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-20150092-IBA1-EN

Issue date 30.04.2015

Valid to 29.04.202

Electric Strike - 118 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-20150092-IBA1-EN

Electric Strike - 118 Series

Owner of the Declaration

ASSA ABLOY Sicherheitstechnik GmbH Bildstockstrasse 20 72458 Albstadt, Germany

Declared product / Declared unit

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

- 118.23-----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 118 Series electric strike.

The primary manufacturing processes, 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



Dr. Wolfram Trinius (Independent verifier appointed by SVA)

2. Product

2.1 Product description

Product name: 118 Series

Product characteristic: electric strike

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

2.2 Application

118 Series electric strikes are ideal for a wide range of applications – from private to commercial and public sectors:

 Residential doors and commercial doors that are not intended for use as fire rated or smoke resistant door.

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	3,750	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 testing118

Series electric strikes are:

DIN EN 14846:2008-11 2.5 Delivery status

Electric strikes are delivered as in a box size - 93 mm x 35 mm x 28 mm



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 118 Series is as following:

Component	Percentage in mass (%)
Zinc	61.4
Brass	8.2
Copper	2.3
Steel	18.7
Stainless Steel	3.2
Plastic	1.8
Electro mechanics	4.4
Total	100.0

2.7 Manufacture

The primary manufacturing processes and the final manufacturing processes occur at 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, GHG, 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 and Environmental Management program effectiveness is evaluated.
- 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.
- Any waste metals during machining are separated and recycled. The waste from the water-based painting process is delivered to waste treatment plant.

2.9 Product processing / Installation

118 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

118 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 latchbolt 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 250,000cycles under normal working conditions, 12 years depending on cycle frequency.

2.14 Extraordinary effects

Fire

Not 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 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 GmbH 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 118 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	0.154 Kg	1 piece of electric strike
Conversion factor to 1 kg	6.48	-

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
- 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)

instandation 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	0.154	kg
Collected as mixed construction waste for landfilling	0	kg
Reuse plastic parts	0.003	kg
Recycling Zinc, Brass, Copper, Steel, Stainless Steel, Electro mechanics	0.151	kg

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

relevant Scenario iniormation		
Name	Value	Unit
Collected separately waste type (without packaging)	0.154	kg
Recycling Zinc	61.4	%
Recycling Brass	8.2	%
Recycling Copper	2.3	%
Recycling Steel	18.7	%
Recycling Stainless steel	3.2	%
Recycling Electro mechanics	4.4	%
Reuse plastic parts	1.8	%



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).

	DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)																		
DESC	RIPT	ION O	F THE	SYST	EM B	OUN	DAR	Y ()	K = IN	ICLUDE	ED IN	I LC	A; N	IND :	= MODI	JLE N	OT I	DECL/	ARED)
PROD	OUCT S	STAGE	CONST ON PRO	OCESS				USE STAGE						END OF LIFE STAGE				BEY S	EFITS AND OADS OND THE YSTEM JNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	-i	Repail	Replacement ¹⁾	Refurbishment ¹⁾	Operational energy	Operational water	esn .	De-construction demolition	Transport	Waste processing	Disposal	Reuse-	Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	В	3	B4	B5	В6	Е	37	C1	C2	C3	C4	4	D
Х	Χ	Х	MND	Χ	MND	MNE	M C	ND	MND	MND	Χ	MI	ND	MND	X	Χ	Х		Χ
RESU	LTS	OF TH	E LCA	\ - EN'	VIRON	MEN	ITAL	. IMI	PACT	Ր: 1 pie	ce of	ele	ctric	stril	ke – 118	8 Serie	es		
Param eter			Paran	neter				Unit	t	A1-A3	-	4 5	E	36	C2	СЗ		C4	D
GWP			oal warmi				[kg	CO2	-Eq.]	1.5E+00	1.3	E-02	1.5	E+00	3.9E-04	5.4E-	04	5.5E-03	-4.7E-01
ODP	Deple	etion pote	ntial of th lay		spheric o	zone	[kg C	FC1	1-Eq.]	5.2E-10	6.0	E-14	1.1	E-09	1.9E-15	3.7E-	13	1.7E-14	-1.0E-10
AP	Ad	cidification	n potentia		and wate	er	[kg	SO2-	-Eq.]	6.1E-03	3.0	E-06	7.3	E-03	1.8E-06	2.5E-	06	1.6E-06	-2.4E-03
EP	F.		rophication				[kg (P	O4)3	8 Eq.]	4.5E-04	5.2	E-07	4.1	E-04	4.1E-07	1.4E-	07	1.3E-07	-1.3E-04
POCP	FC		otential of otochemic			ie	[kg E	Ether	n Eq.]	4.3E-04	2.1	E-07	4.3	E-04	-5.8E-07	1.5E-07		8.3E-08	-1.6E-04
ADPE	Al	oiotic dep	letion pot		non foss	sil	[kg	Sb I	6.9E-04		2.4	4E-10 2.1E-0		E-07	1.5E-11	7.5E-11		3.7E-10	-5.8E-04
ADPF	Abiot	ic depleti	resou on potent		ssil resou	rces		[MJ]		1.6E+01	1 3.7			E+01	5.4E-03			2.6E-03	-5.7E+00
RESU			E LCA				SE:	• •		of elect							<u> </u>		
Paran				Parame					nit	A1-A3	А		В		C2	СЗ		C4	D
PEF	RE		ble prima					[N	۸J]	4.5E+00	-		-		-	-		-	-
PEF	RM	Renev	able prir	mary enderial util		ources	as	[N	۸J]	0.0E+00	-		-		-	-		-	-
PEF	эт	Total	use of re			y ener	gy	ГМ	ΛJ]	4 FE : 00	3.4E	: 04	5.0E	.00	215.04	1 0 = 0	12 /	2.0E-04	1.75.00
PER	X I	Nonra	ماطميييم	resourc				Ĺιν	vioj	4.5E+00	3.40	-04	3.0E	+00	2.1E-04	1.8E-0	13 4	2.06-04	-1.7E+00
PEN	RE	Non re	newable	carrie		as ene	ergy	[N	۸J]	2.2E+01	-		-		-	-		-	-
PEN	RM	Non rer	newable	primary utilizatio	0,	as mat	erial	[N	/J]	0.0E+00	-		-		-	-		-	-
PEN		Total us	e of non	resourc	es	-	ergy		/J]	2.2E+01	4.3E		2.7E		5.4E-03	9.6E-0		2.9E-03	-7.3E+00
SN RS		He	Use of seconds		ry mater				(g] //J]	2.9E-02 0.0E+00	0.0E		0.0E		0.0E+00 0.0E+00	0.0E+0		0.0E+00 0.0E+00	0.0E+00 0.0E+00
NRS			of non re					•		0.0E+00	0.0E		0.0E		0.0E+00	0.0E+0		0.0E+00	0.0E+00
FV	V				sh water			[n	n³]	1.3E-02	3.8E	-05	1.2E	-02	1.5E-07	4.3E-0)6 ′	1.2E-05	-6.4E-03
RESU Series		OF TH	IE LCA	\	TPUT	FLO	WS /	ANE) WA	STE C	ATEC	OR	IES:	1 pi	ece of e	electri	c st	rike –	118
Param				Parame	ter			U	nit	A1-A3	А	5	В	6	C2	С3		C4	D
HW			Hazardo						(g]	2.8E-03	2.9E		3.8E		1.2E-08	1.3E-0	_	2.0E-07	-6.8E-04
NHV RW			on hazar Radioact						kg] kg]	1.0E-01 2.5E-03	3.3E 2.5E		8.8E		6.8E-07 7.1E-09	3.1E-0		2.4E-03 1.1E-07	-8.6E-03 -6.7E-04
CR					or re-use			_		0.0E+00	0.0E		0.0E		0.0E+00	0.0E+0		0.0E+00	-0.7 E-04
MF	R		Mater	ials for r	ecycling			[k	(g]	0.0E+00	9.2E	-03	0.0E	+00	0.0E+00	1.5E-0)1 (0.0E+00	-
ME		N	Materials Exports						0.	0.0E+00	0.0E		0.0E		0.0E+00	0.0E+0		0.0E+00	-
EE EE			_		cal energ	•		•		0.0E+00 0.0E+00	1.7E 4.7E		0.0E		0.0E+00 0.0E+00	0.0E+0		1.0E-02 2.9E-02	-
			2			,			-1										



