

1. PRODUCT AND COMPANY IDENTIFICATION: Stainless Steel Bare Wire Electrodes for Arc Welding

PRODUCT NAME: 308/308L, 308H, 308LSi, 309/309L, 309LMo, 309LSi, 310, 312, 316/316L, 316H, 316LSi, 317/317L, 320/320Cb, 320LR, 330, 347, 347LSi, 348, 385, 409Cb, 410, 410NiMo, 430, 430LCb, 420, 430, 630, 2209

MANUFACTURER: Inweld Corporation
3962 Portland Street
Coplay, PA 18037 USA
Phone: 1-800-346-5368
Fax: 1-877-346-5368
E-mail: Sales@InweldCorporation.com

EMERGENCY TELEPHONE NUMBER: 1-800-346-5368

2. HAZARD IDENTIFICATION:

Emergency Overview: This product is normally not considered hazardous as shipped. Avoid eye contact or inhalation of dust from the product. When this product is used in a welding process, the most important hazards are welding fumes, heat, radiation and electric shock.

Classification of the Substance/Mixture

CLP/GHS Classification (1272/2008):

Skin Irritation, Category 2

Eye Damage, Category 1

Carcinogenicity, Category 2

Specific Target Organ Toxicity (Repeated Exposure), Category 2

EU Classification (67/548/EEC):

Corrosive (C), Harmful (Xn), Irritant (Xi), Carcinogen Category 3, R34, R40, R48, R37

Labelling:

Symbols: 

Signal Word: Danger

Hazard Statements:

H315 – Causes skin irritation.

H318 – Causes serious eye damage.

H351 – Suspected of causing cancer.

H373 – May cause damage to lungs, eyes, brain & central nervous system through prolonged or repeated exposure.

Precautionary Statements:

P201 – Obtain special instruction 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.

P264 – Wash skin and hair thoroughly after handling.

P280 – Wear protective gloves/eye protection/face protection.

P281 – Use personal protective equipment as required.

P302+P352 – IF ON SKIN: Wash with plenty of soap and water.

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.

P314 – Get medical advice/attention if you feel unwell.

P332+P313 – IF skin irritation occurs: Get medical advice/attention.

P362 – Take off contaminated clothing and wash before reuse.

P405 – Store locked up.

P501 – Dispose of contents/container in accordance with local/regional/national/international regulations.

3. COMPOSITION / INFORMATION ON INGREDIENTS:

Solid Wire Electrodes for Arc Welding

Product	Fe ¹	C	Cr ¹	Ni	Mo	Mn ¹	Si ¹	Nb	Ti ¹	Cu	W	V	Carbonate ²	Silicate ³
308/308L	Bal	0.03	22.0	11.0	0.8	2.5	0.7			0.75				
308LSi	Bal	0.03	22.0	11.0	0.8	2.5	1.0			0.75				
308H	Bal	0.08	22.0	10.0	0.5	2.5	0.7			0.75				
309/309L	Bal	0.03	25.0	14.0	0.8	2.5	0.7			0.75				
309LSi	Bal	0.03	25.0	14.0	0.8	2.5	1.0			0.75				
309LMo	Bal	.03	23.0	12.0	2.0	1.0	.3			0.75				
310	Bal	0.15	28.0	22.5	0.8	2.5	0.7			0.75				
312	Bal	0.15	32.0	10.5	0.8	2.5	0.7			0.75				
316/316L	Bal	0.03	20.0	14.0	3.0	2.5	0.7			0.75				
316H	Bal	0.08	20.0	14.0	3.0	2.5	0.7			0.75				
316LSi	Bal	0.03	20.0	14.0	3.0	2.5	1.0			0.75				
317L	Bal	0.03	20.5	15.0	4.0	2.5	0.5			0.75				
320/320Cb	Bal	0.07	21.0	36.0	3.0	2.5	0.6	1.0		4.0				
320LR	Bal	0.025	21.0	36.0	3.0	2.0	0.2	0.4		4.0				
321	Bal	.08	19.0	32.0	2.0	2.5	.6			3.0				
330	Bal	0.25	17.0	37.0	0.8	2.5	0.7			0.75				
347	Bal	0.08	19.0	9.0	0.75	2.5	1.0	1.0		0.75				
347LSi	Bal	0.03	19.0	9.0	0.75	2.5	1.0	1.0		1.5				
385	Bal	.025	21.5	26.0	5.2	2.5	.5			2.0				
409Cb	Bal	0.08	13.5	0.6	0.5	0.8	1.0	0.8		0.75				
410	Bal	0.12	13.5	0.6		0.6	0.5			0.75				
410NiMo	Bal	0.06	12.5	5.0	0.7	0.6	0.5			0.75				
420	Bal	0.40	14.0	0.6	0.8	0.6	0.5			0.75				
430	Bal	0.10	17.0	0.6	0.75	0.4	0.5			0.75				
430LCb	Bal	0.04	19.0	0.1				1.0	1.0	0.75				
630	Bal	0.05	16.8	5.0	0.8	0.8	0.8	0.3		4.0				
2209	Bal	0.03	23.5	9.5	3.5	2.0	0.9			0.75				

(1) Total for this element and its compounds, which are generally characterized as oxides.

