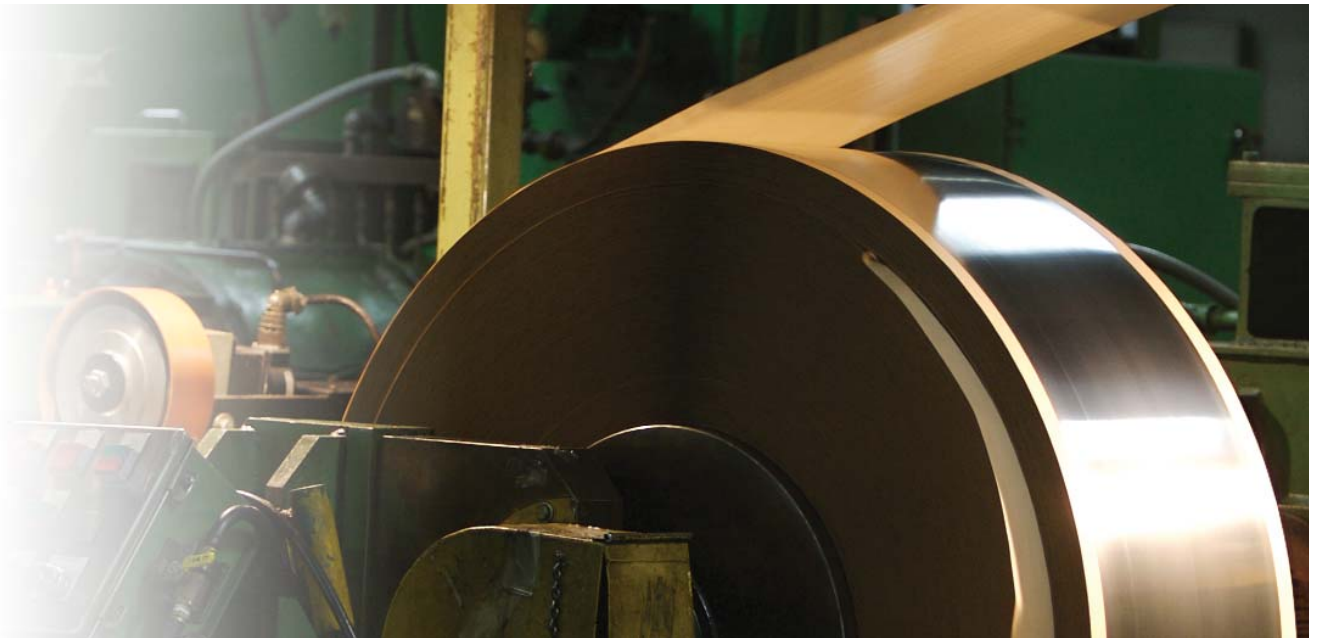


Material Safety Data Sheets



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Introduction

These Material Safety Data Sheets (MSDS) provide information on a specific group of manufactured metal products. Since these metal products share a common physical nature and constituents, the data presented are applicable to all alloys identified.

Several materials described in these Material Safety Data Sheets are proprietary alloys produced under license from various manufacturers. They are identified by the following subscript numbers:

¹Registered Trademark of AK Steel Corporation

²Registered Trademark of Carpenter Technology Corporation

³Registered Trademark of Special Metals Corporation group of companies

⁴Registered Trademark of Allegheny Companies

⁵Registered Trademark of Haynes International, Inc.

⁶Registered Trademark of United Technologies Corporation

Ulbrich Stainless Steels & Special Metals, Inc.

Corporate Headquarters

North Haven, CT USA, 06473-1191
(203) 239-4481
(800) 243-1676
FAX: (203) 239-7479
E-Mail: info@ulbrich.com

Ulbrich Specialty Strip Mill

1 Dudley Avenue, P.O. Box 610
Wallingford, CT 06492-4453
(203) 239-4481
FAX: (203) 239-7479
E-Mail: info@ulbrich.com

Ulbrich Shaped Wire, Inc.

55 Defco Park Road
North Haven, CT USA, 06473-1191
(203) 239-4481
(800) 243-1676
FAX: (203) 239-6744
E-Mail: shaped_wire@ulbrich.com

Ulbrich Precision Flat Wire LLC

692 Plant Road
Post Office Box 619
Westminster, SC 29693
(864) 647-6087
FAX: (864) 647-1549
E-mail: flat_wire@ulbrich.com

Ulbrich of Austria

Industriestrasse 1
Mullendorf 7052, Austria
TEL: +43-676-729-4230

Ulbrich Precision Metals Asia Ltd.

Unit B, 2/F.,
Chiaphua Industries Building
8-10 Siu Lek Yuen Road
Shatin, N.T.
Hong Kong
TEL: +852 2635 2077
FAX: +852 2635 2073

Ulbrich Precision Metals, Ltd.

Unit 8 and 9
Westlink Commercial Park
Oranmore County,
Galway Republic of Ireland
353-91-795182
FAX: 353-91-795183

Service Centers

Ulbrich of Illinois, Inc.

12340 South Laramie Avenue
Alsip, IL 60803-3292
(708) 489-9500
(800) 323-7035
FAX: (708) 371-1802

Ulbrich of New England

57 Dodge Avenue
North Haven, CT 06473-1191
(203) 239-4481
(800) 243-1676
FAX: (203) 239-7479

Ulbrich of California, Inc.

5455 East Home Avenue
Fresno, CA 93727-2106
(559) 456-2310
(800) ULBRICH
(800) 237-2888
FAX: (559) 456-2321

Ulbrinox

Avenida La Canada, #25
Parque Industrial
Bernardo Quintana
Queretaro, Mexico 76246
Telephone: 442-2215500
FAX: 442-2215501

Diversified Ulbrich of Canada

98 Norfinch Drive
Downsview Ontario, Canada
M3N1X1
(416) 663-7130
(800) 268-1233 (Within Canada)
FAX: (416) 663-7792

Service Centers

Diversified Ulbrich du Canada

26A Hymus Boulevard
Pointe Claire, Quebec,
Canada H9R 1C9
(514) 694-6522
(800) 361-5950 (Within Canada)
FAX: (514) 694-0266

Ulbrich Asia Metals Limited

Unit F, 13/F Block B,
Wo Kee Hong Building
585-609 Castle Peak Road
Kwai Chung, N.T. Hong Kong
TEL: +852-3580-1468
FAX: +852-3580-0288

Sales Office Only

Ulbrich of Georgia

207 N. Lewis Street
Suite G
LaGrange, GA 30240
(706) 884-0661
FAX: (706) 884-0962

Ulbrich Stainless Steels & Special Metals, Inc.

