

Product-Category Rules (PCR)
for Preparing an Environmental Product
Declaration (EPD) for

Hot-Dip Metallic Coated Steel Coils/

**Prepainted Hot-Dip Metallic Coated
Steel Coils**

PCR 2010:1.0

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Industrial Technology Research Institute

Environment and Development Foundation

Version 1.0

2010-08-25

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1. General Information

This document is to be used as the product category rules (PCR) for hot-dip metallic coated steel coils/prepainted hot-dip metallic coated steel coils, and is applicable to the world-wide production of hot-dip metallic coated steel coils/prepainted hot-dip metallic coated steel coils. The requirements specified in this PCR are intended to be used for EPDs certified in accordance with the ISO 14025 standard. This document shall be valid until August 25th, 2013.

1.1 Types of Hot-Dip Metallic Coated Steel Coils and corresponding CCC Codes:

There are three major types.

1.1.1 Hot-Dip Galvanized* Steel Coils: There are two types due to difference in iron content of the coating layer.

(1).Hot-Dip Galvannealed* Steel Coils (CCC Code:7210.49.)

(2).Hot-Dip Non-Alloyed Galvanized Steel Coils (CCC Code:7210.49.)

*Note:

1. "Galvanized" also known as "Zinc-Coated".

2. "Galvannealed" also known as "Zinc-Iron Alloy-Coated"

1.1.2 Hot-Dip 5% Al-Zn Coated Steel Coils (CCC Code:7210.49.)

1.1.3 Hot-Dip 55% Al-Zn Coated Steel Coils (CCC Code:7210.61.)

1.2 Types of Pepainted Hot-Dip Metallic Coated Steel Coils and corresponding CCC Codes:

There are three major types.

1.2.1 Prepainted Hot-Dip Galvanized Steel Coils (CCC Code:7210.70.)

1.2.2 Prepainted Hot-Dip 5% Al-Zn Coated Steel Coils(CCC Code:7210.70.)

1.2.3 Prepainted Hot-Dip 55% Al-Zn Coated Steel Coils(CCC Code:7210.70.)

This PCR was prepared by Yieh Phui Enterprise Co., Ltd. and was discussed during the consultation meeting organized by Taiwan Steel and Iron Industries Association (TSIIA) on June 18th, 2010. During the meeting, representatives from major Taiwanese manufacturers of similar products and stakeholders were invited to participate in the discussion and review of 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 hygiene related information.

This PCR is for B2B (Business to Business) only. It covers the hot-dip metallic coated steel coils/ prepainted hot-dip metallic coated steel coils products, and their packaging.

2.1 Product group function

2.1.1 Characteristics and applications of hot-dip metallic coated steel coils

Owing to the coverage of the coating layer (zinc, 5% Al-Zn or 55% Al-Zn) and the protection offered by the sacrificial anode on the steel substrate, the hot-dip metallic coated steel coils have very long service life span, and can provide excellent weathering resistance, good adhesion and easy formability. Thus the hot-dip metallic coated steel coils are suitable for applications in auto parts, IT products (such as computer cases, servers, power supplies; parts of gaming systems, LCD monitors, LCD TVs, and etc.), home appliances (refrigerators, washing machines, air conditioners, vending machines, and etc.), and building materials (purlin, roofing & siding, ventilation duct, scaffolding, and etc.)

2.1.2 Characteristics and applications of prepainted hot-dip metallic coated steel coils

Due to the excellent substrate of hot-dip metallic coated steel coils and the paint film, the prepainted hot-dip metallic coated steel coils can provide good formability, impact resistance, abrasion resistance, chemical resistance, corrosion resistance, weather resistance, and etc. Thus, the prepainted hot-dip metallic coated steel coils are suitable for applications such as outer casing of home appliances, IT products (such as components of LCD monitors, LCD TVs, LED TV components, and etc.) and building materials (such as roofing, siding, partitions, curtain walls, factory buildings, covering materials, elevator panels, and etc).

2.2 Product constituents

2.2.1 The EPD should state the major constituents of the hot-dip metallic coated steel coils, at least include carbon steel substrate, metallic coating layer, surface treatment film and packaging material.

2.2.2 The EPD should also state the major constituents of the prepainted hot-dip metallic coated steel coils, at least include carbon steel substrate, metallic coating layer, surface pre-treatment film, paint coating and packaging material.