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 33% 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. 24%, mainly due to the energy consumption on this process.

Zinc accounts with app. 61% 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 during the reference service life (12 years) was calculated and included. With exception of ozone depletion potential (ODP) (67%), it contributes up to 54% 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 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





Publisher

+49 (0)30 3087748- 0 +49 (0)30 3087748- 29 Institut Bauen und Umwelt e.V. Tel Panoramastr. 1 Fax Mail 10178 Berlin info@bau-umwelt.com Germany Web www.bau-umwelt.com



Programme holder

+49 (0)30 - 3087748- 0 Institut Bauen und Umwelt e.V. Tel +49 (0)30 – 3087748 - 29 info@bau-umwelt.com Panoramastr 1 Fax 10178 Berlin Mail Germany Web www.bau-umwelt.com



Author of the Life Cycle Assessment PE INTERNATIONAL AG Tel +49 (0)711 341817-0 Hauptstraße 111-113 Fax +49 (0)711 341817-25 info@pe-international.com www.pe-international.com 70771 Leinfelden-Echterdingen Mail Web Germany



Owner of the Declaration

Assa Abloy Sicherheitstechnik Bildstockstrasse 20 72458 Albstadt Germany

Tel +49 7431 123-0 Web www.assaabloy.de



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	RIP	TION C	F THE	SYST	ЕМ В	OUNE	DARY (X = IN	CLUDE	ED IN	LCA	; MND :	= MODL	JLE N	OT D	ECLA	RED)
		STAGE	CONST ON PRO	RUCTI OCESS				SE STAG					ND OF LIF	BENE BEYO S'	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
A 1	A2	А3	A4	A5	B1	B2	В3	B4	B5	B6	В7	C1	C2	C3	C4		D
Х	Χ	Х	MND	Χ	MND	MND	MND	MND	MND	Χ	MNE	D MND	Х	Χ	Х		Χ
RESU	LTS	OF TH	IE LC/	4 - EN'	VIRON	MEN.	TAL IM	PACT	: 1 pie	ce of	elect	ric stril	ke – 118	3 Serie	es		
Parame	eter		Para	ameter			Uni	it	A1-A3	A		В6	C2	СЗ		C4	D
GWF)		obal war				[kg CO2	2-Eq.]	1.5E+00	1.3E	-02	1.5E+00	3.9E-04	5.4E-(04 5.	5E-03	-4.7E-01
ODF	•	Depletion		ıı of the s ne layer	tratospne	eric	[kg CFC1	11-Eq.]	5.5E-10	6.3E	-14	1.1E-09	2.0E-15	3.9E-	13 1.8	8E-14	-1.1E-10
AP		Acidificati	ion poten	tial of lan		ater	[kg SO2		5.9E-03			6.9E-03	2.3E-06	2.4E-0		8E-06	-2.3E-03
EP			utrophica				[kg N-		3.0E-04 6.1E-02			2.9E-04 6.2E-02	1.6E-07	1.0E-0		5E-08	-8.1E-05
Smo	_		level smo ources –			aı	[kg O3-						4.8E-05 7.7E-04	2.2E-0		6E-05 BE-04	-2.1E-02 -4.8E-01
RESU						CE III			1.3E+00			1.2E+00 - 118 Se		1.15	01 <u>2.</u> ,	<u> </u>	1.02 01
						<u> </u>								00		0.4	
Param				Parame				Jnit	A1-A3	A5		В6	C2	C3		C4	D
PEF			enewable primary energy as energy carrier [MJ] 4.5E+00 Renewable primary energy resources as [MJ] 0.0E+00														
	RE	Renewa	ble prima	ary ener	gy as en	ergy ca	rrier [MJ]	4.5E+00	-		-	-	-		-	-
PER		Renewa	vable pri	mary en	ergy reso	ergy ca ources	30		4.5E+00 0.0E+00	-		-	-	-		-	-
