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PRODUCT ENVIRONMENTAL PROFILE

DEPM IVS 4332 Tango Pump Series

4332-0406B-015.0, 4332-0406B-020.0, 4332-0406C-025.0
4332-0406B-030.0, 4332-0406C-040.0, 4332-0407-040.0

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1. General Information

1.1. Commercial reference of the Reference Product

Reference product:	4332-0406C-025.0
Options considered:	None
References covered:	4332-0406B-015.0 — 4332-0406B-020.0 — 4332-0406C-025.0 4332-0406B-030.0 — 4332-0406C-040.0 — 4332-0407-040.0
Nominal capacity of the device:	18.64 kW
Product family:	Pump
Product category:	Electrical, Electronic and HVAC-R Products

1.2. Functional Unit

The functional unit is 1 piece of the 25HP DEPM IVS 4332 4 x 4 x 6C Tango (Cast Iron) pumping water at its best efficiency point (BEP) for 20 years. The declared DEPM IVS 4332 Tango Model 0406C is a 25 HP pump manufactured by Armstrong Fluid Technology at the Toronto, Ontario, Canada plant. The parts come from various geographical locations including India, China, Canada, US and France.

Additional Information

The environmental impacts are calculated using a Life Cycle Analysis of the product in accordance with ISO standards 14040 and 14044. All the stages of the manufacture, distribution, installation (packaging end of life), maintenance and end of life of the product are included in this study.

1.3. Manufacturing Stage

The Life Cycle Analysis on which this Product Environmental Profile (PEP) is based was conducted with respect to the criteria set by PCR-ed4-EN-2021 09 06 for the PEP ecopassport® program.

The environmental analysis was conducted for the whole of the following life cycle: production, distribution, installation, use and end of life. The following environmental declaration conforms to the cut rule that stipulates a precision of +/- 5% on the mass of the modelled product.

Production

The product is manufactured in Canada at the Armstrong Fluid Technology production plant in Toronto, which implements an ISO 14001-certified environmental management system. The manufacturing site has also obtained ISO 9001 and ISO 45001 certification.
The range of products manufactured by Armstrong Fluid Technology comply with the requirements of the RoHS Directive 2015/863/UE of 31 March 2015 and 2011/65/EU of 8 June 2011 and the REACH regulation 1907/2006 of 18 December 2006. Armstrong's suppliers are obliged to inform them of any change in the composition of the components. During the manufacturing phase, a procurement scenario is taken into account; information on the provenance of the components has been gathered from the purchasing department. The parts come from various geographical locations including India, China, Canada, USA and France.

Energy Model

Electricity Mix; Low voltage; 2023; Canada.

1.4. Distribution

Transportation from the production plant (gate) to the installation site is by lorry and is defined based on the sales data. We have used a north-east region USA city to represent the average shipping distance to a customer site which is at the mid-point between the furthest customer site and the nearest customer site. The transport distance for this typical scenario is 757 km. for local/domestic transport by lorry.

1.5. Installation

The installation stage requires a forklift truck and a jib crane to move the product into place. Installation operations are required for the products in this range. Processing of the packaging and connection to the hydraulic system are taken into account at this stage. The unit is installed on a concrete slab floor.

1.6. Use Stage

The Use stage is conducted in alignment with the PCR considering product operation under normal conditions of use. Contributions to operational energy use during the Use stage (B6) come from the electricity consumption of the declared product to operate during its intended use, applying realistic and plausible scenarios. Inputs include the BEP flow and head, with the annual running hours. The electricity grid mix used for the calculation of the indicator results for module B6 are representative of the US-NPCC region in which the product is used.

Energy model

Electricity Mix; Low voltage; 2023; USA

1.7. End of Life Stage

End-of-life occurs when a pump is at the end of its service life or replaced before the end of its service life with a more energy efficient pump. At end-of-life, the product is manually disassembled from the piping system in which it was installed and disposed. Disposal refers to both recycling and landfilling. C3 includes the mechanical separation of the product followed by a series of sorting steps. Metal fractions, the electronic printed circuit board (PCB) and some of the plastics are recycled. The magnet is recycled. The remaining plastics and fractions are transported to a landfill site. The residual fractions are landfilled and declared in C4.

1.8. PEP ecopassport® Program Hypothesis

The life cycle analysis was carried out according to the hypothesis and scenarios provided by the PEP ecopassport program.