1403B, Xincheng Tower,
167 Jiangning Road,
Shanghai, China 200041
TEL: +86-21-6215-1448
FAX: +86-21-6215-1449
E-mail: asiametals@ulbrich.com

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
SS-001	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

STAINLESS AND RELATED ALLOYS GROUP I

201; 301; 302, 303; 303SE; 304; 304L; 305; 308; 309; 309S; 309SCB; 310; 310S; 316; 316L; 317; 317L; 321; 330; 347; 384; 405; 409; 410; 414; 416; 416SE; 420; 430; 434; 436; 440A; 442; 446; 18 SR1; Carpenter 20 CB32; 18-9LW1; 19-9DL4; Greek Ascoloy2.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The stainless and related alloy products identified above may contain in varying concentrations, the following elemental constituents aluminum, chromium, copper, iron, manganese, molybdenum, nickel and tungsten. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	CHROME	NICKEL
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53/EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

Ultrich Stainless Steels & Special Metals, Inc.
Material Safety Data Sheets
 Stainless & Related Alloys Group | Sheet 1

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.											(approx.) DENSITY lbs/cuin	MELTING PT. -degree (F)	
		C	Mil	Si	Cr	Ni	Mo	Fe	Cb + Ta	Ti	Se	Other			
201	S20100	.15	5.5/7.5	1.0	16.0/18.0	3.5/5.5		BAL					N .25	.280	2550
301	830100	.15	2.0	1.0	16.0/18.0	6.0/8.0		BAL						.290	2550
302	S30200	.15	2.0	1.0	17.0/19.0	8.0/10.0		BAL						.290	2550
303	S30300	.15	2.0	1.0	17.0/19.0	8.0/10.0		BAL					S .15	.290	2550
303 SE	S30323	.15	2.0	1.0	17.0/19.0	8.0/10.0		BAL			.15min			.290	2550
304	S30400	.08	2.0	1.0	18.0/20.0	8.0/10.5		BAL						.290	2550
304 L	S30403	.03	2.0	1.0	18.0/20.0	8.0/12.0		BAL						.290	2550
305	S30500	.12	2.0	1.0	17.0/19.0	10.5/13.0		BAL						.290	2550
308	S30800	.08	2.0	1.0	19.0/21.0	10.0/12.0		BAL						.290	2550
309	S30900	.20	2.0	1.0	22.0/24.0	12.0/15.0		BAL						.290	2550
309 S	S30908	.08	2.0	1.0	22.0/24.0	12.0/15.0		BAL						.290	2550
309 SCB	N/L	.08	2.0	.75	22.0/24.0	12.0/16.0		BAL	10XCmin/1.10					.290	2550
310	S31000	.25	2.0	1.5	24.0/26.0	19.0/22.0		BAL						.290	2550
310S	S31008	.08	2.0	1.5	24.0/26.0	19.0/22.0		BAL						.290	2550
316	S31600	.08	2.0	1.0	16.0/18.0	10.0/14.0	2.0/3.0	BAL						.290	2550
316L	S31603	.03	2.0	1.0	16.0/18.0	10.0/14.0	2.0/3.0	BAL						.290	2550
317	S31700	.08	2.0	1.0	18.0/20.0	11.0/15.0	3.0/4.0	BAL						.290	2550
317L	S31703	.03	2.0	1.0	18.0/20.0	11.0/15.0	3.0/4.0	BAL						.290	2550
321	S32100	.08	2.0	1.0	17.0/19.0	9.0/12.0		BAL		Ti5XCmin				.290	2550
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	Ta7440-03-1 Cb7440-25-7	7440-32-6	7782-49-2	S 7446-09-5 N 7727-37-9			
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As Fed Fume As Fe	Cb Not Listed As Metal Ta	As Ti02	As Dust As Fume	As S02 Not Listed			
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	15 10	0.5 0.5(VI) 1 0.5	1 1	5 5 15 10	10 5	5	15 10	0.2 0.2 0.2 0.2	13 5 5			

Ulbrich Stainless Steels & Special Metals, Inc.
Material Safety Data Sheets
 Stainless & Related Alloys Group I Sheet 2

ALLOY	UNS No.	CONSTITUENT(S)		% Maximum unless otherwise shown.														(approx.)	
		C	Mn	Si	Cr	Ni	Mo	Fe	Cb + Ta	Cu	Ti	AL	W	Se	V	Other	DENSITY lbs/cuin	MELTING PT. -degree (F)	
330	N08330	.08	2.0	0.75/1.5	17.0/20.0	34.0/37.0		BAL									.289	2550	
347	S34700	.08	2.0	1.0	17.0/19.0	9.0/13.0		BAL	10XCmin								.290	2550	
384	S38400	.08	2.0	1.0	15.0/17.0	17.0/19.0		BAL									.290	2550	
405	S40500	.08	1.0	1.0	11.5/14.5			BAL				.10/.30					.280	2700	
409	S40900	.08	1.0	1.0	10.5/11.75			BAL		6XCmin/0.75							.276	2600	
410	S41000	.15	1.0	1.0	11.5/13.5			BAL									.280	2700	
414	S41400	.15	1.0	1.0	11.5/13.5	1.25/2.5		BAL									.280	2700	
416	S41600	.15	1.25	1.0	12.0/14.0			BAL							S. 15min		.280	2700	
416 SE	S41623	.15	1.25	1.0	12.0/14.0			BAL					0.15 min				.280	2700	
420	S42000	over. 15	1.0	1.0	12.0/14.0			BAL									.280	2650	
430	S43000	.12	1.0	1.0	16.0/18.0			BAL									.280	2600	
434	S43400	.12	1.0	1.0	16.0/18.0		.75/1.25	BAL									.280	2600	
436	S43600	.12	1.0	1.0	16.0/18.0		.75/1.25	BAL	5XCmin/0.70								.280	2600	
440 A	S44002	.60/.75	1.0	1.0	16.0/18.0		0.75	BAL									.280	2500	
442	S44200	.20	1.0	1.0	18.0/23.0			BAL									.280	2600	
446	S44600	.20	1.50	1.0	23.0/27.0			BAL							N .25		.280	2600	
18 SR ¹	N/L	.20	.50	1.0	17.0/19.0	.50		BAL			3.0/6.0	1.50/2.50					.280	2600	
CARPENTER 20 CB3 ²	N08020	.06	2.0	1.0	9.0/21.0	32.5/35.0	2.0/3.0	BAL	8XCmin/1	.0	3.0/4.0						.292	2600	
18-9LW1	N/L	.10	2.0	1.0	17.0/19.0	8.0/10.0		BAL		3.0/4.0							.290	2600	
19-90L4	K63198	.28/.35	.75/1 .5	.3/8	18.0/21.0	8.0/11.0	1.0/1.75	BAL	.25/.60	.50	.10/.35		1.0/1.75				.286	2600	
GREEK ASCOLLOY	F41800	.15/.20	.50	.50	12.0/14.0		.50	BAL					2.5/3.5		1.8/2.2		.286	2700	
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	Ta7440-03-1 Cb7440-25-7	7440-50-8	7440-32-6	7429-90-5	7440-33-7	7782-49-2	V 7440-62-2 1313-62-1	S 7446-09-5 N 7727-37-9			
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As Fe0 Fume As Fe	Co Not Listed As Metal Ta	As Dust As Fume	AsT0 ₂	As Dust As Fume	As Dust	As Dust As Fume	As Dust As Fume	As Dust V ₂ O ₅ As Fume V ₂ O ₅	As SO ₂ Not Listed		
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	15 10	0.5 0.5(VI) 1 0.5	1 1 1 1	5 5 15 10	10 5		1 1 0.1 0.2	15 10	10 5	5	0.2 0.2 0.2 0.2	.5(c) .5 .1(c) .5	13 5 5			

