

SAFETY DATA SHEET

This Safety Data Sheet (SDS) is for welding consumables and related products and may be used to comply with the European Parliament and Council Regulation (EC) No 1907/2006 (known as REACH) and Regulation (EC) No 1272/2008 (known as CLP), which adapted the REACH provisions regarding Safety Data Sheets to comply with the United Nations' Globally Harmonized System (GHS, fifth version) for classifying and labelling chemical substances and mixtures. The REACH and CLP regulations must be consulted for specific requirements. This Safety Data Sheet complies with ISO 11014-1. This document is translated in several languages and is available on our website at www.hobartbrothers.com, from your sales representative or by calling US customer service at 1 (937) 332-4000.

SECTION 1 – IDENTIFICATION OF THE SUBSTANCE /MIXTURE AND OF THE COMPANY /UNDERTAKING

1.1 PRODUCT IDENTIFIER

Products Type: FLUX FOR SUBMERGED ARC WELDING
GROUP A: Trade Name: ---
GROUP B: Trade Name: HF-N
GROUP C: Trade Name: HA-495, HN-511, HN-590
GROUP D: Trade Name: PF 201

1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

Product Use: Flux for Submerged Arc Welding
Uses Advised Against: Use only as indicated for welding operations.

1.3 DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

Name: HOBART BROTHERS COMPANY
Address: 101 TRADE SQUARE EAST, TROY, OH 45373
United States
Website: www.hobartbrothers.com
Competent Person Responsible for the SDS: David.Castro@HobartBrothers.com

1.4 EMERGENCY TELEPHONE NUMBER

Telephone No: +1 (937) 332-4000 [8 am to 5 pm – Eastern US Time Zone]
Emergency No: +1 (800) 424-9300 [Chemtrec Day or Night, within USA and Canada: 1-800-424-9300 CCN11662]
[Outside USA and Canada: +1-703-527-3887 (collect calls accepted)]

SECTION 2 – HAZARDS IDENTIFICATION

GROUP A:

2.1 CLASSIFICATION OF SUBSTANCE OR MIXTURE – The product described in Section 1 is classified as hazardous according to applicable GHS hazard classification criteria as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008.

- Acute Toxicity - Oral Category 4
- Acute Toxicity - Inhalation Category 4
- Specific Target Organ Toxicity (Repeated Exposure) Category 2
- Carcinogenicity Category 2

2.2 LABEL ELEMENTS

Hazard Pictograms:



Signal Word – WARNING

Hazard Statements:

H302: Harmful if swallowed
H332: Harmful If inhaled
H351: Suspected of causing cancer through inhalation
H373: May cause damage to organs through prolonged or repeated exposure through inhalation

Precautionary Statements:

P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathe dusts/fume/gas/mists/vapours/spray.
P264: Wash affected areas thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P312: IF SWALLOWED: Call a POISON CENTER
P330: Rinse mouth
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTER if you feel unwell.
P308 + P313: If exposed or concerned: Get medical advice/attention.
P314: Get medical advice/attention if you feel unwell.
P405: Store locked up.
P501: Dispose of contents and container in accordance with local and national regulations.

GROUP B:

2.1 CLASSIFICATION OF SUBSTANCE OR MIXTURE – The product described in Section 1 is classified as hazardous according to applicable GHS hazard classification criteria as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008.

- Acute Toxicity - Oral Category 4

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- Acute Toxicity - Inhalation Category 4
- Specific Target Organ Toxicity (Repeated Exposure) Category 2
- Carcinogenicity Category 2

2.2 LABEL ELEMENTS

Hazard Pictograms:



Signal Word – WARNING

Hazard Statements:

H302: Harmful if swallowed
H332: Harmful If inhaled
H351: Suspected of causing cancer through inhalation
H373: May cause damage to organs through prolonged or repeated exposure through inhalation

Precautionary Statements:

P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathe dusts/fume/gas/mists/vapours/spray.
P264: Wash affected areas thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P312: IF SWALLOWED: Call a POISON CENTER
P330: Rinse mouth
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTER if you feel unwell.
P308 + P313: If exposed or concerned: Get medical advice/attention.
P314: Get medical advice/attention if you feel unwell.
P405: Store locked up.
P501: Dispose of contents and container in accordance with local and national regulations.

