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SAFETY DATA SHEET (SDS)

GRAY IRON CASTINGS

SDS SC-000-041 Rev. 13

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SECTION 1: PRODUCT IDENTIFICATION

PRODUCT IDENTIFIER

Gray Iron Castings

COMMON NAME AND OTHER DESIGNATIONS

ASTM (American Society for Testing & Materials) Specification No's./ACI (Alloy Casting Institute) Alloy Designations:
ASTM: A48, A74, A126, A159, A278, A319, A667, A748, A823, A942

Manufacturer

Charlotte Pipe and Foundry Co.

Street Address

1335 S. Clarkson St.
Charlotte, NC 28208 USA

Mailing Address

P.O. Box 35430

City, State, Zip, Country

Charlotte, NC 28235 USA

Contact Person/ Telephone No.

David Waggoner / 704-348-5408

e-mail Address / Website

dwaggoner@charlottepipe.com
www.charlottepipe.com

RECOMMENDED USE OF CHEMICAL AND RESTRICTIONS ON USE

Solid casting. No restrictions on use.

SECTION 2: HAZARD IDENTIFICATION

Hazard Classification

This product is an article as sold. Dust or fumes released during machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting of the product may produce airborne contaminants that are hazardous. The following classification information is for the hazardous substances that could be released or generated from such processes.

Label Elements

Signal Word

DANGER

Classification

Skin Sensitizer, Category 1 (nickel, hexavalent chromium)

Carcinogen, Category 1 (Inhalation; target organ-respiratory tract) (hexavalent chromium, nickel oxide, respirable crystalline silica)

Specific Target Organ Toxicity Repeated Exposure, Category 1 (Inhalation, target organ-respiratory tract) (hexavalent chromium, nickel, respirable crystalline silica)

Specific Target Organ Toxicity Repeated Exposure, Category 2 (nervous system) (manganese)

Pictograms



Dust and/or fumes released during processing may contain hexavalent chromium, manganese, nickel and respirable crystalline silica

Hazard Phrases

- H317 May cause an allergic skin reaction
- H350 May cause cancer by inhalation
- H372 Causes damage to respiratory system through prolonged or repeated exposure
- H373 May cause damage to brain & nervous system through prolonged or repeated exposure

Precautionary Phrases

- P260 Do not breathe dust & fumes
- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P280 Wear protective gloves, protective clothing, eye protection and face protection.
- P302 If on skin: Wash with plenty of water
- P314 Get medical advice/attention if you feel unwell
- P333 If skin irritation or rash occurs: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse
- P501 Dispose of contents in accordance with local and national regulations

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

All values are expressed as weight percent and are approximate. The percent composition reflects the range that is possible in this group of products.

Chemical Name	CAS #	Wt. %
Carbon (C)	7440-44-0	2.5–4.0
Chromium (Cr)	7440-47-3	0.01–1.5
Chromium, hexavalent*	1333-82-0	*
Copper (Cu)	7440-50-8	0.01–1.00
Iron (Fe)	7439-89-6	86.3–96.2
Manganese (Mn)	7439-96-5	0.2–1.1
Nickel (Ni)**	7440-02-0	0.01–1.5
Silicon (Si)	7440-21-3	1.0–3.5
Silica, crystalline (SiO ₂)***	14808-60-7	***
Tin (Sn)	7440-31-5	0.1–0.15

NOTES

* When chromium is heated to high temperatures, which may occur during welding and thermal cutting of this product, it may oxidize to form hexavalent chromium. In the product as sold, chromium is in the elemental form.

** When nickel is heated to high temperatures, which may occur during welding and thermal cutting of this product, it may form nickel oxides. In the product as sold, nickel is in the elemental form.

*** Castings that have not been cleaned may contain embedded sand which may release respirable crystalline silica dust during processing.

SECTION 4: FIRST AID MEASURES

No first aid is likely to be needed when castings are handled as sold. The following first aid measures may be needed if dust and/or fumes are released when processes such as machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting are performed on the product.

EYE CONTACT: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

SKIN CONTACT: Wash thoroughly after handling. Wash with plenty of water. If irritation or rash occurs, get medical advice/attention. Remove contaminated clothing and wash before reuse.

INHALATION: Remove person to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. If exposed, concerned or feeling unwell get medical advice/attention.

