DATA SHEET

This Material Safety Data Sheet (MSDS) is intended for welding consumables and related products and can be used to meet the requirements of Regulation (EC) No 1907/2006 (REACH) and Regulation (EC) No 1272/2008 (CLP), which adapted the REACH requirements for MSDSs to meet the requirements of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS, fifth version). The REACH and CLP regulations must be consulted for specific requirements. This safety data sheet meets the requirements of ISO 11014-1

Un-, low-alloyed also heat resistant solid wire electrodes and Rods

Rev1 date: 27.09.2023

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

1.1. Product identification

Name of the Product:

CEWELD® SG 1, SG TITAN, SG 2, SG 3, SG Mo, SG3 NiMo1, SG CrMo1, ER 80S-B2, SG CrMo2, ER 90S-B3, SG CrMo5, ER 80S-B8, ER 90S-B9(P91), ER 90 S-G(P92), SG Corten, ER 80S-D2, SG Ni1, SG Ni2,5, SG Ni3,5, SG NiMo, SG NiMo1, SG3 NiMo1, ER 100 S-G(L), ER 100 S-G, ER 110 Ti, ER 110 S-1, ER 120 S-G, ER 120 S-1, SG 1 Tig, SG TITAN Tig, SG 2 Tig, SG 3 Tig, SG Mo Tig, SG Corten Tig, SG CrMo1 Tig, ER 80S-B2 Tig, ER 80S-D2 Tig, ER 80S-B3L Tig, ER 70S-B2L Tig, SG CrMo2 Tig, ER 90S-B3 Tig, SG CrMo5 Tig, ER 90S-B9(P91) Tig, ER 90 S-G(P92) Tig, ER 80S-D2 Tig, SG Ni1 Tig, SG Ni2,5 Tig, SG Ni3,5 Tig, SG CrMoV6 TIG, ER 100 S-G Tig, ER 110 S-1 Tig, ER 120 S-1 Tig, G 50, P24 Tig, SG Mo Laser welding wire

1.2. Relevant identified uses of the substance or mixture and uses advised against

Product Type: Solid wire arc welding
Relevant identified use: Industry and craft

1.3 Details of the supplier

Company name: Certilas Nederland BV
Address: Gloxinialaan 2, 6851 TG HUISSEN, The Netherlands
Phone: +31 (0)26 30 30 080
Responsible for the safety data sheet: info@certilas.com

1.4 EMERGENCY TELEPHONE NUMBER:

Emergency telephone number International: +44 1235 239670
Available 24 hours a day, 7 days a week. Erreichbar 24 Stunden 7 Tage die Woche.
CZ +420 228 882 830 / **DK** +45 8988 2286 / **FI** +358 9 7479 0199 / **FR** +33 1 72 11 00 03 / **DE** +49 69 222 25285 / **GR** +30 21 1198 3182 /
IT +39 02 3604 2884 / **NL** +31 10 713 8195 / **NO** +47 2103 4452 / **PL** +48 22 307 3690 / **PT** +351 30880 4750 / **ZA** +27 21 300 2732 /
ES +34 91 114 2520 / **SE** +46 8 566 42573 / **TR** +90 212 375 5231/ **US + CA** +1-866-928-0789 or 1-800-424-9300 +1-215-207-0061 /
MX +52-555-004-8763 / **CL** +56 2 2582 9336 / **BR** +55-800-707-7022 / **Middle East, Africa (Arabic speaking countries):** +44 1235 239 671 /
IL +44 (0) 1235 239 670 / **AU** +61 2801 44558 / **CN** +86 532-8388-9090 / +86 10 5100 3039 / **TW** +86 10 5100 3039 / **JP** +81 345 789 341 /
NZ +64 9929 1483 / **IN** 000 800 100 7479 / +65 3158 1198 / **KP** +82 2 3479 8401 / **MY** +60 3 6207 4347 / **PH** +63 2 231 2149 /
Asia Pacific: +65 3158 1074
Netherlands: +31 30 274 88 88
Deutschland, Österreich: Notruf (24h) Deutschland: Beratungsstelle f. Vergiftungserscheinungen, Berlin, Tel. 0049 30 19240 / 0043 1 406 4343
Internet: www.vergiftungszentrale.de
Schweiz: Schweizerisches Toxikologisches Informationszentrum
Tel: 01 251 5151, Fax: 01 252 8833, E-Mail: stic@access.ch, Internet: http://toxinfo.ch/kontakt_de

SECTION 2: HAZARDS IDENTIFICATION

2.1 Hazard classification of substance/mixture

2.1.1 Classification according to Regulation (EG) no. 1272/2008 (CLP)
The product is not classified as hazardous pursuant to the provisions set forth in EC Regulation 1272/2008 (CLP) (and subsequent amendments and supplements).

2.2 Labeling elements

- The product is not subject to compulsory labelling according to Regulation (EC) No 1272/2008.
- Hazard pictograms not applicable
- Signal word not applicable
- Hazard statements not applicable

2.3 Other hazards

The following must be observed during welding:
Welding fumes: excessive exposure to fumes and gases can be harmful to health.
High temperatures: extreme caution must be taken with melting metals, hot spatter or slag, which can cause skin injuries and can cause fires.
Radiation: Arc rays can be harmful to eyes and skin.
Electric shocks: can be fatal. Do not touch current-carrying equipment.

Based on available data, the product does not contain any PBT of vPvB in percentage greater than 0.1%.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Information not relevant.

