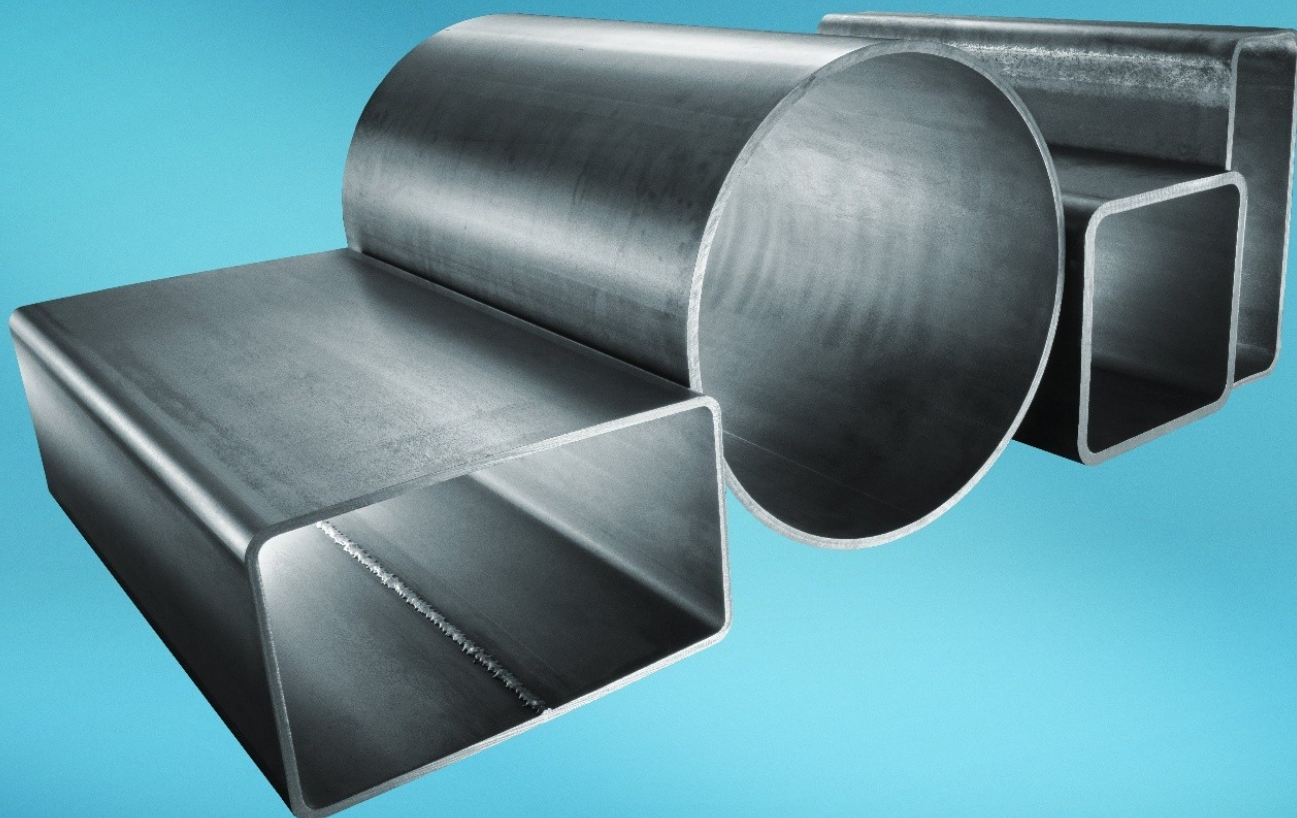


Forcon<sup>®</sup> structural hollow sections  
Environmental Product Declaration



# CONTENTS

<b>1 General information</b>	03
<b>2 Product information</b>	04
2.1 Product Description	04
2.2 Manufacturing	04
2.3 Technical data	06
2.4 Packaging	06
2.5 Reference service life	06
2.6 Biogenic Carbon content	06
<b>3 Life Cycle Assessment (LCA) methodology</b>	07
3.1 Declared unit	07
3.2 Scope	07
3.3 Cut-off criteria	07
3.4 Background data	08
3.5 Data quality	08
3.6 Allocation	08
3.7 Additional technical information	09
3.8 Comparability	09
<b>4 Results of the LCA</b>	10
<b>5 Interpretation of results</b>	12
<b>6 References and product standards</b>	13

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

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

Declaration number: EPD-TS-2025-030  
Date of Issue: 16<sup>th</sup> December 2025  
Valid until: 15<sup>th</sup> December 2030

Owner of the Declaration: Tata Steel Nederland Tubes B.V.  
Programme Operator: Tata Steel UK Limited, 18 Grosvenor Place, London, SW1X 7HS

The CEN standard EN 15804:2012+A2:2019 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 ISO 14025

Internal ☐ External ☒

Author of the Life Cycle Assessment: Tata Steel Nederland  
Third party verifier: Chris Foster, EuGeos SRL

# 1 General information

Owner of EPD	Tata Steel Nederland Tubes B.V.
Product	Forcon® structural hollow sections
Manufacturer	Tata Steel Nederland Tubes B.V.
Manufacturing sites	IJmuiden (Netherlands), Maastricht and Zwijndrecht (Netherlands)
Product applications	Building industry, mechanical engineering and renewable energy such as columns, trusses, frames, piling, formwork construction, scaffolding, towbars, agricultural or construction machinery, structures for trucks, trailers or busses, solar trackers or solar parking
Declared unit	1 tonne of steel product
Date of issue	16 <sup>th</sup> December 2025
Valid until	15 <sup>th</sup> December 2030



This Environmental Product Declaration (EPD) is for Forcon® cold formed welded steel structural hollow sections manufactured by Tata Steel Nederland Tubes. The environmental indicators are average values for cold formed structural hollow sections from Maastricht and Zwijndrecht, with feedstock supplied from IJmuiden and external sources.

