

MATERIAL SAFETY DATA SHEET

1. Product and Company Information

Material Name: Steel Castings (Grades B⁺, E, E⁺, Adapter and Tooth)
Date Prepared: March 18, 2011
Chemical Formula: Mixture
Manufacturer Information: McConway and Torley, LLC
 109 48th Street
 Pittsburgh, PA 15201
 (412) 682-4700
Website: For a current MSDS, refer to: www.mcconway.com/msds.htm

2. Hazard Identification

Overview: Products when used under generally accepted conditions, and pursuant to guidelines recommended by OSHA, do not represent an inhalation, ingestion or contact hazard. However, use of these products in any condition should be evaluated by appropriate engineering controls and under the guidance of a certified health and safety professional and a Certified Industrial Hygienist.

Solid. Grey with no odor. Small chips, fine turnings and dust from processing may be ignitable.

Dust and fumes from processing: Can cause irritation of the eyes, skin and upper respiratory.

During processing operations, acute exposures in excess of the occupational exposure levels listed in Section 8 may cause nausea, fever, chills, shortness of breath and malaise

3. Composition / Information on Ingredients

INGREDIENT	CAS NUMBER	PERCENT (%)
Aluminum (Al)	7429-90-5	0.015 - 0.09
Carbon (C) as carbon black	133-86-4	0.24 - 0.3
Chromium (Cr)	7440-47-3	0.25 - 2.4
Copper (Cu)	7440-50-8	Trace - 0.4
Iron (Fe)	7439-88-6	Balance
Manganese (Mn)	7439-96-5	0.6 - 1.3
Molybdenum (Mo)	7439-98-7	0.1 - 0.55
Nickel (Ni)	7440-02-0	0.3 - 1.9
Phosphorus (P)	7723-14-0	0.035 maximum
Silicon (Si)	7440-21-3	0.35 - 1.7
Sulfur (S)	7704-34-9	0.035 maximum
Notes: The above listing is a summary of elements used in carbon steel		



INGREDIENT	CAS NUMBER	PERCENT (%)
castings. Various grades will contain different combinations of these elements. Other trace elements may also be present in minute amounts.		

4. First Aid Measures

Eye contact Dust and fume from processing: Rinse eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin contact Dust and fume from processing: Wash with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Inhalation Dust and fume from processing: Remove to fresh air. Check for clear airway, breathing, and presence of pulse. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Seek medical attention. This product has not been shown to present an inhalation hazard as shipped (steel casting).

5. Fire Fighting Measures

Flammable Properties This product has not been shown to present fire or explosion hazards as shipped. Solid, massive form is not combustible.

Fire/Explosion Hazards May be a potential hazard under the following conditions: Molten metal in contact with water/moisture. Moisture entrapped by molten metal can be explosive. Small chips, fine turnings and dust from processing may be ignitable/combustible.

Extinguishing Media Use fire fighting methods and materials that are appropriate for surrounding fire.

Protective Equipment Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.

6. Accidental Release Measures

Spill or leak procedures No special precautions are necessary for spills of bulk material. If large quantities of dust are spilled, remove by vacuuming or wet sweeping to prevent heavy concentrations of airborne dust. Follow federal, state and local regulations.

7. Handling and Storage

Handling Avoid generating dust. Avoid contact with sharp edges or heated metal. Store material away from incompatible materials.

8. Exposure Controls and Personal Protection

Engineering controls Dust and fume from processing: Use with adequate general ventilation or local exhaust ventilation to maintain exposures below limits listed in Section 8. Castings under normal conditions have not been shown to represent an inhalation, ingestion, or contact health hazard.

Exposure data
Compounds formed during processing
U.S. OSHA – Specifically Regulated Chemicals



Chromium (VI) compounds (18540-29-9)

2.5 µg/m³ Action Level; 5 µg/m³ time-weighted average (TWA). Cancer hazard – See 29 CRF 1910.1026.

Components

INGREDIENT	CAS NUMBER	OSHA PEL (MG/M ³)	ACGIH TLV (MG/M ³)	NOTES
Aluminum (Al)	7429-90-5	15 (total dust) 5 (respirable)	1 (respirable)	Aluminum metal.
Carbon (C) as carbon black	133-86-4	3.5	3.5, A4	As carbon black.
Chromium (Cr)	7440-47-3	1	0.5, A4	Chromium metal.
Copper (Cu)	7440-50-8	1	1	Cu dust & mist
		0.1	0.2	Cu fume
Iron (Fe)	7439-88-6	See Oxide	See Oxide	PEL as fume.
Iron Oxide (Fe ₂ O ₃)	1309-37-1	10	5 (respirable), A4	
Manganese (Mn)	7439-96-5	5 ceiling limit	0.2	Mn & inorganic compounds.
		5 ceiling limit	0.2	Fume
Molybdenum (Mo)	7439-98-7	15 (total dust)	10 (inhalable) 3 (respirable)	Mo and insoluble compounds.
Nickel (Ni)	7440-02-0	1	1.5 (inhalable) A5	Elemental nickel.
Phosphorus (P)	7723-14-0 12185-10-3	0.1	0.1	OEL for 12185-10-3
Silicon (Si)	7440-21-3	15 (total) 5 (respirable)	-----	TLV withdrawn.
Sulfur (S) as SO ₂	7704-34-9	13	0.25, A4	As SO ₂
Notes:				
<ul style="list-style-type: none"> • Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. • Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. A “C” designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as a 15-minute TWA exposure, which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. • Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix C. • Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix C. • Carcinogenicity – ACGIH <ul style="list-style-type: none"> ○ A1: Confirmed Human Carcinogen ○ A2: Suspected Human Carcinogen ○ A3: Confirmed Animal Carcinogen with Unknown Relevance to Humans ○ A4: Not Classifiable as a Human Carcinogen ○ A5: Not Suspected as a Human Carcinogen 				