INGESTION: NEVER give anything by mouth to an unconscious person. DO NOT INDUCE VOMITING. Give large quantities of water. If vomiting occurs keep airways clear and give more water. Seek medical attention immediately.

Most Important Symptoms & Effects, Both Acute and Delayed

No adverse effects are expected from handling castings as sold. Inhalation of fumes or dust from processes such as machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting may cause irritation of the nose, throat or eyes. Nickel, hexavalent chromium compounds and respirable crystalline silica are listed in the National Toxicology Program (NTP) Annual Report on Carcinogens and the International Agency for Research on Cancer (IARC) Monographs as potential carcinogens (see Section 11). Hexavalent chromium and respirable crystalline silica are considered carcinogens by the Occupational Safety & Health Administration (OSHA). Prolonged overexposure to welding or thermal cutting fumes on materials containing iron may cause siderosis (iron deposits in lungs). Nickel and hexavalent chromium may cause skin sensitization. Manganese may cause damage to brain and nervous system through prolonged or repeated exposure. Respirable crystalline silica may cause adverse lung effects (silicosis), immune system effects and kidney effects.

Indication of Immediate Medical Attention and Special Treatment Needs

None known

SECTION 5: FIREFIGHTING MEASURES

Suitable Extinguishing Media

Use suitable extinguishing methods for surrounding fire.

Special Hazards Arising from the Substance

Not applicable for the casting as sold. Welding arcs and sparks can ignite combustibles and flammables.

Combustion Products

Welding and thermal cutting may generate oxides of the metals listed in Section 3.

Special Protective Actions for Firefighters

Not applicable

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

No special precautions necessary for the product as sold.

Environmental Precautions

Avoid releasing dust generated or collected from processing castings into the environment. Report such spills as required by local and national regulations.

Methods and Material for Containment and Clean-up

Not applicable

SECTION 7: HANDLING & STORAGE

Precautions for Safe Handling

No special requirements for the product as sold. The following precautions may be needed if processes such as machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting are performed and produce dust and/or fumes: Avoid breathing fumes or dust. Use good housekeeping practices. Use adequate ventilation to control exposure to dusts and fumes below their applicable occupational exposure limits. Employee exposures should be assessed to determine what specific corrective actions may be needed when performing tasks that release dust or fumes. Take appropriate precautions to prevent fires and explosion when hot work is performed. Do not eat, smoke or drink when performing the tasks listed above.

Conditions for Safe Storage, Including any Incompatibilities

No special storage requirements.

SECTION 8: EXPOSURE CONTROLS & PERSONAL PROTECTION

Occupational Exposure Limits

This product is an article as sold. Dust or fumes generated from machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting of the product may produce contaminants with the following Occupational Exposure Limits (OELs):

Ingredient	CAS #	FEDERAL OSHA PEL* (mg/m ³)	ACGIH TLV® (mg/m ³)
Carbon	7440-44-0	NE	NE
Chromium Metal Hexavalent, insoluble**	7440-47-3	1 (TWA) 0.005 (TWA)	0.5 (TWA) 0.01 (TWA)
Copper Dust Fume	7440-50-8	1 (TWA) 0.1 (TWA)	1 (TWA) 0.2 (TWA)
Iron	7439-89-6	10 (TWA) (as iron oxide fume)	5 (TWA)(R) (as iron oxide dust or fume)
Manganese	7439-96-5	5 (C)	0.02 (TWA)(R) 0.1 (TWA)(I)
Nickel Elemental Insoluble Oxide***	7440-02-0	1 (TWA) 1 (TWA) 1 (TWA)	1.5 (TWA)(I) 0.2 (TWA) (I) 0.2 (TWA) (I)
Silicon	7440-03-1	15 (TWA) 5 (TWA) (R)	NE
Silica, respirable crystalline	14808-60-7	0.05 (TWA)****(R)	0.025 (TWA) (R)

Tin	7440-31-5	2 (TWA)	2 (TWA)
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NOTES

* The following State OSHA Plans have adopted lower Permissible Exposure Limits (PELs) for some of the constituents in this product:

California: Chromium- 0.5 mg/m³ (TWA); Manganese- 0.2 mg/m³ (TWA); Nickel, metal -0.5 mg/m³ (TWA)

Minnesota: Manganese fume- 1 mg/m³ (TWA); Total Welding Fumes- 5 mg/m³ (TWA).

