Environmental Product Declaration

BREG EN EPD No.: 000108 Issue: 01

This is to certify that this verified Environmental Product Declaration provided by:

Tarmac

Is in accordance with the requirements of:

EN 15804:2012+A1:2013

This declaration is for:

ULTILOW (Low Temperature Asphalt)

Company Address

T3 Tarmac,
Ground Floor, T3 Trinity Park,
Bickenhill Lane,
Birmingham, B37 7ES

Signed for BRE Global Ltd	Laura Critien Operator	11 March 2016 Date of this Issue
11 March 2016 Date of First Issue		10 March 2021 Expiry Date

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To check the validity of this EPD please visit www.greenbooklive.com/check or contact us.

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EPD verification and LCA details

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR[a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐ Internal ☑ External
Third party verifier[b]: **Kim Allbury**
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

LCA Consultant	Verifier
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Commissioner of LCA study	
Andrew Swain Tarmac Bickenhill Lane Solihull, B37 7ES sustainability@tarmac.com	TARMAC A CRH COMPANY

General Information

Summary

This environmental product declaration is for 1 tonne of ULTILOW (Low Temperature Asphalt) produced by Tarmac at the following manufacturing facilities:

All 74 UK Tarmac asphalt sites
Head Office: T3 Tarmac, Ground Floor,
T3 Trinity Park, Bickenhill Lane,
Birmingham, B37 7ES
UK

This is a Cradle to gate with options EPD. The life cycle stages included are as shown below (X = included, MND = module not declared):

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction - Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water use	Deconstruction	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X

Programme Operator

BRE Global, Watford, Herts, WD25 9XX, United Kingdom.
This declaration is based on the BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013.

Comparability

Environmental declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the product category rules used and the source of the data, e.g. the database. See EN 15804:2012+A1:2013 for further guidance.

Construction Product

Product Description

Ultilow is a low temperature asphalt manufactured and supplied to comply with TRL Report 666 [TRL 2014]. ULTILOW asphalts are supplied typically 40°C lower than a hot equivalent asphalt, but maintains its performance to the same standard as conventional hot asphalts. ULTILOW asphalts also provide added benefits of lower on-site energy demand (with related environmental benefits), improved workability and allowing earlier opening times to traffic as it reaches appropriate trafficking temperatures quicker than hot asphalt. By virtue of how asphalt is used as a construction product, this EPD refers to an ‘asset’ rather than to ‘building fabric’ or a building.

Technical Information

Property	Value	Unit
Typical Stiffness	1500	MPa
Typical Ambient Operational Range	-10 - 40	°C
Typical Density	2400	kg/m³
Typical Voids	5	%

