i.idro Drain

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804
Programme: The International EPD System, www.environdec.com
Programme operator: EPD® International AB
EOD registration no.: S-P-01203
Geographical scope: Global

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Valid until: 2024/06/07

Heidelberg Materials

EPD®
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM
EPD
VERIFIED

Declaration of general information

Manufacturer information

Heidelberg Materials Italia Cementi Spa has been the leading company in Italy in the production of cement since 1864. Over one hundred years of history built on people, knowledge and innovation that have enabled the company to become a leading player in the construction material industry from the very beginning. Heidelberg Materials Italia Cementi Spa's widespread presence, rooted in the territory, and the ability of offering innovative, quality products, are at the base of integrated solutions and applications that meet the needs of the cement and concrete market. The industrial structure consists of eight plants for cement production, a plant for special products with a reduced environmental footprint compared to traditional cement and several grinding centres. The production sites have obtained the ISO 14001 environmental certificate and, in some geographical areas, also the CSC Certificate, which certifies the sustainable procurement process along the entire production chain according to the basic principles of Sustainability. The industrial network is complete and integrated, thanks to the remarkable presence in the concrete and aggregates industry with the company Heidelberg Materials Calcestruzzi Spa. Heidelberg Materials Italia Cementi Spa, alongside Heidelberg Materials Calcestruzzi Spa, offers a wide range of products, applications, and solutions, from cement to ready-mixed concrete. The category of traditional cements consists of products suitable for specific construction types: road and marine infrastructures, civil and industrial floorings, dams, extraction wells and the most common applications for the construction sectors. Alongside traditional cement, Heidelberg Materials Italia Cementi Spa also offers a range of solutions for the renovation of buildings, with binders, natural lime, mortar and leveling compounds, products that stand out for their quality, durability, and ease of application. Additionally, there is a range of eco.build products on offer meeting the growing market demand for solutions oriented to environmental sustainability and promoting the circular economy. Heidelberg Materials Italia Cementi Spa is a founding member of the Italian Green Building Council, the association that promotes the dissemination of the principles of the circular economy in the building industry, and is also a partner of the Global Compact, the international organisation that promotes the principles of sustainable development. Now Heidelberg Materials Italia Cementi Spa is part of the Heidelberg Materials, worldwide leader in the industry, with 53,000 employees in over 3,000 production plants in 50 countries in 5 continents. Among the sustainability goals of the Group there is the reduction by 30% of the CO2 emissions per cement ton within 2025.

Further information on HeidelbergCement and Heidelberg Materials Italia Cementi Spa can be accessed at the official website heidelbergmaterials.com/en and heidelbergmaterials.it

i.idro Drain

Air content	**>15% and < 25%**
Draining capacity (aggregates size Xlarge 6-11 mm)	>1000 mm/min
Draining capacity (aggregates size Xlarge 2-6 mm)	>300 mm/min
EPD Type	Cradle-to-grave with module D (LCA stages A1 to D)
EPD Registration no.	S-P-01203
Validity	2024/06/07

Product description

i.idro DRAIN is an innovative concrete with high water drainage capacities and a compressive strength of more than 10MPa. There are two types of i.idro DRAIN depending on the type of cement used. White i.idro DRAIN is made up of white cement while Grey i.idro DRAIN contains grey cement.

Tests carried out according to the Standard EN 206 establishes the compressive strength of Idro Drain at a minimum of 10 MPa. The use of i.idro Drain does not require particular performance as regards environmental exposure class and workability. There is therefore no defined exposure class nor slump class.
i.idro Drain combines the strength of concrete with a drainage capacity of 100 times more than that of silt and clay, thanks to a special selection of aggregate size and the choice of air entrainment agent which both increase the percentage of air content.
As demonstrated through comparative tests performed by Politecnico di Milano, the excellent drainage capacity of i.idro Drain equals or even exceeds that of naturally-available loose materials like sand, clay and silt, and that of traditional water-draining asphalt pavements.
The European Standard,EN 12697-40:2012, describes a method to determine the in-situ relative hydraulic conductivity, at specific locations, of a road surfacing that is designed to be permeable. The test measures the ability of a surfacing to drain water achieved in-situ.
In the case of Idro Drain, results obtained according to the particle size distribution of aggregates used are reported in the table below.
The high draining capacity of i.idro DRAIN promotes water drainage thus reducing surface runoff and hydroplaning effect. It also guarantees groundwater recharge (deep drainage) and is therefore particularly suitable for application within environmentally protected areas where water is to be returned to the ground.
The use of i.idro DRAIN also allows harvesting and reuse of stormwater, as this can be adequately conveyed through suitable collection systems. i.idro DRAIN do not contain oils which usually lead to contaminated stormwater. Moreover, the relatively white surface compared to traditional pavements reduces the ground temperature significantly (down to 30° C) due to the albedo effect, thus providing more comfortable conditions for pedestrians. See section on Additional Information.

The composition, structure and technical properties of Idro Drain makes it suitable for pavement applications in:

- Sidewalks
- Trails
- Parking lots
- Cycle lanes
- Low-volume roadways
- Walkways and alleys
- Environmentally protected roads and areas subject to fire hazards.