3.2 Mixtures
IMPORTANT - This section covers the hazardous materials from which this product is manufactured. This data has been prepared in accordance with the criteria of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as defined and required by the Regulation of the European Parliament and Commission (EC) No 1907/2006 and (EC) No 1272/2008. Vapours and gases generated during normal use of this product are dealt with in section

Chem. name	CAS No. EG No. ECHA-InfoCard REACH No.	Concentration Konzentration	Classification Klassifikation	H-phrase / Sätze
Nickel (Ni)	7440-02-0 231- 111-4 100.028.283 01-2119438727-29	0% - 9%	EU DSD/DPD: Annex VI, Table 3.2: Carc. Cat. 3; R40; R43; T; R48/23 EU CLP: Annex VI, Table 3.1: Carc. 2,; STOT RE 1, ***; Skin Sens. 1, OSHA HCS 2012: Carc. 2; Skin Sens. 1A; Resp.Sens. 1B; STOT RE 2 (Lungs)	H351 ,H372 ,H317
Iron / (Fe) Eisen	7439-89-6 231- 096-4 100.028.270 01-21194662838-24	50% - 95%	EU DSD/DPD: Xn; R22; R53 EU CLP: Acute Tox. 4,; Aquatic Chronic,4 OSHA HCS 2012: Acute Tox. 4 (orl)	H413, H302
Copper / (Cu) Kupfer /	7440-50-8 231- 159-6 100.028.326 01-2119480154-42	0% - 0,5%	EU DSD/DPD: Xi; R37; Repr. Cat. 3; R63 EU CLP: Repr. 2, H361; STOT SE 3: Resp. Irrit., OSHA HCS 2012: Repr. 2; STOT SE 3: Resp. Irrit.	H335 H400 H412
Cobalt / (Co) Kobalt	7440-48-4 231- 158-0 100.028.325 01-2119517392-44	0% - 0,5%	EU DSD/DPD: Annex VI, Table 3.2: R42/43; R53 EU CLP: Annex VI, Table 3.1: Resp. Sens. 1,Skin Sens. 1,; Aquatic Chronic 4, OSHA HCS 2012: Resp Sens. 1; Skin Sens. 1;Carc. 2;	H334; H413, H317, H319, H361,H350; H400, H410
Titanium / (Ti) Titan	7440-32-6 231-142- 3 100.028.311 01-2119484878-14	0% - 5%	EU DSD/DPD: Repr. Cat. 3; R63 EU CLP: Repr. 2, OSHA HCS 2012: Repr. 2	H361
Chromium / (Cr) Chrom	7440-47-3 231-157-5 100.028.324 01-2119485652-31	0% - 15%	EU DSD/DPD: Carc. Cat. 2; R49; R43; N; R50-53 EU CLP: Carc. 1B, 0; Skin Sens. 1, OSHA HCS 2012: Carc. 1A; Skin Sens. 1	H35 ,H317
Molybdenum / (Mo) Molybdän	7439-98-7 231-107-2 100.028.279 01-2119472304-43	0% - 4%	EU DSD/DPD: Xn; R48/20; T; R25 EU CLP: STOT RE 2,; Acute Tox. 3, OSHA HCS 2012: STOT RE 2 (Lungs, Inhl); AcuteTox. 3 (orl)	H301 ,H373
Niobium / (Nb)	7440-03-1	0% - 5%	EU DSD/DPD: Not Classified	

Niob	231-113-5 100.028.284		EU CLP: Not Classified OSHA HCS 2012: Not Classified	
Carbon / (C) Kohlenstoff	7440-44-0 231-153-3 -	0,01% - 0,9%	-	-

You will find further information here https://echa.europa.eu/de/information-on-chemicals
Here you will find further leading or supplementary information.

Legend:
N = Not listed as human carcinogens.
Y = Listed as human carcinogens.
IARC code for attestation of human carcinogenicity:
1 = Positive; **2A** = Probable; **2B** = Possible; **3** = Not classified; **4**= Probably negative.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

After inhalation: Not applicable to the product itself. In case of inhalation of welding fumes, ventilate the area. Immediately remove the patient from the contaminated area to fresh air. Call the doctor. Show the doctor this safety data sheet.
After contact with skin: Not applicable to the product itself. Risk of burns during the welding process.
After contact with eyes: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Burns from radiation see doctor.
After ingestion: Not applicable.

4.2. Most important symptoms and effects, both acute and delayed

Not applicable to the product itself. Check control parameters specified in paragraph 8.1 during welding.
Inhalation Burning in the mouth and throat.
Eye contact redness and Smarting in eyes.

4.3. Indication of any immediate medical attention and special treatment needed

No other indication.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable media: Extinguish fire with: metal fire powder, dry sand, Cement or dry inert sorbent.
Unsuitable media: water, foam or carbon dioxide (CO2).

5.2. Special hazards arising from the substance or mixture

The product is non-flammable and non-combustible, no risk of material in stock.

Special hazards arising from the mixture:
In case of fire, dangerous fumes can be formed: protect the respiratory tract.

Risks arising from combustion: avoid inhaling the fumes.

5.3 Advice for firefighters

Make sure when using that the operating area is free of flammable and / or explosive. Use personal protective equipment if necessary.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

General ventilation and local fume extraction must be adequate to keep fume concentrations within safe limits. Use respiratory equipment when welding in a confined space. Wear protective clothing and eye protection appropriate to arc welding.

6.2. Environmental precautions

Not applicable to the product itself. In the case of welding process, prevent the formation of dust clouds. Keep the environment clean by collecting the dust manually in order to prevent as much as possible its entry into drains, surface water or groundwater.

