

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	NUOVA FAR S.r.l.
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-NUO-20150035-IBC1-EN
Issue date	02.11.2015
Valid to	01.11.2020

NUOVA FAR S.r.l.

Laboratory Taps-Fittings for Water, Pure Water, Burning Gases, and Technical gases at every purity level up to 6.0

www.bau-umwelt.com / <https://epd-online.com>



1. General Information

NUOVA FAR s.r.l.

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number

EPD-NUO-20150035-IBC1-EN

This Declaration is based on the Product Category Rules:

Laboratory Service Fixtures, 07.2014
(PCR tested and approved by the SVR)

Issue date

02.11.2015

Valid to

01.11.2020



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LABORATORY TAPS-FITTINGS

Owner of the Declaration

NUOVA FAR S.r.l.
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28077 Prato Sesia No
ITALY

Declared product / Declared unit

The EPD refers to an average laboratory tap for three main applications in laboratories. The virtual product was determined based on production volumes and consists of fume cupboard taps, angled taps, and water mixer taps. The declared unit is one piece of tap.

Scope:

The EPD considers an average product from one manufacturer covering three representative taps. Data have been collected from the production plant of NUOVA FAR s.r.l. based in Prato Sesia, Italy. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The CEN Norm /EN 15804/ serves as the core PCR

Independent verification of the declaration
according to /ISO 14025/

☐ internally ☒ externally



Christina Bocher
(Independent verifier appointed by SVR)

2. Product

2.1 Product description

The declared product is an average laboratory tap consisting of three commonly used tap models:

- Fume cupboard tap with remote control
- Angle tap, wall mounted with 90° nozzle
- Mixing faucet

The average was calculated based on production volumes in 2013.

2.2 Application

Laboratory taps are used in laboratories and have different shapes, forms and scopes. They have to meet specific needs of each laboratory with highest level of security, ergonomics and security for the user available. Materials, performances, and working processes have to be suitable for the use in a laboratory. Only indoor use is recommended.

2.3 Technical Data

The following table lists technical properties of the covered products:

Constructional data - W.ref.

Name	Value	Unit
Maximum load temperature permanent operation	0 - 90	°C
Maximum load temperature temporary operation	95	°C
Flow rate (at 3 bar)	18	L/min
Max. working pressure	10	bar
Min. working pressure	0	bar
Dimensions General	90 - 500	mm
Dimensions Threads	6 - 38	mm
Surface protection Epoxy Painting	50 - 100	-
Material specification see point 2.6	-	-

Surface protection is expressed in Microms.

Used materials are specified in chapter 2.6.

2.4 Placing on the market / Application rules

General requirement for marketing the product within the EU is the conformity with /DIN 12918:1999-11/. In addition, there are mandatory and voluntary national schemes, as for instance:

- Germany: Deutscher Verein des Gas- und Wasserfaches e.V. (DVGW) label for burning gases taps
- UK: Water Regulations Advisory Scheme (WRAS)
- Denmark: Approval scheme for construction products in contact with drinking water (VA mark)
- Laboratory test regarding the guarantee of "not contamination" for pure waters and pure gases

For application and use the respective national requirements have to be applied.

2.5 Delivery status

Taps are delivered in bubble wrap in a cardboard box. They come with a fixing set, model identification label, installation instructions and/or use and maintenance guide, if needed.

2.6 Base materials / Ancillary materials

The material composition is different for each tap model. Here the minimum and maximum possible scenarios for each material are listed (packaging materials are excluded):

- BRASS: from 81,8% up to 89,4%
- PP: from 8,0% up to 12,0%
- EPOXY: from 0,5% up to 1,0%
- EPDM: from 0,3% up to 0,4%
- STEEL: from 1,8% up to 4,8%

2.7 Manufacture

NUOVA FAR's manufacturing process comprises different steps:

Purchased brass bars are mechanically processed on-site. They are turned to get threads and to produce spare parts. Processed brass parts are cleaned (water cleaning and sandblasting), pre-assembled, and coated with epoxy powder. After the coating, the final assembly is done and a leakage test is performed. If products fulfill quality requirements, they are packaged and delivered.

During the turning, brass chips incur, which are reused by the producer of the brass bars to produce new brass bars (closed-loop recycling).

