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ANCORIAMO L'EDILIZIA AL FUTURO

GL LOCATELLI S.r.l.

EPD ITALY

ECO PLATFORM EPD EN 15804 VERIFIED

ENVIRONMENTAL PRODUCT DECLARATION

CAST-IN ANCHOR CHANNEL SYSTEMS
Turate (CO), Italy

in compliance with ISO 14025 and EN 15804

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	EPD-LOC-2021001-EN
EPDItaly Registration Number	EPDITALY0234

Issue Date	07 / 12 / 2021
Valid to	07 / 12 / 2026

GENERAL INFORMATION

REFERENCES

EPD OWNER: GL LOCATELLI S.r.l. - VIA DANTE ALIGHIERI 66
22078 TURATE (COMO - ITALY)

PROGRAM OPERATOR: EPDITALY - VIA GAETANO DE CASTILLIA 10
20124 MILANO - ITALY
www.epditaly.it

VERIFICATION

This declaration has been developed referring to EPDItaly, following the General Programme Information; further information and the document itself are available at: www.epditaly.it

EPD document valid within the following geographical area: Italy and European countries.

CEN standard EN 15804 served as the core PCR (PCR ICMQ-001/15 Construction products and construction service, rev. 2.1, 22/04/2021)
Independent verification of the EPD and its data, in accordance with ISO 14025 ☐ EPD process certification (Internal) ■ EPD verification (External)
Third party verifier: ICMQ SpA, via De Castillia, 10 20124 Milano
Accredited by: Accredia

Environmental declarations published within the same product category, though originating from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804.

GL Locatelli S.r.l. relieves EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence; EPDItaly declines all responsibility for the manufacturer's information, data and results of the life cycle assessment.

DECLARED PRODUCT

GL LOCATELLI anchor channels systems, including the following range of products: GP 40/223, HGP 40/223, GP 50/30, HGP 50/30, GP 54/33, HGP 54/33 and GP seismic.

DECLARED UNIT

The declared unit is one running metre of anchor channels system with variable weight according to the type and size (as disclosed at p. 14).

DECLARATION BASED ON

EN 15804:2012+A1 (November 2013). Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
CEN/TR 16970:2016 (August 2016). Sustainability of construction works – Guidance for the implementation of EN 15804.
ISO 14040:2006 (July 2006). Environmental management – Life Cycle Assessment – Principles and framework.
ISO 14044:2006 (July 2006). Environmental management – Life Cycle Assessment – Requirements and guidelines.
ISO 14025:2006. Environmental labels and declarations – Type III environmental declarations - Principles and procedures.
Regolamento del Programma EPDItaly, versione 5.0, 01/07/2020.
PCR ICMQ-001/15 – rev. 2.1, Prodotti da costruzione e servizi per costruzioni, Data di emissione: 22/04/2021, Validità fino al: 31/10/2022.
LCA Study Project Report - Life Cycle TEAM, DABC, PoliMI (November 2021). Studio LCA dettagliato di sistemi di ancoraggio in acciaio finalizzato alla realizzazione di una certificazione EPD di prodotto.

CONTACTS

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SCOPE AND TYPE OF EPD

THE APPROACH USED IN THIS EPD IS "CRADLE TO GATE WITH OPTIONS".

TABLE OF MODULES

Table of modules contains the list of modules included or not included in the EPD:
X = module included;
MND = module not declared.

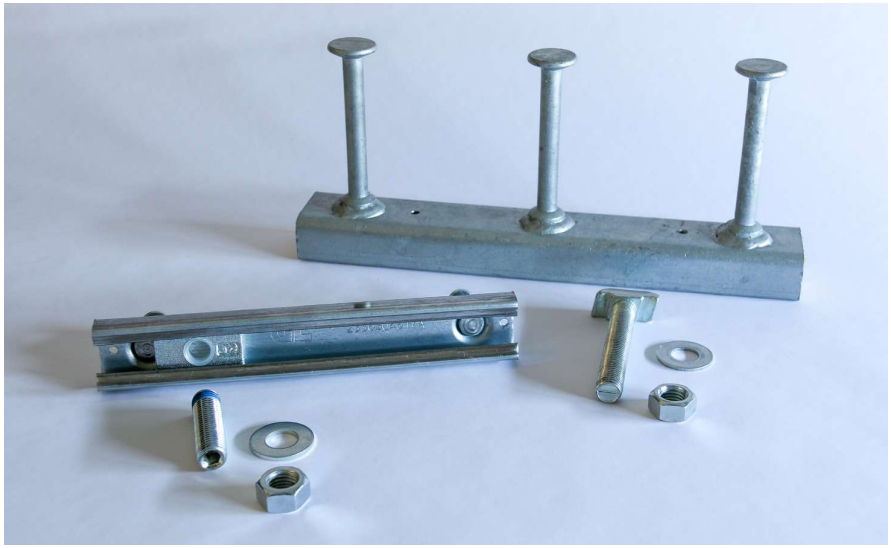
EPD TYPE: Specific for anchor channel systems manufactured in the production plant of Turate (Como, Italy).
EPD GEOGRAPHICAL AREA: Italy and European countries.
SOFTWARE: SimaPro 9.0.0.48
DATABASE: Ecoinvent 3.6

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS
Raw material supply	Transport	Manufacturing	Transport	Construction - installation process	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X

AGENCY

GL LOCATELLI S.r.l.

