

Product-Category Rules (PCR)  
for Preparing an Environmental Product  
Declaration (EPD) for  
Thermal Insulation Products used for wrapping

PCR 2013:1.0

Plastic Industry Development Center  
Kumtek International Co., Ltd.

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## 1. General Information

This document is to be used as the product category rules (PCR) for the manufacturing of thermal insulation products used for wrapping (“product”). 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, 2015.

This PCR was jointly prepared by the Plastics Industry Development Center and Kumtek International Co., Ltd. Representatives from major Taiwanese manufacturers of similar products and stakeholders were invited to the open consultation meeting held on November 6, 2013, to participate in the discussion and review of this PCR. The Environment and Development Foundation (EDF) then reviewed and approved this PCR on November 19, 2013.

This PCR is applicable to products with the Harmonized System (HS) Code of 5911, 6806 and 7019.

For further information and comments concerning this PCR, please contact: Kumtek International Co., Ltd, Shih-Wen Tseng (Tel : +886-03-4644666, Fax : +886-03-4644578 ; email : [services@kumtek.com.tw](mailto:services@kumtek.com.tw)) .

## 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 both business-to-consumer/customer (B2C) and business-to-business (B2B) communications. The term “product” shall include its accessories and packaging materials.

### 2.1 Product group function

The term “Thermal insulation products used for wrapping” in this PCR denotes products made from materials with very small thermal coefficient through material processing, and are used for the purpose of reducing thermal energy transfer. The products are commonly used as wrapping materials for piping or equipment in industrial or building applications, to make use of their thermal insulation properties.

### 2.2 Product components

The products’ main components/constituents include:

- Outer layer materials: Wrapping material or coating (including additives), e.g., Teflon, used to enhance product features or to provide an external protective layer.
- Insulation materials: Material which provides the product’s thermal insulation properties, e.g., glass fiber, ceramic fiber, silica fiber, glass wool and rock wool, hollow glass beads, expanded perlite, perlite or aerosol.□

- Inner layer materials: Material which provides protection to the product's insulation layer and outer layer, and reduce damage to the subject being wrapped, e.g., glass fiber cloth.
- Other materials: e.g., packaging material, or accessories.

The data quality requirements for the main components/materials are described in Section 9 on calculation rules and data quality requirements.

### 2.3 Product technical description

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

- Specification: e.g., product size/dimension
- Weight: unit weight
- Material: e.g., main constituent
- Product properties: e.g., thermal conductivity (W/mK) or thermal coefficient( $m^2K/W$ ), maximum application temperature ( $^{\circ}C$ ), compressive strength (MPa), flexural strength (MPa), moisture absorption

### 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 substances/materials in the product restricted/regulated by legal and customer requirements, e.g., asbestos, formaldehyde, and heavy metals.

