Product Category Rules (PCR)

for preparing an Environmental Product Declaration (EPD) for

Carbon Steel and Carbon Steel Products

PCR 2010:1.0

China Steel Corporation

Version 1.0

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1. General Information

This document is to be used as the product category rules (PCR) for carbon steel and carbon steel products, excluding the stainless steel products, and is applicable to the carbon steel and carbon steel products manufactured and produced worldwide. The requirements specified in this PCR are intended to be used for EPDs certified in accordance with ISO 14025 standard. This document shall be valid until March 31, 2014.

This PCR was prepared by the China Steel Corporation ("CSC"). Representatives from major Taiwanese manufacturers of similar products and stakeholders were invited to the open consultation meeting held on August 19 and October 21, 2010, to participate in the discussion and review of this PCR. EDF then reviewed and approved this PCR.

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2. Company and product description

The EPD shall include information about the manufacturing company/organization. The information may include manufacturing process related information, and environmental related information, such as the environmental management system information. The information may also include special issues the company/organization would like to emphasize, such as the products meeting certain environmental criteria, or environmental safety and health related information.

This PCR covers the carbon steel and carbon steel products and is applicable to communications from business to business (B2B). The carbon steel and carbon steel products covered in this PCR include their packaging. The carbon steel and carbon steel products denoted in this PCR are defined as:

- **Carbon Steel:** Steel made of alloy of iron and carbon, of which carbon content is generally within a range from 0.02% to about 2%. Further, a small amount of silicon, manganese, phosphorus, sulfur, etc. are usually contained. For special requirements, carbon content is possible less than 0.02%.

- **Carbon Steel Products:** A generic term of steel processed to a required shape

by various kinds of methods such as rolling, forging, drawing or casting.

2.1 Product function

The EPD shall include, but not limited to, the following classification and product functions of the carbon steel and carbon steel products. In this PCR, three types of carbon steel (Sections 2.1.1 to 2.1.3) and 7 types of carbon steel products (Sections 2.1.4 to 2.1.10) are included.

2.1.1 Pig Iron **(CCC Code: 7201)**

Mainly used as raw materials for forging, casting and steel making.

2.1.2 Slab, Bloom, Billet & Ingot **(CCC Code: 7207)**

- Slab: Mainly used as raw materials for hot-rolled, cold-rolled, coated, galvanized & steel products.
- Bloom and Billet: Mainly used as raw materials for production of bar products, wire rod products, section products, and plate products.
- Ingot: Mainly used as raw material for forging/casting products, hot-rolled and cold-rolled products, as well as bar products and wire rod products.

2.1.3 Bar Products, Rebar Products and Wire Rod Products **(CCC Code: 7213)**

Mainly used in general structure, construction, mechanical construction, cold processing, hot forging process, hard steel wire and solder core wire products.

2.1.4 Plate Products **(CCC Code: 7208.51/.52/.90)**

Mainly used in building structure, shipbuilding, bridges, oil and gas pipelines, mechanical construction and pressure vessels.

2.1.5 Hot Rolled Products **(CCC Code: 7208, excluding 7208.90 products)**

Mainly used in body structures, buildings, bridges, roads, rails, steel pipes, office furniture, pressure vessels and tools.

2.1.6 Cold Rolled Products **(CCC Code: 7209)**

Mainly used as base material for automobile sheet metal and home appliance products which emphasis quality and exterior appearance, car and motorcycle parts which require high formability during processing, various structural and reinforcement parts, as well as products requiring surface coating treatment.

2.1.7 Galvanized Products **(CCC Code: 7210.49)**

Mainly used in computer casings, building roofs, home appliances, kitchen appliances, furniture, transportation, interior decoration, automotive sheet metal and appliance parts.

2.1.8 Coated Products **(CCC Code: 7210.70)**

Mainly used as coated steel coil in roof construction, household appliances, kitchen appliances, furniture, transportation and interior decoration; as well as used as the electromagnetic steel sheet for the production of core components of motors, transformers, voltage regulators and electrical instrumentation and other products.