GL LOCATELLI produces and designs steel and stainless-steel anchor channels for concrete construction, prefabrication, ventilated facades and for the installation of thermo-technical and electrical systems. The company is specialized in the production of steel anchor channels and it has always been committed to promoting research for product optimization and innovation. Accordingly, GL LOCATELLI was one of the first manufacturer to obtain EN9001 certification in 1992. Moreover, it turned out to be the first Italian manufacturer and among the pioneering EU manufacturers to CE mark the anchor channel systems in compliance with the European standard EAD330008-02-0601. The ongoing research in collaboration with Politecnico di Milano has led to interesting innovations aimed at improving the construction site safety and increasing performance by using less steel. The study of anchor channel systems subject to seismic conditions involved years of dedicated work up to support the development of the European standard EAD 18-33-26699-0601. The company effort to scientific research is determined by the willingness to offer safe and long-lasting solutions (the service life of anchor channels is equal to the building in which it is installed). Today the company is active on the international market – Europe, Middle East and Australia – providing expertise and flexible construction systems suitable for realizing customized design. GL LOCATELLI does not consume water during the production process and the installed photovoltaic system fully-covers all energy consumption.



PRODUCT

DESCRIPTION

The product portfolio of GL LOCATELLI anchor channel systems includes one type of cold roll channel. Anchor channels are GP when the channel is alone and it is use with special T bolts. Anchor channels are HGP when H anchor nuts are put into the channels in production from producer. GP seismic have origin from GP anchor channel assembly with seismic accessory. Concerning steel quality, both pre-galvanized (Sendzimir) and hot-dipped galvanized steel are considered in the study.
The anchor channel is a steel C channel with anchors on the channel back to guaranty the transfer of loads from the steel to the concrete. The foam fulls the channel cavity to stop the concrete penetration in the liquid phase. The anchor channels system is the optimum technique to realise fixings in safety condition of work, without dust, without damage the concrete structures. BIM engineering permits to optimize the anchor channels use in all the connection from concrete structure to services installation.

- GP is the traditional cold form channel (installation with T bolts).
- HGP is the cold form channel with nuts inside (installation with M16 threaded bars).
- GP seismic is complete connection that realise performance under seismic actions.

Anchor channel systems are available in different size – 40/223, 50/30, 54/33 – varying in terms of mass in relation to running metres (as disclosed at p. 14). The declared reference products are GP, HGP and GP seismic anchor channels system.

PRODUCTION PROCESSES

All steel coils, accessories and materials constituting GL LOCATELLI anchor channel systems GP and HGP are purchased from qualified suppliers and then appropriately processed and assembled in-house at GL LOCATELLI manufacturing plant Turate, Como (Italy). The GL LOCATELLI anchor channels are made of cold-formed channel profiles, for the largest share in pre-galvanized (Sendzimir) steel and for the minor share in hot-dipped galvanized steel. Since sourced as semi-finished products, the steel coils are subjected at the plant to a series of process, including: roll-forming process, cutting process, assembly of components (profiles and anchors), foaming process, assembly of steel accessories (H nuts and seismic) and packaging process. After anchors assembly, only pickled coils (no Sendzimir) are transported to external parties for performing the zinc-coating and resulting hot-dip galvanizing. The foaming processing finish the product production before the packaging. Anchor channel systems are packaged, as appropriate with carton board box placed on wooden pallets or with metal straps. Steel accessories are sold separately and combined with anchor channel systems during the installation phase. All types of production waste such as steel scrap, exhausted oils and other emulsions are carefully separated and disposed according to the type.

TECHNICAL DATA

The entire GL LOCATELLI product portfolio of anchor channels is based on cold-formed sections produced by shaping steel coils through a system of rollers. The process takes place in the manufacturing plant of Turate without the use of blast furnaces. The range of anchor channel systems is determined by the applicable loads on the profiles (as disclosed in the table below) and it is expressed in the satisfaction of combined loads.

PRODUCTS	SHEAR LOADS		TRACTION LOADS	
	GP	HGP	GP	HGP
40/223	11,1 kN	22,9 kN	11,1 kN	11,1 kN
50/30	17,2 kN	39,7 kN	17,2 kN	17,2 kN
54/33	32,05 kN	42,6 kN	32,05 kN	42,6 kN
40/223 seismic	new EAD and ETA under construction			

In particular, HGP anchor channel offers excellent performance of transverse shear loads, shear loads along the profile and fatigue loads. 40/223, 50/30 and 54/33 anchor channels allow the application of loads from 10 kN up to 42.6 kN for a single point of traction. HGP anchor channels assures that the certified performance is determined by the anchoring profile rather than on the correct installation operations (recommendations are always present in case of traditional GP anchor channels with T bolts). The size of anchor channel systems increases – from 40/223 to 50/30 up to 54/33 – with increasing loads applied to node.

