Asphalt Mixtures

AG, ABB, ABT, ABS – with penetration bitumen, polymer modified bitumen or special stone. Produced in Hok or Östad

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A1:2013 for:
Sandahls Grus & Asfalt AB, Gammavägen 6, 556 52 Jönköping, Sweden

Programme:	*The International EPD® System, www.environdec.com*
Programme operator:	EPD International AB
EPD registration number:	S-P-04994
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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

SANDAHLS

ECO PLATFORM EPD EN 15804 VERIFIED

EPD®

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2018:04 Asphalt mixtures (Europe, Australia) (1.03) Together with EN 15804:2012+A1:2013
PCR review was conducted by: *The Technical Committee of the International EPD® System. Chair: Claudia A. Peña. Contact via info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Martyna Mikusinska, Sweco Environment AB, Martyna.Mikusinska@sweco.se, +46 (0)19-168178 Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No
LCA practitioner: Viktor Hakkarainen, Miljögiraff AB

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:
Sandahls Grus & Asfalt AB

Contact:
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Description:
Sandahls Grus & Asfalt AB was founded in 1991. The company has offices in Gothenburg and Jönköping.

- Sandahls are primarily specialists in asphalt work and have real cutting-edge expertise in the area.
- Sandahls Grus & Asfalt AB performs asphalt coatings with both manufacturing and laying.
- The company is working towards a quality system according to SS-EN ISO 9001: 2015 and we were the first in the industry according to RISE to be approved according to the new standard in 2015. Sandahls Grus & Asfalt AB has been certified since 1999.06.04 by RISE certificate no. 2325.

Product-related or management system-related certifications:
Sandahlsbolagen Sweden AB are ISO 9001 and ISO 14001 certified.

Name and location of production site(s):
Sandahls Grus & Asfalt AB, Hokvägen, 560 13 Hok
Sandahls Grus & Asfalt AB, Östadsvägen, 441 91 Alingsås

Product information

Product family:
Asphalts

Product identification:

Product name	Type of bitumen	Type of aggregate
AG - Pen. Bitumen	Penetration bitumen	Standard gravel
ABB - Pen. Bitumen	Penetration bitumen	Standard gravel
ABT - Pen. Bitumen	Penetration bitumen	Standard gravel
ABT - Pen. Bitumen Special stone	Penetration bitumen	Special stone
ABS - Pen. Bitumen	Penetration bitumen	Standard gravel
ABS - Pen. Bitumen Special stone	Penetration bitumen	Special stone
AG - PMB	Polymer modified bitumen	Standard gravel
ABB - PMB	Polymer modified bitumen	Standard gravel
ABT - PMB	Polymer modified bitumen	Standard gravel
ABS - PMB	Polymer modified bitumen	Standard gravel
ABS - PMB Special stone	Polymer modified bitumen	Special stone

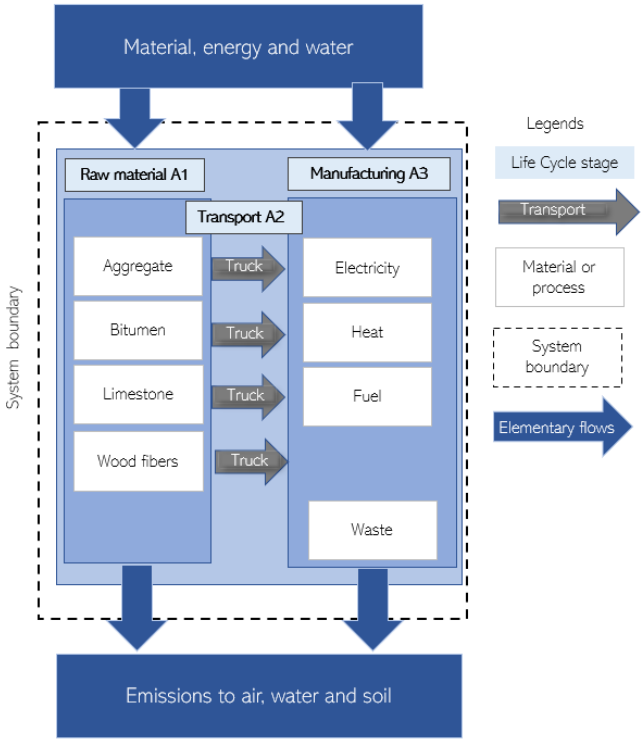
Product description:
Asphalt is a mixture of crushed rocks, bitumen, limestone and sometimes other additives that is used for creating a flat, even surface. Asphalt is used by the millions of tons all over the world and is crucial to the development of infrastructure. Asphalt can come in different variants depending on the size of the rocks, the amount of bitumen and which additives that are included. The different variants are used for different applications (straight roads, roundabouts, industrial pavement etc.)