6.3. Methods and material for containment and cleaning up

Store in a dry place.

6.4 Reference to other sections

Please refer to sections 7 / 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Handle in accordance with good industrial hygiene and safety practice. During welding use adequate individual protective measures. Operate in a ventilated area equipped with welding fume extractors. Do not smoke, eat or drink in areas where the product is being used.

7.2. Conditions for safe storage, including any incompatibilities

No product relevant restrictions for packed material. Observe general rules for the storage of welding consumables, store in a dry place and without major temperature fluctuations.

7.3 Specific end use

None.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

Read and understand the instructions and the labels on the package. Welding fumes are a variable mixture of gases and fine particles emitted into the air, which are a source of danger when inhaled or ingested. The extent of the risk depends on the composition and concentration of the vapors and the duration of exposure. The composition of the vapours depends on the material being machined, the processes and consumables used, the coatings on the workpiece (such as paint, plating or coating), and the presence of oil or residues from cleaning or degreasing. The Exposure must be systematically investigated, taking particular account of the circumstances of the worker or nearby workers who may be exposed. A recommended way to determine the composition and quantity of the vapours and gases to which workers are exposed is to take a sample of air from the welding helmet or from the breathing zone of the worker. There are no European Union (EU) specific exposure limits (OEL) for welding fumes. The lowest available 8-hour limit value (TLV) for particulate matter not otherwise regulated (PNOR) was set by Belgium at 10 mg/m3 and 3 mg/m3 for PNOR as an inhalable fraction. The individual complex compounds in the steam may have lower OELs than the Belgian PNOR limit. A hygiene engineer and/or the EU Member State should be consulted to determine the specific steam ingredients and their exposure limits.
The GESTIS international database of limit values on the website http://limitvalue.ifa.dguv.de/WebForm_gw2.aspx can be used for international OELs for chemical reagents. European Union OELs are listed for EU countries.
As there is no specific limit values for welding operation, for information refer guideline values proposed by ACGIH (2010) for dust:

Notes:

TLV = Threshold Limit Values - American Conference of Governmental Industrial Hygienists

PEL = Permissible Exposure Limit - OSHA 29 CFR 1910.1000 C = Ceiling value

STEL = Short Term Exposure Limit - a time-weighted 15-minute exposure limit, not to be exceeded at any time during a workday.

	TLV-TWA ppm mg/m³	TLV-STEL ppm mg/m³	Value guidance ppm mg/m³	Notes
Insoluble particles Not otherwise classified (PNOC)				
Inhalable particles (*1, *2)	- -	- -	- 10	(*4)
Pirable particles (*1, *3)	- -	- -	- 3	(*4)
*1 for particles which have not TLV applicle, insoluble of poorly water-soluble, low-toxicity				
*2 inhalable fraction				
*3 respirable				
*4 recommendation provived as a guideline rather than as TLV				

	Ingredient	CAS No.	EG No.	Exposure limit mg/m3-ppm Eu/G NIOSH OSHA	Short-term Exposure limit mg/m3-ppm	Remake	Source
National occupational exposure limits	Cobalt	7440-48-4	231-185-0	0,1			GESTIS
	Manganese	7439-96-5	231-105-1	-0,5 -1 -5		- inhalable aerosol	GESTIS
	Manganese	7439-96-5	231-105-1	-0,02	0,16	- respirable aerosol	GESTIS
	Manganese	7439-96-5	231-105-1	-0,2	1,6 -	- inhalable aerosol	GESTIS
	Aluminium – inhalable	7429-90-5	231-072-3	-4	-	-	GESTIS
	Aluminium – respirable	7429-90-5	231-072-3	-1,5	-	-	GESTIS

	Titanium dioxide	13463-67-7	236-675-5	-10	-	inhalable aerosol	GESTIS
	Titanium dioxide	13463-67-7	236-675-5	-4	-	- respirable aerosol	GESTIS
	Chromium	7440-47-3	231-157-5	- 2 - 0,5 - 1,0	-		GESTIS
	Nickel	7440-02-0	231- 111-4	- 0,03 - 0,015 -1,0	-		GESTIS
	Copper	7440-50-8	231- 159-6	-0,02 (0,01)	-	-	GESTIS
	Tantalum	7440-25-7	231-135-5	1.5 dust and fume	4,0 dust and fume		GESTIS
	Cobalt	7440-48-4	231- 158-0	-0,05 dust and fume -0,10 dust and fume	-	-	GESTIS
	Tungsten	7440-33-7	231-143-9	-10 (5 dust) -15 (5)	-	-	GESTIS
	Silicon	7440-21-3	231-130-8	-10 (5 dust) -15 (5)	-	-	GESTIS
	Carbon	7440-44-0	231-153-3	- 10 - 4	-	-	GESTIS

Please check the limits on the website https://limitvalue.ifa.dguv.de/WebForm_gw2.aspx
on your own responsibility for your country itself.

8.2. Exposure controls

Provide adequate local ventilation. If there is a risk of dust formation, install the devices to be able to comply with the exposure limit values.

8.2.1 Appropriate engineering controls

- Provide appropriate ventilation in the workplace
- Apply technical measures necessary to avoid exceeding limit values for occupational exposure
- Respect the rules of hygiene. Do not eat or drink in the workplace. Do not smoke

8.2.2 Personal protective equipment

a) Protection Eye / Face: Wear safety mask with lenses inattiniche of proper protective equipment in the welding technology used (not less than 5 DIN)
b) Skin protection: work clothes that cover completely: apron, gaiters and gloves crust. Replace them at the first sign of wear
c) Respiratory protection: Avoid inhalation of welding fumes. Provide an adequate intake.

