1. PRODUCT AND COMPANY IDENTIFICATION

A. Product Name
Welding Material (Flux Cored Welding Electrode for 55kgf/mm² Class High Tensile Strength Steel)
Dual Shield 8100SR

B. Recommended use of the chemical and restrictions on use

1) Recommended use
Construction, shipbuilding, railcar, heavy equipment industries, automotive, and general structural steel fabrication

2) Restrictions on use
Refer to 7. Handling and Storage

C. Supplier’s details
1) Name
ESAB SeAH Corporation
2) Address
51 Seongju-dong, Seongsan-gu, Changwon, Kyungnam, Korea
3) Phone number
055-269-8111

D. Emergency phone number
055-269-8111, 055-269-8225

2. HAZARD IDENTIFICATION

A. Classification of product
Not classified

B. GHS Label elements, including precautionary statements

1) Pictograms (Hazard symbols)
Not available

2) Signal word
Not available

3) Hazard statements
Not available

4) Precautionary statements

A) Prevention
Not available

B) Response
Not available

C) Storage
Not available

D) Disposal
Not available

C. Other hazards which do not result in classification
No available data

D. Hazards During welding
When these products are used in a welding process, the most important hazards are heat, radiation, electric shock and welding fumes.

Heat: Spatter and melting metal can cause burn injuries and start fires.

Radiation: Arc rays can severely damage eyes or skin.

Electricity: Electric shock can kill.

Fumes: Overexposure to welding fume may result in symptoms like metal fume fever, dizziness, nausea, dryness or irritation of the nose, throat or eyes. Chronic overexposure to welding fumes may affect pulmonary function.

1) Prevention: Welding fumes and gases may be dangerous to your health. Use adequate ventilation to keep fumes from the breathing zone. Arc rays may injure eyes and burn skin. Wear adequate hand, head, eye and body protection.

2) Response: Not applicable

3) Storage: Stored locked up and keep dry.

4) Disposal: Not applicable
This Safety Data Sheet complies with the guidance on Occupation Safety and Health Act and enforcement regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Dual Shield 8100SR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (Al)</td>
<td>7429-90-5</td>
<td>&lt;1</td>
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<tr>
<td>Iron (Fe)</td>
<td>7439-89-6</td>
<td>Bal (≥80)</td>
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<td>Magnesium (Mg)</td>
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<td>Manganese (Mn)</td>
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<td>1.5~3.5</td>
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<tr>
<td>Nickel (Ni)</td>
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<tr>
<td>Silicon (Si)</td>
<td>7440-21-3</td>
<td>0.5~1.5</td>
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<tr>
<td>Silicon Dioxide (SiO₂)</td>
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<td>&lt;1.0</td>
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<tr>
<td>Titanium Oxide (TiO₂)</td>
<td>13463-67-7</td>
<td>5.0~8.0</td>
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<tr>
<td>Zirconium Oxide (ZrO₂)</td>
<td>1314-23-4</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

AWS Classification: A5.29 E81T1-GC

4. FIRST AID MEASURES

A. Eye contact
   - If irritation persists, obtain medical assistance.
   - To remove dusts or fumes flush with water for at least twenty minutes.
   - For radiation burns due to arc flash, see physician.

B. Skin contact
   - If skin irritation or erythema occurs, see physician.
   - Clean the contaminated clothing for reuse.
   - For skin burns from arc radiation, promptly flush with plenty of cold water.
   - Remove contaminated clothing and shoes, and isolate contaminated area.
   - To remove dust or particles wash with mild soap and water for at least twenty minutes.

C. Inhalation
   - If exposure, obtain medical assistance immediately.
   - Move to safety area.
   - If breathing has stopped, perform Cardio Pulmonary Resuscitation (CPR) and obtain medical assistance immediately.
   - If breathing is difficult, provide fresh air and call physician.
   - Keep warm and stabilize body.

D. Ingestion
   - Call a physician or poison control center immediately.
   - Do not induce vomiting unless directed to do so by a physician.

E. Others
   - If exposure, obtain special medical assistance immediately.
   - Recognize materials and do protective action.
   - In an electric shock, disconnect and turn off the power.
   - Use a nonconductive material to pull victim away from contact with live parts or wires.
   - If not breathing, begin artificial respiration, preferably mouth-to-mouth.
   - If no detectable pulse, begin Cardio Pulmonary Resuscitation (CPR).
   - Immediately call a physician.
5. FIRE-FIGHTING MEASURES

A. Suitable extinguishing media
   No specific recommendations for welding consumables.
   Welding arcs and sparks can ignite combustible and flammable materials.
   Use the extinguishing media recommended for the burning materials and fire situation (CO2, water).
   Cover fire site with dried sand or soil.

B. Specific hazards arising from the chemical
   A harmful gas will be produced at high temperature.
   When heated, container may explode.
   Friction, heat, and spark can ignite materials.
   Materials can be re-ignited after extinguishing.

