---

1. IDENTIFICATION

Product Name: **NICKEL BASE ALLOYS: SEE TABLE in SECTION 3**

Typical Use: Welding Wire, Thermal Spray Wire, Welding Electrode, Sheet

Manufacturer: Polymet Corporation
7397 Union Centre Blvd
West Chester, OH 45014
(513) 874-3586 from 8 a.m. – 5 p.m., EST

---

2. HAZARDS IDENTIFICATION

The ARTICLE is NOT classified as dangerous according to directive 1999/45/EC.

BYPRODUCTS generated during the thermal spray or welding process ARE considered hazardous.

WARNING

DANGER

HAZARD STATEMENTS:
- May cause cancer by inhalation
- May cause an allergic skin reaction

PRECAUTIONARY STATEMENTS:
- Obtain special instructions before use
- Do not handle until all safety precautions have been read and understood
- Avoid breathing dust or fume
- Wear protective gloves, protective clothing, eye, and face protection
- Contaminated work clothing should not be allowed out of the workplace
- If exposed or concerned, get medical advice/attention

See Section 11 for more detailed information on health effects and symptoms.

---

3. COMPOSITION / INFORMATION ON INGREDIENTS

ALLOY	ALTERNATE ID	Co	Ni	Cr	W	Mo	Ta	C	Fe	Si	Mn	Al	Ti	Other
PMet 803			Bal	<10		<40			<10		<5			
PMet 806	Ni 200		Bal						<1	<1	<1			<1Cu
PMet 808	R108	<10	Bal	<10	10	<1	3	<1				6	<1	<2Hf, <1B, <1Zr
PMet 811		<10	Bal	<15								<5	<10	
PMet 818	718	1	Bal	19		3			17	<1	<1		1	5Nb
PMet 819		<1	55	20		3			Bal				1	1B, 5 Nb+Ta
PMet 820		12	Bal	19		3	3					<1	1	5Nb
PMet 821			Bal	20										
PMet 822, 823		20	Bal	23	2	<1	1	<1	<1			1	2	<1Nb
PMet 831			Bal	16					7		3		3	
PMet 832		1	Bal	20				<1	<1	<1	1			
PMet 833	FM 62	1	Bal	16				<1	8	<1	1			2Nb
PMet 838	738	9	Bal	16	3	2	2	<1	<1			4	4	<1Nb
PMet 839		<20	Bal	<25	<3		<2	<1				<2	<5	1Nb, <1B, <1Zr
PMet 840		<20	Bal	<25	<3		<3	<1	<1			<3	<5	<2Nb
PMet 841		12	Bal	20		10		<1				1.5	3	<1**B**
PMet 842		12	Bal	7	5	2	6					6		3Re
PMet 844	FM 69	1	Bal	16					7	<1	1	<1	2	1Nb
PMet 845		10	Bal	20		10			1					
PMet 847		10	Bal	8	10		3		<1			6	1	
PMet 854	230		Bal	22	14	2						<1		
PMet 860, 860B	625	1	Bal	22		9			5	1	1			4Nb, <1B
PMet 863	263	20	Bal	20		6			1		1		2	
PMet 864			Bal	31		3		2.5			<1			4B
PMet 865	Waspaloy	14	Bal	20		4			2	<1	<1	<2	3	

3. COMPOSITION / INFORMATION ON INGREDIENTS (continued)

ALLOY	ALTERNATE ID	Co	Ni	Cr	W	Mo	Ta	C	Fe	Si	Mn	Al	Ti	Other
PMet 866			Bal	20		13				6		<2	<1	
PMet 867	242	<1	Bal	8		25		<1	<2	<1	<1			
PMet 869	Hast S	<2	Bal	16		15		<1	<3	<1	<1			
PMet 870	Hast W	3	Bal	5		25		<1	3	1	1			
PMet 872		5	Bal	30	3	5		<1	15	<1	2			2Cu
PMet 875	Hast X	2	Bal	22	1	9		<1	19	1	1			
PMet 876		<1	Bal	20	4	16	<1	<1	3	<1	<1		<1	
PMet 877			Bal						2		2			30Cu
PMet 879		5	Bal	30	3	5	1		15	1	2			1Nb, 2Cu
PMet 880		10	Bal	14	4	4		<1				3	5	
PMet 884			Bal									20		
PMet 885			Bal									5		
PMet 886			Bal	19								7		
PMet 887			Bal	22								10		1Y
PMet 888			Bal			5						6		
PMet 889			Bal	43									<1	
PMet 895		<5	Bal	<10	<5		<10	<1				<10		<3Re, <1Hf
PMet 897			Bal	10		6			5	<1	<1	6		
PMet 898			Bal	15	17				4	4				3B