8.2.3 Control of environmental exposure

Avoid release to the environment. Observe all local and national rules.
ENVIRONMENTAL EXPOSURE CONTROLS.
The emissions generated by manufacturing processes, including those generated by ventilation equipment, should be checked to ensure compliance with environmental standards.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

appearance:	Solid wire and rod
Color:	Metalic to Copper
Odour:	odourless
Odour threshold.	Not applicable
pH value.	Not applicable
Melting point/freezing point.	1500°C
Initial boiling point.	Not applicable.
Boiling range.	Not applicable
Flash point.	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gaseous)	Not applicable
Lower flammability limit.	Not applicable.
Upper flammability limit.	Not applicable
Lower flammability limit.	Not applicable
Upper flammability limit.	Not applicable
Vapour pressure.	Not applicable
Vapour density/ relative density	Not applicable.
Density.	Not applicable
Solubility	Not applicable
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature.	Not applicable
Decomposition temperature.	Not applicable.
Viscosity	Not applicable
Explosion Properties	Not applicable.
Oxidizing properties	Not applicable

9.2. Other information

Solid content. 100 %
VOC (Directive 1999/13/EC) : 0
VOC (volatile carbon) : 0

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
No hazardous reactions known.

10.2. Chemical stability
The product is stable in normal conditions of use and storage.

10.3. Possibility of hazardous reactions
No reference to the product itself.

10.4. Conditions to avoid
No reference to the product itself.

10.5. Incompatible materials
Molten aluminum can react violently with water giving rise to oxides.

10.6. Hazardous decomposition products
In case of fire, vapors can be harmful to health.
Welding fumes and gases. Coating of surfaces, e.g. paints/primers, oils and others. You can rely on the composition of the gases and odours to which the user is exposed.
See the respective national limit values for welding fumes and substances in welding fumes.

SECTION 11. TOXICOLOGICAL INFORMATION

According to currently available data, this product has not yet produced health damages. Anyway, it must be handled according to good industrial practices.

11.1 Information on toxicological effects

Conditions to avoid: none in the form supplied.
When welding, fumes and gases generated can be dangerous to health.

Acute toxicity	Not applicable
Irritation	Not applicable
Corrosive effects	Not applicable
Sensitisation	Not applicable
Mutagenicity	Not applicable
Carcinogenicity	Certain chromium and nickel compounds, like Cr (VI) are suspected of being cancer-causing agents. Welding fumes are possibly carcinogenic to humans.
Repeated dose toxicity	Not applicable
Reproductive toxicity	Not applicable
LD50 Oral	iron: 30000 mg/kg (rat) Maganese: 9000 mg/kg (rat) Chromium: 19,8 mg/kg (rat) Silicon: 3160 mg/kg (rat) zinc: 0,4 mg/kg (rat)
Delayed and immediate effects as well as chronic effects from short and long-term exposure	Short-term overexposure can cause dizziness, nausea and irritation of the nose, throat or eyes. Overexposure to manganese may affect the nervous system. Certain chromium and nickel compounds, like Cr(VI) are suspected of being cancer-causing agents.
Toxicity in case of inhalation	Long-term overexposure may effect the lungs.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

The welding process can effect the enviroment if fume is released directly into the atmosphere. Residues from welding consumables could degrade and accumulate into soils and ground water

Aquatic	Cr(VI) is suspected of being very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.
Acute fish toxicity	LC50 Fish 96h: Manganese: 2,91 mg/l Chromium: 3,4 mg/l Rainbow trout copper: 0,017 mg/l Rainbow trout Magnesium: 1355 mg/l zinc: 1,1 mg/l Rainbow trout
Acute algae toxicity	IC50 Algae 72h: iron: 0,1 mg/l Manganese: 0,55 mg/l Chromium: 0,001 mg/l copper: 0,392 mg/l Selenastrum capricornutum (green algae) Magnesium: 240 mg/l
Acute crustacean toxicity	EC50 Daphnia 48h: iron: 5,2 mg/l Manganese: 5,2 mg/l Chromium: 0,02 mg/l Daphnia pulex (Water flea) copper: 0,0065 mg/l Daphnia magna (Water flea) Magnesium: 67,7 mg/l zinc: 24,6 mg/l Daphnia magna (Water flea)

12.2 Persistence and degradability

Not applicable

12.3 Bioaccumulation

Bioconcentration factor (BCF):
iron: 140000
Maganese: 59052

Cas 7440-48-4: 4000

12.4 Mobility in soil
Mobility in soil: immobile

12.5 Results of PBT and vPvB assessment
This preparation contains no substance considered to be persistent, bio accumulating nor toxic (PBT).
This preparation contains no substance considered to be very persistent nor very bio accumulating (vPvB).

12.6 Additional information
Information not available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods
Disposal considerations
Dispose of any product, residue or packing material according to national and local regulations.
Spent fume extraction filters shall be disposed of as dangerous waste.
Do not dispose together with domestic waste. Do not empty into drains.
Waste code (EWC)
Waste code (EWC): 12 01 13 - welding waste
The waste code (EWC) is a recommendation. In the event of non-compliant handling, the end user is personally responsible for a suitable EWC code.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number
Not applicable.