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
HM-002	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

CONSTITUENTS HIGH MANGANESE ALLOYS GROUP II

Nitronic 32¹; Nitronic 33¹; Nitronic 40 (21-6-9)¹; Nitronic 50¹; Nitronic 60¹.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The high manganese alloy products identified above may contain, in varying concentrations, the following elemental constituents: chrome, iron, manganese, molybdenum, nickel, nitrogen and silicon. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.											(approx.) DENSITY lbs/cuin	MELTING PT. -degree (F)
		C	Mn	Si	Cr	Ni	Mo	Fe	N	Cb	V	Other		
NITRONIC 32 ¹	S24100	10	12.0	5	18.0	1.6		BAL	.35				.281	2550
NITRONIC 33 ¹	S24000	.06	13.0	.5	18.0	3.0		BAL	.30				.280	2550
NITRONIC 40 ¹ 21-6-9	S21904	.08	8.0/10.0	1.0	18.0-20.0	5.0/7.0		BAL	.15/.40				.283	2550
NITRONIC 50 ¹	S20910	.06	4.0/6.0	10	20.5/23.5	11.5/13.5	1.5/3.0	BAL	.2/.4	0.1/0.3	0.1/0.3		.285	2550
NITRONIC 60 ¹	S21800	.10	7.0/9.0	3.5/4.5	16.0/18.0	8.0/9.0		BAL					.276	2550
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	7727-37-9	7440-25-7	V7440-62-2 1313-62-1			
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As Fed Fume As Fe	Not Listed	Not Listed	As Dust V ₂ O ₅ As Fume V ₂ O ₅			
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	15 10	0.5 0.5(VI) 1 0.5	1 1	5 5 15 10	10 5	5		.5(c) .5 .1(c) .5			

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
HR-003	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

PRECIPITATION HARDENING AND HIGH IRON ALLOYS GROUP III

A 286⁴; AM-350⁴; 17-7PH¹; PH 15-7MO¹.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The precipitation hardening and high iron alloy products identified above may contain in varying concentrations, the following elemental constituents aluminum, chromium, iron, manganese, molybdenum, nickel, and silicon. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

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The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY	UNS No.	CONSTITUENT(S)													DENSITY lbs/cuin	MELTING PT. -degree (F)
		C	Mn	P	S	Si	Cr	Ni	Mo	Fe	Al	Ti	V	Other		
A 2S6 ⁴	K66286	.08	2.0	.04	.035	1.0	13.5/16.0	24.0/27.0	1.0/1.75	BAL	.35	1.9/2.3	0.1/0.5	B .003/.01	.286	2600
AM-350 ⁴	S35000	.07/.11	.5/1.25	.04	.03	.50	16.0/17.0	4.0/5.0	2.5/3.25	BAL				N.07/.13	.286	2500
17-7 PH ¹	S17700	.09	1.0	.04	.03	1.0	16.0/18.0	6.5/7.75		BAL	.75/1.50				.282	2560
PH 15-7MO ¹	S15700	.09	1.0	.04	.03	1.0	14.0/16.0	6.5/7.75	2.0/3.0	BAL	.75/1.50				.282	2550
CAS Number		7440-44-0	7439-96-5	7723-14-0	7704-34-9	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	7429-90-5	7440-32-6	7440-62-2 1313-62-1	7440-42-8 7727-37-9		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Phos (yellow)	As SO ₂	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As Fed Fume As Fe	As Dust As Fume	None	As Dust V ₂ O ₅ As Fume V ₂ O ₅	Not Listed		
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	0.1 0.1	13 5	15 10	0.5 0.5(VI)	1 1	5 5 15 10	10 5	10 5	None	.5(c) .5 .1(c) .5			

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
NI-004	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

NICKEL AND NICKEL-IRON-CHROME ALLOYS GROUP IV

Incoloy 800³; Incoloy 801³; Incoloy 825³; Ni-Span-C 902³.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The nickel and nickel-iron-chrome alloy products identified above may contain in varying concentrations, the following elemental constituents aluminum, chromium, iron, manganese, molybdenum, nickel, and silicon. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.											(approx.) DENSITY lbs/cuin	MELTING PT. -degree (F)
		C	Mn	Fe	Si	Cu	Cr	Al	Ti	Ni	Mo	Other		
INCOLOY 800 ³	N08800	.05	.75	460	.50	.38	21.0	38	.36	BAL			.287	2475
INCOLOY 801 ³	N08801	05	.75	44.5	.50	.25	20.5		1.13	BAL			.287	2475
INCOLOY 825 ³	N08825	03	.50	300	.25	2.25	21.5	.10	.90	BAL	3 0		.294	2500
Ni-Span-C 902 ³	N09902	06	80	BAL	1.0		4.9/5.75	0.3/0.8	2 2/2.75	41.0/43.5			.293	2650
CAS Number		7440-44-0	7439-96-5	7439-89-6	7740-21-3	7440-50-8	7740-47-3	7429-90-5	7440-32-6	7740-02-0	7439-98-7	B7440-42-8 N7727-37-9		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As FeO Fume As Fe	As Dust	As Dust As Fume	As Soluble Salts As Insoluble Salts	As Dust As Fume	None	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	Not Listed		
(mg/m3)			5(c) 5(c)	10	15 10	1 1	0.5 0.5(VI)	0 10	None	1 1	5 5			
PEL TLV			5(c) 1	5		0.1 0.2	1 0.5	0 5		1 1	15 10			

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
NI-005	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

