

TATA STEEL



EN 15804 verified EPD programme

Product Category Rules Part 2 Structural Steels



V1 January 2017

Requirements for structural steels

Scope

This document provides supplementary information on the requirements of an environmental product declaration for structural steels. The document is relevant to products that fall into the following categories:

- Hollow steel sections (e.g. steel tubes) for use in construction and infrastructure applications
- Steel plate for use in construction and infrastructure applications
- Open steel sections for use in construction & infrastructure applications

Product specific rules

The declared unit is 1 tonne of product

Requirements on content and format

A recommended template for a structural steel EPD is indicated as follows:

[Name of declared product]

Picture of declared product

Environmental Product Declaration **(in accordance with EN 15804 and ISO 14025)**

This EPD is representative and valid for the specified (named) product

Declaration Number: EPD-TS-[YEAR-NO]

Date of Issue: [Date]

Valid until: [Date]

Owner of the Declaration: [Name]

Programme Operator: Tata Steel UK Limited, 30 Millbank, London, SW1P 4WY

The CEN standard EN 15804:2012 +A1:2013 serves as the core Product Category Rules (PCR) supported by Tata Steel's EN 15804 verified EPD PCR documents

Independent verification of the declaration and data, according to EN ISO 14025:2010

Internal

External

Author of the Life Cycle Assessment: [Name]

Third Party verifier: [Name & Address]

1 General information

Owner of EPD	Tata Steel
Product	Name of product
Manufacturer	Tata Steel
Manufacturing sites	List all sites at which product is manufactured
Product applications	List applications of product
Declared unit	Unit is 1 tonne of steel product
Date of issue	Date
Valid until	Date (5 years from date of issue)

This environmental product declaration is for [insert brief description of product(s) included and whether environmental indicators for these products are average values]

The information in the environmental product declaration is based on production data for [insert year(s)]

EN 15804 serves as the core PCR, supported by Tata Steel's EN 15804 verified EPD programme Product Category Rules documents, and this declaration has been independently verified according to ISO 14025.

Third party verifier

[Signature of verifier]

[Name/organisation of verifier]

2 Product information

2.1 Product Description

A description of the product must be provided. Where an average product is used it should be clear what range of products is covered by the average.

2.2 Manufacturing

The manufacturing sites included in the EPD should be listed as shown in Table 1, along with a description of the process of manufacture, including diagrams, such as Figure 1 below. Other diagrams of the manufacturing process can be added if required.

2.3 Technical data and specifications

The relevant technical specifications and data that relate to the product should be described, along with details of use and applications. Tables 2 and 3 need to be completed.

2.4 Packaging

Mention packaging use and describe what is included in the EPD.

2.5 Reference service life

For Cradle-to-Grave studies where the use stage is included, a Reference Service Life should be specified.