Draining capacity of i.idro Drain

Aggregates size	Draining capacity (UNI 12697-40)	Classification
X Large (2mm<15%, 6,3mm<95%)	>1000 mm/min (2.69*10-2 m/s)	VERY HIGH
Large (6,3mm<25%, 10mm<75%)	>300 mm/min (5.78*10-3 m/s)	HIGH

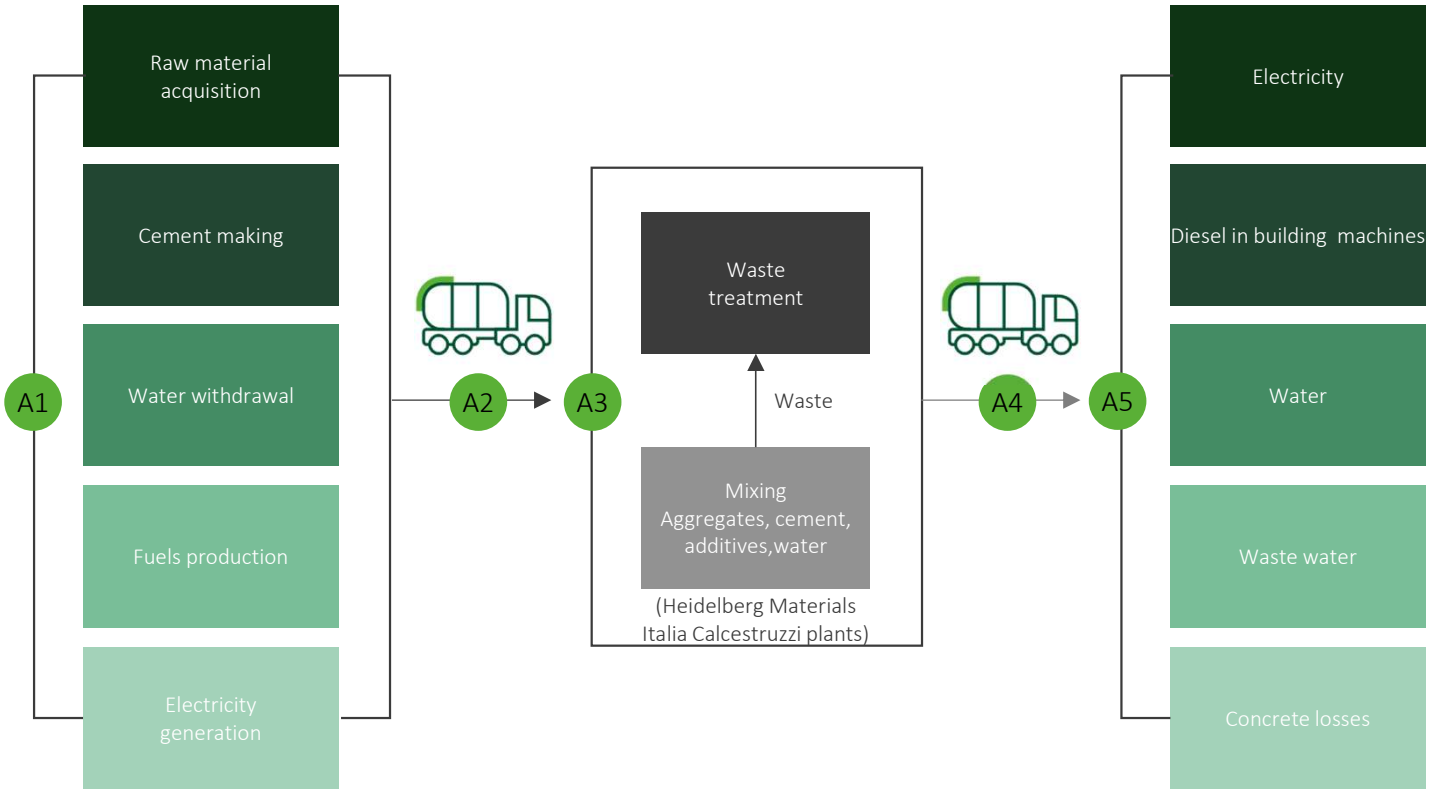
Production process

The innovative nature of i.idro DRAIN is also linked to the choice of input materials as well as the production process. In the case of aggregates, the objective to achieve specific draining capacities, requires a special selection of aggregate type which are supplied from the quarries located nearby the concrete plants of Heidelberg Materials Italia Calcestruzzi Spa. Moreover, the composi- tion mix is strictly respected in order to guarantee expected mechanical and draining performance. The production mix is controlled and maintained by appropriate measuring instruments in the concrete plants.

At Heidelberg Materials Italia Calcestruzzi Spa plants producing i.idro DRAIN, cement supplied are stored in silos while aggregates are depos- ited in a dedicated open area. Additives are received and stored in cisterns and tanks protected from atmospheric agents while water is sourced from wells located in the plants. All raw materials are automatically measured ac- cording to stabilised proportion, transported through conveyor belts directly to the concrete mixer where they are all mixed together. Cement is fed through coclea, aggregates on conveyor belts while water and additives are pumped. The produced i.idro DRAIN is then delivered to the building sites in concrete mixers.
Emissions related to the production process includes air emissions from the use of fuels in onsite transportation vehicles and also dust emissions arising from the handling (transportation, mixing and packaging in bags) of raw materials and product.

i.idro DRAIN concrete production

Process flow diagram



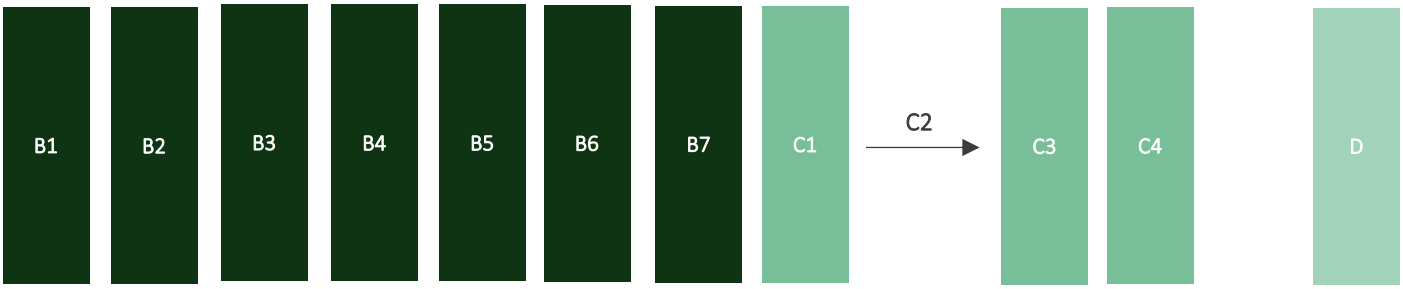
A1 _____
Raw material extraction & processing, processing of secondary material