NICKEL AND NICKEL BASED ALLOYS GROUP V SHEET 1 and 2

Inconel 600³; 601³; 617³; 625³; 702³; TIB³; 722³; X-750³; Hastelloy B³; B2⁵; C-276⁵; C22⁵; X⁵; G-30⁵; Haynes 214⁵; 230⁵; Waspaloy⁶; 80 Ni-20 Cr; Nickel 200; 201; 233; 270; Nimonic 75³; Permannickel 300³; Monel 400³; R405³; K500³.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The nickel and nickel based alloy products identified above may contain in varying concentrations, the following elemental constituents aluminum, chromium, cobalt, copper, iron, manganese, molybdenum, nickel, titanium and tungsten. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

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NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53/EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

Ulbrich Stainless Steels & Special Metals, Inc.
Material Safety Data Sheets
 Nickel & Nickel-Based Alloys Group V Sheet No. 1

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.															(approx.)		
		C	Mn	Fe	Si	Cu	Cr	Al	Ti	Ni	Mo	Cb + Ta	Co	W	V	Zr	Other	DENSITY lbs/cuin	MELTING PT. -degree (F)
INCONEL 600 ³	N06600	.08	.5	8.0	.25	.25	15.5			BAL								.304	2470
INCONEL 601 ³	N06601	.05	.5	14.1	.25	.50	23.0	1.35		BAL								.291	2375
INCONEL 617 ³	N06617	.07	.5	1.5	.5	.20	22.0	1.20	.3	52.0	9.0		1.25					.302	2430
INCONEL 625 ³	N06625	.05	.25	2.5	.25		21.5	.2	.2	BAL	9.0	3.65						.305	2350
INCONEL 702 ³	N/L	.05	.5	1.0	.35	.25	15.5	3.25	.63	BAL								.304	2450
INCONEL 718 ³	N07718	.08	.35	BAL	.35	.30	17.0/21.0	.2/8	.65/1.15	50.0/55.0	2.8/3.3	4.75/5.5	1.0			B .006	.297	2300	
INCONEL 722 ³	N/L	.08	1.0	5.0/9.0	.70	.50	14.0/17.0	.4/1.0	2.0/2.75	70.0 min			1.0					.298	2450
INCONEL X-750 ³	N07750	.08	.35	5.0/9.0	.35	.50	14.0/17.0	.4/1.0	2.25/2.75	*70.0min		.7/1.2	*1.0					.298	2540
HASTELLOY B ⁵ , B2 ⁵	N10665	.02	1.0	2.0	.10		1.0			BAL	26.0/30.0		1.0					.333	2420
HASTELLOY C ⁵ , C276 ⁵	N10276	.01	1.0	4.0/7.0	.08		14.5/16.5			BAL	15.0/17.0		2.5	3.0/4.5	V.35			.321	2415
HASTELLOY C22 ⁵	W86022	.015	.50	2.0/6.0	.08		20.0/22.5			BAL	12.5/14.5		2.5	2.5/3.5	V.35			.314	2475
HASTELLOY G-30 ⁵	N06030	.03	1.5	13.0/17.0	.80	1.0/2.4	28.0/31.5			BAL	4.0/6.0	.3/1.5	5.0	1.5/4.0				.297	2300
HASTELLOY X ⁵	N06002	.05/15	1.0	17.0/20.0	1.0	.50	20.5/23.0	.50	.15	BAL	8.0/10.0		.5/2.50	17.0/20.0		B .008	.297	2300	
HAYNES 214 ⁵	N/L	.15	.20	2.0/6.0	.10		15.0/17.0	4.0/5.0	.10	BAL	.10		.10	.10		Y .003/.04	.291	2450	
HAYNES 230 ⁵	N/L	.05/15	1.0	17.0/20.0	1.0		20.5/23.0			BAL	8.0/10.0		.5/2.5	.2/1.0		B.005	.319	2375	
WASPALOY ⁶	N07001	.02/10	.10	2.0	.15	.10	18.0/21.0	1.2/1.6	2.75/3.25	BAL	3.5/5.0		12.0/15.0		.02/.08	B.003/.01	.296	2425	
80Ni-20Cr	N/L	.15	2.5	1.0	.75/1.60		19.0/21.0			BAL									
CAS Number		7440-44-0	7439-96-5	7439-89-6	7740-21-3	7440-50-8	7740-47-3	7429-90-5	7440-32-6	7440-02-0	7439-98-7	7440-03-1	7440-48-4	7440-33-7	77440-62-2	7440-67-7	7440-42-8		
											Cb 7440-25-7				1313-62-1				
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As FeO Fume As Fe	As Dust As Fume	As Dust As Fume	As Soluble Salts As Insoluble Salts	As Dust As Fume	None	As Metals Ni As Soluble	As Soluble Salts As Insoluble Salts	Cb Not Listed As Metal Ta	As Dust As Metal	As Dust As Fume	As Dust V ₂ O ₅ As Fume V ₂ O ₅	As Dust As Fume	Not Listed		
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	10 5	15 10	1 1 0.1 0.2	0.5 0.5(VI) 1 0.5	0 10 0 5	NONE	1 1 1 1	5 5 15 10	5	0.1 0.1	5	.5(c) .5 .1(c) .5	5 5 5 5			

Ulbrich Stainless Steels & Special Metals, Inc.
Material Safety Data Sheets
Nickel & Nickel-Based Alloys Group V Sheet No. 2

ALLOY	UNS No.	CONSTITUENT(S)												(approx.)	
		% Maximum unless otherwise shown.												DENSITY	MELTING PT.
		C	Mn	Fe	S	Si	Cu	Cr	Al	Ti	Ni	Mg	Other	lbs/cuin	-degree (F)
Ni 200	N0220	.08	.18	.2	.005	.18	.13				BAL			.321	2615
Ni 201	N02201	.01	.18	.2	.005	.18	.13				BAL			.321	2615
NI 233	N/L	.10	.30	.10	.008	.10	.10			.005	BAL			.321	2650
Ni 270	N02270	.01	<0.001	.003	<0.001	<0.001	<0.001	<0.001		<0.001	BAL	<.001	Co<.001	.321	2650
NIMONIC 75 ³	N06Q75	.12	1.0	3.0		1.0	.25	19.0/21.0			BAL			.301	2450
PERMANICKEL 300 ³	N/L	.20	.25	.30	.005	.18	.13			.40	BAL	.35		.316	2650
MONEL 400 ³	N04400	.15	1.0	1.25	.012	.25	31.5				BAL			.319	2370
MONEL R405 ³	N04405	.15	1.0	1.25	.043	.25	31.5				BAL			.319	2370
MONEL K5Q0 ³	N05500	.13	.75	1.0	.005	.25	29.5		2.73	.60	BAL			.305	2400
CAS Number		7440-44-0	7439-96-5	7439-89-6	7704-34-9	7740-21-3	7440-50-8	7740-47-3	7429-90-5	7440-32-6	7740-02-0	1309-48-4	7440-48-4		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Fed Fume As Fe	As SO ₂	As Dust	As Dust As Fume	As Soluble Salts As Insoluble Salts	As Dust As Fume	None	As Metal Ni As Soluble Ni	As Fume MgO	As Dust As Fume		
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	0.1 0.1	13 5	15 10	1 1 0.1 0.2	0.5 0.5(VI) 1 0.5	0 10 0 5	None	1 1 1 1	15 10	0.1 0.1 0.1 0.1		

