

CLIMATE PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Wienerberger Oy Ab
GROUP B1



Building information Ltd Climate Product Declaration

Declaration Number: RAK-IS_002.2_25

Issue date: 6.6.2025

Valid to: 6.6.2030



GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Wienerberger Oy Ab
Address	Kumpulantie 15, 00520 Helsinki
Contact details	office@wienerberger.fi
Website	https://www.wienerberger.fi

PRODUCT IDENTIFICATION

Product group	Clay bricks, Group B1
Product name	<p>Products included within the product group:</p> <ul style="list-style-type: none">• Kuura Retro• Pellava Retro• Grafiitinmusta Retro• Terva Retro• Graniitti Makasiini• Graniitinkirjava Makasiini• Tervankirjava Makasiini• Hiilenkirjava Makasiini• Utu Vuolu• Sumu Vuolu• Kajo Vuolu
Representative product	<p>This product group's climate product declaration has been developed following the principle of conservatism, where the chosen reference product Terva Retro has the highest GWP total (A1-3) value. Products with the lowest total GWP value within this product group are 15% lower than the reference product.</p>
Additional label(s)	
Product number / reference	Appendix 2
Place(s) of production	Koria, Finland

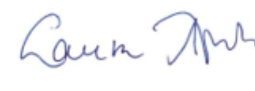
The manufacturer has the sole ownership, liability, and responsibility for the EPD and climate product declaration. EPDs and climate product declaration within the same product category but registered in different EPD programs may not be comparable. For two EPDs or climate product declarations to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. EN15804 impact assessment indicators are based on EF 3.1.

DECLARATION INFORMATION

Program operator, publisher	Rakennustieto, Malminkatu 16 A, 00100 Helsinki, Finland https://ymparisto.rakennustieto.fi/
Standards	The declaration has been prepared in accordance with EN 15804:2019 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. Rakennustiedon ilmastaseloste-PCR 2025
Component EPD number	RTS_384.0_25
Declaration verifier	Anni Viitala, Granlund
Declaration number	RAK-IS_002.2_25
Declaration publishing date	6.6.2025
Declaration valid until	6.6.2030




Jukka Seppänen
RTS EPD Committee Secretary



Laura Apilo
Managing Director

VERIFICATION STATEMENT

Verified according to the requirements of EN 15804+A2 (product category rules)	
Independent verification of the declaration, according to EN ISO 14025:2010	
<input checked="" type="checkbox"/> External	<input type="checkbox"/> Internal
Third party verifier:  Anni Viitala, Granlund	

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The main raw materials for brick products are clay, sand and water. Finnish clay contains iron compounds, which is reflected in the brick as a red hue after firing. Kaolin clay and lime are used in the production of the lightest bricks. In addition, mineral-based additives and engobes can be used in the brick mass, which affect the color tone of the brick.

The solid and perforated bricks as well as brick slips are produced by extruding method. Brick products are fired at over 1000 °C. The firing process can be fueled with either natural gas or biogas in the Koria brick factory. Bricks produced with biogas are available for purchase on request, but they are not within the scope.

The appendix 1 includes the environmental impact data for the reference product produced with biogas. Appendix 2 includes details of the products included within the product group.

PRODUCT APPLICATION

Extruded bricks and brick slips are mainly used in façade solutions. Certain brick sizes can also be used in chimneys and fireplaces.

RAW MATERIAL COMPOSITION

Component	Contents	Declared unit	Origin	Renewable material content (%)	Non-renewable material content (%)	Post-consumer recycled material content (%)
Clay	100 % Clay	1 kg	FI / UK	0 %	100 %	0 %
Sand	100 % Sand	1 kg	FI	0 %	100 %	0 %
Lime	100 % Calcium carbonate	1 kg	FI	0 %	100 %	0 %
Sawdust	100 % Wood	1 kg	FI	100 %	0 %	0 %
Pigments	61 % Manganese Dioxide 39 % Chromite	1 kg	FI	0 %	100 %	0 %
Crushed brick	70 % Clay 24 % Sand 4 % Lime 1 % Sawdust 1 % Pigments	1 kg	FI	0 %	100 %	0 %
Natural gas	100 % Natural gas	1 kWh	EU	0 %	100 %	0 %
Wienerberger's manufacturing		1 kg				

PRODUCT GROUP COMPONENT COMPOSITION

Product group and reference product-specific component quantities are presented in the table below.

