ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration ASSA ABLOY Sicherheitstechnik GmbH

Programme holder Institut Bauen und Umwelt e.V. (IBU)

Publisher Institut Bauen und Umwelt e.V. (IBU)

Declaration number EPD-ASA-20150093-IBA1-EN

Issue date 30.04.2015

Electric Strike – 118F Series

ASSA ABLOY Sicherheitstechnik GmbH



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





1. General Information

ASSA ABLOY Sicherheitstechnik GmbH

Programme holder

IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1

10178 Berlin Germany

Declaration number

EPD-ASA-20150093-IBA1-EN

Electric Strike - 118F Series

Owner of the Declaration

ASSA ABLOY Sicherheitstechnik GmbH Bildstockstrasse 20 72458 Albstadt, Germany

Declared product / Declared unit

The declaration represents 1 electric strike – 118F Series consisting of the following items:

- 118F.20----A71

This Declaration is based on the Product Category Rules:

Locks and fittings , 07.2014 (PCR tested and approved by the independent expert committee (SVA))

Issue date

30.04.2015

Valid to

29.04.2020

Wermanes

Prof. Dr.-Ing. Horst J. Bossenmayer

(President of Institut Bauen und Umwelt e.V.)

Dr.-Ing. Burkhart Lehmann (Managing Director IBU)

Scope:

This declaration and its LCA study are relevant to the 118F Series electric strike.

The primary manufacturing processes are done by external suppliers. Secondary manufacturing processes and assembly occur at the manufacturing factory in Albstadt, Germany. 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 Standard EN 15804 serves as the core PCR
Independent verification of the declaration
according to ISO 14025

internally

externally



2. Product

2.1 Product description

Product name: 118F Series

Product characteristic: Electric Strike

The 118F Series is an electric strike, designed for fire door application and to accommodate mainly European style locks according EN 12209. All major components are completely encased within its 66mm x 16mm x 25.5mm steel housing. The monitoring contact is adapted to the housing. The small overall dimensions make this electric strike versatile. The operation mode is fail secure. The voltage range is 10-24 V AC/DC.

2.2 Application

118F Series electric strikes are ideal for a wide range of applications – mainly for commercial and public sectors:

- For fire rated or smoke resistant doors.

2.3 Technical Data

For the declared product, the following technical data in the delivery status must be provided with reference to the test standard.

Technical data

Parameter	Value	Unit
Static strength	9,000	Newton
Endurance	250,000	Cycles
Multi voltage	10 - 24	V AC/DC

Note: tested according factory standard;

2.4 Placing on the market / Application rules The standards that can be applied for 118F Series electric strikes are:

- DIN EN 14846:2008



2.5 Delivery status

Electric strikes are delivered as in a box size - 93 mm x 35 mm x 28 mm containing an installation instruction.

2.6 Base materials / Ancillary materials

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.

The average composition for 118F Series is as following:

Component	Percentage in mass (%)
Zinc	11.9
Brass	0.3
Copper	2.0
Steel	74.4
Stainless Steel	8.3
Plastic	1.2
Electro mechanics	1.9
Total	100.0

2.7 Manufacture

The primary manufacturing processes are carried out by an external supplier in Santander, Spain and the final manufacturing processes occur at the factory in Albstadt, Germany. The electric coil is produced in Albstadt. The components come from processes like stamped steel, plastic molding, milling, turning and zinc casting. Final assembly takes place in Albstadt.

The factory of Albstadt has a certification of Quality Management system in accordance with DIN EN ISO 9001:2008.

2.8 Environment and health during manufacturing

ASSA ABLOY is committed to producing and distributing door opening solutions with minimal environmental impact, where health & safety is the primary focus for all employees and associates.

- Environmental operations, Greenhouse Gas Emissions, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met to ensure Environmental Management program effectiveness.
- Code of Conduct covers human rights, labor practices and decent work. Management of ASSA ABLOY is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.
- The factory of Albstadt has certification of Environmental Management to DIN EN ISO 14001:2009 and Occupational Health and Safety to OHSAS 18001:2007.
- Manufacturing waste is minimised and treated appropriately to ensure minimal environmental impact.

2.9 Product processing / Installation

118F Series electric strikes are distributed through and installed by door manufacturers, trained installation technicians, such as locksmiths, carpenters etc. adhering to local/national standards and requirements.

2.10 Packaging

118F Series electric strikes are packed in a cardboard box. The packaging is fully recyclable. Material composition of packaging in % of total packaging mass is as following:

Material	Value (%)
Cardboard/paper	100.0
Total	100.0

2.11 Condition of use

To maintain low friction and secure latching, annual maintenance <1g of grease on contact surfaces of electric strike is recommended.

No cleaning. Electric strikes can be replaced or upgraded without changing control unit or installation cable.