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
SA-006	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

COBALT BASED SUPERALLOYS AND RELATED ALLOYS GROUP VI

L-605 (Haynes 25)⁵; Haynes 188⁵; N 155

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The cobalt based superalloys and related alloy products identified above may contain in varying concentrations, the following elemental constituents chromium, cobalt, iron, manganese, molybdenum, nickel, silicon and tungsten. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	CHROME	NICKEL
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY	UNS No.	CONSTITUENT(S)														DENSITY lbs/cuin	(approx.) MELTING PT. -degree (F)	
		C	Mn	P	S	Si	Cr	Ni	Co	Fe	W	La	Cu	Mo	Cb + Ta			Other
L-605 HAYNES 25 ⁵	R30605	.05/.15	1.0/2.0	.04	.03	.40	19.0/21.0	9.0/11.0	BAL	3.0	14.0/16.0						.330	2425
HAYNES 188 ⁵	R30188	.05/.15	1.25	.02	.015	.2/.5	20.0/24.0	20.0/24.0	BAL	3.0	13.0/16.0	.02/.12				B.015	.324	2375
N-155	R30155	.08/.16	1.0/2.0	.04	.04	1.0	20.0/22.5	19.0/21.0	18.5/21.0	BAL	2.0/3.0		.50	2.5/3.5	.75/1.25	N.10/.20	.298	2350
CAS Number		7440-44-0	7439-96-5	7723-14-0	7704-34-9	7440-21-3	7740-47-3	7740-02-0	7440-48-4	7439-89-6	7440-33-7	N/L	7440-50-8	7439-98-7	Cb 7440-25-7 Ta 7440-03-1	B7440-42-8 N7727-37-9		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Phos (yellow)	As Dust	As Soluble Mo As Insoluble Mo	As Metal Ni As Soluble Ni	as Dust	As FeO Fume As Fe	As Dust	Not Listed	As Dust As Fume	As Soluble Mo As Insoluble Mo	Cb Not Listed As Metal Ta	Not Listed		
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	0.1 0.1 0.1 0.1	13 5	15 10	0.5 0.5(VI) 1 0.5	1 1 1 1	0.1 0.1	10 5	5		1 1 0.1 0.2	5 10 15 10				

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
EA-007	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

ELECTRONIC ALLOYS GROUP VII

Ulbraseal 36; 42; 46; 48; 52; Ulbravar 29-17; Sealmet HC-4.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The electronic alloy products identified above may contain, in varying concentrations, the following elemental constituents: chromium, cobalt, copper, iron, manganese, nickel and silicon. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

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The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

Ulbrich Stainless Steels & Special Metals, Inc.
Material Safety Data Sheets
Electronic Alloys Group VII

ALLOY	UNS No.	CONSTITUENT(S)														DENSITY lbs/cuin	MELTING PT. -degree (F)	
		C	Mn	Si	Cr	Ni	Co	Cu	Fe	Al	Mo	Ti	Mg	Zr	Other			
ULBRASEAL36	K93601	.03	.30	.20	.10	36.0	.05	.15	BAL	.01							.291	2600
ULBRASEAL42	K94100	.05	.80	.30	.25	41.0			BAL	.10							.293	2600
ULBRASEAL46	N/L	.05	.80	.30	.25	46.0			BAL	.10							.294	2600
ULBRASEAL48	K94800	.0	.80	.30	.25	48.0			BAL	.10							.295	2600
ULBRASEAL52	K95050	.05	.60	.30	.25	50.5			BAL	.10							.300	2600
ULBRAVAR29-17	K94610	.04	.50	.20	.20	29.0	17.0	.20	53.0	.10	0.20	0.10	0.10	0.10			.302	2640
SEALMETHC-4	N/L	.50	.50	.25	5.75	42.5			BAL								.293	2600
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7440-48-4	7440-50-8	7439-89-6	7429-90-5	7439-98-7	7440-32-6	1309-48-4	7440-67-7				
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Mo As Insoluble Mo	As Metal Ni As Soluble Ni	as Dust	As Dust As Fume	As FeO Fume As Fe	As Dust As Fume	As Soluble Mo As Insoluble Mo	As TiO ₂	As Fume MgO	As Dust As Fume				
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	15 10	0.5 0.5(VI) 1 0.5	1 1 1 1	0.1 0.1	1 1 0.1 0.2	10 5	10 5	5 5 15 10	15 10	15 10	5 5 5 5				

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
TA-008	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

TITANIUM AND TITANIUM BASED ALLOYS GROUP VIII

Titanium Grade IA25/A35; Grade IIA40; Grade III A55; Grade IV A70/A75; 6A1-4V; 3A1-2.5V.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The titanium and titanium based alloy products identified above may contain in varying concentrations, the following elemental constituents: aluminum, iron, titanium and vanadium. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.										DENSITY lbs/cuin	(approx.) MELTING PT. -degree (F)
		C	N	Fe	H	O	V	Al	Ti	Other			
GRADE IA25/A35	N/L	.10	.03	.20	.01	.18					BAL	.163	3000
GRADE II A 40	R50400	.08	.03	.30	.0125	.20					BAL	.163	3000
GRADE III A 55	R50550	.08	.05	.30	.015	.30					BAL	.163	3000
GRADE IV A70/A75	R50700	.08	.05	.50	.015	.40					BAL	.164	3000
6Al-4V	R56400	.08	.05	.25	.015	.20	3.5/4.5	5.75/6.75			BAL	.160	3000
3Al-2.5V	R56320	.05	.02	.30	.015	.18	2.0/3.0	2.5/3.5			BAL	.160	3000
CAS Number		7440-44-0	7727-37-9	7439-89-6	1333-74-0	7782-44-7	7440-62-2	7429-90-5	7440-32-6				
Contaminant & Exposure Limits		Not Listed	Not Listed	As FeO Fume As Fe	Not Listed	Not Listed	Dust (V ₂ O ₅) Fume (V ₂ O ₅)	As Dust As Fume	None				
(mg/m3) PEL TLV				10 5			0.5 0.5 .1 0.5	0 10 0 5	None				

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
AA-009	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

