Safety Data Sheet

(according to Regulation EC 1907/2006)

Version No. 01/EN
Revision 2ND
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1. IDENTIFICATION OF SUBSTANCE / MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Trade name	COLD ROLLED 300 SERIES STAINLESS STEEL COIL (representative steel grade)
Registration no.	POSCO Code Number: 053

1.2 Relevant identified uses of substance or mixture and uses advised against

Identified uses

1.3 Details of the supplier of the safety data sheet

Company	POSCO
	5 Dongchon-dong, Nam-gu, Pohang-si, Gyeongsangbuk-do 790-360, Korea
Telephone	82-54-220-0114, 82-54-220-6000
E-mail	

1.4 Emergency telephone number 82-54-220-7021, 7046

This number is serviced during office hours only.

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No 1272/2008 [CLP]

STOT-Single exposure Cat 3

2.1.2. Classification according to Directive 1999/45/EC

In accordance with Directive 1999/45/EC, the product does not need to be classified nor labeled.

2.2 Label elements

Symbol

Signal word **Warning**

Hazard Statement H335 May cause respiratory irritation

Precautionary statement

- Prevention
  - P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
  - P271 Use only outdoors or in a well-ventilated area.
- Response
  - P312 Call a POISON CENTER or doctor/physician if you feel unwell.
  - P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Storage
  - P405 Store locked up.
  - P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
- Disposal
  - P501 Dispose of contents/container to in accordance with local/regional/national/ international regulation

2.3. Other hazards

HMIS Hazard Rating:

COMPONENTS	HEALTH	FLAMMABILITY	REACTIVITY
Fe (Iron)	1	3	0
Cr (Chromium)	1	3	0
Ni (Nickel)	No data available	No data available	No data available

COMPONENTS	HEALTH	FLAMMABILITY	REACTIVITY
Mn (Manganese)	1	3	1

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Mixture

Components	%	Classification
Fe (Iron) (CAS 7439-89-6)	Balance	Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.
Cr (Chromium) (CAS No. 7440-47-3)	(18.1-18.7) %	Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP] Acute aquatic toxicity: Cat. 1  - Signal word: WARNING - H400 Very toxic to aquatic life. - P273 Avoid release to the environment. This substance is not classified as dangerous according to Directive 67/548/EEC.
Ni (Nickel) (CAS No. 7440-02-0)	(8.1-8.5) %	Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP] Skin sensitisation (Category 1) Carcinogenicity (Category 2) Specific target organ toxicity - repeated exposure (Category 1) Chronic aquatic toxicity (Category 3)  - Signal word: DANGER - H317 May cause an allergic skin reaction. - H351 Suspected of causing cancer. - H372 Causes damage to organs through prolonged or repeated exposure. - H412 Harmful to aquatic life with long lasting effects. - P273 Avoid release to the environment. - P280 Wear protective gloves. - P314 Get medical advice/ attention if you feel unwell. Classification according to EU Directives 67/548/EEC or 1999/45/EC T Toxic - R40 Limited evidence of a carcinogenic effect. - R43 May cause sensitization by skin contact. - R48/23 Toxic: danger of serious damage to health by prolonged exposure through inhalation.

Components	%	Classification
Mn (Manganese) (CAS No. 7439-96-5)	(1.0-1.3) %	Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP] Substances, which in contact with water, emit flammable gases: Cat. 1  - H260 In contact with water releases flammable gases which may ignite spontaneously. - P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire. - P231 + P232 Handle under inert gas. Protect from moisture. - P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction. - P422 Store contents under inert gas.
		Classification according to EU Directives 67/548/EEC or 1999/45/EC Highly flammable. Contact with water liberates extremely flammable gases.  - R11 Highly flammable. - R15 Contact with water liberates extremely flammable gases. - S43 In case of fire, use fire-fighting equipment on basis class D.

* All commercial steel products may contain small amounts of various elements in addition to those specified. These small quantities (less than 0.1%) may exist as intentional additions, or as "trace" or "residual" elements that generally originate in the raw materials used. These elements may include: aluminium, antimony, arsenic, boron, cadmium, calcium, chromium, cobalt, columbium, copper, lead, molybdenum, tin, vanadium, and zirconium.

