THE INTERNATIONAL EPD® SYSTEM

TURKEY EPD®

ENVIRONMENTAL PRODUCT DECLARATIONS

ECO PLATFORM EPD VERIFIED

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO14025 and EN15804+A2:2019 for

Laminated PVC Profiles for Windows and Doors

Manufactured by Fırat Plastik

Programme: The International EPD® System	Programme Operator: EPD International AB	Local Operator: EPD Turkey	S-P Code: S-P-04135	Publication Date: 2022-07-11	Validity Date: 2027-07-12	Geographical Scope: Turkey

FIRAT

FIRATPEN Gedizpen winhouse

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.

PROGRAMME INFORMATION

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ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Product Category Rules (PCR):

2019:14 Version 1.11, 2021-02-05, Construction Products and Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

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PCR review was conducted by:

The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile

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Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification EPD verification ✓

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Approved by: The International EPD® System Technical Committee, supported by the Secretariat

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Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No ✓

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

ABOUT FIRAT PLASTİK

Fırat Plastik Kauçuk Sanayi ve Ticaret AŞ, was established in 1972 to carry out production in the field of plastic building materials. Fırat, which always sets out with the principles of quality production and product diversity, has succeeded in becoming both the leading establishment of the sector and the export leader of the sector as a result of significant investments that have taken years.

In its production, Fırat targets various sectors such as construction, agriculture, automotive, medical, domestic appliances sectors with its plastic-based products. It realizes its production targeting those sectors in its modern factories in Büyükçekmece-İstanbul and Sincan-Ankara which have a total area that reaches 750,000 m^2 with its expert staff and is one of three biggest plastic production complexes in Europe. Fırat, which adopted sustainability and producing more ecologic and innovative products in order to leave more livable environment to future generations, is the leader and pioneering company in pvc window sector.

Quality and Control

Fırat is capable of conducting raw material analysis; tests such as welding, heavy rain and wind resistance, blow and milled blow resistance, compression, shear and break-off strength, ring rigidity (strength of FKS and Triplex pipes against soil load).

Fırat products are offered to the market with "Fırat Quality Assurance Confirmation". Fırat is the only company of the sector which holds international quality certificates such as GOST, SKZ, BDS, EMI, DVGW, and TSE as well as all of the system certificates which are ISO 14001, ISO 45001 and ISO 9001. As an environmentally friendly manufacturer, Fırat holds ISO 14000 En vironment Management System Certificate.
The quality control process carried out in Fırat laboratories consists of three phases as input, process and output-final quality control. Products passed all these three tests and met the required quality conditions are offered for the customer use.

Input Quality Control

Quality Control tests complying with the quality-production standards are applied to raw materials and auxiliary materials coming from the suppliers. After samples taken in the scope of "Sampling for Approval" standards, the tests of Physical Compliance, Chemical Compliance, Density, MFI, Humidity, Bulk Density, Viscosity Number, Distribution of Grain Thickness, K Number and Homogeneity are performed in the Quality Control laboratories. It is compulsory that raw materials pass these tests and obtain "Suitable for Production" approval.

Process Quality Control

In the production process carried out with raw materials and auxiliary materials bearing "Suitable for Production" approval, samples are taken from the production lines during or soon after production, and the Process Quality Control tests that are determined by national (TSE) and international (SKZ, EN, DIN etc.) standard institutions are performed and recorded regularly.

Main Process Quality Control tests are as follows:

- Test for Impact Resistance at Cold
- Test for Dent Impact Resistance
- Elongation Test
- Density Test
- Vicat Test
- Wind Load Resistance Test
- Leak Test
- Air Permeability Test
- Corner Welding Test

At the stage of Process Quality Control, product measurements are controlled simultaneously with the production process and recorded. It is compulsory that the products pass through all the tests conducted in compliance with the control frequency and numbers set by the st andards and obtain "Quality Approval".

