FALK

VERIFIED by SCS Global Services
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

Declaration Owner
FALK Panel LLC
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Product
Insulated Metal Panels

- HFW-40 (3″)
- CSW-44 (4″)
- SSR-42 (3″)
- RRP-40 (2.5″)
- RDEK-40 (3″)
- MRP-44 (4″)

Declared Unit
The declared unit is 100m^2 of panel

EPD Number and Period of Validity
SCS-EPD-10288
EPD Valid November 8, 2024 through November 7, 2029

Product Category Rule
PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. UL 10010. March 2022.

PCR Guidance for Building-Related Products and Services Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels, UL 10010–5. October 23, 2018. Expiration date Dec 31, 2024.

Program Operator
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
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SCSglobal SERVICES

Declaration owner:	FALK Panel LLC
Address:	1782 Northridge Dr. NW, Walker, MI 49544
Declaration Number:	SCS-EPD-10288
Date of Issue:	November 8, 2024
Declaration Validity Period:	EPD Valid November 8, 2024 through November 7, 2029
Program Operator:	SCS Global Services, 2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
General Program Instructions:	SCS Type III Environmental Declaration Program: Program Operator Manual. V12.0
Product(s):	Insulated Metal Panels: HFW-40, CSW-44, SSR-42, RRP-40, RDEK-40, MRP-44
Declared Unit:	100m^2 of panel
Markets of Applicability:	North America
EPD Type:	Product specific
EPD Scope:	Cradle-to-gate
Year(s) of Reported Manufacturer Primary Data:	July 1, 2023 to June 30, 2024
LCA Software & Version Number:	OpenLCA v 2.1.0
LCI Database(s) & Version Number:	Ecoinvent v3.10
LCIA Methodology & Version Number:	TRACI 2.1, CML-IA, IPCC AR5
Part A Product Category Rule:	PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. UL 10010, UL v4.0, March 2022.
Part A PCR Review conducted by:	Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig
Part B Product Category Rule:	PCR Guidance for Building-Related Products and Services Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels, UL 10010–5. October 23, 2018. Expiration date Dec 31, 2024
Part B PCR Review conducted by:	Thomas Gloria (Chair), Industrial Ecology Consultants; Lindita Bushi, PhD; Bob Zebcik, PE
LCA Practitioner:	Lucas Wathen
Independent critical review of the LCA and data, according to ISO 14044 and the PCR:	☐ internal ☒ external
LCA Reviewer:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Independent verification of the declaration and data, according to ISO 14025 and the PCR:	☐ internal ☒ external
EPD Verifier:	Lindita Bushi, Ph.D., Athena Sustainable Materials Institute
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.

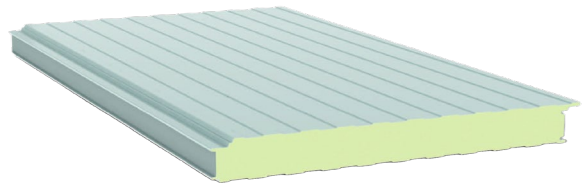
1. FALK Panel LLC

FALK specializes in manufacturing premium insulated metal roof and wall panels, while operating from a state-of-the-art production facility located in Walker, MI. The organization is committed to delivering innovative, high-quality, sustainable construction solutions, with a strong focus on versatility. Our panels are designed to streamline construction processes, reduce labor expenses, and offer a variety of aesthetic options to meet diverse architectural needs. Our skilled team is committed to their pursuit of excellence within the insulated metal panel market, delivering outstanding value, craftsmanship, and adaptability.

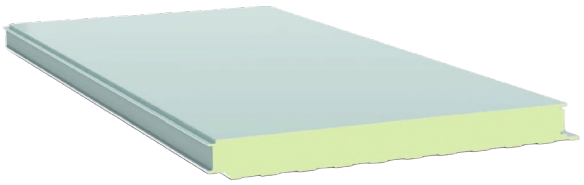
2. PRODUCT

2.1 PRODUCT DESCRIPTION

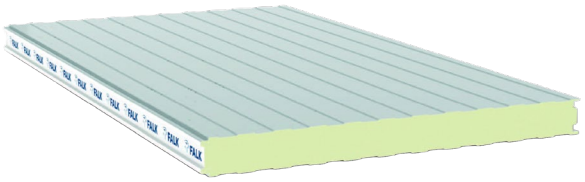
Insulated metal panels, or IMPs, are frequently referred to as sandwich panels due to their structure: a layer of foam insulation nestled between two metal sheets. These panels provide insulative properties while serving as the outer wall, interior wall, ceiling and roof assemblies for various buildings. FALK's offerings are well suited for agricultural, commercial, industrial, cold storage applications and have recently been used within the automotive and pharmaceutical sectors because of the superior thermal resistance they provide. Wall Product categories include HFW40, CSW44. Roofing categories for sloped applications are SSR42, RRP40 and when low slope commercial roof is needed MRP44 and RDEK40 meet the needs with commercially available waterproofing membranes.