2.1.9 Section Products **(CCC Code: 7216)**

Mainly used for general structural steel, welded structural steel, structural steel, bridge structure steel, covered public boards, vehicles, shipbuilding, machinery, offshore marine platforms and other large-scale main structure.

2.1.10 Pipe Products **(CCC Code: 7304** (excluding 7304.11/22/24/39/49 products))

Mainly used for water pipes, structural pipes, oil pipes and oil well casing.

2.2 Product components

2.2.1 Pig Iron

The EPD shall at least describe the main components and marking of pig iron.

2.2.2 Slab, Bloom, Billet, and Ingot

The EPD shall at least describe the main components and marking of slab, bloom, billet and ingot.

2.2.3 Bar, Rebar and Wire Rod

The EPD shall at least describe the main components, marking and packing material of bar products, rebar products and wire rod products.

2.2.4 Plate products

The EPD shall at least describe the main components and marking of plate products.

2.2.5 Hot Rolled Products

The EPD shall at least describe the main components, oiled, marking and packing material of hot rolled products.

2.2.6 Cold Rolled Products

The EPD shall at least describe the main components, oiled, marking and packing material of cold rolled products.

2.2.7 Galvanized Products

The EPD shall describe the main components of galvanized products, which shall at least include: base metal, zinc coating, chemical film, paint coating, oiled, marking and packing material.

2.2.8 Coated Products

The EPD shall describe the main components coated products, which shall at least include: base metal, insulating film or paint coating, marking and packing material.

2.2.9 Section Products

The EPD shall at least describe the main components, marking and packing material of section products.

2.2.10 Pipe Products

The EPD shall at least describe the main components, oiled, marking and packing material of pipe products.

2.3 Product technical description

2.3.1 Pig Iron

The technical description for pig iron products shall include the following information:

(1) Carbon (C) Content: Percent (%)
(2) Silicon (Si) Content: Percent (%)
(3) Dimension): Thickness x Width x Length (mm)

2.3.2 Slab, Bloom, Billet & Ingot

The technical description for slab, bloom, billet & ingot products shall include the following information:

(1) Semi-product Commodity Name: Slab, Bloom, Billet or Ingot
(2) Dimension: Thickness x Width x Length (mm)

2.3.3 Bar, Rebar & Wire Rod

The technical description for bar, rebar & wire rod products shall include the following information:

(1) Commodity Name: Straight Bar, Bar in Coil, Rebar, Wire in Coil, Spheroidization Annealed Bar or Wire in Coil.
(2) Product Specification: Specification No. & Grade.
(3) Nominal Dimension: Diameter and/or Length (mm).
(4) Delivery condition: Type of heat treatment.
(5) Additional Requirements.

2.3.4 Plate products

The technical description for plate products shall include the following information:

(1) Commodity Name: Plate.
(2) Product Specification: Specification No. & Grade.
(3) Nominal Dimension: Thickness x Width x Length (mm).
(4) Delivery condition: Type of heat treatment/surface treatment.
(5) Additional Requirements.

2.3.5 Hot Rolled Products

The technical description for hot rolled products shall include the following information:

(1) Commodity Name: Hot-Rolled Coil/Sheet, Hot-Rolled Pickled and Oiled Coil.
(2) Product Specification: Specification No. & Grade.
(3) Nominal Dimension: Thickness x Width and/or Length (mm).
(4) Delivery condition: Type of heat treatment/surface treatment.
(5) Additional Requirements.

2.3.6 Cold Rolled Products

The technical description for cold rolled products shall include the following information:

(1) Commodity Name: Cold Rolled Steel Coil.
(2) Product Specification: Specification No. & Grade.
(3) Nominal Dimension: Thickness x Width (mm).
(4) Delivery condition: Type of heat treatment/surface treatment.
(5) Additional Requirements.