A2 _____
Transport to manufacturer

A3 _____
Manufacturing process and treatment of waste generated

A4 _____
Transport to building site

A5 _____
Construction Installation process



B1 - Use
B2 - Maintenance
B3 - Repair
B4 - Replacement
B5 - Refurbishment
B6 - Operational energy use
B7 - Operational water use

C1 - Deconstruction - Demolition
C2 - Transport
C3 - Waste processing
C4 - Disposal
D - Reuse-Recovery-Recycling potential

Due to the high percentage of environmental impacts of concrete products coming from their cement components and due to the fact that cement for i.idro DRAIN is supplied by Heidelberg Materials Italia Calcestruzzi Spa a description of the cement production process is provided here alongside that of the concrete production phase.

i.idro DRAIN material content declaration

Material inputs	1 m^3 Grey i.idro DRAIN Composition (%)	1 m^3 White i.idro DRAIN Composition (%)
Grey cement	16.05	-
White cement	-	17.29
Aggregates	78.94	75.59
Water	4.78	6.94
Admixtures	0.01	0.06
Additives	0.22	0.12

Recycled materials content (ISO 14021 compliant)

Product	**Recycled pre-consumer materials**	**Recycled post-consumer materials**
1 m^3 White i.idro Drain	0.00 %	0.00 %
1 m^3 Grey i.idro Drain	0.88 %	0.89 %

Idro Drain energy use | for m³ Idro Drain

Energy consumption in the production of i.idro DRAIN is mainly electricity associated to the movement and mixing of cement, aggregates, additives and water in the concrete plant. There is limited use of diesel for transportation onsite.

Energy use	1m³ Grey Idro DRAIN	1m³ White Idro DRAIN
Electricity (kWh)	3.56	2.39
Diesel (l)	0.11	0.10

The EPD refers to a cradle to gate boundary so as to meet the following goals:

- Provide relevant information and data for business-to-business communication.
- Investigate environmental performance related to various choices of raw materials and inform decision making on future production.

EPD type and programme operator

This is an Environmental Product Declaration (EPD) compliant to a Type III environmental declaration as defined by ISO 14025:2010. The EPD is subject to the International EPD System (IES) which acts as the Programme Operator:
EPD International AB, Box 210 60; SE-100 31 Stockholm, Sweden.
E-mail: info@environdec.com.

This EPD is aligned to the Product Category Rules (PCR) for the assessment of the environmental performance of UN CPC 375 relative to Concrete (C-PCR-003 ”Concrete and concrete elements” (EN 16757) v. 2019-12-20 to PCR 2019:14 ”Construction Products” v.1.2.5).

This EPD refers to the production in Italy of i.idro DRAIN for Grey i.idro Drain and White i.idro Drain during the year 2022 and applies life cycle assessment study carried out following the principles contained in the ISO 14040 series of standards and EN 15804 specific for construction products.
Heidelberg Materials Italia Calcestruzzi Spa as EPD owner has the sole ownership, liability and responsibility for this EPD.
EPDs within the same product category but from different EPD Programmes shall not be comparable.
EPDs of construction products may not be comparable if they do not comply with EN 15804. The comparison of products on the basis of their EPD is defined by the contribution they make to the environmental performance of the building.
Consequently, comparison of the environmental performance of construction products using this EPD information shall be based on the product’s use in and its impacts on the building and shall consider the complete life cycle of the product within the building or construction works.

The results in terms of environmental impacts, resource use and other environmental information are based on this declared unit. They are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.
The EPD Tool (GCCA tool for EPD of concrete and cement v.4.0) pre-verified against requirements of the reference cement and concrete PCR, was used in computing Life cycle impacts of i.idro DRAIN. The Tool applies specific datasets of the cement and concrete production process together with representative datasets in Ecoinvent version 3.5 to compute environmental parameters of the product under study.

Declaration of general information

Declaration of environmental parameters derived from LCA

Declared unit (as of reference PCR)	1 m^3 i.idro DRAIN
Density	1914 kg/m^3 - White i.idro DRAIN 2042 kg/m^3 - Grey i.idro DRAIN
Temporary boundary	2022 production
System boundary	Cradle to grave with module D (A+B+C+D) A1 - Raw material and fuel acquisition, electricity generation & distribution. A2 - Transport to plant. A3 - Manufacturing processes at plant, treatment of waste manufacturing processes. A4 - Transport to construction site A5 - Construction process B1 - Use C1 - Deconstruction - Demolition C2 - Transport C3 - Waste processing C4 - Disposal D - Reuse - Recovery - Recycling potential

Parameters describing environmental impacts

The following information on environmental impacts is expressed with the impact category parameters of LCIA using characterization factors.

1 m³ White i.idro DRAIN

Environmental Impacts	Units	A1-A3	A4	A5	B1	B2-B7
GWP-tot	kg CO_2 eq	3.78E2	2.52E0	1.83E1	-3.46E1	-
GWP-fos	kg CO_2 eq	3.75E2	2.52E0	1.80E1	-3.46E1	-
GWP-bio	kg CO_2 eq	3.30E0	1.02E-3	2.90E-1	0E0	-
GWP-luc	kg CO_2 eq	1.07E-1	8.81E-4	6.72E-3	0E0	-
ODP	mol N eq.	7.85E-6	4.97E-7	1.57E-6	0E0	-
AP	kg Sb eq	2.12E0	8.31E-3	1.38E-1	0E0	-
EP-fw	MJ eq	9.31E-2	1.94E-4	3.99E-3	0E0	-
EP-mar	kg CFC-11 eq	3.76E-1	1.69E-5	1.19E-2	0E0	-
EP-ter	mol H+ eq.	4.66E0	1.84E-2	4.45E-1	0E0	-
POCP	kg P eq	1.67E0	7.48E-3	1.35E-1	0E0	-
ADPE	kg N eq.	6.78E-4	4.86E-6	2.65E-5	0E0	-
ADPF	Mj eq	3.44E3	4.11E1	2.24E2	0E0	-
WDP	m^3	1.36E2	3.03E-1	2.04E0	0E0	-