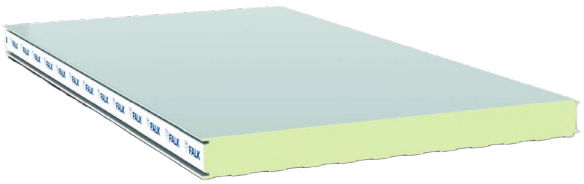
HFW-40



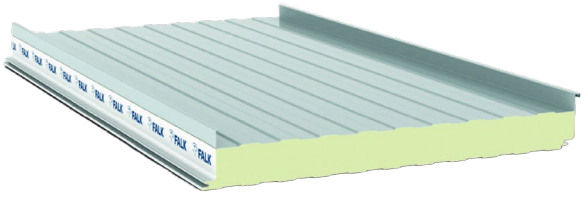
RDEK-40



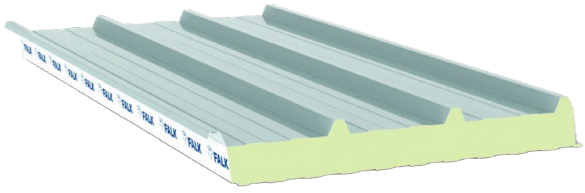
CSW-44



MRP-44



SSR-42



RRP-40

Figure 1. *Product images for the FALK insulated metal panels*

2.2 TECHNICAL SPECIFICATION

FALK insulated metal panels belong to the CSI code 074213.19 for Insulated Metal Walls. Additional technical specifications and applicable codes for each FALK panel are provided in the tables below.

Table 1. *specification of FALK insulated metal panel properties*

Technical Specification	Unit	HFW-40 RDEK-40	CSW-44 MRP-44	SSR-42	RRP-40
Intended Application	n/a	Wall; Roof	Wall; Roof	Roof	Roof
Length	m	2.44 – 25.0	2.44 – 25.0	2.44 – 25.0	2.44 – 25.0
Width	m	1.02	1.12	1.07	1.02
Thickness	mm	76.2	102	76.2	63.5
Density	kg/m^3	37.1	37.1	37.1	37.1
Tensile Strength (Adhesion)	MPa	0.124 – 0.179	0.124 – 0.179	0.124 – 0.179	0.124 – 0.179
Modulus of Elasticity (Steel)	MPa	210,000	210,000	210,000	210,000
U-value of assembly including interruptions	W/(m2/K)	0.043	0.03	0.043	0.053
R value of typical materials where continuous	m2K/W	22.8	30.4	22.8	19.0
Water vapor permeance	Metric Perms	N/A	N/A	N/A	N/A
Airborne sound reduction	dB	N/A	N/A	N/A	N/A
Sound absorption coefficient	%	N/A	N/A	N/A	N/A

Table 2. *List of testing and classification standards applicable to FALK insulated metal panels*

Standard Code	Standard Name
ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM D1929	Standard Test Method for Determining Ignition Temperature of Plastics
ASTM E72	Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E1592	Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E1646	Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
ASTM E1680	Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems
ASTM E283	Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM 331	Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
CAN/ULC S138	Standard method of test for fire growth of insulated building panels in a full-scale room configuration
NFPA 286	Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
UL 1256	Standard for Test for Surface Burning Characteristics of Building Materials