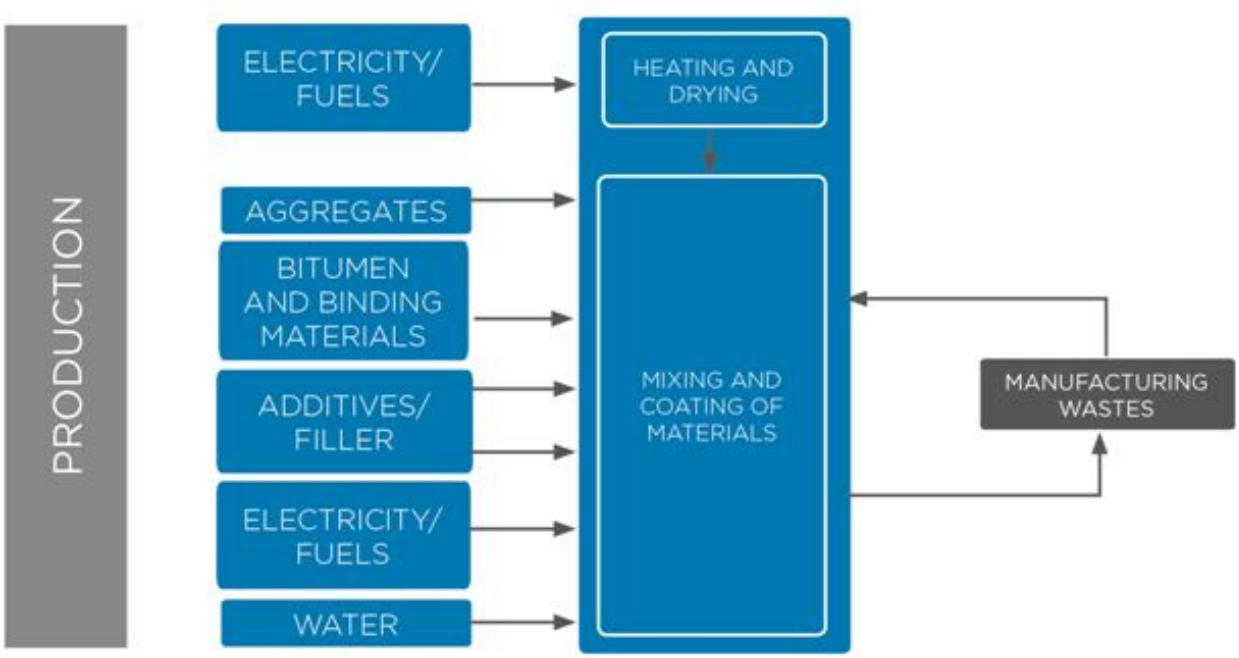
Product Contents

Material/Chemical Input	%
Aggregate	79.2%
RAP	15.0%
Bitumen / Polymer Modified Bitumen (PMB)	4.1%
Additives / Fillers	1.7%

Manufacturing Process

Asphalt is formed primarily of aggregates and bitumen-based binders (bitumen, polymer-modified bitumen etc.) with additives added to modify the properties of the final product. In the case of warm mix asphalt, warm mix additive is used to allow for a reduction in the temperature at which the asphalt is supplied. Electricity and fuels are used in the manufacture of asphalt, primarily for heating the asphalt mixture (or maintaining temperature) and mixing/processing constituent materials.

The process flow diagram is shown below:



Construction Installation

Asphalt is transported to site in lorries and then laid using paving machines and rollers. These impacts are based on guidance in the asPECT methodology [asPECT 2011]. The on-site asphalt wastage rate is assumed to be 1%.

Use Information

There should also be no impacts associated with the use phase of asphalt surfaces assuming correct design, specification and construction.

Reference Service Life

Guidelines produced by the Mineral Products Association (MPA) and the Association of Directors of Environment, Economy, Planning and Transport (ADEPT) recommend service life figures of 15 years for thin surface course asphalt, 20 years for hot rolled asphalt, 30 years for binder course asphalt and 40 years for base course asphalt. [ADEPT 2015]. The service life for any asphalt surface is subject to correct design, specification and construction. In this study, an “average” service life of 25 years for all asphalt surfaces provided to customers is used based on advice from Tarmac’s technical management team.

End of Life

The impacts of removing of the asphalt surface are based on the use of a 1 metre wide planer with a planing depth of 60 mm. This is combined with the fuel consumption from other equipment used on site. Transport to recycling or landfill and waste processing are also included. It is assumed that 99% of asphalt is sent for recycling with 1% going to inert landfill.

Life Cycle Assessment Calculation Rules

Declared / Functional unit

1 tonne (t) of ULTILOW low temperature asphalt.

System boundary

This is a cradle to gate with all options declared EPD covering all modules from A1 to C4 and includes module D. Impacts and aspects related to losses/wastage (i.e. production, transport and waste processing and end-of-life stage of lost waste products and materials) are considered in the modules in which the losses/wastage occur.

Data sources, quality and allocation

A generic specification for ULTILOW asphalt has been generated using data collected by Tarmac for 74 asphalt production sites for the 2014 calendar year combined with specific requirements for the warm mix additive. Site impacts are modelled based on a mass weighted average of asphalt sites operated by Tarmac in 2014 with adjustments to energy demand made to reflect the reduced heating requirement for low temperature asphalt. This EPD therefore covers the manufacture of ULTILOW manufactured by Tarmac at any of their production sites. Allocation of materials, energy, water, emissions and waste has been done according to the provisions of the BRE PCR PN514 and EN 15804. All background LCI datasets used in the generation of this EPD are taken from the ecoinvent 3.1 database contained in the GaBi ts software tool.