TECHNICAL RULES OF THE PRODUCT

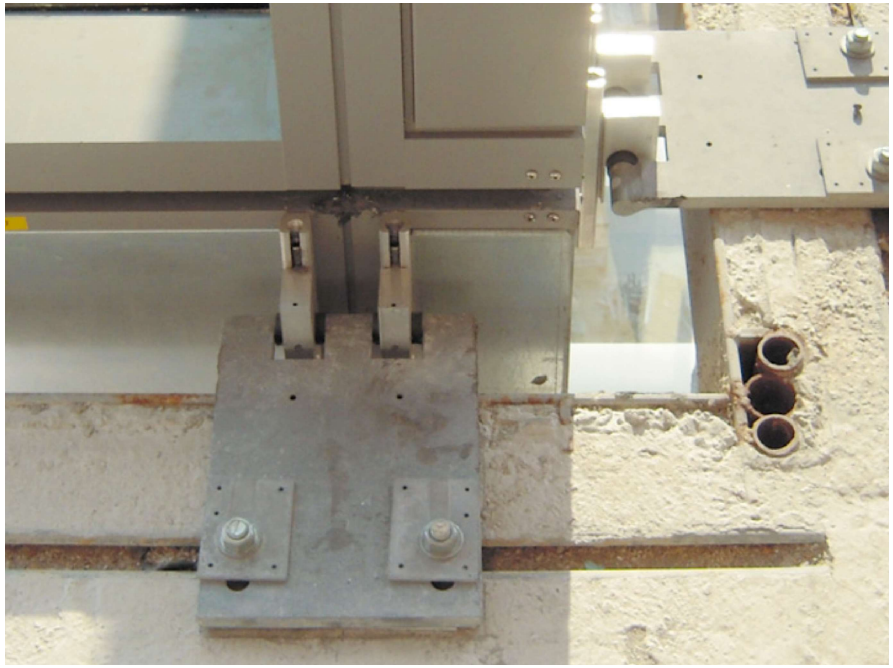
Placing on the market/Technical rules of the product:
Regulation (EU) N° 305/2011 and its amendments;
Product standards: EAD 330008-02-0601 and EAD 18-33-26699-0601.

DANGEROUS SUBSTANCES

None of the following substances have been added to the product: Substances on the REACH Candidate list of substances of very high concern and substances that lead to the product being classified as hazardous waste.

APPLICATION

Anchor channel systems are used for concrete constructions, both in civil construction works and infrastructure. Concerning civil construction, the anchor channels are placed as appropriate into the concrete slabs and/or into the technical and elevator shafts. The anchor channels pre-installed in concrete facilitate the installation of glass facades, prefabricated facades, parapets, sunshades, elevators, distribution of building systems, installation of machinery on the roof/basement. In the construction of prefabricated concrete buildings, they ensure the on-site assembly of components as beams, pillars and panels. They allow to operate in complete security since, by not requiring holes in the concrete, they do not generate dust in the atmosphere, delivering healthy air to indoor environments. In infrastructure works, anchor channels are playing an ever-increasing role in speeding up the installation of (million) fixing points. Here, anchor channel systems are used for the assembly of concrete prefabricated elements such as parts of tunnels, tunnel linings, screens, barriers, signage, electrical/lighting/ventilation systems.



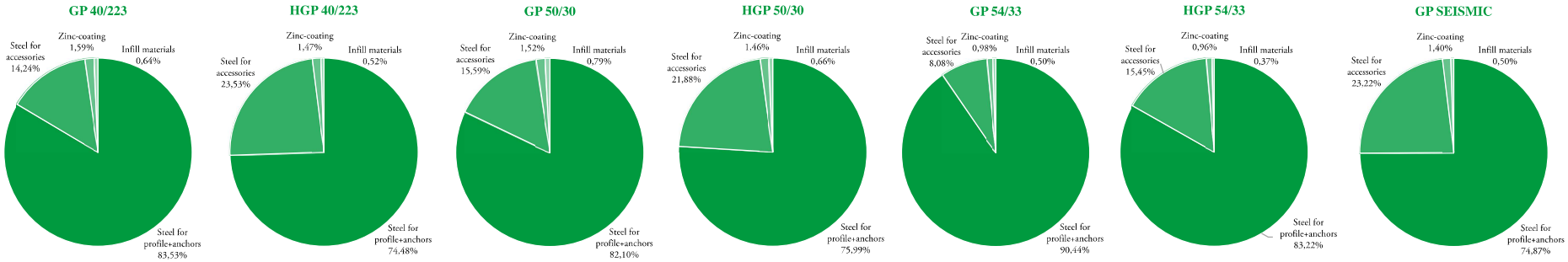
COMPONENTS

To provide a comprehensive overview of GL LOCATELLI anchor channel systems, the components assessed by this EPD are briefly described, indicating the related weight percentages with reference to the products under consideration.

Steel is the principal material, sourced from different steel plants.
Steel constitutes both profiles, anchors and accessories, all zinc-coated.
Expanded polyurethane foam derives from the mixture of polyol, isocyanate and solvents and it is placed on PVC tape.
Lubricating oils are used for the roll-forming process.
Note that electricity is the fuel that power the whole production process and the energy demand is reduced by the on-site renewable energy production through the installation on the roof of the manufacturing plant of photovoltaic system.
No water consumption occurs during the processing of anchor channel systems.

42190 Reference product CPC code (based on version 2.1: 2015). Number of HS 2007 classification: 7304110090 for GP and HGP; 73181631 for accessories.

Components of GP, HGP and GP seismic anchor channel systems, according to the different size.



