.com, from your sales representative or by calling customer service at 1 (937) 332-4000.

SECTION 1 - IDENTIFICATION

Manufacturer/Supplier Name: HOBART BROTHERS COMPANY
Address: 101 TRADE SQUARE EAST, TROY, OH 45373
Website: www.hobartbrothers.com

Telephone No: +1 (937) 332-4000
Emergency No: +1 (800) 424-9300

Product Type: SEBU FLUX

Trade Name: 212A, Hobart 335A and 447A, Dry Flux Powder 447C, ECA 13, Hobart 418

SECTION 2 - IDENTIFICATION OF HAZARDS

IMPORTANT - This section covers the hazardous materials from which this product is manufactured. The fumes and gases produced during welding with normal use of this product are also addressed in Section 8. The term "hazardous" in this section should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910.1200).

| HAZARDOUS INGREDIENT | CAS | EINECS ¹ | REGULATORY HAZARD CLASSIFICATION/DESIGNATION 67/548/EEC ³ | IARC ⁴ | NTP ² | OSHA ⁵ 65 ⁶ |
|-------------------------|------------|---------------------|----------------------------------------------------------------------|-------------------|------------------|-----------------------------------|
| ALUMINUM OXIDE | 1344-28-1 | 215-691-6 | None | --- | --- | --- |
| CALCIUM CARBONATE | 1317-65-3 | 215-279-6 | None | --- | --- | --- |
| CELLULOSE | 9004-34-6 | 232-674-9 | None | --- | --- | --- |
| IRON | 7439-89-6 | 231-096-4 | None | --- | --- | --- |
| IRON OXIDE | 1309-37-1 | 215-168-2 | None | 3 | --- | --- |
| MAGNESIUM OXIDE | 1309-48-4 | 215-171-9 | None | --- | --- | --- |
| MANGANESE | 7439-96-5 | 231-105-1 | Xn - R20/22 ⁷ | --- | --- | --- |
| SILICA | 14808-60-7 | 238-878-4 | Xn - R48/20, R40/20 | 1 ⁸ | K | X |
| (Amorphous Silica Fume) | 69012-64-2 | 273-761-5 | None | 3 | K | X |
| TITANIUM DIOXIDE | 13463-67-7 | 236-675-5 | None | 2B | --- | --- |
| ZIRCONIUM | 7440-67-7 | 231-176-9 | F - R15, R17 | --- | --- | --- |

1 - European Inventory of Existing Chemical Substances Number 2 - European Union Directive 67/548/EEC - Annex 1 3 - International Agency for Research on Cancer (1 - Human Carcinogen, 2A - Probably Carcinogenic to Humans, 2B - Possibly Carcinogenic to Humans, 3 - Unclassifiable as to Carcinogenicity in Humans, 4 Probably Not Carcinogenic to Humans) 4 - US National Toxicology Program (K - Known Carcinogen, S - Suspected Carcinogen) H - OSHA Known Carcinogen List 5 - California Proposition 65 (X - On Proposition 65 list) --- Dashes indicate the ingredient is not listed with the IARC, NTP, OSHA or 65 7 - Manganese Dioxide EU 67/548/EEC Classification/Designation 8 - Silica Crystalline α -Quartz

The following symbols correspond with the EU 67/548/EEC column above are in European Union Directive 67/548/EEC Annex 1 and EC 1272/2008 Annex VI - Table 3.2:



F - Flammable



Xn - Harmful

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.

ARC RAYS: The welding arc can injure eyes and burn skin.
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, calcium oxide, manganese, and silica. Other reasonably expected constituents of the fume would also include complex oxides of iron, titanium 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 - HAZARDOUS INGREDIENTS

CONTENT PERCENTAGE BY INGREDIENTS

| INGREDIENT | CAS | EINECS | %WEIGHT | INGREDIENT | CAS | EINECS | %WEIGHT |
|-------------------|-----------|-----------|---------|-------------------------|------------|-----------|---------|
| ALUMINUM OXIDE | 1344-28-1 | 215-691-6 | 0-5 | MANGANESE | 7439-96-5 | 231-105-1 | 5-15 |
| CALCIUM CARBONATE | 1317-65-3 | 215-279-6 | 0-10 | SILICA | 14808-60-7 | 238-878-4 | 0-40 |
| CELLULOSE | 9004-34-6 | 232-674-9 | 10-20 | (Amorphous Silica Fume) | 69012-64-2 | 273-761-5 | --- |
| IRON | 7439-89-6 | 231-096-4 | 0-10 | TITANIUM DIOXIDE | 13463-67-7 | 236-675-5 | 30-60 |
| IRON OXIDE | 1309-37-1 | 215-168-2 | 0-15 | ZIRCONIUM | 7440-67-7 | 231-176-9 | <2 |
| MAGNESIUM OXIDE | 1309-48-4 | 215-171-9 | 0-2 | | | | |

--- Dashes indicate the ingredient is not present within the group of products

SECTION 4 - FIRST AID MEASURES

INHALATION: If breathing is difficult provide fresh air and contact physician.
Section 11 of this MSDS covers the acute effects of overexposure to the various ingredients within the welding consumable. Section 8 of this MSDS lists the exposure limits and covers methods for protecting yourself and your co-workers.