PER	RM	Renev	vable pri	mary en terial util	ergy reso ization e primar	ources	as [MJ]			04 5				03 2.0		
	RM	Renev	vable pri mat	mary eneterial util enewable resourc	ergy reso ization e primar es energy	ources y energ	as [I	MJ]	0.0E+00	-	04 5	-	-	-	03 2.0	-	-
PEF	RM RT RE	Renev Total Non re	vable prii mat use of re	mary en- terial util enewable resourc primary carrie	ergy resortization e primary es energy r energy a	ources y energ as ener	as [l	MJ]	0.0E+00 4.5E+00	3.4E-	04 5	-	-	-	03 2.0	-	-
PER	RM RT RE RM	Total Non re	vable prii mat use of re newable	mary en- terial util enewable resourc primary carrie primary utilization	ergy reso ization e primary es energy r energy a on ble prim	y energ as ener as mate	as [il	MJ] :	0.0E+00 4.5E+00 2.2E+01	3.4E-		-	-	-		-)E-04 -	-
PEN PEN SM	RM RT RE RM RT	Total Non re Non rer Total us	vable prii mat use of re newable newable se of non Use of s	mary enderial util enewable resource primary utilization renewaresource seconda	ergy resortization e primarges energy renergy a energy a on ble primes ry mater	y energ as energ as mate ary ene	as [li y [li rgy [li rial [li ergy [li	MJ] MJ] MJ] MJ] MJ] MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02	3.4E-1 - - 4.3E-1 0.0E+	03 2	- 5.0E+00 - - - 2.7E+01	- 2.1E-04 - - 5.4E-03 0.0E+00	1.8E-0 - - 9.6E-0 0.0E+0	03 2.9	- DE-04 - - DE-03	-1.7E+00 - - -7.3E+00 0.0E+00
PEN PEN PEN SM RS	RM RE RM RT	Renev Total Non re Non rer Total us	vable prii matuse of re newable newable se of non Use of se	mary en- derial util enewable resourc primary carrie primary utilizati renewa resourc seconda wable se	ergy resortation e primary es energy r energy a on ble prime es ry mater econdary	y energy energy as energy ener	as [li y [li rgy [li erial [li ergy [li	MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00	3.4E- - - 4.3E- 0.0E+ 0.0E+	03 2	- 6.0E+00 	- 2.1E-04 - - 5.4E-03 0.0E+00 0.0E+00	1.8E-0 - - 9.6E-0 0.0E+0	03 2.9	- DE-04 - - DE-03 DE+00 DE+00	-1.7E+00 - - -7.3E+00 0.0E+00 0.0E+00
PEN PEN SM	RM RE RM RT J	Renev Total Non re Non rer Total us	vable prii mat use of re newable newable se of non Use of se e of rene of non re	mary enderial utilization resource primary utilization renewal resource secondal wable sonewable and rewalle sonewable sonewab	ergy resortization e primaries energy renergy a energy a on ble primes ry mater econdary escondary	y energy as energy as mater ary energy energy energy energy fuels ary fuels ary fuels	as [III] If y [II	MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 0.0E+00	3.4E- - - 4.3E- 0.0E+ 0.0E+ 0.0E+	03 2 00 0 00 0 00 0	- 6.0E+00 	- 2.1E-04 - - 5.4E-03 0.0E+00	1.8E-0 9.6E-0 0.0E+0 0.0E+0	03 2.9 00 0.0 00 0.0 00 0.0	- DE-04 - DE-03 DE-00 DE+00 DE+00	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00