Component	Product group value range	Reference product: Terva Retro
Clay	0,49-0,80 kg	0,76 kg
Sand	0,12-0,34 kg	0,12 kg
Lime	0-0,04 kg	0,0 kg
Sawdust	0,02-0,06 kg	0,02 kg
Pigments	0-0,03 kg	0,03 kg
Crushed brick	0-0,09 kg	0,08 kg
Biogas	0,5-0,55 kWh/kg	0,55 kWh/kg
Wienerberger's manufacturing	1,0 kg	1,0 kg

DECLARATION OF MATERIAL CLASSES

Material classes	by mass per Declared Unit
Concrete, masonry, tiles, ceramic tiles, natural stone	1 kg
Wood and other bio-based materials	0
Glass materials	0
Plastics and rubber materials	0
Bitumen materials and bitumen mixtures	0
Metals	0
Thermal insulation materials	0
Gypsum-based materials	0
Building integrated appliances	0
Other materials	0

PACKAGING MATERIAL COMPOSITION

Main packaging materials of products per declared unit are presented in the table below.

Product	Quantity	Weight % of total
Wood pallets	0,0008 kg	42 %
Shrink hood	0,0012 kg	58 %
Total	0,0020 kg	

PRODUCT STANDARDS

All Wienerberger Koria plant bricks have a CE certificate and cover the standard SFS-EN 771-1+A1 requirements.

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	1 year, 2023
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DECLARED AND FUNCTIONAL UNIT

Declared unit	1 clay brick
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

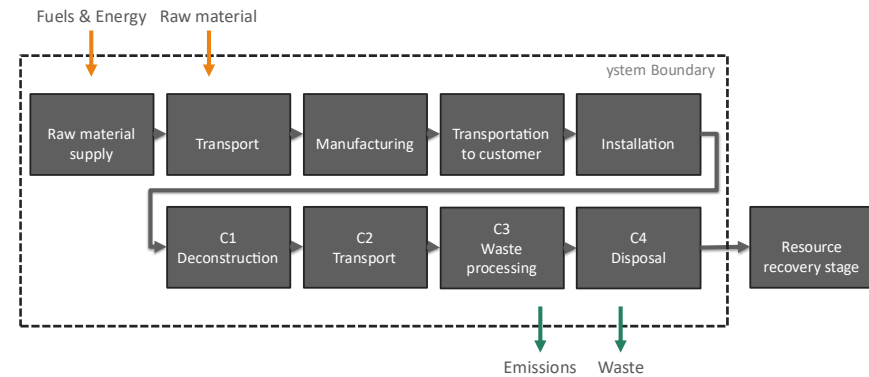
SYSTEM BOUNDARY

The studied system boundary was cradle to gate with options, modules C1–C4 and module D (A1–A3, A4, A5, C1–C4 and D).

	Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage				Benefits and loads beyond the system boundary		
	Raw material supply	Transport	Manufacturing	Transport to building	Installation to building	Use/applications	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling
Stage	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
Included	X	X	X	X	X								X	X	X	X	X	X	X
Relevancy	R	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	R	R	R	R	R	R	R

	Mandatory
	Mandatory as per the RTS PCR section 6.2.1 rules and terms
	Optional modules based on scenarios

Studied system covers the following steps of life cycle according to EN 15804: **A1** Raw material supply, **A2** Transport, **A3** Manufacturing, **A4** Transportation to customer, **A5** Installation, **C1** Deconstruction, **C2** Transportation of end-of-life, **C3** Waste processing and **C4** Disposal. In addition, the benefits and loads beyond the system boundary of stage **D** consist of product reuse, recovery and recycling. System boundary describing the system boundary and the input and output flows is shown below:



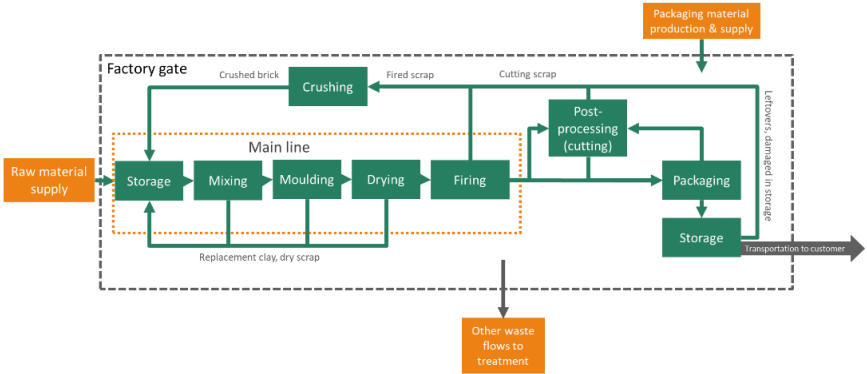
LCA System Boundary of studied products

The study does not omit any life cycle stages, processes or data needs that are mandatory according to EN 15804 and RTS PCR.

The end of waste (EoW) point of the production scraps is the point where it is processed to be ready to use in following life cycles. For example, for incinerated waste streams, it is the incineration of the materials, which results as energy that is then available for consumption in the following life cycle. For paper waste, it is ready to be used as secondary raw material after sorting. EoW point of the packaging materials collected for processing in A5 module is the point when materials are collected and handled in the sorting plant. EoW point of the studied product is the step when bricks are recycled and available to following life cycles as waste brick or collected for final disposal

THE PRODUCTION PROCESS OF THE STUDIED PRODUCT

Production stage (A3) of Wienerberger’s production site covers the following manufacturing processes; raw material supply, processing and packaging the final product. After that, products are transported to the customer. The production processes of the studied product are presented in the following figure. Component “Crushed brick” represents the internally recycled production waste.



Wienerberger’s production processes

CUT-OFF CRITERIA

This study follows the cut-off criteria stated in RTS PCR and EN 15804 -standard. This study does not exclude any modules or processes which represent more than 1 % of the emissions of the studied life cycle stage. The study does not exclude any hazardous materials or substances.

Excluded processes and the criteria for exclusion are given in the following table. Machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

Process excluded from study	Cut-off criteria	Quantified contribution from process
B1-B7 Use stage	Not relevant for the product group	-

ALLOCATION

Allocation rules used are made according to ISO14044:2006. Allocation is avoided when possible and when necessary, allocation is made based on physical shares and also avoiding double calculations. Allocation is required if the production process produces more than one product and the flows of materials, energy and waste cannot be separately measured for the studied product. Allocation used in generic data sources follow the requirements of the EN 15804 -standard. It should be noticed that the allocation method 'Allocation, cut-off, EN15804' has been used for Ecolnvent 3.10.1 data, which complies with EN 15804.

Avoiding allocation could not be avoided for following inputs as the information was only measured on factory process level.

Electricity consumption, fuels for processing: only measured on factory level.

Production waste flows: only measured on factory level.

Production water consumption: only measured on factory level

Packaging materials: only measured on factory level.

According to EN 15804, flows leaving the system at the end-of-waste boundary of the product stage (A1-A3) are allocated as co-products. According to EN 15804, processes that has a very low contribution to the overall revenue may be neglected in co-product allocation.

KEY ASSUMPTIONS

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

End of life scenario: EAA's 2020 end-of-life data was utilized. The mineral waste from construction and demolition -waste category was assumed to be the most compatible for the product. According to EAA 2020, end-of-life data for mineral waste from construction and demolition, 88.4% of the mineral waste is recycled (including backfilling) and the remaining 11.6% goes to final disposal (including energy recovery). (EAA 2020.)