4. FIRST AID MEASURES

4.1 Description of first aid measures

This formed solid metal product poses little or no immediate health or fire hazard. When product is subjected to welding, burning, grinding, melting, sawing, brazing, or other similar machining activities, potentially hazardous airborne particulate and fumes may be generated and should be evaluated by an industrial hygienist.

Inhalation	For over-exposure to airborne fumes and particulate, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly. Metal fume fever may be treated by bed rest, and administering a pain and fever reducing medication.
Skin contact	Not anticipated to pose a significant skin hazard. However, should dermatitis develop, wash affected area thoroughly with mild soap and water. If irritation or other symptoms develop, seek medical attention. Remove contaminated clothing. If thermal burn has occurred, flush area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.
Eye contact	Treat for foreign body in the eye. Flush with large amounts of clean water to remove particles. Seek medical attention if irritation persists.
Ingestion	Not considered an ingestion hazard.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Do not use water on molten metal.

5.2 Special hazards arising from the substance or mixture

When product is subjected to welding, burning, grinding, melting, sawing, brazing, or other similar machining activities, potentially hazardous airborne particulate and fumes may be generated.

At temperatures above the melting point, fumes containing metal oxides and other alloying elements may be liberated.

5.3 Advice for firefighters

Fire fighters are to wear full protective equipment, including full bunker gear and SCBA respiratory protection.

5.4 Special Information

Steel products do not present fire or explosion hazards under normal conditions. But, molten metal may react violently with water. High concentrations of metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Not applicable to steel in solid state. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust.

6.2 Environmental precautions

Do not release into sewers or waterways.

6.3 Methods and material for containment and cleaning up

Fine, dry material should be removed by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid using compressed air. Do not release into sewers or waterways.

Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping. Avoid breathing metal fumes and/or dust.

7.2 Conditions for safe storage, including any incompatibilities

Store away from acids and incompatible materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Occupational exposure limits

Components	Local (TWA)	OSHA (PEL)	ACGIH (TLV)
Fe (Iron)	5 mg/m³	10 mg/m³	5 mg/m³
Cr (Chromium)	0.5 mg/m^3	0.5 mg/m³	0.5 mg/m^3
Ni (Nickel)	1 mg/m^3	1 mg/m^3	1 mg/m³
Mn (Manganese)	1 mg/m^3	5 mg/m^3	1 mg/m³

8.2 Appropriate engineering controls

Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Use lifting and work devices, e.g., crane, hoist, etc., within rated capacities and in accordance with manufacturer's instructions when handling these products.

(1) avoid breathing dust and fume
(2) evaluate potential employee exposure
(3) minimize generation of airborne emissions
(4) maintain surfaces free as practical of accumulated material
(5) use protective clothing as specified by an industrial hygienist or safety professional where exposure levels may be excessive
(6) do not smoke in work area
(7) wash hands before eating, drinking or smoking and after handling,
(8) change contaminated clothing before leaving work premises.

Ventilation: Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Do not use compressed air to clean-up spills.

8.3 Personal protection equipment

Respiratory protection	Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen.
Skin and eye protection	For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, gloves and safety glasses to prevent skin and eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations. Protective gloves should be worn as required for welding, burning or handling operations.

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Properties	Product	Fe (Iron)	Cr (Chromium)	Ni (Nickel)	Mn (Manganese)
Appearance	Solid	Solid	Solid	Solid	Solid
Odor	odourless	odourless	No data	No data	No data
Odor threshold	No data	No data	No data	No data	No data
pH	Not applicable	Not applicable	No data	No data	No data
Melting point/Freezing point	~2750 °F	1538 °C	1857 °C	1453 °C	1244 °C
Boiling point and range	Not applicable	2861 °C	2672 °C	2732 °C	1962 °C
Flash point	No data	Not applicable	Not applicable	Not applicable	Not applicable
Evaporation rate	Not applicable	No data	No data	No data	No data

