

# Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

## Guardrail for traffic barriers

from

**NRS Nordic Road Safety AB**



Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
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*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*



## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
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<b>Accountabilities for PCR, LCA and independent, third-party verification</b>
<b>Product Category Rules (PCR)</b>
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): <i>PCR 2019:14 Construction products (EN 15804:A2) (1.11)</i>
PCR review was conducted by: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat <a href="http://www.environdec.com/contact">www.environdec.com/contact</a> .
<b>Life Cycle Assessment (LCA)</b>
LCA accountability: Ida Adolfsson and Xenofon Lemperos at Tyréns Sverige AB
<b>Third-party verification</b>
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:  <input checked="" type="checkbox"/> EPD verification by individual verifier  Third-party verifier: Pär Lindman Miljögiraff AB  Approved by: The International EPD® System  Procedure for follow-up of data during EPD validity involves third party verifier:  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

Owner of the EPD: NRS Nordic Road Safety AB

Contact: Åke Larsson email: [ake.larsson@nordicroadsafety.com](mailto:ake.larsson@nordicroadsafety.com)

Description of the organisation:

Nordic Road Safety (NRS) is a company that specializes in developing and selling permanent road safety solutions in Sweden. NRS manufactures and sells guardrails and poles for traffic barriers, bridge railings, centre road barriers and noise barriers and can also help with assembly, design, project management and development.

Product-related or management system-related certifications:

EN 1317–2: It covers requirements for safety barriers, how they shall be tested and how their properties are to be described.

CE-marked products are delivered with CE-certificate, declaration of performance and installation manual. The declaration of performance is written in Swedish which is required by the Swedish Transport Administration and the National Board of Housing, Building and Planning (BFS 2013:7SEK). BASTA (Sweden): The core of BASTA is EU Regulation EC 1907/2006 (REACH) and its requirements regarding chemical content. BASTA calls upon those wishing to choose materials in a conscious way aiming to phase out dangerous substances.

Name and location of production site(s):

NRS Nordic Road Safety AB  
Headquarters and production site  
Årvältsvägen 18  
861 36 Timrå, Sweden

## Product information

Product name:

Guardrail for traffic barriers

Product description:

Road traffic barrier's purpose is to increase traffic safety by preventing vehicles from driving off the road, into dangerous objects or into objects that need protection from colliding vehicles. Based on road classification, there are specific rules and guidelines for choosing a combination of guardrail and pole so that the road barrier can function optimally depending on the situation.

A road barrier system consists of two parts. A horizontal guardrail and a vertical post that is assembled on site with screws and built into the ground at the roadside. Both parts are galvanized steel sheet profiles that have different shapes and steel qualities depending on use and road safety requirements. The most common profiles for guardrails are called W, K and M profile while for the posts are C and Sigma profile. The steel strength classification depending on the use, varies between S235, S355 and S420.

In this EPD the product under assessment is the horizontal guardrail that includes all profiles (W,K and M) and steel strength classification S235, S355 and S420.

Manufacturing process:

The material used for the profiles is hot-rolled steel in thin sheets between 3 and 6 millimetres, which are then cut and bent into a profile. Most of the steel material comes from suppliers in China and a small amount is from Turkey.

The steel profiles then go through a hot-dip galvanizing process and are dipped in zinc bath to get sufficient protection against rust and weather elements. After galvanizing process, the pieces are transported to NRS storage facility in Timrå in Sweden. Depending on the project and road safety requirements, NRS designs the road barriers and transports the products to the road construction site for assembly.

UN CPC code: 41231

Geographical scope:

Production stage: Europe & Asia

Use stage and End of life stage: Sweden

**LCA information**

Declared unit: 1 tonne

Conversion factor: 10.65 kg/meter

Time representativeness: The data represents the year 2023.