The information in this Environmental Product Declaration is based on production data from 2024.

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 <sup>[1,2,3,4,5,6,7]</sup>.

Third party verifier

---

Chris Foster, EuGeos EuGeos SRL rue Dieudonné Lefèvre 17 - B 1020 Bruxelles - Belgium

---

## 2 Product information

### 2.1 Product description

Forcon® cold formed structural hollow sections (sometimes referred to as ‘tubes’) are manufactured in a range of circular, square, rectangular and octagonal shaped tubes. They are manufactured to different grades in a range of sizes from 21,3 to 323,9mm, with wall thicknesses from 2 to 12mm. The full range of Tata Steel’s Forcon® structural hollow sections is included in this EPD.

Forcon® tubes are made from fully killed steel, which is critical to formability and weldability, and the dimensions and corner radii are controlled to tight tolerances. They are strong, light, cost-effective and aesthetically appealing structural steel hollow sections that provide reliable formability and toughness. These tubes can be used in a wide range of structural and engineering applications, including those where specific properties and compliance with design codes are required.

### 2.2 Manufacturing

The manufacturing sites included in the EPD are listed in Table 1 below.

**Table 1 Participating sites**

Site name	Product	Manufacturer	Country
IJmuiden	Direct rolled coil	Tata Steel	NL
IJmuiden	Hot rolled coil	Tata Steel	NL
External	Hot rolled coil	External	EU
External	Hot rolled coil	External	Global
Maastricht	Structural hollow sections	Tata Steel	NL
Zwijndrecht	Structural hollow sections	Tata Steel	NL

The process of hollow section manufacture at Tata Steel begins with sinter and/or pellet being produced from iron ore and limestone, and together with coke from coal, reduced in a blast furnace to produce iron. Steel scrap is added to the liquid iron and oxygen is blown through the mixture to convert it into liquid steel in the basic oxygen furnace. The liquid steel is continuously cast into discrete slabs, which are either rolled directly to produce direct rolled coil or subsequently reheated and rolled in a hot strip mill to produce steel coil, the primary feedstock of the hollow section manufacturing process. The coils are transported by inland waterway, trucks or ships from IJmuiden or external sources to either Maastricht or Zwijndrecht manufacturing sites. An overview of the process from raw materials to hot rolled coil is shown in Figure 1.

The tube making process begins with the uncoiling, levelling and slitting of the hot rolled coil, which is then passed through a series of shaped rolls that gradually form the flat strip into a circular section. The two strip edges, now adjacent to one another, are welded using a high frequency induction process. Both external and internal weld beads are trimmed in-line and a further set of rolls effect the final shaping and sizing of the tube. 100% non-destructive testing is performed in-line on the weld seam to ensure integrity and the tubes are cut to length prior to despatch. An overview of the process from hot rolled coil to cold formed structural hollow section is shown in Figure 2.

Process data for the manufacture of hot rolled coil at IJmuiden were gathered as part of the latest data collection on behalf of worldsteel. For IJmuiden and for the tube making sites, the data collection was not only organised by site, but also by each process within each site. In this way it was possible to attribute resource use and emissions to each process, and using processed tonnage data, also attribute resources and emissions to specific products.

The coils sourced from external companies are represented with worldsteel averages.

