CHOSUN WELDING	**Material Safety Data Sheets (MSDS)**	Document No.: CSW-0369 Rev. date : 2013.4.1 Rev. No. : 2

1. IDENTIFICATION(BRAND NAME & MANUFACTURER INFORMATION)

1-1. Brand Name : **TGC-317L** (AWS A5.9 ER317L)

1-2. Product Type : Solid Wire For Gas Tungsten Arc Welding

1-3. Manufacturer / Supplier

1) Manufacturer : Chosun Welding Co., Ltd.
2) Address : #321 Hwasan-Li, Onsan-Myun, Ulsan, Korea
3) Emergency Tel : +82-080-285-9080, +82-52-237-5301~6 Fax:+82-52-237-2305

2. HAZARD DATA

The ingredients are components of this product and hardly harmful to users because of the processed a series of progresses.

This section covers the materials and the hazard .

2-1. Classification of hazard

Specific target organ toxicity, repeated exposure : Category 2

2-2. Warning signals including precaution.

○ Pictograph



○ A signal : warning

○ Health hazard statements

- H317 May cause an allergic skin reaction.
- H351 Suspected of causing cancer.
- H373 May cause damage to organs through prolonged or repeated exposure.

○ Prevention 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 dust/fume/gas/mist/vapours/spray.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P281 Use personal protective equipment as required.

○ Response precautionary statements

- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- P308+P313 IF exposed or concerned: Get medical advice/attention.
- P314 Get medical advice/attention if you feel unwell.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse.

○ Storage precautionary statements

- P405 Store locked up.

○ Disposal precautionary statements

- P501 Dispose of contents and container in accordance with local and national regulations.

2-3. Other hazards : No data available

3. COMPOSITION/INFORMATION OF INGREDIENTS

Followed terms are related to components which constituted this product.
Various materials(fumes and gases) which are occurred by welding refer to *10.safety and reaction*

3-1. HAZARDOUS INGREDIENTS

Ingredients	CAS No.	EC No.	Contents (wt %)
Iron	7439-89-6	231-096-4	Rem.
Manganese(Mn)	7439-96-5	231-105-1	1.0~2.5
Silicon(Si)	7440-21-3	231-130-8	0.2~0.8
Chromium(Cr)	7440-47-3	231-157-5	16.0~20.0
Nickel(Ni)	7440-02-0	231-111-4	11.0~15.0
Molybdenum(Mo)	7439-98-7	231-107-2	2.0~5.0

4. FIRST AID MEASURES

In case that expose a excess arc and fume, take a following first aid treatment.
- Move a patient in fresh air and untie a neck and a waist.
- Rest a patient warmly and if having a difficult breath, take a oxygen supplier or artificial respiration
- Take a proper medical treatment in case of a burn and an electric shock.
- Call for a medical aid.

5. FIREFIGHTING MEASURES

5-1. Danger or fire and explosion : Product have no ignition and inflammability ,but arc , spatter, heating in welding cause a fire and a explosion.
5-2. Fire extinguishing : In case that extinguish a fire without danger, isolate a product from fire position and behave with one's back to the wind
5-3. Injurious smoke : May generate injurious smoke.
5-4. Count measure : Before welding remove dangerous materials and ventilate a place of work. Proper equipment(a fire extinguisher) is prepared for a fire.

6. ACCIDENTAL RELEASE MEASURES

6-1. Personal precautions, protective equipment and emergency procedure : Not applicable
6-2. Environmental precautions : Not applicable
6-3. Methods and material for containment and clean up : Not applicable

7. HANDLING AND STORAGE

7-1. Treatment : Refer to a precautionary label on a box – observe a handling law.
7-2. Storage method : Store with waterproof and low moisture.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8-1. Data of exposure

Ingredients	CAS No.	EC No.	Occupation safety and health acts (mg/m^3)	OSHA-PEL (mg/m^3)	ACGIH-TLV (mg/m^3)
Titanium dioxide	13463-67-7	236-675-5	10.0	15.0	10.0
Manganese(as Mn)	7439-96-5	231-105-1	5.0	5.0	0.2
Iron	7439-89-6	231-096-4	5.0	15.0	10.0
Silicon(as Si)	7440-21-3	231-130-8	10.0	15.0	10.0
Silica(as SiO2)	60676-86-0	262-373-8	-	0.1	0.025
Quartz	14808-60-7	238-878-4		-	-
Aluminum	7429-90-5	231-072-3	-	15.0	10.0
Aluminum Oxide	1344-28-1	215-691-6	-	-	-
Magnesium	7439-95-4	231-104-6	10.0	15.0	10.0
Magnesium Oxide	1309-48-4	215-171-9	-	-	-
Fluorine	7782-41-4	231-954-8	0.5	2.5	2.5
Boron	7440-42-8	231-151-2	-	15.0	10.0
Calcium Oxide	1305-78-8	215-138-9	2.0	5.0	2.0
Chromium	7440-47-3	231-157-5	0.5	0.5	0.5
Copper	7440-50-8	215-159-6	0.1	0.1	0.2
Molybdenum	7439-98-7	231-107-2	10.0	5.0	0.5
Nickel	7440-02-2	231-111-4	1.0	1.0	0.1
Vanadium	7440-62-2	231-171-1	-	0.1	0.05
Tungsten	7440-33-7	231-143-9	-	1.0	1.0
Zirconium dioxide	1314-23-4	215-227-2	-	-	