UN CPC code:
1533 – Bitumen and asphalt, natural; asphaltites and asphaltic rock

LCA information

Declared Unit	One ton of asphalt
Reference Service Life (RSL)	Not specified
Product group classification	UN CPC
Goal	The result will be used to understand the environmental impact of the product up until factory gate. This will be useful during product development to reduce this impact and to our customer during the decision process of selecting asphalt. The result will be published by the International EPD system. The audience are construction companies and infrastructure developers.
Scope	Cradle to gate
Time & data collection period	Data was collected over the year 2020 and the background datasets are representative of 2020 conditions (most recent version of ecoinvent). Yearly values were divided by mass on total production from the manufacturing sites.
Manufacturing Sites	Sandahls Grus & Asfalt AB, Hokvägen, 560 13 Hok Sandahls Grus & Asfalt AB, Östadsvägen, 441 91 Alingsås
Geographical Area	Sweden
Compliant with	This EPD follows the "Book-keeping" LCA approach which is defined as an attributional LCA in the ISO 14040 standard. ISO 14025 EN 15804:2012+A1:2013 Product Category Rules PCR 2018:04 Asphalt mixtures (Europe, Australia) (1.03)
Cut-Off Rules	The procedure below is followed for the exclusion of inputs and outputs according to the EN 15804:2012+ A1:2013 standard: Transports of production waste is not modelled due to being below cut-off (~12 grams of waste per ton of asphalt produced) Capital goods are not included (Machines and facilities) as per PCR specifications
Key Assumptions	Road transports are assumed to be carried out by EURO 5 standard vehicles Swiss conditions are assumed to be representative for Swedish conditions for LCI data.
Background Data	The background data from ecoinvent 3.7 are from 2016-2020. The data for bitumen is from Eurobitume (www.eurobitume.eu)
Electricity data	Electricity consumption in the A3 module is "fossile free" electricity choice delivered by the energy company e.on.
LCA software	SimaPro 9.2.0.1
Average or specific EPD	Specific The EPD is for 11 types of asphalt produced at two different sites, Hok and Östad. Results are presented for all types produced at both sites.

System diagram:



Modules declared (X included, ND not declared), geographical scope, share of specific data (in GWP-GHG indicator) and data variation: EPD modules included (G = generic data, S = Specific data).

	Raw material		Manufacturing			Use							End of life				Reuse
	Raw material	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Renovation	Energy during use	Water use	Demolition	Transport	Waste process	Final disposal	Potential benefit in recycling
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Geography	SE	SE	SE	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Type of data	G	G	S	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Data quality indicators (DQI):

Time period	2014 and after
Geography	Europe, Western
Technology	Average technology or BAT[1]
Representativeness	Average from a specific process
Multiple output allocation	Physical causality
Substitution allocation	Not applicable
Waste treatment allocation	Not applicable
Cut-off rules	Less than 1% environmental relevance
System boundary	Second order (material/energy flows including operations)
Boundary with nature	Not applicable

[1] BAT (Best Available Technology or Best Available Techniques) signifies the latest stage in development of activities, processes and their method of operation which indicate the practical suitability of particular techniques as the basis of emission limit values, linked to environmental regulations, such as the European Industrial Emissions Directive (IED, 2010/75/EU) . In determining whether operational methods are BAT, consideration is given to economic feasibility and the availability of techniques to carry out the required function. The BAT concept is closely related to BEP (Best Environmental Practice), which is the best environment-friendly company practice.