Figure 1 Process overview from raw materials to steel coils

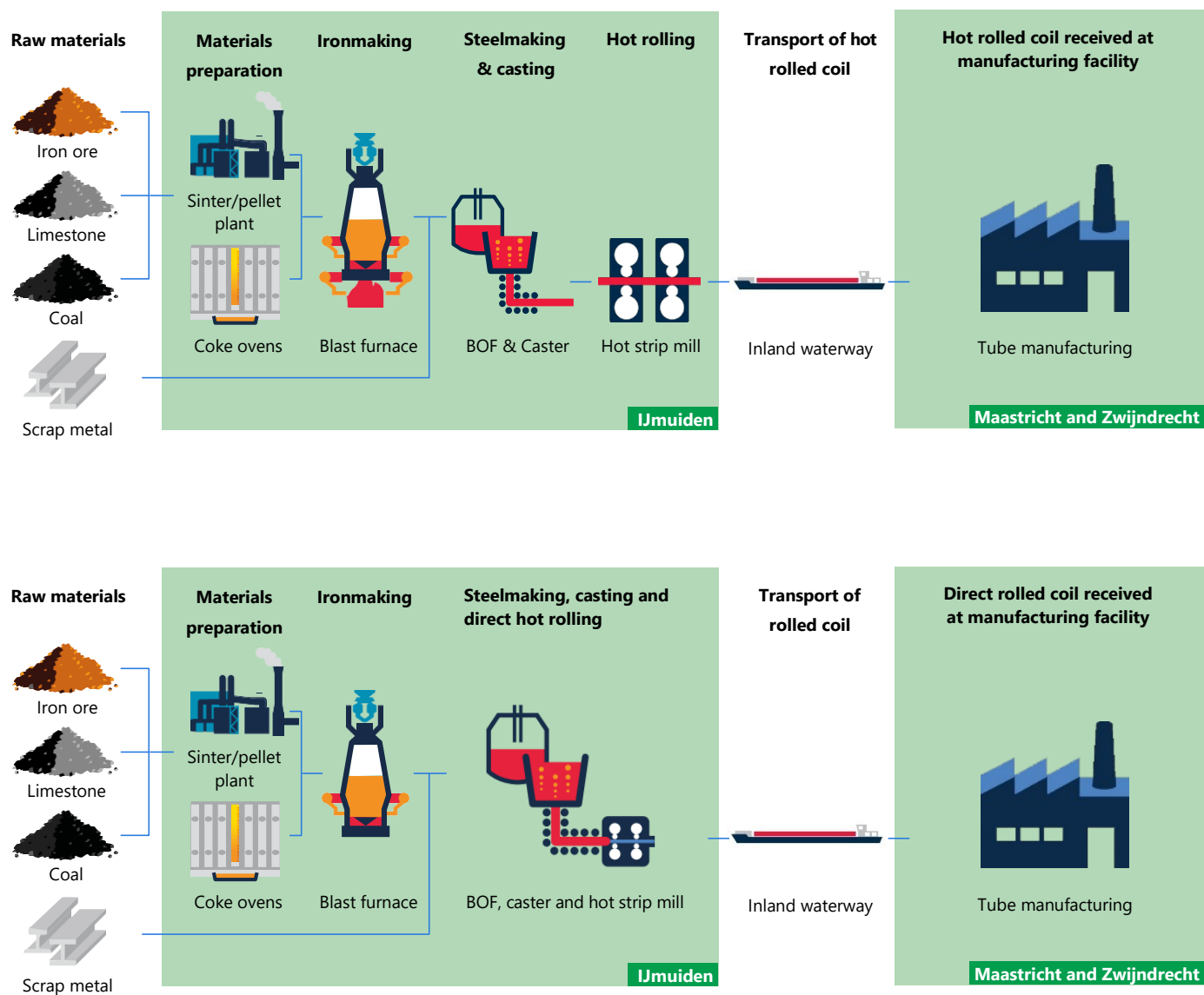
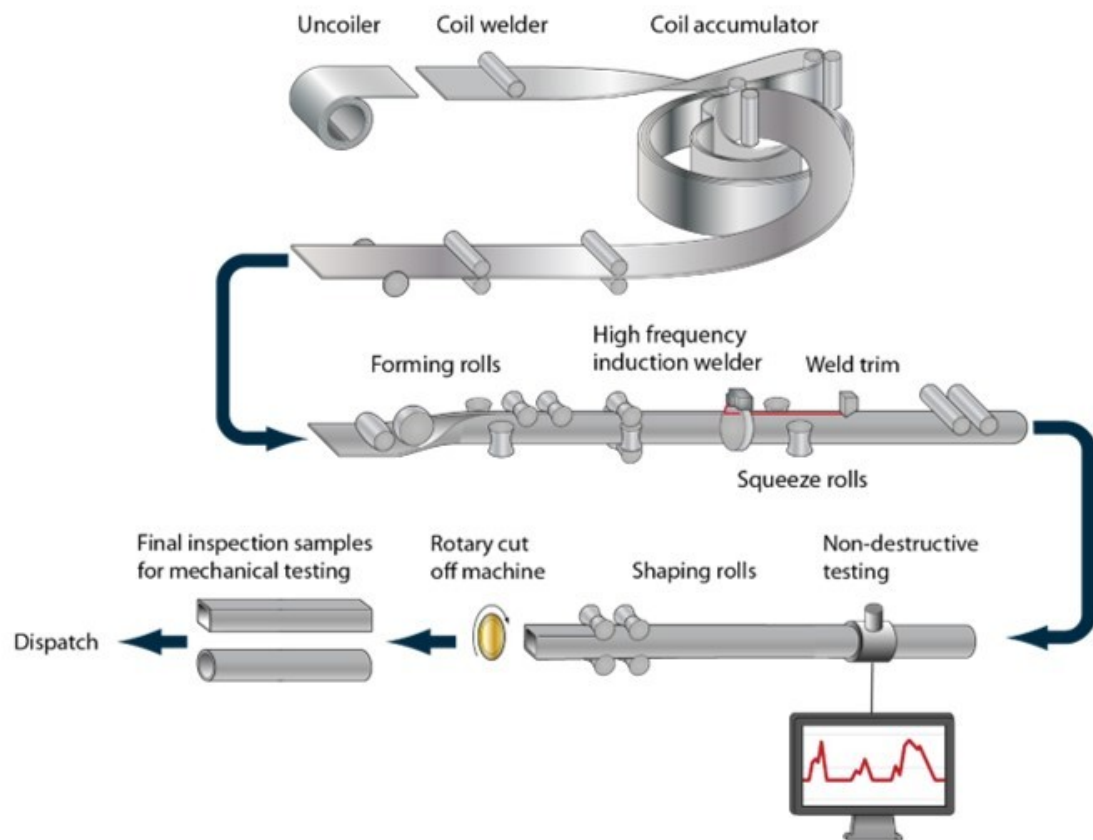