14.2 Proper shipping name in accordance to UN-standards
Not applicable.

14.3 Tranport hazard class(es)
Not applicable.

14.4 Packaging group
Not applicable.

14.5 Environmental hazards
Not applicable.

14.6 Special precautions to the user
Not applicable.

14.7 Transport in bulk according to Annex II to MARPOL and the IBC Code
Information not relevant.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
EU regulations
The product does not need to be labelled in accordance with EC directives or respective national laws. Regulation (EC) No 1907/2006 of the European Parliament and of the Council, (REACH).
European Parliament and Council Regulation (EC) No. 1272/2008, CLP.

National regulations
EH40/2005 Workplace exposure limits
Waste Ordinance (2011:927)
Local laws and regulations should be carefully observed.

15.2. Chemical safety assessment
No chemical safety assessment has been processed for the mixture and the substances it contains.

SECTION 16: OTHER INFORMATION

European Welding Association

Welding Exposure Scenario WES - ENGL

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Guidance and Recommendations for Exposure Scenarios, Risk Management Measures and to identify Operational Conditions under which metals, alloys and metallic articles and mixtures may be safely welded regarding welding fumes and gases exposure

Welding/Brazing produces fumes, which can affect human health.

Welding and allied processes generate a varying mixture of fumes (airborne particles) and gases, which, if inhaled or swallowed, constitute a health hazard.

The degree of risk will depend on the composition of the fume, the 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.
The amount of fumes generated is dependent on the welding process, the welding parameters, the shielding gas, the type of consumable and the potential coating on the work.

A systematic approach to the assessment of exposure is necessary, taking into account the particular circumstances for the operator and ancillary worker that can be exposed.

General Rules to reduce exposure to welding fumes and gases

Considering the emission of fumes when welding brazing or cutting of metals, it is recommended to (1) arrange risk management measures through applying general information and guidelines provided by this document and (2) using the information provided by the Safety Data Sheet, issued in accordance with REACH, by the welding consumable manufacturer.

The employer shall ensure that the risk from welding fumes to the safety and health of workers is eliminated or reduced to a minimum. Start every new work with an Occupational Safety & Health Risk Inventory.

The following principles shall be applied, unless local regulation say otherwise:

1. ***Substitution:***
   Select the applicable process/base material combinations with the lowest emission, whenever possible
   Set welding process with the lowest emission parameters (e.g. welding parameters/arc mode transfer, shielding gas composition) *
2. ***Technological Means:***
   Apply the relevant collective protective measures (general ventilation, local exhaust ventilation) in accordance with class number.
3. ***Organizational Measures:***
   Limit the time a worker is exposed to welding fumes,
   Establish and apply Welding Procedure Specifications
4. ***Personal Protective Equipment:***
   To protect the worker, wear the relevant personal protective equipment in accordance with the duty cycle

In addition, compliance with the National Regulations regarding the exposure of welders and related personnel to welding fumes, their components with specific occupational exposure limit, and gaseous substances with specific occupational exposure limits shall be verified. It is therefore strongly recommended to seek clarification of specific national legislation that may apply.

** In MIG / MAG process , innovative waveform controlled processes generate less welding fumes and particles than conventional processes - The use of such processes can be an additional measure to reduce the exposure of the welder and or workers*

European Welding Association

Welding Exposure Scenario WES - ENGL

Risk Management Measures for Individual process/base material combinations

According to the welding or allied process and the base material to be welded, a general guidance on *Technological means* is proposed in the table below.
An approximate ranking to mitigate the risk of welding fumes and gases exposure is given for each welding or allied process/base material combination.
The individual process/base material combinations are ranked from the lowest emission ones (**Class I**) to the highest emission ones (**Class VIII**).

NOTE: The International Institute of Welding (IIW) assessed the publication of IARC Monograph 118. Based on the current state of knowledge, IIW confirms its statement from 2011 on "Lung cancer and welding" and encourages all those responsible to reduce the exposure to welding fume to a minimum. It also recommends that to eliminate the excess risk of lung cancer, welders and their managers must ensure that exposure to welding fume is minimized, at least to national guidelines. This IIW statement is posted both on IIW and EWA website.

For each class, general recommendations on Ventilation/Extraction/Filtration and Personal Protection Equipment are proposed.

Class[1]	Process *(according to ISO 4063)*	Base Materials	Remarks	Ventilation / Extraction / Filtration[14]	PPE[2] DC<15%	PPE[2] DC>15%
			Non-confined space[16]			
I	GTAW *141*	All	Except Aluminum	GV low[3]	n.r.	n.r.
	SAW *12*					
	Autogenous *3*					
	PAW *15*					
	ESW/EGW *72/73*					
	Resistance *2*					
	Stud welding *78*					
	Solid state *521*					
	Gases Brazing *9*	All	Except Cd- alloys	GV low[3]	n.r.	n.r.
II	GTAW *141*	Aluminum	n.a.	GV medium[4]	n.a.	FFP2[5]
III	MMAW *111*	All	Except Be-, V- , Mn-, Ni- alloys and Stainless[6]	GV low[7] LEV low[12]	Improved helmet[13]	FFP2[5]
	FCAW *136/137*	All	Except Stainless and Ni- alloys [6]			
	GMAW *131/135*	All	Except Cu-, Be-, V-alloys[6]			
	Powder Plasma Arc *152*	All	Except Be-, V-, Cu- , Mn-, Ni-alloys and Stainless [6]			
IV	All processes class I	Painted / primed / oiled / galvanized	No Pb containing primer	GV low[3]	FFP2[5]	FFP3[8], TH2/P2, or LDH3
	All processes class III	Painted / primed / oiled / galvanized	No Pb containing primer	GV low [7] LEV low[12]		
V	MMAW *111*	Stainless, Ni-, Be-, and V-alloys	n.a.	LEV high[10]	TH3/P3, LDH3[11]	TH3/P3, LDH3[11]
	FCAW *136/137*	Stainless, Mn- and Ni-alloys				
	GMAW *131*	Cu-alloys				
	Powder Plasma Arc *152*	Stainless, Mn-, Ni-, and Cu-alloys				