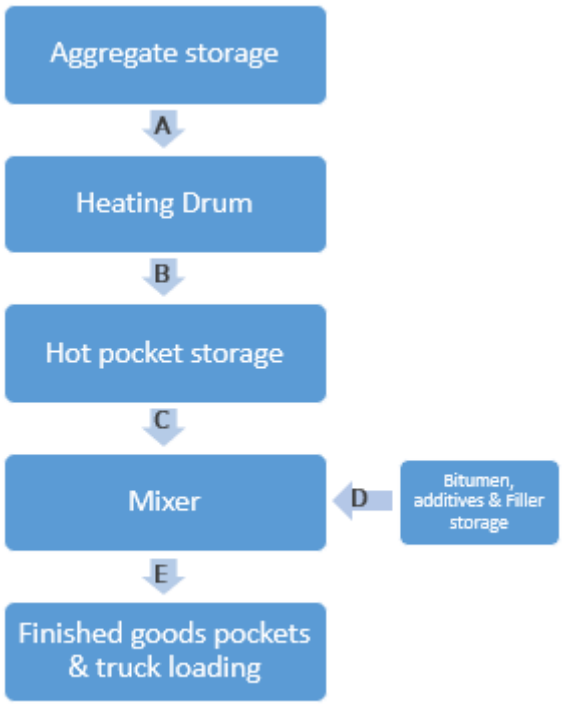
Content information

The product weight is 1 ton, numbers are declared in kg

	Asphalt type										
Product components	AG - Pen. Bitumen	ABB - Pen. Bitumen	ABT - Pen. Bitumen	ABT - Pen. Bitumen Special stone	ABS - Pen. Bitumen	ABS - Pen. Bitumen Special stone	AG - PMB	ABB - PMB	ABT - PMB	ABS - PMB	ABS - PMB Special stone
Aggregate	941	938	931	425	922	203,5	941	938	931	925	205
Special Stone	0	0	0	506	0	718,5	0	0	0	0	720
Bitumen	49	52	59	59	65	65	0	0	0	0	0
Polymer Bitumen (PMB)	0	0	0	0	0	0	49	52	59	65	65
Binder (Limestone)	10	10	10	10	10	10	10	10	10	10	10
Cellulose fibre	0	0	0	0	3	3	0	0	0	0	0
Substances of Very High Concern (SVHC)	<0,1% of total product weight										

Manufacturing process description

Following is the description of the process for manufacturing asphalt at the facility.



A. From the storage locations, the stone material is introduced into a drum where it is dried and heated to the correct temperature.

B. The heated material is then transported upwards in a mixing tower and is screened in different fractions for different sizes of asphalt. The material is then temporarily stored in hot pockets to maintain the temperature.

C. From the hot pockets, given amounts of each fraction are dropped into a stone scale that weighs the material before being dropped into a mixer.

D. Bitumen is weighed on a separate scale and then supplemented with additives which are then dropped into the mixer together with the stone material. Filler and / or fiber are added after weighing on a filler scale.

E. The mixing takes place over a given period before the finished mass is dropped into a conveyor, which then transports the finished mass up to heat-insulated finished goods pockets. It is then unloaded unto trucks from the storage pockets.

Environmental Information

First production in Hok is presented, followed by production in Östad.

Potential environmental impact – mandatory indicators according to EN 15804 - Hok

Some numbers are presented in scientific notation, example: 5,2E-03 equals 0,0052

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			AG - Pen. Bitumen				ABB - Pen. Bitumen				ABT - Pen. Bitumen			
Global Warming potential (GWP)	Fossil	kg CO2 eq	13,09	1,84	16,66	31,59	15,16	2,13	16,66	33,95	15,30	14,34	16,66	46,31
	Biogenic	kg CO2 eq	1,34E-01	4,72E-03	2,55E-01	3,94E-01	1,33E-01	5,42E-03	2,55E-01	3,93E-01	1,53E-01	3,49E-02	2,55E-01	4,42E-01
	Land use and LU change	kg CO2 eq	7,40E-03	6,77E-04	2,21E-02	3,01E-02	7,32E-03	7,75E-04	2,21E-02	3,02E-02	1,08E-02	4,93E-03	2,21E-02	3,78E-02
	Total	kg CO2 eq	13,23	1,84	16,94	32,01	15,30	2,13	16,94	34,37	15,47	14,38	16,94	46,79
Acidification		kg SO2,eq	7,63E-02	3,17E-03	4,04E-02	1,20E-01	8,88E-02	3,65E-03	4,04E-02	1,33E-01	8,97E-02	2,37E-02	4,04E-02	1,54E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	2,04E-03	4,06E-04	1,48E-03	3,92E-03	2,02E-03	4,67E-04	1,48E-03	3,96E-03	2,03E-03	3,02E-03	1,48E-03	6,53E-03
Photochemical ozone formation		kg C_2H^4 eq	8,30E-02	3,60E-03	5,04E-02	1,37E-01	9,65E-02	4,14E-03	5,04E-02	1,51E-01	9,80E-02	2,65E-02	5,04E-02	1,75E-01
Resource use, minerals and metals		kg Sb eq	6,91E-05	7,42E-06	2,99E-05	1,06E-04	6,84E-05	8,47E-06	2,99E-05	1,07E-04	6,76E-05	5,30E-05	2,99E-05	1,51E-04
Resource use, fossils		MJ	2262	28	242	2532	2715	32	242	2989	2723	217	242	3182
Ozone depletion		kg CFC11 eq	3,64E-07	4,14E-07	3,60E-06	4,38E-06	3,60E-07	4,80E-07	3,60E-06	4,44E-06	3,91E-07	3,26E-06	3,60E-06	7,25E-06