GROUP C:

2.1 CLASSIFICATION OF SUBSTANCE OR MIXTURE – The products described in Section 1 is classified as hazardous according to applicable GHS hazard classification criteria as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008.

- Acute Toxicity - Oral Category 4
- Acute Toxicity - Inhalation Category 4
- Specific Target Organ Toxicity (Repeated Exposure) Category 2
- Carcinogenicity Category 2

2.2 LABEL ELEMENTS

Hazard Pictograms:



Signal Word – WARNING

Hazard Statements:

H302: Harmful if swallowed
H332: Harmful If inhaled
H351: Suspected of causing cancer through inhalation
H373: May cause damage to organs through prolonged or repeated exposure through inhalation

Precautionary Statements:

P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathe dusts/fume/gas/mists/vapours/spray.
P264: Wash affected areas thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P312: IF SWALLOWED: Call a POISON CENTER
P330: Rinse mouth
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTER if you feel unwell.

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P308 + P313: If exposed or concerned: Get medical advice/attention.
P314: Get medical advice/attention if you feel unwell.
P405: Store locked up.
P501: Dispose of contents and container in accordance with local and national regulations.

GROUP D:

2.1 CLASSIFICATION OF SUBSTANCE OR MIXTURE – The product described in Section 1 is classified as hazardous according to applicable GHS hazard classification criteria as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008.

- Skin Corrosion/Irritation Category 2
- Serious Eye Damage/Eye Irritation Category 1
- Specific Target Organ Toxicity (Repeated Exposure) Category 2
- Specific Target Organ Toxicity (Single Exposure) Category 3
- Carcinogenicity Category 2

2.2 LABEL ELEMENTS

Hazard Pictograms:



Signal Word – DANGER

Hazard Statements:

H315: Causes skin irritation
H318: Causes serious eye damage
H335: May cause respiratory irritation
H351: Suspected of causing cancer through inhalation
H373: May cause damage to organs through prolonged or repeated exposure through inhalation

Precautionary Statements:

P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathe dusts/fume/gas/mists/vapours/spray.
P264: Wash affected areas thoroughly after handling.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352: IF ON SKIN: Wash with plenty of water.
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/attention.
P310: Immediately call a POISON CENTER or doctor/physician.
P321: Specific treatment (see on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.
P308+P313: If exposed or concerned: Get medical advice/attention.
P314: Get medical advice/attention if you feel unwell.
P403+P233: Store in well-ventilated place. Keep container tightly closed.
P405: Store locked up.
P501: Dispose of contents and container in accordance with local and national regulations.

2.3 OTHER HAZARDS

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, plus those from the base metal and coating, etc., of the materials shown in Section 3 of this Safety Data Sheet. Monitor for the component materials identified in the list in Section 3.

Fumes from the use of this product may contain complex oxides or compounds of the following elements and molecules: amorphous silica fume, calcium oxide, fluorspar or fluorides, 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.

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SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

3.2 MIXTURES

IMPORTANT - This section covers the hazardous materials from which this product is manufactured. This data has been classified according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008. The fumes and gases produced during welding with normal use of this product are addressed in Section 8.