COMPONENTS [kg]	GP 40/223	HGP 40/223	GP 50/30	HGP 50/30	GP 54/33	HGP 54/33	GP SEISMIC
Steel for profile+anchors	83,53%	74,48%	82,10%	75,99%	90,44%	83,22%	74,87%
Steel for accessories	14,24%	23,53%	15,59%	21,88%	8,08%	15,45%	23,22%
Zinc-coating	1,59%	1,47%	1,52%	1,46%	0,98%	0,96%	1,40%
Infill materials	0,64%	0,52%	0,79%	0,66%	0,50%	0,37%	0,50%
	100%	100%	100%	100%	100%	100%	100%

REFERENCE SERVICE LIFE

A service life of at least 50 years is applicable to GL LOCATELLI anchor channel systems GP and HGP, which are in line with the safety concepts outlined in the Eurocode and ACI. Nevertheless, the practical service life can be considerably longer in accordance with the designed application. This service life refers to static design approach and not to reference service life according to ISO 15686.

LIFE CYCLE DESCRIPTION

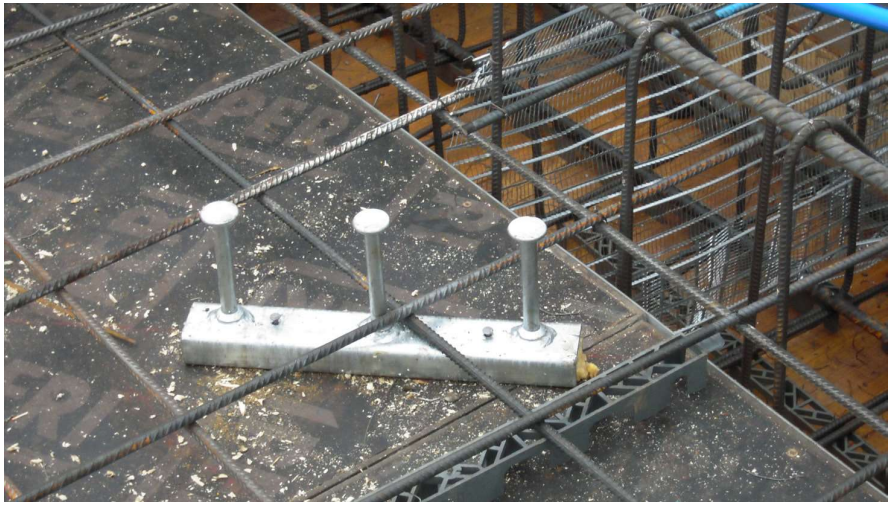
The following paragraphs provide an overview of the product life cycle stages. However, note that only production stage and end of life stage are included in the assessment, while construction stage and use stage are out from the system boundaries.

PRODUCTION STAGE
During in-house manufacturing, the anchor channel is roll-formed, joined with anchors, integrated with accessories, such as H nuts, and filled with expanded polyurethane foam. The pre-galvanized Sendzimir profiles leaves the manufacturing plant to go directly to the construction site. Whereas, for the hot-dip galvanized profiles, a galvanizing process is required with transport to and from the galvanising plant.

CONSTRUCTION STAGE
On the construction site, the anchor channels are placed in the formworks together with reinforcement bars. It is important to accurately place the anchor channels ensuring contact between the profile hollow surface and the formwork. Once the formworks are removed, the anchor channels appear as a simple hollow line into the concrete construction.
Later in time, the anchoring is carried out by the installer by using special T bolts for GP anchor channels. Instead, in HGP anchor channels are mounted only threaded bars M16. The same installer is responsible to set HVAC, elevators, facades, sunshades, parapets and all related elements of project. No supplementary materials are needed. After concrete consolidation, foam are removed and disposed (to recycling).

USE STAGE
The anchor channel systems keep for a long time their mechanical properties, allowing the use, disassembly and potential reuse of channels. No maintenance operations and periodic inspection are required except as a result of traumatic events such as earthquakes and fires.

END OF LIFE STAGE
At the end of life, when the concrete structure is demolished, the anchor channels are separated at the construction site from the concrete like other steel elements (reinforcement bars and steel accessories) and thereafter they are fully recycled as steel scrap.



ENVIRONMENTAL PROFILE

The results of the underlying LCA is presented in terms of environmental impacts, resource use, output flows and waste for the phases A1-A3, C3-C4 and module D.

ENVIRONMENTAL IMPACT

GP 40/223 ANCHOR CHANNEL SYSTEM

ENVIRONMENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	6,03E+00	0,00E+00	-1,70E+00	[kg CO_2-Eq.]
ODP	5,23E-07	0,00E+00	-5,74E-08	[kg CFC11-Eq.]
AP	5,95E-02	0,00E+00	-5,79E-03	[kg SO_2-Eq.]
EP	2,09E-02	0,00E+00	-3,10E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	3,18E-03	0,00E+00	-1,43E-03	[kg ethene-Eq.]
ADPE	5,55E-03	0,00E+00	-3,74E-06	[kg Sb-Eq.]
ADPF	6,83E+01	0,00E+00	-1,50E+01	[MJ]