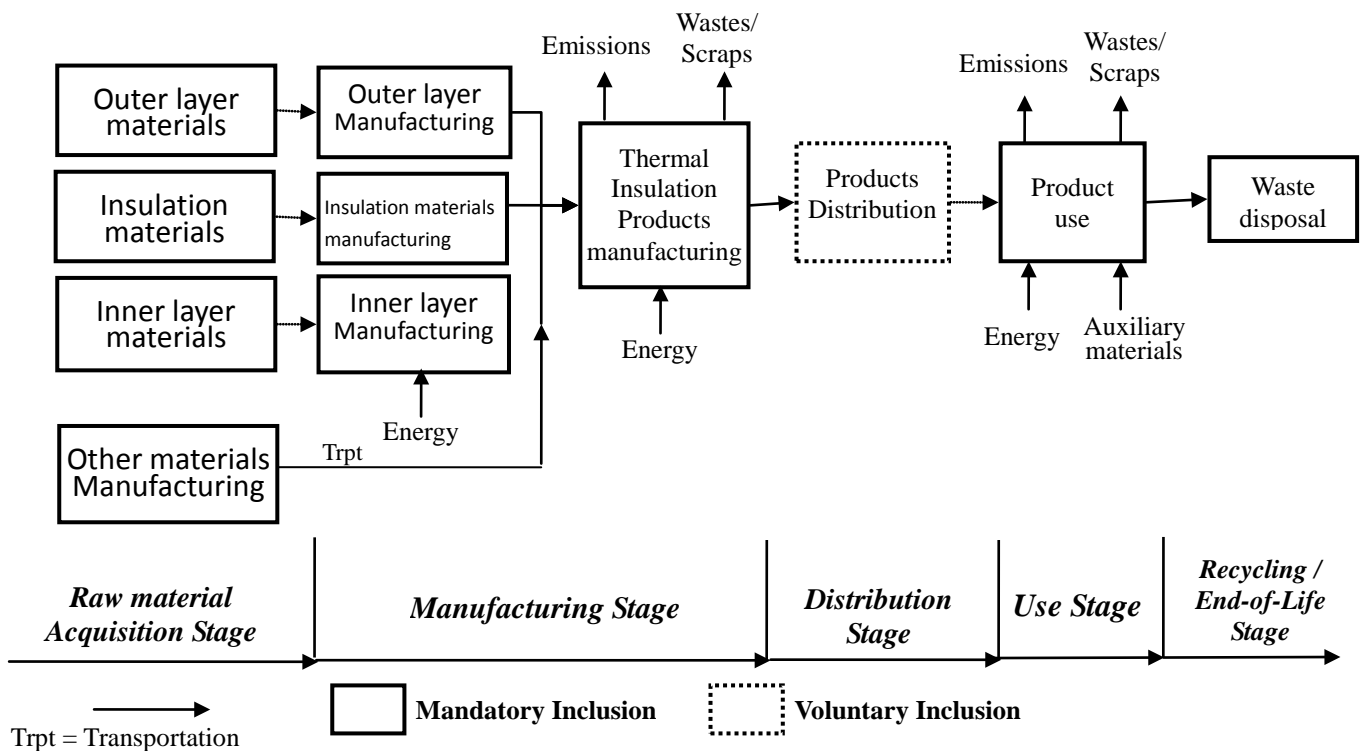
The declaration of relevant information may only be made when appropriate evidences are available (for example, test reports from accredited laboratories/testing facilities). The following organizations may provide accreditation for testing facilities: Taiwan Accreditation Foundation (TAF), (Asia Pacific 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 one square meter ( $m^2$ ) or one cubic meter ( $m^3$ ) of thermal insulation products used for wrapping. Information regarding product materials and thermal conductivity or thermal coefficient shall also be provided.

### 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 the product covers five life cycle stages: raw material acquisition, product manufacturing, distribution, product use and waste disposal. The data quality requirements for the main and secondary materials 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:

- Production and extraction of the raw materials used for the outer layer materials, thermal insulation materials and inner layer materials;
- Production of energy used for raw material manufacturing.

Reporting of information regarding relevant raw materials' forming and refining processes, as well as transportation of raw materials is optional (voluntary).

### Manufacturing Stage

The LCA shall include information for the following unit processes:

- Manufacturing of outer layer materials, thermal insulation materials and inner layer materials;

and transportation of manufacturing process waste to the processing/treatment plant;

- Assembly of products; and transportation of assembly process waste to the processing/treatment plant;
- Transportation of outer layer materials, thermal insulation materials and inner layer materials to the product assembly plant.

### **Distribution and Marketing Stage**

- Transportation of products to the distribution sites or distributor designated sites;
- Reporting of inputs of energy/resource and waste generation during the marketing/sales stage is optional;
- Reporting of transportation from the distributors/retailers' site to the consumers is optional.

### **Use Stage**

- The material input required to install one unit area/volume of product, e.g., adhesives, accessories;
- Environmental impact resulting from product maintenance during the use stage is not considered;
- The energy saving benefit resulting from product use may be calculated using the thermal conductivity (W/mK) information.

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

The LCA shall include information for the following unit processes:

- Transportation of end-of-life products to the treatment/recycling facilities;
- Reporting of recycling information (such as recycling ratio, recycling/disassembly report or information on recycling channels) is mandatory in the EPD. Also, the environmental impact shall be calculated based on the declared recycling ratio/rate.

## **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 quantity of the disposed waste needs to be considered; landfilling process does not need to be considered. 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 do 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 constituents 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.
- **Closed loop recycling:** For materials from the product system that are being recycled and reused within the same product system, the recycling ratio shall be considered to avoid double counting. The transportation and energy inputs from the recycling process to the reuse of materials 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**

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

- Generic data may be used for the extraction, production, forming and refining of the various materials used for the products. Please refer to Appendix I for the common sources of generic data. Generic data prior to 1990 shall not be used.

