

Product-Category Rules (PCR)  
for Preparing an Environmental Product  
Declaration (EPD) for  
Stainless Steel Slab/Stainless Steel Billets  
PCR 2011:1.0

Yieh United Steel Corp.

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## **Table of Contents**

1. General information
  2. Company and product description
    - 2.1 Product group function
    - 2.2 Product constituents
    - 2.3 Product technical description
  3. List of materials and chemical substances
  4. Declared unit
  5. System boundaries
    - 5.1 Specifications for different boundary settings
  6. Cut-off rules
  7. Allocation rules
  8. Units
  9. Calculation rules and data quality requirements
  10. Parameters to be declared in the EPD
  11. Recycling information
  12. Other environmental information (Optional)
  13. Information about the certification
  14. References
- Appendix I Generic data sources to refer to
- Appendix II Reporting format for the EPD
- Appendix III Abbreviations

## **1. General Information**

This document is to be used as the product category rules (PCR) for the global production and manufacturing of stainless steel slab/stainless steel billets. 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 December 31, 2013.

This PCR was prepared by Yieh United Steel Corp. (YUSCO). Representatives from major Taiwanese manufacturers of similar products and stakeholders were invited by the Taiwan Steel and Iron Industries Association to the open consultation meeting on December 15, 2011, to participate in the discussion and review of this PCR. Environment and Development Foundation (EDF) then reviewed and approved this PCR.

This PCR is applicable to products with the CCC Code of 721890.

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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 which the company/organization would like to emphasize, such as the products meeting certain environmental criteria, or environmental safety and health related information.

This PCR is applicable to business to business (B2B) communications covering the stainless steel slab/stainless steel billets. The stainless steel slab/stainless steel billet products also include the packaging. In this PCR, the term “stainless steel slab/stainless steel billet” is defined as follows:

The stainless steel refers to an alloy of iron and chromium. It is a type of steel alloy with at least 10.5% chromium content and usually contains a small amount of silicon, manganese, phosphorus, sulfur or other specific trace elements. Depending on the type of stainless steel, it may also contain a certain proportion of nickel, manganese and molybdenum and other elements. Based on its shape, stainless steel can be divided into stainless steel slabs and stainless steel billets.

### **2.1 Product group function**

This PCR includes the classification and description of stainless steel slabs and stainless steel billets. Stainless steel slab is primarily used as the raw material to produce hot-rolled, cold-rolled and steel plate products; while the stainless steel billet is used mainly as the raw material for production of steel bar and steel wire products.

### **2.2 Product constituents**

The description for stainless steel slab/stainless steel billets in the EPD shall at least include the major constituents and marking. For example:

The main raw materials for stainless steel are:

- Iron, including scrap carbon steel and scrap stainless steel;
- Silicon, manganese, phosphorus, sulfur or other specific trace elements; and
- Certain stainless steel contains a specific percentage of chromium alloy, nickel alloy and molybdenum.

The auxiliary materials for stainless steel include: lime, flux, etc.

The data quality requirements for the main constituents are described in Section 9 on calculation rules and data quality requirements. The EPD shall also include the other constituents of the product, but their data quality requirements are different from those of the main constituents.

### **2.3 Product technical description**

The product technical description part of the EPD may include but not limited to the following information:

- (Semi-product commodity) name;
- Grade;
- Dimension: Thickness x Width x Length (mm)

### **3. List of materials and chemical substances**

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

- All materials of the product (excluding packaging material) with weight ratio (material weight/product weight (excluding packaging))  $\geq 1\%$ ;
- All materials of the packaging with weight ratio (material weight/packaging weight)  $\geq 1\%$ ;
- All materials/substances in the product (including packaging) regulated by legal, customer and environmental requirements.

### **4. Declared unit**

The declared unit is one tonne of stainless steel slab/stainless steel billet. This unit is chosen because the stainless steel slab/stainless steel billet products are marketed and sold in units of weight.

## 5. System boundaries

The main system boundaries for the declared product system are presented as follows:

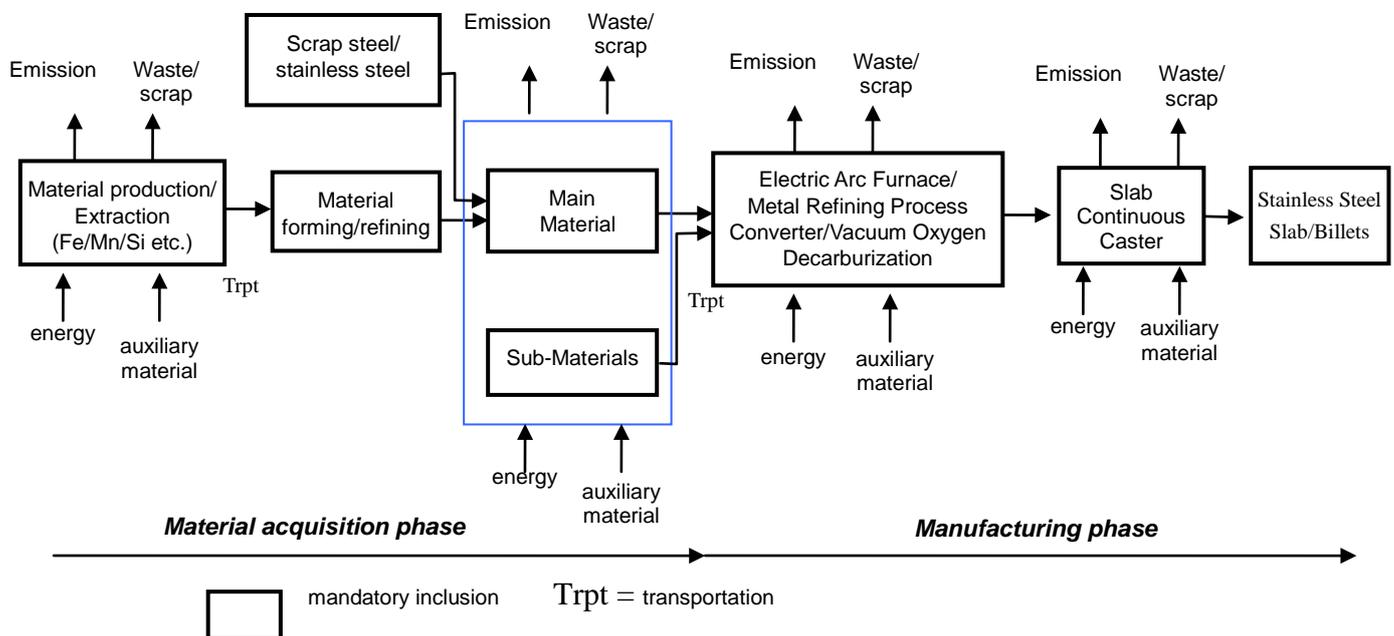


Figure 1 System boundary of the product system

As noted in Figure 1 above, the life cycle of stainless steel slab/stainless steel billet only covers two life cycle stages: raw material acquisition and product manufacturing. The data quality requirements for the main constituents and other constituents are described in Section 9 on calculation rules and data quality requirements.

### Raw Materials Acquisition Stage

The LCA shall include information for the following unit processes:

- Material extraction and manufacturing of main components and other components;
- Production/generation of energy used for raw material manufacturing;
- Transportation among raw materials; and
- Information regarding recycling and reuse of scrap carbon steel/scrap stainless steel, e.g., recycling ratio of scrap carbon steel, recycling channel, etc.

The inclusion in the LCA the information on the forming and refining of raw materials and transportation of raw materials is optional (voluntary).

### Manufacturing Stage

The LCA shall include information for the following unit processes:

- Energy/resource and material inputs associated with product manufacturing
- Emissions from manufacturing of products and generation of associated process waste;

- Transportation of process waste to treatment/disposal facility; and
- Transportation of products within manufacturing plant.

### **Distribution and Marketing Stage**

EPD for the product as defined in this PCR is for B2B communication purpose, thus the environmental loading during the distribution and marketing stage is not within the scope of the inventory study.

### **Recycling/end-of-life Stage**

EPD for the product as defined in this PCR is for B2B communication purpose, thus the environmental loading during the recycling/end-of-life stage is not within the scope of the inventory study.

## **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 solid 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 the waste which is required to be disposed of needs to be considered; landfilling process does not need to be included. If the waste is generated through wastewater treatment or incineration process, such waste should be included into the wastewater treatment or incineration process.

### **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 and activities of the workers, 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 stage, 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 stage, the transportation towards the recycling process shall be included.

*(Note: Further explanations are provided in Section 7 on open-loop recycling)*

### **Boundaries regarding geographical coverage**

The manufacturing stage 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 environmental impact parameters should be used for life cycle impact assessment (see Section 10).

## 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. Nonetheless, the accumulated impact of neglected process/activity may not exceed 5%. Components 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 stage 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 stage, the transportation towards the recycling process shall be included.

*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.

Power & energy units:

- power unit: W
- energy unit: J

Specification units:

- length unit: m
- capacity unit: m<sup>3</sup>
- area unit: m<sup>2</sup>
- weight unit: kg

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

10<sup>9</sup> = giga, symbol “G”

10<sup>6</sup> = mega, symbol “M”

10<sup>3</sup> = kilo, symbol “k”

10<sup>-2</sup> = centi, symbol “c”

10<sup>-3</sup> = milli, symbol “m”

10<sup>-6</sup> = micro, symbol “μ”

10<sup>-9</sup> = nano, symbol “n”

## **9. Calculation rules and data quality requirements**

### **Date quality requirements for the raw material acquisition stage**

- Generic data may be used for the acquisition, production, forming and refining of raw materials used for the constituents of the stainless steel slab/stainless steel billet products. Please refer to Appendix I for the common sources of generic data.