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			ABT - Pen. Bitumen special stone				ABS - Pen. Bitumen				ABS - Pen. Bitumen special stone			
Global Warming	Fossil	kg CO2 eq	15,30	14,34	16,66	46,31	16,86	2,48	16,66	36,00	16,60	19,64	16,66	52,90
	Biogenic	kg CO2 eq	1,53E-01	3,49E-02	2,55E-01	4,42E-01	2,42E-01	6,26E-03	2,55E-01	5,02E-01	1,60E-01	4,78E-02	2,55E-01	4,62E-01

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			ABT - Pen. Bitumen special stone				ABS - Pen. Bitumen				ABS - Pen. Bitumen special stone			
potential (GWP)	Land use and LU change	kg CO2 eq	1,08E-02	4,93E-03	2,21E-02	3,78E-02	7,60E-03	8,95E-04	2,21E-02	3,06E-02	1,22E-02	6,74E-03	2,21E-02	4,10E-02
	Total	kg CO2 eq	15,47	14,38	16,94	46,79	17,11	2,48	16,94	36,53	16,77	19,70	16,94	53,41
Acidification		kg SO2,eq	8,97E-02	2,37E-02	4,04E-02	1,54E-01	9,89E-02	4,22E-03	4,04E-02	1,44E-01	9,75E-02	3,24E-02	4,04E-02	1,70E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	2,03E-03	3,02E-03	1,48E-03	6,53E-03	2,56E-03	5,40E-04	1,48E-03	4,57E-03	2,02E-03	4,13E-03	1,48E-03	7,62E-03
Photochemical ozone formation		kg C_2H^4 eq	9,80E-02	2,65E-02	5,04E-02	1,75E-01	1,07E-01	4,78E-03	5,04E-02	1,62E-01	1,07E-01	3,62E-02	5,04E-02	1,93E-01
Resource use, minerals and metals		kg Sb eq	6,76E-05	5,30E-05	2,99E-05	1,51E-04	7,56E-05	9,75E-06	2,99E-05	1,15E-04	6,66E-05	7,23E-05	2,99E-05	1,69E-04
Resource use, fossils		MJ	2723	217	242	3182	2993	37	242	3272	2997	298	242	3537
Ozone depletion		kg CFC11 eq	3,91E-07	3,26E-06	3,60E-06	7,25E-06	4,06E-07	5,60E-07	3,60E-06	4,57E-06	4,01E-07	4,47E-06	3,60E-06	8,47E-06

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			AG - PMB				ABB - PMB				ABT - PMB			
Global Warming potential (GWP)	Fossil	kg CO2 eq	23,37	1,84	16,66	41,87	24,62	1,92	16,66	43,21	27,54	2,13	16,66	46,33
	Biogenic	kg CO2 eq	1,75E-01	4,72E-03	2,55E-01	4,34E-01	1,77E-01	4,93E-03	2,55E-01	4,37E-01	1,82E-01	5,42E-03	2,55E-01	4,42E-01
	Land use and LU change	kg CO2 eq	1,04E-02	6,77E-04	2,21E-02	3,32E-02	1,06E-02	7,06E-04	2,21E-02	3,34E-02	1,10E-02	7,75E-04	2,21E-02	3,38E-02
	Total	kg CO2 eq	23,56	1,84	16,94	42,34	24,81	1,93	16,94	43,68	27,73	2,13	16,94	46,80
Acidification		kg SO2,eq	9,70E-02	3,17E-03	4,04E-02	1,41E-01	1,02E-01	3,31E-03	4,04E-02	1,46E-01	1,14E-01	3,65E-03	4,04E-02	1,58E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	1,25E-02	4,06E-04	1,48E-03	1,44E-02	1,32E-02	4,25E-04	1,48E-03	1,51E-02	1,46E-02	4,67E-04	1,48E-03	1,66E-02
Photochemical ozone formation		kg C_2H^4 eq	1,76E-01	3,60E-03	5,04E-02	2,30E-01	1,86E-01	3,76E-03	5,04E-02	2,40E-01	2,08E-01	4,14E-03	5,04E-02	2,63E-01
Resource use, minerals and metals		kg Sb eq	1,16E-04	7,42E-06	2,99E-05	1,54E-04	1,19E-04	7,73E-06	2,99E-05	1,57E-04	1,25E-04	8,47E-06	2,99E-05	1,64E-04
Resource use, fossils		MJ	2414	28	242	2684	2559	29	242	2830	2898	32	242	3172
Ozone depletion		kg CFC11 eq	7,58E-07	4,14E-07	3,60E-06	4,77E-06	7,81E-07	4,34E-07	3,60E-06	4,82E-06	8,34E-07	4,80E-07	3,60E-06	4,92E-06