Output - Final Quality Control

The end products are then checked for Packaging Compliance, Pack Compliance, Description and Label Compliance through automatic packaging and wrapping processes and get "Suitable for Shipping" approval. Also, apart from the quality control tests conducted in FIRAT laboratories, all products are regularly sampled from the production lines twice a year, and subjected to quality control tests by the representatives of international test and certification institutions such as TSE, SKZ, IFT etc.

FUDEL Laboratory

In order to fill the gap in the sector regarding determination of performance characteristics of window-door systems built with these profiles and providing the results in an independent, unbiased and reliable way, FIRAT PLASTİK KAUÇUK SAN. ve TİC. A.Ş. established Türkiye's "first and only" TÜRKAK accredited "Window Laboratory," Fırat Conformity Evaluation Laboratory (FUDEL) in Büyükçekmece/İstanbul, with 100% Turkish capital and offered it for servicing the sector. FUDEL, service scope consists of following tests;

TESTS	STANDARTS
Resistance to wind load	TS 4644 EN 12211
Air permeability	TS EN 1026
Water insulation	TS EN 1027
Load bearing capacity of safety systems	TS EN 14609
Calculation of heat transmission	TS EN ISO 10077-1

FUDEL provides services to associations and institutions carrying out market inspection and supervision and the window andaccessory manufacturers operating in the sector. The aim of FUDEL is to provide service to the entire sector in the fields of 'importance of window, engineering calculations of window, personnel training on window'. FUDEL is also planning to organize training days for public institutions, construction companies and private associations and institutions to describe the importance of window in Turkey, to prevent erroneous applications and to offer higher quality products to the final customers.

ABOUT THE PRODUCT

PRODUCT SPECIFICATIONS

The following Laminated PVC windows and doors profiles are covered under this Environmental Product Declaration. PVC windows and door profiles includes the following series: Diamond60, Opal70, Garnet70, Garnet70 Selective, Garnet70 Strong, Garnet70 Strong Selective, Selenit75, Selenit75 Selective, Selenit75 Strong, Selenit75 Strong Selective, Elegane80, Elegance80 Selective, Redonit85, Zenia Slide and Andes Slide. These series are placed on the market under three different brands owned by Fırat, namely Fıratpen, Gedizpen and Winhouse.

The raw material compositions of Laminated PVC Windows and Doors Profiles are shown below. Laminated PVC Profiles along with the auxiliary profiles are mainly made of Polyvinyl Chloride (PVC) known as the most valuable raw material within the chemical industry. These products may also contain other raw materials such as acrylic impact modifiers, stabilizers and calcium carbonate. For lamination, primer, adhesive and lamine are also used. The compositions of these products are shown below.

Main Body of Profile		**Lamination Process**	
Composition	Amount, %	Composition	Amount, %
PVC	68-70	Rending Agent	0.5 - 1
Calcium Carbonate	10-12		
Stabilizer	2 - 4	Rending Agent	0.1 - 1
Masterbatch	1 - 2		
Minor additives	5 -7	Lamina Foil	2 - 3

Raw materials used in the production of Laminated PVC Profiles for Windows and Doors. Addition to the above materials, there is 10 % use of recycled PVC in the final product.

ABOUT THE PRODUCT

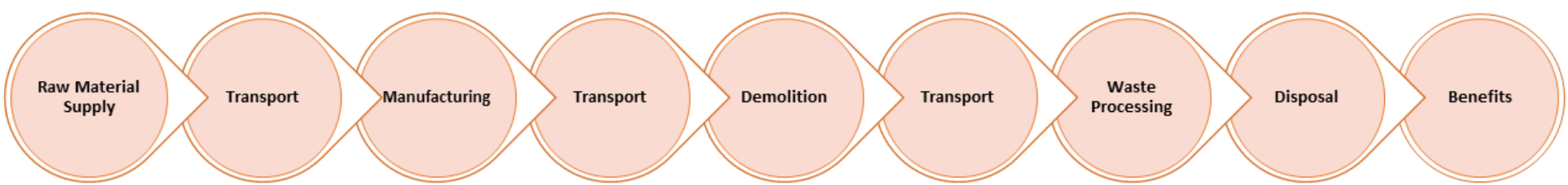
Technical Specifications	Diamond60	Opal70	Garnet70	Garnet70 Selective	Garnet70 Strong	Garnet70 Strong Selective	Selenit75	Selenit75 Selective
Profile Width (mm)	60	70	70	70	70	70	75	75
Number of Chambers (ad)	4	5	5	5	5	5	6	6
Wind Load Resistance (km/h)	200	245	245	245	245	245	110	110
Max. Sound Insulation (db)	38	40	40	40	40	40	43	43