Component	CAS No.	EC No.	Component	CAS No.	EC No.
Aluminum (Al)	7429-90-5	231-072-3	**Molybdenum (Mo)**	7439-98-7	231-107-2
Carbon (C)	7440-44-0	231-153-3	**Nickel (Ni)**	7440-02-0	231-111-4
Boron (B)	7440-42-8	231-151-2	**Niobium (Nb)**	7440-03-1	231-113-5
Copper (Cu)	7440-50-8	231-159-6	**Silicon (Si)**	7440-21-3	231-130-8
Chromium (Cr)	7440-47-3	231-157-5	**Tantalum (Ta)**	7440-25-7	231-135-5
Cobalt (Co)	7440-48-4	231-158-0	**Titanium (Ti)**	7440-32-6	231-142-3
Hafnium (Hf)	7440-58-6	231-166-4	**Tungsten (W)**	7440-33-7	231-143-9
Iron (Fe)	7439-89-6	231-096-4	**Yttrium (Y)**	7440-65-5	231-174-8
Manganese (Mn)	7439-96-5	231-105-1			

---

4. FIRST-AID MEASURES

These measures apply primarily to the byproducts produced during thermal spray or welding.

Inhalation: Move exposed person to fresh air. Keep the person warm and at rest. If not breathing or if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Obtain medical attention if symptoms occur. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Ingestion: Wash out mouth with water. Remove dentures if any. Move exposed person to fresh air. Keep the person warm and at rest. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Obtain medical attention if symptoms occur. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin Contact: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Obtain medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Protection of First Aiders: No action shall be taken involving any personal risk or without suitable training.

See Section 11 for more detailed information on health effects and symptoms.

---

5. FIRE-FIGHTING MEASURES

This section applies primarily to the wire as supplied.

Extinguishing Media

Suitable: Use an extinguishing agent suitable for the surrounding fire.

Not Suitable: None known

Special Exposure Hazards: No specific hazard

Hazardous Thermal Decomposition Products: Some metallic oxides

Special Protective Equipment for Fire-Fighters: Fire-fighters should wear appropriate protective equipment and self-contained apparatus (SCBA) with a full face-piece operated in positive pressure mode.

---

6. ACCIDENTAL RELEASE MEASURES

These measures apply to the wire as supplied and the byproducts produced during the thermal spray or welding process.

Personal Precautions: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment.

Environmental Precautions: Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Methods for Cleaning Up: Use appropriate tools to transfer the spilt solid to a convenient waste disposal container. Recycle if possible.

---

7. HANDLING AND STORAGE

This section applies primarily to the wire as supplied.

Handling: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking.

Storage: Keep container tightly closed. Keep container in a cool, well ventilated area.

Packaging Matls Recommended: Use original container.

---

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

This section contains information which applies during the welding and thermal spray processes.

Components	OSHA PEL (mg/m^3)	ACGIH TLV (mg/m^3)
Al	15 total dust, 5 respirable	1
B	15 total dust, 5 respirable	10 dust
C	15 total dust, 5 respirable	10 inhalable, 2 respirable
Cr metal*	1	0.5
Cr*	0.5 (as Cr III) 0.005 (as Cr VI)	0.003 (as Cr III) 0.0005 (as Cr VI)
Co	0.1	0.02
Cu	1 dust, 0.1 fume	1 dust, 0.2 fume
Hf	0.5	0.5
Fe (oxide fume)	10	5
Mn	5	0.1 inhalable, 0.02 respirable
Mo	15 Total dust	10 inhalable, 3 respirable
Ni**	1	0.1 (soluble compounds)
Nb	-	-
Si	15 total dust, 5.0 respirable	10 inhalable, 3 respirable
Ta	5	–
Ti	–	–
W	–	5
Y	1	1

Additional Information: * A portion of metallic chromium may be converted during the welding process to hexavalent chromium. Hexavalent chromium is classified as an IARC Group 1 carcinogen. NTP classifies hexavalent chromium as Known to be Carcinogenic.

** A portion of nickel may be converted during the thermal spray process to nickel compounds which are classified as an IARC Group 1 Carcinogen. NTP classifies nickel compounds as Known to be Carcinogenic.

Monitoring Procedures: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances.

Exposure Controls

Occupational Exposure: Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fumes or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Respiratory Protection: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hand Protection:	Gloves should be worn to minimize contact. During the thermal spray process, heat insulated gloves are recommended.
Eye Protection:	Safety glasses or goggles are recommended when handling this material. During the thermal spray process, safety goggles and dark lenses must be worn.
Skin Protection:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Hearing Protection:	During the thermal spray process, the operator and other personnel close to the spray operation must be protected from excessive noise. Use hearing protection that meets local standards.
Hygiene Measures:	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

---

9. PHYSICAL AND CHEMICAL PROPERTIES

This section applies primarily to the wire as supplied.