2.3.7 Galvanized Products

The technical description for galvanized products shall include the following information:

(1) Commodity Name: Electrolytic Zinc-coated Steel Coil or Hot-dip Zinc-coated Steel Coil.
(2) Product Specification: Specification No. & Grade.
(3) Coating Designation: Type of Coating, Coating Mass
(4) Surface Treatment: Chemical treatment/Oiled.
(5) Nominal Dimension: Thickness x Width (mm).
(6) Additional Requirements.

2.3.8 Coated Products

The technical description for coated products shall include the following information:

(1) Commodity Name: Electric/Magnetic Steel Coil or Prepainted Cold Rolled Steel Coil.
(2) Product Specification: Specification No. & Grade.
(3) Insulating Film or Painting Treatment: Type of Insulating Film, Type of Paint.
(4) Nominal Dimension: Thickness x Width (mm).
(5) Additional Requirements.

2.3.9 Section Products

The technical description for section products shall include the following information:

(1) Commodity Name: Section Product.
(2) Product Specification: Specification No. & Grade.
(3) Nominal Dimension: Height x Width x Web Thickness / Flange Thickness (mm)
(4) Additional Requirements.

2.3.10 Pipe Products

The technical description for pipe products shall include the following information:

(1) Commodity Name: Steel Pipes.
(2) Product Specification: Specification No. & Grade.
(3) Nominal Dimension: Diameter x Thickness x Length (mm).
(4) Additional Requirements.

3. List of materials and chemical substances

The contents of the following materials and chemical substances in the product shall be declared:

- All materials used in the product weighing ≥ 0.5% product weight;
- All substances used in the product regulated by customer and legal requirements (such as compliance declaration required in EU's RoHS Directive).
- The substances in the main components which are regulated by EU's RoHS Directive (the latest version).

The declaration of no RoHS-regulated substances may only be made when appropriate evidences are available (for example, test reports from accredited laboratories/testing facilities). The following organizations may provide accreditation for testing facilities: Taiwan Accreditation Foundation (TAF), (Asia Pacific Laboratory Accreditation Cooperation (APLAC), International Laboratory Accreditation Cooperation (ILAC) or ILAC Mutual Recognition Arrangement (ILAC MRA). For definitions of testing methodology and confirmations of regulated hazardous substances based on the accredited laboratories' product testing methods, please refer to IEC 62321 Standard.

4. Declared unit

The declared unit is defined as one (1) kg of carbon steel and carbon steel products, as carbon steel and carbon steel products are marketed and sold in such a unit.

5. System boundaries

The main system boundaries of the product system are presented as follows:

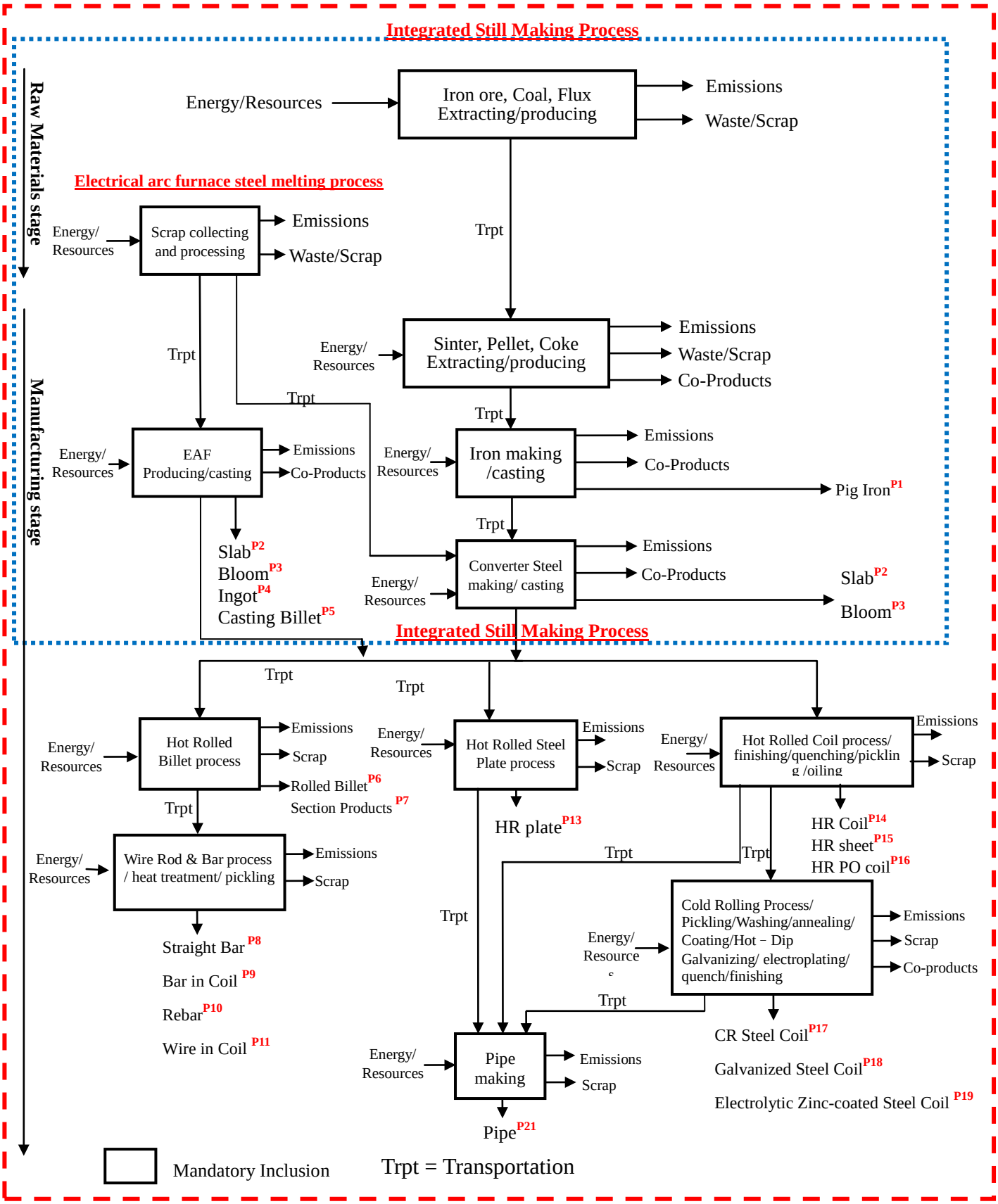

Figure 1 System boundary of the main product system

The life cycle of carbon steel and carbon steel products is described in Figure 1 above, and includes only raw material mining phase and manufacturing phase. The inclusion in the LCA information on recycling is voluntary (see Section 11).

Raw material mining phase

The LCA shall include information for the following unit processes:

— Raw material extraction
— Raw material processing and manufacturing
— Transportation of raw materials to product manufacturer.

The inclusion in the LCA the information on shaping and refining of secondary materials and other minor components is of the voluntary reporting nature. When voluntarily reported information is included, they shall be explained in the EPD.

Manufacturing Phase

The LCA shall include information for the following unit processes:

— Handling, transportation, shaping and refining of raw materials

— Handling, transportation, shaping and refining of auxiliary materials

— Processing, shaping and manufacturing of intermediate products

— Product packaging

Use Phase

The EPD does not include information on product transportation during use phase and other use phase information.

The inclusion in the LCA information on shaping and refining of secondary raw materials and auxiliary materials, as well as manufacturing of minor components is of the voluntary reporting nature. When voluntarily reported information is included, they shall be explained in the EPD.

5.1 Specification of different boundary settings

Boundary in time

The validity period for the LCA results presented in the LCA report shall be defined.