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 other constituents of the products, 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 shall include the following information:

2.3.1 Hot-Dip Metallic Coated Steel Coils:

- (1) Commodity: Hot-Dip Galvanized Steel Coils / Hot-Dip 5% Al-Zn Coated Steel Coils / Hot-Dip 55% Al-Zn Coated Steel Coils
- (2) Specification Designation: JIS, ASTM, EN or others
- (3) Coating Mass Designation
- (4) Surface Treatment: Surface Passivation Treatment/ Organic Resin Coating/ Oiled
- (5) Dimensions: Thickness × Width
- (6) Designed Life Span

2.3.2 Prepainted Hot-Dip Metallic Coated Steel Coils:

- (1) Commodity: Prepainted Hot-Dip Galvanized Steel Coils / Prepainted Hot-Dip 5% Al-Zn Coated Steel Coils / Prepainted Hot-Dip 55% Al-Zn Coated Steel Coils
- (2) Specification Designation: JIS, ASTM, EN or others
- (3) Coating Mass Designation
- (4) Paint Coating Type: PE/SMP/AC/PU/PVC/PVDF or others
- (5) Dimensions: Thickness × Width
- (6) Designed Life Span

3. List of materials and chemical substances

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

- All materials and chemical substances with weight ratio (material weight/product weight) $\geq 0.5\%$;
- All banned substances regulated and environmentally-related by legal and customer requirements;
- The following materials in the main constituents: flame retardants, lead content in soldering, lead and flame retardant content in solder masking agent, and substances regulated by RoHS Directive (the latest version).

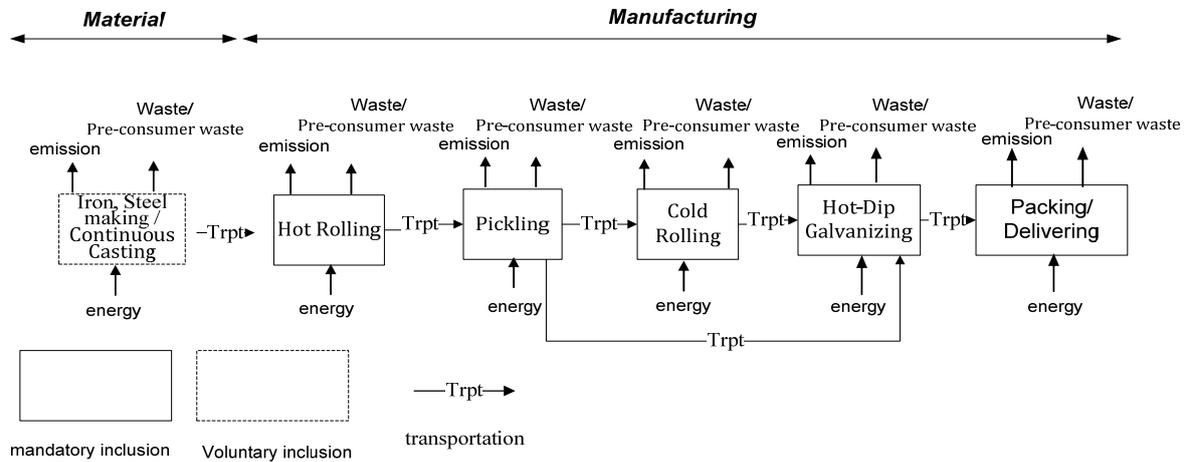
The declaration of halogen-free flame retardants, lead-free solders and no RoHS-regulated substances may only be made when appropriate evidences are available (for example, test reports from accredited laboratories/testing facilities). The following organizations may provide accreditation for testing 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 kilogram (1 kg) of hot-dip metallic coated steel coils/prepainted hot-dip metallic coated steel coils, as the products are sold in the units of weight.

5. System boundaries

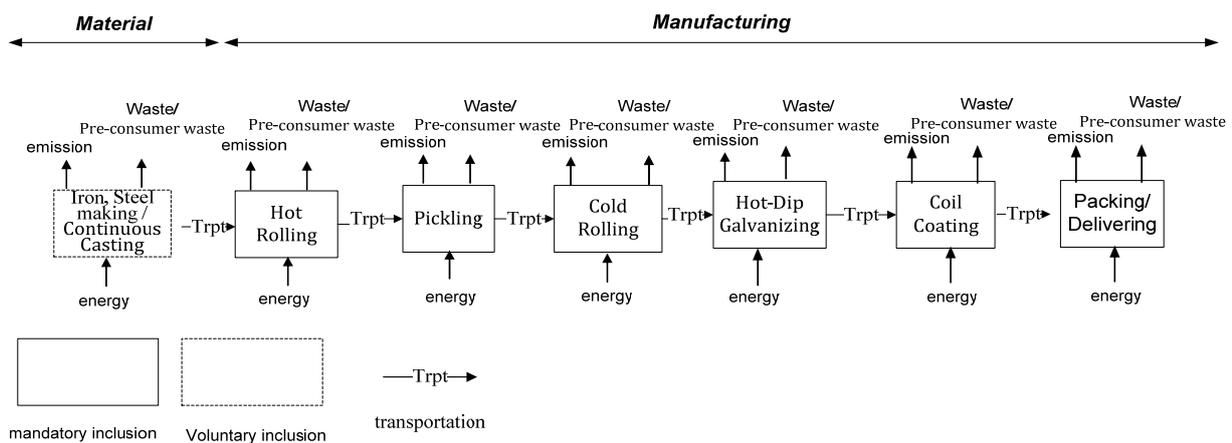
The system boundaries of the product system covering only B2B phases are presented as follows:



Note 1: Scrap materials (pre-consumer waste) include steel scrap, zinc slag, iron oxide powder, and etc.