Figure 2 Process overview from hot rolled coil to cold formed structural hollow section





### 2.3 Technical data and specifications

The formability and weldability of Forcon® structural hollow sections mean that they can be used in a wide range of structural and engineering applications. The general properties of Forcon® structural hollow sections are shown in Table 2 and the technical specification in Table 3. The relevant European standard for cold formed structural hollow sections is EN10219 [8,9,10]. The section properties (minimum yield strength, tensile strength, minimum elongation, minimum impact energy), dimensions (wall thickness and outside dimensions) and chemical composition depend on the grade and on the structural design requirements.

**Table 2 General properties of Forcon® structural hollow sections**

Forcon® structural hollow sections	
Density (kg/m <sup>3</sup> )	7850
Modulus of elasticity (N/mm <sup>2</sup> )	210000
Coefficient of thermal expansion (10 <sup>-6</sup> /K)	12
Thermal conductivity (W/mK)	48
Melting point (°C)	1520
Electrical conductivity at 20°C (/Ω m)	3,9

**Table 3 Technical specification of Forcon® structural hollow sections**

Forcon® structural hollow sections	
Specification (kg/m <sup>3</sup> )	EN 10219
Yield strength (N/mm <sup>2</sup> )	235-700
Tensile strength (N/mm <sup>2</sup> )	360-950
Elongation (min)	5-24%
Impact strength (Joules)	27J at +20°C up to 40J at -20°C
Carbon equivalent (max)	0,35-0,42
Certification	Product certification 2.2 and 3.1 [11] Applicable to Tata Steel's Maastricht and Zwijndrecht Sites; ISO 9001 [12], ISO 14001 [13], ISO 45001 [14], BES 6001 [15]

### 2.4 Packaging

The tubes are secured for transport using steel banding and clips, timbers and anti-slip mats. The mass of this packaging is 1,2 kg/tonne for steel banding and clips, 1,38kg/tonne for timber, and 0,2 kg/tonne for anti-slip mats. The amount of polyethylene film and card/paper packaging used at the Netherlands sites is 0,32 kg/tonne in total.

### 2.5 Reference service life

A reference service life for structural hollow sections is not declared because they can be used in a variety of different forms of construction, and the final construction application is not defined. To determine the full service life of structural hollow sections, all factors would need to be included such as location and environment, corrosion protection and fire protection. Corrosion and fire protection are usually applied during installation on site. Under 'normal' conditions, structural hollow sections would not need to be replaced over the life of the building or structure. Structural hollow steel sections can be recovered and reused or recycled repeatedly as a building material without loss of quality and they comply with the requirements of construction product class A1 (non-combustible). Tata Steel's structural hollow sections are supplied with full certification, declaration of performance (DoP) for the applicable steel grades & factory production control (FPC) ensuring full traceability during and after the original service life.

### 2.6 Biogenic carbon content

There are no biogenic carbon containing materials in the product. The biogenic carbon content of the packaging materials is shown in Table 3.

**Table 4 Biogenic carbon content at the factory gate**

Forcon® structural hollow sections	
Biogenic carbon content (product) (kg C)	0
Biogenic carbon content (packaging) (kg C)	0,69

Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO<sub>2</sub>

## 3 LCA methodology

### 3.1 Declared unit

The unit being declared is 1 tonne of Forcon® tubes.

### 3.2 Scope

This EPD can be regarded as Cradle-to-Gate with modules C and D and the specific modules considered in the LCA are:

A1-A3: Production stage (raw material supply, transport to production site, manufacturing)

C1-C4: End-of-life (demolition/deconstruction, transport, processing for recycling and disposal)