2.8 Environment and health during manufacturing

NUOVA FAR s.r.l. has a policy to create a safe and healthy working environment with minimum possible impacts on humans and environment. To achieve this objective several measures have already been implemented, for instance:

- A Code of Conduct was implemented covering human rights, labor practices, and decent work.
- A controlled air system with forced air extraction was installed and air emissions are monitored by an external certification body.

- The use of hazardous substances was minimized (e.g. cleaning of the welding by sand blasting instead of pickling with acids).
- A photovoltaic system was mounted on the roof of the production hall and produces around 24% of total electricity consumption of the production.
- The production site was built according to state-of-the-art energetic standards.

2.9 Product processing/Installation

FAR laboratory taps are sold to laboratory furniture manufacturers and are installed by trained technicians. FAR periodically trains its customers regarding correct installation and connection. This is something that cannot be standardized, as every customer/user has different furnitures/lines where the taps have to be installed and for every scenario FAR has to provide a proper solution.

2.10 Packaging

The standard packaging consists of bubble wrap (LDPE) and cardboard boxes. These materials are 100% recyclable. As tertiary packaging an euro-pallet is used which is re-used.

2.11 Condition of use

The piping has to be made in conformity with international norms, needs to be appropriate to the media that is managed, and has to be well cleaned before the taps are mounted. Taps do not need any particular maintenance, if the piping line has been made in a proper way. Working conditions, like pressure and temperature, are indicated in the technical data sheets available for each tap and have to be respected in order to obtain the ideal performance of the product.

2.12 Environment and health during use

During use, the taps do not create any danger for the user or the environment. In case the substance (media) erogated by the tap can be hazardous for the user or the environment, this is clearly communicated to the user by an "unremovable" and "unerasable" labelling system on the tap.

2.13 Reference service life

As the use phase is not considered in this EPD, the definition of the RSL is optional. Therefore, only an indication of the product life time is given: In proper working conditions, the tap can easily work for 15 - 20 years; there are also taps which have been working for 30 years. In addition to the requirements of /DIN 12918:1999-11/ and its referred norms, taps are also conform to life time and properties of /DIN EN 817:2008-09/ and /DIN EN 200:2008/.

2.14 Extraordinary effects

Fire

In case of fire the taps react in different ways, depending on how many times the products stay in contact with fire and which temperature the materials reach:

- For accidental short-term contact with fire/flames no impact is to be expected.
- In case of longer contact with fire, the taps react as follows:

Fire reaction

Name	Value
Building material class	A2
Burning droplets	d0
Smoke gas development	s1
PP parts softening point	>130°C

Water

In case of flooding there is no impact to be expected.

Mechanical destruction

In case of mechanical destruction there is no impact on human health and environment. No hazardous substances are contained in the taps that could be

released by the tap material once it is mechanically destroyed.

2.15 Re-use phase

Taps can be re-used after the first use phase. They can be easily disassembled and installed in another place. If the products need to be repaired or checked, products can be sent to FAR.

In the LCA model re-use was not considered as it is not common practice so far.

2.16 Disposal

De-installed products can be submitted to recycling yards or metal scrap dealers. Taps can be recycled from 93.8% up to 97.4% of their mass, depending on the tap model. The main material of the taps is brass that can be fully recycled. The plastic components can be sent to an incineration plant for energy recovery. There is no specific waste code for laboratory taps.

2.17 Further information

Further information can be found on www.farlabs.com. You can also send an e-mail to info@farlabs.com.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is one piece of laboratory tap. Considered is an average tap covering fume cupboard taps, angle taps, and mixing faucets that weighs 0.489 kg (without packaging).

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Conversion factor to 1 kg	2.05	-

3.2 System boundary

Type of the EPD: cradle-to-gate - with options

The EPD includes modules A1-A3, C4, and D.

Modules A1-A3 include raw material extraction and processing, the transport of process inputs to the production site as well as the manufacturing of the average tap.

Module C4 includes the thermal treatment of the plastic parts of the tap, i.e. the handle (PP) and the o-ring (EPDM).

In addition, module D is considered. It covers environmental impacts and benefits due to the recycling of the metal parts of the tap (brass and steel) as well as benefits for the production of energy (electricity and steam) during the thermal treatment of the plastic incineration.