Table 1 Participating sites

Site name	Product	Country

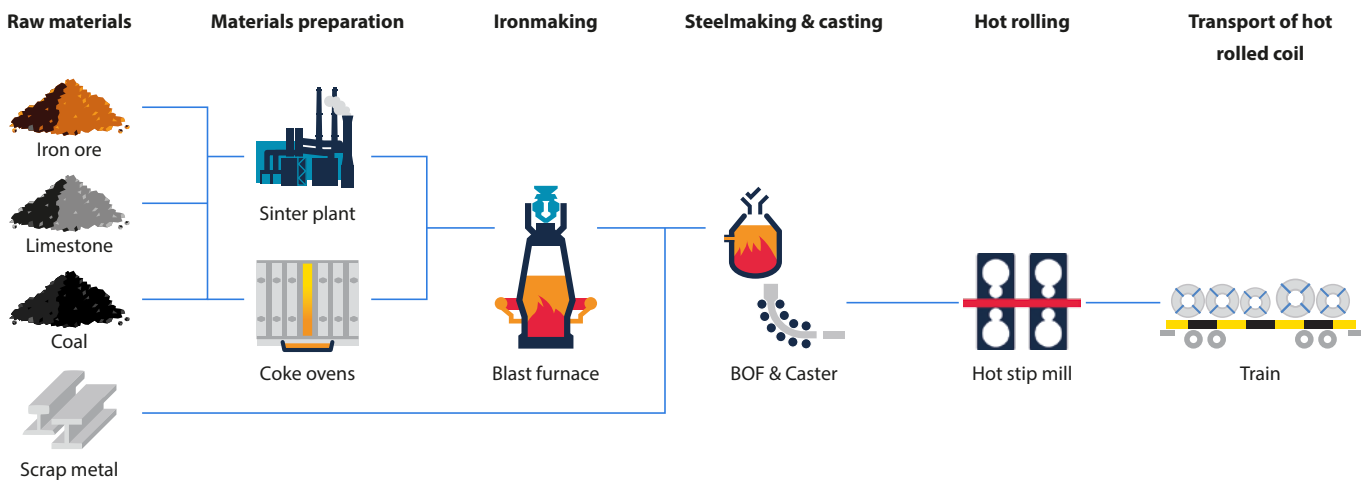
Table 2 General properties of [name of product]

[Name of Product]
Density (kg/m ³)
Modulus of Elasticity (N/mm ²)
Coefficient of Thermal Expansion (10 ⁻⁶ K ⁻¹)
Thermal Conductivity (W/mK)
Melting Point (°C)
Electrical Conductivity at 20°C (Ω ⁻¹ m ⁻¹)

Table 3 Technical specification of [name of product]

[Name of Product]
Specification
Yield strength (min)
Tensile strength
Elongation (min)
Impact strength
Carbon equivalent (max)
Certification

Figure 1 Example of process overview



3 Life Cycle Assessment (LCA) methodology

3.1 Declared unit

The functional unit being declared is 1 tonne of product. Other declared units are permissible if conversion to 1 tonne is provided in a transparent manner.

3.2 Scope

The type of EPD can either be Cradle-to-Gate (with options) or Cradle-to-Grave. For Cradle-to-Grave EPD (including the use stage) a Reference Service Life shall be specified and the declared unit will become a functional unit. The modules considered in the LCA will depend on the product type and should be highlighted from the following list and figure:

A1-3: Product stage (Raw material supply, transport to production site, manufacturing)

A4-5: Construction stage (Transport to construction site, construction site installation)