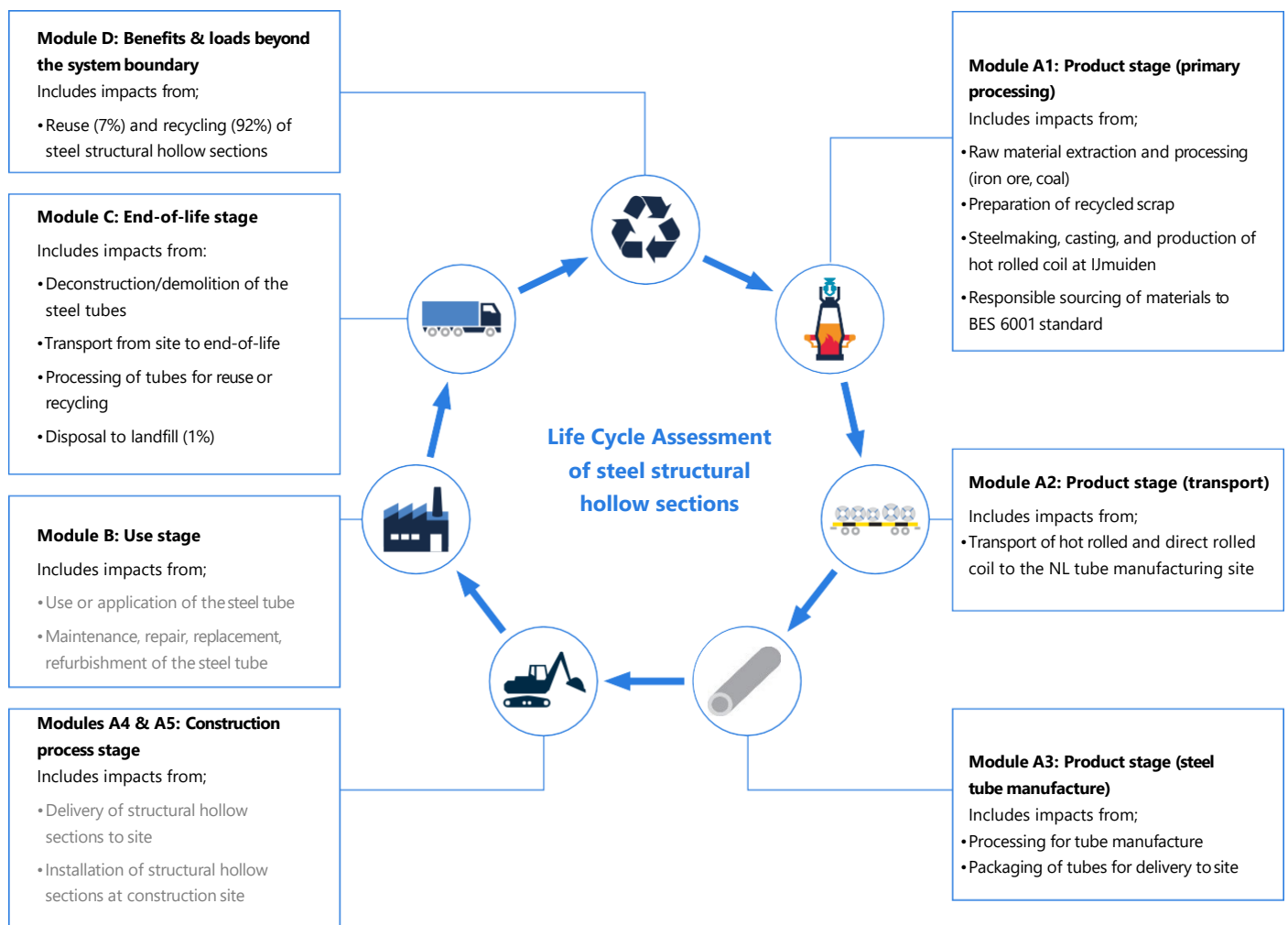
D: Reuse, recycling and recovery

The life cycle stages are explained in more detail in Figure 3, but where the text is in light grey, the impacts from this part of the life cycle are not considered.

### 3.3 Cut-off criteria

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 Forcon® have been omitted. On this basis, there is no evidence to suggest that inputs 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 the sum of any 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.

Figure 3 Life Cycle Assessment of Forcon®





### 3.4 Background data

For life cycle modelling of Forcon® tubes, the LCA for Experts (LCAfE) software has been used <sup>[16]</sup>. The LCAfE database contains consistent and documented datasets which can be viewed in the online LCAfE documentation <sup>[17]</sup>.

Specific data derived from Tata Steel's own production processes at IJmuiden and the tube manufacturing sites were the first choice to use where available.

To ensure comparability of results in the LCA, the basic data of the LCAfE database were used for energy, transportation and auxiliary materials.

### 3.5 Data quality

The data from Tata Steel's own production processes are from 2021 for steelmaking and 2024 for tube manufacturing, and the technologies on which these processes were based during those periods are the ones used at the date of publication of this EPD. All relevant background datasets are taken from the LCAfE software database, and the last revision of these datasets took place less than 10 years ago. An assessment of the quality of data used in this study, has been made using the scheme provided in the UN Environment Global Guidance on LCA database development, referenced in EN 15804. The study is considered to be based on very good quality data.

### 3.6 Allocation

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 <sup>[18]</sup>. 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 arise from the production of the continuously cast steel slabs at IJmuiden, and are accounted for using the system expansion method. This method is also referenced in the same EUROFER document and the impacts of co-product allocation, during manufacture, are accounted for in the product stage (module A1).

End-of-life assumptions for recovered steel and steel recycling are accounted for as per the current methodology from the World Steel Association 2017 Life Cycle Assessment methodology report <sup>[19]</sup>. A net scrap approach is used to avoid double accounting, and the net impacts are 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 in Table 4. The end-of-life percentages are taken from a Tata Steel/ EUROFER recycling and reuse survey of UK demolition contractors carried out in 2012 <sup>[20]</sup>.