3.3 Estimates and assumptions

Since the data availability was very good only a few assumptions had to be made. The most important assumptions are related to waste treatment processes. The following assumptions were made:

Waste treatment of

- steel and brass: material recycling
- plastic: incineration with energy recovery

3.4 Cut-off criteria

Inputs and outputs that represent less than 1% and in sum not more than 5% of total mass or energy input of one module were excluded, in case data was not readily available. No flows which are particularly hazardous for humans or environment were excluded.

3.5 Background data

For the LCA model mainly datasets from the /GaBi 6/ database were used. To close data gaps, datasets from /ecoinvent/ version 3 were also applied for material processing processes.

3.6 Data quality

In general the data quality is good. Primary data was collected for all foreground processes covering one year to balance seasonal fluctuations. Secondary data was used to model all background processes.

Applied datasets from LCA databases meet defined quality criteria, e.g. regarding technological, time-related, and geographical representativeness. As far as possible, applied data was specific for the production conditions of NUOVA FAR and most of the used datasets were updated in 2014 and 2010 respectively.

3.7 Period under review

Primary data are representative for 2013.

3.8 Allocation

As far as possible allocation was avoided. Where allocation was necessary, physical allocation was applied. This was the case for the on-site production processes of NUOVA FAR, as different types of taps are produced and it was not possible to link the use of utilities to specific products. Therefore, the total production was considered and inputs and outputs that could not be assigned to specific products, as for instance electricity, heat, or water, were allocated mass-based.

For all waste flows in A1-A3 that can be considered as secondary material or fuel closed loop recycling was assumed. The burdens of the disposal of the plastic parts of the tap, i.e. the handle and the o-ring, were modeled in C4 with an incineration process, while the credits of produced electricity and steam were modeled in D. A net efficiency of 44% of the incineration plant was assumed, i.e. R1 is below 0,6.

Recycling potentials of the metal parts of the tap were also modeled in D.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Scenarios and additional technical information

End of life (C1-C4)

Name	Value	Unit
Collected separately (brass, steel and plastic waste)	0.1	kg
Collected as mixed construction waste	0	kg
Reuse	0	kg
Recycling metal waste	0.04	kg
Energy recovery plastic waste	0.06	kg
Landfilling	0	kg

It is assumed that the taps with the fittings are separated from the construction waste. The metal parts are recycled (brass and steel), while the plastic parts (mainly PP) are incinerated with energy recovery.

Due to the high recycled content of the metal parts, the amount that can be sent to recycling at the end of life is quite low, as only net flows can be taken into account. In contrast the plastic parts of the tap do not contain any recycling material, so that the total amount of plastic can be sent to energy recovery.

Reuse, recovery and/or recycling potentials (D), relevant scenario information

To calculate environmental benefits and loads of the metal recycling the following recycling rates (RR) were applied:

Name	Value	Unit
RR brass	93	%
RR iron and steel	88	%

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: one piece of an average laboratory tap

Parameter	Unit	A1-A3	C4	D
Global warming potential	[kg CO ₂ -Eq.]	1.42E+0	1.96E-1	-1.78E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	5.37E-9	4.64E-13	-2.95E-10
Acidification potential of land and water	[kg SO ₂ -Eq.]	5.60E-3	1.42E-5	-6.53E-4
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	4.08E-6	1.25E-9	-1.07E-7
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	4.54E-4	1.68E-6	-5.43E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	5.85E-4	9.68E-10	-3.15E-5
Abiotic depletion potential for fossil resources	[MJ]	2.28E+1	2.07E-2	-2.45E+0

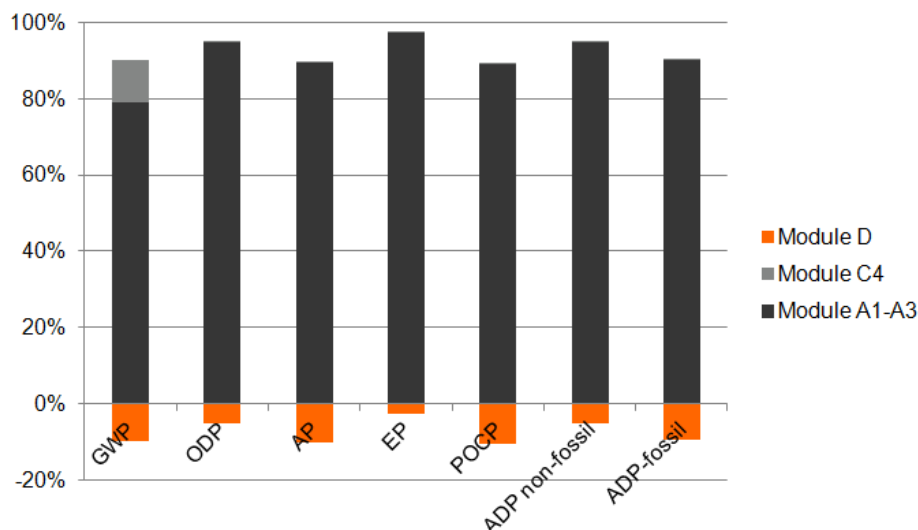
RESULTS OF THE LCA - RESOURCE USE: one piece of an average laboratory tap