- GWP-tot (Global Warming Potential total)
- GWP-fos (Global Warming Potential fossil fuels)
- GWP-bio (Global Warming Potential biogenic)
- GWP-luc (Global Warming Potential land use and land use change)
- ODP (Depletion potential of the stratospheric ozone layer)
- AP (Acidification potential,Accumulated Exceedance)
- EP-fw (Eutrophication potential, fraction of nutrients reaching freshwater end compartment)
- EP-mar (Eutrophication potential, fraction of nutrients reaching marine end compartment)
- EP-ter (Eutrophication potential, Accumulated Exceedance)
- POCP (Formation potential of tropospheric ozone)
- ADPE (Abiotic depletion potential for non- fossil resources)
- ADPF (Abiotic depletion for fossil resources potential)
- WDP (Water (user) deprivation potential, deprivation weighted water consumption)

1 m³ White i.idro DRAIN

Environmental Impacts	Units	C1	C2	C3	C4	D
GWP-tot	kg CO_2 eq	8.99E0	7.15E0	-1.42E0	2.10E0	-1.17E1
GWP-fos	kg CO_2 eq	8.99E0	7.14E0	-1.45E0	2.10E0	-1.16E1
GWP-bio	kg CO_2 eq	1.60E-3	5.24E-3	1.60E-2	1.39E-3	-4.70E-2
GWP-luc	kg CO_2 eq	1.13E-3	4.25E-3	1.22E-2	1.13E-3	-2.04E-2
ODP	mol N eq.	1.62E-6	1.23E-6	3.09E-7	6.85E-7	-7.97E-7
AP	kg Sb eq	9.42E-2	3.33E-2	3.27E-2	2.01E-2	-8.28E-2
EP-fw	MJ eq	4.02E-4	9.79E-4	2.55E-3	2.46E-4	-4.89E-3
EP-mar	kg CFC-11 eq	3.34E-5	7.24E-5	1.76E-4	2.32E-5	-3.17E-4
EP-ter	mol H+ eq.	4.44E-1	9.31E-2	6.11E-2	7.21E-2	-2.06E-1
POCP	kg P eq	1.22E-1	3.07E-2	1.72E-2	2.12E-2	-5.23E-2
ADPE	kg N eq.	2.66E-6	1.29E-5	3.81E-6	2.29E-6	-1.33E-4
ADPF	Mj eq	1.30E2	1.09E2	6.35E1	5.85E1	-1.34E2
WDP	m^3	7.67E-1	9.47E-1	8.91E-1	2.83E0	-2.27E1

- GWP-tot (Global Warming Potential total)
- GWP-fos (Global Warming Potential fossil fuels)
- GWP-bio (Global Warming Potential biogenic)
- GWP-luc (Global Warming Potential land use and land use change)
- ODP (Depletion potential of the stratospheric ozone layer)
- AP (Acidification potential,Accumulated Exceedance)
- EP-fw (Eutrophication potential, fraction of nutrients reaching freshwater end compartment)
- EP-mar (Eutrophication potential, fraction of nutrients reaching marine end compartment)
- EP-ter (Eutrophication potential, Accumulated Exceedance)
- POCP (Formation potential of tropospheric ozone)
- ADPE (Abiotic depletion potential for non- fossil resources)
- ADPF (Abiotic depletion for fossil resources potential)
- WDP (Water (user) deprivation potential, deprivation weighted water consumption)

1 m³ Grey i.idro DRAIN

Environmental Impacts	Units	A1-A3	A4	A5	B1	B2-B7
GWP-tot	kg CO_2 eq	2.79E2	2.69E0	1.57E1	-1.84E1	-
GWP-fos	kg CO_2 eq	2.79E2	2.69E0	1.55E1	-1.84E1	-
GWP-bio	kg CO_2 eq	-2.76E-1	1.09E-3	2.09E-1	0E0	-
GWP-luc	kg CO_2 eq	5.42E-2	9.40E-4	5.17E-3	0E0	-
ODP	mol N eq.	1.01E-5	5.31E-7	1.64E-6	0E0	-
AP	kg Sb eq	6.58E-1	8.86E-3	9.42E-2	0E0	-
EP-fw	MJ eq	1.72E-2	2.07E-4	1.72E-3	0E0	-
EP-mar	kg CFC-11 eq	3.96E-3	1.80E-5	7.57E-4	0E0	-
EP-ter	mol H+ eq.	2.02E0	1.96E-2	3.66E-1	0E0	-
POCP	kg P eq	5.13E-1	7.98E-3	1.00E-1	0E0	-
ADPE	kg N eq.	2.43E-4	5.19E-6	1.35E-5	0E0	-
ADPF	Mj eq	1.81E3	4.38E1	1.75E2	0E0	-
WDP	m^3	5.87E1	3.23E-1	-2.56E-1	0E0	-

- GWP-tot (Global Warming Potential total)
- GWP-fos (Global Warming Potential fossil fuels)
- GWP-bio (Global Warming Potential biogenic)
- GWP-luc (Global Warming Potential land use and land use change)
- ODP (Depletion potential of the stratospheric ozone layer)
- AP (Acidification potential,Accumulated Exceedance)
- EP-fw (Eutrophication potential, fraction of nutrients reaching freshwater end compartment)
- EP-mar (Eutrophication potential, fraction of nutrients reaching marine end compartment)
- EP-ter (Eutrophication potential, Accumulated Exceedance)
- POCP (Formation potential of tropospheric ozone)
- ADPE (Abiotic depletion potential for non- fossil resources)
- ADPF (Abiotic depletion for fossil resources potential)
- WDP (Water (user) deprivation potential, deprivation weighted water consumption)