For all indicators the characterisation factors from the EC-JRC are applied, identified by the name EN 15804, and based upon the EF Reference Package 3.1 <sup>[21]</sup>. In LCAfE, the corresponding impact assessment is used, denoted by 'EN 15804+A2'.

The values presented in the LCA results tables of section 4 are tonnage weighted average values for Forcon® tubes across the two manufacturing sites at Maastricht and Zwijndrecht.

### 3.8 Comparability

Care must be taken when comparing EPDs from different sources. 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/infrastructure assessment, in order to capture any differences in other aspects of the building or infrastructure design that may result from specifying different products. For example, a more durable product would require less maintenance and reduce the number of replacements and associated impacts over the life of the building or infrastructure, or, a higher strength product may require less material for the same function.

**Table 5 Main scenario assumptions**

Module	Scenario assumptions
<b>A1 to A3 – Product stage</b>	Manufacturing data from Tata Steel's sites at IJmuiden, Maastricht and Zwijndrecht (Netherlands) are used
<b>A2 – Transport to the tube manufacturing site</b>	The coils are transported from IJmuiden to Maastricht a distance of 274km, and from IJmuiden to Zwijndrecht a distance of 168km, on a 1500t load capacity barge. A load capacity utilisation of 0,45 is assumed to allow for empty returns
<b>C1 – Deconstruction and demolition</b>	Energy consumption estimated based upon published data for the dismantling of steel constructions in Germany <sup>[22]</sup>
<b>C2 – Transport for recycling, reuse, and disposal</b>	In the Netherlands, distance of 150km is assumed from installation site to both recycling and reuse sites, whereas a distance of 100km is assumed from the installation site to landfill. A load capacity utilisation of 0,45 is assumed to allow for empty returns.
<b>C3 – Waste processing for reuse, recovery and/or recycling</b>	This considers the energy associated with cutting the tubes for recycling and is based upon the same data as C1
<b>C4 – Disposal</b>	At end-of-life, 1% of product is disposed to landfill
<b>D – Reuse, recycling, and energy recovery</b>	At end-of-life, 92% of product is recycled and 7% is reused

Please note that in the LCAfE software, an empty return journey is accounted for by halving the load capacity utilisation of the outbound journey.

## 4 Results of the LCA

### 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	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

X = Included in LCA; ND = module not declared

### Environmental impact:

1 tonne of Forcon®

Parameter	Unit	A1 – A3	C1	C2	C3	C4	D
GWP-total	kg CO <sub>2</sub> eq	2,16E+03	3,94E+01	1,57E+01	6,99E-01	1,50E-01	-1,56E+03
GWP-fossil	kg CO <sub>2</sub> eq	2,17E+03	3,93E+01	1,60E+01	6,97E-01	1,50E-01	-1,56E+03
GWP-biogenic	kg CO <sub>2</sub> eq	-3,43E+00	3,35E-02	-2,63E-01	1,29E-03	-1,03E-03	8,57E+00
GWP-luluc	kg CO <sub>2</sub> eq	3,26E-01	1,81E-03	6,48E-04	5,09E-05	8,98E-04	-2,11E-01
ODP	kg CFC11 eq	2,56E-10	2,12E-11	2,95E-12	6,00E-12	4,04E-13	1,88E-09
AP	mol H <sup>+</sup> eq	4,74E+00	4,40E-02	6,43E-02	6,11E-04	1,06E-03	-3,79E+00
EP-freshwater	kg P eq	6,11E-04	1,22E-05	4,08E-06	1,51E-06	3,40E-07	-3,72E-04
EP-marine	kg N eq	1,20E+00	1,52E-02	3,13E-02	1,88E-04	2,74E-04	-6,39E-01
EP-terrestrial	mol N eq	1,30E+01	1,68E-01	3,45E-01	1,96E-03	3,01E-03	-5,89E+00
POCP	kg NMVOC eq	3,87E+00	5,18E-02	6,32E-02	6,54E-04	8,37E-04	-2,53E+00
ADP-minerals&metals	kg Sb eq	2,10E-04	1,47E-06	4,95E-07	5,28E-08	9,70E-09	-8,02E-03
ADP-fossil	MJ net calorific value	2,06E+04	5,68E+02	2,07E+02	9,70E+00	1,97E+00	-1,55E+04
WDP	m <sup>3</sup> world eq deprived	3,94E+01	1,22E-01	2,16E-02	1,37E-02	1,71E-02	-9,81E+01
PM	Disease incidence	ND	ND	ND	ND	ND	ND
IRP	kBq U235 eq	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND
SQP		ND	ND	ND	ND	ND	ND

GWP-total = Global Warming Potential total

GWP-fossil = Global Warming Potential fossil fuels

GWP-biogenic = Global Warming Potential biogenic

GWP-luluc = Global Warming Potential land use and land use change

ODP = Depletion potential of stratospheric ozone layer

AP = Acidification potential, Accumulated Exceedance

EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment

EP-terrestrial = Eutrophication potential, Accumulated Exceedance

The following indicators should be used with care as the uncertainties on these results are high or as there is limited experience with the indicator :

ADP-minerals&metals, ADP-fossil, and WDP.