Michigan: Chromium- 0.5 mg/m³ (TWA); manganese fume- 1 mg/m³ (TWA); Total Welding Fumes- 5 mg/m³ (TWA).

Oregon: Chromium- 0.5 mg/m³ (TWA)

** When chromium is heated to high temperatures, which may occur during welding and thermal cutting of this product, it may oxidize to form hexavalent chromium. In the product as sold, chromium is in the elemental form.

*** When nickel is heated to high temperatures, which may occur during welding and thermal cutting of this product, it may form nickel oxides. In the product as sold, nickel is in the elemental form.

**** This OSHA PEL takes effect in June, 2018. Until then, or if the OSHA Respirable Crystalline Silica Standard (1910.1053) is stayed or otherwise not enforced, the PEL-TWA in Federal OSHA jurisdictions and in some state jurisdictions is calculated using the following formula: $PEL (mg/m^3) = 10\% \text{ quartz} + 2$ and applies with when the quartz content of the air sample exceeds 1%.

Exposure Limit Abbreviations

ACGIH TLV American Conference of Governmental Industrial Hygienists Threshold Limit Value® (2017)

C Ceiling Limit

I Inhalable fraction of particulate

mg/m³ Milligram of substance per cubic meter of air

NE None Established

OSHA PEL Occupational Health and Safety Administration Permissible Exposure Limit

R Respirable fraction of particulate

STEL Short Term Exposure Limit

TWA Time Weighted Average

Appropriate Engineering Controls

As sold no special control measures are necessary. If dust and/or fumes are released when processes such as machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting are performed, adequate ventilation should be used to control exposures to dusts and fumes below their applicable occupational exposure limits. Industrial hygiene sampling should be used to determine what specific corrective actions may be needed. Take appropriate precautions to prevent fires and explosion when hot work is performed. Do not eat, smoke or drink when performing the tasks listed above.

Personal Protective Equipment (PPE)

Eye Protection

Wear safety glasses with side-shields if there is a risk of particles getting in eyes. Welding and thermal cutting of this product can generate ultraviolet and infrared radiation. Select appropriate welding shades to prevent eye injury.

Skin Protection

No chemical protective clothing is required. During use of this product, other hazards such as ultraviolet radiation, infrared radiation, hot metal and sparks may be generated. Use appropriate protective clothing and gloves for the application.

Respiratory Protection

As sold, no respiratory protection is expected to be necessary. If dust and/or fumes are released when processes such as machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting are performed, respiratory protection may be necessary if the concentrations of the hazardous substances listed in the above Table exceed the applicable occupational exposure limits. In these cases, a National Institute of Occupational Safety & Health (NIOSH) approved respirator should be selected based on the form and concentration of the contaminant in air.

SECTION 9: PHYSICAL & CHEMICAL PROPERTIES

Appearance	Solid, gray colored material
Odor	Not applicable
Odor threshold	Not applicable
pH	Not applicable
Melting Point	~2350°F (1300°C)
Boiling point	5000°F (2750°C) for iron
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability	Not applicable
Upper/Lower Flammability or Explosive Limits	Not applicable
Vapor Pressure	Not applicable
Vapor Density	Not applicable
Relative Density	Not applicable
Solubility in Water	Insoluble
Partition Coefficient	Not applicable
Auto-Ignition Temperature	Not applicable
Decomposition Temperature	Not applicable
Viscosity	Not applicable

SECTION 10: STABILITY & REACTIVITY

Reactivity

Inert, not reactive

Chemical Stability

Stable

Possibility of Hazardous Reactions

None known with the product as sold.

Conditions to avoid

None known

Incompatible Materials

None known

Hazardous Decomposition Products

Welding and thermal cutting on casting may generate oxides of the metals listed in Section 3.

SECTION 11: TOXICOLOGICAL INFORMATION

This product is an article as sold. Dust or fumes generated from machining, grinding, drilling, melting, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting of the product may produce airborne contaminants that are hazardous. Information about these components is supplied.

Acute Toxicity

The constituents do not meet the criteria to be classified in this category.