INGREDIENT	CAS NO.	EINECS ¹	GROUP AND %WEIGHT				GHS Classification(s)	GHS HAZARD STATEMENTS (See Section 16 for Complete Phrases)
			A	B	C	D		
ALUMINUM OXIDE	1344-28-1	215-691-6	20-30	10-20	15-45	10-20	NONE	
CALCIUM CARBONATE	471-34-1	207-439-9	---	---	---	<1	NONE	
CALCIUM CARBONATE	1317-65-3	215-279-6	5-10	---	<5	---	NONE	
CALCIUM OXIDE	1305-78-8	215-138-9	---	---	---	3-10	- Skin Corr. 2 ⁽¹⁾ - Eye Irrit. 1 ⁽²⁾ - STOT SE 3 ⁽³⁾	H315 H318 H335
FLUORSPAR	7789-75-5	232-188-7	5-10	25-35	3-10	10-20	NONE	
IRON	7439-89-6	231-096-4	<5	---	<5	<2	NONE	
IRON OXIDE	1309-37-1	215-168-2	---	---	---	0-5	NONE	
KAOLIN	1332-58-7	310-164-1	<5	---	0-10	---	NONE	
MAGNESIUM OXIDE	1309-48-4	215-171-9	20-30	25-35	0-30	3-10	NONE	
MANGANESE	7439-96-5	231-105-1	5-10	<5	0-10	---	- Acute Tox. 4 (Oral) ⁽⁴⁾ - Acute Tox. 4 (Inhalation) ⁽⁴⁾ - STOT RE 1 ⁽⁵⁾	H302 H332 H372
MANGANOUS OXIDE	1344-43-0	215-695-8	---	---	---	20-30	NONE	
POTASSIUM SILICATE	1312-76-1	215-199-1	<1	1-3	1-3	---	NONE	
SILICA	14808-60-7	238-878-4	<7	3-10	15-25 ⁽⁶⁾	30-40	- STOT RE 2 ⁽⁵⁾ - Carc. 2 ⁽⁷⁾	H373 H351
(Amorphous Silica Fume)	69012-64-2	273-761-1	---	---	---	---	NONE	
SILICON	7440-21-3	231-130-8	<5	---	<5	---	NONE	
SODIUM SILICATE	1344-09-8	215-687-4	0-1	0-2	0-2	---	NONE	
TITANIUM DIOXIDE	13463-67-7	236-675-5	<5	---	<5	---	- Carc. 2 ⁽⁷⁾	H351
ZIRCONIUM	7440-67-7	231-176-9	<5	---	---	---	- Pyr. Sol. 1 ⁽⁸⁾ - Water-react. 1 ⁽⁹⁾	H250 H260

--- Dashes indicate the ingredient is not present within the group of products. ¹ – European Inventory of Existing Commercial Chemical Substances (1) Skin corrosion/irritation (Categories 1, 1A, 1B, 1C and 2) (2) Serious eye damage/eye irritation (Cat. 1 and 2) (3) Specific target organ toxicity (STOT) – single exposure (Cat. 1, 2 and 3) (4) Acute toxicity (Cat. 1, 2, 3 and 4) (5) Specific target organ toxicity (STOT) – repeated exposure (Cat. 1 and 2) (6) – Group C – Not Present in HA-495 (7) Carcinogenicity (Cat. 1A, 1B and 2) (8) Pyrophoric solid (Cat. 1) (9) Substance or mixture which in contact with water emits flammable gases (Cat. 1, 2 and 3)

SECTION 4 – FIRST AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES

Ingestion: Not an expected route of exposure. Do not eat, drink, or smoke while welding; wash hands thoroughly before performing these activities. If symptoms develop, seek medical attention at once.

Inhalation during welding: If breathing is difficult, provide fresh air and contact physician. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.

Skin Contact during welding: Remove contaminated clothing and wash the skin thoroughly with soap and water. If symptoms develop, seek medical attention at once.

Eye Contact during welding: Dust or fume from this product should be flushed from the eyes with copious amounts of clean, tepid water until victim is transported to an emergency medical facility. Do not allow victim to rub or keep eyes tightly closed. Obtain medical assistance at once.

Arc rays can injure eyes. If exposed to arc rays, move victim to dark room, remove contact lenses as necessary for treatment, cover eyes with a padded dressing and rest. Obtain medical assistance if symptoms persist.

4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

No adverse effects are expected from welding consumables until they are welded. Inhalation of welding fumes may cause dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Arc rays may injure eyes and burn skin. Respirable crystalline silica is listed as a human carcinogen in the International Agency for Research on Cancer (IARC) Monographs. Prolonged or repeated exposure to welding fumes causes damage to respiratory system, teeth and bones. Prolonged or repeated exposure to welding fumes

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may cause damage to brain and nervous system. Prolonged or repeated exposure to welding fumes may cause siderosis (iron deposits in lungs), liver or kidney damage, skin and respiratory sensitization (allergic reaction) and affect pulmonary function.

4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED

Specific Treatment: If eye or skin burns occur, get immediate medical attention.

Notes for the doctor: Treat symptomatically.

Section 11 of this SDS covers the acute effects of overexposure to the various ingredients within the welding consumable. Section 8 of this SDS lists the exposure limits and covers methods for protecting yourself and your co-workers.