Note 2: In the manufacturing stage, if there is no cold rolling after pickling process, cold rolling process can be excluded.

Figure 1 System Boundary for Hot-Dip Metallic Coated Steel Coils



Note : Scrap materials (pre-consumer waste) include steel scrap, zinc slag, iron oxide powder, and etc.

Figure 2 System Boundary for Prepainted Hot-Dip Metallic Coated Steel Coils

As described in Figure 1 and Figure 2 above, the life cycle of hot-dip metallic coated steel coils/prepainted hot-dip metallic coated steel coils covers raw material acquisition and product manufacturing phases. It does not include the human resource required in the manufacturing and preparatory manufacturing process, commuting of the workers to and from the work site, and animals providing transportation services.

Raw materials acquisition phase

The Life Cycle Assessment (LCA) study should include information for the following unit process during the raw material manufacturing and transportation of hot-dip metallic coated steel coils/prepainted hot-dip metallic coated steel coils.

- Iron making
- Steel making
- Continuous casting
- Hot rolling
- Transportation of raw materials/materials from suppliers to steel coil manufacturers

The inclusion in the LCA the information on the iron making, steel making and continuous casting for the raw material acquisition phase is of the voluntary reporting nature. When voluntarily reported information is included, they shall be explained in the EPD.

Manufacturing phase

The LCA study should include information for the following unit process during the manufacturing and transportation of hot-dip metallic coated steel coils/prepainted hot-dip metallic coated steel coils. In addition, the system boundary should include the information on utilities, air emissions, water emissions and waste/scrap generation.

- Pickling
- Cold rolling, if any
- Hot-dip galvanizing
- Coil coating
- Transportation of hot-rolled raw materials/materials from suppliers to steel coil manufacturers

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 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, 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 will be treated through water treatment or incineration, these processes need to be included.

Boundaries in the life cycle

The boundaries in the product life cycle are described in Figure 1 and Figure 2. The construction of the site and infrastructure and the production of manufacturing equipment do not need to be included.

Boundaries towards other technical systems

Boundaries towards other technical systems describe the inputs of material and other constituents 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.

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

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 constituents shall be the specific regional data for the region where the process takes place (see Section 9). For

easiness of comparison, no matter where the emissions are generated, the same 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.

If this PCR is to be used for product footprint declaration purpose, the cut-off rules should be consistent with the adopted carbon footprint standard or specifications.

Constituents 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, function or economical relationship.
- Multi-input: The allocation is based on actual correlation. For example, the manufacturing process’ 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 data set. For the product which shall be recycled during the manufacturing phase, 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: m³
- area unit: m²
- weight unit: kg

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

- 10⁹ = giga, symbol "G"
- 10⁶ = mega, symbol "M"
- 10³ = kilo, symbol "k"
- 10⁻² = centi, symbol "c"
- 10⁻³ = milli, symbol "m"
- 10⁻⁶ = micro, symbol "μ"
- 10⁻⁹ = nano, symbol "n"

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 main constituents. If other types of information are used, description of the information and rationale for using the information shall be provided.
- Generic data may be used in the manufacturing process for the minor (not main) constituents of the products. 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 or waste is processed; 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 data shall be representative for the average of a specific year.

Data quality requirements for the manufacturing phase

- Site-specific data shall be used for the manufacturing of the product's main assembly and constituents.
- The electricity mix for the manufacturing phase should be site-specific data. If site-specific data can not be obtained, the official electricity mix in the country where the manufacturing 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 should be used for sites located in Taiwan. For sites located outside Taiwan, legal requirements for the host country shall be observed.
- As to the transportation of products, if the same products are delivered to different countries with the same selling mode, or to different users, the specific data in the country where the manufacturer is located can be used, or the average is calculated based on the sales volume in each country or based on the average distribution in the specific country.
- 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

For the manufacturing phase, the following parameters shall be declared (reported to two decimal places, in scientific notations):

Energy Use MJ

Resource Use

Use of non-renewable resources

Use of renewable resources

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 ₂ H ₄ equivalent |
| -Eutrophication | kg P ₂ O ₅ equivalent |

Additional information

Electricity consumption during the manufacturing phase

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 product characteristics should be described in the EPD from the perspective of recycling. For recycled products, the EPD should include description of recycling process.

Information for the materials which cannot 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 such as technology adopted, site of product manufacturing and assembly, 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 the commitment shall be ensured to be measurable, reportable and verifiable. The company may also list environmental and energy management related information, such as awards, commendations, system certifications (for instance, QC080000 IECQ HSPM), and etc.

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, 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.gednet.org/>;
- 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 legitimate 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
Taiwan LCA Database	DoITPro	2008
Steel	IISI (International Iron and Steel Institute)	1998
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 introductory part on the top frame of the document, 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 shall be included in product environmental declaration, for example, period of LCA, functional units, system boundaries*

(graphical presentation), cut-off and allocation rules, and data sources.

Manufacturing phase (see Section 10)

Use phase (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 13)

- *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*