2.3 FLOW DIAGRAM

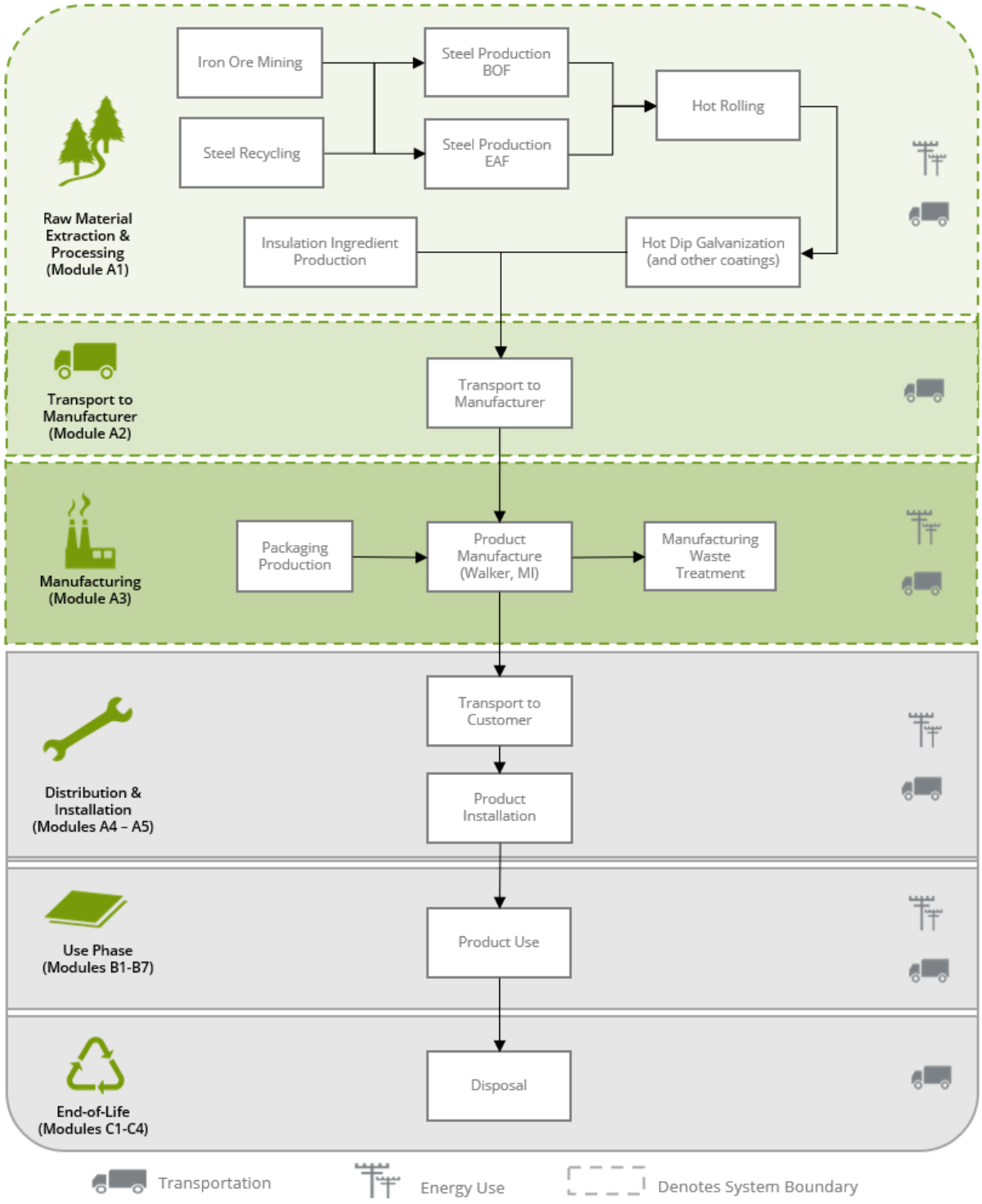


Figure 2. *Flow diagram illustrating the life cycle of FALK insulated metal panels.*

2.4 APPLICATION

Insulated metal panels are roofing and wall products designed to serve as structural elements and/or a barrier between buildings and their environments.

2.5 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-gate, including raw material extraction and processing; raw material transportation; and product manufacture including packaging.

Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported.

Processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No known flows were deliberately excluded from this EPD.

