Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Mora MMIX II, Bath and Shower mixers

from

mora

This EPD covers multiple products, based on representative product 331000
The list of included products is presented on page 14 of this EPD document

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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

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *Construction products, 2019:14, version 1.3.3*
PCR review was conducted by: *The Technical Committee of the International EPD® System. Chair of the PCR review: Claudia A. Peña. The review panel may be contacted via info@environdec.com*
Life Cycle Assessment (LCA)
LCA accountability: *Uniben Tettey, RISE Research Institutes of Sweden*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Hannu Karppi, Ramboll Finland Oy* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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Company information

Owner of the EPD: FM Mattsson Group

Contact:
Phone: +46 250 59 60 00
Email: info@fmmattssongroup.com
Web: www.moraarmatur.com

Description of the organisation:
FM Mattsson Group conducts the sale, manufacturing and product development of water mixers and related products under the established brands of FM Mattsson, Mora, Damixa, Hotbath, Aqualla and Adamsez.
The group's vision is to be the customer's first choice in the bathroom, kitchen and beyond.
In 2023 the business generated sales of more than 1.9 billion SEK from its companies in Sweden, Norway, Denmark, Finland, Benelux, UK, Germany and Italy and had 568 employees.
FM Mattsson Group is listed on Nasdaq Stockholm.

Product-related or management system-related certifications:
ISO 9001:2015
ISO 14001:2015

Name and location of production site(s):
FM Mattsson Group
Östnorsvägen 95
792 95 Mora, Sweden

Product information

Product group name: Mora MMIX II, Bath/Shower mixers

This EPD covers the product group – Mora MMIX II, Bath/Shower mixers. The EPD is based on declared results per kg product for a representative product within the product group. The criterion for defining the representative product is mainly based on the sales volume of products in the group.

Reference Product: The reference product bath/shower mixer 331000 was chosen as the representative product based on high sales volume.

Product group identification: Thermostatic mixing valve for bath/shower, vertical mounted, two hole exposed, according to EN 1111

Product group description: Mora bath/shower mixers for installation in bathrooms. The mixers are mechanically operated to mix hot and cold water, as well as regulate the water flow. The products come with two different water inlet dimensions, 150cc and 160cc to accommodate installation requirements on different markets. Moras bath/shower mixers include built-in features for limitation of water flow and temperature limitation to ensure a sustainable product life cycle with efficient use of water and energy during the usage phase.

UN CPC code: 42911 – Sinks, washbasins, baths and other sanitary ware and parts thereof, of iron, steel, copper, and aluminium.

Geographical scope: Europe

LCA information

Functional unit / declared unit: 1 kg of bath/shower mixer.

Reference service life[1]: 16 years.

Time representativeness: The data used for the LCA calculation covers bill-of-materials as well as operations at FM Mattsson Group, Mora for the year 2023.

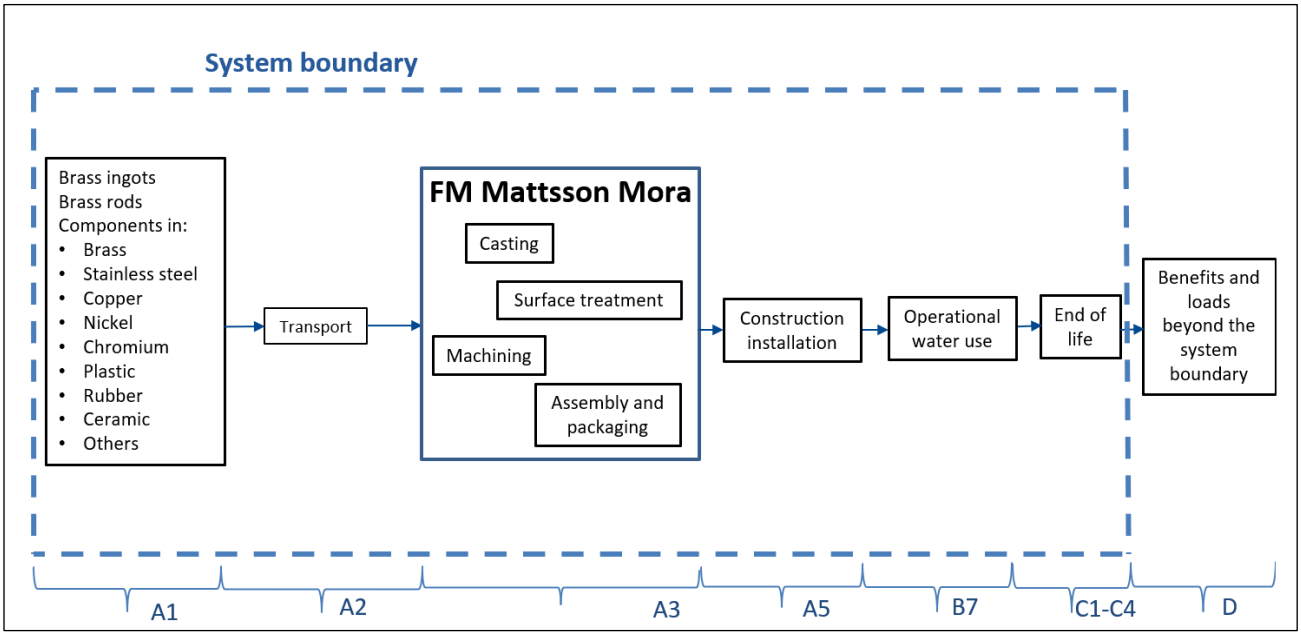
Allocation: Energy and materials input flows for manufacturing activities at FM Mattsson Group factory in Mora are allocated between the studied products by mass. Allocation between the studied products is based on manufacturing data from FM Mattsson Group factory in Mora for the year 2023.

