



# Material Safety Data Sheets

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Stainless Steel Bar, Wire rod and Billet 316 - 654SMO

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## SECTION 1 – Manufacturer/Product Identification:

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**Manufacturer's (Distributor's) Name**

AvestaPolarit Inc., Bar Products  
3043 Crenshaw Parkway  
Richburg, SC 29729

**Emergency Telephone Number**  
(803) 789-5383

**Information Telephone Number**  
(803) 789-5383

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**Trade Name:** Stainless Steel Grades and/or AvestaPolarit, Inc. Steel Bar, Wire rod and Billet Trade Names: 316, 316L, 317, 317L, 904L, 2205, 2205 Code+2, 2507, 254SMO, 654SMO

This MSDS covers all grades listed above that have additional letter and/or number suffixes or prefixes, including PRODEC.

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**Date:** 10/05/01

**Revision:** 3

**Prepared by:** Elisabeth Torsner  
(Signature on File)

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## SECTION II – Hazardous Ingredients Information:

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Stainless steel products covered by this MSDS are shipped as non-reactive, non-flammable, non-explosive, and essentially non-hazardous materials. The information in this section covers the chemicals from which this product is manufactured. The fumes which may be produced as a by-product during welding, brazing, thermal cutting, or similar processes are discussed in Section V.

**HAZARDOUS COMPONENTS<sup>1</sup>:**  
(Specific Chemical Identity;  
Common Name)

Specific Chemical Identity (Common Name)	CAS Number	SARA <sup>2</sup>	OSHA PEL <sup>3</sup> (mg/m <sup>3</sup> )	ACGIH TLV <sup>4</sup> (mg/m <sup>3</sup> )	NOTES	PERCENT By Weight
Chromium	7440-47-3	*		0.01	Cr(VI)	16-27
			1	0.5	Metal	
Iron	7439-89-6		10	5	(Fe <sub>2</sub> O <sub>3</sub> )	> 40
Manganese	7439-96-5	*	5 <sup>6</sup>	0.2	Fume	< or = 4
			5 <sup>6</sup>	0.2	Dust	
Molybdenum	7439-98-7		15	10	Metal & insoluble	2-8
				3	Respirable	
Nickel	7440-02-0	*	1	1.5	Metal	4.5-28
				0.1	Soluble	
				0.2	Insoluble	
Silicon	7440-21-3		15	10	Total dust	< or = 1
			5	NA	Respirable	

**Notes:**

1. The term "Hazardous" should be interpreted as defined and required in the OSHA Hazard Communication Standard (29 CFR 1910.1200) and does not necessarily imply the existence of any hazard. Any components at concentrations equal to or greater than 0.1 percent are listed in this section, according to OSHA 29 CFR 1910.1200.

2. An asterisk (\*) after the Chemical Abstract Service (CAS) Number indicates a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (SARA) and 40 CFR Part 372.

3. These permissible exposure levels (PELs) are based on OSHA's rulemaking (29 CFR 1910 Subpart Z) adopted on May 29, 1971, and are the current regulatory limits.

4. These values are based on the American Conference of Governmental Industrial Hygienists (ACGIH) 2001 TLVs.

5. Approximate percent by weight values.

6. Ceiling Limit.

7. NA = Not Applicable; Not Available.

**WARNING:** This product contains or produces chemicals known to the State of California and other states, if applicable, to cause cancer.

AvestaPolarit Stainless Steel Bar, Wire rod and Billet 316 – 654SMO 1/30/01

**SECTION III - Physical/Chemical Characteristics:**

BOILING POINT:	NA	VAPOR DENSITY (Air = 1):	NA
MELTING POINT:	NA	VAPOR PRESSURE (mm Hg):	NA
SPECIFIC GRAVITY:	NA	EVAPORATION RATE	
pH:	NA	(Butyl Acetate = 1):	NA
APPEARANCE AND ODOR:	Solid, metallic gray stainless steel; odorless.	SOLUBILITY IN WATER	NA

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**SECTION IV – Fire and Explosion Hazard Data:**

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FLASH POINT (Method Used):	NA
FLAMMABLE LIMITS:	LEL: NA UEL: NA
EXTINGUISHING MEDIA:	No special media required.
SPECIAL FIRE FIGHTING PROCEDURES:	None.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	This product is not flammable, combustible or explosive.

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**SECTION V – Reactivity Data:**

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**STABILITY:**

Conditions to Avoid:

Stable:  Unstable: 

None known.

**INCOMPATIBILITY (Materials to Avoid):**

None known.

**HAZARDOUS POLYMERIZATION:**

Conditions to Avoid:

May occur:  Will not occur: 

None known.