Cut-off criteria

All raw materials and energy input to the manufacturing process have been included.

LCA Results

(INA = Indicator not assessed, AGG = Aggregated, NA = Not Applicable)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3
		Raw Material supply	Transport to factory	Manufacturing	Merged A1/A2/A3	Transport to site	Construction - installation	Use	Maintenance	Repair
Environmental impacts per declared/functional unit										
GWP	kg CO_2 eq.	AGG	AGG	AGG	64.4	6.87	6.04	0.00	0.00	0.00
ODP	kg CFC 11 eq.	AGG	AGG	AGG	3.14E-05	1.22E-06	1.10E-06	0.00	0.00	0.00
AP	kg SO_2 eq.	AGG	AGG	AGG	0.386	0.018	0.0455	0.00	0.00	0.00
EP	kg $(PO_4)^{3-}$ eq.	AGG	AGG	AGG	0.0971	0.00526	0.0118	0.00	0.00	0.00
POCP	kg C_2H_4 eq.	AGG	AGG	AGG	0.0713	0.00316	0.00693	0.00	0.00	0.00
ADPE	kg Sb eq.	AGG	AGG	AGG	7.36E-05	2.98E-05	2.27E-06	0.00	0.00	0.00
ADPF	MJ eq.	AGG	AGG	AGG	2690	101	87.7	0.00	0.00	0.00
GWP = Global Warming Potential (Climate Change); ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels										
Resource use										
PERE	MJ	AGG	AGG	AGG	97.3	1.66	0.579	0.00	0.00	0.00
PERM	MJ	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	AGG	AGG	AGG	97.3	1.66	0.579	0.00	0.00	0.00
PENRE	MJ	AGG	AGG	AGG	2740	103	88.6	0.00	0.00	0.00
PENRM	MJ	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	AGG	AGG	AGG	2740	103	88.6	0.00	0.00	0.00
SM	kg	AGG	AGG	AGG	163	0.00	0.00	0.00	0.00	0.00
RSF	MJ	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	AGG	AGG	AGG	90.2	0.00	0.00	0.00	0.00	0.00
FW	m^3	AGG	AGG	AGG	0.416	0.0203	0.0148	0.00	0.00	0.00
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 = Net use of fresh water										
Waste to disposal										
HWD	kg	AGG	AGG	AGG	0.00126	0.00	0.00	0.00	0.00	0.00
NHWD	kg	AGG	AGG	AGG	4.31	0.00	10.00	0.00	0.00	0.00
TRWD	kg	AGG	AGG	AGG	0.000439	0.00055	0.000495	0.00	0.00	0.00
RWDHL	kg	AGG	AGG	AGG	1.52E-06	6.93E-08	3.51E-08	0.00	0.00	0.00
HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; TRWD = Total Radioactive waste disposed; RWDHL = Radioactive waste disposed (high-level nuclear waste)										
Other output flows										
CRU	kg	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ	AGG	AGG	AGG	0.00	0.00	0.00	0.00	0.00	0.00
CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Export energy										

LCA Results (continued)

(INA = Indicator not assessed, AGG = Aggregated, NA = Not Applicable)