EYE/SKIN INJURIES: For radiation burns, see physician.

Section 8 of this MSDS lists the exposure limits and covers methods for protecting yourself and your co-workers.



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 complex compounds 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. European Union Occupational Exposure Limits (EU OEL) are listed with the most stringent limit among the EU member nations. All exposure limits are in milligrams per cubic meter (mg/m³).

| INGREDIENT | CAS | EINECS | OSHA PEL | ACGIH TLV | EU OEL |
|-------------------------|------------|-----------|----------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| ALUMINUM OXIDE## | 1344-28-1 | 215-691-6 | 5 R* | 1 R* (A4) | 1.5 R* (Aerosol) - Germany; 2 - Poland |
| CALCIUM CARBONATE | 1317-65-3 | 215-279-6 | 5 R*, 5 (as CaO) | 3 R*, 2 (as CaO) | 3 R* (Aerosol) - Switzerland; 10 I* (Aerosol) - UK |
| CELLULOSE | 9004-34-6 | 232-674-9 | 5 R* | 10 | 3 R* (Aerosol) - Switzerland; 10 I* (Aerosol) - UK |
| IRON+ | 7439-89-6 | 231-096-4 | 5 R* | 5 R* (Fe ₂ O ₃) (A4) | 3 R* (Aerosol as Fe ₂ O ₃) - Switzerland 7*** (as Fe ₂ O ₃) - Denmark |
| IRON OXIDE | 1309-37-1 | 215-168-2 | 10 (Oxide Fume) | 5 R* (Fe ₂ O ₃) (A4) | 3 R* (Aerosol as Fe ₂ O ₃) - Switzerland 7*** (as Fe ₂ O ₃) - Denmark |
| MAGNESIUM OXIDE | 1309-48-4 | 215-171-9 | 15 (Fume, Total Part) | 10 I* (A4) | 3 R* (Aerosol as Mg) - Switzerland 4 I* (Aerosol as Mg); 1.5 R*** (Aerosol as Mg) - Germany |
| MANGANESE# | 7439-96-5 | 231-105-1 | 5 CL ** (Fume) 1, 3 STEL*** ■ | 0.1 I* (A4) ♦ 0.02 R* ♦♦ | 0.02 R* (Aerosol); 0.16 R*** (Aerosol) - Germany 0.2 I* (Aerosol) - Germany 0.2; 0.4*** - Denmark |
| SILICA++ | 14808-60-7 | 238-878-4 | 0.1 R* | 0.025 R* (A2) | 0.1 (Fused, Respirable Dust) - Denmark 0.2*** (Fused, Respirable Dust) - Denmark 2 I*; 4 I*** - Denmark |
| (Amorphous Silica Fume) | 69012-64-2 | 273-761-5 | 0.8 | 3 R* | 1.5 R* - Germany |
| TITANIUM DIOXIDE | 13463-67-7 | 236-675-5 | 15 (Dust) | 10 (A4) | 1 I* (Aerosol); 0.1 I*** (Aerosol) - Germany |
| ZIRCONIUM | 7440-67-7 | 231-176-9 | 5 (Zr Cpnds) | 5, 10 STEL*** (Zr Cpnds) (A4) | |

R* - Respirable Fraction R*** - Respirable Fraction - Short Term Exposure Limit I* - Inhalable Fraction I*** - Inhalable Fraction - Short Term Exposure Limit ** - 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 ## - Reportable material under Section 313 of SARA only in fibrous form ■ - NIOSH REL TWA and STEL ♦ - Limit of 0.1 mg/m³ is for Inhalable Mn in 2013 by ACGIH ♦♦ - Limit of 0.02 mg/m³ is for Respirable Mn in 2013 by ACGIH Cpnds - Compounds NOS - Not Otherwise Specified (A2) - Suspected Human Carcinogen per ACGIH (A4) - Not Classifiable as a Human Carcinogen per ACGIH

VENTILATION: Use enough ventilation, local exhaust at the arc or both to keep the fumes and gases 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 hand, head 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

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded.

PHYSICAL STATE: Cored Wire

COLOR: Gray

ODOR: N/A

FORM: Coated Rod

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 dryness or irritation of nose, throat or eyes. **Aluminum Oxide** - Irritation of the respiratory system. **Calcium Oxide** - Dust or fumes may cause irritation of the respiratory system, skin and eyes. **Iron, Iron Oxide** - None are known. Treat as nuisance dust or fume. **Magnesium Oxide** - Overexposure to the oxide may cause metal fume fever characterized by metallic taste, tightness of chest and fever. Symptoms may last 24 to 48 hours following overexposure. **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. **Silica (Amorphous)** - Dust and fumes may cause irritation of the respiratory system, skin and eyes. **Titanium Dioxide** - Irritation of respiratory system. **Zirconium** - May cause irritation of the eyes, nose and throat due to mechanical effects.

LONG-TERM (CHRONIC) OVEREXPOSURE EFFECTS: **Welding Fumes** - Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or "siderosis." **Aluminum Oxide** - Pulmonary fibrosis and emphysema. **Calcium Oxide** - Prolonged overexposure may cause ulceration of the skin and perforation of the nasal septum, dermatitis and pneumonia. **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. **Magnesium Oxide** - No adverse long term health