**HAZARDOUS DECOMPOSITION OR BYPRODUCTS:** Various fumes and gases may be produced when stainless steel is subjected to welding, brazing, thermal cutting, and similar processes. Such fumes and gases cannot be simply classified. The composition and quantity of both are dependent upon the composition of the base metal and the process, procedures, and consumables being used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include; coatings on the base metal (such as paint, plating, galvanizing, and phosphate coatings), the number of workers performing welding, brazing, thermal cutting, or other related operations, the volume of the work area, the quantity of consumables used, the design and amount of ventilation delivered, the position of the worker's head with respect to the fume plume, and the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from solvent, cleaning, or painting activities) which may decompose by the arc into toxic gases such as phosgene.

Decomposition products from welding, brazing, thermal cutting operations will include those originating from the volatilization, reaction, or oxidation of ingredients in welding rods, fluxes, and fillers, plus those from the base metal and coatings, etc. Possible decomposition products that may be generated during welding, brazing or thermal cutting include complex oxides of the ingredients listed in Section II. Fumes generated during welding, brazing, or thermal cutting may contain: chromium compounds, including hexavalent chromium (Cr VI); nickel; manganese; iron; molybdenum; and silicon compounds.

The employer is required by OSHA to limit the worker's level of exposure to chemicals for which OSHA has established a PEL in 29 CFR 1910 Subpart Z. The only way to determine a worker's exposure to welding, brazing or thermal cutting decomposition products is by sampling and analyses using accepted industrial hygiene techniques. The composition and quantity of the fumes and gases to which a worker is exposed can be established from an air sample(s) obtained from inside the welder's helmet, if worn, or in the worker's breathing zone. Review ANSI/AWS F1.1 and F1.3 standards for further information on air sampling for welding decomposition products.

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**SECTION VI – Health Hazard Data:**

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**ROUTE(S) OF ENTRY:** Inhalation: Unlikely Skin/Eye Contact: Yes Skin Absorption: Unlikely Ingestion: Unlikely

As distributed, stainless steel does not present an inhalation, absorption, or ingestion hazard. However, operations such as welding, brazing, thermal cutting, burning, sawing or grinding may result in the following health effects:

## HEALTH HAZARDS (Acute and Chronic):

**Acute (Short-Term Effects):** Short-term exposures to the fumes generated by welding, brazing, or thermal cutting on stainless steel may result in dizziness; nausea; and irritation of the eyes, skin, lungs, nose and throat. Metal fume fever, a flu-like illness lasting about 24 hours with chills, aches, cough, and fever can be caused by overexposure to metal fumes, including iron, chromium, and manganese.

Metal dust particles may cause eye, skin and/or respiratory system irritation. Acute asthma attacks may be experienced by asthmatics when metal dust or fume is inhaled. Skin contact with chromium and nickel-containing dust may cause allergic contact dermatitis on sensitized individuals.

**Chronic (Long-Term Effects):** Long-term exposures to metal dusts or fumes generated by welding, brazing, thermal cutting, burning, sawing, grinding or otherwise processing this product may lead to the accumulation of particulate in the lungs and may result in lung fibrosis, or pneumoconiosis. The severity of these conditions depends on the level and duration of the exposure. Overexposure to iron oxide can cause siderosis (deposits of iron in the lungs) which may affect pulmonary function. Select chromium compounds and chromium VI, which may be formed during welding, brazing or thermal cutting on this material, are considered carcinogenic to humans. Nickel metal and compounds that may be formed during welding, brazing, or thermal cutting are known to be carcinogenic. Chromium and nickel compounds can cause lung cancers. Nickel may also cause nasal cancers. Overexposure to chromium compounds may cause respiratory irritation with symptoms resembling asthma, and ulceration and perforation of the nasal septum. Long-term overexposure to nickel fumes can cause allergic asthma, pneumonitis, pulmonary fibrosis and edema. Skin contact with chromium and nickel may cause sensitization. Overexposure to manganese can result in central nervous system effects referred to as manganism, including symptoms of muscular weakness and tremors similar to Parkinson's disease.

**CARCINOGENICITY:** NTP: Yes\* IARC: Yes\* OSHA REGULATED: Yes\* CAL. PROP. 65: Yes\*\*

\*Nickel metal and select nickel and chromium compounds are listed in the National Toxicology Program (NTP) Annual Report on Carcinogens and in the International Agency for Research on Cancer (IARC) Monographs and are also considered carcinogens by OSHA.

\*\*WARNING: This product contains or produces chemicals known to the State of California and other states, if applicable, to cause cancer.