※ ACGIH : American Conference of Governmental Industrial Hygienist
※ TLV : Threshold Limit Value
※ OSHA : Occupational Safety and Health Administration
※ PEL : Permissible Exposure Limit

8-2. Personal protector in welding

- Protection glasses, protection mask : because of protecting eyes, face from arc ray and spatter, shield-light number of filter-lens are over 12.
- Dustproof mask, poison-protection mask: ventilation equipment which have an enough capacity must be installed in work-place and if needed, wear a dustproof mask or poison-protection mask
- Protection gloves : leather goods is useful of preventing an electric shock and a burn. Wear a cotton gloves in leather gloves.
- Apron : leather goods is useful for protecting from the breast to the femoral region.
- Isolation shoe : prevent an electric shock and a burn, protect a foot from out-impact
- Ventilation : partial ventilation equipment is installed for a standard permission
- Emergency eye washing : employer provide eye washing equipment ,for in case that worker's eye is exposed a alien materials

9. PHYSICAL AND CHEMICAL CHARACTER

9-1. Physical State : Solid
9-2. Odor : Odorless
9-3. Odor threshold : Not applicable

9-4. pH Value : Not applicable
9-5. Melting point : Not applicable
9-6. early boiling point : Not applicable
9-7. Flash point : Not applicable
9-8. Evaporation rate : Not applicable
9-9. Flammability : Not applicable
9-10. Explosion limit - lower : Not applicable
Explosion limit - upper : Not applicable
9-11. Vapor pressure : Not applicable
9-12. Solubility in water : Not applicable
9-13. Vapor density : Not applicable
9-14. Density : 7~8.
9-15. Partition coefficient N-octanol / water : Not applicable
9-16. Spontaneous combustion temperature : Not applicable
9-17. Dcomposition temperature : Not applicable
9-18. Viscosity : Not applicable
9-19. Molecular weight : Not applicable

10.STABILITY AND REACTION

10.1 Stability and reaction : stable in the normal temperature and in normal pressure.
Hazardous reaction materials – this product generate hazardous fume and gas in welding but welding fumes and gases cannot be classified simply because the composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases the which workers may be exposed include; coatings on the metal being welded, the numbers of welders and the volume of the worker area, the quality the atmosphere. In generally welding fumes and gases is generated because the ingredient of *2.ingredient of component.* is to vaporize and react and oxidize. welding fumes and gases consist of representative Iron oxide, manganese, magnesium oxide, silicon oxide, calcium oxide, titanium oxide, etc.

11. HEALTH HAZARD DATA

Welding fume consist of complex materials and represent iron oxide , manganese oxide and fluorine oxide. follow section is a health hazard data..

11.1 Iron oxide
- Acute poisonous character : relatively non-poison at intake
- A generation of cancer : no data
- Health influence : (expose a eye and a skin) acute exposure – occur a physical stimulation.
  Chronic exposure – no data.
  (Ingestion) acute exposure - occur a physical stimulation.
  Chronic exposure – occur a iron-pneumoconiosis in case that a welding fume is piled in the lung.

11.2 Manganese oxide(manganese)
- Acute poisonous character : it is rare for worker to occur an acute poison.
- A generation of cancer : nothing
- Health influence : (Ingestion) acute exposure – May occur a acute pneumonia in case that a welding fume of manganese steel is breathed in.
  May occur a metal fume fever.

Chronic exposure - occur a nervous disease by reason of chronic poison when welded in a limited place.

※Metal fume fever - metal fume fever which have a symptoms like a cold is occurred when a worker ingest a corpuscle of metal oxide, below 1.5 micro(generally 0.02~0.05 micro)
First symptoms occur after 4~12h and are thirst, sweat, a metal smell or a stink in mouth.
Other symptoms are a couch, a stimulate, a dry of mucous membrane, a languor and a discomfort.
Occur a fever, a cold fit, a muscular pain and headache.
Occur a vomiting, a excess mental activity and have loose bowels.
Tolerance about a fume directly occur and disappear soon. Every symptoms is lessened less than 24~36h.
Chronic exposure – chronic metal fume fever don't occur but symptoms occur repeatedly and disappear within one-two days due to have a tolerance.

12. DATA OF ENVIRONMENT INFLUENCE

12-1. Toxicity : No data available
12-2. Persistence–degradability : No data available
12-3. Bio accumulative potential : No data available
12-4. Mobility in soil : No data available
12-5. Results of PBT and vPvB assessment : No data available

13. CAUTIONS OF WASTES

Follow the rules of the government and the local government when dump wastes.

14. DATA FOR A TRANSPORT

14.1 Grade classification : No data available
14.2 Cautions of a transfer – Don't give a impact to products not to break. Observe the safety driving law.
14.3 Prepare a waterproof and a damp proof of products.

15. EXPRESSION OF LAWS AND REGULATIONS

Observing the article 39 (express of hazardous materials) of law of industry safety & health and the article 31 of this same law, express the precautionary label on the product.

16. REFERENCES

16-1. This MSDS is made by CHOSUN WELDING CO., LTD and refer to the MSDS of each materials and data of welding fume & gas from the Korea Occupational Safety & Health Agency.
16-2. Read and understand the manufacturer's instruction and the precautionary label on the product, and follow the laws.
16-3. Reference data : FUMES and GASES in the welding Environment(AWS)
Welding : FUME And GASES (Australian Government Publishing Service Canberra)
MSDS(KISCO-NET) of each materials
Data cooperation : Korea institute of industrial technology