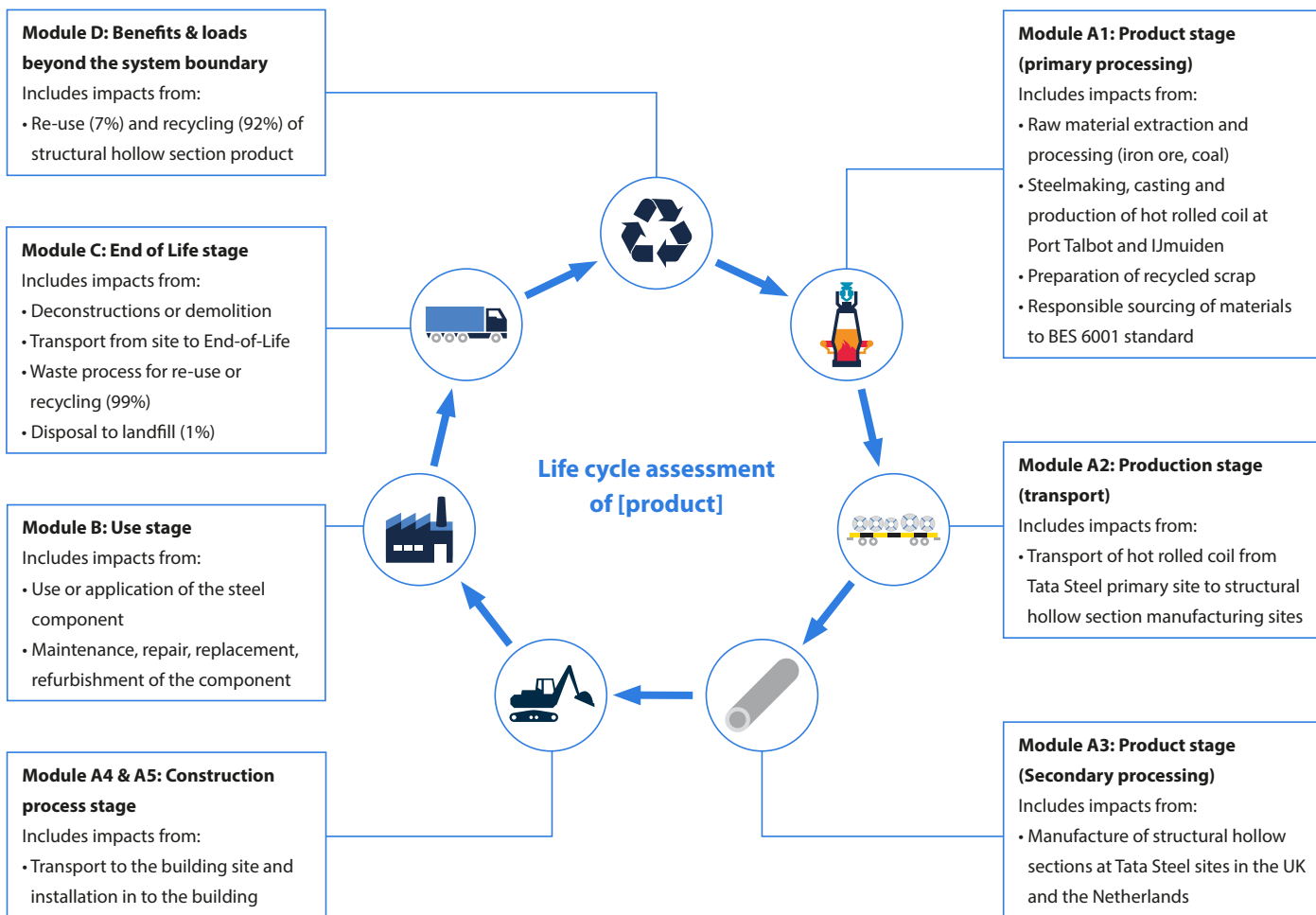
B1-7: Use stage (Impact for duration of Reference Service Life)

C1-4: End-of-Life (Demolition, transport, waste processing, disposal)

D: Reuse, Recycling and recovery

The life cycle stages are explained in more detail in Figure 2.

Figure 2 Life cycle assessment of [product]



3.3 Cut-off criteria

The following statement is an example of what should be included.

All information from the data collection process has been considered, covering all used and registered materials, and all fuel and energy consumption. On-site emissions were measured and those emissions have been considered. Data for all relevant sites were thoroughly checked and also cross-checked with one another to identify potential data gaps. No processes, materials or emissions that are known to make a significant contribution to the environmental impact of the products studied have been omitted. On this basis, there is no evidence to suggest that input or outputs contributing more than 1% to the overall mass or energy of the system, or that are environmentally significant, have been omitted. It is estimated that all excluded flows contribute less than 5% to the impact assessment categories. The manufacturing of required machinery and other infrastructure is not considered in the LCA.

3.4 Background data

The following statement is an example of what should be included.

For life cycle modelling of the considered products, the GaBi Software System for Life Cycle Engineering is used. The GaBi database contains consistent and documented datasets which can be viewed in the online GaBi documentation. To ensure comparability of results in the LCA, the basic data of the GaBi database were used for energy, transportation and auxiliary materials. However, specific data derived from Tata Steel's own production processes are the first choice to use where available.

3.5 Data quality

The following statement is an example of what should be included.