SECTION 5 – FIRE-FIGHTING MEASURES

5.1 EXTINGUISHING MEDIA

Suitable Extinguishing Media: Use a suitable extinguishing agent for a surrounding fire.

Unsuitable Extinguishing Media: None known.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, non-explosive and essentially nonhazardous until welded. Welding arcs and sparks can ignite combustibles and flammable products. If there are flammable materials, including fuel or hydraulic lines, in the work area and the worker cannot move the work or the flammable material, a fire-resistant shield such as a piece of sheet metal or fire resistant blanket should be placed over the flammable material. If welding work is conducted within 10 meters (~35 feet) or so of flammable materials, station a responsible person in the work zone to act as fire watcher to observe where sparks are flying and to grab an extinguisher or sound the alarm if needed. Unused welding consumables may remain hot for a period of time after completion of a welding process.

5.3 ADVICE FOR FIRE-FIGHTERS

Self-contained breathing apparatus and protective clothing should be worn in fighting fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES

Not applicable to fluxes. During use of product in a welding process, wear personal protective equipment as specified in Section 8. Avoid contact with the skin. Do not inhale dust, fumes or gases that arise from the welding process.

6.2 ENVIRONMENTAL PRECAUTIONS

Collect powder from welding operations using a vacuum cleaner or by gentle sweeping to keep dust away from drains, surface and ground water. Prevent particulates from entering watercourses or drains. Avoid formation of dust clouds.

6.3 METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

In the case of a release of solid welding consumable products, granular flux materials can be swept up and placed into a disposal container. Collect powder from welding operations using a vacuum cleaner or by gentle sweeping. If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8. Wear proper personal protective equipment while handling. Do not discard as general trash.

6.4 REFERENCE TO OTHER SECTIONS

Refer to Section 8.

SECTION 7 - HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING

No specific requirements in the form supplied. Wear gloves when handling welding consumables. Avoid exposure to dust. Do not ingest. Avoid breathing welding fumes. Keep your head out of the fumes. Use with enough ventilation or exhaust at the arc, or both, to keep fumes and gases below the occupational exposure limits in your breathing zone and the general area. Use air sampling to determine the need for corrective action. (Refer to Section 10 for additional information). Some individuals can develop an allergic reaction to certain materials. Retain all warning and product labels.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

Store in a dry area to protect product quality. Keep separate from acids and strong bases to prevent possible chemical reactions.

7.3 SPECIFIC END USE(S)

Industrial uses: Welding process.

Professional uses: Welding process.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 CONTROL PARAMETERS

Read and understand the instructions and the labels on the packaging. Welding fumes are a varying mixture of airborne gases and fine particles which, if inhaled or swallowed, constitute a health hazard. The degree of risk will depend on the composition of the fume, concentration of the fume and duration of exposure. The fume composition is dependent upon the material being worked, the process and consumables being used, coatings on the work such as paint, galvanizing or plating, oil or contaminants from cleaning and degreasing activities. A systematic approach to the assessment of exposure is necessary, taking into account the particular circumstances for the operator or nearby coworkers who could be exposed. 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.