C. Special protective actions for fire-fighters
   Wear proper protective equipment.
   Keep a certain distance and extinguish the fire.
   If not dangerous, remove container.
   If impossible extinguish, protect surround and extinguish itself.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures
   Avoid inhalation of dust, fume, gas, mist, and spray.
   Clean up the spilling and follow the section 8. C. individual protection measures.
   Don’t touch and don’t wake around the spilling.
   Remove all ignition sources.
   If not dangerous, stop leaking.
   Pay attention to the avoiding substances and condition.

B. Environmental precautions
   The spilling can cause pollution.
   Block the inflow to waterway, drain, basement, and enclosed area.

C. Method and materials for containment and cleaning up
   Absorb the spilling with the Inert materials (dried sand or soil) and put it to chemical waste container.
   Wash the contaminated area with water and soap.

7. HANDLING AND STORAGE

A. Precautions for safe handling
   Don’t treat before reading and understanding all safe precautions.
   Avoid inhalation of dust, fume, gas, mist, and spray.
   Wash handling part after finishing handling.
   Don’t eat, drink, and smoke when treating.
   Follow MSDS/label precautions when treating empty container.
   Use with caution when handling and storing.
   Remove the cap with caution.
If no a ventilation system, don’t enter the storage area.
Prevent dust generation.
Don’t touch products when welding.
Wear the nonconductive gloves.
Don’t use damaged or wet gloves.
Wear insulating shoes at workplace.
Don’t touch terminal of products, welding cable, and welding machine socket,
Don’t wear wet clothing at conductive place.
Keep the instruction manual and precautions before welding.
Use proper welding cable and repair or exchange the damaged cables.
Remove hazardous materials (combustibles or flammable liquid) to prevent spatter from firing, or cover them with
nonflammable materials.
Don’t weld container or pipe with combustible or flammable materials, or enclosed container or pipe.
Don’t put a hot welding material around combustible or flammable materials.
Remove hidden combustible or flammable materials when welding around ceiling, floor, and wall.
Keep extinguisher around workplace.

B. Conditions for safe storage

Keep away food and drink.
Store in a well-ventilated and low humidity place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Control parameters

1) Internal and external regulations

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No.</th>
<th>Internal TWA(1) (mg/m³)</th>
<th>Internal STEL(2) (mg/m³)</th>
<th>External TLV(3) (mg/m³)</th>
<th>PEL(4) (mg/m³)</th>
<th>Notes</th>
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<tr>
<td>Iron (Fe)</td>
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<td>-</td>
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<td>Zirconium Oxide (ZrO₂)</td>
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</table>

(1) TWA : Time Weighted Average
(2) STEL : Short Time Exposure Limit
(3) TLV : Threshold Limit Values according to American Conference of Governmental Hygienists, 2012
(4) PEL : Permissible Exposure Limits according to the Occupational Safety & Health Administration (USA)

* Total dust, ** Respirable fraction, *** Inhalable fraction.
^ Value from OSHA expressed in PPM and value shown is conversion to mg/m³
## AIHA WEEL (particulates only)
### Respirable dust
2) Biological limit values

Not available

B. Appropriate engineering controls

To install local ventilation system in the vicinity of welding fume sources is more effective than to deal with fume spreaded at workplace

Natural ventilation: If the concentration is low, the space is 284m$^3$ or more per two workers, and a ceiling height of space is more 5 meter, the natural ventilation is applied. It is also applied to the non-enclosed space with dilution.

Local ventilation: Install the appropriate local ventilation system depending on the nature of processing and welding materials. If the local ventilation is installed newly, the combined type, local air supply and local exhaust, is recommended. Local ventilation system installed closer to the worker as possible is desirable. It must have the ventability lower than the exposure limit. It is the most effective system to remove fume, but if the exhaust is too larger, welding defects will be occurred because of disturbance of the shielding gas. Workers should turn on it while working and conduct maintenance.

Portable local ventilation: It is applied when working in a confined space such as ship-body assembly or in the tank. Local air supply and local exhaust takes place at the same time. If necessary, run all the time. If welding fume exhausts to other workplace, portable dust collection equipment should be installed.

Full ventilation: Workplace is ventilized with fans and blowers. It is effective when workplace is a relatively small volume. To remove fume, parallel push-pull ventilation should be considered. It should be designed and installed according to the workplace.

C. Individual protection measures

Use protective equipment certified by the Korea Occupational Safety and Health agency while welding.

1) Respiratory protecton

To prevent fume or hazardous gases, wear a mask while welding as below.

Dust mask: Wear it in a bad ventilation condition while welding.

Gas mask: Wear a gas mask when ventilation is not sufficient such as inside the tank or in a narrow place.

Select a gas mask that can be used to combined with protective goggles

Use the proper canister according to hazardous substance.

Air-supplied respirator: Use air-line mask with compressed air.

2) Eye protection

Use a facial mask with filter screen from the ultraviolet of arc or spatter. There are face shield helmet or hand shielded helmet.

Use shielding grade as welding type.