HGP 40/223 ANCHOR CHANNEL SYSTEM

ENVIRONMENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	6,99E+00	0,00E+00	-1,91E+00	[kg CO_2-Eq.]
ODP	5,95E-07	0,00E+00	-6,45E-08	[kg CFC11-Eq.]
AP	6,45E-02	0,00E+00	-6,51E-03	[kg SO_2-Eq.]
EP	2,34E-02	0,00E+00	-3,49E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	3,55E-03	0,00E+00	-1,61E-03	[kg ethene-Eq.]
ADPE	5,99E-03	0,00E+00	-4,20E-06	[kg Sb-Eq.]
ADPF	7,86E+01	0,00E+00	-1,69E+01	[MJ]

GP 50/30 ANCHOR CHANNEL SYSTEM

ENVIRONMENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	8,67E+00	0,00E+00	-2,34E+00	[kg CO_2-Eq.]
ODP	7,54E-07	0,00E+00	-7,90E-08	[kg CFC11-Eq.]
AP	8,19E-02	0,00E+00	-7,97E-03	[kg SO_2-Eq.]
EP	2,96E-02	0,00E+00	-4,27E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	4,49E-03	0,00E+00	-1,97E-03	[kg ethene-Eq.]
ADPE	11,1E-03	0,00E+00	-5,15E-06	[kg Sb-Eq.]
ADPF	9,83E+01	0,00E+00	-2,06E+01	[MJ]

HGP 50/30 ANCHOR CHANNEL SYSTEM

ENVIRONMENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	9,55E+00	0,00E+00	-2,53E+00	[kg CO_2-Eq.]
ODP	8,10E-07	0,00E+00	-8,55E-08	[kg CFC11-Eq.]
AP	8,71E-02	0,00E+00	-8,63E-03	[kg SO_2-Eq.]
EP	3,19E-02	0,00E+00	-4,62E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	4,78E-03	0,00E+00	-2,14E-03	[kg ethene-Eq.]
ADPE	11,7E-03	0,00E+00	-5,57E-06	[kg Sb-Eq.]
ADPF	10,7E+01	0,00E+00	-2,24E+01	[MJ]

GWP = Global warming potential
ODP = Depletion potential of the stratospheric ozone layer
AP = Acidification potential of land and 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

GP 54/33 ANCHOR CHANNEL SYSTEM

ENVIRON-MENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	20,4E+00	0,00E+00	-4,55E+00	[kg CO_2-Eq.]
ODP	17,3E-07	0,00E+00	-15,3E-08	[kg CFC11-Eq.]
AP	15,5E-02	0,00E+00	-15,5E-03	[kg SO_2-Eq.]
EP	7,04E-02	0,00E+00	-8,29E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	10,1E-03	0,00E+00	-3,84E-03	[kg ethene-Eq.]
ADPE	26,0E-03	0,00E+00	-5,21E-06	[kg Sb-Eq.]
ADPF	23,1E+01	0,00E+00	-4,01E+01	[MJ]

GP SEISMIC ANCHOR CHANNEL SYSTEM

ENVIRON-MENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	8,17E+00	0,00E+00	-2,16E+00	[kg CO_2-Eq.]
ODP	6,98E-07	0,00E+00	-7,30E-08	[kg CFC11-Eq.]
AP	7,19E-02	0,00E+00	-7,37E-03	[kg SO_2-Eq.]
EP	2,67E-02	0,00E+00	-3,95E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	4,08E-03	0,00E+00	-1,83E-03	[kg ethene-Eq.]
ADPE	6,25E-03	0,00E+00	-4,76E-06	[kg Sb-Eq.]
ADPF	9,16E+01	0,00E+00	-1,91E+01	[MJ]

GWP = Global warming potential
ODP = Depletion potential of the stratospheric ozone layer
AP = Acidification potential of land and water
EP = Eutrophication potential

HGP 54/33 ANCHOR CHANNEL SYSTEM

ENVIRON-MENTAL IMPACT	A1 - A3	C3 - C4	D	Units
GWP	22,3E+00	0,00E+00	-4,95E+00	[kg CO_2-Eq.]
ODP	18,6E-07	0,00E+00	-16,7E-08	[kg CFC11-Eq.]
AP	16,5E-02	0,00E+00	-16,8E-03	[kg SO_2-Eq.]
EP	7,52E-02	0,00E+00	-9,03E-03	[kg $(PO_4)^{3-}$-Eq.]
POCP	10,8E-03	0,00E+00	-4,18E-03	[kg ethene-Eq.]
ADPE	27,1E-03	0,00E+00	-5,67E-06	[kg Sb-Eq.]
ADPF	25,1E+01	0,00E+00	-4,37E+01	[MJ]

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

GP 40/223 ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	8,57E+00	0,00E+00	1,70E-01	[MJ]
PERM	6,95E-01	0,00E+00	0,00E+00	[MJ]
PERT	9,26E+00	0,00E+00	1,70E-01	[MJ]
PENRE	7,88E+01	0,00E+00	-1,35E+01	[MJ]
PENRM	7,24E-01	0,00E+00	0,00E+00	[MJ]
PENRT	7,95E+01	0,00E+00	-1,35E+01	[MJ]
SM	1,39E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	7,31E-02	0,00E+00	-1,56E-03	[m³]