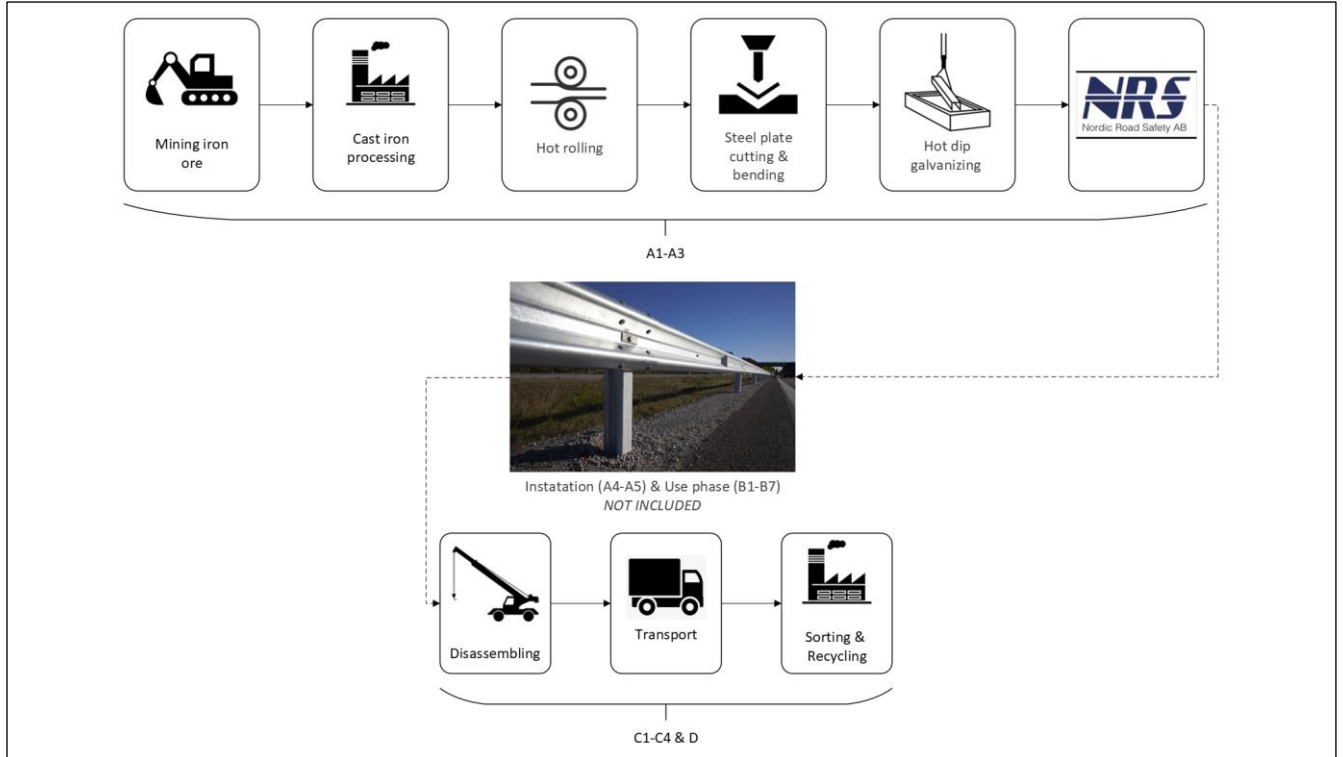
Database(s) and LCA software used:

The LCA software is SimaPro FLOW and the database is EcolInvent 3.9.1. When modelling in Simapro, Ecoinvent data (updated December 2022) has been used for generic data.

Description of system boundaries:

a) Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D)

System diagram:



Included	Excluded
<b>Production (A1-A3)</b> <ul style="list-style-type: none"> <li>Raw materials and production of raw and consumed materials.</li> <li>Material spill during the manufacturing process.</li> <li>Transport of raw materials during production.</li> <li>Transport of guardrail to NRS storage facility.</li> <li>Energy and fuel consumption in NRS storage facility.</li> <li>Production of packaging material for products delivered to NRS.</li> <li>Production of packaging material for guardrail products delivered from NRS.</li> <li>Transport of recyclable waste material from NRS to recycling facilities*</li> </ul>	<b>Production (A1-A3)</b> <ul style="list-style-type: none"> <li>NRS's infrastructure</li> </ul>
	<b>Installation (A4-A5)</b>
	<b>Use phase (B1-B7)</b>
<b>End of life (C1-C4)</b> <ul style="list-style-type: none"> <li>Disassembly of guardrail and transportation to waste management facilities.</li> </ul>	
<b>Benefits and loads beyond the system boundary (D)</b> <ul style="list-style-type: none"> <li>Steel recycling</li> </ul>	

More information:

LCA practitioners:

Ida Adolfsson – Environmental specialist Tyréns Sverige AB

[Ida.Adolfsson@tyrens.se](mailto:Ida.Adolfsson@tyrens.se)

Allocations:

Mass allocation method was used for energy consumption as well as waste disposal at NRS storage facility to determine the environmental impact for 1 tonne of guardrail product.

Assumptions:

- Steel material for guardrail has different steel strength classifications that depend on road safety requirements. It is assumed that different steel strength classifications have the same environmental impact.
- Steel density 7850 kg/m<sup>3</sup>
- Wood density 470 kg/m<sup>3</sup>
- Diesel density 0.845 kg/l
- Diesel thermal efficiency 0.0234 kg/MJ
- Transport distance to recycling facility for disassembled guardrail assumed 50 km

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU/ASIA	EU/ASIA	EU/ASIA	ND	ND	ND	ND	ND	ND	ND	ND	ND	SE, FE, NO	SE, FE, NO	SE, FE, NO	SE, FE, NO	SE, FE, NO
Specific data used	13 %					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

## Content information

Product components	Weight. Kg	Post-consumer material. weight-%	Renewable material. weight-%
Steel	914	19.18%	0%
Zink	86	0%	0%
TOTAL	1000	17,53%	
Packaging materials	Weight. Kg	Weight-% (versus the product)	
Plastic straps	0.09	<0.1%	
Wood	3.00	0.3%	
TOTAL	3.09	0.3%	

The product does not include any dangerous substances from the candidate list of SVHC.