All relevant background datasets are taken from the GaBi 6 software database, and the last revision of these data sets took place less than [X] years ago. The data from Tata Steel's own production processes are from [years], and the technologies on which these processes were based in [years], are those used at the date of publication of this EPD. Therefore, the study is considered to be based on high quality data.

3.6 Allocation

The following statements are examples of what should be included.

To align with the requirements of EN 15804, a methodology is applied to assign impacts to the production of slag and hot metal from the blast furnace (co-products from steel manufacture), that was developed by the World Steel Association and EUROFER. This methodology is based on physical and chemical partitioning of the manufacturing process, and therefore avoids the need to use allocation methods, which are based on relationships such as mass or economic value. It takes account of the manner in which changes in inputs and outputs affect the production of co-products and also takes account of material flows that carry specific inherent properties. This method is deemed to provide the most representative method to account for the production of blast furnace slag as a co-product.

Economic allocation was considered, as slag is designated as a low value co-product under EN 15804. However, as neither hot metal nor slag are tradable products upon leaving the blast furnace, economic allocation would most likely be based on estimates. Similarly BOF slag must undergo processing before being used as a clinker or cement substitute. The World Steel Association and EUROFER also highlight that companies purchasing and processing slag work on long term contracts which do not follow regular market dynamics of supply and demand.

Process gases will be accounted for using the system expansion method, which is also referenced in the same EUROFER document and the impacts of co-product allocation, during manufacture, are accounted for in the product stage (modules A1 to A3).

End of life assumptions for recovered steel and steel recycling are accounted for as per the current methodology from the World Steel Association 2011 Life Cycle Assessment methodology report. A net scrap approach is used to avoid double accounting, and the net impacts shall be reported as benefits and loads beyond the system boundary (module D).

3.7 Additional technical information

The main scenario assumptions used in the LCA are detailed below in Table 4.

3.8 Comparability

The EPD should contain the following statement in relation to comparability:

Care must be taken when comparing different EPDs. EPDs may not be comparable if they do not have the same functional unit or scope (for example, whether they include installation allowances in the building), or if they do not follow the same standard such as EN 15804. The use of different generic data sets for upstream or downstream processes that form part of the product system may also mean that EPDs are not comparable.

Comparisons should ideally be integrated into a whole building assessment, in order to capture any differences in other aspects of the building design that may result from specifying different products. For example, a higher strength product may require less material for the same function.

Table 4 Main scenario assumptions

Module	Scenario assumptions
A1 to A3 – Product stage	Actual manufacturing data is used from Tata Steel (sites)
A4 - Transport to construction site	If included: X km total transport distance (X/2 km each way) on a Y t load capacity articulated lorry, Z% utilisation to account for empty returns
A5 - Installation at construction site	If included: Estimation of energy consumption for power tools for fasteners and lifting equipment
B1 to B7 - Use stage	If included: state the extent of maintenance over the reference service life
C1 – Deconstruction and demolition	If included: Estimation of energy consumption
C2 - Transport	X km total transport distance (X/2 km each way) on a Y t load capacity articulated lorry. Z% utilisation to account for empty returns
C3 - Waste Processing	Energy associated with mechanical shredding of material collected for recycling. Shredding process has a 1% metal yield loss. No additional processing of material for reuse.
C4 - Disposal	specify disposal rate
D - Reuse, Recycling, Energy Recovery	specify use and recycling rates

4 Results of the LCA

In the top section of the following table of results, a cross should be used to indicate which modules are declared and MND inserted to show those modules not considered in the LCA study. Also, the results for all modules shall be presented separately in columns (for example, C2 and C4), but those for modules A1, A2 and A3 may be grouped together.