Cut-off criteria: All materials and energy used to manufacture the bath/shower mixers are included. Impacts from infrastructure and/or capital goods are excluded as they are assumed to be negligible.

Database(s) and LCA software used: Ecoinvent 3.9.1 with the system model for "allocation, cut-off by classification" and SimaPro 9.5.0.0. The LCIA is based on the EN 15804 reference package EF 3.1.

Description of system boundaries: Cradle to gate (A1-A3) with options, i.e., also operational water use module B7, waste management modules C1–C4 and beyond end-of-life module D.

System diagram:



[1] The reference service life is valid under domestic and indoor use conditions and defined based on Cordella M. et al. (2014).

More information

Supplier specific electricity mixes and corresponding GWP impact: Sweden: 37.1 g CO_2/kWh; Denmark: 224 g CO_2/kWh; Lithuania: 459 g CO_2/kWh; Spain: 268 g CO2/kWh; Hong Kong: 870 g CO2/kWh.

Electricity used in module A3: Purchased electricity for operations at FM Mattsson Group, Mora is 100% renewable based, from wind, hydro and solar with a GWP impact of 13.4 g CO_2-eq/kWh.

Information about scenarios and additional technical information: Information about the scenario for operational water use for this product is provided under “Additional Information” below.

Variations in environmental impact results aggregated over modules A-C: For the list of included products in this EPD, the largest variations in aggregated results over modules A-C, relative to the representative product are less than 10% for all the mandatory environmental impact indicators.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	X	ND	ND	ND	ND	ND	ND	X	X	X	X	X	X
Geography	Global /EU	Global /EU	SE		EU							EU	EU	EU	EU	EU	EU
Specific data used	63% for GWP in A1-A3					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	6% for GWP in A1-A3					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%, all A3 in one site					-	-	-	-	-	-	-	-	-	-	-	-

LCA modules

A1 Raw material supply: This module relates to raw material extraction and processing, processing of secondary material input (e.g. recycling processes), transport to component manufacturing and component manufacturing.

A2 Transportation: This module relates to transport from raw material extraction and processing, and component manufacturing to FM Mattsson Group, Mora.

A3 manufacturing: This module covers the relevant production processes at FM Mattsson Group, Mora. The processes cover casting, machining, surface treatment and assembling of components. Treatment of waste and wastewater are also included.

A5 Construction installation: This module covers transport of cardboard and paper packaging wastes to waste management and their incineration. It is assumed that 26% of the packaging waste is incinerated.

B7 Operational: This module covers the production, heating and wastewater treatment of tap water use over the reference service life of the product. Further details on the scenario for operational water use are given in “Additional Information” below.

C1 De-construction: This module relates to the dismantling of the product at the end-of-life. It is assumed that the dismantling is done manually and the related impacts are assumed to be negligible.

C2 Waste Transport: This module relates to the transport of the dismantled product at end-of-life to a waste processing site. An average distance of 100 km is assumed.

C3 Waste processing: This module covers impacts related to sorting and recycling processes for the relevant material components. It is assumed that 90% of the brass and non-brass metals as well as 74% of the packaging wastes are recovered for recycling. The remaining portions of the brass, non-brass metals as well as all the plastics and rubber components are assumed to be incinerated with energy recovery.

C4 Waste disposal: This module relates to waste disposal processes such as landfilling. It is assumed that the ceramic components in the studied products are landfilled.