(2) Carbonate compounds consist of calcium carbonate and magnesium carbonate

(3) Silicate compounds consist of sodium and potassium silicates

4. FIRST AID MEASURES:

Inhalation: Remove to fresh air immediately or administer oxygen. Get medical attention immediately. **Skin:** Flush skin with large amounts of water. If irritation develops and persists, get medical attention. **Eye:** Flush eyes with water for at least 15 minutes. Get medical attention.

Ingestion: Obtain medical attention immediately if ingested. Rinse mouth.

Electric Shock: Disconnect and turn off the power. Use a nonconductive material to pull victim away from contact with live parts or wires. Immediately contact a physician.

5. FIRE-FIGHTING MEASURES:

Suitable Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Welding arcs and sparks can ignite combustible and flammable materials. Use the extinguishing media recommended for the burning

material and fire situation.

Unsuitable Extinguishing Media: Do not use water on molten metal. Large fires may be flooded with water from a distance.

Specific Hazards Arising From Chemical: Keep away from heat/spark/open flames/hot surfaces – No smoking. Iron oxides, Manganese/manganese oxides, Sodium oxides, Silicon oxides

Protective Equipment: Fire fighters should wear complete protective clothing including self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES:

Personal Precautions: Refer to section 8.

Environment Precautions: Refer to section 13.

Cleaning Measures: Solid objects may be picked up and placed into a container. Liquids or pastes should be scooped up and placed into a container. Wear proper protective equipment while handling these materials. Do not discard as refuse.

7. HANDLING AND STORAGE:

Precautions for Safe Handling: Handle with care to avoid stings or cuts. Wear gloves when handling welding consumables. Avoid exposure to dust. Do not ingest. Some individuals can develop an allergic reaction to certain materials. Retain all warning and identity labels.

Conditions for Safe Storage: Store in dry place in closed packages. Keep separate from chemical substances like acids and strong bases, which could cause chemical reactions. Ground/Bond container and receiving equipment.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION:

Engineering Controls: Avoid exposure to welding fumes, radiation, spatter, electric shock, heated materials and dust. Ensure sufficient ventilation, local exhaust, or both, to keep welding fumes and gases from breathing zone and general area. Keep work place and protective clothing clean and dry. Train welders to avoid contact with live electrical parts and insulate conductive parts. Check condition of protective clothing and equipment on a regular basis.

Exposure limits: Use industrial hygiene equipment to ensure that exposure does not exceed applicable national exposure limits. The limits defined under section 3 can be used as guidance. Unless noted, all values are for 8 hour time weighted average. For information about welding fume analysis refer to section 10.

Biological limits: No available data

Personal protection:

Respiratory protection: Use an air purifying dust respirator when welding or brazing in a confined space, or when local exhaust or ventilation is not sufficient to keep exposure values within safe limits.

Hands protection: Wear appropriate gloves to prevent skin contact.

EN 12477: Protection gloves for welders

Requirements (EN Levels)	Type A	Type B
Abrasion (Cycles)	2 (500)	1 (100)
Cut (Factor)	1 (1.2)	1 (1.2)
Tear (Newton)	2 (25)	1 (10)
Puncture (Newton)	2 (60)	1 (20)
Burning Behavior	3	2
Contact Heat	1	1
Convective Heat	2	-
Small Splashes	3	2
Dexterity	1 (11)	4 (6.5)

Type B gloves are recommended when high dexterity is required as for TIG welding, while type A gloves are recommended for other welding processes. The contact temp (°C) is 100 and the threshold time (seconds) >15.

Eyes protection: Welder's helmet or face shield with colour absorbing lenses. Shield and filter to provide protection from harmful UV radiation, infra red and molten metal approved to standard EN379. Filter shade to be a minimum of shade 9.

Skin protection: Heat-resistant protective clothing. Wear safety boots, apron, arm and shoulder protection. Keep protective clothing clean and dry. Clothing should be selected to suit the level, duration and purpose of the welding activity.