2.12 Environment and health during use

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

2.13 Reference service life

Approved for 250,000 cycles under normal working conditions, 12 years depending on cycle frequency. Through System 1 according DIN EN 14846:2008.

2.14 Extraordinary effects

Fire

Suitable for use in fire and smoke doors (EN 14846).

Water

Contain no substances that have any impact on water in case of flood. Electric operation of the device will be influenced negative.

Mechanical destruction

No danger to the environment can be anticipated during mechanical destruction.

2.15 Re-use phase

The product is possible to re-use during the reference service life and can be moved from one door to another. The majority, of components are brass and steel, which can be recycled. The locks can be mechanically disassembled to separate the different materials. 100% of the materials used are recyclable.

2.16 Disposal

All parts of product can be recycled.

2.17 Further information

Assa Abloy Sicherheitstechnik Bildstockstrasse 20 72458 Albstadt, Germany Tel: +49 7431 123-0 www.assaabloy.de



3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of 118F Series as specified in Part B requirements on the EPD for PCR Locks and fittings: (mechanical & electromechanical locks & fittings).

Declared unit

Name	Value	Unit
Declared unit	0.180 Kg	1 piece of electric strike
Conversion factor to 1 kg	5.54	-

3.2 System boundary

Type of the EPD: cradle to gate - with options The following life cycle phases were considered:

Production stage:

- A1 Raw material extraction and processing
- A2 Transport to the manufacturer and
- A3 Manufacturing

Construction stage:

A5 – Packaging waste processing

Use stage related to the operation of the building includes:

 B6 – Operational energy use (Energy consumption for sectional door operation)

End-of-life stage:

- C2 Transport to waste processing
- C3 Waste processing for recycling and
- C4 Disposal (landfill)

This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

 D - Declaration of all benefits or recycling potential from EOL and A5.

3.3 Estimates and assumptions

Use Phase:

For the use phase, it is assumed that the electric strike is used in the European Union, thus an European electricity grid mix is considered within this stage.

EoL:

In the End-of-Life phase, for all the materials which can be recycled, a recycling scenario with 100% collection rate was assumed.

3.4 Cut-off criteria

In the assessment, all available data from production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available).

In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts.

Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

3.5 Background data

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by PE INTERNATIONAL AG, is used /GaBi 6 2013/. The GaBi-database contains consistent and documented datasets which are documented in the online GaBi-documentation /GaBi 6 2013D/. To ensure comparability of results in the LCA, the

To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

3.6 Data quality

The requirements for data quality and background data correspond to the specifications of the /IBU PCR PART A/.

PE INTERNATIONAL performed a variety of tests and checks during the entire project to ensure high quality of the completed project. This obviously includes an extensive review of project-specific LCA models as well as the background data used.

The technological background of the collected data reflects the physical reality of the declared products. The datasets are complete and conform to the system boundaries and the criteria for the exclusion of inputs and outputs.

All relevant background datasets are taken from the GaBi 6 software database. The last revision of the used background data has taken place not longer than 10 years ago.

3.7 Period under review

The period under review is 2013/14 (12 month average).

3.8 Allocation

Regarding incineration, the software model for the waste incineration plant (WIP) is adapted according to the material composition and heating value of the combusted material. In this EPD, the following specific life cycle inventories for the WIP are considered for:

- Waste incineration of paper from packaging
- Waste incineration of plastics

Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Thus, these materials are considered in module D. Specific information on allocation within the background data is given in the GaBi dataset documentation.

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

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

Installation into the building (A5)

instanation into the ballang (As)		
Name	Value	Unit
Output substances following waste treatment on site (Paper packaging)	0.009	kg

Reference service life

Name	Value	Unit
Reference service life (250,000 cycles)	12	а

Operational energy use (B6)

operational energy acc (20)		
Name	Value	Unit
Electricity consumption	3.24	kWh
Days per year in use	300	d
Hours per day in on mode	0.3	h
Power consumption in on mode in W	3	W
Hours per day in off mode	23.7	h
Power consumption in off mode in W	0	W

End of life (C1-C4)

Name	Value	Unit
Collected separately Zinc, Brass, Copper, Steel, Stainless Steel, Plastic, Electro mechanics	0.180	kg
Collected as mixed construction waste for landfilling	0	kg
Reuse plastic parts	0.009	kg
Recycling Zinc, Brass, Copper, Steel, Stainless Steel, Electro mechanics	0.171	kg

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

Name	Value	Unit
Collected separately waste type	0.180	ka
(without packaging)	0.160	kg
Recycling Zinc	11.9	%
Recycling Brass	0.3	%
Recycling Copper	2.0	%
Recycling Steel	74.4	%
Recycling Stainless steel	8.3	%
Recycling Electro mechanics	1.9	%
Reuse plastic parts	1.2	%



5. LCA: Results

Results shown below were calculated using CML2001 – Apr. 2013 Methodology. The values for operational energy use (module B6) are presented per reference service life (12 years).