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives. Material flows at the end of life were assumed to be following:

C1 Deconstruction/demolition: During the demolition phase C1, the entire final product is dismantled, using the mass of the final product as the input data. The energy use (diesel usage) in the demolition stage is 1,30 kWh/t (Erlandsson, M. & Pettersson, D., 2015.)

C2 Transportation: Transportation distance 75 km road driving by lorry. (SYKE 2021.)

C3-C4 Waste treatment and final disposal: For clay bricks, EAA mineral waste from construction and demolition in 2020 end-of-life data is utilized, with 88.4% of the mineral waste being recycled (including backfilling) and the remaining 11.6% going to final disposal (including energy recovery). (EAA 2020.)

Module D covers the net benefits and loads arising from the reuse of products or the recycling or recovery of energy from end-of-waste state materials. Waste brick can be used in backfilling or in other different filling applications.

DATA QUALITY

The quality requirements for the life cycle assessment were set according to the EN ISO 14044 standard (4.2.3.6) and EN 15804 standard (6.3.7).

This LCA study follows the standard EN 15804:2012+A2:2019 and RTS PCR and no decisions are made based on the values. The study does not consider long-term emissions (i.e. over 100 years). Impact assessment characterization factors are aligned with EF 3.1. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

The calculations were conducted using One Click LCA -tool which is a cloud-based LCA software in compliance with EN 15804 -standard.

PROCEDURE FOR COLLECTION PROCESS SPECIFIC DATA

Production specific data was collected directly from the manufacturer's production plant. The data represents the production of the studied product at the plant from the materials transported to the facility and represents 1 year average. The data represents the year 2023, which was the latest year with full year data. All gathered data was used without excluding categories in advance following the system boundaries set in earlier chapters.

CRITERIA FOR CHOOSING THE GENERIC DATA

Generic data that was used for upstream and downstream processes represents complementary data from Ecoinvent 3.10.1 database.

The datasets were chosen to represent the studied system as closely as possible. When available supplier specific information was used for instance in form of EN 15804 EPDs or emissions profile of local energy supplier. When supplier-specific information was not available the information sources were chosen based on their technical and geographical representativeness. Only when country specific or European data has not been available has global level data been used (concerns mainly data from Ecoinvent 3.10.1.)

As up-to-date data as possible was chosen and no more than five years old for producer specific data and ten years for generic data was used.

ENVIRONMENTAL IMPACT DATA

GROUP B1

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP – total	kg CO ₂ e	2.36E-01	1.42E-02	1.44E-03	4.69E-04	8.08E-03	3.18E-03	2.50E-03	-1.64E-02
GWP – fossil	kg CO ₂ e	2.37E-01	1.42E-02	7.31E-05	4.69E-04	8.07E-03	3.18E-03	2.49E-03	-1.64E-02
GWP – biogenic	kg CO ₂ e	-1.36E-03	0.00E+00	1.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP – LULUC	kg CO ₂ e	1.06E-04	6.37E-06	9.15E-09	4.80E-08	3.61E-06	3.26E-07	5.44E-06	-1.26E-05

1)GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO₄e.

BIOGENIC CARBON CONTENT

Biogenic carbon content	Unit (expressed per declared unit)
Biogenic carbon content in product	0 kg
Biogenic carbon content in accompanying packaging	0,001 kg

NOTE 1 kg biogenic carbon is equivalent to 44/12 kg of CO₂

SCENARIO DOCUMENTATION

MANUFACTURING ENERGY SCENARIO DOCUMENTATION

Scenario parameter	Value
Electricity data source and quality	Electricity production, hydro, reservoir, alpine region. EN15804+A2, Norway, 2024. Ecoinvent 3.10.1 Electricity production, wind, 1-3MW turbine, onshore. EN15804+A2, Sweden, 2024. Ecoinvent 3.10.1
Electricity CO ₂ e / kWh	0,0072 kg CO ₂ e / kWh