Properties	Product	Fe (Iron)	Cr (Chromium)	Ni (Nickel)	Mn (Manganese)
Flammability (solid, gas)	No data	No data	No data	No data	No data
Upper/lower flammability or explosive limits	No data	No data	No data	No data	No data
Vapor pressure	Not applicable	Not applicable	No data	1810 °C	No data
Vapor density	Not applicable	No data	No data	No data	No data
Relative density	7.85 g/mL	No data	7.14 g/mL	8.9 g/mL	7.3 g/mL
Solubility	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
Partition coefficient: n-octanol/water	No data	Not applicable	No data	No data	No data
Auto-ignition temperature	No data	No data	No data	No data	No data
Decomposition temperature	No data	No data	No data	No data	No data
Viscosity	No data	No data	No data	No data	No data
Explosive properties	No data	Not explosive	No data	No data	No data
Oxidizing properties	No data	not classified as oxidizing	No data	No data	No data

10. STABILITY AND REACTIVITY

10.1 Reactivity No data available

10.2 Chemical stability Steel products are stable under normal storage and handling conditions.

10.3 Possibility of hazardous reactions No data available

10.4 Conditions to avoid Storage with strong acids or calcium hypochlorite

10.5 Incompatible materials Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.

10.6 Hazardous decomposition products Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other alloying elements.

11. TOXICOLOGICAL INFORMATION

11.1 Routes of exposure Inhalation. Steel products in the natural state do not present an inhalation, ingestion or contact hazard. However, operations such as burning, welding, sawing, brazing, machining and grinding may result in the following effects if exposures exceed recommended limits

11.2 Information on toxicological effects

Acute toxicity — No LC50 or LD50 has been established for the mixture as a whole.

- Fe (Iron) (CAS 7439-89-6) — LD50: 3000 mg/kg oral (Rat)
- Cr (Chromium) (CAS No. 7440-47-3) — No data available
- Ni (Nickel) (CAS No. 7440-02-0) — LD50: 9000 mg/kg (Rat)
- Mn (Manganese) (CAS No. 7439-96-5) — LD50: 984 mg/kg (Rat)

Skin corrosion/irritation — No information is available for the product as a mixture

- Fe (Iron) (CAS 7439-89-6) — No skin irritation

Cr (Chromium) (CAS No. 7440-47-3)	No data available
Ni (Nickel) (CAS No. 7440-02-0)	No data available
Mn (Manganese) (CAS No. 7439-96-5)	Slight irritating (rabbit)
Serious eye damage/irritation	No information is available for the product as a mixture
Fe (Iron) (CAS 7439-89-6)	No eye irritation (Rabbit) - OECD Test Guideline 405
Cr (Chromium) (CAS No. 7440-47-3)	may cause Irritating
Ni (Nickel) (CAS No. 7440-02-0)	No data available
Mn (Manganese) (CAS No. 7439-96-5)	Slight irritating (rabbit)
Respiratory or skin sensitisation	No information is available for the product as a mixture
Fe (Iron) (CAS 7439-89-6)	Did not cause sensitisation on laboratory animals.
Cr (Chromium) (CAS No. 7440-47-3)	Respiratory sensitizer
Ni (Nickel) (CAS No. 7440-02-0)	May cause sensitisation by skin contact.
Mn (Manganese) (CAS No. 7439-96-5)	No data available
Germ cell mutagenicity	No information is available for the product as a mixture
Fe (Iron) (CAS 7439-89-6)	Not mutagenic in Ames Test.
Cr (Chromium) (CAS No. 7440-47-3)	Cromosome aberration test - Positive (rats)
Ni (Nickel) (CAS No. 7440-02-0)	No data available
Mn (Manganese) (CAS No. 7439-96-5)	No data available
Carcinogenicity	The International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), and OSHA do not list steel products as carcinogens.
Fe (Iron) (CAS 7439-89-6)	IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
Cr (Chromium) (CAS No. 7440-47-3)	IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Chromium) This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.
Ni (Nickel) (CAS No. 7440-02-0)	Limited evidence of carcinogenicity in animal studies IARC: 2B - Group 2B: Possibly carcinogenic to humans (Nickel) ACGIH: Group A1 (confirmed human carcinogen) NTP: Group 2 (reasonably anticipated to be a human carcinogen)
Mn (Manganese) (CAS No. 7439-96-5)	IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
Reproductive toxicity	
Fe (Iron) (CAS 7439-89-6)	Did not show teratogenic effects in animal experiments. Animal testing did not show any effects on fertility.
Cr (Chromium) (CAS No. 7440-47-3)	No data available
Ni (Nickel) (CAS No. 7440-02-0)	No data available
Mn (Manganese) (CAS No. 7439-96-5)	Fertility Test (mouse): Embryonic lethality, fetal malformations

