STAINLESS STEEL ALLOYS **MATERIAL SAFETY DATA SHEET**

1. This MSDS covers available stainless steel wire and stainless steel welding consumables sold by:
Central Wire Industries Ltd. Information: (613) 267-3752
1 North Street
Perth, Ontario, Canada K7H 2S2 Emergency: (613) 267-3752

2. **PREPARATION INFORMATION**
This MSDS prepared October 1988, and revised September 2008 by the Laboratory.

3. **HAZARDOUS INGREDIENTS**
IMPORTANT: This section covers the materials contained in the wire and is applicable to dust generated by mechanical cutting or grinding. The fumes generated during high temperature processes such as welding are covered in the reactivity section.

Ingredients	CAS no.	TLV*	PEL*	Ingredients	Cas no..	TLV	PEL
Aluminum (Al)	7429-90-5	10	15	Molybdenum (Mo)	7439-98-7	10	15
Chromium (Cr)	7440-47-3	0.5	1	Nickel (Ni)	7440-02-0	1	1
Copper (Cu)	7440-50-8	1	1	Niobium (Nb)	7440-03-1	None	None
Iron (Fe)	1309-37-1	None	None	Silicon (Si)	7440-21-3	10	15
Manganese (Mn)	7439-96-5	.02	5	Titanium (Ti)	7440-32-6	None	None

TLV & PEL in mg/m^3 C = ceiling limit

ALLOY AND COMPOSITION

ALLOY*	Mn	Si	Cr	Ni	Mo	Fe	Other
S177	0.0-1.0		16.0-18.0	6.5-7.8	2.0-3.0	REM	A1 0.75-1.5
S216	7.5-9.0		17.5-22.0	5.0-7.0		“	
S2209	05-2.0		21.5-23.5	7.0-9.0	2.5-3.5	“	
S302, S302H	0.0-2.0		17.0-19.0	8.0-10.0		“	
S302HQ	0.0-2.0		17.0-19.0	8.0-10.0		“	Cu 3.0-4.0
S304, 304L, 304H	0.0-2.0		18.0-20.0	8.0-10.5		“	
S305, S305HQ	0.0-2.0		17.0-19.0	10.5-13.0		“	
S308, S308L, S308LSI		0.0-2.5		19.0-22.0	9.0-12.0		“
S309, S309L, S309LSI		0.0-2.5		22.0-25.0	12.0-15.0		“
S310, 310S	0.0-2.5		24.0-28.0	19.0-22.5		“	
S312	0.0-2.5		28.0-32.0	8.0-10.5		“	
S31254		0.0-2.0		19.5-20.5	17.5-18.5		“
S314	0.0-2.0	0.0-2.5	23.0-26.0	19.0-22.0		“	
S316, S316L,S316LSI		0.0-2.5		16.0-20.0	10.0-14.0	2.0-3.0	“
S317, S317L	0.0-2.5		18.0-20.5	11.0-15.0	3.0-4.0	“	
S321	0.0-2.0		17.0-19.0	9.0-12.0		“	Ti 0.1-1.0
S347	0.0-2.5		17.0-21.5	9.0-12.0		“	Nb+Ta 0.1-1.0
S35/19Cb	0.0-2.5	0.75-2.0	19.0-21.0	34.0-37.0		“	Nb+Ta 0.75-1.5
S409			10.5-12.5	0.0-06		“	Ti 0.1-1.0
S410, S410L			11.5-13.5	0.0-06		“	
S420			12.0-14.0	0.0-0.6		“	
S430			16.0-18.0	0.0-0.3		“	
S434A			16.0-18.0	0.0-0.5		“	Cu 0.75-1.25
S446	0.0-1.5		23.0-27.0	0.0-0.5		“	

*Welding grade limits included in each alloy.

*TLV = Threshold Limit Value, American Conference of Governmental Industrial Hygientists
*PEL = Permissible Exposure Limit, OSHA (29CFR 1910.1000)

4. **PHYSICAL DATA**

Solid silver coloured metal wire. S.G. = 7.8-8.0 g/cm^3, M.P. = 1370-1540°C.

5. **FIRE AND EXPLOSION DATA**

Non-flammable, non-explosive, CAUTION: Welding arcs and sparks can ignite flammable gases and combustible liquids or solids.

6 **REACTIVITY DATA**

High temperature cutting and welding produce hazardous fumes and gases. The constituents of the fume may include oxides and silicates of elements in the base metal, filler metal, and any coatings present. Gases are generated during welding by heat or reaction between ultraviolet radiation and air. The gases are dependent on the alloy being welded, the process, and electrodes used. The following decomposition products and exposure limits apply to brazing, welding, and high temperature work areas. Determine actual exposure by industrial hygiene monitoring.

Substance	TLV	PEL	Substance	TLV	PEL
Aluminum fume	5	5	Nickel (soluble)	0.1	1
Carbon monoxide	29	55	Nitrogen dioxide	5.6	9(c)
Chromium (chromates)	0.05	.1(c)	Ozone	0.20(c)	0.2(c)
Copper fume	0.2	0.1	Silica (amorphous)	10	80
Iron Oxide fume	5	10	Titanium oxide	10	15
Manganese fume	0.2	5(c)	Welding Fume	5	5
Molybdenum (soluble)	5	5	(Total Particulate)		

C= ceiling limit TLV & PEL in mg/m^3

Caution: Explosive hydrogen gas is evolved from these alloys when they dissolve in acids.

7. **TOXICOLOGICAL PROPERTIES**

Routes of Entry: Inhalation of dust and fume, eye or skin contact with dust or fume.
Short Term Exposure: Acute exposure may cause irritation of the eyes or skin. Inhalation may give a metallic taste, headache, nausea, chills, fever, irritation of the respiratory tract, cough.
Long Term Exposure: Chronic exposure may cause skin sensitization, asthma, bronchitis, lung fibrosis or pneumoniosis. It may also cause damage to the kidneys and liver as well as the nervous system. Chromates and soluble nickel compounds are confirmed human carcinogens.

8. **PREVENTATIVE MEASURES**

Eye protection and protective clothing: Safety equipment when brazing, cutting or welding should include nonflammable clothing, gloves and glasses, goggles or face shields with the appropriate lens shade.
Respiratory Protection: Necessary when exposure limits are exceeded. Use an air supplied respirator in confined spaces. Keep head out of fumes. Use industrial hygiene air monitoring to ensure that TLV or PEL values are not exceeded.
Ventilation: Ensure adequate ventilation or use local exhaust when brazing, cutting or welding. Special precaution should be taken in confined spaces.
Waste Disposal: Recycle or dispose according to local regulations.

9. **FIRST AID MEASURES**

If dust or fume gets into eyes, irrigate immediately. If irritation persists, seek medical attention. If contact with skin occurs, wash with soap and water. If a rash develops, seek medical attention. If

person breathes in large amounts of dust and fume, remove from exposure. Seek medical help if respiratory irritation persists.

Additional Information:

ANSI Z49.1
The American Welding Society
550 N.W. LeJeune Road,
P.O. Box 351040
Miami, Florida 33135
U.S.A.

W117.2
Canadian Standard Association
178 Rexdale Blvd.
Toronto, Ontario, M9W 1R3
Canada

OSHA (29CFR 1910)
U.S. Dept. of Labour
Washington, D.C.
20210
U.S.A.

Threshold Limit Values
ACGIH
6500 Glenway Ave., Bldg. D-7
Cincinnati, OH 45211-4438
U.S.A.

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