Activity area:	Collective residential / Tertiary
Expected lifetime:	20 years
Annual operating time:	4000 hours/yr
Electricity consumption:	54,503 kWh/yr
Activity area:	Commercial/MURB

A standard L-frame American National Standards Institute (ANSI) pump can be expected to operate for 20 years—and in many cases longer than 25 years—if it is used as designed running near the best/design operating point.[i]

1.9. Technical Description of the Product

The 25HP DEPM IVS Tango 4332 -0406C pump characterized in this PEP is inherently configurable. Configuration and efficiency depend on a mechanical engineer's specification. Armstrong Fluid Technology generates Submittals for all pumps. Submittals are technical documents that include shop drawings, diagrams, illustrations, schedules, samples, and all relevant data prepared by a manufacturer which details how a specific pump is fabricated, installed, and operated. Armstrong Fluid Technology generates a Pump Energy Report using our proprietary software (DEVA/EPIC). A pump energy report is provided to customers when a pump is ordered. The calculations in the pump energy report are based on the pump operating energy at its BEP (Best Efficiency Point).

Technical Data and Test Standard Verification Method			
Name	**Value**	**Unit**	**Test Standard Verification method**
Frequency	60	Hz	Calibrated power supply used on Head and Flow test
Voltage	460	V	Calibrated power supply used on Head and Flow test
Pump liquid (e.g., water)	Water or Water with Glycol mix	Liter	From specification
Pump Energy Index (PEI)[i]	0.45	PER / PER_{STD}	Calculations per test method Hydraulic Institute 41.5
Operational Efficiency	392.6	W/(l/s)	Pump Head and Flow measurement on calibrated test rig
Flow range (max)	700 (159.0)	USgpm (m^3/h)	Pump Head and Flow measurement on calibrated test rig
Head max.	100 (30.48)	Feet (m)	Pump Head and Flow measurement on calibrated test rig
Power input, Average	23.25 (17.34)	HP (kW)	Calibrated power supply used on Head and Flow test
Nominal capacity	25 (18.64)	HP (kW)	Motor manufacturer name plate rating

[i] https://www.pumps.org/2021/09/23/energy-ratings-program-now/

1.10. Sales Scenarios

Sales of the device are distributed as follows:

Country name	Share in sales (%)
USA	100
Europe	0
World	0

2. Component Materials

2.1 Reference Product

Name	Value	Unit
Declared unit	1	pc.
Mass reference	379.30	kg/pc
Conversion factor to 1 kg	0.003	-

2.2 Constituent Materials

Name	Value (kg)	Value (%)
Metals	**354.95**	**93.58**
Aluminum	47.75	12.59
Ductile Iron	1.89	0.50
Cast Iron	164.37	43.33
Copper	12.7	3.35
Stainless Steel	18.51	4.88
Steel	109.73	28.93
Plastics	**17.33**	**4.57**
Plastic	17.33	4.57
Other Materials	**6.983**	**1.85**
Electronics (Printed Circuit Board and components)	1.802	0.48
Magnet	4.2	1.11
Rubber	0.981	0.26
Total Assembly	379.3	100

2.3 Packaging Materials

Name	Value (kg)	Value (%)
Metals	**6.692**	**3.47**
Steel	6.692	3.47
Other	186.11	96.53
Wood	186.11	96.53
Total	192.802	100