<table>
<thead>
<tr>
<th>Welding type</th>
<th>Shielding grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shielded metal arc welding</td>
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<tr>
<td>Gas metal arc welding</td>
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<td>Gas tungsten arc welding</td>
<td>12</td>
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<tr>
<td>Flux cored arc welding</td>
<td>11-12</td>
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</tbody>
</table>

3) Hand protection

Wear the nonconductive gloves.

Don't use damaged or wet gloves.

4) Body protection

Wear leather apron and welding gloves to prevent burns and take insulating shoes at workplace.
9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance
   1) Physical state: Solid
   2) Colour: Silver or gray

B. Odour: Not available
C. Odour threshold: Not available
D. pH: Not available
E. Melting point/freezing point: Not available
F. Initial boiling point and boiling range: Not available
G. Flash point: Not available
H. Evaporation rate: Not available
I. Flammability (Solid, Gas): Not available
J. Upper/lower flammability or explosive limits: Not available
K. Vapour pressure: Not available
L. Vapour density: Not available
M. Relative density: Not available
N. Solubility: Not available
O. Partition coefficient: n-octanol/water: Not available
P. Auto-ignition temperature: Not available
Q. Decomposition temperature: Not available
R. Viscosity: Not available
S. Molecular weight: Not available

10. STABILITY AND REACTIVITY

A. Reactivity, chemical stability, and possibility of hazardous reactions
   Although may be burnt, ignition is difficult.
   During fire, irritant gases and fume will be produced.

B. Conditions to avoid
   Ignition sources (heat, spark, blaze)

C. Incompatible materials
   Combustible or flammable materials, chemical substances like acids and strong bases

D. Hazardous decomposition products
   May produce irritant gases and fume

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure: Not available

B. Health hazard information
   1) Acute toxicity: Not available
      A) Oral: Not available
      B) Dermal: Not available
This Safety Data Sheet complies with the guidance on Occupation Safety and Health Act and enforcement regulations.

C) Inhalation
2) Skin corrosion/irritation
3) Serious eye damage/irritation
4) Respiratory sensitization
5) Skin sensitization
6) Carcinogenicity
   A) Occupation safety and health acts
   B) The ministry of employment and labor
   C) IARC
   D) OSHA
   E) ACGIH
   F) NTP
   G) EU CLP
7) Germ cell mutagenicity
8) Reproductive toxicity
9) STOT-single exposure
10) STOT-repeated exposure
11) Aspiration hazard

12. ECOLOGICAL INFORMATION
A. Toxicity
   1) Fish
   2) Crustacea
   3) Birds
B. Persistence and degradability
   1) Persistence
   2) Degradability
C. Bioaccumulative potential
   1) Bioconcentration factor
   2) Biodegradation
D. Mobility in soil
E. Other advers effects

13. DISPOSAL CONSIDERATIONS
A. Disposal method
   Disposal contents and container as wastes control act.
B. Precautions
   Disposal contents and container as wastes control act.

14. TRANSPORT INFORMATION
A. UN number
   Not available
B. UN proper shipping name
   Not available
This Safety Data Sheet complies with the guidance on Occupation Safety and Health Act and enforcement regulations.

C. Transport hazard class
Not available

D. Packing group
Not available

E. Environmental hazards
Not available

F. Special precautions for user
1) Fire emergency action
Not available
2) Leak emergency action
Not available

15. REGULATORY INFORMATION

A. Internal regulation
No available internal regulation against products.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Control material</th>
<th>Work environment monitoring material</th>
<th>Special health monitoring material</th>
<th>Exposure standard material</th>
<th>Acceptable standard material</th>
<th>Permission material</th>
<th>Toxic Chemicals Control Act</th>
<th>Safety Control of Dangerous Substances Act</th>
<th>Wastes Control Act</th>
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</tbody>
</table>

Work environment monitoring material: unless noted, measure every 6 months.
Special health monitoring material: unless noted, measure every 12 months.

O: included
X: not included

B. Other internal or external regulations
No available other internal or external regulation against products.

<table>
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<tr>
<th>Ingredient</th>
<th>Al</th>
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This Safety Data Sheet complies with the guidance on Occupation Safety and Health Act and enforcement regulations.

---

**EU classification (S-phrase)**

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<th>Si</th>
<th>SiO₂</th>
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**External regulation**

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<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

X : not included.

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### 16. OTHER INFORMATION

**A. References**

- EU REGULATION (EC) No 1272/2008
- EU DIRECTIVE 2009/2/EC
- The Ministry of Employment and Labor notification No. 2012-31
- Threshold Limit Values according to American Conference of Governmental Hygienists, 2012
- Permissible Exposure Limits according to the Occupational Safety & Health Administration (USA)
- Chemical Information System (http://ncis.nier.go.kr/ncis)
- Korea Occupational Safety & Health Agency (http://www.kosha.or.kr)
- National Emergency Management Agency (http://www.nema.go.kr)

**B. First issued date**

2013. 06. 11

**C. Revision**

1) Revision No.

2

2) Date revised

2014.02.19