DESC	RIPT	ION C	F THE	SYST	ГЕМ В	OUN	DAR	Y (X = IN	ICLUDI	ED IN	LC	A; MI	ID :	= MODL	JLE N	OT		
PROL	DUCT S	STAGE	CONST ON PRO	OCESS				USE STAGE						END OF LIFE STAGE					EFITS AND LOADS OND THE YSTEM JNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	.: .:	кераіг	Replacement ¹⁾	Refurbishment ¹⁾	Operational energy use	Operational water	use De-construction	demolition	Transport	Waste processing	Disposal	Reuse-	Recovery- Recycling- potential
A1	A2	А3	A4	A5	B1	B2	Е	33	B4	B5	В6	E	37	C1	C2	C3	C	4	D
Х	Χ	Х	MND	Χ	MND	MNI	о мі	ND	MND	MND	Χ	MI	ND N	ND	Х	Χ	Х	(Χ
RFSI	JI TS	OF TH	IF I CA	- FN	VIRON	MFN	JTAI	IM	PACT	: 1 pie	ce of	ele	ctric s	tri	ke – 11	8F Se	ries		
Param eter			Paran					Uni		A1-A3		\5	Ве		C2	СЗ		C4	D
GWP			bal warmi				[kg	CO2	?-Eq.]	1.5E+0	1.3	E-02	1.5E+	00	2.4E-03	7.2E-(04	5.3E-03	-4.1E-01
ODP	Depl	etion pote	ential of th lay		spheric o	zone	[kg C	CFC1	1-Eq.]	4.1E-10	6.0	E-14	1.1E-	09	1.1E-14	4.9E-	13	1.6E-14	-2.6E-11
AP	A	cidificatio	n potentia		and water	er		SO2		6.0E-03	3.0	E-06	7.3E-		1.1E-05	3.4E-0	06	1.5E-06	-2.2E-03
EP			rophication				[kg (F	PO4)3	3 Eq.]	4.6E-04	5.2	E-07	4.1E-	04	2.5E-06	1.9E-0	07	1.3E-07	-1.4E-04
POCP	F		ootential of otochemic			ie	[kg l	Ethe	n Eq.]	4.8E-04	2.1	E-07	4.3E-	04	-3.5E-06	2.0E-0	07	8.3E-08	-2.0E-04
ADPE	A	oiotic dep	letion pot resou		r non foss	sil	[kg	g Sb	Eq.]	2.1E-04	1 2.4	2.4E-10		E-07 9.0E-11		1.0E-10		3.6E-10	-1.7E-04
ADPF	Abiot	ic depleti	on potent		ssil resou	ırces		[MJ	1	1.5E+0	1 3.7			·01 3.3E-02		8.2E-0	03	2.6E-03	-4.4E+00
RESU	JLTS	OF TH	IE LCA	- RE	SOUR	CE U	JSE:	1 p	iece c	of elect			- 118	BF S	Series				
Paran	neter			Parame	ter					A1-A3		A5			C2	C2 C3		C4	D
PEI	RE		ble prima					[]	MJ]	3.0E+00	-		-			-		-	-
PEF	RM		vable prir mat	erial util	ization			[1	MJ]	0.0E+00	.0E+00 -		-			-		-	-
PEI	RT	Total	use of re	newabl resourc		y ener	gy	[MJ] 3		3.0E+00	E+00 3.4E-04 5.		5.0E+	E+00 1.3E-03		2.4E-03		2.0E-04	-4.2E-01
PEN	IRE	Non re	newable		energy	as en	ergy	[]	MJ]	2.0E+01	-		-			_		-	-
PEN	RM	Non rer	newable		energy a	as mat	terial	[]	MJ]	0.0E+00	-		-		-	-		-	-
PEN	IRT	Total us	se of non		ıble prim	ary en	ergy	[1	MJ]	2.0E+01	4.3E	-03	2.7E+)1	3.3E-02	1.3E-0)2	2.9E-03	-4.7E+00
SI			Use of s	econda	ry mater			[1	kg]	2.3E-02	0.0E	+00	0.0E+	00	0.0E+00	0.0E+0	00 (0.0E+00	0.0E+00
RS			e of rene						MJ]	0.0E+00	0.0E		0.0E+		0.0E+00	0.0E+0		0.0E+00	0.0E+00
NR:		Use	of non rei Use o		second sh water		eis	_	MJ] m³]	0.0E+00 8.3E-03	0.0E 3.8E		0.0E+0		0.0E+00 9.1E-07	0.0E+0		0.0E+00 1.2E-05	0.0E+00 -2.0E-03
	JLTS	OF TH)WS				•				ece of e				
Paran				Parame	ter			U	Init	A1-A3	A	5	В6		C2	C3		C4	D
HV			Hazardo					[kg]	2.1E-03	2.9E		3.8E-0		7.5E-08	1.8E-0		1.9E-07	-4.7E-05
NHV			on hazar					_	kg]	7.9E-02	3.3E		8.8E-0		4.1E-06	4.2E-0	_	2.7E-03	-2.3E-02
RW CR			Radioact		te dispos or re-use			_	kg] kg]	1.8E-03 0.0E+00	2.5E		3.9E-0		4.3E-08 0.0E+00	1.9E-0		1.1E-07 0.0E+00	-1.3E-04
MF					recycling			_	kg]	0.0E+00	9.2E		0.0E+		0.0E+00	1.7E-0		0.0E+00	-
ME	R	N	Materials	for ene	rgy recov	ery		[kg]	0.0E+00	0.0E	+00	0.0E+	00	0.0E+00	0.0E+0	00 (0.0E+00	-
EE					cal ener			_		0.0E+00	1.7E		0.0E+		0.0E+00	0.0E+0		1.0E-02	
EE	:1		Exporte	ed therm	nal energ	ly .		(I	MJ]	0.0E+00	4.7E	-02	0.0E+	U	0.0E+00	0.0E+0)()	2.8E-02	-