3. Environmental Impacts

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT_25HP DEPM IVS 4332 Tango_20 YEARS PUMPING												
Parameter	Method Used	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	Total
Climate change - total	EF v3.1	[kg CO_2-Eq.]	1.83E+03	6.64E+01	3.36E-01	0.00E+00	2.66E+05	0.00E+00	2.91E+00	0.00E+00	1.16E-02	2.68E+05
Climate change - fossil	EF v3.1	[kg CO_2-Eq.]	1.81E+03	6.63E+01	3.36E-01	0.00E+00	2.64E+05	0.00E+00	2.91E+00	0.00E+00	1.15E-02	2.66E+05
Climate change - biogenic	EF v3.1	[kg CO_2-Eq.]	1.31E+01	1.81E-02	9.16E-05	0.00E+00	8.04E+02	0.00E+00	7.90E-04	0.00E+00	6.62E-05	8.17E+02
Climate change- land use and chang	EF v3.1	[kg CO_2-Eq.]	5.23E+00	3.46E-02	1.80E-04	0.00E+00	1.18E+03	0.00E+00	1.52E-03	0.00E+00	8.42E-06	1.18E+03
Ozone depletion	EF v3.1	[kgCFC11-Eq.]	6.72E-05	1.03E-06	5.21E-09	0.00E+00	1.83E-03	0.00E+00	4.50E-08	0.00E+00	2.71E-10	1.89E-03
Acidification	EF v3.1	[mol H+ -Eq.]	1.70E+01	3.16E-01	1.60E-03	0.00E+00	6.10E+02	0.00E+00	1.39E-02	0.00E+00	8.19E-05	6.27E+02
Eutrophication, fresh water	EF v3.1	[kg P-Eq]	1.29E+00	5.51E-03	2.79E-05	0.00E+00	3.44E+01	0.00E+00	2.40E-04	0.00E+00	3.01E-06	3.57E+01
Eutrophication, marine	EF v3.1	[kg N-Eq]	3.66E+00	1.16E-01	6.10E-04	0.00E+00	1.27E+02	0.00E+00	5.23E-03	0.00E+00	3.07E-05	1.30E+02
Eutrophication, terrestrial	EF v3.1	[mol N-Eq]	2.55E+01	1.28E+00	6.49E-03	0.00E+00	1.33E+03	0.00E+00	5.60E-02	0.00E+00	3.30E-04	1.35E+03
Photochemical ozone formation	EF v3.1	[kg NMVOC-Eq.]	1.55E+01	4.35E-01	2.21E-03	0.00E+00	6.91E+02	0.00E+00	1.91E-02	0.00E+00	1.10E-04	7.07E+02
ADPE	ML IA-baselir	[kg Sb-Eq.]	1.06E-01	1.50E-04	7.70E-07	0.00E+00	4.08E+00	0.00E+00	6.65E-06	0.00E+00	2.10E-08	4.19E+00
ADPF	ML IA-baselir	[MJ]	2.08E+04	9.34E+02	4.74E+00	0.00E+00	3.96E+06	0.00E+00	4.09E+01	0.00E+00	2.43E-01	3.99E+06
Water use	EF v3.1	[m3 depriv.]	8.69E+02	4.66E+00	2.36E-02	0.00E+00	2.56E+05	0.00E+00	2.04E-01	0.00E+00	1.38E-03	2.57E+05
Caption		ADPE=Abiotic resource depletion - metals and minerals; ADPF=Abiotic resource depletion - fossils										

RESULTS OF THE LCA - RESOURCE USE_ 25HP DEPM IVS 4332 Tango_20 YEARS PUMPING												
Parameter	Method Used	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	Total
RPR_E	cumulative energy demand based on ACLCA Guidance	[MJ]	7.34E+02	3.37E+00	1.71E-02	0.00E+00	3.41E+05	0.00E+00	1.47E-01	0.00E+00	9.80E-04	3.42E+05
RPR_M		[MJ]	5.55E+02									5.55E+02
RPR_T		[MJ]	1.39E+03	3.37E+00	1.71E-02	0.00E+00	3.41E+05	0.00E+00	1.47E-01	0.00E+00	9.80E-04	3.43E+05
$NRPR_E$		[MJ]	2.06E+04	9.35E+02	4.74E+00	0.00E+00	3.96E+06	0.00E+00	4.09E+01	0.00E+00	2.44E-01	3.99E+06
$NRPR_M$		[MJ]	2.86E+02									2.86E+02
$NRPR_T$		[MJ]	2.09E+04	9.35E+02	4.74E+00	0.00E+00	3.96E+06	0.00E+00	4.09E+01	0.00E+00	2.44E-01	3.99E+06
Use of secondary materia		[kg]			0.00E+00	0.00E+00						0.00E+00
Use of renewable secondary fuel		[MJ]			0.00E+00	0.00E+00						0.00E+00
Use of non-renewable secondary		[MJ]			0.00E+00	0.00E+00						0.00E+00
Net use of fresh water		[m3]	8.69E+02	4.66E+00	2.36E-02	0.00E+00	2.56E+05	0.00E+00	2.04E-01	0.00E+00	1.38E-03	2.57E+05
Caption		RPR_E=Renewable primary energy exclude RM; RPR_M=Renewable primary energy used as RM; RPR_T=Total use of renewable primary energy; $NRPR_E$=Non-renewable primary energy exclude RM; $NRPR_M$=Non-renewable primary energy used as RM; $NRPR_T$=Total use of non-renewable primary energy										