1 m³ Grey i.idro DRAIN

Environmental Impacts	Units	C1	C2	C3	C4	D
GWP-tot	kg CO_2 eq	8.99E0	7.62E0	1.18E0	-5.45E0	-1.25E1
GWP-fos	kg CO_2 eq	8.99E0	7.61E0	1.15E0	-5.45E0	-1.24E1
GWP-bio	kg CO_2 eq	1.60E-3	5.59E-3	1.71E-2	1.48E-3	-5.02E-2
GWP-luc	kg CO_2 eq	1.13E-3	4.54E-3	1.30E-2	1.20E-3	-2.18E-2
ODP	mol N eq.	1.62E-6	1.32E-6	3.30E-7	7.30E-7	-8.50E-7
AP	kg Sb eq	9.42E-2	3.56E-2	3.49E-2	2.15E-2	-8.83E-2
EP-fw	MJ eq	4.02E-4	1.04E-3	2.72E-3	2.63E-4	-5.22E-3
EP-mar	kg CFC-11 eq	3.34E-5	7.72E-5	1.88E-4	2.48E-5	-3.38E-4
EP-ter	mol H+ eq.	4.44E-1	9.93E-2	6.52E-2	7.70E-2	-2.20E-1
POCP	kg P eq	1.22E-1	3.28E-2	1.84E-2	2.26E-2	-5.58E-2
ADPE	kg N eq.	2.66E-6	1.38E-5	4.06E-6	2.44E-6	-1.42E-4
ADPF	Mj eq	1.30E2	1.17E2	6.78E1	6.24E1	-1.43E2
WDP	m^3	7.67E-1	1.01E0	9.51E-1	3.02E0	-2.42E1

- GWP-tot (Global Warming Potential total)
- GWP-fos (Global Warming Potential fossil fuels)
- GWP-bio (Global Warming Potential biogenic)
- GWP-luc (Global Warming Potential land use and land use change)
- ODP (Depletion potential of the stratospheric ozone layer)
- AP (Acidification potential,Accumulated Exceedance)
- EP-fw (Eutrophication potential, fraction of nutrients reaching freshwater end compartment)
- EP-mar (Eutrophication potential, fraction of nutrients reaching marine end compartment)
- EP-ter (Eutrophication potential, Accumulated Exceedance)
- POCP (Formation potential of tropospheric ozone)
- ADPE (Abiotic depletion potential for non- fossil resources)
- ADPF (Abiotic depletion for fossil resources potential)
- WDP (Water (user) deprivation potential, deprivation weighted water consumption)

Parameters describing additional environmental impacts

1 m³ White i.idro DRAIN

Environmental Impacts	Units	A1-A3	A4	A5	B1	B2-B7
GWP GHG	kg CO_2 eq	3.75E2	2.19E0	1.80E1	-3.46E1	-
PM	Disease incidence	3.12E-6	2.19E-7	1.72E-6	0E0	-
IRP	kBq U235 eq.	3.97E3	2.16E2	1.22E3	0E0	-
ETP	CTUe	6.20E3	8.66E0	1.90E2	0E0	-
HTPC	CTUh	1.54E-6	1.67E-8	2.31E-7	0E0	-
HTPNC	CTUh	5.91E-6	4.66E-7	9.88E-7	0E0	-
SQP	dimensionless	1.53E3	7.29E1	9.12E1	0E0	-

1 m³ White i.idro DRAIN

Environmental Impacts	Units	C1	C2	C3	C4	D
GWP GHG	kg CO_2 eq	8.99E0	7.15E0	-1.42E0	2.10E0	-1.17E1
PM	Disease incidence	2.45E-6	6.38E-7	2.92E-7	3.75E-7	-9.71E-7
IRP	kBq U235 eq.	6.08E2	6.26E2	6.82E2	2.70E2	-1.10E3
ETP	CTUe	1.76E0	1.92E1	1.33E0	1.10E0	-5.66E0
HTPC	CTUh	6.36E-8	8.32E-8	5.29E-8	1.84E-8	-2.79E-7
HTPNC	CTUh	2.46E-7	1.15E-6	2.43E-7	1.18E-7	-1.66E-6
SQP	dimensionless	7.71E0	1.78E2	5.19E1	1.09E2	-1.76E2

- GWP GHG (Global Warming Potential GHG)
- PM (Potential incidence of disease due to PM emissions)
- IRP (Potential Human exposure efficiency relative to U235)
- ETP (Potential Comparative Toxic Unit for ecosystems)
- HTPC (Potential Comparative Toxic Unit for humans - cancer)
- HTPNC (Potential Comparative Toxic Unit for humans - non-cancer)
- SQP (Potential soil quality index)

1 m³ Grey i.idro DRAIN

Environmental Impacts	Units	A1-A3	A4	A5	B1	B2-B7
GWP GHG	kg CO_2 eq	2.79E2	2.69E0	1.55E1	-1.84E1	-
PM	Disease incidence	6.65E-6	2.33E-7	1.83E-6	0E0	-
IRP	kBq U235 eq.	5.79E3	2.31E2	1.27E3	0E0	-
ETP	CTUe	1.07E2	9.24E0	7.50E0	0E0	-
HTPC	CTUh	8.53E-7	1.78E-8	2.10E-7	0E0	-
HTPNC	CTUh	7.98E-6	4.97E-7	1.05E-6	0E0	-
SQP	dimensionless	8.38E2	7.77E1	7.11E1	0E0	-

1 m³ Grey i.idro DRAIN

Environmental Impacts	Units	C1	C2	C3	C4	D
GWP GHG	kg CO_2 eq	8.99E0	7.62E0	1.18E0	-5.45E0	-1.25E1
PM	Disease incidence	2.45E-6	6.81E-7	3.12E-7	4.00E-7	-1.04E-6
IRP	kBq U235 eq.	6.08E2	6.68E2	7.28E2	2.88E2	-1.17E3
ETP	CTUe	1.76E0	2.04E1	1.42E0	1.18E0	-6.04E0
HTPC	CTUh	6.36E-8	8.88E-8	5.64E-8	1.96E-8	-2.98E-7
HTPNC	CTUh	2.46E-7	1.22E-6	2.60E-7	1.26E-7	-1.78E-6
SQP	dimensionless	7.71E0	1.90E2	5.54E1	1.16E2	-1.87E2