2.6 MATERIAL COMPOSITION

Table 3. *Material component summary for 100m² of 76.2mm (3") thick FALK **HFW-40 & RDEK-40** and 102mm (4") thick FALK **CSW-44 & MRP-44** insulated metal panels.*

Material	HFW-40 & RDEK-40 (3")		CSW-44 & MRP-44 (4")	
	Mass Final Product (%)	Recycled Content (%)	Mass Final Product (%)	Recycled Content (%)
Product				
Steel - Interior	31%	71%	30%	71%
Steel - Exterior	45%	65%	39%	77%
Isocyanate	15%	0.00	19%	0.00
Polyol	7%	0.00	10%	0.00
Other	2%	0.00	2%	0.00
Total:	**100%**	**52%**	**100%**	**52%**
Packaging				
Fiberboard	79%	90%	79%	90%
LDPE	18%	7%	18%	7%
Other Packaging	3%	0%	3%	0%
Total:	**100%**	**73%**	**100%**	**72%**

**Columns may not sum due to rounding*

Table 4. *Material component summary for 100m² of 76.2mm (3") thick FALK **SSR-42** and 63.5mm (2.5") thick FALK **RRP-40** insulated metal panels.*

Material	SSR-42 (3")		RRP-40 (2.5")	
	Mass Final Product (%)	Recycled Content (%)	Mass Final Product (%)	Recycled Content (%)
Product				
Steel - Interior	32%	71%	32%	71%
Steel - Exterior	44%	77%	46%	65%
Isocyanate	15%	0.00	13%	0.00
Polyol	7%	0.00	7%	0.00
Other	2%	0.00	2%	0.00
Total:	**100%**	**57%**	**100%**	**53%**
Packaging				
Fiberboard	78%	90%	78%	90%
LDPE	19%	7%	19%	7%
Other Packaging	3%	0%	3%	0%
Total:	**100%**	**72%**	**100%**	**72%**

**Columns may not sum due to rounding*

2.7 TRANSPORTATION

The majority of raw materials (~85%) are sourced from within North America, and require only truck and/or rail transportation for delivery to FALK's facility in Walker, MI. The remaining raw materials (~15%) are sourced internationally and require a combination of ocean freight, truck, and/or rail for delivery. All packaging materials are sourced within the U.S. and delivered via truck.

2.8 MANUFACTURE

Manufacturing of FALK insulated metal panels takes place at their facility in Walker, MI. IMP production takes place in four stages: (1) entry, (2) foaming, (3) cutting, and (4) packaging. During the entry stage, upper and lower steel coils are formed, brought together, and a protection film is applied to the lower coil. Next, foam is mixed, poured into a heated/formed steel frame, and allowed to expand to fill the desired space between coils. Once cooled, panels are cut to the desired size and inspected for quality. Finally, during the packaging stage, IMPs are stacked, bundled, and packaged prior to distribution.

No "green power", or CO_2 certificates is/are included in this EPD project.

2.9 PACKAGING

All FALK IMPs are packaged for distribution primarily using hardboard, LDPE stretch wrap, and LDPE protection film. Recycled content values of packaging materials can be found in Table 2 Table 5.

3. Methodological Framework

3.1 DECLARED UNIT

Based on the Part B PCR, the declared unit is defined as coverage of 100m^2 (1076.4 ft^2) with metal product. This declared unit does not capture any losses on installation.

Table 5. *Declared unit, mass, and mass conversion factor for the FALK IMP product system.*

Name	Unit	HFW-40 RDEK-40	CWS-44 MRP-44	SSR-42	RRP-40
Declared Unit	m^2	100m^2 of panel			
Mass	kg/100m^2	1370	1420	1340	1330
Conversion factor to 1kg	m^2/kg	7.29x10^{-2}	7.02x10^{-2}	7.47x10^{-2}	7.51x10^{-2}

3.2 SYSTEM BOUNDARY

Table 6. *FALK insulated metal panel system boundary.*

Product			Construction		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module Included | MND = Module Not Declared

3.3 ALLOCATION

This LCA follows an attributional approach as outlined in ISO 21930 Section 7.1.1. Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported. With respect to secondary materials, the 100-0 recycled content approach is used in which the recycled material bears only the burden of any processing from waste material and transportation to the facility. No allocation to secondary material, secondary fuels or recovered energy is permitted.

3.4 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results.

3.5 DATA SOURCES

Primary data were provided by FALK for their manufacturing facility in Walker, MI. The principal source of secondary LCI data is the Ecoinvent 3.10 database, with additional secondary electricity generation data from the US EPA's eGRID database. LCI data for hot dip galvanization are taken from the AISI report, "Life Cycle Inventories of North American Steel Products," which details inputs and outputs required for the hot dip galvanization process.