Technical Specifications	Selenit75 Strong	Selenit75 Strong Selective	Elegane80	Elegance80 Selective	Redonit85	Zenia Slide	Andes Slide
Profile Width (mm)	75	75	80	80	85	125	38
Number of Chambers (ad)	6	6	6	6	7	-	3
Wind Load Resistance (km/h)	245	245	245	245	245	*	*
Max. Sound Insulation (db)	43	43	40	40	44	40	40

*the maximum wind load values to which the buildings can be exposed were taken into the consideration.

SYSTEM BOUNDARIES AND DESCRIPTION

A1: Raw Material Supply
Production starts with raw materials, mainly locally sourced but some transported overseas. 'Raw material supply' also includes pre-treatment processes before the production, such as masterbatch preparation.
A2: Transportation
Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. The transport distances and routes are calculated based on the given information from the manufacturer for 2021.
A3: Manufacturing
Production stages start with extrusion of PVC and continue with cooling, dragging and cutting for Laminated PVC Profiles and the process goes on as coating, cleaning, sleeking, drying and adhesion for Laminated PVC Profiles. Only electric energy is consumed during the manufacturing of PVC Profiles, no natural gas is consumed for the production.
A4: Transport
Transport of final product to customers are considered and the routes and distances are calculated accordingly. Transport routes were provided by the manufacturer for 2021.
C1: Demolition
Based on the information given by the manufacturer, no energy is used for the demolition of the considered product after its reaches end-of-life.
C2: Transport
Based on the information given by the manufacturer, 25 km distance is considered for the transport of final materials.
C3: Waste Processing
It is assumed that the generated waste can be disposed of or recycled directly. Thus, no process is needed.
C4: Disposal
Considering the recycling rates in Türkiye and common practices, 10% of the PVC used in the product is assumed to be recycled and the rest of the PVC and other raw materials are assumed to be landfilled.
D: Future reuse. recycling or energy recovery potentials
The benefits of 10 % recycled PVC in module C4 are considered and modelled in the LCA study.



System Boundary of the LCA study for Laminated PVC

LCA INFORMATION

Declared Unit	1 kg of Laminated PVC Profiles for Windows and Doors
Time Representativeness	2021
Database(s) and LCA Software	Ecoinvent 3.8 and SimaPro 9.3
System Boundaries	Cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and A4 modules).

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / demolition	Transport		Disposal	Future reuse, recycling or energy recovery potentials
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	TR	GLO	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific Data Used	>90%	>90%	>90%	>90%	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation-Sites	NR					-	-	-	-	-	-	-	-	-	-	-	-

The inventory for the LCA study is based on the 2021 production figures. This EPD's system boundary is cradle to gate with options, modules C1-C4, and module D. (A1–A3 + C + D and A4 modules).

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2021 production figures. In addition, hazardous and nonhazardous waste amounts were also allocated from the 2021 total waste generation.

Cut-Off Criteria

1% cut-off is applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR. There are no co-product allocations within the LCA study underlying this EPD. The regional energy datasets were used for all energy calculations.