- GWP GHG (Global Warming Potential GHG)
- PM (Potential incidence of disease due to PM emissions)
- IRP (Potential Human exposure efficiency relative to U235)
- ETP (Potential Comparative Toxic Unit for ecosystems)
- HTPC (Potential Comparative Toxic Unit for humans - cancer)
- HTPNC (Potential Comparative Toxic Unit for humans - non-cancer)
- SQP (Potential soil quality index)

Parameters describing resource use

The following environmental parameters apply data based on the LCI. They describe the use of renewable and non- renewable material resources, renewable and non- renewable primary energy, water use and electricity use during manufacturing.

1 m^3 White i.idro DRAIN

Environmental Impacts	Units	A1-A3	A4	A5	B1	B2-B7
PERE	Mj	1.54E2	5.90E-1	1.16E1	0E0	-
PERM	Mj	1.68E0	0E0	5.05E-2	0E0	-
PERT	Mj	1.55E2	5.90E-1	1.17E1	0E0	-
PENRE	Mj	3.44E3	4.11E1	2.24E2	0E0	-
PENRM	Mj	2.19E0	0E0	6.57E-2	0E0	-
PENRT	Mj	3.44E3	4.11E1	2.24E2	0E0	-
SM	kg	0E0	0E0	0E0	0E0	-
RSF	Mj	0E0	0E0	0E0	0E0	-
NSRF	Mj	0E0	0E0	0E0	0E0	-
NFW	m^3	4.30E0	9.06E-3	2.28E-1	0E0	-

For white i.idro DRAIN the parameters Use of secondary material, Use of renewable secondary fuels and Use of non-renewable secondary fuels are zero. The very nature and color of white i.idro DRAIN prevents the use of secondary materials or fuels which bring in impurities.

- 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 materials)
- RSF (Use of renewable secondary fuels)
- NRSF (Use of non-renewable secondary fuels)
- NFW (Net use of fresh water)

1 m^3 White i.idro DRAIN

Environmental Impacts	Units	C1	C2	C3	C4	D
PERE	Mj	7.59E-1	2.74E0	6.94E0	1.52E0	-1.1E1
PERM	Mj	0E0	0E0	0E0	0E0	0E0
PERT	Mj	7.59E-1	2.74E0	6.94E0	1.52E0	-1.1E1
PENRE	Mj	1.30E2	1.09E2	6.35E1	5.85E1	-1.34E2
PENRM	Mj	0E0	0E0	0E0	0E0	0E0
PENRT	Mj	1.30E2	1.09E2	6.35E1	5.85E1	-1.34E2
SM	kg	0E0	0E0	0E0	0E0	0E0
RSF	Mj	0E0	0E0	0E0	0E0	0E0
NSRF	Mj	0E0	0E0	0E0	0E0	0E0
NFW	m^3	1.99E-2	2.92E-2	3.61E-2	6.58E-2	-5.43E-1

- 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 materials)
- RSF (Use of renewable secondary fuels)
- NRSF (Use of non-renewable secondary fuels)
- NFW (Net use of fresh water)

1 m^3 Grey i.idro DRAIN

Environmental Impacts	Units	A1-A3	A4	A5	B1	B2-B7
PERE	Mj	5.63E2	6.29E-1	8.74E0	0E0	-
PERM	Mj	1.91E0	0E0	5.73E-2	0E0	-
PERT	Mj	5.82E1	6.29E-1	8.79E0	0E0	-
PENRE	Mj	1.80E3	4.38E1	1.75E2	0E0	-
PENRM	Mj	2.49E0	0E0	7.46E-2	0E0	-
PENRT	Mj	1.81E3	4.38E1	1.75E2	0E0	-
SM	kg	4.36E1	0E0	1.31E0	0E0	-
RSF	Mj	2.04E1	0E0	6.11E-1	0E0	-
NSRF	Mj	2.55E1	0E0	7.65E-1	0E0	-
NFW	m^3	1.50E0	9.66E-3	1.44E-1	0E0	-

For white i.idro DRAIN the parameters Use of secondary material, Use of renewable secondary fuels and Use of non-renewable secondary fuels are zero. The very nature and color of white i.idro DRAIN prevents the use of secondary materials or fuels which bring in impurities.

- 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 materials)
- RSF (Use of renewable secondary fuels)
- NRSF (Use of non-renewable secondary fuels)
- NFW (Net use of fresh water)

1 m³ Grey i.idro DRAIN

Environmental Impacts	Units	C1	C2	C3	C4	D
PERE	Mj	7.59E-1	2.92E0	7.41E0	1.62E0	-1.17E1
PERM	Mj	0E0	0E0	0E0	0E0	0E0
PERT	Mj	7.59E-1	2.92E0	7.41E0	1.62E0	-1.17E1
PENRE	Mj	1.30E2	1.17E2	6.78E1	6.24E1	-1.43E2
PENRM	Mj	0E0	0E0	0E0	0E0	0E0
PENRT	Mj	1.30E2	1.17E2	6.78E1	6.24E1	-1.43E2
SM	kg	0E0	0E0	0E0	0E0	0E0
RSF	Mj	0E0	0E0	0E0	0E0	0E0
NSRF	Mj	0E0	0E0	0E0	0E0	0E0
NFW	m^3	1.99E-2	3.12E-2	3.86E-2	7.02E-2	-5.80E-1

- 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 materials)
- RSF (Use of renewable secondary fuels)
- NRSF (Use of non-renewable secondary fuels)
- NFW (Net use of fresh water)

Other environmental information describing different waste categories and output flows

The following environmental parameters apply data based on the LCI. They describe the Waste Flows (Hazardous, Non-hazardous and Radioactive waste disposed) and the Output flows (Components for re-use, Materials for recycling, Materials for energy recovery and Exported energy) for declared unit of i.idro DRAIN.