Boundary towards nature

If the manufacturing processes are located within Taiwan, the waste categories as defined in Taiwan's Waste Disposal Act shall be adopted. If the processes are located in other countries, equivalent legal requirements shall be considered.

The natural boundary of the system shall describe the boundary where the materials and energy resources flow from nature into the system, and where the water and air emissions and waste are released out of the system.

Only waste which is required to be disposed of needs to be considered. If the waste will be treated through water treatment or incineration, these processes need to be included; landfilling process does not need to be included.

Boundaries in the life cycle

The boundaries in the product life cycle are described in Figure 1. The construction of the site and infrastructure, as well as the production of manufacturing equipment does not need to be included.

Boundaries towards other technical systems

Boundaries towards other technical systems describe the inputs of material and other components towards other systems, as well as outputs of materials towards other systems. For the inputs of recycled materials and energy towards the product manufacturing phase, the transportation between the recycling process and use of recycled materials shall be included in the data set. For the production of recyclable products during the manufacturing phase, the transportation towards the recycling process shall be included.

Boundaries regarding geographical coverage

The manufacturing phase may cover manufacturing processes located on any sites around the world. For processes located in a specific region, the data used should be representative of the region. The data for the main components shall be the specific regional data for the region where the process takes place (see Section 9). For ease of comparison, no matter where the emissions are generated, the same parameters should be used for life cycle impact assessment (see Section 10).

5.2 Other requests for boundary settings

If the system boundary only covers a part of the flowchart as described in the Figure 1, the relation between up-stream and down-stream processes shall be described in detail, and the EPD shall include various environmental information regarding the up-stream

processes.

6. Cut-off rules

For any impact category, if the sum of various impacts from a specific process/activity is less than 1% of the impact equivalent in that category, such a process/activity may be neglected during the inventory analysis. Components/parts and materials omitted from the LCA shall be documented.

(Note: This judgment for this “1% Rule” is based on the environment relevance assessment of material input to the system, and does not consider special and exceptional environmental impacts.)

7. Allocation rules

The main allocation rules shall be valid for the entire product system. For other secondary processes, other allocation rules may be defined; however, the use of these rules should be justified. Product-specific information should be preferentially collected in order to avoid the need for allocation.

While selecting allocation rules, the following principles are recommended.

- Multi-output: The allocations are based on the changes in the resource consumption and pollutant emissions (for example, adopted quantity allocation for some main component, or surface allocation for some components), following the changes in the studied system’s output product or function or economical relationship.

- Multi-input: The allocation is based on actual relationship. For example, the manufacturing process’s emissions may be affected by the change in waste flow input.

- Open loop recycling: For the input of recycled materials or energy during the manufacturing phase of the product system, the transportation between the recycling process and the recycling to material use shall be included in the dataset. For the product which shall be recycled during the manufacturing phase, the transportation towards the recycling process shall be included.

- System Expansion Method: For a product system which produces multiple products and by-products (such as valuable fuel gas, coal by-products and slag) during the manufacturing process, the principle of production avoidance shall be used for the allocation rule of products and by-products. For the allocation principle of iron and steel product LCI study, please refer to “worldsteel, World

Steel Life Cycle Inventory Methodology Report 1999/2000, October 2002."

Notes:

- Allocation may be avoided through avoidance of dividing processes, for example as described in Section 6.3 of ISO/TR 14049; or through expansion of system boundary (for example as described in Section 6.4), so that the amended system shares the same product exchanges as the original system.

8. Units

The base units and derived units of the International System of Units (SI, Système International d'unités) shall be used preferentially.

The following units shall be used:

Power & energy units:

- power unit: W
- energy unit: J

Specification units:

- length unit: m
- capacity unit: m^3
- area unit: m^2
- weight unit: g

If necessary, prefixes may be used before the SI units.