POCP = Formation potential of tropospheric ozone

ADP-minerals&metals = Abiotic depletion potential for non-fossil resources

ADP-fossil = Abiotic depletion potential for fossil resources

WDP = Water (user) deprivation potential, deprivation-weighted water consumption

PM = Potential incidence of disease due to PM emissions

IRP = Potential Human exposure efficiency relative to U235

ETP-fw = Potential Comparative Toxic Unit for ecosystems

HTP-c = Potential Comparative Toxic Unit for humans

HTP-nc = Potential Comparative Toxic Unit for humans

SQP = Potential soil quality index

## Resource use:

1 tonne of Forcon®

Parameter	Unit	A1 – A3	C1	C2	C3	C4	D
PERE	MJ	4,19E+02	9,31E+00	1,39E+01	2,50E+00	3,44E-01	5,25E+02
PERM	MJ	2,37E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,66E+00
PERT	MJ	4,43E+02	9,31E+00	1,39E+01	2,50E+00	3,44E-01	5,24E+02
PENRE	MJ	2,06E+04	5,68E+02	2,07E+02	9,70E+00	1,97E+00	-1,55E+04
PENRM	MJ	2,09E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,46E-01
PENRT	MJ	2,06E+04	5,68E+02	2,07E+02	9,70E+00	1,97E+00	-1,55E+04
SM	kg	1,26E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,02E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m <sup>3</sup>	1,79E+01	5,69E-03	1,03E-03	9,43E-04	5,23E-04	-1,44E+02

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 = Input 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 tonne of Forcon®

Parameter	Unit	A1 – A3	C1	C2	C3	C4	D
HWD	kg	3,70E-07	3,27E-08	8,39E-09	4,63E-09	4,91E-10	-1,05E-04
NHWD	kg	1,55E+01	1,23E-01	1,82E-02	6,52E-03	1,00E+01	1,69E+02
RWD	kg	5,72E-02	6,44E-04	1,52E-04	1,25E-04	2,07E-05	-2,47E-03
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,00E+01	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,20E+02	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HWD = Hazardous waste disposed

NHWD = Non-hazardous waste disposed

RWD = Radioactive waste disposed

CRU = Components for reuse

MFR = Materials for recycling

MER = Materials for energy recovery

EEE = Exported electrical energy

EET = Exported thermal energy

# 5 Interpretation of results

Figure 4 shows the relative contribution per life cycle stage for selected environmental impact categories for 1 tonne of Tata Steel's Forcon® product. Each column represents 100% of the total impact score, which is why all the columns have been set with the same length. A burden is shown as positive (above the 0% axis) and a benefit is shown as negative (below the 0% axis). The main contributors across the impact categories are A1-A3 (burdens) and D (benefits beyond the system boundary). The manufacture of hot rolled coil during stage A1-A3 is responsible for over 90% of each impact in all of the categories, specifically, the conversion of iron ore into liquid steel which is the most energy intensive part of the overall tube manufacturing process.

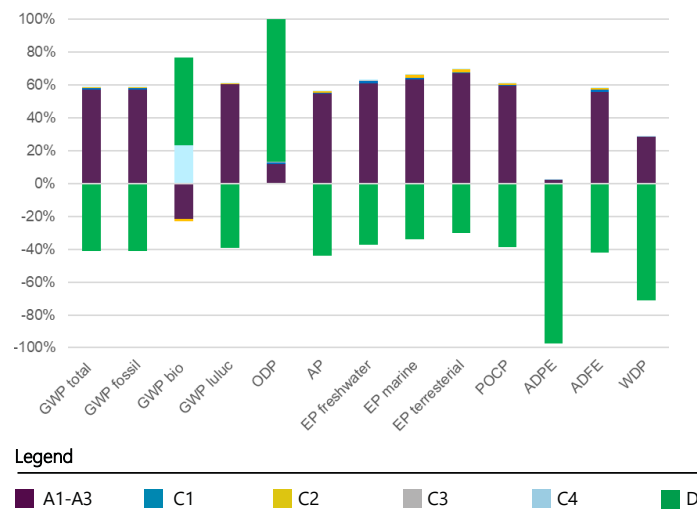
The site emissions come from the use of coal and coke in the blast furnace, and from the injection of oxygen into the basic oxygen furnace, as well as combustion of the process gases. These processes give rise to emissions of CO<sub>2</sub>, which contributes 93% of the Global Warming Potential (GWP), and sulphur oxides, which are responsible for 55% of the impact in the Acidification Potential (AP) category. In addition, oxides of nitrogen are emitted which contribute 44% of the A1-A3 Acidification Potential, and over 90% of the Eutrophication Potentials (EP-marine and EP-terrestrial), and the combined emissions of nitrogen oxides (76%) together with sulphur oxides, carbon monoxide and methane, contribute to the Photochemical Ozone indicator (POCP).

Figure 4 clearly indicates the relatively small contribution to each impact from the other life cycle stages, which are the end-of-life stages C1 to C4. The exceptions are the contribution of C4 (in which biogenic carbon from previous stages is assumed re-emitted) and module D to the GWP-biogenic and GWP-luluc indicators.