Welding fumes do not have a specific European Union (EU) Occupational Exposure Limit (OEL). The most stringent available EU member nation 8-hour Threshold Limit Value (TLV) for Particulates-Not Otherwise Regulated (PNOR) is provided by Belgium at 10 mg/m³. The individual complex compounds within the fume may have a lower OEL than the Belgium PNOR limit value. An Industrial Hygienist and/or the EU member nation should be consulted to determine the specific fume constituents present and their respective exposure limits. The GESTIS International Limit Value database at the website http://limitvalue.ifa.dguv.de/WebForm_gw2.aspx may be accessed for international OELs for chemical agents. European Union Occupational Exposure Limits 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	EU OEL
ALUMINUM OXIDE	1344-28-1	215-691-6	TLV: 5 (R*), STLV: 10 (R*) - Austria; TLV: 1 (Respirable fraction) - Belgium; TLV: 5 (I*), TLV: 2 (R*), STLV: 10 (I*), STLV: 4 (R*) - Denmark; TLV: 10 (R*) - France; TLV: 4 (I*), TLV: 1.5 (R*) - Germany (DFG); TLV: 2.5 (fume, total dust), TLV: 1.2 (fume, respirable dust), STLV: 16 - Poland; TLV: 10 (I*), TLV: 5 (R*) - Spain; TLV: 5 (I*), TLV: 2 (R*) - Sweden; TLV: 3 (R*) - Switzerland; TLV: 10 I* - France; TLV: 10 - Poland; TLV: 3 R* - Switzerland TLV: 10 (I*) - Spain; TLV: 3 (R*) - Switzerland; TLV: 2 (I*), STLV: 4 (I*) - Austria; TLV: 2, STLV: 4 - Denmark; TLV: 2 - Finland; TLV: 2 - France; TLV: 1 (Inhalable fraction), STLV: 2 (15 min avg (AGS)/15 min ref period (DFG), Inhalable fraction) - Germany (AGS & DFG); TLV: 2, STLV: 6 - Poland; TLV: 5 - Spain; TLV: 1, STLV: 2.5 (Inhalable dust, 15 min avg) - Sweden; TLV: 2 (I*), STLV: 2 (I*) - Switzerland;
CALCIUM CARBONATE	471-34-1	207-439-9	
CALCIUM CARBONATE	1317-65-3	215-279-6	
CALCIUM OXIDE	1305-78-8	215-138-9	

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FLUORSPAR (CALCIUM FLUORIDE)	7789-75-5	232-188-7	Same as for Fluorides above (not separately established);
IRON+	7439-89-6	231-096-4	TLV: 5 (R*), STLV: 10 (R*) - Austria; TLV: 3.5, STLV: 7 - Denmark; TLV: 5 (as Fe and fume) - Finland; TLV: 5, STLV: 10 - Poland; TLV: 5 - Spain; TLV: 3 (R*) - Switzerland;
IRON OXIDE	1309-37-1	215-168-2	Same as for Iron+ above;
KAOLIN	1332-58-7	310-164-1	TLV: 2 (R*), STLV: 4 (R*) - Denmark; TLV: 2 (R*) - Finland; TLV: 10 (R*) - France; TLV: 3 (R*) - Switzerland;
MAGNESIUM OXIDE	1309-48-4	215-171-9	TLV: 6 (I*), STLV: 12 (I*) - Denmark; TLV: 10 (R*) - France; TLV: 4 (I*), STLV: 1.5 (R*) - Germany (DFG); TLV: 5 (fume), 10 (dust) - Poland; TLV: 10 (R*and I*) - Spain; TLV: 3 (R*) - Switzerland;
MANGANESE++	7439-96-5	231-105-1	TLV: 0.1, STLV: 0.2 - Denmark; TLV: 1 - France; TLV: 0.02 (R*), STLV: 0.16 (R*) (STV for permanganates: 0.02, 15 min average value) - Germany (DFG); TLV: 0.2 - Sweden; Calculated as Mn - TLV: 0.2 (Inhalable fraction), 0.02 mg/m3 (Respirable fraction) - Finland;
MANGANOUS OXIDE (calculated as Mn)	1344-43-0	215-695-8	(Silicates & aluminosilicates) Not established;
POTASSIUM SILICATE	1312-76-1	215-199-1	TLV: 0.15 (R*) - Austria; TLV: 0.3 (I*), TLV: 0.1 (R*), STLV: 0.6 (I*), STLV: 0.2 (R*) - Denmark;
SILICA +++ (respirable crystalline quartz)	14808-60-7	238-878-4	TLV: 0.05 (respirable fraction) - Finland; TLV: 0.075 (respirable dust) - Netherlands; TLV: 0.15 (R*) Switzerland;
(Amorphous silica fume and fused respirable dust)	69012-64-2 60676-86-0	273-761-1	TLV: 0.3 (fused, respirable dust) - Austria; TLV: 2 (fume, respirable fraction), STLV: 4 (fume, respirable fraction), TLV: 0.1 (fused respirable dust), STLV: 0.2 (fused, respirable dust) - Denmark; TLV: 0.3 (fume, R*) - Germany AGS; TLV: 0.3 (fused, respirable dust aerosol) - Germany (AGS & DFG); TLV: 0.3 (fused, respirable dust aerosol) - Switzerland;
SILICON+	7440-21-3	231-130-8	TLV: 10 (I*), STLV: 20 (I*) - Denmark; TLV: 10 (R*) - France; TLV: 3 (R*) - Switzerland;
SODIUM SILICATE	1344-09-8	215-687-4	Not established;
TITANIUM DIOXIDE	13463-67-7	236-675-5	TLV: 6 (total dust), STLV: 12 (total dust) - Denmark; TLV: 11 (I*) - France; TLV: 10, STLV: 30 - Poland;
ZIRCONIUM (Compounds, as Zr)	7440-67-7	231-176-9	TLV: 5 (I*) - Austria; TLV: 5, STLV: 10 - Denmark; TLV: 1 (as element & as stabilized and nonstabilized powder) - Finland; TLV: 1 (I*), STLV: 1 (I*) (AGS-15 min avg value) - Germany (AGS & DFG); TLV: 5, STLV: 10 - Poland; TLV: 5, STLV: 10 - Spain; TLV: 5 (I*) - Switzerland;