STOT-single exposure	
Fe (Iron) (CAS 7439-89-6)	The substance or mixture is not classified as specific target organ toxicant, single exposure.
Cr (Chromium) (CAS No. 7440-47-3)	Causes respiratory tract irritation in humans
Ni (Nickel) (CAS No. 7440-02-0)	Pneumonia, pulmonary edema, may cause Kidney problems
Mn (Manganese) (CAS No. 7439-96-5)	Causes of pneumonia
STOT-repeated exposure	Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.
Fe (Iron) (CAS 7439-89-6)	The substance or mixture is not classified as specific target organ toxicant, repeated exposure.
Cr (Chromium) (CAS No. 7440-47-3)	No data available
Ni (Nickel) (CAS No. 7440-02-0)	Asthma, pulmonary fibrosis
Mn (Manganese) (CAS No. 7439-96-5)	Causes respiratory tract and nervous system
Aspiration hazard	No data available
Potential health effects	- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation. - Ingestion: May be harmful if swallowed. - Skin: May be harmful if absorbed through skin. May cause skin irritation. - Eyes: Causes eye irritation.

12. ECOLOGICAL INFORMATION

12.1 Ecotoxicity	No data available for the product as a whole. However, individual components of the product have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife.
Fe (Iron)(CAS 7439-89-6)	LC50: 13.6 mg/L (Fish, 96 hr)
Cr (Chromium) (CAS No. 7440-47-3)	mortality NOEC: 12 mg/L (Pimephales promelas, 7 d) mortality LOEC: 2.4 mg/L (Pimephales promelas, 7 d)
Ni (Nickel) (CAS No. 7440-02-0)	LC50: 1.3 mg/L (Cyprinus carpio (Carp), 96 h) EC50: 1 mg/L (Daphnia magna (Water flea), 48 h)
Mn (Manganese) (CAS No. 7439-96-5)	EC50: 40 mg/L (Daphnia magna (Water flea), 48 h)
12.2 Persistence and degradability	No data available
12.4 Bioaccumulative potential	
Fe (Iron)(CAS 7439-89-6)	No data available
Cr (Chromium) (CAS No. 7440-47-3)	Oncorhynchus mykiss (rainbow trout) - 30 d- 1,33 µg/l Bioconcentration factor (BCF): 1,03 - 1,22
Ni (Nickel) (CAS No. 7440-02-0)	No data available
Mn (Manganese) (CAS No. 7439-96-5)	No data available

12.5 Mobility in soil — No data available for the product as a whole. However, individual components of the product have been found to be absorbed by plants from soil.

13. DISPOSAL CONSIDERATIONS

13.1 Disposal instructions — Any excess product can be recycled for further use, disposed in an appropriately permitted waste landfill, or disposed by other methods in accordance with local, state, and federal regulations.

13.2 Waste from residues / unused products — Steel scrap should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.

13.3 Contaminated packaging — Follow applicable Federal, state and local regulations. Observe safe handling precautions.

14. TRANSPORT INFORMATION

Not a hazardous material for DOT shipping.

14.1 UN number — No data available

14.2 UN proper shipping name — Not dangerous goods

14.3 Transport hazard class(es) — No data available

14.4. Packing group — No data available

14.5. Environmental hazards — No

14.6. Special precautions for user — No data available

15. REGULATORY INFORMATION

15.1 Regulatory information

The following listing of regulations relating to a POSCO product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities. This product and/or its constituents are subject to the following regulations. And those followings are described (listed) by counting of first importance to USA.

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

Regulations in Korea — Individual components of the product are regulated under Industrial Safety And Health Act, Toxic Chemicals Control Act and Fire Services Act.