HGP 40/223 ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	9,79E+00	0,00E+00	1,92E-01	[MJ]
PERM	6,95E-01	0,00E+00	0,00E+00	[MJ]
PERT	10,5E+00	0,00E+00	1,92E-01	[MJ]
PENRE	9,16E+01	0,00E+00	-1,51E+01	[MJ]
PENRM	6,52E-01	0,00E+00	0,00E+00	[MJ]
PENRT	9,22E+01	0,00E+00	-1,51E+01	[MJ]
SM	1,57E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	8,21E-02	0,00E+00	-1,76E-03	[m³]

GP 50/30 ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	12,7E+00	0,00E+00	2,35E-01	[MJ]
PERM	10,1E-01	0,00E+00	0,00E+00	[MJ]
PERT	13,7E+00	0,00E+00	2,35E-01	[MJ]
PENRE	11,4E+01	0,00E+00	-1,85E+01	[MJ]
PENRM	12,5E-01	0,00E+00	0,00E+00	[MJ]
PENRT	11,5E+01	0,00E+00	-1,85E+01	[MJ]
SM	1,92E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	10,6E-02	0,00E+00	-2,15E-03	[m³]

HGP 50/30 ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	13,8E+00	0,00E+00	2,54E-01	[MJ]
PERM	10,1E-01	0,00E+00	0,00E+00	[MJ]
PERT	14,8E+00	0,00E+00	2,54E-01	[MJ]
PENRE	12,5E+01	0,00E+00	-2,01E+01	[MJ]
PENRM	11,4E-01	0,00E+00	0,00E+00	[MJ]
PENRT	12,7E+01	0,00E+00	-2,01E+01	[MJ]
SM	2,08E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	11,5E-02	0,00E+00	-2,33E-03	[m³]

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

GP 54/33 ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	31,7E+00	0,00E+00	4,78E-01	[MJ]
PERM	24,4E-01	0,00E+00	0,00E+00	[MJ]
PERT	34,2E+00	0,00E+00	4,78E-01	[MJ]
PENRE	27,1E+01	0,00E+00	-3,78E+01	[MJ]
PENRM	15,1E-01	0,00E+00	0,00E+00	[MJ]
PENRT	27,2E+01	0,00E+00	-3,78E+01	[MJ]
SM	3,73E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	28,4E-02	0,00E+00	-4,12E-03	[m³]

GP SEISMIC ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	12,1E+00	0,00E+00	2,17E-01	[MJ]
PERM	9,13E-01	0,00E+00	0,00E+00	[MJ]
PERT	13,0E+00	0,00E+00	2,17E-01	[MJ]
PENRE	10,7E+01	0,00E+00	-1,71E+01	[MJ]
PENRM	7,24E-01	0,00E+00	0,00E+00	[MJ]
PENRT	10,8E+01	0,00E+00	-1,71E+01	[MJ]
SM	1,77E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	9,32E-02	0,00E+00	-1,99E-03	[m³]

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

HGP 54/33 ANCHOR CHANNEL SYSTEM

RESOURCE USE	A1 - A3	C3 - C4	D	Units
PERE	34,1E+00	0,00E+00	5,20E-01	[MJ]
PERM	24,4E-01	0,00E+00	0,00E+00	[MJ]
PERT	36,5E+00	0,00E+00	5,20E-01	[MJ]
PENRE	29,5E+01	0,00E+00	-4,11E+01	[MJ]
PENRM	12,2E-01	0,00E+00	0,00E+00	[MJ]
PENRT	29,6E+01	0,00E+00	-4,11E+01	[MJ]
SM	4,06E+00	0,00E+00	0,00E+00	[kg]
RSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
NRSF	0,00E+00	0,00E+00	0,00E+00	[MJ]
FW	30,1E-02	0,00E+00	-4,49E-03	[m³]

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

GP 40/223 ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	1,08E-03	0,00E+00	-1,94E-04	[kg]
NHWD	1,52E+00	0,00E+00	-1,76E-01	[kg]
RWD	2,66E-04	0,00E+00	1,18E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	2,71E-01	2,72E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[MJ]

HGP 40/223 ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	1,19E-03	0,00E+00	-2,18E-04	[kg]
NHWD	1,72E+00	0,00E+00	-1,98E-01	[kg]
RWD	3,18E-04	0,00E+00	1,33E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	2,71E-01	3,06E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[MJ]

GP 50/30 ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	1,94E-03	0,00E+00	-2,67E-04	[kg]
NHWD	2,14E+00	0,00E+00	-2,40E-01	[kg]
RWD	3,96E-04	0,00E+00	1,63E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	3,49E-01	3,74E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[MJ]

HGP 50/30 ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	2,06E-03	0,00E+00	-2,89E-04	[kg]
NHWD	2,33E+00	0,00E+00	-2,60E-01	[kg]
RWD	4,41E-04	0,00E+00	1,77E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	3,49E-01	4,05E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[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

* Note that MFR impacts refer only to Module C3. All impacts in Module C3 and C4 are equal to zero, except MFR that considers the steel scrap at the end of life sent for recycling and declared in Module C3.