Personal protective equipment
Eye/face protection

Required for melt, grind, cut and welding operations. Wear safety glasses with side shields. Melting, welding, and arc cutting may require special eye protection including face shields with and special tinted glass. Grinding operations may also require face shield. NIOSH approved respirator may be required during melt, grind, cut and welding operations if exposure exceeds occupational exposure standards and guidelines listed in Section 8.

Skin protection

Wear appropriate gloves to avoid skin injury. Gloves should be selected for the specific operations.

Additional Precautions

Additional personal protective equipment may be required for supplementary work conducted on steel castings. Personnel who handle and work with molten metal should utilize protective clothing such as fire resistant tapper's jackets, leggings, spats and similar equipment to prevent burn injuries.

Special Precautions

These castings were produced in a silica sand mold. Therefore, there may be some residual sand on the surface of the castings or lying loose on or inside the product. Precautions must be taken if handling or work on the castings would release or cause this silica to become airborne in the workers' breathing zone. The OSHA PEL for respirable silica is calculated, based on the percentage of silica in the sample, as follows: $PEL (\text{respirable fraction}) = 10 \div [\% \text{ quartz} + (\% \text{ cristobalite} \times 2) + (\% \text{ tridymite} \times 2) + 2]$. The ACGIH TLV for silica, crystalline quartz and cristobalite is 0.025 mg/m^3 , A2. It is recommended that workers with the potential for exposure above the listed occupational exposure levels be required to wear National Institute of Occupational Safety and Health approved respiratory protection, selected in accordance with NIOSH decision logic or other appropriated selection criteria.

9. Physical & Chemical Properties

Appearance	Gray solid
Odor	Odorless
Melting point	~1500 °C (2700 °F)
Boiling point	~3000 °C (5400 °F)
Specific gravity	~7.6 - 7.8
Density	~7.4 g/cm ³ to 8.0 g/cm ³
Auto-ignition temperature	Not applicable
Flammability limits in air	Not applicable
Vapor pressure	Not applicable
Vapor density	Not applicable
Solubility (water)	Insoluble
pH	Not applicable
Evaporation rate	Not applicable



10. Chemical Stability & Reactivity Information

Chemical stability	Stable as shipped. Metallic dust or fumes may be produced during welding, burning, grinding and possibly machining
Conditions to avoid	Molten metal may react violently with water. Materials to avoid include acids, bases and oxidizers.

11. Toxicological Information

Steel Castings	When used as recommended above, these castings have not been shown to represent an inhalation, ingestion or contact health hazard. However, each specific use should be evaluated under appropriate engineering controls with the involvement of a certified health and safety professional consulting with a certified industrial hygienist.
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Health effects associated with ingredients

Aluminum: The metal itself is a health risk when it occurs as a fine powder, usually called stamped aluminum powder. Exposure, without proper respiratory protection, to such aluminum powder at concentrations significantly above the TLV have been reported as increased incidence of fibrosis of the lung, sometimes referred to as aluminosis. Some incidence of neurological effects have been reported in aluminum welders and aluminum production workers who have exposures in excess of the PEL. Exposures exceeding TLV have been reported as causing irritation of the lower respiratory tract.

Carbon dust: Elemental carbon, as it exists in this product is of very low toxicity. However, exposure to this dust can cause irritation of eyes, mucous membranes and upper respiratory tract.

Chromium metal: Can cause irritation of eyes, mucous membranes and upper respiratory tract. The health hazards associated with exposure to chromium are dependant on the form that the chromium takes and there are independent TLV's for each of these states.

Copper dust and fume: Copper fume exposure effects include upper respiratory tract irritation, metal fume fever, metallic or sweet taste sensation and in some instances, discoloration of the skin and hair. Inhalation of dust and mist of copper or its salts can cause irritation of nasal mucous membranes, sometimes of the pharynx, and on occasion, ulceration with perforation of the nasal septum. If copper salts reach the gastrointestinal tract in sufficient concentration, they act as irritants. Chronic exposures may result in an anemia. On the skin, copper salts also act as irritants; on the eye it may cause conjunctivitis.

Iron as iron oxide: Inhalation of iron oxide dust or fume can cause a form of pneumoconiosis. sometimes termed siderosis or iron pigmentation.