Parameter	Unit	A1-A3	C4	D
Renewable primary energy as energy carrier	[MJ]	5.76E+0	0.00E+0	-3.00E-1
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	5.76E+0	0.00E+0	-3.00E-1
Non-renewable primary energy as energy carrier	[MJ]	2.43E+1	3.00E-2	-2.89E+0
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.43E+1	3.00E-2	-2.89E+0
Use of secondary material	[kg]	4.40E-1	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m³]	1.90E+0	0.00E+0	-2.90E-1

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: one piece of an average laboratory tap

Parameter	Unit	A1-A3	C4	D
Hazardous waste disposed	[kg]	6.15E-6	7.24E-9	-5.61E-7
Non-hazardous waste disposed	[kg]	1.08E-9	3.11E-3	-7.43E-1
Radioactive waste disposed	[kg]	5.71E-4	1.64E-6	-4.56E-5
Components for re-use	[kg]	0.00E+0	0.00E+0	IND
Materials for recycling	[kg]	0.00E+0	1.20E-2	IND
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	IND
Exported electrical energy	[MJ]	0.00E+0	3.63E-1	IND
Exported thermal energy	[MJ]	0.00E+0	8.25E-1	IND

6. LCA: Interpretation



Most of the impacts are caused in the manufacturing phase A1- A3. Emissions relevant to the climate are also emitted in noticeable amount by the thermal treatment of the plastic parts (C4). Module D has a considerable environmental benefit through the recycling potential of the metal parts and the energy that is produced during the incineration of the plastic parts.

In the manufacturing phase most relevant processes are:

- Brass production
- Heat production on-site with natural gas
- Electricity production (grid mix)
- Production of the fitting (steel)
- Production of the handle (PP)

Thus, the majority of emissions are caused in the supply chain of NUOVA FAR, especially through metal production and processing. Only one on-site process is in the top 5 list: the heat production with natural gas. However, the other processes can be indirectly influenced, e.g. by reduced resource consumption.

In the following paragraphs the results for A1-A3 are interpreted per impact category:

GWP

Most important processes regarding climate change are the production of the brass, the on-site heat production and the production of the handle (PP). In addition, the electricity production (Italian grid mix) and the production of the fitting have a noticeable impact.

Usually the energy consumption dominates the impacts in the production phase. In this case the low impact of the electricity can be explained by the use of almost 25% green electricity and the low impact of the heat production is related to the modern production

hall of NUOVA FAR. Also the impact of the brass is quite small due to a recycled content of 95,7% in the applied LCA dataset.

ODP

The production of the fitting from stainless steel dominates the ozone depletion potential. It causes around 99% of the environmental load in this impact category.

AP

The main contribution to the acidification potential of the laboratory tap stems from the brass production, which causes 50% of the impact. The production of the fitting is responsible for around 21,3% of the impact. The electricity production, the handle and the heat production contribute each with around 6%.

EP

In the impact category eutrophication potential is no dominating process. The highest impact shows the epoxy powder with 22% and the fitting with 21,4% contribution, followed by the brass production with 17%. A noticeable impact is caused by the testliner and corrugating medium production, which are raw materials for the cardboard box used as packaging.

POCP

40% of the environmental load in the impact category photochemical ozone creation potential originates from the brass production. The heat production, the fitting, and the handle contribute each with around 14%. The electricity production causes ca. 7% of the impact.

AD - NF

The abiotic resource depletion is almost exclusively caused by the brass production. It contributes with 98,97% to the total result in this impact category.

AD - F

The main impact regarding abiotic depletion of fossil resources originates from the heat production closely

followed by the production of the brass and the handle. The electricity production contributes with 9% to the total result.