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			ABS - PMB				ABS - PMB special stone			
Global Warming potential (GWP)	Fossil	kg CO2 eq	30,04	2,30	16,66	49,00	30,25	19,68	16,66	66,59
	Biogenic	kg CO2 eq	1,86E-01	5,84E-03	2,55E-01	4,47E-01	2,14E-01	4,79E-02	2,55E-01	5,17E-01
	Land use and LU change	kg CO2 eq	1,13E-02	8,35E-04	2,21E-02	3,42E-02	1,63E-02	6,75E-03	2,21E-02	4,51E-02
	Total	kg CO2 eq	30,24	2,31	16,94	49,48	30,48	19,73	16,94	67,15
Acidification		kg SO2,eq	1,24E-01	3,93E-03	4,04E-02	1,68E-01	1,25E-01	3,24E-02	4,04E-02	1,98E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	1,59E-02	5,03E-04	1,48E-03	1,79E-02	1,59E-02	4,13E-03	1,48E-03	2,15E-02
Photochemical ozone formation		kg C_2H^4 eq	2,28E-01	4,46E-03	5,04E-02	2,83E-01	2,30E-01	3,63E-02	5,04E-02	3,17E-01
Resource use, minerals and metals		kg Sb eq	1,30E-04	9,11E-06	2,99E-05	1,70E-04	1,29E-04	7,24E-05	2,99E-05	2,32E-04
Resource use, fossils		MJ	3188	35	242	3465	3199	298	242	3740
Ozone depletion		kg CFC11 eq	8,80E-07	5,20E-07	3,60E-06	5,00E-06	9,24E-07	4,47E-06	3,60E-06	9,00E-06

Potential environmental impact – mandatory indicators according to EN 15804 - Östad

Some numbers are presented in scientific notation, example: 5,2E-03 equals 0,0052

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			AG - Pen. Bitumen				ABB - Pen. Bitumen				ABT - Pen. Bitumen			
Global Warming potential (GWP)	Fossil	kg CO2 eq	14,01	0,78	22,69	37,49	14,63	0,81	22,69	38,13	16,07	0,86	22,69	39,62
	Biogenic	kg CO2 eq	1,29E-01	2,16E-03	3,47E-02	1,66E-01	1,29E-01	2,22E-03	3,47E-02	1,66E-01	1,28E-01	2,35E-03	3,47E-02	1,65E-01
	Land use and LU change	kg CO2 eq	6,57E-03	3,16E-04	2,06E-02	2,74E-02	6,55E-03	3,24E-04	2,06E-02	2,74E-02	6,50E-03	3,43E-04	2,06E-02	2,74E-02
	Total	kg CO2 eq	14,14	0,79	22,75	37,68	14,76	0,81	22,75	38,32	16,20	0,87	22,75	39,82
Acidification		kg SO2,eq	8,20E-02	1,44E-03	4,08E-02	1,24E-01	8,58E-02	1,47E-03	4,08E-02	1,28E-01	9,45E-02	1,56E-03	4,08E-02	1,37E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	2,12E-03	1,86E-04	1,42E-03	3,73E-03	2,11E-03	1,90E-04	1,42E-03	3,73E-03	2,09E-03	2,02E-04	1,42E-03	3,72E-03
Photochemical ozone formation		kg C_2H^4 eq	9,29E-02	1,67E-03	3,77E-02	1,32E-01	9,69E-02	1,71E-03	3,77E-02	1,36E-01	1,06E-01	1,81E-03	3,77E-02	1,46E-01
Resource use, minerals and metals		kg Sb eq	6,93E-05	3,55E-06	4,25E-05	1,15E-04	6,90E-05	3,64E-06	4,25E-05	1,15E-04	6,85E-05	3,83E-06	4,25E-05	1,15E-04
Resource use, fossils		MJ	2273	12	341	2626	2409	12	341	2762	2726	13	341	3080
Ozone depletion		kg CFC11 eq	5,64E-07	1,75E-07	4,96E-06	5,70E-06	5,62E-07	1,81E-07	4,96E-06	5,70E-06	5,58E-07	1,93E-07	4,96E-06	5,71E-06