Indicator	Unit	B4	B5	B6	B7	C1	C2	C3	C4	D
		Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste Processing	Disposal	Reuse/ Recovery/ Recycling Potential
Environmental impacts per declared/functional unit										
GWP	kg CO_2 eq.	0.00	0.00	0.00	0.00	4.54	4.35	4.07	0.0538	-14.6
ODP	kg CFC 11 eq.	0.00	0.00	0.00	0.00	8.20E-07	7.73E-07	7.33E-07	1.80E-08	-5.84E-06
AP	kg SO_2 eq.	0.00	0.00	0.00	0.00	0.0342	0.0114	0.0308	0.000417	-0.077
EP	kg $(PO_4)^{3-}$ eq.	0.00	0.00	0.00	0.00	0.00887	0.00333	0.00794	0.000109	-0.0192
POCP	kg C_2H_4 eq.	0.00	0.00	0.00	0.00	0.00521	0.002	0.00467	6.38E-05	-0.0131
ADPE	kg Sb eq.	0.00	0.00	0.00	0.00	1.66E-06	1.89E-05	1.49E-06	7.21E-08	-4.07E-05
ADPF	MJ eq.	0.00	0.00	0.00	0.00	65.4	64.1	58.6	1.52	-499
GWP = Global Warming Potential (Climate Change); ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels										
Resource use										
PERE	MJ	0.00	0.00	0.00	0.00	0.402	1.05	0.36	0.0491	-17.4
PERM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	0.00	0.00	0.00	0.00	0.402	1.05	0.36	0.0491	-17.4
PENRE	MJ	0.00	0.00	0.00	0.00	66.1	65.3	59.1	1.55	-510
PENRM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	0.00	0.00	0.00	0.00	66.1	65.3	59.1	1.55	-510
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.00	0.00	0.00	0.00	0.00991	0.0129	0.00891	0.0017	-0.0964
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 = Net use of fresh water										
Waste to disposal										
HWD	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-4.19E-05
NHWD	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	-0.167
TRWD	kg	0.00	0.00	0.00	0.00	0.000369	0.000348	0.000329	8.13E-06	-0.00267
RWDHL	kg	0.00	0.00	0.00	0.00	2.60E-08	4.39E-08	2.15E-08	8.30E-10	-3.71E-07
HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; TRWD = Total Radioactive waste disposed; RWDHL = Radioactive waste disposed (high-level nuclear waste)										
Other output flows										
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00	0.00	0.00	0.00	960	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Export energy										

Scenarios and Additional Technical Information

Module A4 – Transport to the building site				
Vehicle Type	**Fuel Consumption (L/km)**	**Distance (km)**	**Capacity Utilisation (%)**	**Density Of Product (kg/m³)**
Lorry	0.471	31.2	61	2400

Module A5 - Installation in the building			
Parameter	**Description**	**Unit**	**Value**
Energy Use	On-site fuel consumption	litres/t	1.78
Waste materials from installation wastage		%	1

End-of-life modules – C1, C3, and C4			
Parameter	**Description**	**Unit**	**Value**
Waste for recycling		%	99
Waste for final disposal		%	1
Other assumptions for scenario development, e.g, transportation	Asphalt removal fuel use	litres/t	1.35

Module C2 – Transport to waste processing				
Vehicle Type	**Fuel Consumption (L/km)**	**Distance (km)**	**Capacity Utilisation (%)**	**Density Of Product (kg/m³)**
Lorry	0.471	20	100	2400

Module D – Reuse/Recovery/Recycling Potential
Asphalt sent for recycling can be used either as recycled asphalt pavement or recycled aggregate. The exact proportion of asphalt that can be replaced by RAP is dependent on the specification. It has therefore been assumed that 6.7% of the RAP sent for recycling is used to replace asphalt on a 1:1 basis with the module D credit being equal to the mass of avoided primary asphalt production, while the remaining 93.3% is used as a primary aggregate substitute.

Interpretation

The lifecycle impact of ULTILOW asphalt is dominated by the production phase (module A1-A3). This contributes at least 71% of the overall impact for each of the indicators covered in the figure below For global warming potential, A1-A3 accounts for 71% of the lifecycle impact. with the remaining 29% spread between distribution, construction, demolition, EoL transport and waste processing, with each of these stages contributing between 5% and 8%. Further analysis of A1-A3, reveals that the two main contributors to the A1-A3 GWP are the upstream production of bitumen, which accounts for 23% of the life cycle impact of asphalt and the impact of the electricity and fuels used to mix and heat the asphalt which account for 32% of the lifecycle impact, the largest contributions coming from natural gas production and combustion and the upstream production of electricity. If polymer modified bitumen is taken into account bitumen-based products account for 26% of the total lifecycle impact. For most other categories the production of bitumen accounts for an even greater proportion of the total impact, contributing more than 35% of the A1 – C4 impact for AP, EP, ODP, POCP and ADP of fossil resources. Bitumen production also accounts for 60% of the non-renewable primary energy demand and 31% of the renewable primary energy demand. Bitumen production accounts for 48% of the freshwater consumption The energy and fuels consumed on site contribute between 13% and 22% to the overall A1-C4 impacts for AP, EP, ADP of fossil resources. It also contributes 14% to the non-renewable primary energy demand.