COMMON WROUGHT ALUMINUM ALLOYS GROUP IX

Aluminum 1100; 3003; 5005; 5052.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The common wrought aluminum alloy products identified above may contain, in varying concentrations, the following elemental constituents: aluminum, chromium, copper, magnesium, manganese and silicon. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY AA Number	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.					Other	DENSITY lbs/cuin	(approx.) MELTING PT. -degree (F)
		Mg	Mn	Cr	Cu	Al			
1100	A91100				0.12	99.00 min		.098	1215
3003	A93003		1.2		0.12	98.6 min.		.099	1210
5005	A95005	0.8				99.2 min.		.097	1205
5052	A95052	2.5		0.25		97.2 min.		.097	1200
CAS Number		1309-48-4	7439-96-5	7740-47-3	7440-50-8	7429-90-5			
Contaminant & Exposure Limits		As Fe0 Fume As Fe	As Dust As Fume	As Soluble Salts As Insoluble Salts	As Dust As Fume	As Dust As Fume			
(mg/m3) PEL TLV		15 10	5(c) 5(c) 5(c) 1	0.5 0.5(V1) 1 0.5	1 1 0.1 0.2	0 10 0 5			

MSDS IDENTIFICATION NUMBER	DATE ISSUED	REVIEWED DATE	ISSUED BY	EMERGENCY PHONE NUMBER
CS-010	March 1, 1989 Revised 2008	January 15, 2010	Environmental Engineering Dept.	Ulbrich 203-239-4481 Chemtrec 800-424-9300
TRADE NAME: High performance, heat resistant alloys		FORMULA: Alloy composed of varying concentrations of elements listed in Section II.		
I. PRODUCT IDENTIFICATION CHEMICAL NAME: See Section II for Alloy Designations		CHEMICAL FAMILY: Alloy		

II. HAZARDOUS CONSTITUENTS

STANDARD CARBON STEELS GROUP X

AISI-SAE 1050; 1065; 1070; 1074; 1075; 1095.

DANGER

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The standard carbon steels alloy products identified above may contain, in varying concentrations, the following elemental constituents: carbon, iron and manganese. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
	<u>CHROME</u>	<u>NICKEL</u>
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313

Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST

Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

NOTICE: HEXAVALENT CHROME

Hexavalent Chromium is not a constituent component of Stainless and Specialty Steels. Stainless Steels are iron-based alloys that contain a minimum of approximately 11 % chromium by weight. It is this addition of chromium that gives stainless steel its unique corrosion resistant properties through the formation of an invisible and adherent chromium-rich oxide surface film.

The vast majority of chromium in stainless and other specialty steels is in the metallic/elemental form *(zero valence state). A small amount of trivalent chromium (oxide) is formed on the surface of specialty steels and is crucial for protecting the alloy from corrosion. Hexavalent chromium, which is associated with certain adverse health effects, is not a constituent of stainless or other specialty steels.

Accordingly, stainless and specialty steels are in conformance with the requirements of the European Union's legislation on waste electrical and electronic equipment ("WEEE"; Directive 2002/53/EC) and its companion directive on the restriction on hazardous substances used in EEE ("ROHS": Directive 2002/95/EC), as well as EU Directive 2000/53EC on End of Life Vehicles, and the Japanese Green Procurement Initiative.

ALLOY AISI-SAE	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown.				DENSITY lbs/cuin	(approx.) MELTING PT. -degree (F)
		C	Mn	Fe	Other		
1050	G10500	.48/.55	.60/.90	BAL		.283	2700
1065	G10650	.60/.70	.60/.90	BAL		.283	2700
1070	G10700	.65/75	.60/.90	BAL		.283	2700
1074	G10740	.70/.80	.50/.80	BAL		.283	2700
1075	61 0750	.70/.80	.40/.70	BAL		.283	2700
1095	G10950	.90/1.03	.30/.50	BAL		.283	2700
CAS Number		7440-44-0	7439-96-5	7439-89-6			
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As FeO Fume As Fe			
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	10 5			

III. PHYSICAL PROPERTIES

FREEZING POINT: Not Applicable

MELTING POINT: See Section I

BOILING POINT: Not Applicable

SUBLIMES @: Not Applicable

EVAPORATION RATE: Not Applicable

APPEARANCE AND ODOR: Solid - Silver Gray Color - No Odor

VAPOR PRESSURE (mmHg): Not Applicable

VAPOR DENSITY (AIR = 1): Not Applicable

SPECIFIC GRAVITY (H₂O=1): See Section II

SOLUBILITY IN WATER = None

% VOLATILES BY VOLUME: None

IV. FIRE, EXPLOSION AND REACTIVITY INFORMATION

FLASH POINT (WITH TEST METHOD)

None

FLAMMABLE (EXPLOSIVE) LIMITS V/V%

LEL: None

UEL: None

EXTINGUISHING MEDIA

This alloy is noncombustible. Use extinguishing media appropriate to the surrounding fire.

SPECIAL FIREFIGHTING PROCEDURES

If this material is reduced to powder form, caution must be used to prevent fire or explosion. To extinguish a metal powder fire use dry sand, dry graphite or other class "D" fire extinguishing powder.

UNUSUAL FIRE AND EXPLOSION HAZARDS

No unusual fire or explosion hazards are associated with this material.

GENERAL REACTIVITY

This alloy is a stable material.

INCOMPATIBILITY (MATERIALS TO AVOID)

Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas; the evolution of hydrogen may be an explosion hazard.

HAZARDOUS DECOMPOSITION PRODUCTS

Various elemental metals and metal oxides may be generated from melting or dross handling operations. Refer to Section II for permissible exposure limits.

V. HEALTH HAZARD INFORMATION

PRIMARY ROUTE(S) OF EXPOSURE

INHALATION: Inhalation of metal dust, fume or powder may result from melting, dross handling, casting, welding, grinding, crushing or similar operations which generate airborne metal particulate during use of this material.

INGESTION: Hand, clothing, food and drink contact with metal dust, fume or powder can cause ingestion of particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc.

V. HEALTH HAZARD INFORMATION (continued)

PRIMARY ROUTE(S) OF EXPOSURE

EYES: Particulate metal (dust, fume or powder) may be dangerous to the eye and surrounding tissue. Airborne particulate (chips, dust or powder) is always a potential problem as well as inserting fingers into the eye socket if the hand or clothing is contaminated with metal particulate.

TOXICITY

There is no information on the toxicity of this alloy. Under normal handling and use of the solid form of this material there are a few health hazards. Cutting, welding, melting, grinding, etc. of this material will produce dust, fume or particulate containing the component elements of this material. Exposure to the dust, fume or particulate may present significant health hazards which are referable to the elemental constituents in Section II.