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			ABT - Pen. Bitumen special stone				ABS - Pen. Bitumen				ABS - Pen. Bitumen special stone			
Global Warming potential (GWP)	Fossil	kg CO2 eq	15,72	6,49	22,69	44,91	17,76	1,13	22,69	41,58	16,80	8,91	22,69	48,40
	Biogenic	kg CO2 eq	1,51E-01	1,59E-02	3,47E-02	2,01E-01	2,37E-01	2,99E-03	3,47E-02	2,74E-01	1,59E-01	2,17E-02	3,47E-02	2,15E-01
	Land use and LU change	kg CO2 eq	1,05E-02	2,25E-03	2,06E-02	3,33E-02	6,78E-03	4,32E-04	2,06E-02	2,78E-02	1,21E-02	3,06E-03	2,06E-02	3,57E-02
	Total	kg CO2 eq	15,88	6,51	22,75	45,14	18,01	1,13	22,75	41,89	16,97	8,93	22,75	48,65
Acidification		kg SO2,eq	9,23E-02	1,08E-02	4,08E-02	1,44E-01	1,05E-01	2,00E-03	4,08E-02	1,47E-01	9,87E-02	1,47E-02	4,08E-02	1,54E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	2,07E-03	1,37E-03	1,42E-03	4,86E-03	2,63E-03	2,57E-04	1,42E-03	4,31E-03	2,03E-03	1,87E-03	1,42E-03	5,33E-03
Photochemical ozone formation		kg C_2H^4 eq	1,03E-01	1,21E-02	3,77E-02	1,52E-01	1,16E-01	2,29E-03	3,77E-02	1,56E-01	1,09E-01	1,64E-02	3,77E-02	1,63E-01
Resource use, minerals and metals		kg Sb eq	6,77E-05	2,42E-05	4,25E-05	1,34E-04	7,58E-05	4,80E-06	4,25E-05	1,23E-04	6,66E-05	3,29E-05	4,25E-05	1,42E-04
Resource use, fossils		MJ	2728	98	341	3167	3004	17	341	3362	3000	135	341	3476

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			ABT - Pen. Bitumen special stone				ABS - Pen. Bitumen				ABS - Pen. Bitumen special stone			
Ozone depletion		kg CFC11 eq	4,82E-07	1,48E-06	4,96E-06	6,92E-06	6,03E-07	2,53E-07	4,96E-06	5,81E-06	4,44E-07	2,02E-06	4,96E-06	7,43E-06

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			AG - PMB				ABB - PMB				ABT - PMB			
Global Warming potential (GWP)	Fossil	kg CO2 eq	24,29	0,78	22,69	47,77	25,54	0,81	22,69	49,04	28,45	0,86	22,69	52,01
	Biogenic	kg CO2 eq	1,70E-01	2,16E-03	3,47E-02	2,07E-01	1,72E-01	2,22E-03	3,47E-02	2,09E-01	1,77E-01	2,35E-03	3,47E-02	2,14E-01
	Land use and LU change	kg CO2 eq	9,60E-03	3,16E-04	2,06E-02	3,05E-02	9,76E-03	3,24E-04	2,06E-02	3,07E-02	1,01E-02	3,43E-04	2,06E-02	3,11E-02
	Total	kg CO2 eq	24,47	0,79	22,75	48,01	25,72	0,81	22,75	49,28	28,64	0,87	22,75	52,25
Acidification		kg SO2,eq	1,03E-01	1,44E-03	4,08E-02	1,45E-01	1,08E-01	1,47E-03	4,08E-02	1,50E-01	1,19E-01	1,56E-03	4,08E-02	1,62E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	1,26E-02	1,86E-04	1,42E-03	1,42E-02	1,32E-02	1,90E-04	1,42E-03	1,49E-02	1,47E-02	2,02E-04	1,42E-03	1,63E-02
Photochemical ozone formation		kg C_2H^4 eq	1,86E-01	1,67E-03	3,77E-02	2,25E-01	1,95E-01	1,71E-03	3,77E-02	2,35E-01	2,18E-01	1,81E-03	3,77E-02	2,58E-01
Resource use, minerals and metals		kg Sb eq	1,16E-04	3,55E-06	4,25E-05	1,62E-04	1,19E-04	3,64E-06	4,25E-05	1,65E-04	1,25E-04	3,83E-06	4,25E-05	1,72E-04
Resource use, fossils		MJ	2425	12	341	2778	2571	12	341	2923	2909	13	341	3263
Ozone depletion		kg CFC11 eq	9,58E-07	1,75E-07	4,96E-06	6,09E-06	9,80E-07	1,81E-07	4,96E-06	6,12E-06	1,03E-06	1,93E-07	4,96E-06	6,18E-06