**SIGNS AND SYMPTOMS OF EXPOSURE:** Inhalation of fumes may cause irritation of the lungs, damage to the lungs and asthma-like symptoms. Overexposure to metals in fumes can cause metal-fume fever which is a flu-like sickness including chills, fever, head and muscle ache, tightness of chest, dryness of nose and mouth, nausea and vomiting. Symptoms occur within several hours of exposure lasting 6-24 hours. Extreme overexposure can cause death. Chromium dust can burn eyes and form ulcers on skin. Absorption through the skin can affect kidney and liver function. Manganese can produce behavioral changes and changes in hand writing. Exposure to metal dust or fume may cause irritation to eyes, skin, and/or respiratory system. Allergic contact dermatitis may occur in individuals who are sensitized to chromium or nickel.

**MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:** Exposure to metals dust and fumes may aggravate pre-existing respiratory or allergic conditions in some workers. Some studies have shown a higher level of lung related problems among order welders who smoked than those who did not smoke.

**EMERGENCY AND FIRST AIR PROCEDURES:** Remove from exposure area and call for medical aid. Employ first aid techniques recommended by the American Red Cross.

**Eyes:** In case of irritation from particulate, immediately flush with plenty of water for 15 minutes and call for medical assistance.

**Skin:** In case of skin contact causing irritation, wash thoroughly with plenty of soap and water.

**Inhalation:** If breathing is difficult, remove to fresh air and give oxygen. If breathing has stopped, provide artificial respiration.

**Ingestion:** Accidental ingestion unlikely. If ingested, call for medical assistance.

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## SECTION VII – Control Measures:

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As distributed, control measures are not required while handling stainless steel.

Appropriate control measures should be employed when welding, brazing, thermal cutting, burning, sawing or grinding stainless steel. For welding and related processes, read and understand the MSDSs, manufacturers instruction, and precautionary labels for welding consumables. See American National Standard Z49.1, Safety in Welding and Cutting, published by the American Welding Society, 550 N.W. LeJeune Road, Miami, Florida. 33126 and OSHA Publication 2206 (29 CFR 1910), U.S. Government Printing Office, Washington, D.C. 20402, for more details on exposure controls.

**VENTILATION:** Use local exhaust and dilution ventilation to control dust and/or fumes during welding, brazing, thermal cutting, burning sawing or grinding on stainless steel pipe and tube.

**RESPIRATORY PROTECTION (Specific Type):** Use a NIOSH approved respirator for dust and fumes or an air supplied respirator where local exhaust or general dilution ventilation does not keep exposures below the PEL or TLV for air contaminants.

**PROTECTIVE GLOVES:** Wear protective gloves while handling stainless steel to prevent cuts and skin abrasions, and to reduce the risk of sensitization from skin contact. For activities such as welding, brazing and thermal cutting, appropriate hand protection should be worn.

**EYE PROTECTION:** ANSI Z87.1 approved safety glasses with side shields or goggles should be worn where metal dust or fume is present. Use appropriate eye protection, including welding helmets and/or face shields with protective filter lenses when welding, brazing or thermal cutting. Select welding lens shades from the American Welding Society (AWS) publication F2.2.

**PROTECTIVE CLOTHING:** Protective clothing is generally not required when handling stainless steel. Remove and launder work clothes soiled with metal dust to avoid spreading contamination outside the work area. Wear appropriate head and body protection during welding, brazing and thermal cutting on stainless steel. Refer to ANSI Z49.1 for more information.

**OTHER PROTECTIVE EQUIPMENT:** Protective clothing such as uniforms, disposable coveralls, safety shoes, etc. may be required during metal handling operations as appropriate.

**WORK/HYGIENIC PRACTICES:** Do not eat, smoke, or drink in areas where metal dust or fume is present. Utilize good personal hygiene including washing hands and face prior to eating or drinking.

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## SECTION VIII – Precautions for Safe Handling and Use:

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**STEPS TO BE TAKEN IN CASE 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. Place material in a suitable waste container and properly label all containers.

**WASTE DISPOSAL METHOD:** Dispose of product, residue, liners, containers and waste material in accordance with local, state, and federal regulations.

**OTHER PRECAUTIONS:** Use good personal hygiene and safe work practices. Keep out of reach of children. Always read and follow directions on product label and other product information.

**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 or release exists, it is advisable to develop an emergency spill response plan.

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**SECTION IX – California Proposition 65:**

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**CALIFORNIA PROPOSITION 65: WARNING:** This product contains or produces chemicals known to the State of California to cause cancer. [California Health and Safety Code § 25249.5 ET SEQ.]

**END OF MSDS.**