EFFECTS OF OVEREXPOSURE

ACUTE: The metal dust and fumes of those elements in Section II can cause irritation to the skin, eye and mucous membranes. Contact with chrome, cobalt, copper and nickel may cause allergic skin reactions. As dust, powder or fume, exposure which abrades the skin can cause irritation and dermatitis. Injury to the eyes is generally a result of particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. Excessive inhalation of aluminum, cobalt, copper, manganese, nickel and vanadium can cause respiratory irritation, cough, bronchitis, chills, "fume fever" and asthma-like symptoms.

CHRONIC: Respiratory disease with symptoms ranging from shortness of breath and cough to permanent disability due to loss of lung function, fibrosis or subsequent effects on the heart may be caused by excessive exposure to dust or fumes containing cobalt, nickel, titanium and tungsten. Central nervous system depression has been identified with excessive manganese exposure. Nickel and chrome metal and certain compounds have been linked to nasal, bronchial and lung cancers. Aluminum and iron have been indicated to cause gastro-intestinal disorders and non-significant changes in the lung. Chronic health effects specific to an element(s) may be difficult to detect due to the numerous elemental constituents in this alloy.

CARCINOGENIC REFERENCES

Nickel and chrome metal and some of their compounds have been listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. Detailed information from these sources may be obtained from the following: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man; Geneva, WHO, IARC 1972-1977 (Multivolume work) 49 Sheridan Street, Albany, NY 12219. Third Annual Report on Carcinogens, Summary, September, 1983 NTP 82-330 NTP Public Information Office, MD B2-04 Box 12233, Research Triangle Park, NC 27709.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Individuals who may have had allergic reaction or sensitivity to metals such as chrome, copper, cobalt and nickel may encounter skin rash or dermatitis if skin contact with this product occurs. Persons with impaired pulmonary function, airway diseases and conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further disability if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the Neurologic (nervous), Circulatory, Hematologic (blood) or Renal (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk if handling and use of this material causes excessive exposure.

VI. EMERGENCY AND FIRST AID PROCEDURES

INHALATION

Breathing difficulty caused by inhalation of dust or fume requires removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.

INGESTION

Swallowing metal powder or dust can be treated by having the affected person swallow large quantities of water and attempting to induce vomiting if conscious. Obtain medical assistance at once.

SKIN

Skin cuts and abrasions can be treated by standard first aid. Skin contamination with dust or powder can be removed by washing with soap and water. If irritation persists obtain medical assistance.

EYES

Dust or powder should be flushed from the eyes with copious amounts of clean water. If irritation persists obtain medical assistance. Contact lenses should not be worn if working with metal dusts and powders.

VII. INDUSTRIAL HYGIENE CONTROL MEASURES

VENTILATION

Local exhaust ventilation should be used to control exposure to airborne dust and fume whenever possible.

RESPIRATORY PROTECTION

Use NIOSH approved respirators as specified by an Industrial Hygienist or qualified Safety Professional. Lung function tests are recommended for users of negative pressure devices.

PROTECTIVE GLOVES

Wear gloves to prevent metal cuts and skin abrasions particularly during handling of wrought forms, solid metal sheet, strip or tube.

EYE PROTECTION

Wear safety glasses when risk of eye injury is present particularly during machining, grinding, welding, powder handling, etc.

OTHER PROTECTIVE EQUIPMENT

Protective clothing such as uniforms, disposable coveralls, safety shoes, etc. may be required during metal handling operations as appropriate to the circumstances of exposure.

RECOMMENDED MONITORING PROCEDURES

ENVIRONMENTAL SURVEILLANCE: Exposure to the elements identified in Section II can be best determined by having air samples taken in the employee breathing zone, work area or department.

MEDICAL SURVEILLANCE: Lung function tests, chest x-rays and routine physical examinations may be useful to determine effects of dust or fume exposure.

VIII. ENVIRONMENTAL PROTECTION INFORMATION

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

In solid form this material poses no special clean-up problems. If this material is in powder or dust form, clean-up should be conducted with a vacuum system utilizing a high efficiency particulate air filtration system. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Properly label all materials collected in waste container.

WASTE DISPOSAL METHOD

Prior to disposal consider if the material has recovery value. State or federal regulations may require specific labeling, packing, storage, transportation and disposal procedures. Contact an Environmental Engineer or consultant familiar with waste disposal regulations.

ENVIRONMENTAL HAZARDS

In solid form this material poses no special environmental problems. Metal powders or dusts may have significant impact on air and water quality. Airborne emissions, spills and releases to the environment (discharge to streams, sewer systems, ground water, surface soil, etc.) should be controlled immediately. If such potential for a spill exists it is advisable to develop an emergency spill response plan.

IX. SPECIAL PRECAUTIONS

HANDLING PRECAUTIONS

This product must be handled accordingly to the size, shape and quantity of material involved. Solid metal may require use of hoists, cranes, etc. Powders should be moved or transported to minimize spill or release potential.

STORAGE PRECAUTIONS

In solid form this material poses no special storage problems. Store metal and metal powder in a dry area. Do not store adjacent to mineral acids. Fine metal powder should be kept away from flames and sources of ignition.

X. DOT SHIPPING REQUIREMENTS

SHIPPING NAME: Not Applicable

IDENTIFICATION NUMBER: Not Applicable

HAZARD CLASS: Not Applicable

LABEL(S) REQUIRED: Not Applicable

ADDITIONAL INFORMATION

The following is the label text which accompanies this product during shipment:

STAINLESS STEEL AND RELATED ALLOYS GROUP

INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The heat resistant alloy products identified above may contain, in varying concentrations, the following elemental constituents: aluminum, cobalt, chromium, copper, iron, manganese, molybdenum, nickel and tungsten. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Element or Certain Compounds Evaluated or Both
(Identified by Element Shown)

Determination/Evaluation	Nickel	Chrome
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

Content & Description Of Ulbrich Stainless Steels & Special Metals, Inc. Material Safety Data Sheets

ENVIRONMENTAL ENGINEERING DEPARTMENT
Ulbrich Stainless Steels & Special Metals, Inc.
57 Dodge Avenue
North Haven, CT 06473
(203) 239-4481

SECTION I - PRODUCT IDENTIFICATION

Chemical Name: A name consistent with the nomenclature system of the International Union of Pure & Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS).

Trade Name: The name the product is sold by, i.e., the product name. **Chemical Family:** A general designation for a group of elements or compounds. **Formula:** The scientific designation for an element or compound.

SECTION I - PRODUCT IDENTIFICATION

Chemical Name: A name consistent with the nomenclature system of the International Union of Pure & Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS).

Trade Name: The name the product is sold by, i.e., the product name. **Chemical Family:** A general designation for a group of elements or compounds. **Formula:** The scientific designation for an element or compound.