R* - Respirable Aerosol; I* - Inhalable Aerosol; + - as oxide, fume, or respirable dust; ++ - as fume, or respirable dust; +++ - 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; AGS - Ausschuss für Gefahrstoffe (German Committee on Hazardous substances); DFG- Deutsche Forschungsgemeinschaft (German Research Foundation); TLV - Threshold Limit Value; STLV - Short Term Limit Value; EINECS - European Inventory of Existing Commercial Chemical Substances.

8.2 EXPOSURE CONTROLS

VENTILATION: Use enough ventilation, local exhaust at the arc or both to keep the fumes and gases below the 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 a fume respirator or air supplied respirator approved by the EU Member State agency responsible for personal protective equipment certification under Directive 89/686/EEC (list available upon request) 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. 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 TLV/OEL. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures which exceed TLV/OEL. Always use exhaust ventilation. Refer to the following sources for important additional information: Refer to the following sources for important additional information: EU OSHA - European Agency for Safety and Health at Work OSHwiki database, *Dust and aerosols – welding fumes*, last modified 17 May 2013, retrieved 4 August 2015.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

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

PHYSICAL STATE: Solid

APPEARANCE: Granular

COLOR: Varies by product

ODOR: Not Applicable

ODOR THRESHOLD: Not Applicable

pH: Not Applicable

MELTING POINT/FREEZING POINT: Not Available

INITIAL BOILING POINT AND BOILING RANGE: Not Available

FLASH POINT: Not Available

EVAPORATION RATE: Not Applicable

FLAMMABILITY (SOLID, GAS): Not Available

UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS: Not Available

VAPOR PRESSURE: Not Applicable

VAPOR DENSITY: Not Applicable

RELATIVE DENSITY: Not Available

SOLUBILITY: Not Available

PARTITION COEFFICIENT: N-OCTANOL/WATER: Not Applicable

AUTO-IGNITION TEMPERATURE: Not Available

DECOMPOSITION TEMPERATURE: Not Available

VISCOSITY: Not Applicable

EXPLOSIVE PROPERTIES: Not Available

OXIDIZING PROPERTIES: Not Available

9.2 OTHER INFORMATION

No other physical or chemical parameters are necessary for welding flux.

SECTION 10 – STABILITY AND REACTIVITY

10.1 REACTIVITY

Welding consumables applicable to this sheet are solid, stable, and nonvolatile as shipped.

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10.2 CHEMICAL STABILITY

This product is stable under normal conditions.

10.3 POSSIBILITY OF HAZARDOUS REACTIONS

Contact with acids or strong bases may cause generation of gas. See also Section 8.

10.4 CONDITIONS TO AVOID

This product is only intended for use per the welding parameters it was designed for.

10.5 INCOMPATIBLE MATERIALS

Contact with acids or strong bases may cause generation of explosive gases (e.g., hydrogen).

10.6 HAZARDOUS DECOMPOSITION PRODUCTS

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. When the flux is consumed, the fume and gas decomposition products generated are different in percent and form than ingredients in the manufactured product. Decomposition products of normal operation include those originating from the volatilization reaction, or oxidation of the materials shown in Section 3, plus those from the base metal and coating, etc., as noted above.

SECTION 11 – TOXICOLOGICAL INFORMATION

11.1 INFORMATION ON TOXICOLOGICAL EFFECTS

Potential Health Effects: Welding consumables are not hazardous until welded.