6



6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. Stated percentages in the whole interpretation are related to the overall life cycle, excluding credits (module D).

The production phase (modules A1-A3) contributes between 28% and 100% to the overall results for all the environmental impact assessment categories hereby considered, except for the abiotic depletion potential (ADPE), for which the contribution from the production phase accounts for app. 100% - this impact category describes the reduction of the global amount of non-renewable raw materials, therefore, as expected, it is mainly related with the extraction of raw materials (A1). Within the production phase, the main contribution for all the impact categories is the production of zinc and steel, with app. 16%, mainly due to the energy consumption on this process.

Steel accounts with app. 74% to the overall mass of the product, therefore, the impacts are in line with the mass composition of the product. The environmental impacts for the transport (A2) have a negligible impact within this stage.

To reflect the use phase (module B6), the energy consumption was calculated for reference service life (12 years) and included. With exception of ozone depletion potential (ODP) (72%), it contributes up to 55% for all the other impact categories considered. This is a result of 0.3 hours of operation per day in on mode per 365 days in a year.

In the end-of-life phase, there are loads and benefits (module D, negative values) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution).

7. Requisite evidence

Not applicable in this EPD.

8. References

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

IBU PCR Part A

IBU PCR Part A: Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. April 2013

www.bau-umwelt.de

IBU PCR Part B

IBU PCR Part B: PCR Guidance-Texts for Building-Related Products and Services. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part B: Requirements on the EPD for Locks and fittings. www.bau-umwelt.com

DIN EN 14846

DIN EN 14846:2008-11: Building hardware - Locks and latches - Electromechanically operated locks and striking plates - Requirements and test methods

DIN EN ISO 9001

DIN EN ISO 9001:2008: Quality management systems - Requirements; Trilingual version EN ISO 9001:2008

DIN EN ISO 14001

DIN EN ISO 14001: Environmental management systems - Requirements with guidance for use (ISO 14001:2004 + Cor. 1:2009)

DIN EN 14846:2008-11

DIN EN 14846:2008-11: Building hardware - Locks and latches - Electromechanically operated locks and striking plates - Requirements and test methods; German version EN 14846:2008

EN 12209

EN 12209 Mechanically operated locks, latches and locking plates

EN 15804

EN 15804:2012+A1:2014: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

GaBi 6 2013

GaBi 6 2013: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013.

GaBi 6 2013D

GaBi 6 2013D: Documentation of GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013. http://documentation.gabi-software.com/

OHSAS 18001

OHSAS 18001: Arbeits- und Gesundheitsschutz-Managementsysteme - Leitfaden für die Implementierung von OHSAS 18001





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9. Annex

Results shown below were calculated using TRACI Methodology. The values for operational energy use (module B6) are presented per reference service life (12 years).