Class 1	
Impact of Spatter	15 Drops
Heat Transfer (radiation)	RHTI 24 \geq 7 seconds
Process	Manual welding with light formation of spatter and drops <ul style="list-style-type: none"> • Gas Welding • TIG Welding • MIG Welding • Micro plasma welding • Brazing • Spot Welding • MMA Welding (with rutile-covered electrode)
Environmental Conditions	Operation of machines <ul style="list-style-type: none"> • Oxygen cutting machines • Plasma cutting machines • Resistance welding machines • Machines for thermal spraying • Bench welding

Class 2	
Impact of Spatter	25 Drops
Heat Transfer (radiation)	RHTI 24 \geq 16 seconds
Process	Manual welding with heavy formation of spatter and drops <ul style="list-style-type: none"> • MMA welding (with basic or cellulose-covered electrodes) • MAG welding (with CO₂ or mixed gases) • MIG Welding (with high current) • Self shielded flux core arc welding • Plasma cutting • Gouging • Oxygen cutting • Thermal spraying
Environmental Conditions	Operation of machines <ul style="list-style-type: none"> • In confined spaces • At overhead welding/cutting or in comparable constrained positions

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance: Solid.

Color: None

Odor: Odorless

Odor Threshold: Not Available

pH Value: Not Available

Melting Point/Melting Range: 1560 - 2000° F, 850 - 1100° C

Freezing Point: Not Available

Boiling Point/Boiling Range: Not Available

Flash point: Not Available

Evaporation Rate: Not Available

Self-in flammability: Not Available

Explosion limits: Not Available

Vapour pressure: Not Available

Vapour density: Not Available

Density at 20°C: Not Available

Relative density: 6-9 g/cm³

Solubility: Insoluble in water.

Partition coefficient: Not Available

Auto-ignition temperature: Not Available

Decomposition temperature: Not Available

Other Information: No available data.

10. STABILITY AND REACTIVITY:

Chemical Stability: This product is stable under normal conditions.

Hazardous Reactions: Contact with chemical substances like acids or strong bases cause generation of gas.

Conditions to Avoid: Not applicable.

Incompatible Materials: Reacts with acid.

Hazardous Decomposition Products: When this product is used in a welding process, hazardous decomposition product would include those from volatilization, reaction or oxidation of the material listed in section 3 and those from the base metal and coating. The amount of fumes generated from this product varies with welding parameters and dimensions.

Refer to applicable national exposure limits for fume compounds, including those exposure limits for fume compounds found in section 3. Manganese has a low exposure limit, in some countries that may be easily exceeded. Reasonably expected gaseous products would include carbon oxides, nitrogen oxides and ozone. Air contaminants around the welding area can be affected by the welding process and influence the composition and quality of fumes and gases produced.

11. TOXICOLOGICAL INFORMATION:

Signs and Symptoms of Overexposure: Inhalation of welding fumes and gases can be dangerous to your health. Classification of welding fumes is difficult because of varying base materials, coatings, air contaminants and processes. The Internal Agency for Research on Cancer has classified welding fumes as possible carcinogenic to humans (Group 2B).

Acute Effects: Overexposure to welding fumes may result in symptoms like metal fume fever, dizziness, nausea, dryness or irritation of the nose, throat or eyes. Prolonged inhalation of crystalline silica may result in silicosis, a disabling pulmonary fibrosis characterized by fibrotic changes and military nodules in the lungs, a dry cough, shortness of breath, emphysema, decreased chest expansion and increased susceptibility to tuberculosis. May cause sensitisation by skin contact.

LD/LC50 Values that are relevant for classification		
Cellulose 9004-34-6		
Oral	LD50	>5000 mg/kg (rat)
Inhalation	LC50	>3mg/L/4hr.(rat)
Dermal	LD50	>2000 mg/kg (rat)

LD/LC50 Values that are relevant for classification		
Chromium 7440-47-3		
Oral	LD50	19.8 mg/kg (rat) (highly toxic)

LD/LC50 Values that are relevant for classification		
Manganese 7439-96-5		
Oral	LD50	9000 mg/kg (rat)

LD/LC50 Values that are relevant for classification		
Titanium Dioxide 13463-67-7		
Oral	LD50	>10000 mg/kg (rat)
Dermal	LD50	>10000 mg/kg (rabbit)

LD/LC50 Values that are relevant for classification		
Iron 7439-89-6		
Oral	LD50	30000 mg/kg (rat)

LD/LC50 Values that are relevant for classification		
Nickel 7440-02-0		
Oral	LD50	>9000 mg/kg (rat)
Inhalation	LC50	>10.2 mg/L/1hr. (rat)

Chronic Effects: Overexposure to welding fumes may affect pulmonary function and eyes. 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. Prolonged inhalation of titanium dioxide (Classified 2B by IARC) above safe exposure limits can cause cancer. Prolonged inhalation of (Classified by 2B by IARC) above safe exposure limits can cause cancer.