OSHA Regulations — Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): The product as a whole is not listed. However, individual components of the product are listed.

EPA Regulations: — - RCRA(40CFR261): Steel scrap is not regulated as a solid waste or a hazardous waste under this act. If product dusts and/or fumes from processing operations are not recycled, they are considered to be a solid waste and may be classified as a hazardous waste depending on the toxicity characteristics of the dust as defined within 40CFR261.24.

	- CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed. However, individual components of the product are listed: Copper (Reportable Quantity (RQ)-5000#). Manganese compounds are also listed although no reportable quantity is assigned to this generic or broad class. - SARA 311/312 Codes (40CFR370): Immediate (acute) health hazard and delayed (chronic) health hazard. - SARA 313 (40CFR372.65): Manganese is subject to SARA 313 reporting requirements. Please note that if you prepackage or redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.
State Regulations in USA	The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations. - Pennsylvania Right to Know: Contains regulated material in the following categories : Hazardous Substances: Calcium, Silicon and Sulfur. : Environmental Hazards: Aluminum, Copper and Manganese. - New Jersey Right to Know: Contains regulated material in the following categories: : Hazardous Substance: Aluminum (dust and fume), Copper, Manganese and Sulfur : Special Health Hazard Substances: Calcium. - California Prop. 65: The product may possibly contain trace quantities (generally much less than 0.1%) of metallic elements known to the State of California to cause cancer or reproductive toxicity. These include arsenic (inorganic), cadmium, lead and nickel.
Other Regulations:	The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

15.2 Chemical Safety Assessment:

No data available

15.3 Inventory status

No data available

16. OTHER INFORMATION

The contents and format of this MSDS/SDS are in accordance with Regulation (EC) No 1907/2006.

- **References**

Health Care Center, Department of Labor & Safety, POSCO

KOSHA – Chemical information database system

Other MSDS (Lookchem., Sigma-aldrich, Science lab, Guidechem etc., Fisher Scientific, etc)

International Uniform Chemical Information Database (IUCLID) (http://ecb.jrc.it/esis)

National Library of Medicine/Hazadous Substances Data Bank (NLM/HSDB) (http://toxnet/nim.nih.gov/cgi-bin/ sis/ htmlgen?HSDB)

TOXNET, U.S. National Library of Medicine (http://toxnet.nlm.nih.gov)

Corporate Solution From Thomson Micromedex (http://csi.micromedex.com)

The Chemical Database, The Department of Chemistry at the University of Akron (http://ull.chemistry.uakron.edu/erd)

Ecological Structure Activity Relationships (ECOSAR)

The ECOTOXicology database (ECOTOX) (http://cfpub.epa.gov/ECOTOX /quick_query.htm)

National Library of Medicine (NLM) (http://toxnet.nlm.nih.gov/cgi-bin/sis/html gen?CHEM)

- **Abbreviation and acronyms**

ACGIH - American Conference of Industrial Hygienists

BOD - Biochemical Oxygen Demand

CAS - Chemical Abstracts Service

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act of 1980

CFR - Code of Federal Regulations of the United States

CLP - Regulation on classification, labeling and packaging of substances and mixtures. (Directive67/548/EEC)

COD - Chemical Oxygen Demand

DOT - U.S. Department of Transportation

EC - European Community

EC50 - 50 % effective concentration

EEC - The European Economic Community

EPA - The United States Environmental Protection Agency

GHS - Global Harmonized System

HMIS - Hazardous Materials Identification System

IARC - International Agency for Research on Cancer

LC50 - 50 % lethal concentration

LD50 - 50 % lethal dose

LOEC - Lowest-Observed-Effect-Concentration

NIOSH - National Institute of Occupational Safety & Health

NOEC - No observed effect concentration

NTP - The National Toxicology Program

OECD - Organisation for Economic Co-operation and Development

OSHA - Occupational Safety and Health Administration

RCRA - Resource Conservation and Recovery Act

SARA - The Superfund Amendments and Reauthorization Act

SCBA - Self-Contained Breathing Apparatus

STOT - Specific Target Organ Toxicity

TWA - Time Weighted Average

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