DESC	יפופי	ELON O	E TUE	CVCI	CEM D	ониг	ADV /	V IN	ELLID	-D-IN	LCA	MAID	= MODI	U E N	OT F	YECI A	-BED)
		STAGE	CONST ON PRO	RUCTI OCESS	EIVI B	OUNI	`	SE STA		ED IN	LCA		ND OF LIF			BEY(EFITS AND OADS OND THE YSTEM INDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Nse	Maintenance	Repair	Replacement ¹⁾	Refurbishment ¹⁾	Operational energy use	Operational water	De-construction demolition	Transport	Waste processing	Disposal	Reuse-	Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	В3	B4	B5	B6	В7	C1	C2	C3	C4		D
Х	Χ	Х	MND	Х	MND	MND	MND	MND	MND	Χ	MNE	MND	X	Χ	Х		Х
RESU	ILTS	OF TH	IE LCA	\ - EN'	VIRON	MEN	TAL IM	IPACT	: 1 pie	ce of e	elect	ric stri	ke – 118	BF Ser	ies		
Parame	eter		Para	ameter			Un	it	A1-A3	A!	5	В6	C2	СЗ		C4	D
GWF)		obal war				[kg CO2	2-Eq.]	1.4E+0	1.3E	-02 ′	1.5E+00	2.4E-03	7.2E-	04 5	5.3E-03	-4.1E-01
ODF	·	Depletion		ii of the s ne layer	tratospne	eric	[kg CFC	11-Eq.]	4.3E-10	6.3E	-14	1.1E-09	1.2E-14	5.3E-	13 1	.7E-14	-2.8E-11
AP		Acidificati	ion poten	tial of lan		ater	[kg SO2		5.8E-03			6.9E-03	1.4E-05	3.2E-0		.8E-06	-2.1E-03
EP Smo	n		utrophica level smo			ial	[kg N- [kg O3		3.4E-04 6.4E-02			2.9E-04 6.2E-02	1.0E-06 2.9E-04	1.4E-0		.7E-05	-8.7E-05 -2.4E-02
Onio	9	Cround		ources	on potoni	i Ci	[Mc		1.0E+0			1.2E+00	4.7E-03	5.8E-		2.8E-04	-1.7E-01
RESU	ILTS	OF TH	RESULTS OF THE LCA - RESOURCE USE: 1 piece of electric strike – 118F Series														
							SE: 1 p	iece c	of elect	ric str	ike –	· 118F	Series				
Param				Parame		CE U		Jnit	of elect	ric str A5	ike –	118F	Series C2	C3		C4	D
Paran PEF	neter	Renewa	ble prima	Parame ary ener	t er gy as en	ergy ca	arrier [Jnit			ike –			C3		C4 -	D -
	neter	Renewa	ble prima	Parame ary ener	ter gy as en ergy res	ergy ca	arrier [Jnit MJ]	A1-A3	A5	ike –		C2	C3 -		C4 -	D -
PEF	neter RE RM	Renewa Renew	ble prima	Parame ary energenery mary energenery terial util enewable	gy as en ergy rese ization e primar	ergy ca ources	arrier [as [Jnit MJ] MJ]	A1-A3 3.0E+00	A5			C2	C3 - - 2.4E-0	03 2	C4 0E-04	D
PEF	RE RM RT	Renewa Renew Total	ble prima vable prii mat	Parame ary energemary energemental util enewable resource primary	gy as en ergy rese ization e primar es	ergy ca ources y energ	arrier [as [Jnit MJ] MJ] MJ]	A1-A3 3.0E+00 0.0E+00	A5 -		B6 - -	C2 - -	-	03 2	-	-
PEF PEF	RE RM RT RE	Renewa Renew Total Non re	ble prima vable prin mat use of re	Parame ary energinary energial util enewable resourc primary carrie	gy as en ergy rescization e primar es energy r	ergy ca ources y energ as ene	arrier [as []	Mu] Mu] Mu]	A1-A3 3.0E+00 0.0E+00 3.0E+00	A5 -		B6 - -	C2 1.3E-03	-	03 2	-	-
PEF PEF PEF	RE RM RT RE	Renewa Renew Total Non re	ble prima vable prii mat use of re newable	Parame ary energinary energinary enewable resource primary carrie primary utilization	gy as en ergy resc ization e primar es renergy r energy a on	ergy ca ources y energ as ene	arrier [as [ly [rgy [rgy [rgy]]	Mn] Mn] Mn] Mn] Mn]	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01	3.4E-0	04 5	B6 - - .0E+00	C2 - - 1.3E-03	2.4E-0		- - .0E-04	- -4.2E-01
PEF PEF PEN PEN PEN SM	RE RM RT M	Renewa Renew Total Non re	ble prima vable prii mat use of re newable newable se of non	Parame ary energeneral util enewable resource primary carrie primary utilizatie renewa resource seconda	gy as en ergy reso ization e primar es r energy r energy a on ible prim es ry mater	ergy ca ources y energ as energ as mate ary energial	tantrier [as []] [] [] [] [] [] [] [] []	MJ M	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01 0.0E+00 2.0E+01 2.3E-02	3.4E-(- - 4.3E-(0.0E+	04 5	B6	C2 1.3E-03 3.3E-02 0.0E+00	2.4E-0 - - 1.3E-0	02 2	- .0E-04 - - .9E-03	-4.2E-01 -4.7E+00 0.0E+00