10^9 = giga, symbol "G"
10^6 = mega, symbol "M"
10^3 = kilo, symbol "k"
10^{-2} = centi, symbol "c"
10^{-3} = milli, symbol "m"
10^{-6} = micro, symbol "μ"
10^{-9} = nano, symbol "n"

Preferentially used power and energy units:

- power units use W;
- energy units use kWh.

9. Calculation rules and data quality requirements)

- Site-specific data (for example, specific factory data or transportation data for a specific manufacturing process) shall be used for the manufacturing of main assembly and components. If other types of information are used, description of the information and rationale for using such information shall be provided.

- Generic data may be used for the manufacturing process of non-major and auxiliary materials.

- Generic data may also be used for the production of bulk materials (see Appendix I for sources of generic data). For example, when bulk raw materials are purchased from the spot market and during waste processing; when suppliers refuse to provide specific data; or when even if generic data are used in place of specific data, there is only minor impacts to the results. The general rule is that when generic data are used as substitute for site specific data, their combined contribution for all life cycle phases shall be no greater than 10% of the total impact for any impact category. But there may be certain exception to specific products.
- The data shall be representative for the average of a specific year.

Date quality requirements for the manufacturing phase:

- Site-specific data shall be used for the production of main assembly/components of the product.
- The electricity mix for the manufacturing phase should be site-specific data. If site-specific data cannot be obtained, the official electricity mix for the country where the site is located may be used as approximate value. The electricity mix should be documented.

- For the definition of hazardous waste, the definition as defined in Taiwan's Waste Disposal Act shall be used for sites located in Taiwan. For sites located outside Taiwan, legal requirements for the host country shall be observed.

- For the transportation of manufacturer, the transportation modes and distances used by the suppliers shall be considered.

10. Parameters to be declared in the EPD

The following parameters shall be declared in the EPD:

1. Energy Use MJ

2. Resource Use

Water consumption tonne

3. Impact equivalents expressed as potential environmental impacts

-Global warming	kg CO_2 equivalent
-Acidification	kg SO_2 equivalent
-Ozone depletion	kg CFC-11 equivalent
-Photochemical oxidant formation	kg C_2H_4 equivalent
-Eutrophication	kg PO_4^{3-} equivalent

Note: For characterization factors of each impact category, please refer to *EPD Supporting Annexes*, Version 1.0 (2008-02-29), The International EPD Cooperation, downloadable from www.environdec.com.

4. Additional information

- □ - Recyclable materials (optional)
- □ - Information on secondary materials (optional)
- □ - Waste (classification):
  - - Hazardous waste as defined in Taiwan's Waste Disposal Act. Follow host countries' laws for sites outside Taiwan.
  - - Other waste.

(Note: Declared waste includes both solid and semi-solid waste.)

11. Recycling information

The recycling information shall include information such as disassembly instructions, which parts/components are suitable for recycling (such as metal cases) or not suitable for recycling.

Information for the parts which can not be recycled and therefore should be disposed of properly during the end-of-life phase may also be included.

12. Other environmental information (Optional)

The EPD may cover information including technology adopted, site of product manufacturing and assembly, as well as information on other working environment, health and risk-related aspects.

If this PCR is to be used for product carbon footprint declaration purpose, in the declaration, information regarding commitment on GHG reduction shall be included and shall ensure that the commitment is measurable, reportable and verifiable. The organization may also list environmental and energy management related information, such as awards, commendations and system certifications (such as QC 08000 IECQ HSPM).

13. Information about the certification

The information on PCR review, EPD verification and verification organization shall be included.

EPD Certification is valid until 2013-__-__ According to the Requirements for the international EPD system. General Programme Instructions, version 1 (2008) – www.environdec.com. The PCR review for _____ (PCR 2010:) was administered by the Environment and Development Foundation and carried out by an LCA expert panel chaired by Dr. Ning Yu (ningyu@edf.org.tw) Independent verification of the declaration, according to ISO 14025:2006 □ Internal ■ External
Third party verifier：Environment and Development Foundation in Taiwan. Accredited by : Name: Title: Organization: Signature:_____ Name: Title: Organization: Signature:_____ Name: Title: Organization: Signature:_____
Environmental declarations from different programmes may not be comparable.