European Welding Association

Welding Exposure Scenario WES - ENGL

Doc -5-2021

Class[1]	Process (according to ISO 4063)	Base Materials	Remarks	Ventilation / Extraction / Filtration[14]	PPE[2] DC<15%	PPE[2] DC>15%
Non-confined space[16]						
VI	GMAW 131 Powder Plasma Arc 152	Be-, and V-alloys	n.a.	Reduced (negative) pressured area[9] LEV low[12]	TH3/P3, LDH3[11]	TH3/P3, LDH3[11]
VII	Self shielded FCAW 114	Un-, high alloyed steel	Cored wire, not containing Ba	Reduced (negative) pressured area[9] LEV medium[13]		
	Self-shielded FCAW 114	Un-, high alloyed steel	Cored wire, containing Ba	Reduced (negative) pressured area[9] LEV high[10]	TH3/P3, LDH3[11]	TH3/P3, LDH3[11]
	All	Painted / primed / galvanized	Paint / Primer containing Pb			
	Arc Gouging and Cutting 8	All	n.a.			
	Thermal Spray	All	n.a.			
	Gases Brazing 9	Cd- alloys	n.a.			
Closed system or Confined space[15]						
I	Laser Welding 52 Laser Cutting 84 Electron Beam 51	All	Closed system	GV medium[4]	n.a.	n.a.
VIII	All	All	Confined space	LEV high[10] External air supply	LDH3[11]	LDH3[11]

Notes:

1 Class: approximate ranking to mitigate risk by selecting process/material combinations with the lowest value. Identified collective and individual risk management measures shall be applied

2 Personal Protective Equipment (PPE) required avoiding exceeding the National Exposure Limit Value (DC: Duty cycle expressed on 8 hours)

3 General Ventilation (GV) Low. With additional Local Exhaust Ventilation (LEV) and extracted air to the outside, the GV or LEV capacity may be reduced to 1/5 of the original requirement.

4 General Ventilation (GV) Medium (double compared to Low)

5 Filtrating half mask (FFP2)

6 When an alloyed consumable is used, measures from "Class V" are required

7 General Ventilation (GV) Low. When no Local Exhaust Ventilation, the ventilation requirement is 5-fold

8 Filtrating half mask (FFP3), helmet with powered filters (TH2/P2), or helmet with external air supply (LDH2)

9 Reduced (negative) pressured Area: A separate, ventilated area where reduced (negative) pressure, compared to the surrounded area, is maintained

10 Local Exhaust Ventilation (LEV) High, extraction at source (includes table, hood, arm or torch extraction)

11 Helmet with powered filters (TH3/P3), or helmet with external air supply (LDH3)

12 Local Exhaust Ventilation (LEV) Low, extraction at source (includes table, hood, arm or torch extraction)

13 Local Exhaust Ventilation (LEV) Medium, extraction at source (includes table, hood, arm or torch extraction)

14 Recommended measures to comply with national maximum allowable limits. Extracted fumes, for all materials except unalloyed steel and aluminum, shall be filtered before release in the outside environment.

15 A confined space, despite its name, is not necessarily small. Examples of confined spaces include ship, silos, vats, utility vaults, tanks, etc.

16 Improved helmet, designed to avoid direct flow of welding fumes inside

n.a. Not applicable

n.r. Not recommended

International Standards & EU Regulations

The following ISO standards and European Union Directives address general information for risk assessments of exposure to welding fumes and gases released by welding and allied processes.
In addition, national regulations and recommendations need to be consulted and applied.

ISO 4063:2009	Welding and allied processes -- Nomenclature of processes and reference numbers
ISO EN 21904-1:2020	Health and safety in welding and allied processes -- Equipment for capture and separation of welding fume -- Part 1: General requirements
ISO EN 21904-2:2020	Health and safety in welding and allied processes -- Equipment for capture and separation of welding fume -- Part 2: Requirements for testing and marking of separation efficiency
ISO EN 21904-3:2018	Health and safety in welding and allied processes — Requirements, testing and marking of equipment for air filtration — Part 3: Determination of the capture efficiency of on-torch welding fume extraction devices
ISO EN 21904-4:2020	Health and safety in welding and allied processes -- Equipment for capture and separation of welding fume -- Part 4: Determination of the minimum air volume flow rate of capture devices
ISO 15607:2003	Specification and qualification of welding procedures for metallic materials — General rules
EN ISO 15609:	Specification and qualification of welding procedures for metallic materials - Welding procedure specification part1 -> part 6
ISO 17916:2016	Safety of thermal cutting machines
EN 149:2001+A1:2009	Respiratory protective devices. Filtering half masks to protect against particles. Requirements, testing, marking
EN 14594:2018	Respiratory protective devices. Continuous flow compressed air line breathing devices. Requirements, testing and marking
EN 12941:1998+A2:2008	Respiratory protective devices. Powered filtering devices incorporating a helmet or a hood. Requirements, testing, marking
EN 143:2000	Respiratory protective devices. Particle filters. Requirements, testing, marking
Directive 98/24/EC	on the protection of the health and safety of workers from the risks related to chemical agents at work
Directive 2004/37/EC	on the protection of workers from the risks related to exposure to carcinogens or mutagens at work
Directive 2017/2398	Amending Directive 2004/37/EC on chromium VI exposure limit
Directive 2017/164/EU	indicative occupational exposure limit values (for nitrogen oxides)
Directive 2019/130	Amending Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens or mutagens at work

Use Descriptor System according to REACH Regulation

REACH use descriptor system is a system developed by ECHA[1] to facilitate chemical risk assessment and supply chain communication.