PEF PEF PEN PEN PEN RS	RE RM RT RE RM RT	Renewa Renew Total Non re Non rer Total us	ble prima vable prin mat use of re newable newable se of non Use of se	Parame ary energinary energial util enewable resource primary carrie primary utilization resource	gy as en ergy reso ization e primar es renergy r energy a on ible prim es ry mater econdar	ergy ca burces y energ as energ as mate ary energ ial y fuels	Larrier [as [] [] [] [] [] [] [] [] [] [MJ]	A1-A3 3.0E+00 0.0E+00 3.0E+01 0.0E+01 0.0E+01 2.0E+01 2.3E-02 0.0E+00	3.4E-(- - 4.3E-(0.0E+ 0.0E+	04 5	B6	C2 1.3E-03 3.3E-02 0.0E+00 0.0E+00	2.4E-0 - - 1.3E-0 0.0E+0	02 2 00 0.00 0.00 0.00 0.00 0.00 0.00 0	- .0E-04 - .9E-03 .0E+00 .0E+00	-4.2E-01 4.7E+00 0.0E+00 0.0E+00
PEF PEF PEN PEN PEN SM	RE RM RT RE RM RT J	Renewa Renew Total Non re Non rer Total us	ble prima vable prii mat use of re newable newable se of non Use of se e of renee	Parame ary energy mary energy mary energy resourc primary carrie primary utilizati renewa resourc seconda wable se	gy as en ergy reso ization e primar es renergy r energy a on ible prim es ry mater econdar	ergy ca burces y energ as energ as mate ary energ ial y fuels ary fuels	tarrier [as [] [] [] [] [] [] [] [] [] [MJ]	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01 0.0E+00 2.0E+01 2.3E-02	3.4E-(- - 4.3E-(0.0E+	04 5	B6	C2 1.3E-03 3.3E-02 0.0E+00	2.4E-0 - - 1.3E-0)2 2 00 0. 00 0. 00 0.	- .0E-04 - .9E-03 .0E+00 .0E+00	-4.2E-01 -4.7E+00 0.0E+00
PEF PEF PEN PEN PEN SM RS NRS FV	RE RM RT M FF SF V	Renewa Renew Total Non re Non rer Total us	ble prima wable prii mat use of re newable se of non Use of se of rene of non re	Parame ary energy mary energy resource primary carrie primary utilizati renewa resource seconda wable se newable of net free	gy as energy resization e primares energy renergy a on the series ry mater econdary second sh water	ergy ca ources y energ as energ as mate ary energ ial y fuels ary fuels	rarrier [[as []]] [as [] [MJ]	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01 0.0E+00 2.0E+01 2.3E-02 0.0E+00 0.0E+00 8.3E-03	3.4E-(- - - 4.3E-(0.0E+ 0.0E+ 0.0E+ 3.8E-(04 5 03 2 00 0 00 0 00 0 05 1	B6	C2 1.3E-03 3.3E-02 0.0E+00 0.0E+00 0.0E+00	2.4E-0 - - 1.3E-0 0.0E+0 0.0E+0 5.8E-0	00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	.0E-04 .0E-03 .9E-03 .0E+00 .0E+00 .0E+00 .2E-05	-4.2E-01 -4.7E+00 -4.7E+00 0.0E+00 0.0E+00 0.0E+00 -2.0E-03
PEF PEN PEN PEN SM RSS NRS	RE RM RT M F F S F V V JLTS	Renewa Renew Total Non re Non rer Total us	ble prima wable pri mat use of re newable se of non Use of se of rene f non rei Use	Parame ary energy mary energy resource primary carrie primary utilizati renewa resource seconda wable se newable of net free	gy as en ergy resrication e primaries energy a on ble primes ry mater econdary econdary econdary econdary econdary econdary econdary econdary econdary experies econdary experies econdary experies exper	ergy ca ources y energ as energ as mate ary energ ial y fuels ary fuels	arrier [as [] [] [] [] [] [] [] [] [] [MJ]	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01 0.0E+00 2.0E+01 2.3E-02 0.0E+00 0.0E+00 8.3E-03	3.4E-(- - - 4.3E-(0.0E+ 0.0E+ 0.0E+ 3.8E-(04 5 03 2 00 0 00 0 00 0 05 1	B6	C2 1.3E-03 3.3E-02 0.0E+00 0.0E+00 0.0E+00 9.1E-07	2.4E-0 - - 1.3E-0 0.0E+0 0.0E+0 5.8E-0	00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	.0E-04 .0E-03 .9E-03 .0E+00 .0E+00 .0E+00 .2E-05	-4.2E-01 -4.7E+00 -4.7E+00 0.0E+00 0.0E+00 0.0E+00 -2.0E-03