RESULTS OF THE LCA -OUTPUT FLOWS AND WASTE CATEGORIES_25HP DEPM IVS 4332 Tango_20 YEARS PUMPING												
Parameter	Method Used	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	Total
Hazardous waste disposed	cumulative energy demand based on ACLCA Guidance	[kg]	0.00E+00	NA	0.00E+00	0.00E+00					0.00E+00	0.00E+00
Non-hazardous waste disposed		[kg]	0.00E+00	NA	0.00E+00	0.00E+00					9.81E-01	9.81E-01
Radioactive waste disposed		[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU=Components for re-use		[kg]				0.00E+00		0.00E+00		0.00E+00		0.00E+00
Materials for recycling		[kg]	0.00E+00		4.39E+01	0.00E+00		0.00E+00		3.78E+02		4.22E+02
Materials for energy recovery		[kg]	0.00E+00		0.00E+00	0.00E+00				0.00E+00		0.00E+00
Exported energy		[MJ]	0.00E+00		0.00E+00	0.00E+00				0.00E+00	0.00E+00	0.00E+00
Total Primary Energy		[MJ]	2.22E+04	9.38E+02	4.76E+00	0.00E+00	4.30E+06	0.00E+00	4.11E+01	0.00E+00	2.45E-01	4.33E+06
Others												
Biogenic carbon content of the product		kg C	0.00E+00									
Biogenic carbon content of the packaging		kg C	9.31E+01									

4. Extrapolation to other sizes in the range

	Pump Model	Submittal Mass (kg)	Capacity	Manufacturing A1-A3	Distribution A4	Installation A5	B2	Use B6	EoL C1-C4
	4332-0406B-015.0	311.8	11.18 kW	0.9	0.9	0.9	0.9	0.6	0.9
	4332-0406B-020.0	328.6	14.91 kW	0.9	0.9	0.9	0.9	0.8	0.9
REF	4332-0406C-025.0	350.1	18.64 kW	1	1	1	1	1	1
	4332-0406B-030.0	422.2	22.37 kW	1.2	1.2	1.2	1.2	1.2	1.2
	4332-0406C-040.0	434.2	29.82 kW	1.2	1.2	1.2	1.2	1.6	1.2
	4332- 0407-040.0	529.3	29.82 kW	1.5	1.5	1.5	1.5	1.6	1.5

Extrapolation coefficients are given for the environmental impact of the functional unit. For each stage of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the extrapolation coefficient. The "Total" column should be calculated by adding the

environmental impacts of each stage of the life cycle.

The extrapolation coefficients are calculated as follows:

Manufacturing, Distribution, Installation, A1 – A5

$$kA = \frac{MASS_{considered\ product}}{MASS_{referenced\ product}}$$

Maintenance, B2

$$kB2 = \frac{MASS_{considered\ product}}{MASS_{referenced\ product}}$$

Use, B6

$$kB6 = \frac{CONSUMPTION_{considered\ product}}{CONSUMPTION_{referenced\ product}}$$

End of Life, C1 – C4

$$kC = \frac{MASS_{considered\ product}}{MASS_{referenced\ product}}$$

5. Glossary

Life Cycle Assessment (LCA):

A method to evaluate the environmental impacts associated with all stages of a product's life (manufacture, installation, use, and end-of-life).

Functional unit:

A quantified performance of a product system used as a reference in LCA. [ISO 14040]

Homogeneous Environmental Family:

A group of products with identical functional units (identical use, standard, technology) whose impacts are identical or can be extrapolated from a reference product by applying a defined calculation rule.

Environmental Impact:

Any change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organization's activities, products, or services. [ISO 14050]

PCR (Product Category Rules):

Rules and guidelines for developing Type III environmental declarations for one or multiple product categories. [ISO 14025]

PEP (Product Environnemental Profile):

Declaration of a product's environmental aspects drawn up in accordance with the PEP ecopassport® program based on ISO 14025, ISO 14040, and ISO 14044.

Reference product:

Product or product system modeled in the LCA and representative of a homogeneous environmental family.

Registration number: SAAL-43321-V01.01-EN	**Drafting rules: <<PEP-PCR-ed4-EN-2021 09 06>>**	
Verifier accreditation number: VH44	**Information and reference documents: www.pep-ecopassport.org**	
Date of Issue: 2026-03	**Validity period: 5 years**	
Independent verification of the declaration and date, in compliance with ISO 14025: 2006		
Internal: ☐ External: ☑		
The PCR was conducted by a panel of experts chaired by Julie ORGELET (DDemain)		
PEP are compliant with XP C08-100-1: 2016 or EN 50693: 2019 **The elements of the present PEP cannot be compared with elements from another program.**		
Document in compliance with ISO 14025: 2006 'Environmental labels and declaration. Type III environmental declarations'		

The illustrations in this document are provided for information only and do not form any part of any sales offer or contact.

The manufacturer reserves the right to change any product specifications without notice.

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[i] https://www1.eere.energy.gov/manufacturing/tech_assistance/pdfs/pumplcc_1001.pdf