TRANSPORTATION SCENARIO

Parameter	Value
Fuel type and consumption of vehicle used for transport	Truck: diesel, maximum load capacity 34 t. Specific transport emissions 0,11 kg CO ₂ equiv. / tkm
Distance (km)	Average transport distance 132 km
Capacity utilization (%)	100 % for truck
Density of transported products (kg/m ³)	Density varies depending on the mass and size of the product type
Volume capacity utilization factor	1

INSTALLATION OF THE PRODUCT IN THE BUILDING

Parameter	Unit
Ancillary materials for installation (specified by material)	Disposable gloves (not included in the analysis due to insignificant amount)
Water use	0 m ³
Other resource use	0 kWh (energy use is insignificant)
Quantitative description of energy type (regional mix) and consumption during the installation process	
Waste materials generated by product installation	Packaging materials per 1 kg of products: Wood pallets 0,0008 kg Shrink hood 0,0012 kg

END OF LIFE SCENARIO DOCUMENTATION

Clay brick		
Process flow	Mass	
Collection process specified by type	kg collected separately	1,0 kg
	kg collected with mixed construction waste	-
Recovery system specified by type	kg for reuse	-
	kg for recycling	0,884 kg
	kg for energy recovery	-
Disposal specified by type	kg material for final deposition	0,116 kg
Assumptions for scenario development	units as appropriate	Waste materials are transported 75 km by truck to recycling facility with a truck capacity utilization of 45%

REFERENCES

- ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.
- ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
- EN 15804:2012+A2:2021 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
- Ecoinvent database v3.10.1, System model: Allocation, cut-off, EN15804 (2024)
- The Building Information Foundation RTS (RTS EPD Product Category Rules). Rakennustietosäätiö RTS sr (RTS EPD PCR menetelmäohje 15804:2019, 26.8.2020)
- The Finnish RTS EPD programme RTS EPD Guideline, 18.2.2021
- Rakennustiedon ilmastaseloste-PCR, 30.5.2025
- Emissions database for construction, Finnish Environmental Institute, 2023. Available at: <https://co2data.fi/>
- EAA. 2020. European Environment Agency. Available at: https://www.eea.europa.eu/ds_resolveuid/b1460a4479c940859297359644449a49
- The Building Information Foundation RTS (RTS GWP Product Category Rules). Rakennustietosäätiö RTS sr (RTS GWP PCR 15804:2019)

ANNEX 1: ENVIRONMENTAL IMPACT DATA: REFERENCE PRODUCT PRODUCED WITH BIOGAS.

The results are based on actual production data from 2023, in a scenario where biogas is used instead of natural gas. When biogas is utilized in the production of the included products, these results are more accurate than those presented on page 10 or in the EPDs.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP – total	kg CO ₂ e	9.49E-02	1.42E-02	1.44E-03	4.69E-04	8.08E-03	3.18E-03	2.50E-03	-1.64E-02
GWP – fossil	kg CO ₂ e	9.62E-02	1.42E-02	7.31E-05	4.69E-04	8.07E-03	3.18E-03	2.49E-03	-1.64E-02
GWP – biogenic	kg CO ₂ e	-1.36E-03	0.00E+00	1.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP – LULUC	kg CO ₂ e	1.01E-04	6.37E-06	9.15E-09	4.80E-08	3.61E-06	3.26E-07	5.44E-06	-1.26E-05

1)GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO₄e.

BIOGENIC CARBON CONTENT

Biogenic carbon content	Unit (expressed per declared unit)
Biogenic carbon content in product	0 kg
Biogenic carbon content in accompanying packaging	0,001 kg