D Benefits and loads beyond system boundary: This module covers benefits and loads associated with recovery/recycling beyond the defined system boundary. For this product, this covers benefits from recycling and waste incineration.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Brass	0.752	80	0
Stainless steel	0.009	55	0
Copper	0.015	15	0
Nickel	0.008	35	0
Chromium	0.000	15	0
Plastic	0.206	0	0
Rubber	0.003	0	0
Ceramic	0.007	0	0
TOTAL	1		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Corrugated board	0.201	20.1	0.101
Paper	0.003	0.3	0.002
TOTAL	0.205	20.5	0.102

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
Lead	231-100-4	7439-92-1	0.086

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per kg bath/shower mixer									
Indicator	**Unit**	**A1-A3**	**A5**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	4.50E+00	1.79E-02	3.32E+02	0.00E+00	1.85E-02	6.09E-01	5.60E-05	-8.61E-01
GWP-biogenic	kg CO_2 eq.	-2.83E-01	1.86E-01	2.55E+01	0.00E+00	1.69E-05	3.05E-01	2.58E-07	3.56E-02
GWP-luluc	kg CO_2 eq.	8.48E-03	7.05E-06	2.15E-01	0.00E+00	9.12E-06	1.06E-04	3.86E-08	-3.79E-03
GWP-total	kg CO_2 eq.	4.57E+00	1.06E-01	3.58E+02	0.00E+00	1.85E-02	6.37E-01	5.63E-05	-8.29E-01
ODP	kg CFC 11 eq.	4.82E-07	5.58E-10	5.79E-06	0.00E+00	4.02E-10	4.15E-09	1.27E-12	-1.30E-08
AP	mol H^+ eq.	4.12E-02	8.98E-05	1.49E+00	0.00E+00	4.04E-05	5.07E-04	3.54E-07	-3.28E-02
EP-freshwater	kg P eq.	1.62E-03	2.19E-06	1.68E-01	0.00E+00	1.31E-06	3.04E-05	1.14E-08	-2.64E-03
EP-marine	kg N eq.	5.13E-03	3.87E-05	9.37E-01	0.00E+00	1.02E-05	2.15E-04	1.35E-07	-2.30E-03
EP-terrestrial	mol N eq.	5.02E-02	3.68E-04	2.32E+00	0.00E+00	1.04E-04	1.71E-03	1.44E-06	-2.69E-02
POCP	kg NMVOC eq.	1.61E-02	1.32E-04	1.16E+00	0.00E+00	6.27E-05	5.53E-04	4.87E-07	-7.75E-03
ADP-minerals&metals*	kg Sb eq.	1.07E-04	7.08E-08	3.57E-04	0.00E+00	6.04E-08	6.94E-07	1.37E-10	-4.20E-04
ADP-fossil*	MJ	6.11E+01	2.00E-01	4.41E+03	0.00E+00	2.62E-01	1.37E+00	1.05E-03	-1.12E+01
WDP*	m^3	4.34E+02	1.69E-03	2.22E+03	0.00E+00	1.08E-03	1.93E-02	3.25E-05	-6.04E-01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

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.

As this EPD includes module C, the use of the results of modules A1-A3 without considering the results of module C is discouraged.

Note that the results are per declared unit of 1 kg of the product and in order to estimate results per 1 unit of a product, the results declared here per 1 kg of the product should be multiplied by its gross weight, including packaging. Also the results for module B7 are per a flow rate of 1 liter per minute and in order to estimate results for a specific flow rate for a product, the results declared here for 1 liter per minute should be multiplied by the actual flow rate of the product, Further information about the weights and flow rates of the listed products in this EPD on page 14 of this document or at www.moraarmatur.com.

Additional mandatory and voluntary impact category indicators

Results per kg bath/shower mixer									
Indicator	**Unit**	**A1-A3**	**A5**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[2]	kg CO_2 eq.	4.51E+00	1.79E-02	3.32E+02	0.00E+00	1.85E-02	6.09E-01	5.60E-05	-8.64E-01

Resource use indicators

Results per kg bath/shower mixer									
Indicator	**Unit**	**A1-A3**	**A5**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.84E+02	6.97E-03	5.41E+02	0.00E+00	4.12E-03	1.16E-01	2.15E-05	-3.49E+00
PERM	MJ	3.26E+00	-3.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.88E+02	-3.25E+00	5.41E+02	0.00E+00	4.12E-03	1.16E-01	2.15E-05	-3.49E+00
PENRE	MJ	6.12E+01	2.00E-01	4.41E+03	0.00E+00	2.62E-01	1.37E+00	1.05E-03	-1.12E+01
PENRM	MJ	6.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.26E+00	0.00E+00	0.00E+00
PENRT	MJ	6.74E+01	2.00E-01	4.41E+03	0.00E+00	2.62E-01	-4.89E+00	1.05E-03	-1.12E+01
SM	kg	6.12E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	6.02E+00	1.11E-04	6.63E+01	0.00E+00	7.94E-05	1.59E-03	5.59E-07	-1.92E-02
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

[2] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Waste indicators

Results per kg bath/shower mixer									
Indicator	**Unit**	**A1-A3**	**A5**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.87E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	4.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.58E-03	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flow indicators