## Environmental Information

### Potential environmental impact – mandatory indicators according to EN 15804

Results per 1 tonne safety barrier							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	2.68E+03	1.51E+01	9.24E+00	2.46E+01	1.38E-01	-1.18E+03
GWP-biogenic	kg CO <sub>2</sub> eq.	-2.22E+00	3.47E-03	8.46E-03	-2.83E-02	3.88E-04	0.00E+00
GWP-luluc	kg CO <sub>2</sub> eq.	1.42E+00	1.70E-03	4.56E-03	3.61E-02	1.85E-05	-2.76E-01
GWP-total	kg CO <sub>2</sub> eq.	2.67E+03	1.51E+01	9.25E+00	2.46E+01	1.38E-01	-1.18E+03
ODP	kg CFC 11 eq.	4.60E-05	2.40E-07	2.01E-07	3.92E-07	2.21E-09	-2.87E-05
AP	mol H <sup>+</sup> eq.	1.62E+01	1.40E-01	2.02E-02	2.76E-01	1.25E-03	-4.29E+00
EP-freshwater	kg P eq.	9.33E-01	4.64E-04	6.57E-04	1.45E-02	4.27E-06	-4.78E-01
EP-marine	kg N eq.	3.92E+00	6.49E-02	5.09E-03	6.44E-02	5.79E-04	-1.03E+00
EP-terrestrial	mol N eq.	4.19E+01	7.06E-01	5.18E-02	7.18E-01	6.29E-03	-1.09E+01
POCP	kg NMVOC eq.	1.64E+01	2.09E-01	3.13E-02	2.15E-01	1.87E-03	-6.26E+00
ADP-minerals&metals*	kg Sb eq.	7.43E-02	5.28E-06	3.02E-05	1.52E-03	5.51E-08	5.59E-04
ADP-fossil*	MJ	3.58E+04	1.98E+02	1.31E+02	3.34E+02	1.80E+00	-1.24E+04
WDP*	m <sup>3</sup>	7.65E+02	6.41E-01	7.71E-01	6.62E+00	6.25E-03	-7.73E+01
Acronyms		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 the 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; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption					

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

## Potential environmental impact – additional mandatory and voluntary indicators

		Results per 1 tonne safety barrier					
Indicator	Unit	Tot.A1-A3	C1	C2	C3	C4	D
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq.	2.68E+03	1.51E+01	9.24E+00	2.47E+01	1.38E-01	-1.18E+03

## Use of resources

		Results per 1 tonne safety barrier					
Indicator	Unit	Tot.A1-A3	C1	C2	C3	C4	D
PERE	MJ	1.78E+03	1.13E+00	1.13E+00	5.18E+01	5.31E-02	-2.16E+02
PERM	MJ	4.97E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.83E+03	1.13E+00	1.13E+00	5.18E+01	5.31E-02	-2.16E+02
PENRE	MJ	3.61E+04	2.10E+02	2.10E+02	3.54E+02	1.92E+00	-1.31E+04
PENRM	MJ.	2.84E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.61E+04	2.10E+02	2.10E+02	3.54E+02	1.92E+00	-1.31E+04
SM	kg	2.03E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+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>	1.87E+01	2.95E-02	2.95E-02	2.59E-01	2.80E-04	-2.89E+00

Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water
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<sup>1</sup> The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

## Waste production and output flows

### Waste production

		Results per 1 tonne safety barrier					
Indicator	Unit	Tot.A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	1.17E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed	kg	1.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### Output flows

		Results per 1 tonne safety barrier					
Indicator	Unit	Tot.A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.69E+01	0.00E+00	0.00E+00	9.50E+02	0.00E+00	0.00E+00
Materials for energy recovery	kg	2.58E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	3.25E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	1.09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### Information on biogenic carbon content

Results per 1 tonne safety barrier		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	1.50

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

## Differences versus previous versions

The previous version of this EPD was based on information from year 2021. This EPD is based on information from year 2023. The energy and waste consumption in A3 is updated and the number of supplies have decreased. Almost all suppliers have an EPD. The scenario for C1 and C2 has been updated to align with *c-PCR-010 Guardrails and bridge parapets (2021-02-11)*.

## References

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