Module C4

Module C4 contains the incineration of the plastic parts of the tap, i.e. the thermal treatment of the handle made from PP and the o-ring made from EPDM. The incineration of the PP is dominating the impacts in module C4, because there is much more PP in the system as EPDM.

It is assumed that the net efficiency of the waste incineration plant is 44%. Credits for produced energy during the incineration process are modeled in module D.

Module D

Module D covers the recycling benefits for brass and steel as well as the credits for energy production during the incineration of the plastic parts of the tap. The module has in total a negative environmental impact, i.e. the recycling of the laboratory tap and the produced energy during the thermal treatment of the plastic parts of the tap alleviate the environmental impacts to a certain extent.

The main benefit regarding avoided GHG emissions stems from the production of the steam. In addition, the steel recycling and the electricity credit have a large contribution to the result. Due to the high recycled content of the brass, the benefit of the brass recycling is quite low.

7. Requisite evidence

7.1 CHEMICAL RESISTANCE:

After a Kesternich test made in conformity with /DIN 50018:2013-2/ and salt spray, no alteration of the surface has been reported.

7.2 VOC TEST made in conformity to /UNI 10899:2001/ with Solid-phase Microextraction or capillary gas chromatography:
Following to a test report, all the FAR models are under the limit of 0.005mg/l.

7.3 CHEMICAL NICKEL PLATING (when required):
Following to a test report the release of nickel in deionized water at a temperature of 35° after 24 hours

of static contact with the internal nickel chemical plated surface of the tap, it is no more than 10 µg/ml.

7.4 FIRE GAS TOXICITY

In general, taps are classified as non-combustible (class A1).

However, there are two components that can cause smoke: the epoxy painting and the handle made of PP. The Epoxy painting creates combustion products (carbon oxides, toxic pyrolysis products, etc.). Combustion happens at a temperature range of 500°-600°C. In case of combustion PP can create vapors of monomers, low polymers, and any products of their oxidation/ degradation. Combustion starts at 470°C.

8. References

Approval scheme for construction products in contact with drinking water (VA mark)

<http://www.etadenmark.dk/en/va>

ecoinvent

Life cycle assessment database from ecoinvent centre, version 3.1, Zurich 2014, www.ecoinvent.org.

ELCD

European Commission: European Reference Life Cycle Database, version 3.0, 2013, <http://eplca.jrc.ec.europa.eu/ELCD3/>.

Deutscher Verein des Gas- und Wasserfaches e.V.

(DVGW), <http://www.dvgw-cert.com/de/produkte-gas/dvgw-produktzertifizierung.html>

DIN 12918

DIN 12918:1999-11: Laboratory equipment - Laboratory fittings, with four parts

DIN 50018

DIN 50018:2013-05: Testing in a saturated atmosphere in the presence of sulfur dioxide

DIN EN 200

DIN EN 200:2008: Sanitary tapware - Single taps and combination taps for water supply systems of type 1 and type 2 - General technical specification

DIN EN 817

DIN EN 817:2008-09: Sanitary tapware - Mechanical mixing valves (PN 10) - General technical specifications

GaBi 6

PE INTERNATIONAL: GaBi 6: Software system and database for life cycle engineering, version 6.4, Stuttgart 2015, <http://www.gabi-software.com>.

ISO 14040

EN ISO 14040:2006: Environmental management - Life cycle assessment - Principles and framework

ISO 14044

EN ISO 14044:2006: Environmental management - Life cycle assessment - Requirements and guidelines

PCR Part A

Institut Bauen und Umwelt e.V.: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report, version 1.2, Berlin 2013.

PCR Part B

Institut Bauen und Umwelt e.V.: Requirements on the EPD for Laboratory Service Fixtures, version 1.5, Berlin 2014.

UNI 10899

UNI UNI 10899:2001: Water quality - Determination of



volatile hydrocarbons (VOC) and volatile halogenated hydrocarbons (VOX) - Method by solid-phase microextraction (SPME) and capillary gas-chromatography

Water Regulations Advisory Scheme (WRAS),
https://www.wras.co.uk/approvals/what_is_a_wras_approval/

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin(pub.):
Generation of Environmental Product Declarations (EPDs);

General principles

for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013/04
www.bau-umwelt.de

ISO 14025

DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804

EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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