PEF PEN PEN PEN SM RSS FV RESU Series	RE RM RT M F SSF V V V V V V V V V V V V V V V V V	Renewa Renev Total Non re Non rer Total us Use o	ble prima wable pri mat use of re newable se of non Use of se of non re Use of	Parame ary energy energ	gy as en ergy resrication e primar es renergy a con lable prim es ry mater econdars es secondars termination e primar es ry mater econdars es to the primar es ry mater econdars es to the primar es to the primare en	ergy capurces y energy as energy as mate ary energy y fuels FLO	Larrier [as [] [] [] [] [] [] [] [] [] [MJ M	A1-A3 3.0E+00 0.0E+00 3.0E+01 2.0E+01 0.0E+02 2.0E+01 2.3E-02 0.0E+00 0.0E+00 8.3E-03 STE C A1-A3 2.1E-03	4.3E-(0.0E+ 0.0E+ 3.8E-(ATEG	03 2 000 0 000 0 000 0 05 1	B6	1.3E-03 - 3.3E-02 0.0E+00 0.0E+00 9.1E-07 cc2 7.5E-08	2.4E-0 - 1.3E-0 0.0E+0 0.0E+0 0.0E+0 5.8E-0 c 1.8E-0	02 2 00 0.00 00 0.00 06 1 c str		-4.2E-01 -4.7E+00 -0.0E+00 0.0E+00 -2.0E-03 18F D -4.7E-05
PEF PEN PEN PEN SM RS RS FV RESU Series Param HW NHV	RE RM RT M FF SS Selector VVD	Renewa Renev Total Non re Non rer Total us Use o	ble prima vable pri mat use of re newable se of non Use of se of rene of non re Use of Hazardo	Parame ary energy mary energy mary energy carrie primary carrie primary cutilizati renewa resourc seconda wable seconda wable so finet free Parame ous wast dous wast	gy as en ergy resrication e primar es energy a on bble prim es ry mater econdar secondar secondar es econdar e	ergy capurces y energy as energy as mate ary energy ital y fuels ary fuel FLO	arrier [as [] [] [] [] [] [] [] [] [] [MJ	A1-A3 3.0E+00 0.0E+00 3.0E+01 2.0E+01 0.0E+00 2.0E+01 2.3E-02 0.0E+00 0.0E+00 A1-A3 2.1E-03 7.9E-02	3.4E-(03 2 2 000 0 000 0 000 0 0 0 0 0 0 0 0 0	B6	1.3E-03 1.3E-03 3.3E-02 0.0E+00 0.0E+00 9.1E-07 ccc of c 7.5E-08 4.1E-06	2.4E-0	02 2 00 0. 00 0. 00 0. 06 1 c str		-4.2E-01 -4.7E+00 -4.7E+00 0.0E+00 0.0E+00 -2.0E-03 18F D -4.7E-05 -2.3E-02
PEF PEN PEN PEN SM RS NRS FV RESU Series Param HW RW	RE RM RT A A A A A A A A A A A A A A A A A A	Renewa Renev Total Non re Non rer Total us Use o	ble prima vable prima use of re newable se of non Use of se of rene use of Hazardo on hazar Radioaci	Parame ary energy mary energy mary energy resource primary utilization resource seconda wable sy newable for the free Parame ous wast dous wast tive was	gy as en ergy resrization e primares energy a on ible primes ry mater econdary second sh water ter e disposaste disposast	ergy capurces y energy as energy as mate ary energy ary fuels ary fuels FLO	arrier [as [] [] [] [] [] [] [] [] [] [MJ MJ MJ MJ MJ MJ MJ MJ	A1-A3 3.0E+00 0.0E+00 3.0E+01 2.0E+01 0.0E+00 2.0E+01 2.3E-02 0.0E+00 8.3E-03 STE C A1-A3 2.1E-03 7.9E-02 1.8E-03	4.3E-(0.0E+ 0.0E+ 3.8E-(ATEG(4.3SE-(2.9E-(2.5E-(2.5E-(2.5E-(03 2 03 2 000 0 000 0 000 0 005 1 1 07 3 3 44 8 8 07 3	B6	1.3E-03 1.3E-03 3.3E-02 0.0E+00 0.0E+00 9.1E-07 cce of c 7.5E-08 4.1E-06 4.3E-08	2.4E-0	02 2 2 00 0.00 0.00 0.00 0.06 1 1 c str		-4.2E-01 -4.7E+00 -0.0E+00 0.0E+00 -2.0E-03 18F D -4.7E-05