Welding fumes and gases are secondary non-intentional byproducts generated during welding operations. As such, they are not considered as substances or mixtures under REACH definition. They are not intended to be used by workers or consumers.

However, occupational exposure to welding fumes and gases may represent a risk similar to the ones of the substances and mixtures regulated by REACH.

The identification of hazards, the evaluation of their risks and the putting in place of control measures to secure the health and safety can be implemented with REACH methodology.
This system has been applied to welding fumes and gases.

The system firstly describes the Life Cycle Stage. The EWA welding consumable manufacturers define 2 life cycle stages: a) manufacture of the product and b) the application at an industrial site.

In addition, REACH uses five descriptors:

Sector of use (**SU**), *[NOTE: previously listed SU3 and SU10 have been removed by ECHA[1]]*
Process category (**PROC**),
Product category (**PC**),
Article category (**AC**) and
Environmental release category (**ERC**)

to describe identified uses.

The applicable descriptors for welding consumables are:

Manufacture of consumables:

SU14 SU15 PC7 PC38 PROC5 PROC21 PROC22 PROC23 PROC24 PROC25 ERC 2 ERC3 AC7

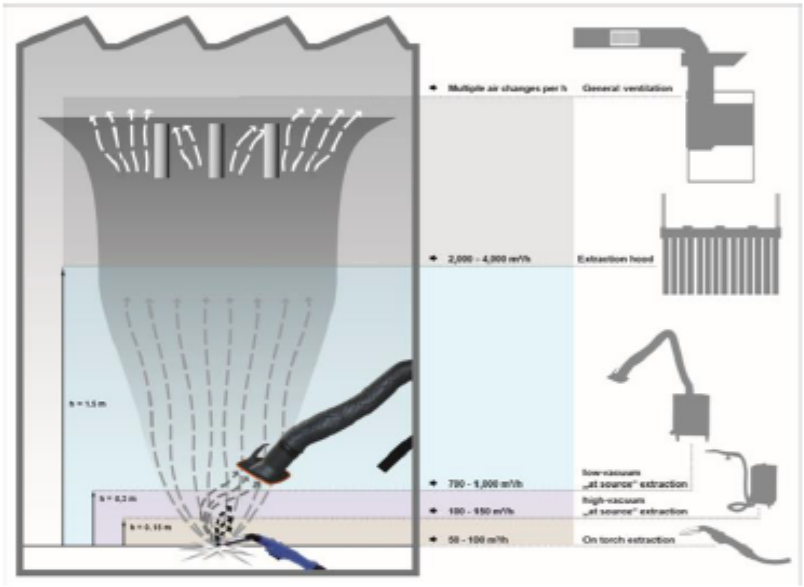
Industrial and Professional welding:

SU15 SU17 PC7 PC38 PROC21 PROC22 PROC23 PROC24 PROC25 ERC5 ERC8c ERC8f AC1 AC2 AC7

SU14	Manufacture of basic metals, including alloys
SU15	Manufacture of fabricated metal products, except machinery and equipment
SU17	General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment
PC7	Base metals and alloys
PC38	Welding and soldering products, flux products
PROC5	Mixing or blending in batch processes
PROC21	Low energy manipulation of substances bound in materials and/or articles
PROC22	Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting
PROC23	Open processing and transfer operations with minerals/metals at elevated temperature
PROC24	High (mechanical) energy work-up of substances bound in materials and/or articles
PROC25	Other hot work operations with metals
ERC2	Formulation of preparations
ERC3	Formulation into solid matrix
ERC5	Industrial use resulting in inclusion into or onto a matrix
AC1	Vehicles
AC2	Machinery, mechanical appliances, electrical/electronic articles
AC7	Metal articles

[1] *Guidance on Information Requirements and Chemical Safety Assessment*, Chapter R.12: Use description, Version 3.0 December 2015 (https://echa.europa.eu/documents/10162/13632/information_requirements_r12_en.pdf)

Annex: Illustration of welding fume extraction systems (optional)



Note: Illustration of welding fume extraction systems is only an example. Compliance, with national country legislation, is needed if different

This document has been prepared by the members of EWA technical committees. These members are working for different European producers of welding equipment and welding consumables (which are members of EWA). All EWA technical information documents are based on EWA members' experience and technical knowledge at the time of publication. Such technical information documents provide voluntary guidance and are not binding.

EWA hereby disclaims any liability that may arise from the use of such technical information documents, including, but not limited to, non-performance, mis-interpretation, and improper use of the technical information".

References to key literature and data sources
Regulation (EC) No 1907/2006 of the European Parliament and of the Council, (REACH).
Regulation (EC) No 1272/2008 of the European Parliament and of the Council.
Regulation (EU) 2020/878 of the European Parliament and of the Council.
EH40/2005 Workplace exposure limits
Waste Ordinance (2011:927)
www.prevent.se
C&L Inventory database

Phrase meaning
Acute Tox. 3 - oral - Acute toxicity, oral, hazard category 3
Acute Tox. 4 - inhalation - Acute toxicity, inhalation, hazard category 4
Aquatic Chronic 1 - Hazardous to the aquatic environment — Chronic hazard category 1
Eye Irrit. 2 - Eye irritation, hazard category 2
Pyr. Sol. 1 - Pyrophoric solids, hazard category 1
Skin Irrit. 2 - Skin irritation, hazard category 2

Hazard statements General:
H-Phrase.