Description of the system boundary

Product Stage			Construction Stage		Use Stage							End of Life Stage				Benefits and Loads Beyond the System Boundary
Raw material supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse Recovery Recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

X = Included in LCA; MND = module not declared

Environmental impact:

1 unit of product

Parameter	Unit	A	B	C	D
GWP	[kg CO ₂ eq]				
ODP	[kg CFC11 eq]				
AP	[kg SO ₂ eq]				
EP	[kg PO ₄ ³⁻ eq]				
POCP	[kg Ethene eq]				
ADPE	[kg Sb eq]				
ADPF	[MJ]				

GWP = Global warming potential

ODP = Depletion potential of stratospheric ozone layer

AP = Acidification potential of land & water

EP = Eutrophication potential

POCP = Formation potential of tropospheric ozone photochemical oxidants

ADPE = Abiotic depletion potential for non-fossil resources

ADPF = Abiotic depletion potential for fossil resources

Resource use:

1 unit of product

Parameter	Unit	A	B	C	D
PERE	[MJ]				
PERM	[MJ]				
PERT	[MJ]				
PENRE	[MJ]				
PENRM	[MJ]				
PENRT	[MJ]				
SM	[kg]				
RSF	[MJ]				
NRSF	[MJ]				
FW	[m ³]				

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials

PERM = Use of renewable primary energy resources used as raw materials

PERT = Total use of renewable primary energy resources

PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials

PENRM = Use of non-renewable primary energy resources used as raw materials

PENRT = Total use of non-renewable primary energy resources

SM = Use of secondary material

RSF = Use of renewable secondary fuels

NRSF = Use of non-renewable secondary fuels

FW = Use of net fresh water

Output flows and waste categories:

1 unit of product

Parameter	Unit	A	B	C	D
HWD	[kg]				
NHWD	[kg]				
RWD	[kg]				
CRU	[kg]				
MFR	[kg]				
MER	[kg]				
EEE	[MJ]				
EET	[MJ]				

HWD = Hazardous waste disposed

NHWD = Non-hazardous waste disposed

RWD = Radioactive waste disposed

CRU = Components for re-use

MFR = Materials for recycling

MER = Materials for energy recovery

EEE = Exported electrical energy

EET = Exported thermal energy

5 Interpretation of results

Key parameters influencing the results should be explained using diagrams where appropriate and the main impacts highlighted. The variance of individual products within the family compared with the average should be published, and the contribution of individual inventory flows to the impact assessment categories should be explained.

If applicable, the following comment regarding sensitivity could be included: This EPD is representative of the system manufacturers listed, It incorporates the average distances for transport to the manufacturer and to the construction site. Variations in transport distances has minimal (<3%) impact on the results displayed. Differences in manufacturing impacts from the average also have minimal effect (<3%) on results. The results are directly related to the quantities of materials specified in the system.

6 References and product standards

1. Tata Steel's EN 15804 verified EPD programme, General programme instructions, V1 January 2017
2. Tata Steel's EN 15804 verified EPD programme, Product Category Rules Part 1, V1 January 2017
3. ISO 14044:2006, Environmental management - Life cycle assessment - Requirements and guidelines
4. ISO 14025:2010, Environmental labels and declarations - Type III environmental declarations - Principles and procedures
5. ISO 14040:2006, Environmental management - Life cycle assessment - Principles and framework
6. EN 15804:2012+A1:2013, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
7. thinkstep; GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2013.
8. GaBi 6: Documentation of GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2013. <http://documentation.gabi-software.com>
9. EUROFER in cooperation with the World Steel Association, 'A methodology to determine the LCI of steel industry co-products', February 2014
10. World Steel Association: Life cycle assessment methodology report, 2011 (12/2012)
11. Sanson M and Avery N, Reuse and recycling rates of UK steel demolition arisings, Proceedings of the Institution of Civil Engineers Engineering Sustainability 167, June 2014, Issue ES3, (Tata Steel/EUROFER survey of members of the National Federation of Demolition Contractors (NFDC) for 'heavy structural sections and tubes')
12. CML LCA methodology, Institute of Environmental Sciences (CML), Faculty of Science, University of Leiden, Netherlands.

[Plus relevant product standards]





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