Results per kg bath/shower mixer									
Indicator	**Unit**	**A1-A3**	**A5**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	1.52E-01	0.00E+00	0.00E+00	0.00E+00	9.43E-02	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	5.33E-02	0.00E+00	0.00E+00	0.00E+00	2.09E-01	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.26E-01
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.47E+00

Additional environmental information

Overall, the results for the potential environmental impacts over the entire life cycle of the bath/shower mixers show that the use phase (B7) related to operational water use is by far the most significant contributor. It illustrates the importance of the use phase in reducing environmental impacts associated with sanitary fitting products. Design of energy-efficient products, choice of renewable energy sources during the use phase as well as appropriate user behaviour can play a significant role in lowering the use phase impacts. Studies have shown that up to 40% energy savings can be realized through energy-efficient taps and showers (Dodoo et al. 2017; Folkeson et al., 2017).

Operational water use scenario

For this product, the scenario for operational water use has been modelled based on average performance parameters for sanitary fitting products derived from a study by Cordella M. et al. (2014) on different sanitary products within the EU and information from the European Water Label (EWL, 2022). The parameters used to estimate the water use for the bath/shower mixers as well as the energy mix for water heating are given in the tables below. Based on the given parameters and assumptions, the annual average water consumption for this product is 2 555 liters per person. About 90% of this is assumed to be hot water use and the corresponding annual energy use to heat the water is about 60 kWh. Note that the corresponding climate impact for module B7, 358 kg CO2-eq is based on an assumed flow rate of 1 liter/minute for 16 years of use by one person and also includes water production and distribution, as well as waste water treatment. In order to estimate the climate impact for B7 for a specific bath/shower mixer, the climate impact result of 358 kg CO2-eq should be multiplied by its actual nominal flow rate and further information about the nominal flow rates of the listed bath/shower mixers are given on page 14 and also available at www.moraarmatur.com.

Parameters used to model the operational water use for the bath/Shower mixers		
Parameter	**Value**	**Unit**
Reference flow	1	l/minute
Use cycles	1	Per person/day
Duration of use cycle	7	Minute
Share of hot water use	90	%
Cold water inlet temperature	15	ºC
Outlet mixed water temperature	38	ºC
Specific heat capacity of water	4.18	kJ/(kg·K)
Density of water	0.981	kg/l

The energy mix for the operational water use scenario is modelled based on data for different fuel mixes for water heating in EU households for 2020 (Eurostat, 2022). In 2020, 15% of the total final energy use in the EU was for water heating in the residential sector.

Energy mix for operational water heating modelling	
Energy source	**Share, %**
Solid fossil fuels and peat	8.97
Natural gas	22.18
Oil and petroleum products	16.78
Renewables and biofuels	11.84
Electricity	13.79
Heat	26.44
Total	100
Corresponding GWP	329 g CO2-eq/kWh

Differences versus previous versions

This is the first version of the EPD so there are no differences versus previous versions of the EPD.

References

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This EPD covers the product group – Mora MMIX II/EKO+ Bath and Shower mixers and is based on the reference product 331000 Mora MMIX II Shower mixer 160, outlet down as the representative product due to its high sales volume within the group. The EPD covers the bath and shower mixers listed below:

Article number	GTIN	Name	Weight (kg)	Weight, incl. packaging (kg)	Flow rate (l/min)
330000	7391887267437	Mora MMIX II Bath mixer 160	1.962	2.295	12.0
330100	7391887267420	Mora MMIX II Bath mixer 150	1.954	2.288	12.0
330100.DB	7391887267413	Mora MMIX II Bath mixer 150 with cover plates	2.063	2.397	12.0
331000	7391887267406	Mora MMIX II Shower mixer 160 outlet down	1.474	1.776	12.0
331100	7391887267390	Mora MMIX II Shower mixer 150 outlet down	1.464	1.767	12.0
331100.DB	7391887267383	Mora MMIX II Shower mixer 150 with cover plates	1.573	1.877	12.0
331200	7391887267376	Mora MMIX II Shower mixer 160 outlet up	1.549	1.851	12.0
331205	7391887267369	Mora MMIX II Shower mixer 150 outlet up	1.539	1.842	12.0
334000	7391887267192	Mora MMIX II Bath mixer 40 inlet down	2.048	2.381	12.0
334005	7391887267185	Mora MMIX II Bath mixer 40 inlet up	2.065	2.398	12.0
334010	7391887267178	Mora MMIX II Shower mixer 40 inlet down	1.555	1.857	12.0
334015	7391887267161	Mora MMIX II Shower mixer 40 inlet up	1.546	1.848	12.0
360101	7391887271045	EKO+ Bath mixer 150	1.954	2.288	12.0
361101	7391887270994	EKO+ Shower mixer 150	1.464	1.767	12.0

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