SECTION II - HAZARDOUS CONSTITUENTS

Constituent(s): The chemical component(s) of the product. A hazardous constituent is a chemical which is a physical hazard or health hazard.

Percent: The amount of component or range present in the product and expressed on a weight basis.

CAS Number: A specific chemical identification number assigned by the Chemical Abstracts Service. The lack of a CAS Number for any given chemical or mixture indicates that a number may not have been assigned.

NIOSH RTECS Number: The National Institute for Occupational Safety & Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS) Access Number for a specific element or compound's toxicological data.

OSHA PEL: The Occupational Safety & Health Administration (OSHA) Permissible Exposure Limit (PEL) - usually a time weighted average (TWA) ceiling limit (C) or maximum peak exposure limit (P) expressed as PPM (parts per million) or as Mg/M3 (milligrams per cubic meter).

ACGIH TLV: The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) - in many cases, identical to the OSHA PEL. ACGIH also recommends a short term exposure limit (STEL) for certain substances that should not be exceeded at any time.

SECTION III - PHYSICAL PROPERTIES

Freezing Point: The temperature at which a liquid changes to a solid. A range may be given.

Melting Point: The temperature at which a solid changes to a liquid. A range may be given.

Boiling Point: The temperature at which a liquid changes to a vapor. Usually expressed at sea level pressure (760mmHg).

Sublimes @: The temperature at which a solid changes directly to vapor.

Evaporation Rate: Indicated as faster or slower than Ethyl Ether unless stated.

Appearance and Odor: A description of the product in terms of form, color, odor, etc.

Vapor Pressure (mmHg): The pressure of a saturated vapor above a liquid expressed as mmHg at 20°C, unless stated at a different temperature.

Vapor Density (Air=1): The relative density of a vapor or gas compared to an equal volume of air. Air is equivalent to 1.0.

Specific Gravity (H2O=1): The ratio of the weight of a volume of material to the weight of an equal volume of water. Water is equivalent to 1.0 @ 4°C. The term "DENSITY" describes the concentration of matter as the mass per unit volume, e.g., pounds/cubic inch.

Solubility In Water: The degree to which a material is capable of dissolving in water.

% Volatiles By Volume: The volumetric percentage of volatile compounds in a product.

SECTION IV - FIRE, EXPLOSION AND REACTIVITY INFORMATION

Flash Point (With Test Method): The lowest temperature at which a vapor/air mixture will propagate a flame above the surface of the material being tested.

Flammable (Explosive) Limits V/V%:

LEL: LOWER EXPLOSION LIMIT: The lowest vapor concentration in air at which ignition by spark or flame will occur.

UEL: UPPER EXPLOSION LIMIT: The highest vapor concentration in air at which ignition by spark or flame will occur. **Extinguishing Media:** The type of fire extinguishing media to be used taking into account the type of chemical and its flammable characteristics.

Special Firefighting Procedures: Indicates equipment to protect firemen from toxic products of combustion.

Unusual Fire and Explosion Hazards: Chemical changes that may occur under heat or fire conditions.

General Reactivity: The tendency of a material to undergo chemical reaction with the release of energy.

Incompatibility (Materials To Avoid): Materials which could cause dangerous reactions.

Hazardous Decomposition Products: The breakdown of a material into compounds or elements that may have specific hazard properties different than the original material.

SECTION V - HEALTH HAZARD INFORMATION

Primary Route(s) Of Exposure:

Inhalation: The breathing in of a gas, dust, fume, vapor, or mist as a contribution to exposure.

Ingestion: The swallowing of a substance as a contribution to exposure.

Skin: The contribution to exposure by the cutaneous route, either skin absorption or skin contact.

Eyes: The effect of chemical exposure on the eye.

Toxicity: The available toxicological data usually expressed as lethal dose or lethal concentration of the material or its components. Most toxicity test results are from exposure tests conducted on animals such as rats or mice and caution is recommended in making direct comparison to human beings.

Effect Of Overexposure:

Acute: Rapid effects of exposure with severe symptoms.

Chronic: Effects due to exposure that develop slowly over a long period of time or which recur frequently.

Carcinogenic References: Available references which indicate the potential for a material to cause cancer in man or animals.

Medical Conditions Aggravated By Exposure: Medical conditions that warrant consideration regarding exposure to a toxic substance.

SECTION VI - EMERGENCY & FIRST AID PROCEDURES

Inhalation: Emergency action to address adverse effects due to inhalation of a hazardous material.

Ingestion: Emergency action to address adverse effects due to ingestion of a hazardous material.

Skin: Emergency action to address adverse effects due to skin contact or absorption of a hazardous material.

Eyes: Emergency action to address adverse effects or injury to the eye due to contact with a hazardous material.

SECTION VII - INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation: Recommended type of ventilation for control of gases or particulate.

Respiratory Protection: General information on the type of respiratory protection recommended.

Protective Gloves: Recommendation for protection of prevent hand contact with the material.

Eye Protection: Recommendation to protect against eye injury.

Other Protective Equipment: Other personal protective equipment (PPE) such as clothing, safety shoes, etc. that may be appropriate to protect against injury or exposure.

Recommended Monitoring Procedures:

Environmental Surveillance: Personal air sampling or related procedures to evaluate exposure of an individual.

Medical Surveillance: Biological monitoring or related tests/examinations to evaluate the effects of exposure to an individual.

SECTION VIII - ENVIRONMENTAL PROTECTION INFORMATION

Steps To Be Taken If Material Is Released Or Spilled: Specifically refers to containment, cleanup and control.

Waste Disposal Method: Refers to recommended disposal practices or applicable regulatory requirements when known.

Environmental Hazards: Refers to information such as aquatic or vegetative toxicity, ambient air pollution concerns, etc. which are available from regulatory or published technical services.

SECTION IX - SPECIAL PRECAUTIONS

Handling Precautions: Safe movement of the product may require specific handling procedures.

Storage Precautions: Safe storage of the product may require specific storage procedures.

SECTION X- DOT SHIPPING REQUIREMENTS

Shipping Name: The approve Department of Transportation (DOT) Shipping Name where applicable.

Hazard Class: The approved DOT Hazard Class where applicable.

Identification Number: Either the United Nations or North American approved identification number referenced by DOT.

Label(s) Required: The required DOT shipping label where applicable.

ADDITIONAL INFORMATION

This section is reserved for remarks which may not be specifically addressed in preceding sections such as Product Hazard Warnings & Label Information.

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Ulbrich Stainless Steels & Special Metals, Inc.

57 Dodge Avenue, P.O. Box 294, North Haven, CT USA, 06473-1191 • (203) 239-4481 • (800) 243-1676 • FAX: (203) 239-7479 • E-Mail: info@ulbrich.com

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