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

- Site specific data (for example, specific data for a manufacturing plant's manufacturing process or transportation data) shall be used for the manufacturing of inner layer materials, thermal insulation materials and outer layer materials. If other types of information are used, description of the information and rationale for using such information shall be provided.
- Site specific data (for example, specific data for a manufacturing plant's manufacturing process or transportation data) shall be used for the product assembly. If other types of information are used, description of the information and rationale for using such information shall be provided. For site specific data of 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 products, and based the calculation on actual consumption. Please refer to Appendix I for the common sources of generic data. Generic data prior to 1990 shall not be used.
- When generic data are used, the equivalence between the chemical and/or physical process, as well as the technology and system boundaries of the referred generic system with the declared product system 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 year cannot be obtained, the average data for a specific time period may be used, the data shall be representative, and 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 components/constituents to the manufacturing plant, the actual transportation modes used and distance traveled shall be considered.

### **Data quality requirements for the distribution and marketing stage**

- For the transportation of products to the distribution sites or retailer sites, the actual mode of

transportation and distance traveled shall be considered.

#### **Data quality requirements for the use stage**

- Consider the actual material inputs for installation of one unit area/volume of products.
- The electricity mix for the use stage may be the official electricity mix for the country where the product is exported as the approximate value (generic data). Please refer to Appendix I for the common sources of generic data. Generic data prior to 1990 shall not be used.

#### **Date quality requirements for the recycling/waste disposal stage**

- For transportation of end-of-life products to the processors/recyclers, the data from national, industry or consumer surveys can be used. When such data cannot be obtained, evaluation based on assumed scenario can be made, and the assumptions for such a scenario shall be reported in the EPD.
- If for specific reason the site specific data for the recycling/waste disposal system cannot be obtained, generic data and recycling rate may be used to calculate environmental impact. Please refer to Appendix I for the common sources of generic data used internationally. Generic data prior to 1990 shall not be used.

### **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.
- 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 recycled/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.
- Plastic parts marking: Where technologically possible, plastic parts of the product weighing  $\geq 25$  g shall be marked in accordance with the ISO 11469 and ISO 1043 Part 1/2/3/4, SPI or other international standard label to facilitate their identification and recovery at the end of life.
- Plastic packaging material marking: The Plastic packaging materials shall be labeled on the parts with SPI or other international standards for ease of sorting.

### **11. Recycling information**

If practical, information for the constituents 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.

### 13. Information about the certification

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

EPD Certification is valid until 20XX-\_\_-\_\_

According to the Requirements for the international EPD system. General Programme Instructions, Version 1 (2008) – www.environdec.com

The PCR review for \_\_\_\_\_ (PCR 201X: ) 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

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Third party verifier: Environment and Development Foundation in Taiwan.  
 Accredited by :

Name:	
Title:	
Organization:	Signature: _____

Name:	
Title:	
Organization:	Signature: _____

Name:	
Title:	
Organization:	Signature: _____

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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/>;
- Relevant PCR documents: Insulation Materials, NPCR 12 rev, 2012.10.12, Norway
- 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. When data from the following generic databases are used, the most current and updated data should be used.

Material	Database	Published
Industrial processes	Ecoinvent 2 <sup>nd</sup> edition	2007
Packing materials, transport, Waste treatments	BUWAL 250, 2 <sup>nd</sup> edition	2004
	Ecoinvent 2 <sup>nd</sup> edition	2007
Steel, Primary copper, Copper products, Electricity, Fuels, Aluminum, Chemicals, Transports, Waste management	LCA Database for Taiwan : DoITPro	2008-2010
	PE-GaBi	2006
	ELCD version 2.0	2009
	Ecoinvent 2 <sup>nd</sup> edition	2007
	The Boustead Model 5.0	2007
	EIME (Environmental Information and Management Explorer) EcoBilan	1998-2000
Plastics	PE Plastics Europe (Association of Plastics Manufacturers in Europe)	1993-1998
	PE-GaBi	2006
	ELCD	2009
	Ecoinvent 2 <sup>nd</sup> edition	2007
	The Boustead Model 5.0	2007
	EIME (Environmental Information and Management Explorer) EcoBilan	1998-2000
Electronic components	LCA Database for Taiwan : DoITPro	2008-2010
	PE-GaBi	2006
	ELCD	2009
	Ecoinvent 2 <sup>nd</sup> edition	2007
	The Boustead Model 5.0	2007

<b>Material</b>	<b>Database</b>	<b>Published</b>
Industrial processes	Ecoinvent 2 <sup>nd</sup> edition	2007
Packing materials, transport, Waste treatments	BUWAL 250, 2 <sup>nd</sup> edition	2004
	Ecoinvent 2 <sup>nd</sup> edition	2007
	EIME (Environmental Information and Management Explorer) EcoBilan	1998-2000
LCA Database in Taiwan	DoITPro	2010

## **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 (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 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

Acronym	Common Name
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
WEEE	The Waste Electrical and Electronic Equipment Directive