PER PEN PEN SM RS NRS FV	RM RE RM RT M F SF V	Renev Total Non rei Total us Use o	wable prii mat use of re newable se of non Use of se of rene of non re	mary enderial utilization resource primary carrie primary utilization renewal resource secondal wable sinewable of net free	ergy resortization e primary es energy r energy a on ble prim es ry mater econdary seconds sh water	ources y energ as energ as mate ary ene ial y fuels ary fuel	as [li yy [li rigy [li rial [li ergy [li s [li s [li	MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 0.0E+00 1.3E-02	3.4E- - - 4.3E- 0.0E+ 0.0E+ 0.0E+ 3.8E-	03 2 00 0 00 0 00 0 00 0		- 2.1E-04 - - 5.4E-03 0.0E+00 0.0E+00 0.0E+00	9.6E-0 0.0E+(0.0E+(4.3E-0	03 2.9 00 0.0 00 0.0 00 0.0 06 1.2	DE-04 - DE-03 DE+00 DE+00 DE+00 DE+00 DE-05	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00 -6.4E-03
PER PEN PEN SM RS NRS	RM RT RE RM RT J F SF V JLTS	Renev Total Non rei Total us Use o	vable prii mat use of re newable newable se of non Use of se of ron re Use Collection (Use Col	mary enderial utilization resource primary carrie primary utilization renewal resource secondal wable sinewable of net free	ergy resolization e primary es energy r energy a on ble prim es ry mater econdary second sh water	ources y energ as energ as mate ary ene ial y fuels ary fuel	as [III] If y [II	MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 0.0E+00 1.3E-02	3.4E- - - 4.3E- 0.0E+ 0.0E+ 0.0E+ 3.8E-	03 2 00 0 00 0 00 0 00 5 1		2.1E-04 - - 5.4E-03 0.0E+00 0.0E+00 0.0E+00 1.5E-07	9.6E-0 0.0E+(0.0E+(4.3E-0	03 2.9 00 0.0 00 0.0 00 0.0 00 0.0 c stril	DE-04 - DE-03 DE+00 DE+00 DE+00 DE+00 DE-05	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00 -6.4E-03
PER PEN PEN PEN SM RS NRS FV RESU Series	RRM RE RM RT A F SF V JLTS S S neter	Renev Total Non rei Total us Use o	vable prii mat use of re newable newable se of non Use of se of rene of non re Use CELECA	mary enterial util enewable resource primary utilization renewaresource seconda wable seconda for the free primary utilization renewaresource seconda wable seconda for the free primary utilization renewaresource seconda wable seconda wable seconda produce primary produce produce primary utilization renewable seconda produce produce produce produce produce primary primary primary utilization primary prim	ergy resolization e primary es energy r energy a on ble prim es ry mater econdary second sh water	y energias energias materiary energial y fuels arry fuel	as [III] IV [IIII] IV [IIII] IV [IIII] IV [IIIII] IV [IIIII] IV [IIIII] IV [IIIIII] IV [IIIIIII] IV [IIIIIIIII] IV [IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 0.0E+00 1.3E-02 STE CA	3.4E- - 4.3E- 0.0E+ 0.0E+ 3.8E- TEG	03 2 00 0 00 0 00 0 05 1		2.1E-04 - 5.4E-03 0.0E+00 0.0E+00 0.0E+00 1.5E-07 ece of e	1.8E-0	03 2.9 00 0.0 00 0.0 00 0.0 06 1.2 c stril		-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 -6.4E-03