- Carbon:** Rat (oral) LD50 = 2000 mg/kg
Chromium: Rat (oral) LD50 >5000 mg/kg; Rat (Inhalation) LC50 (4 hr) = 5.41 mg/L air
Copper: Rat (oral) LD50 = 300–2,500 mg/kg; Rat LC50 (4 hr) = 5.11 mg/L air; Rat (dermal) LD50 = 2000 mg/kg
Hexavalent Chromium: Rat (oral) LD50 = 52 mg/kg; Rat (inhalation) LC50 (4 hr) = 99–262 mg/m³, Rabbit (dermal) LD50 = 57 mg/kg
Iron: Rat (oral) LD50 = 98.6–1060 g/kg; Rat (inhalation) LC50 (6 hr) = 250 mg/m³ air
Manganese: Rat (oral) LD50 > 2000 mg/kg; Rat (inhalation) (4 hr) LC50 > 5.14 mg/L
Nickel: Rat (oral) LD50 >9000 mg/kg
Silicon: Rat (oral) LD50 = 3160 mg/kg

LD50 = Lethal Dose of the substance at which 50% of the exposed test population is killed within a given period of time.
LC50 = Lethal Concentration of the substance at which 50% of the exposed test population is killed within a given period of time.

Skin Corrosion/Irritation

The constituents do not meet the criteria to be classified in this category.

Serious Eye Damage or Irritation

Dusts and fumes may cause eye irritation but the constituents do not meet the criteria to be classified in this category.

Respiratory or Skin Sensitization

Nickel and Hexavalent Chromium

May cause allergic skin sensitization.

Germ Cell Mutagenicity

Nickel

Chromosomal aberrations and in vitro and in vivo testing has shown that nickel is genotoxic (ATSDR); data is insufficient for classification.

Carcinogenicity

Carbon

Not listed by IARC, NTP or OSHA

Chromium

Metallic chromium is not listed by IARC, NTP or OSHA. When chromium is heated to high temperatures such as those that occur in welding arcs or during thermal cutting processes, it can oxidize to form hexavalent chromium. In the product as sold, chromium is in the elemental form. Hexavalent chromium is listed by IARC (possibly carcinogenic to humans—Group 2BA) and NTP (known human carcinogen).

Copper

Not listed by IARC, NTP or OSHA

Iron

Not listed by IARC, NTP or OSHA

Manganese

Not listed by IARC, NTP or OSHA

Nickel

Listed by IARC (possibly carcinogenic to humans—Group 2BA) and NTP (known human carcinogen). The increased risk of lung and sinus cancer varies with the form of nickel. There is no evidence that metallic nickel is associated with nasal or lung cancer (ATSDR, ECHA).

Silicon

Not listed by IARC, NTP or OSHA

Silica, Respirable Crystalline

Listed as a carcinogen by IARC 1 (Carcinogenic to Humans), NTP (Known to be a human carcinogen) and OSHA. Respirable crystalline silica has been associated with an increased risk of lung cancer.

Tin

Not listed by IARC, NTP or OSHA

Abbreviations

ASTDR	US Agency for Toxic Substances & Disease Registry (US Dept. Health & Human Services)
ECHA	European Chemicals Agency
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program (U.S. National Institute of Environmental Health Sciences)
OSHA	U.S. Occupational Safety and Health Administration

Reproductive Toxicity

Nickel

Some studies indicate there may be effects on fertility but the data do not meet the criteria to be classified in this category.

Specific Target Organ Toxicity-Single Exposure (SE)

Copper

There are reports of copper fume causing "metal fume fever" resulting in symptoms of with a burning sensation, throat irritation, coughing, shortness of breath, nausea, aches and fever. These studies lack adequate exposure data and clear evidence that copper fumes caused metal fume fever. The data is inadequate for classification.

Specific Target Organ Toxicity-Repeated Exposure

Hexavalent Chromium

Chrome ulcers, nasal septum holes, inflammation of the nasal mucosa and throat, chronic bronchitis, kidney and liver effects have been reported in chrome workers. The effects result in a Specific Target Organ Toxicity-Repeat or Prolonged Exposure (STOT-RE) Category 1 classification.

Iron

Prolonged exposure may lead result in iron deposits in the lung, a condition known as siderosis but this effect but does not meet the criteria to be classified in this category.

Manganese

Inflammatory changes in the lung were found in monkeys exposed to manganese dioxide via inhalation for 10 months. At high exposure levels (greater than 5 mg/m³), manganism (chronic manganese poisoning) has been reported in workers. Symptoms of manganism include sleepiness, weakness in the legs, a mask-like facial appearance, emotional disturbances and a spastic gait. High levels of pneumonia have also been reported in workers inhaling large amounts of manganese dust and fume. In some studies, manganese has been associated with longer reaction times, hand steadiness and eye-hand coordination. Effects appear to be more pronounced with exposures to respirable sized particles. These effects result in a STOT-RE Category 2 classification.