Impact category		Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
			ABS - PMB				ABS - PMB special stone			
Global Warming potential (GWP)	Fossil	kg CO2 eq	30,94	0,91	22,69	54,55	30,45	8,92	22,69	62,07
	Biogenic	kg CO2 eq	1,81E-01	2,46E-03	3,47E-02	2,18E-01	2,13E-01	2,17E-02	3,47E-02	2,70E-01
	Land use and LU change	kg CO2 eq	1,05E-02	3,58E-04	2,06E-02	3,14E-02	1,61E-02	3,07E-03	2,06E-02	3,97E-02
	Total	kg CO2 eq	31,14	0,91	22,75	54,80	30,68	8,95	22,75	62,37
Acidification		kg SO2,eq	1,29E-01	1,64E-03	4,08E-02	1,72E-01	1,26E-01	1,47E-02	4,08E-02	1,82E-01
Eutrophication, freshwater		kg PO_4^{-3} eq	1,60E-02	2,12E-04	1,42E-03	1,76E-02	1,60E-02	1,88E-03	1,42E-03	1,93E-02
Photochemical ozone formation		kg C_2H^4 eq	2,37E-01	1,90E-03	3,77E-02	2,77E-01	2,32E-01	1,65E-02	3,77E-02	2,86E-01

Impact category	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		ABS - PMB				ABS - PMB special stone			
Resource use, minerals and metals	kg Sb eq	1,31E-04	4,00E-06	4,25E-05	1,77E-04	1,29E-04	3,29E-05	4,25E-05	2,05E-04
Resource use, fossils	MJ	3199	14	341	3554	3202	135	341	3678
Ozone depletion	kg CFC11 eq	1,08E-06	2,04E-07	4,96E-06	6,24E-06	9,68E-07	2,03E-06	4,96E-06	7,95E-06

Use of resources - Hok

The consumption of resources in terms of energy is measured as primary energy demand with the method CED 1.11.

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		AG - Pen. Bitumen				ABB - Pen. Bitumen				ABT - Pen. Bitumen			
PERE	MJ	8,8	0,4	149,8	159,0	8,7	0,4	149,8	158,9	8,7	0,5	149,8	158,9
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	8,8	0,4	149,8	159,0	8,7	0,4	149,8	158,9	8,7	0,5	149,8	158,9
PENRE	MJ	2401	30	256	2686	2545	31	256	2831	2881	34	256	3171
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2401	30	256	2686	2545	31	256	2831	2881	34	256	3171
SM	Kg	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	M3	0,08	0,00	0,01	0,09	0,08	0,00	0,01	0,09	0,09	0,00	0,01	0,10
Abbreviations	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;												

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
	NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water												

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		ABT - Pen. Bitumen special stone				ABS - Pen. Bitumen				ABS - Pen. Bitumen special stone			
PERE	MJ	11,4	3,0	149,8	164,2	10,0	0,5	149,8	160,3	12,5	4,1	149,8	166,3
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	11,4	3,0	149,8	164,2	10,0	0,5	149,8	160,3	12,5	4,1	149,8	166,3
PENRE	MJ	2889	231	256	3376	3177	40	256	3472	3181	316	256	3753
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2889	231	256	3376	3177	40	256	3472	3181	316	256	3753
SM	Kg	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	M3	0,09	0,01	0,01	0,11	0,10	0,00	0,01	0,11	0,10	0,02	0,01	0,12

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		AG - PMB				ABB - PMB				ABT - PMB			
PERE	MJ	14,8	0,4	149,8	164,9	15,1	0,4	149,8	165,3	15,9	0,5	149,8	166,1
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	14,8	0,4	149,8	164,9	15,1	0,4	149,8	165,3	15,9	0,5	149,8	166,1
PENRE	MJ	2565	30	256	2850	2719	31	256	3006	3079	34	256	3369
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2565	30	256	2850	2719	31	256	3006	3079	34	256	3369
SM	Kg	0	0	0	0	0	0	0	0	0	0	0	0

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	M3	0,10	0,00	0,01	0,11	0,11	0,00	0,01	0,12	0,12	0,00	0,01	0,13

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		ABS - PMB				**ABS - PMB special stone**			
PERE	MJ	16,6	0,5	149,8	166,9	20,4	4,1	149,8	174,3
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	16,6	0,5	149,8	166,9	20,4	4,1	149,8	174,3
PENRE	MJ	3388	37	256	3680	3399	317	256	3971
PENRM	MJ	0	0	0	0	0	0	0	0
PENRT	MJ	3388	37	256	3680	3399	317	256	3971
SM	Kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	M3	0,13	0,00	0,01	0,14	0,13	0,02	0,01	0,15

Use of resources - Östad

The consumption of resources in terms of energy is measured as primary energy demand with the method CED 1.11.