GP 54/33 ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	3,92E-03	0,00E+00	-5,20E-04	[kg]
NHWD	5,04E+00	0,00E+00	-4,67E-01	[kg]
RWD	9,74E-04	0,00E+00	3,17E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	6,48E-01	7,29E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[MJ]

HGP 54/33 ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	4,15E-03	0,00E+00	-5,66E-04	[kg]
NHWD	5,43E+00	0,00E+00	-5,08E-01	[kg]
RWD	10,7E-04	0,00E+00	3,45E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	6,48E-01	7,93E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[MJ]

GP SEISMIC ANCHOR CHANNEL SYSTEM

OUTPUT FLOWS AND WASTE	A1 - A3	C3 - C4	D	Units
HWD	1,29E-03	0,00E+00	-2,47E-04	[kg]
NHWD	1,98E+00	0,00E+00	-2,22E-01	[kg]
RWD	3,83E-04	0,00E+00	1,51E-05	[kg]
CRU	0,00E+00	0,00E+00	0,00E+00	[kg]
MFR	2,71E-01	3,46E+00*	0,00E+00	[kg]
MER	0,00E+00	0,00E+00	0,00E+00	[kg]
EEE	0,00E+00	0,00E+00	0,00E+00	[MJ]
EET	0,00E+00	0,00E+00	0,00E+00	[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

* Note that MFR impacts refer only to Module C3. All impacts in Module C3 and C4 are equal to zero, except MFR that considers the steel scrap at the end of life sent for recycling and declared in Module C3.

CALCULATION RULES

DECLARED UNIT

The declared unit is 1 m length of anchor channel system, assuming a variable number of anchors with regard to the product concerned and four accessories per running metre channel for the whole range of products (considering different types, e.g. 4 x T bolts type M16/50 in the case of GP).
In order to calculate the LCA results in kg, the conversion factors listed in the attached tables can be applied, according to the weight of each type and size of anchor channel system.

PRODUCT [mm]	WEIGHT [kg/ml]	CONVERSION FACTOR to 1 kg
GP 40/223	2,736	0,365
HGP 40/223	3,072	0,325
GP 50/30	3,774	0,265
HGP 50/30	4,079	0,245
GP 54/33	7,323	0,136
HGP 54/33	7,960	0,126
GP seismic	3,478	0,287

ASSUMPTIONS

This EPD is intended to represent the product portfolio of GL LOCATELLI anchor channel systems, all produced in one manufacturing plant (Turate). During the LCA study, assumptions were avoided as much as possible, collecting primary data from the manufacturing plant at issue. However, due to lack of information, assumptions were made on steel coils, since GL LOCATELLI is supplied by different steel plants that have no EPD for their products and no traceability systems to provide evidence on the rate of recycled content. For these reasons, in accordance with EU data (EUROFER, 2020), it is assumed that 60% of steel is produced via the Basic Oxygen Furnace (BOF) production route, with 19% recycled content; while 40% of steel via the Electric Arc Furnace (EAF) production route, with 100% recycled content. Anchors are calculated on the basis of the average production in 2020, while accessories are based in terms of number and types on the most commonly used items. Concerning transport, the exact distances between suppliers and manufacturing plant are calculated, except for Chinese suppliers for which it is hypothesized the distance potentially travelled by sea. For the end of life scenarios, it is esteemed 5% steel scrap loss during the recycling process.

CUT OFF RULES

All data for the production process of anchor channel systems are considered in the LCA study. They include input flows with a contribution of less than 1% of mass or energy. The transport of all materials in input and output are accounted. Impacts relating to the production of machines and facilities required during production are outside the scope, whereas the impacts relating to the processing of steel accessories are included in the assessment. The impacts derived from the dismantling of the building structure (separating concrete, steel and other building materials) and sorting plant are not included.

DATA QUALITY

Primary data from GL LOCATELLI manufacturing plant in Turate (Como) were recorded for the EPD. Primary data refers to the year 2020 and they involve supplier invoices, material/energy consumption and generation, actual production volumes. Only steel specifications (production routes and recycled content) are based on European statistical data revised at 2020 (EUROFER, 2020). The background datasets were taken from Ecoinvent database. Technological, geographical and temporal representativeness is given from the selection of Ecoinvent datasets. During the assessment, some datasets were adjusted as appropriate to be representative of the distinct features of the declared products, for instance diversifying the zinc-coating thickness of pre-galvanized steel profiles (20 um) and hot-dipped galvanized (55 um) starting from the selected Ecoinvent dataset (range 20-45 um).

ALLOCATIONS

Allocation was avoided whenever possible. However, since Turate manufacturing plant comprises further products beside the products considered in this study, allocation was inevitable for the set of data related to the entire production system. In particular, they concern machinery lubricating oils, photovoltaic panels and production waste (steel scrap, exhausted emulsions, etc.). In all these cases, allocation was done on mass basis (kg) of anchor cannel systems compared to the total production.

SYSTEM BOUNDARIES

CRADLE TO GATE WITH OPTIONS

The system boundary of the EPD follows the modular structure in line with EN 15804. This section describes the modules covered by the scope of this study. In particular, the assessment considers the life cycle stages of production (A1-A3), end of life scenarios (C3-C4) and benefits and loads beyond the system boundaries (D).

Broad scheme of anchor channel system, showing the main activities included in the system boundary according to the LCA modules.

A1 - Raw materials supply	**A2** - Transport	**A3** - Manufacturing	**C3 - C4** - Waste processing and disposal	**D** - Benefits and loads beyond the system boundary
Steel coil sourcing	Steel coil delivery	Roll-forming process	Collection of construction waste	Recycling
Steel anchors and accessories sourcing	Steel anchors and accessories delivery	Cutting process		
Materials for roll-forming	Process materials delivery	Assembly process of anchors		
Materials for foaming	Packaging materials delivery	Hot dip galvanizing process *		
Materials for packaging		Assembly process of accessories		
		Foaming process		
		Packaging process		

* Note that galvanization is performed by external parties and it concerns a limited share of the production related to only pickled channels (no Sendzimir).