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

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, Kaolin** - Irritation of the respiratory system. **Calcium Oxide** - Dust or Fumes may cause irritation of the respiratory system, skin and eyes. **Fluorides** - Fluoride compounds evolved may cause skin and eye burns, pulmonary edema and bronchitis. **Iron, Iron Oxide** - None are known. Treat as nuisance dust or fume. **Magnesium, 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, Manganous Oxide** - 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. **Nickel, Nickel Compounds** - Metallic taste, nausea, tightness in chest, metal fume fever, allergic reaction. **Potassium Oxide** - Dust or fumes may cause irritation of the respiratory system, skin and eyes. **Silica (Amorphous)** - Dust and fumes may cause irritation of the respiratory system, skin and eyes. **Silica (Crystalline Quartz)** - Irritation of the respiratory system, skin, and eyes. **Sodium Oxide** - Dust or 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." Studies have concluded that there is sufficient evidence for ocular melanoma in welders. **Aluminum Oxide, Kaolin** - Pulmonary fibrosis and emphysema. **Calcium Oxide** - Prolonged overexposure may cause ulceration of the skin and perforation of the nasal septum, dermatitis and pneumonia. **Fluorides** - Serious bone erosion (Osteoporosis) and mottling of teeth. **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, Magnesium Oxide** - No adverse long term health effects have been reported in the literature. **Manganese, Manganous Oxide** - Long-term overexposure to manganese compounds may affect the central nervous system. Symptoms may be similar to Parkinson's disease and can 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. **Potassium Oxide** - Prolonged overexposure may cause ulceration of the skin and perforation of the nasal septum, dermatitis and pneumonia. **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. **Silica (Crystalline Quartz)** - Overexposure can cause silicosis. IARC studies indicate sufficient evidence for carcinogenicity in humans. **Sodium Oxide** - Prolonged overexposure may cause ulceration of the skin and perforation of the nasal septum, dermatitis and pneumonia. **Titanium Dioxide** - Pulmonary irritation and slight fibrosis. **Zirconium** - May cause pulmonary fibrosis and pneumoconiosis.

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 until they have consulted their doctor and obtained information from the manufacturer of the device. Respirators are to be worn only after being medically cleared by your company-designated physician.

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

Carcinogenicity: Silica (crystalline quartz) is classified as an IARC Group 1 carcinogen. Titanium dioxide and welding fumes are classified as an IARC Group 2B carcinogen.

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INGREDIENT	CAS	IARC ^E
ALUMINUM OXIDE	1344-28-1	---
CALCIUM CARBONATE	471-34-1	---
CALCIUM CARBONATE	1317-65-3	---
CALCIUM OXIDE	1305-78-8	---
FLUORSPAR	7789-75-5	---
IRON	7439-89-6	---
IRON OXIDE	1309-37-1	3
KAOLIN	1332-58-7	---
MAGNESIUM OXIDE	1309-48-4	---
MANGANESE	7439-96-5	---
MANGANOUS OXIDE	1344-43-0	---
POTASSIUM SILICATE	1312-76-1	---
SILICA	14808-60-7	1 ^ψ
(Amorphous Silica Fume)	69012-64-2	---
SILICON	7440-21-3	---
SODIUM SILICATE	1344-09-8	---
TITANIUM DIOXIDE	13463-67-7	2B
Welding Fumes		2B
ZIRCONIUM	7440-67-7	---

E – International Agency for Research on Cancer (1 – Carcinogenic to Humans, 2A – Probably Carcinogenic to Humans, 2B – Possibly Carcinogenic to Humans, 3 – Not Classifiable as to its Carcinogenicity to Humans, 4 Probably Not Carcinogenic to Humans) ^ψ – Silica Crystalline α-Quartz --- Dashes indicate the ingredient is not listed with the IARC

SECTION 12 – ECOLOGICAL INFORMATION

12.1 TOXICITY

No environmental toxicity data is available for the solid product. Welding processes can release fumes directly to the environment.

12.2 PERSISTENCE AND DEGRADABILITY

Welding flux (granular) can degrade if left outside and unprotected.

12.3 BIOACCUMULATIVE POTENTIAL

Residues from welding consumables and processes could degrade and accumulate in the soil and groundwater.