1 m^3 White i.idro DRAIN

Waste	Units	A1-A3	A4	A5	B1	B2-B7
HWD	kg	5.32E-2	0E0	1.60E-3	0E0	-
NHWD	kg	1.87E-1	0E0	1.15E1	0E0	-
RWD	kg	-	-	-	-	-

1 m^3 White i.idro DRAIN

Waste	Units	C1	C2	C3	C4	D
HWD	kg	0E0	0E0	0E0	0E0	0E0
NHWD	kg	0E0	0E0	0E0	3.82E2	0E0
RWD	kg	-	-	-	-	-

1 m^3 Grey i.idro DRAIN

Waste	Units	A1-A3	A4	A5	B1	B2-B7
HWD	kg	6.30E-1	0E0	1.90E-2	0E0	-
NHWD	kg	7.11E-1	0E0	1.23E1	0E0	-
RWD	kg	-	-	-	-	-

- HWD (Hazardous waste disposed)
- NHWD (Non-hazardous waste disposed)
- RWD (Radioactive waste disposed)

1 m³ Grey i.idro DRAIN

Waste	Units	A1-A3	A4	A5	B1	B2-B7
HWD	kg	0E0	0E0	0E0	0E0	0E0
NHWD	kg	0E0	0E0	0E0	4.08E2	0E0
RWD	kg	-	-	-	-	-

- HWD (Hazardous waste disposed)
- NHWD (Non-hazardous waste disposed)
- RWD (Radioactive waste disposed)

1 m³ White i.idro DRAIN

Output flow	Units	A1-A3	A4	A5	B1	B2-B7
CRU	kg	0E0	0E0	0E0	0E0	-
MFR	kg	3.77E1	0E0	4.71E1	0E0	-
MER	kg	0E0	0E0	0E0	0E0	-
EE	Mj	0E0	0E0	0E0	0E0	-

1 m³ White i.idro DRAIN

Output flow	Units	C1	C2	C3	C4	D
CRU	kg	0E0	0E0	0E0	0E0	0E0
MFR	kg	0E0	0E0	1.53E3	0E0	0E0
MER	kg	0E0	0E0	0E0	0E0	0E0
EE	Mj	0E0	0E0	0E0	0E0	0E0

- CRU (Components for re-use)
- MFR (Materials for recycling)
- MER (Materials for energy recovery)
- EE (Exported energy)

1 m³ Grey i.idro DRAIN

Output flow	Units	A1-A3	A4	A5	B1	B2-B7
CRU	kg	0E0	0E0	0E0	0E0	-
MFR	kg	1.03E2	0E0	5.21E1	0E0	-
MER	kg	0E0	0E0	0E0	0E0	-
EE	Mj	0E0	0E0	0E0	0E0	-

1 m³ Grey i.idro DRAIN

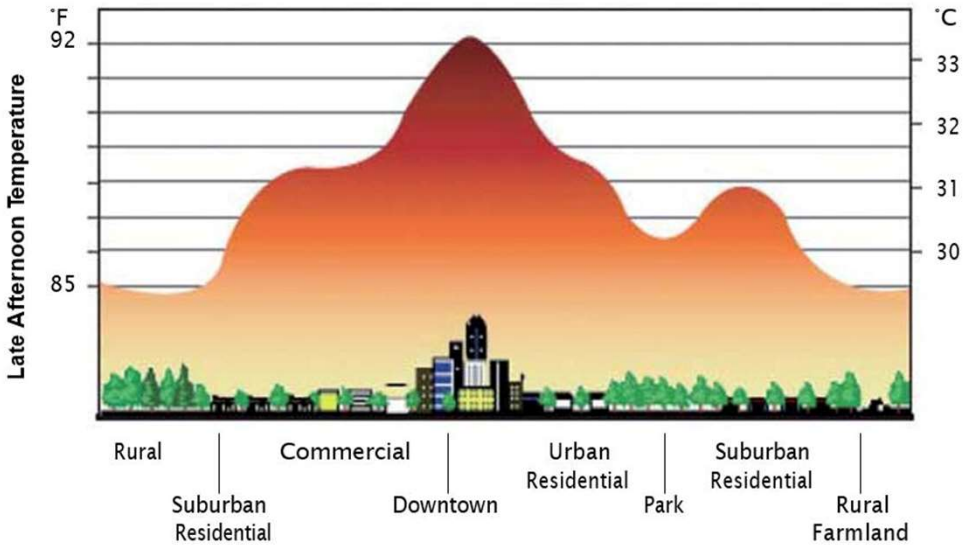
Output flow	Units	C1	C2	C3	C4	D
CRU	kg	0E0	0E0	0E0	0E0	0E0
MFR	kg	0E0	0E0	1.63E3	0E0	0E0
MER	kg	0E0	0E0	0E0	0E0	0E0
EE	Mj	0E0	0E0	0E0	0E0	0E0

- CRU (Components for re-use)
- MFR (Materials for recycling)
- MER (Materials for energy recovery)
- EE (Exported energy)

Additional information

The results above refer not only to the volume of concrete produced but also to its draining capacity. i.idro DRAIN delivers, alongside a resistant surface, a draining capacity which ranges from 300 mm/min to 1000 mm/min. Draining capacities of concrete not used for draining purposes will normally fall under the 10 mm/min mark. The primary advantage of permeable pavements is the storm water management aspects together with the control of runoff and the reduction of imperviousness. By encouraging water from storms to recharge the ground-water table, i.idro DRAIN pavements have a profound effect on localized ecosystems. Use of permeable pavements by designers is encouraged by the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System™ which awards credits for Stormwater Management. This credit is meant to minimize impervious surfaces and to encourage the natural processes of infiltration. The use of i.idro DRAIN, therefore, aides in obtaining LEED credits on both stormwater quantity and quality control.
Pavements made up of i.idro DRAIN are capable of reducing the heat Island effect in urban areas. The heat island effect is due to the replacement of open land and vegetation with buildings, roads, and other infrastructure which have low Solar reflectance indices (SRI). This causes urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape.