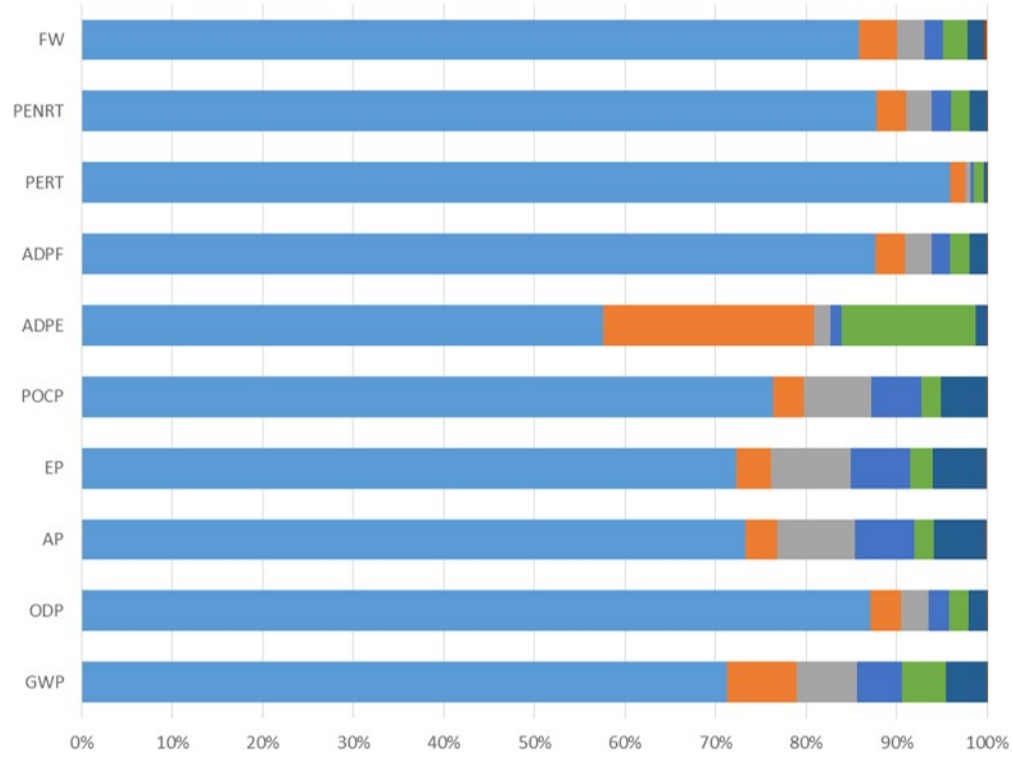


Figure 1

	GWP	ODP	AP	EP	POCP	ADPE	ADPF	PERT	PENRT	FW
A1-A3	71%	87%	73%	72%	76%	58%	88%	96%	88%	86%
A4	8%	3%	3%	4%	3%	23%	3%	2%	3%	4%
A5	7%	3%	9%	9%	7%	2%	3%	1%	3%	3%
B1-B7	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
C1	5%	2%	6%	7%	6%	1%	2%	0%	2%	2%
C2	5%	2%	2%	2%	2%	15%	2%	1%	2%	3%
C3	5%	2%	6%	6%	5%	1%	2%	0%	2%	2%
C4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

A1-A3 A4 A5 B1-B7 C1 C2 C3 C4

Figure 2

Sources of additional information

BRE Global. BRE Environmental Profiles 2013: Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013. PN 514. Watford, BRE, 2014.

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