PEF PEN PEN PEN SM RS NRS FV RESU Series Param HW RW CR	RE RM RT F SSF V V V V V V V V V V V V V V V V V	Renewa Renev Total Non re Non rer Total us Use o	ble primary wable primary wable primary wable mewable newable se of non record from record from record from record from record from hazara Radioact Comp	Parame mary enermary eneral util enewable resourc primary carrie primary utilizati renewa resourc seconda swable s newable f net fre Parame bus wast dous wast dous wast onents f	gy as en ergy resization e primar es energy a on ible prim es es energy a on ible prim es es econdar es econdar es edispos aste dispos at edispos or re-use	ergy capurces y energy as energy as mate ary ene ial y fuels ary fuel FLO	arrier [as []] [] [] [] [] [] [] [] []	Mag	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01 0.0E+00 2.0E+01 2.3E-02 0.0E+00 8.3E-03 STE C/ A1-A3 2.1E-03 7.9E-02 1.8E-03 0.0E+00	A5	03 2 2 000 0 000 000 00 005 1 1 0 0 0 0 0 0 0	B60E+007E+01 .0E+00 .0E+00 .0E+00 .0E+00 .2E-02 S: 1 pi B6 .8E-03 .8E-03 .9E-03 .0E+00	1.3E-03 1.3E-03 3.3E-02 0.0E+00 0.0E+00 9.1E-07 ccc of c 7.5E-08 4.1E-06	2.4E-0 1.3E-0 0.0E+(02 2 00 0. 00 0. 00 0. 06 1 c str		-4.2E-01 -4.7E+00 -4.7E+00 0.0E+00 0.0E+00 -2.0E-03 18F D -4.7E-05 -2.3E-02
PEF PEN PEN PEN PEN SM RS RS RS RY FV RESU Series Param HW NHV RW CR ME	RE RM RT RE RT M FF FF FF V V V V V V V V V V V V V V	Renewa Renev Total Non rer Total us Use OF TH	ble prima vable pri mat use of re newable newable se of non Use of se e of rene Use of non re Use of non re Con hazar Radioact Comp Mater Materials	Parame ary enermary eneral util enewable resourc primary carrie primary utilizati renewa resourc seconda wable se mewable of net fre Parame bus wast dous wast dous wast rials for i for ener	gy as en ergy reservations of the secondary se	ergy capurces y energy as energy as mate ary energy y fuels ary fuel FLO ed osed sed every	rrier [as []] [] [] [] [] [] [] [] []	MJ	A1-A3 3.0E+00 0.0E+00 3.0E+01 0.0E+01 0.0E+01 2.0E+01 2.3E-02 0.0E+00 0.0E+00 8.3E-03 7.9E-02 1.8E-03 0.0E+00 0.0E+00 0.0E+00	A5	03 2 2 00 0 0 00 00 0 0 0 0 0 0 0 0 0 0	B6	C2 1.3E-03 - 3.3E-02 0.0E+00 0.0E+00 9.1E-07 ece of 6 C2 7.5E-08 4.1E-06 4.3E-08 0.0E+00 0.0E+00 0.0E+00	2.4E-0 1.3E-0 0.0E+0 0.0E+0 5.8E-0 1.8E-0 4.2E-0 1.7E-0 0.0E+0 0.0E+0	02 2 2 2 000 0.000 0.000 0.06 1 1 0.06 1 1 0.000 0.01 1 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0		-4.2E-01 -4.7E+00 -0.0E+00 0.0E+00 -2.0E-03 18F D -4.7E-05 -2.3E-02 -1.3E-04 -
PEF PEN PEN PEN PEN SM RS NRS FV RESU Series Param HW NHV RC GR	RE RM RT MEET NOT TO THE REPORT NOT	Renewa Renev Total Non rer Total us Use OF TH	ble prima wable pri mat use of re newable se of non Use of se of rene Use of non re Use of non rea Con hazar Radioact Comp Mater Materials	Parame ary energinary	gy as energy responses on a secondary secondar	ergy capurces y energy as energy as mate ary energy y fuels ary fuel edd osed sed every gy	ws AN	MJ	A1-A3 3.0E+00 0.0E+00 3.0E+00 2.0E+01 0.0E+00 2.3E-02 0.0E+00 8.3E-02 A1-A3 2.1E-03 7.9E-02 1.8E-03 0.0E+00 0.0E+00	A5	03 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	B6	C2 1.3E-03 - 3.3E-02 0.0E+00 0.0E+00 9.1E-07 ece of 6 C2 7.5E-08 4.1E-06 4.3E-08 0.0E+00 0.0E+00	2.4E-0 	02 2 2 2 2 2 000 0.000 0		-4.2E-01 -4.7E+00 -0.0E+00 0.0E+00 -2.0E-03 18F D -4.7E-05 -2.3E-02 -1.3E-04 -