Table 7. *LCI datasets and associated databases used to model the FALK insulated metal panels.*

Component	Dataset	Geography	Data Source	Publication Date
Raw Materials				
Steel	steel production, converter, low-alloyed | steel, low-alloyed | Cutoff, U	RER*	EI v3.10	2023
	steel production, electric, low-alloyed | steel, low-alloyed | Cutoff, U	EU w/o CH and AU*	EI v3.10	2023
	Steel Dynamics, Prepainted, metallic-coated, cold-rolled steel sheet	Butler, IN	EPD	2024
	market for hot rolling, steel | hot rolling, steel | Cutoff, U	GLO	EI v3.10	2023
	market for sheet rolling, steel | sheet rolling, steel | Cutoff, U	GLO	EI v3.10	2023
Hot Dip Galvanization	market group for electricity, medium voltage | electricity, medium voltage | Cutoff, U	GLO	AISI EI v3.10	2020 2023
	market group for natural gas, high pressure | natural gas, high pressure | Cutoff, U	GLO	AISI EI v3.10	2020 2023
	market for nitrogen, liquid | nitrogen, liquid | Cutoff, U	RoW	AISI EI v3.10	2020 2023
	market for steam, in chemical industry | steam, in chemical industry | Cutoff, U	RoW	AISI EI v3.10	2020 2023
	market for zinc | zinc | Cutoff, U	GLO	AISI EI v3.10	2020 2023
Steel Coating	market for polyester resin, unsaturated | polyester resin, unsaturated | Cutoff, U	RoW	EI v3.10	2023
	market for polyvinylchloride, emulsion polymerised | polyvinylchloride, emulsion polymerised | Cutoff, U	GLO	EI v3.10	2023
	market for polyvinylfluoride | polyvinylfluoride | Cutoff, U	GLO	EI v3.10	2023
Foam Insulation	market for chemical, inorganic | chemical, inorganic | Cutoff, U	GLO	EI v3.10	2023
	market for pentane | pentane | Cutoff, U	GLO	EI v3.10	2023
	market for methylene diphenyl diisocyanate | methylene diphenyl diisocyanate | Cutoff, U - RoW	RoW	EI v3.10	2023
	market for polyether polyols, short chain | polyether polyols, short chain | Cutoff, U	RoW	EI v3.10	2023
	market for polyurethane adhesive | polyurethane adhesive | Cutoff, U	GLO	EI v3.10	2023
Packaging				
Protection Film	market for polyethylene, low density, granulate | polyethylene, low density, granulate | Cutoff, U	GLO	EI v3.10	2023
	market for extrusion, plastic film | extrusion, plastic film | Cutoff, U	GLO	EI v3.10	2023
Stretch Wrap	market for polyethylene, linear low density, granulate | polyethylene, linear low density, granulate | Cutoff, U	GLO	EI v3.10**	2023
	GLO market for extrusion, plastic film | extrusion, plastic film | Cutoff, U	GLO	EI v3.10**	2023
Hardboard	market for fibreboard, hard | fibreboard, hard | Cutoff, U	RoW	EI v3.10**	2023
Transport				
Truck	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, U	RoW	EI v3.10	2023
Ship	market for transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, U	GLO	EI v3.10	2023
Rail	market for transport, freight train | transport, freight train | Cutoff, U	US	EI v3.10	2023
Manufacture Inputs				
Electricity	market for electricity, medium voltage | electricity, medium voltage | Cutoff, U	RFCM	eGRID	2022
Natural Gas	market for heat, district or industrial, natural gas | heat, district or industrial, natural gas | Cutoff, U	RoW	EI v3.10	2023
Propane	market for propane | propane | Cutoff, U	GLO	EI v3.10	2023
Water	market for tap water | tap water | Cutoff, U	RoW	EI v3.10	2023
Waste Outputs				
Manufacture Waste	market for inert waste, for final disposal | inert waste, for final disposal | Cutoff, U	RoW	EI v3.10	2023
Wastewater	market for wastewater, average | wastewater, average | Cutoff, U	RoW	EI v3.10	2023

**Ecoinvent datasets modified to reflect regional electricity grid and technology make-up from steel suppliers in the following countries: US, MX, KR, IN, UK*

***Ecoinvent datasets modified to reflect recycled content values provided by FALK*

3.6. DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 8. *Data quality assessment.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The manufacturer provided primary data on product manufacturing for the Walker, Mi facility for a year beginning July 1, 2023 and ending June 30, 2024. Representative datasets (secondary data) for upstream and background processes are generally less than 5 years old.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data modelled for the specific electricity grids represented in this study. Surrogate data used in the assessment are representative of global or European operations and are considered sufficiently similar to actual processes.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative component datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represents typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.10 data where available. Different portions of the product life cycle are equally considered.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of the data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Energy use data at the Walker, MI facility represents a 12-month average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.10 data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment methodology includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 PERIOD UNDER REVIEW

The period of review is based on a 12-month period from July 1, 2023 through June 30, 2024.