Manganese dust or fume: Exposures in excess of the OSHA PELs may cause inflammation of the lung tissue, scarring of the lungs (pulmonary fibrosis), reproductive harm in males and central nervous system damage. Exposure to manganese oxide fumes have been shown to cause irritation of eyes, skin and respiratory tract. Acute overexposures, in the absence of personal protective equipment may cause nausea, fever, chills, shortness of breath and malaise.

Molybdenum: Generally of low toxicity but may vary by compounds. Dust of metallic molybdenum has been reported to cause difficulty breathing, general weakness, pain in chest, joints, hands and feet, expectoration, fatigue, headache, anorexia, possible liver and kidney damage and bone deformity. Molybdenum has also been reported in the scientific literature to cause anemia and poor growth in experimental animals. Molybdenum may also cause irritation to lungs and eyes and chronic exposures in

excess of permissible exposure limits has been suggested in the literature to be linked to forms of pneumoconiosis.

Nickel dust and fume: Can cause irritation of eyes, skin and respiratory tract. Eye contact: Can cause inflammation of the eyes and eyelids (conjunctivitis). Skin contact: Can cause sensitization and allergic contact dermatitis. Chronic overexposures: Can cause perforation of the nasal septum, inflammation of the nasal passages (sinusitis), respiratory sensitization, asthma and scarring of the lungs (pulmonary fibrosis).

Phosphorus: Red phosphorus is not readily absorbed and, in pure form, is considered non-poisonous. However, possible contamination with the yellow form must be considered, and symptoms such as nausea, vomiting, abdominal pain or garlic odor on breath will indicate poisoning by the latter. Not considered highly toxic by inhalation but acute exposure may cause coughing, bronchitis, possible liver or kidney impairment if contaminated with yellow phosphorus.

Silicon: Chronic overexposures can contribute to chronic bronchitis and cause increased airway resistance. Accumulation in lungs has been linked to certain forms of pneumoconiosis.

Sulfur: Fire and explosion risk in finely divided form.

Health effects associated with compounds formed during processing

(The following could be expected if welded, re-melted, arc cut or otherwise processed at elevated temperatures)

Hexavalent Chromium: Hexavalent chromium compounds are irritants and sensitizers of the skin, mucous membranes, and respiratory tract. They are absorbed through inhalation and ingestion, distributed widely throughout the body, and are excreted by the kidney. Hexavalent chromium compounds are toxic to most tissues they contact: acute ingestion of these substances can lead to gastrointestinal hemorrhage, liver and kidney damage; chronic exposure is associated with skin ulceration (including ulceration and perforation of the nasal septa), sensitization, and bronchial hyperactivity. Classified as a confirmed human carcinogen by ACGIH.

Welding fumes: The potential hazards of welding operations include metal fumes, toxic gases, and ultraviolet and infrared radiation. Fume particles are formed from vaporization of molten metal. They are very fine in size, generally one micron or smaller, and may join together to form larger particles. The adverse health effects of overexposure to welding fumes and gases may include both chronic or acute systemic damage, metal fume fever (a short-term painful ailment with symptoms of fever and chills), pneumoconiosis (lung disease due to accumulation of mineral or metallic particles), and irritation of the respiratory tract.

The welding fumes produced at welding operations depend primarily on the composition of the metals being welded and the welding rods. When the base metal is iron or steel, with welding rods of similar composition the main component of the fume will be iron oxide. When welding on stainless steel, fumes containing nickel and chromium may be produced. Welding on plated, galvanized, or painted metals may generate fumes containing cadmium, zinc oxide, or lead. In addition, some welding rods can generate fluoride in the fume as well as free silica, depending on the composition of the welding rod coating. In summary, welding processes may generate many different metal fumes and other toxic components. It is important that the hazards of a welding operation be evaluated properly by engineering, health and safety and certified industrial hygiene experts with a specific environment. Toxic gases that may arise in welding operations include carbon monoxide, nitrogen dioxides, and ozone. If welding or cutting operations are conducted in the presence of chlorinated hydrocarbons, such as the form of solvents, either



on the metals or in the ambient air, hazardous concentrations of phosgene and hydrogen chloride, which are highly toxic irritant gases, may be produced.

12. Ecological Information

Steel Castings

No significant ecological impact as shipped.

13. Disposal Considerations

Steel Castings

Dispose in accordance with federal, state and local laws and regulations. Reuse or recycle material whenever possible.

14. Transportation Information

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packing Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. Regulatory Information

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.

California Proposition 65 This product contains chemicals known to the State of California to cause cancer and chemicals known to the State of California to cause birth defects or other reproductive harm.

Regulatory Lists Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.

Toxic Substances Control Act (TSCA) Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Steel castings are not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches.

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III Section 311/312 Hazard Categories: Immediate Health Effect, Delayed Health Effect. This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency



Planning and Community Right – To – Know Act of 1986 (40 CFR 372): Section 313 Reportable Ingredients: aluminum, chromium, manganese, nickel and phosphorus.

16. Other Information

The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.