A1 - Raw materials supply | A2 | A3 | C3 - C4 | D

Steel coil sourcing from qualified suppliers, including pre-galvalized (Sendzimir) steel coils and pickled steel coils.

Steel anchors and accessories sourcing from qualified suppliers, including:
- for GP: T bolts;
- for HGP: H nuts and H bolts;
- for GP seismic: seismic sleds.

Materials sourcing used for the roll-forming process: oils for lubricating machinery.

Materials sourcing used for the foaming process: PCV tapes and expanded polyurethane foam, derived from the mixture of polyol, isocyanate and solvents.

Materials sourcing used for the packaging process: carton board box, wooden pallets and metal straps.

A1	A2 - Transport	A3	C3 - C4	D

Steel coil delivery from suppliers to production plant by road transportation.

Steel anchors and accessories delivery from suppliers to production plant by both road and sea transportation in the case of anchors and by only road in the case of accessories (T bolt , H nuts, H bolt and seismic sleds).

Process materials delivery from production and supplier facilities to production plant by road transportation.

Packaging materials delivery from suppliers to production plant by road transportation.

A1	A2	A3 - Manufacturing	C3 - C4	D

Roll-forming process of steel coils of varying thicknesses to realize channel ì of C-shaped different sizes.

Cutting process of steel profiles to achieve the desired product length and to create the buttonholes for anchors positioning.

Assembly process between steel channels and anchors. Anchors are mounted by cold pressure process on steel profiles, except for 54/33 in which they are welded.

Hot dip galvanizing process only of pickled steel anchor channel systems. The zinc-coating is performed by external parties, implying additional roads transports.

Assembly process of H nuts and seismic sleds accessories (only for GP seismic and HGP). Instead, note that T bolts are mounted during the installation phase.

Foaming process of anchor channel systems, with expanded polyurethane on PVC tapes.

Packaging process of anchor channel systems, as appropriate with carton board box placed on wooden pallets or with metal straps.

A1 | A2 | A3 | **C3 - C4 -** Transport, Waste processing and disposal | D

Collection of anchor channel systems as steel scraps, destined entirely for recycling.

Note that during installation, expanded polyurethane foam is removed and disposed but, due to low weight rate, impacts are considered negligible.

The separation process of steel from concrete is not considered, since performed at the construction site (Modulo C1), here outside the system boundary.

A1 | A2 | A3 | C3 - C4 | **D** - Benefits and loads beyond the system boundary

Recycling of galvanised steel included in anchor channels, anchors and accessories.

Note that all components of the described product can be returned and recycled into the material cycle only if it is ensured the separation of materials during decommissioning (division between concrete and steel parts).

ADDITIONAL INFORMATION

SPECIFICATIONS RELATED TO RECYCLING

End of life (C3-C4)
On account of the 100% collection rate, the product mass follows the material flows listed in the table at the bottom. Note that this scenario implies the fully separation of steel products from concrete. This practice is commonly performed at the construction site for all steel elements (including reinforcement bars and steel accessories). For this reason, the separation process results here outside the system boundary, falling into the de-construction (Module C1).

Reuse, recovery and/or recycling potentials (D)
According to the anchor channel system size, it is envisioned the recycling of 100% galvanised steel included in anchor channels, anchors and accessories. For avoiding double counting, the steel scrap input volume is deducted from the total steel scrap EoL volume in order to define the net steel scrap volume sent to recycling process. The loss of recycling is considered at 5%.
With reference to GP 40/223 anchor channel, the net steel scrap volume is 1,26 kg, resulting from an input steel scrap of 1,39 kg and an EoL steel scrap volume of 2,72 kg, under consideration of 5% recycling loss.
The value of scrap has been calculated in accordance with the methodology developed by the World Steel Association and is calculated based on the difference between a theoretical 100% primary steel (BOF route) and 100% secondary steel (EAF route).

END OF LIFE	GP 40/223	HGP 40/223	GP 50/30	HGP 50/30	GP 54/33	HGP 54/33	GP SEISMIC
Collected as construction waste	2,72 kg	3,06 kg	3,74 kg	4,05 kg	7,29 kg	7,93 kg	3,46 kg
Recycling	2,72 kg	3,06 kg	3,74 kg	4,05 kg	7,29 kg	7,93 kg	3,46 kg
Landfilling	0,00 kg	0,00 kg	0,00 kg	0,00 kg	0,00 kg	0,00 kg	0,00 kg

RECYCLING POTENTIALS	GP 40/223	HGP 40/223	GP 50/30	HGP 50/30	GP 54/33	HGP 54/33	GP SEISMIC
Steel scrap input volume	1,39 kg	1,57 kg	1,92 kg	2,08 kg	3,73 kg	4,06 kg	1,77 kg
Steel scrap EoL volume	2,72 kg	3,06 kg	3,74 kg	4,05 kg	7,29 kg	7,93 kg	3,46 kg
Net steel scrap volume	1,26 kg	1,42 kg	1,73 kg	1,88 kg	3,38 kg	3,67 kg	1,60 kg