12.4 MOBILITY IN SOIL

This product is not soluble in water or soil. Particles formed by this product can be transported in air or water.

12.5 RESULTS OF PBT AND vPvB ASSESSMENT

No REACH Chemical Safety Report is required for fluxes; these products do not meet the criteria for PBT (persistent, bio accumulative and toxic) or vPvB (very persistent and very bio accumulative) in accordance with REACH, Annex XIII.

12.6 OTHER ADVERSE EFFECTS

In solid form, fluxes present no hazards to the environment. Particles and ions can, nevertheless, enter the environment by means of dust or smoke from welding operations, or by chemical liberation due to erosion thereby introducing iron or heavy metals into the ground or water.

SECTION 13 – DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS

Non-contaminated waste from production and fluxes is recyclable. Use recycling procedures if available. The unused product is not classified as hazardous waste. Any residues of finely-divided product (particles, dust, fumes) may be regarded as Hazardous Waste, depending on local regulations. Discard any product, residue, packaging, disposable container or liner in an environmentally acceptable manner, in full compliance with regional, national, and European regulations. Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

SECTION 14 – TRANSPORT INFORMATION

14.1 UN NUMBER

Fluxes are not classified as dangerous goods for transport and have no UN number. No international regulations or restrictions are applicable. No special precautions are necessary.

14.2 UN PROPER SHIPPING NAME

Not regulated.

14.3 TRANSPORT HAZARD CLASS(S)

Not regulated.

14.4 PACKING GROUP

Not regulated.

14.5 ENVIRONMENTAL HAZARDS

Not regulated.

14.6 SPECIAL PRECAUTIONS FOR USER

None.

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14.7 TRANSPORT IN BULK ACCORDING TO ANNEX II OF MARPOL 73/78 AND THE IBC CODE

Not applicable – product is transported only in packaged form.

SECTION 15 – REGULATORY INFORMATION

15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE OR MIXTURE

Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label and the safety data sheet. Observe all local and national rules and regulations. Take all necessary precautions to protect yourself and others. This Safety Data Sheet was prepared in accordance with Regulations (EC) No 1907/2006 and No 1272/2008 of the European Parliament and Council. All the components in this product are listed on the European Inventory of Existing Commercial Chemical Substances (EINECS) for the European Union or are exempt.

15.2 CHEMICAL SAFETY ASSESSMENT

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16 – OTHER INFORMATION

The following Hazard Statements, provided in Annex I of (EC) No 1272/2008 (CLP) correspond to the columns labeled 'GHS Hazard Statements' within Section 3 of this safety data sheet. Take appropriate precautions and protective measures to eliminate or limit the associated hazard

- H250:** Catches fire spontaneously if exposed to air
- H260:** In contact with water releases flammable gases which may ignite spontaneously
- H302:** Harmful if swallowed
- H315:** Causes skin irritation
- H318:** Causes serious eye damage
- H332:** Harmful if inhaled
- H335:** May cause respiratory irritation
- H351:** Suspected of causing cancer
- H372:** Causes damage to organs through prolonged or repeated exposure
- H373:** May cause damage to organs through prolonged or repeated exposure

For additional information please refer to the following sources:

ISO International Standardization Organization, 11014: 2009 – "Safety Data sheet for chemical products—Content and order of sections".

ECHA European Chemicals Agency, created under REACH,
"Safety data sheets and exposure scenarios, Advice for recipients", eGuide 1,
<http://view.pagetiger.com/ECHAEGuide1-1/Issue1>.

"Compilation of Safety Data Sheets", Version 3.0 August 2015 (http://echa.europa.eu/documents/10162/13643/sds_en.pdf)

EU OSHA European Agency for Safety and Health at Work, OSHwiki database, "Dust and aerosols – welding fumes", last modified 17 May 2013, retrieved 4 August 2015.

UK: WMA Publication 236 and 237, "Hazards from Welding Fume", "The arc welder at work, some general aspects of health and safety".

Hobart Brothers Company strongly recommends the users of this product study this SDS, the product label information and become aware of all hazards associated with welding. Hobart Brothers Company believes this data to be accurate and to reflect qualified expert opinion regarding current research. However, Hobart Brothers Company cannot make any expressed or implied warranty as to this information.