Heat island effect



The effect of i.idro DRAIN on the heat island effect can be seen by the results of tests carried out by Istituto Giordano according to ASTM E903, ASTM E 1980, ASTM C 1371 and AST G173 which show SRI values of more than 29.

Reflectance index of i.idro DRAIN pavements

Pavement type	SRI (initial)	SRI 3 years aged
Grey i.idro DRAIN	33.4	30.4
White i.idro DRAIN	46.7	NA

Source: Istituto Giordano Spa – Optics Laboratory

Moreover, the LEED awards credits to paving materials with a three-year aged SRI value of at least 28, in order to minimize effects on microclimates and human and wildlife habitats by reducing heat islands.
The use onsite of i.idro DRAIN involves the addition of water and application on a surface through vibrating road pavers or manually resorting to special building site equipment. During this operation no toxic emissions occur and no safety risks for the operators are involved. The safety data sheet of i.idro DRAIN, is published on the website of Heidelberg Materials Italia Calcestruzzi Spa: heidelbermaterials.it
No substance in the "Candidate List of Substances of Very High Concern (SVHC) for authorisation" exceeds 0.1 weight-% of i.idro DRAIN.

The production of i.idro DRAIN is in line with our Sustainability Policies which advocate designing products suit- able for sustainable construction. Moreover, blended cements are being promoted to reduce the use of clinker and thus to further curb environmental impacts in concretes. In particular, research focuses on the use of renew- able and reusable raw materials and the development of specialty admixtures and special additions for concrete, also through investigations and experiments based on nano and biotechnologies applied to the construction materials sector.

In particular, research focuses on the use of renew- able and reusable raw materials and the development of specialty admixtures and special additions for concrete, also through investigations and experiments based on nano and biotechnologies applied to the construction materials sector. In addition, unconventional products in portfolio of Heidelberg Materials Italia Cementi Spa and Heidelberg Materials Italia Calcestruzzi Spa, such as TX Active®, i.light®, are able to provide added technological and functional value to traditional products. More information on Sustainable development at Heidelberg Materials Italia Cementi Spa, Heidelberg Materials Calcestruzzi Spa and Heidelberg materials, Sustainability Policies and related activities can be accessed at the official website: heidelbergmaterials.com/en/sustainability

Heidelberg Materials Italia Calcestruzzi Spa is certified according ISO 14001:2015 since 2010 and ISO 9001:2015 since 1996.
Calusco d'Adda (BG), Rezzato (BS), Tavernola Bergamasca (BG), Novi Ligure (AL), Ravenna, Cagnano Amiterno (AQ), Colleferro (RM), Matera, Samatzai (CA) and Salerno plants of Heidelberg Materials Italia Cementi Spa and Italsacci SpA, providing cement used in i.idro DRAIN, are certified according to ISO 14001:2015 since 2004 and ISO 9001:2015 since 1995, in line with Heidelberg Materials sustainability policies and strategy.

Changes versus previous version

The principal differences versus previously published version depends from:

- Concrete plants and cement plants involved in i.idro DRAIN production;
- Raw materials utilized in i.idro DRAIN composition, especially cement type;
- Use of secondary materials and renewable secondary fuels in cement production;
- Changes occurred in the energy mix
- Waste disposed from cement and concrete production;
- New version GCCA EPD Tool (version 4.0)
- Changes occurred in the more recent versions of the Ecoinvent and in the reference documentation (e.g. GPI, PCR,…)

References

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations
ISO 14040:2021	Environmental management - Life cycle assessment -- Principles and Framework
ISO 14044:2021	Environmental management - Life cycle assessment – Requirements and Guidelines
GPI	General Programme Instructions of IES www.environdec.com (Version 4.0)
EN 15804 :2012 + A2:2019/AC:2021	Sustainability of construction works - Environmental product declarations Core rules for the product category of construction products
PCR for concrete	www.environdec.com - PRODUCT CATEGORY RULES (PCR) for Product Group "Concrete", CPC 375- C-PCR-003 "Concrete and concrete elements" (EN 16757) v. 2019-12-20 to PCR 2019:14" Construction Products" v.1.2.5

Demonstration of verification

CEN standard EN 15804 serves as the Core Product Category Rules (PCR).

Programme	EPD® THE INTERNATIONAL EPD® SYSTEM
PCR:	UN CPC 375 - C-PCR-003 "Concrete and concrete elements" (EN 16757) v. 2019-12-20 to PCR 2019:14 "Construction Products" v.1.2.5
PCR Moderator:	Martin Erlandson, IVL Swedish Environmental Research Institute, martin.erlandson@ivl.se.
PCR Comitee	IVL Svedish Environmental Research Institute Secretariat of the International EPD® System
Independent verification of the declaration and data, according to ISO 14025:2010	✔ EPD Process Certification (Internal) ⊖ EPD Verification (External)
EPD Registration No.	S-P-01203
Date of Certification	2018/01/11
Version date	2023/10/26
Validity	2024/06/07
Third part Independent Verifier	Certiquality Srl (Number of accreditation: 003H rev.17)
Accredited by	Accredia

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Glossary

Ozone layer depletion 20a	Destructive effects on the stratospheric ozone layer over a time horizon of 20 years.
Acidification	Increase of soil and water acidity.
Eutrophication	Excessive levels of macronutrients in the environment caused by emissions of nutrients to air, water and soil.
Photochemical oxidation	Oxidizing of volatile compounds in the presence of nitrogen oxides (NOx) which frees ozone in the low atmosphere.
Abiotic depletion	Extraction of minerals and fossil fuels due to inputs in the system.

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