2xx: Physical hazards			3xx: Health hazards		4xx: Environmental
20x	Explosion hazard	30x	Acute toxicity by ingestion	40x	Acute aquatic toxicity
21x		31x	Acute toxicity by skin contact, irritation, burns	41x	Chronic aquatic toxicity
22x	Flammability	32x		42x	Hazards to the ozone layer
23x	Explosion hazard in the absence of air	33x	Acute toxicity, irritation, sensitization by inhalation		
24x	Explosion hazard when heated	34x	Mutagenicity		
25x	Spontaneous ignitability	35x	Carcinogenicity		
26x	Reaction with water liberating flammable gases	36x	Reproductive toxicity		
27x	Oxidizing agent	37x	Specific organ toxicity		
28x	Deep freezing gases, gases and chemicals under pressure				
29x	Corrosion hazard to metals				

P-Phrase

Reihe	Designation
1xx	General
2xx	Prevention
3xx	Reaction to accidents
4xx	Storage
5xx	Disposal

Hazard statements •

H228 - Flammable solid.
H250 - Catches fire spontaneously if exposed to air.
H290 - May be corrosive to metals.
H301 - Toxic if swallowed
H302 - Harmful if swallowed
H311 - Toxic in contact with skin
H314 - Causes severe skin burns and eye damage
H317 - May cause an allergic skin reaction
H318 - Causes serious eye damage
H319 - Causes serious eye irritation
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335 - May cause respiratory irritation
H341 - Suspected of causing genetic defects
H350 - May cause cancer.
H361(d/f) - Suspected of damaging the unborn child.
H372 - Causes damage to organs through prolonged or repeated exposure.
H373 - May cause damage to organs through prolonged or repeated exposure.
H402 - Harmful to aquatic life

Precautionary statements

Prevention •

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P260 - Do not breathe dust.
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.
P281 - Use personal protective equipment as required.
P285 - In case of inadequate ventilation, wear respiratory protection.

Response •

P304+P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P342+P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P321 - Specific treatment, see supplemental first aid information.
P363 - Wash contaminated clothing before reuse.
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.
P308+P313 - IF exposed or concerned: Get medical advice/attention.

Storage/Disposal •

P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P402 -
P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

LEGEND:

- ADR: European Agreement concerning the carriage of Dangerous goods by Road
- CAS NUMBER: Chemical Abstract Service Number
- CE50: Effective concentration (required to induce a 50% effect)
- CE NUMBER: Identifier in ESIS (European archive of existing substances)
- CLP: EC Regulation 1272/2008
- DNEL: Derived No Effect Level
- EmS: Emergency Schedule
- GHS: Globally Harmonized System of classification and labeling of chemicals
- IATA DGR: International Air Transport Association Dangerous Goods Regulation
- IC50: Immobilization Concentration 50%
- IMDG: International Maritime Code for dangerous goods
- IMO: International Maritime Organization
- INDEX NUMBER: Identifier in Annex VI of CLP
- LC50: Lethal Concentration 50%
- LD50: Lethal dose 50%
- OEL: Occupational Exposure Level
- PBT: Persistent bioaccumulative and toxic as REACH Regulation
- PEC: Predicted environmental Concentration
- PEL: Predicted exposure level
- PNEC: Predicted no effect concentration
- REACH: EC Regulation 1907/2006
- RID: Regulation concerning the international transport of dangerous goods by train
- TLV: Threshold Limit Value
- TLV CEILING: Concentration that should not be exceeded during any time of occupational exposure.
- TWA STEL: Short-term exposure limit
- TWA: Time-weighted average exposure limit
- VOC: Volatile organic Compounds
- vPvB: Very Persistent and very Bioaccumulative as for REACH Regulation
- WGK: Water hazard classes (German).

GENERAL BIBLIOGRAPHY

1. Directive 1999/45/EC and following amendments
2. Directive 67/548/EEC and following amendments and adjustments
3. Regulation (EU) 1907/2006 (REACH) of the European Parliament
4. Regulation (EU) 1272/2008 (CLP) of the European Parliament
5. Regulation (EU) 790/2009 (I Atp. CLP) of the European Parliament
6. Regulation (EU) 453/2010 of the European Parliament
7. Regulation (EU) 286/2011 (II Atp. CLP) of the European Parliament
8. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
9. Regulation (EU) 487/2013 (IV Atp. CLP) of the European Parliament
10. Regulation (EU) 944/2013 (V Atp. CLP) of the European Parliament
11. Regulation (EU) 605/2014 (VI Atp. CLP) of the European Parliament

- The Merck Index. - 10th Edition
- Handling Chemical Safety
- Niosh - Registry of Toxic Effects of Chemical Substances
- INRS - Fiche Toxicologique (toxicological sheet)
- Patty - Industrial Hygiene and Toxicology
- N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
- ECHA website

- https://ec.europa.eu/taxation_customs/dds2/SAMANCTA/DE/Safety/HP_DE.htm
- https://www.msds-europe.com/h-statements/
- http://www.reach-compliance.ch/
- https://pubchem.ncbi.nlm.nih.gov/
- https://echa.europa.eu/de/information-on-chemicals

Note for users:
The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product. This document must not be regarded as a guarantee on any specific product property. The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses. Provide appointed staff with adequate training on how to use chemical products.

Changes to previous review:
The following sections were modified:

(The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.)