Module D values are largely derived using worldsteel's value of scrap methodology which is based upon many steel plants worldwide, including both BF/BOF and EAF steel production routes. At end-of-life, the recovered steel pipe is modelled with a credit given as if it were re-melted in an Electric Arc Furnace and substituted by the same amount of steel produced in a Blast Furnace<sup>[19]</sup>. The specific emissions that represent the burden in A1-A3, are essentially the same as those responsible for this Module D credit. It is important that the life cycle of the steel product is considered here, because in most cases, the Module D credit provides significant benefits in terms of reducing the whole life environmental impacts.

In this case there are significant benefits seen in all impact categories with the exception of the ODP and Global Warming Potential-bio indicators, which only show minimal benefit. For ODP indicator, this is because the module D benefit of reuse is offset by the module D burdens of steel recycling. It is also worth noting that for the Abiotic Depletion Potential of Elements indicator (ADPE), the benefit in Module D is much greater than the impact from manufacturing in A1-A3.

Figure 4 LCA results for Forcon®



This does not mean that elemental resources are created by the steel manufacturing process, but is a feature of the worldsteel 'value of scrap' calculation being based on many steel plants worldwide. The tube manufacturing process (A1-A3) does not consume zinc, and so this burden is small when compared with the credit from the worldsteel 'value of scrap' process which features significant recovery of zinc from steel recycling in electric arc furnaces. In other words, the average net avoided burden of manufacturing virgin steel for Forcon® tube includes zinc recovery, whereas zinc is not actually consumed in the manufacturing process.

The WDP indicator also shows the same pattern for a similar reason – the worldsteel value of scrap being an average of plants across the globe. Some of these plants will be in very water scarce regions compared to the Netherlands, so will have a much greater WDP as a result. This means that the water 'saved' from recycling steel on a global basis is much higher than water 'used' in producing steel in IJmuiden, hence the relatively large module D credit.

Figure 4 clearly indicates the relatively small contribution to each impact from life cycle stages C1-4 for almost all impact categories. The impact from stage C4 was expected to be very small, it being the result of losing a small percentage of steel to landfill. The most significant impact contribution from stage C2, transport to end-of-life processes, is to the GWP-biogenic indicator, and is caused by the emission of carbon from biodiesel, which is combusted as part of the diesel mix used in road transport.

## 6 References and product standards

1. Tata Steel's EN 15804 verified EPD programme, General programme instructions, V2 January 2022
2. Tata Steel's EN 15804 verified EPD programme, Product Category Rules Part 1, V2 January 2022
3. Tata Steel's EN 15804 verified EPD programme, Product Category Rules Part 2 – Structural Steels, V2 January 2022
4. ISO 14044:2006, Environmental management - Life Cycle Assessment - Requirements and guidelines
5. ISO 14025:2010, Environmental labels and declarations - Type III environmental declarations - Principles and procedures
6. ISO 14040:2006, Environmental management - Life Cycle Assessment - Principles and framework
7. EN 15804:2012+A2:2019, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
8. EN 10219-1:2006, Cold formed welded structural hollow sections of non-alloy and fine grain steels – Technical delivery requirements
9. EN 10219-2:2019, Cold formed welded steel structural hollow sections - Tolerances, dimensions and sectional properties
10. EN 10219-3:2020, Cold formed welded steel structural hollow sections - Technical delivery conditions for higher strength and weather resistant steels
11. EN 10204:2004, Metallic materials – Types of inspection documents
12. ISO 9001:2015, Quality management systems
13. ISO 14001:2015, Environmental management systems
14. ISO 45001:2018, Occupational health and safety management system
15. BES 6001, Responsible sourcing of construction products
16. Sphera; LCAfE: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2022
17. Documentation of LCA for Experts. Copyright, TM. Stuttgart, Echterdingen, 1992-2024. <https://lcadatabase.sphera.com/>
18. EUROFER in cooperation with the World Steel Association, 'A methodology to determine the LCI of steel industry co-products', February 2014
19. World Steel Association: Life cycle assessment methodology report, 2017
20. Sansom 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')
21. EC-JRC, EN 15804 Reference Package, <https://eplca.jrc.ec.europa.eu/LCDN/EN15804.xhtml>
22. Raban Siebers, Development of sustainability key figures for the value chain stages – erection and dismantling – in steel construction, in publication, Stahlbau Verlags-und Service GmbH, Düsseldorf, 2021



[www.tatasteelnederland.com/tubes](http://www.tatasteelnederland.com/tubes)

**Trademarks of Tata Steel**

Forcon® is a trademark of Tata Steel Nederland.

While care has been taken to ensure that the information contained in this publication is accurate, neither Tata Steel, nor its subsidiaries, accept responsibility or liability for errors or for information which is found to be misleading.

Before using products or services supplied or manufactured by Tata Steel and its subsidiaries, customers should satisfy themselves as to their suitability.

Copyright 2025

**Tata Steel Nederland Tubes B.V.**

Souvereinstraat 35  
4903 RH Oosterhout  
The Netherlands

E: [TubesNL@tatasteleurope.com](mailto:TubesNL@tatasteleurope.com)