PER PEN PEN SM RSS FV RESU Series Param	RM RT M F F S S S S S S S S S S S S S S S S S	Non ree Non ree Total us Use G OF Th	wable prii mat use of re newable newable se of non Use of se of rene of non re Use of the LCA	mary enterial utilization resource primary carrie primary utilization resource seconda wable sinewable of net free primary primary utilization resource seconda wable sinewable of net free pus wastedous wast	ergy resortation e primary es energy renergy a oble primes ry mater econdary second sh water TPUT ter e disposs aste disp	y energy as energy as material y fuels arry fuel FLOV	as [III] If y [II	MJ] MJ] MJ] MJ] MJ] kg] MJ] MJ] D WA:	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 1.3E-02 STE CA A1-A3 2.8E-03 1.0E-01	3.4E-I 3.4E-I 4.3E-I 0.0E+ 0.0E+ 3.8E-I TEG A5 2.9E-I 3.3E-I	03 2 00 0 00 0 00 0 05 1 07 3 04 8	.0E+00 .0E+00	2.1E-04 - 5.4E-03 0.0E+00 0.0E+00 1.5E-07 C2 1.2E-08 6.8E-07	1.8E-0 9.6E-0 0.0E+0 0.0E+0 4.3E-0 9.6E-ctric	03 2.9 00 0.0 00 0.0 00 0.0 06 1.2 c stril	- DE-04 DE-03 DE+00 DE+00 DE+00 DE-05 Ke - 1 DE-07 DE-03	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00 -6.4E-03 18 D -6.8E-04 -8.6E-03
PER PEN PEN SM RS NRS FV RESU Series Param HW NHV RW	RE RM RT M F F F F F F F F F F F F F F F F F F	Non ree Non ree Total us Use G OF Th	wable primaruse of remewable newable se of non Use of se of rene Use of IE LCA	mary enterial utilization was to be condarion with the condition of the co	ergy resortation e primary es energy renergy a on bile primes ry mater econdary second sh water TPUT ter e dispos siste dispos te dispos te dispos	y energe as energe as mater ary energe ary fuels ary fuels eddosed sed	as [IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	MJ] MJ] MJ] MJ] MJ] kg] MJ] MJ] D WAS Jnit kg] kg]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 1.3E-02 STE CA A1-A3 2.8E-03 1.0E-01 2.5E-03	3.4E-I 3.4E-I 4.3E-I 0.0E+ 0.0E+ 3.8E-I TEG A5 2.9E-I 3.3E-I 2.5E-I	03 2 00 0 00 0 00 0 05 1 07 3 04 8 07 3		2.1E-04 - 5.4E-03 0.0E+00 0.0E+00 1.5E-07 ece of 6 1.2E-08 6.8E-07 7.1E-09	1.8E-0 9.6E-0 0.0E+0 0.0E+0 4.3E-0 2.13E-0 3.1E-0 1.4E-0	03 2.9 00 0.0 00 0.0 00 0.0 06 1.2 c stril	- DE-04 DE-03 DE+00 DE+00 DE+00 DE+00 DE-05 Ke — 1 DE-07 DE-03 DE-07	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00 -6.4E-03 118 D -6.8E-04 -8.6E-03 -6.7E-04
PER PEN PEN RS NRS FV Series Param HW RW CR	RM RT RE RM RT A F F S S Neter A D U D U U	Non ree Non ree Total us Use G OF Th	wable primar was of remember of non remember o	mary enterial utilization was to be conda was	ergy resortation e primary es energy renergy a on ble prime es ry mater econdary second sh water TPUT ter e dispos sate dispos or re-use	ed osed sed	as [IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	MJ] MJ] MJ] MJ] MJ] MJ] MJ] MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 1.3E-02 STE C/ A1-A3 2.8E-03 1.0E-01 2.5E-03 0.0E+00	3.4E-I 