Nickel (elemental and nickel oxide)

Animal studies have shown lung changes and inflammation following inhalation exposure. Effects vary with the form of nickel used in the studies, animal species and route of administration. There have been case reports of occupational asthma, pulmonary fibrosis and pulmonary edema in workers, however, exposure data is lacking. The animal studies result in a STOT-RE Category 1 classification.

Silica, Respirable Crystalline

Prolonged and repeated exposure to respirable crystalline silica may cause silicosis. Respirable crystalline silica may also cause immune system effects and kidney effects.

Aspiration Hazard

Based on the physical form, the product is not expected to be an aspiration hazard.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Ecotoxicity is expected to be minimal since the product as sold is a solid with low water solubility. Dust generated and/or collected from further processing of the casting may be toxic to the environment.

Persistence and Degradation

Not applicable

Bioaccumulation

Not applicable

Mobility in Soil

Not applicable

Environmental Fate

Not applicable

SECTION 13: DISPOSAL INFORMATION

Recover or recycle castings or dispose of according to federal, state and local regulations. Dust collected from product processing operations may be classified as a hazardous waste. Dispose of such dust in accordance with federal, state and local regulations.

SECTION 14: TRANSPORTATION INFORMATION**U.S. Department of Transportation (DOT)**

Product is not regulated

International Maritime Dangerous Goods (IMDG)

Product is not regulated

Transport in bulk according to Annex II of MARPOL 73/78 (Marine Pollution) and the International Bulk Chemical (IBC) Code

Product is not regulated

International Civil Aviation Org. (ICAO) / International Air Transport Assoc. (IATA)

Product is not regulated

SECTION 15: REGULATORY INFORMATION

This product is an article as sold. If this product is further processed, the regulatory status of the components listed in the composition section of this sheet may be altered. The following regulatory information may not be complete and should not be relied upon as the sole source of information regarding regulatory responsibilities.

Occupational Health and Safety Administration

This product is an article as sold. Dust or fumes generated by further processing of the product may produce airborne contaminants that are regulated by OSHA. These are listed in Section 8.

TSCA Chemical Inventories

This product is an article as defined by Toxic Substances Control Act (TSCA) regulations, and is exempt from TSCA Inventory listing requirements

Other Regulatory Information

Substance	CAS #	CERCLA RQ (lbs)	Section 313	NPRI Threshold Category	California Prop 65
Chromium	7440-47-3	5,000	313	1A	Carcinogen (hexavalent form only)
Copper	7440-50-8	5,000	313		
Iron	7439-89-6				
Manganese	7439-96-5		313	1A	
Nickel	7440-02-0	100	313	1A	Carcinogen

Notes

CAS = Chemical Abstract Service Registry Number, a 7-digit identifier.

CERCLA RQ = Comprehensive Environmental Response, Compensation & Liability Act of 1980, Reportable Quantity. If a value is listed then releases of particles, $\leq 100 \mu\text{m}$ in size, to the environment may require reporting under CERCLA Sections 102–103 (40 CFR Part 302).

EINECS = European Inventory of Existing Commercial Chemical Substances, a 7-digit identifier.

NPRI = National Pollutant Release Inventory Threshold Category, if 1A or 1B is listed, may be subject to reporting under the Canadian Environmental Protection Act, 1999.

Prop 65 = Proposition 65, if listed in the table above: WARNING: This product contains chemicals known to the State of California to cause cancer.

Section 313 = if '313' is listed, may be subject to the reporting requirements found under Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 (40 CFR Part 372).

These products are not believed to contain any substances that meet the notification requirements found under EPCRA Sections 302 or 304 (40 CFR Part 355) nor subject to the accidental release prevention requirements under CAA 112(r) (40 CFR Part 68).

SECTION 16: OTHER INFORMATION

DATE PREPARED: October 2017

PREPARER: American Foundry Society, Inc. Occupational Safety & Health Committee (10-Q)

This SDS is intended to be used as a guide to the appropriate handling, storage, and use of this product by an adequately trained person. The American Foundry Society, Inc. is not responsible for the misuse, mishandling or improper storage of this material by the user.

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