3.8 COMPARABILITY AND BENCHMARKING

The PCR this EPD was based on dictates that comparison of the environmental performance of insulated metal panels shall be based on the IMP's use and impacts at the building level. As the scope of this EPD is cradle-to-gate (A1-A3) and does not include the use phase of the panels, it may not be used for comparison.

Furthermore, this cradle-to-gate EPD is intended for business-to-business (B2B) communication.

3.9 ESTIMATES AND ASSUMPTIONS

The assessment relied on a number of assumptions related to material composition, processing, and transportation. The major assumptions used in the assessment are described below.

- Specific data were not available on the production of cyclopentane and isocyanate in the insulation recipe. Secondary datasets for pentane, and methylene diphenyl diioscyanate were used from the Ecoinvent database to represent these insulation ingredients in the LCA model.
- Steel used in the production of FALK IMPs is sourced from around the globe. When a specific steel plant of origin could not be identified, national averages from worldsteel were used to model the relevant steel-making technologies; electric arc furnace (EAF) vs basic oxygen furnace (BOF).
- PVC pipe is consumed as an ancillary material during panel production. Based on input from product experts at FALK, this material was deemed to fall below the 1% cut-off.
- Water is only used during the production of the SSR-42 and RRP-40 IMPs. Without the ability to submeter water use, an assumption that 5% of total building water use is attributable to the IMP product system was made based on estimates of water use during manufacturing from experts at FALK.
- Transportation distance of the manufacturing waste to the appropriate waste treatment facility is assumed to be 32 km by truck based on the US EPA WARM model.

4. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The following environmental impact category indicators are reported using characterization factors specified by the PCR, using the TRACI 2.1, CML-IA, and IPCC AR5 impact assessment methods. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Table 9. *Mandatory environmental impact assessment categories.*

Impact Category	LCIA Method	Unit
GWP: Global Warming Potential	IPCC AR5, 2013	kg CO_2 eq
ODP: Depletion potential of the stratospheric ozone layer	TRACI 2.1	kg CFC 11 eq
AP: Acidification Potential of soil and water	TRACI 2.1	kg SO_2 eq
EP: Eutrophication Potential	TRACI 2.1	kg N eq
SFP: Smog Formation Potential	TRACI 2.1	kg O_3 eq
ADP_F: Abiotic Depletion Potential, fossil fuels	CML-IA Baseline	MJ, LHV

These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes. The following inventory parameters, specified by the PCR, are also reported.

Table 10. *Additional transparency categories.*

Resource Use Indicators	Unit	Waste and Output Indicators	Unit
RPR_E: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	**HWD:** Hazardous waste disposed	kg
RPR_M: Renewable primary resources with energy content used as material	MJ, LHV	**NHWD:** Non-hazardous waste disposed	kg
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	**RWD:** Radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material	MJ, LHV	**CRU:** Components for re-use	kg
SM: Secondary materials	kg	**MR:** Materials for recycling	kg
RSF: Renewable secondary fuels	MJ, LHV	**MER:** Materials for energy recovery	kg
NRSF: Non-renewable secondary fuels	MJ, LHV	**EE:** Recovered energy exported from the product system	kg
RE: Recovered energy	MJ, LHV	**EE:** Recovered energy exported from the product system	MJ, LHV
FW: Use of new freshwater resources	m^3		

All LCA results are stated to three significant figures in agreement with the PCR for this product and therefore the sum of the total values may not exactly equal 100%.