NOTE 1 kg biogenic carbon is equivalent to 44/12 kg of CO₂

ANNEX 2: PRODUCTS WITHIN THE PRODUCT GROUP B1

	Product code	GTIN-code	Brick size	Unit weight [kg]	Scaling factor
Kuura Retro	23113161	6419140129207	285x135x60	2.9	2.9
	23113181	6419140130807	285x135x75	3.6	3.6
	23123111	6419140130548	285x85x60	2.0	2
	23213111	6419140129108	285x45x60	1.3	1.3
	23213181	6419140130760	285x75x45	1.6	1.6
	23233131	6419140129122	285L135x60	0.9	0.9
	23233161	6419140129283	285x60L135	2.4	2.4
Pellava Retro	23113241	6419140001916	285x85x75	2.4	2.4
	23113261	6419140122543	285x135x60	2.9	2.9
	23113281	6419140130821	285x135x75	4.0	4
	23123211	6419140126862	285x85x60	2.0	2
	23213211	6419140122642	285x45x60	1.3	1.3
	23233231	6419140128507	285L135x60	1.0	1
	23233261	6419140128101	285x60L135	2.4	2.4
Grafiitinmusta Retro	23110841	6419140132962	285x85x75	2.6	2.6
	23110861	6419140122444	285x135x60	3.1	3.1
	23110881	6419140130906	285x135x75	3.8	3.8
	23210811	6419140122628	285x45x60	1.4	1.4
	23210881	6419140131606	285x45x75	1.6	1.6
	23230821	6419140130944	285L85x60	0.9	0.9
	23230831	6419140128668	285L135x60	1.1	1.1
	23230851	6419140131583	285L135x75	1.3	1.3
	23230861	6419140131866	285x60L135	2.4	2.4
	23230871	6419140002876	285x75L135	2.6	2.6
Terva Retro	23116061	6419140002319	285x135x60	3.2	3.2
	23116081	6419140132108	285x135x75	4.0	4
	23126011	6419140004757	285x85x60	2.1	2.1
	23216081	6419140132221	285x45x75	1.6	1.6
	23236051	6419140132306	285L135x75	1.4	1.4
	23236071	6419140132283	285x75L135	3.0	3
Graniitti Makasiini	23116264	6419140125940	285x135x60	3.2	3.2
	23126214	6419140129368	285x85x60	2.1	2.1
	23216214	6419140126947	285x45x60	1.3	1.3
	23236224	6419140130524	285L85x60	0.8	0.8
	23236234	6419140127524	285L135x60	1.1	1.1
	23236264	6419140127784	285x60L135	2.5	2.5
Graniitinkirjava Makasiini	23116364	6419140125964	285x135x60	3.2	3.2
	23116314	6419140125902	285x85x60	2.1	2.1
	23216314	6419140126367	285x45x60	1.3	1.3
	23236334	6419140128224	285L135x60	1.1	1.1

	23236364	6419140128088	285x60L135	2.5	2.5
Tervankirjava Makasiini	23116164	6419140125926	285x135x60	3.2	3.2
	23126114	6419140129382	285x85x60	2.1	2.1
	23216114	6419140126824	285x45x60	1.3	1.3
	23236134	6419140128460	285L135x60	1.1	1.1
	23236164	6419140128064	285x60L135	2.5	2.5
	23115864	6419140000995	285x135x60	3.2	3.2
Hiilenkirjava Makasiini	23125814	6419140000971	285x85x60	2.1	2.1
	23215814	6419140002494	285x45x60	1.3	1.3
	23113565	6419140127920	285x135x60	3.0	3
Utu Vuolu	23123515	6419140131545	285x85x60	2.0	2
	23213515	6419140130289	285x45x60	1.3	1.3
	23233525	6419140000155	285L85x60	0.7	0.7
	23233535	6419140130388	285L135x60	1.0	1
	23233565	6419140130425	285x60L135	2.4	2.4
	23233595	6419140000230	285x60L85	1.5	1.5
	23114265	6419140132887	285x135x60	3.0	3
Sumu Vuolu	23124215	6419140001398	285x85x60	2.0	2
	23214215	6419140001510	285x45x60	1.3	1.3
	23234235	6419140001534	285L135x60	1.0	1
	23234265	6419140132924	285L135x60	2.4	2.4
	23113665	6419140129481	285x135x60	2.9	2.9
Kajo Vuolu	23123615	6419140131569	285x85x60	2.0	2
	23213615	6419140130326	285x45x60	1.3	1.3
	23233635	6419140130401	285L135x60	1.0	1
	23233665	6419140130449	285x60L135	2.4	2.4