LCA RESULTS

Impact Category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP- Fossil	kg CO_2 eq	2.34	0.181	0.494	3.02	0.135	0	0.004	0	0.052	0.200
GWP- Biogenic	kg CO_2 eq	0.023	138E-6	0.004	0.027	258E-6	0	9.0E-6	0	83.2E-6	0.001
GWP- Luluc	kg CO_2 eq	0.002	116E-6	0.003	0.006	61.2E-6	0	1.8E-6	0	6.80E-6	193E-6
GWP- Total	kg CO_2 eq	2.37	0.181	0.502	3.05	0.136	0	4.3E-3	0	0.052	0.201
ODP	kg CFC-11 eq	1.11E-6	36.8E-9	11.7E-9	1.16E-6	29.0E-9	0	917E-12	0	1.98E-9	90.3E-9
AP	mol H+ eq	0.012	0.004	0.003	0.020	0.001	0	12.5E-6	0	56.6E-6	0.001
*EP- Freshwater	kg P eq	0.001	8.1E-6	491E-6	0.001	9.6E-6	0	322E-9	0	949E-9	57.0E-6
EP- Freshwater	kg (PO_4) eq	0.002	24.9E-6	0.002	0.004	29.5E-6	0	984E-9	0	2.91E-6	174E-6
EP- Marine	kg N eq	0.002	0.001	0.001	0.004	188E-6	0	2.6E-6	0	243E-6	181E-6
EP- Terrestrial	mol N eq	0.022	0.012	0.005	0.039	0.002	0	27.8E-6	0	207E-6	0.002
POCP	kg NMVOC	0.006	0.003	0.001	0.010	0.001	0	7.2E-6	0	61.6E-6	469E-6
ADPE	kg Sb eq	98E-6	357E-9	770E-9	99.1E-6	440E-9	0	14.8E-9	0	21.6E-9	3.0E-6
ADPF	MJ	48.7	2.42	5.70	56.8	1.97	0	0.063	0	0.154	4.26
WDP	m^3 depriv.	1.58	0.005	0.192	1.77	0.006	0	213E-6	0	0.007	0.14
PM	disease inc.	98.1E-9	7.2E-9	13.7E-9	119E-9	8.1E-9	0	268E-12	0	1.08E-9	7.63E-9
IR	kBq U-235 eq	0.153	0.011	0.006	0.170	0.009	0	288E-6	0	0.001	0.014
ETP- FW	CTUe	62.6	1.67	5.23	69.5	1.66	0	0.054	0	2.38	3.89
HTTP- C	CTUh	3.31E-9	97.4E-12	96.9E-12	3.5E-9	54.2E-12	0	1.60E-12	0	5.25E-12	132E-12
HTTP- NC	CTUh	92.5E-9	1.27E-9	4.2E-9	97.9E-9	1.5E-9	0	50.7E-12	0	462E-12	3.39E-9
SQP	Pt	7.34	0.772	0.66	8.77	1.30	0	0.045	0	0.378	0.567

Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change- biogenic, GWP-luluc: Climate change- land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion- elements, ADPF: Abiotic depletion- fossil resources, WDP: Water scarcity, PM: Respiratory inorganics- particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, C1: Deconstruction / demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Future reuse. recycling or energy recovery potentials
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
*Disclaimer 3	EP-freshwater: This indicator is calculated both in kg PO_4 eq and kg P eq as required in the charactarization model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

Resource use											
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.88	0.020	1.11	3.01	0.022	0	0.001	0	0.003	0.161
PERM	MJ	0	0	0	0	0	0	0	0	0	
PERT	MJ	1.88	0.020	1.11	3.01	0.022	0	0.001	0	0.003	0.161
PENRE	MJ	48.7	2.42	5.70	56.81	1.97	0	0.063	0	0.154	4.26
PENRM	MJ	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	48.7	2.42	5.70	56.81	1.97	0	0.063	0	0.154	4.26
SM	kg	0.1	0	0	0.1	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m^3	0.015	283E-6	0.002	0.017	323E-6	0	10.8E-6	0	172E-6	0.001
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.										

Waste & Output Flows											
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	0	0	196E-6	196E-6	0	0	0	0	0	0
NHWD	kg	0	0	1.24E-3	1.24E-3	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.										

Climate impact											
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
*GHG-GWP	kg CO_2 eq	2.30	0.180	0.492	2.97	0.134	0	0.004	0	0.045	0.195
GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology * The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013											
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, C1: Deconstruction / demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Future reuse. recycling or energy recovery potentials										

REFERENCES

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/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.11 DATE 2019-12-20

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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