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		AG - Pen. Bitumen				**ABB - Pen. Bitumen**				**ABT - Pen. Bitumen**			

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
PERE	MJ	8,1	0,2	15,7	24,0	8,1	0,2	15,7	24,0	8,0	0,2	15,7	23,9
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	8,1	0,2	15,7	24,0	8,1	0,2	15,7	24,0	8,0	0,2	15,7	23,9
PENRE	MJ	2413	13	360	2785	2557	13	360	2929	2893	14	360	3267
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2413	13	360	2785	2557	13	360	2929	2893	14	360	3267
SM	Kg	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	M3	0,08	0,00	0,01	0,09	0,08	0,00	0,01	0,09	0,09	0,00	0,01	0,10

Abbreviations

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

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		ABT - Pen. Bitumen special stone				**ABS - Pen. Bitumen**				**ABS - Pen. Bitumen special stone**			
PERE	MJ	11,1	1,4	15,7	28,2	9,3	0,3	15,7	25,3	12,3	1,9	15,7	29,9
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
PERT	MJ	11,1	1,4	15,7	28,2	9,3	0,3	15,7	25,3	12,3	1,9	15,7	29,9
PENRE	MJ	2895	105	360	3359	3189	18	360	3566	3183	143	360	3686
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2895	105	360	3359	3189	18	360	3566	3183	143	360	3686
SM	Kg	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	M3	0,09	0,01	0,01	0,11	0,10	0,00	0,01	0,11	0,10	0,01	0,01	0,12

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		AG - PMB				**ABB - PMB**				**ABT - PMB**			
PERE	MJ	14,1	0,2	15,7	30,0	14,4	0,2	15,7	30,3	15,2	0,2	15,7	31,1
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	14,1	0,2	15,7	30,0	14,4	0,2	15,7	30,3	15,2	0,2	15,7	31,1
PENRE	MJ	2577	13	360	2949	2731	13	360	3104	3091	14	360	3465
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	2577	13	360	2949	2731	13	360	3104	3091	14	360	3465
SM	Kg	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
FW	M3	0,10	0,00	0,01	0,12	0,11	0,00	0,01	0,12	0,12	0,00	0,01	0,13

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
		ABS - PMB				**ABS - PMB special stone**			
PERE	MJ	15,9	0,2	15,7	31,8	20,3	1,9	15,7	37,8

Parameter	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
PERM	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PERT	MJ	15,9	0,2	15,7	31,8	20,3	1,9	15,7	37,8
PENRE	MJ	3400	15	360	3774	3402	144	360	3905
PENRM	MJ	0	0	0	0	0	0	0	0
PENRT	MJ	3400	15	360	3774	3402	144	360	3905
SM	Kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	M3	0,13	0,00	0,01	0,14	0,13	0,01	0,01	0,15

Waste production and output flows – Both sites

The production of waste in terms of final waste and the output of materials for recycling, is measured from the calculation of selected inventory results with our own method[2]. Final waste and output flows, refers to flows that are leaving the system of the LCA. In this LCA only elementary flows (substances) are leaving the system. For the manufacturing, there are no such flows for any type of asphalt. All waste equals zero due to the use of ecoinvent as the database, which already accounts for the waste in the datasets.

Waste production:

Indicator	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
Hazardous waste	Kg	0	0	0	0
Non-Hazardous waste	Kg	0	0	0	0
Radioactive waste	Kg	0	0	0	0

Output flows:

Indicator	Unit	Raw materials A1	Transports to site A2	Production A3	Sum A1-A3
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0

[2] EPD (2018) EN15804 v3

References

CEN - EUROPEAN COMMITTEE FOR STANDARDIZATION, EN 15804:2012+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

EPD International. (2018). ASPHALT MIXTURES PRODUCT CATEGORY CLASSIFICATION: UN CPC 1533 & 3794. 2018:04 v1, 1–33

General Programme Instructions of the International EPD® System. Version 3.01.

Hakkarainen, V. (Miljögiraff ab). (2021). Life Cycle Assessment of asphalts by Sandahls

ISO. (2006a). ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures. International Organisation for Standardization

ISO. (2006b). ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework. 1–28. International Organization for Standardization

ISO. (2006c). ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines. https://doi.org/10.1007/s11367-011-0297-3