12. ECOLOGICAL INFORMATION:

Toxicity: Welding rods contain metals which are considered to be very toxic towards aquatic organisms. Finely divided welding rods are therefore considered harmful to aquatic organisms.

Persistence and Degradability: The welding rods consist of elements that can not degrade any further in the environment.

Bio accumulative Potential: Welding rods contain heavy metals which bio accumulates in the food chain. The following figures are the bio concentration factor (BCF) for the substances on their own.

BCF:

Chromium, BCF: 200

Manganese, BCF: 59052

Nickel, BCF: 16

Iron, BCF: 140000

Mobility in Soil: Welding rods are not soluble in water or soil. Particles formed by working welding rods can be transported in the air.

Other Adverse Effects: In massive form, welding rods present no hazards to the aquatic environment.

Welding materials could degrade into components originating from the materials used in the welding process. Avoid exposure to conditions that could lead to accumulation in soils or groundwater. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS:

Product: For product elimination, consult recycling companies or appropriate local authority.

USA RCRA: This product is not considered hazardous waste if discarded. Residue from welding consumables and processes could degrade and accumulate in soils and groundwater.

Package: May be disposed in approved landfills provided local regulations are observed.

14. TRANSPORT INFORMATION:

UN-number: Welding rods are not classified as dangerous goods for transport and has no UN number.

UN proper shipping name: Welding rods are not classified as dangerous goods for transport and has no UN proper shipping name.

Transport hazard class: Welding rods are not classified as dangerous goods for transport.

Packing group: There are not any special precautions with which a user should or must comply or be aware of in connection with transport or conveyance either within or outside premises.

Environmental hazards: Welding rods are not environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID and AND) and/or a marine pollutant to the IMDG Code.

Special precautions for users: There are not any special precautions which a user should or must comply or be aware of in connection with transport or conveyance either within or outside premises of the welding rod.

Transport in Bulk According to Annex III MARPOL 73/78 and the IBC Code: Welding rods in massive form do not subject under MARPOL 73/78 and the IBC Code. Not applicable – product is transported only in packaged form.

15. REGULATORY INFORMATION:

Safety, health and environment 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. Observe any federal and local regulations. Take precautions when welding and protect yourself and others.

Warning: Welding fumes and gases are hazardous to your health and may damage lungs and other organs. Use adequate ventilation. Electric shock can kill. Arc rays and sparks can injure eyes and burn skin. Wear correct hand, head, eye and body protection.

Chemical safety assessment: No

USA: Under the OSHA Hazard Communication Standard, this product is considered hazardous. This product contains or produces a chemical known to the state of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code § 25249.5 et seq.) United States EPA Toxic Substance Control Act: All constituents of this product are on the TSCA inventory list or are excluded from listing.

EPCRA/SARA Title III Toxic Chemicals

The following metallic components are listed as SARA 313 "Toxic Chemicals" and potential subject to annual SARA reporting. See Section 3 for weight percentage.

Ingredient Name	Disclosure Threshold
Manganese	5 mg/m ³
Chromium	5 mg/m ³
Nickel	1 mg/m ³

16. OTHER INFORMATION:

The information in this document is believed to be correct as of the date issued. However, no warranty is expressed to be implied regarding the accuracy or completeness of this information. This information and product are furnished on the condition that the person receiving them shall make his own determinations as to the suitability of the product for his particular purpose and on the condition that he assumes the risk of his use thereof.

This Material Safety Data Sheet complies with the EC directives 91/155/EEC and 93/112/EEC, including modifications 2001/58/EC.

Complies with OSHA Communication Standard 29 CFR 1910.1200 and Superfund Amendments and Reauthorization Act (SARA) of 1986 Public Law 99-499

Hazard Statements:

H314 – Causes severe skin burns and eye damage.

H315 – Causes skin irritation.

H318 – Causes serious eye damage.

H319 – Causes serious eye irritation.

H332 – Harmful if inhaled.

H335 – May cause respiratory irritation.

H351 – Suspected of causing cancer.

H373 – May cause damage to organs through prolonged or repeated exposure.

R-Phrases:

R20 – Harmful by inhalation.

R34 – Causes burns.

R36/38 – Irritating to eyes and skin.

R36/37/38 – Irritating to eyes, respiratory system and skin.

R37 – Irritating to respiratory system.

R40 – Limited evidence of a carcinogenic effect.

R48 – Danger of serious damage to health by prolonged exposure.

R48/20 – Harmful: danger of serious damage to health by prolonged exposure through inhalation.

S-Phrases:

S22 – Do not breathe dust.

S26 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36/37/39 – Wear suitable protective clothing, gloves and eye/face protection.

S43 – In case of fire, use fire-fighting equipment on basis class D.

S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

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