Appearance

Physical State:	Solid (wire)
Color:	Metallic grey
Odor:	Odorless
Odor Threshold:	Not Available

Important Health, Safety and Environmental Information

pH:	Not Applicable
Boiling Point:	Not Available
Melting Point:	>1300°C
Flash Point:	Not Available
Explosive Properties:	Thermal Spray Byproducts – Fine dust clouds may form explosive mixtures in air.
Explosion Limits:	Not Available
Oxidizing Properties:	Not expected based on chemical composition.
Vapor Pressure:	Not Applicable
Relative Density:	~8 – 9 g/cc
Solubility:	Insoluble in water
Viscosity:	Not Applicable
Vapor Density:	Not Applicable
Evaporative Rate:	Not Applicable

Other Information

Auto-Ignition Temperature:	Not Available

---

10. STABILITY AND REACTIVITY

This section applies primarily to the wire as supplied.

Stability:	The product is stable under normal storage conditions.
Conditions to Avoid:	Store in a cool dry place away from incompatible materials.
Materials to Avoid:	Strong acids

Hazardous Decomposition Products:
During the thermal spray or welding processes, gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by radiation from the arc.

---

11. TOXICOLOGICAL INFORMATION

This information applies to the wire as supplied and the byproducts produced during the thermal spray process.

Potential Acute Health Effects

Inhalation:	Exposure to high concentrations may result in health complaints. Irritating to respiratory system. Exposure may result in depressed respiration, coughing, nausea and sore throat. Prolonged or repeated exposure to large amounts may cause damage to lungs (lung edema).
Ingestion:	Prolonged or repeated exposure may be irritating to mouth, throat and esophagus (sore throat, nausea).
Skin:	Exposure to high concentrations may result in health complaints. Prolonged or repeated exposure may be irritating (redness, pain).
Eyes:	Moderately irritating to eyes.

Acute Toxicity

Component	Test	Result	Route	Species
Nickel	LDLo LD50	5 mg/kg 9000 mg/kg	Oral Oral	Guinea Pig Rat
Cobalt	LDLo LD50	750 mg/kg 6170 mg/kg	Oral Oral	Rabbit Rat
Boron	LD50 LD50 LD50	650 mg/kg 310 mg/kg 250 mg/kg	Oral Oral Oral	Rat Rabbit Cat
Manganese	LD50	9000 mg/kg	Oral	Rat
Silicon	LD50	3160 mg/kg	Oral	Rat

Potential Chronic Health Effects

Nickel Carcinogen Category 3; R40, R43

Carcinogenicity: Contains material which may cause cancer, based on animal data. Risk of cancer depends on duration and level of exposure.

Mutagenicity: No known significant effects or critical hazards.

Reproductive Toxicity: No known significant effects or critical hazards.

Over-Exposure Signs / Symptoms

Target Organs: Contains material which causes damage to the following organs: blood, kidneys, lungs, upper respiratory tract, skin, central nervous system (CNS), eye lens or cornea.

---

12. ECOLOGICAL INFORMATION

This information applies to the wire as supplied.

Ecotoxicity Data

Component	Species	Period	Result
Manganese	Daphnia magna (EC50)	48 hours	40 mg/l

Other Adverse Effects: No known significant effects or critical hazards.

---

13. DISPOSAL CONSIDERATIONS

This information applies to the wire as supplied and the byproducts produced during the thermal spray process.

Methods of Disposal: Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Disposal of Packaging: Contaminated packaging material should be disposed of in the same manner as the product itself. Non-contaminated or clean packaging material should be reused for the same product, treated as domestic waste or material for recycling.

Hazardous Waste: The classification of the product and byproducts may meet the criteria for a hazardous waste.

---

14. TRANSPORT INFORMATION

This information applies to the wire as supplied.

International Transport Regulations

Regulatory Information	UN Number	Proper Shipping Name	Class	Packing Group	Label	Additional Information
ADR/RID Class	Not Regulated					
ADNR Class	Not Regulated					
IMDG Class	Not Regulated					
IATA Class	Not Regulated					

---

15. REGULATORY INFORMATION

This information applies to the wire as supplied.

SARA Section 313 Supplier Notification:

The product covered by this MSDS may contain the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know act of 1986 and of 40 DFR 372: Chromium, Copper, Manganese and Nickel. Refer to Section 3 of this MSDS for percentage of each element by weight and CAS number.

Hazard Symbol:	 Harmful
Risk Phrases:	R40 – Limited evidence of a carcinogenic effect R42/43: May cause sensitization by inhalation and skin contact. R15 – Contact with water liberates extremely flammable gases R10 – Flammable
Safety Phrases:	S22 – Do not breathe dust S24 – Avoid contact with skin S37 – Wear suitable protective gloves
Contains:	Nickel
Product Use:	Classification and labeling have been performed according to EU Directives 67/548/EEC and 1999/45/EC (including amendments) and the intended use.
Industrial Applications:	Used by spraying or welding.

---

16. OTHER INFORMATION

This information applies to the wire as supplied and the byproducts produced during the thermal spray or welding process.

Full Text of Classifications:	Carc. Cat. 3 – Carcinogen Category 3 F – Highly Flammable Xn – Harmful
Date of Issue:	05/11/2021
Revision #:	2
Revision Date:	12/06/2023

Notice to Reader

To the best of our knowledge, the information contained herein is accurate. However, the above named supplier does not assume liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.