### **Date quality requirements for the manufacturing stage**

- Site specific data (for example, specific data for manufacturing plant or transportation) shall be used for the manufacturing of major constituents of the stainless steel slab/stainless steel billet products. If other types of information are used, description of the information and rationale for using the information shall be provided. For site specific data of main materials manufacturing plants, specific data from a plant representative of such a site may be used.
- Generic data may be used for the manufacturing of other materials for the stainless steel slab/stainless steel billet products, and based the calculation on actual consumption. Please refer to Appendix I for the common sources of generic data.
- When generic data are used, the equivalence between the chemical and/or physical process of referred systems shall be considered. Moreover, it is also recommended to consider the date or geographic aspects of the data quality when feasible.
- Generic data may also be used when suppliers refuse to provide specific data, or when even if generic data are used in place of specific data, there is only minor impact to the results. The general rule is that if generic data are used in place of specific data, their combined contribution for all life cycle stages shall not be greater than 20% of total impacts for each impact category. But there may be certain exception to specific products, and such exceptions shall be explained.
- The data shall be representative for the average of a specific year. If the average data for a specific time period of less than one year is used, the reason for using such data shall be provided.

- The electricity mix for the manufacturing stage 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 main materials to the manufacturing plant, the actual transportation modes used and distance traveled shall be considered.

## 10. Parameters to be declared in the EPD

The following parameters shall be declared in the EPD:

### Energy use

- The energy consumption during each product life cycle stage shall be declared. If the product is intended for end-users, the power consumption during the use stage shall also be declared.
- The following units shall be used preferentially:  
kW or W for power; J or MJ for energy.

### Resource use

The information on resource input during the product life cycle stages shall be declared.

### Impact equivalents expressed as potential environmental impacts

-Global warming	kg CO <sub>2</sub> equivalent
-Acidification	kg SO <sub>2</sub> equivalent
-Photochemical oxidant formation	kg C <sub>2</sub> H <sub>4</sub> equivalent
-Eutrophication	kg PO <sub>4</sub> <sup>3-</sup> equivalent
-Ozone depletion	kg CFC-11 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](http://www.environdec.com).

### 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.

## **11. Recycling information**

The recycling information shall include information such as dis-assembly instructions, which parts/components are suitable for recycling (such as metal cases) or not suitable for recycling. The information which the EU WEEE Directive requires the end product manufacturer to provide may also be included in the product declaration information for stainless steel slab/stainless steel billet products.

If practical, information for the parts which can not be recycled and therefore should be disposed of properly during the end-of-life stage 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 should 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 (e.g., ISO 14001, ISO 14064-1, IECQ HSPM) etc.



## 14. References

Energy Star Computer Specification -Version 5.2

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/>;
- 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 the data published by the commercial, industrial and 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. The following generic databases are recommended for use.

Material	Database
Packing materials, transport, Waste treatments	BUWAL 250
Steel, Primary copper, Copper products, Electricity, Fuels, Aluminum, Chemicals, Transports, Waste management	ELCD EIME (Environmental Information and Management Explorer) EcoBilan
Plastics	PE Plastics Europe (Association of Plastics Manufacturers in Europe) ELCD EIME (Environmental Information and Management Explorer) EcoBilan
Electronic components	ELCD EIME (Environmental Information and Management Explorer) EcoBilan
General Database	Ecoinvent The Boustead Model PE-GaBi DoITPro(Taiwan)

## **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.*

#### ***Manufacturing stage (see Section 10)***

#### ***Use stage (see Section 10)***

- *Geographical region for product delivery*
- *Transportation data*
- *End-of-life information*

### **Information about Company and Certification Organization**

#### ***Recycling information (see Section 11)***

#### ***Other environmental information (see Section 12)***

#### ***Information regarding certification***

- *Names of certification and verification organizations*

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

**References** (see Section 14)

- *relevant PCR documents*
- *EPD General Program Instructions, Version 1.0 (2008-02-29)*
- *underlying LCA study*
- *other supporting documents for LCA information*
- *other relevant documents regarding company/organization's environmental activities*

### Appendix III Abbreviations

<b>Acronym</b>	<b>Common Name</b>
APLAC	Asia Laboratory Accreditation Cooperation
CFP	Carbon Footprint of Product
EPD	Environmental Product Declaration
ErP	Energy Related Product
ILAC	International Laboratory Accreditation Cooperation
ILAC MAR	International Laboratory Accreditation Cooperation Mutual Recognition Arrangement
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rule
RoHS	The Restriction of the use of certain Hazardous Substances in electrical and electronic equipment
SPI	Society of the Plastics Industry
TAF	Taiwan Accreditation Foundation
TEC	Typical Energy Consumption
Trpt	Transportation