3.4E-I 4.3E-I 0.0E+ 0.0E+ 3.8E-I TEG A5 2.9E-I 3.3E-I 2.5E-I 0.0E+	03 2 00 0 00 0 00 0 05 1 0RIE	6.0E+00 - 2.7E+01 0.0E+00 0.0E+00 1.2E-02 S: 1 pic B6 8.8E-03 3.8E-03 3.9E-03 0.0E+00	2.1E-04 - 5.4E-03 0.0E+00 0.0E+00 1.5E-07 cc of c 1.2E-08 6.8E-07 7.1E-09 0.0E+00	1.8E-0 9.6E-0 0.0E+0 0.0E+0 4.3E-0 clectric C3 1.3E-0 3.1E-0 1.4E-0 0.0E+0	03 2.9 00 0.0 00 0.0 00 1.2 c stril	DE-04 - DE-03 DE+00 DE+00 DE+00 DE+00 DE-07 DE-03 DE-03 DE-07 DE-03 DE-07 DE-07 DE-07	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00 -6.4E-03 118 D -6.8E-04 -8.6E-03 -6.7E-04
PER PEN PEN SM RS NRS FV RESU Series Param HW NHV RW	RM RT RE RM RT RT VU VU R	Renev Total Non re Non rei Total us Use o	wable primar was of remember of non remember o	mary enterial utilization resource primary utilization resource seconda wable sinewable of net free bus wastitive was onents frials for it	ergy resortation e primary es energy renergy a on ble prim es ry mater econdary second sh water TPUT ter e dispose set dispose or re-use recycling	ed essed	as [III] If y [II	MJ] MJ] MJ] MJ] MJ] MJ] MJ] MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 1.3E-02 STE CA A1-A3 2.8E-03 1.0E-01 2.5E-03	3.4E-I 3.4E-I 4.3E-I 0.0E+ 0.0E+ 3.8E-I TEG A5 2.9E-I 3.3E-I 2.5E-I	00 00 00 00 00 00 00 00 00 00 00 00 00	3.0E+00 	2.1E-04 - 5.4E-03 0.0E+00 0.0E+00 1.5E-07 ece of 6 1.2E-08 6.8E-07 7.1E-09	1.8E-0 9.6E-0 0.0E+0 0.0E+0 4.3E-0 2.13E-0 3.1E-0 1.4E-0	03 2.90 00 0.00 00 0.00 00 0.00 06 1.2 c stril	- DE-04 DE-03 DE+00 DE+00 DE+00 DE+00 DE-05 Ke — 1 DE-07 DE-03 DE-07	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 0.0E+00 -6.4E-03 118 D -6.8E-04 -8.6E-03 -6.7E-04
PER PEN PEN SM RS NRS FV RESU Series Param HW NHW CR MF	RM RT RE RM RT F F SF V ILTS S Deter D U U R R R R E	Renev Total Non re Non rei Total us Use o	wable primar was of rememble newable newable se of non rememble se of reneating the control of t	mary enterial util enewable resource primary utilization renewaresource seconda wable	ergy resortation e primary es energy renergy a on ble prim es ry mater econdary second sh water TPUT ter e dispose set dispose or re-use recycling	y energias energias materially fuels arry fuels eddosed seddorery	as [III] IV [II	MJ]	0.0E+00 4.5E+00 2.2E+01 0.0E+00 2.2E+01 2.9E-02 0.0E+00 1.3E-02 STE C/ A1-A3 2.8E-03 1.0E-01 2.5E-03 0.0E+00 0.0E+00	3.4E-I 3.4E-I 4.3E-I 0.0E+ 0.0E+ 3.8E-I TEG A5 2.9E-I 3.3E-I 2.5E-I 0.0E+ 9.2E-I	000 000 000 000 000 000 000 000 000 00	3.0E+00 	2.1E-04 5.4E-03 0.0E+00 0.0E+00 1.5E-07 cce of 6 1.2E-08 6.8E-07 7.1E-09 0.0E+00 0.0E+00 0.0E+00	9.6E-0 0.0E+0 0.0E+0 0.0E+0 4.3E-0 3.1E-0 1.4E-0 0.0E+0 1.5E-0	03 2.50 00 0.00 00 0.00 00 1.20 c stril	- DE-04 DE-03 DE+00 DE+00 DE+00 DE+00 DE-05 Ke - 1 DE-07 HE-03 DE-07 HE-03 DE-07 HE-03 DE-07 DE-07	-1.7E+00 -1.7E+00 -7.3E+00 0.0E+00 0.0E+00 -6.4E-03 118 D -6.8E-04 -8.6E-03 -6.7E-04