14. References

The EPD shall make reference to the following documents:

- EPD General Program Instructions, Version 1.0 (2008-02-29), The International EPD Cooperation, downloadable from http://www.environdec.com/.

-World Steel Association, World Steel Life Cycle Inventory Methodology Report 1999/2000, October 2002.

- EPD Requirements, MSR 1999:2, downloadable from http://www.environdec.com/.

- Relevant PCR documents.
- The underlying LCA report.

When available, the following documents shall also be referenced:

- Other documents and recycling instructions which verify and complement the EPD.

Appendix I – Generic Data Sources to Refer to

For processes located within Taiwan, Taiwan generic data or data published by the commercial, industrial or energy competent authorities of the Republic of China (ROC) government, may be used. However, for other regions (such as EU), if there are more relevant generic data available, these data should be used instead.

When data from the following generic databases are used, the most current and updated data should be used:

Material	Database	Published
LCA Database in Taiwan	DoITPro	2008
Steel	World Steel Association (worldsteel)	2010
Copper	ICA (International Copper Association)	1998
Copper semi products	ICA (International Copper Association) + IME (Institut für Metallhüttenwesen und Elektrometallurgi, Aachen)	1998 1995
Electricity	ETH (Eidgenössische Technische Hochschule) Data combined with IEA (International Energy Agency) statistics 1998	1996
Aluminum	EAA (European Aluminum Association)	2000
Plastics (and some chemicals)	APME (Association of Plastics Manufacturers in Europe)	1993-1998
Electronic components	EIME (Environmental Information and Management Explorer) EcoBilan	1998-2000
Energy	Boustead model 5.0	2007
Industrial processes	Ecoinvent 2nd edition	2007
Energy	ETH ESU 96	2004
Packaging materials, transport, waste treatments	BUwAL 250, 2nd edition	2004

Appendix II – Reporting Format for the EPD

This appendix provides guidance information for the titles of sections, types of data and required information to be reported in the mandatory reporting part of the EPD. As a generic reporting template, the following titles and sub-titles are recommended:

(Refer to the PCR manual for the section numbering, the information in Italics are the recommended data/information for inclusion)

Introductory part

Each EPD should have an introduction part on the top part of the EPD which includes the following information:

- *Company/organization name*
- *Product name*
- *EPD registration number*

Description of the company/organization and product/service

Company/Organization

- *Description of company/organization*
- *Description of overall working environment, existing quality system and environmental management system*

Product and services (see Section 2)

- *Product's main applications*
- *Description of product specification, manufacturing process, manufacturing sites (if there are several sites)*
- *For product's environmental performance aspects, characteristics which may improve the usefulness of product*
- *Other types of relevant information, for example, special manufacturing processes with special advantages to the environment*

List of materials and chemical substances

- *Content declaration (see Section 3)*

Presentation of the environmental performance

- *Outline of the LCA methodology, for example, period of LCA, declared units, system boundaries (graphical presentation), cut-off and allocation rules, and data sources.*

Material extraction phase *(see Section 10)*

Manufacturing phase *(see Section 10)*

Information about Company and Certification Organization

Recycling information *(see Section 11)*

Other environmental information *(see Section 12)*

Information regarding certification *(see Section 13)*

- *Names of certification and verification organizations*
- *Validity of certification certificates*
- *Compliance with legal and relevant requirements*

References *(see Section 14)*

- relevant PCR documents;

- EPD Requirements, MSR 1999:2;

- underlying LCA study;

- other supporting documents for LCA information;

- other relevant documents regarding company/organization's environmental activities.