Table 11. *LCIA Environmental Impact Results for 100m² of 76.2mm (3") thick FALK* ***HFW-40 and RDEK-40*** *IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
HFW-40/RDEK-40					
GWP	kg CO_2 eq	4,790	514	226	**5,530**
ODP	kg CFC-11 eq	$1.05x10^{-4}$	$8.24x10^{-6}$	$3.76x10^{-6}$	**$1.17x10^{-4}$**
AP	kg SO_2 eq	19.1	2.67	0.827	**22.6**
EP	kg N eq	29.0	0.570	0.988	**30.6**
SFP	kg O_3 eq	242	62.4	10.4	**315**
ADP_F	MJ	61,200	7,030	2,930	**71,100**

Table 12. *LCIA Environmental Impact Results for 100m² of 102mm (4") thick FALK* ***CSW-44 and MRP-44*** *IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
CSW-44/MRP-44					
GWP	kg CO_2 eq	5,470	552	233	**6,250**
ODP	kg CFC-11 eq	$1.36x10^{-4}$	$8.85x10^{-6}$	$3.89x10^{-6}$	**$1.48x10^{-4}$**
AP	kg SO_2 eq	22.4	2.66	0.847	**25.9**
EP	kg N eq	35.3	0.612	1.01	**37.0**
SFP	kg O_3 eq	275	63.5	10.7	**349**
ADP_F	MJ	73,200	7,570	3,020	**83,800**

Table 13. *LCIA Environmental Impact Results for 100m² of 76.2mm (3in) thick FALK* ***SSR-42*** *IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
SSR-42					
GWP	kg CO_2 eq	4,670	519	236	**5,430**
ODP	kg CFC-11 eq	$1.06x10^{-4}$	$8.32x10^{-6}$	$3.95x10^{-6}$	**$1.19x10^{-4}$**
AP	kg SO_2 eq	18.8	2.54	0.862	**22.2**
EP	kg N eq	28.7	0.575	1.04	**30.3**
SFP	kg O_3 eq	236	60.3	11.0	**307**
ADP_F	MJ	60,500	7,100	3,150	**70,700**

Table 14. *LCIA Environmental Impact Results for 100m² of 63.5mm (2.5") thick FALK* ***RRP-40*** *IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
RRP-40					
GWP	kg CO_2 eq	5,080	560	226	**5,870**
ODP	kg CFC-11 eq	$1.08x10^{-4}$	$8.96x10^{-6}$	$3.79x10^{-6}$	**$1.21x10^{-4}$**
AP	kg SO_2 eq	20.2	2.92	0.829	**23.9**
EP	kg N eq	30.3	0.622	1.03	**32.0**
SFP	kg O_3 eq	257	68.3	10.5	**336**
ADP_F	MJ	64,300	7,650	2,960	**74,900**

Table 15. *Resource use indicators Results for 100m² of 76.2mm (3") thick FALK **HFW-40 and RDEK-40** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
HFW-40/RDEK-40					
RPR_E	MJ, LHV	4,970	92.7	1,020	**6,080**
RPR_M	MJ, LHV	0.00	0.00	0.00	**0.00**
$NRPR_E$	MJ, LHV	65,100	7,120	3,250	**75,500**
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	**0.00**
SM	kg	779	0.00	37.4	**817**
RSF	MJ, LHV	0.00	0.00	0.00	**0.00**
NRSF	MJ, LHV	0.00	0.00	0.00	**0.00**
RE	MJ, LHV	0.00	0.00	0.00	**0.00**
FW	m^3	53.9	0.954	1.17	**56.0**

Table 16. *Resource use indicators Results for 100m² of 102mm (4") thick FALK **CSW-44 and MRP-44** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
CSW-44/MRP-44					
RPR_E	MJ, LHV	5,820	101	1,030	**6,950**
RPR_M	MJ, LHV	0.00	0.00	0.00	**0.00**
$NRPR_E$	MJ, LHV	77,800	7,670	3,350	**88,800**
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	**0.00**
SM	kg	834	0.00	37.4	**872**
RSF	MJ, LHV	0.00	0.00	0.00	**0.00**
NRSF	MJ, LHV	0.00	0.00	0.00	**0.00**
RE	MJ, LHV	0.00	0.00	0.00	**0.00**
FW	m^3	61.4	1.03	1.21	**63.7**

Table 17. *Resource use indicators Results for 100m² of 76.2mm (3") thick FALK **SSR-42** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
SSR-42					
RPR_E	MJ, LHV	4,870	94.3	1,030	**6,000**
RPR_M	MJ, LHV	0.00	0.00	0.00	**0.00**
$NRPR_E$	MJ, LHV	64,400	7,200	3,480	**75,100**
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	**0.00**
SM	kg	855	0.00	37.4	**893**
RSF	MJ, LHV	0.00	0.00	0.00	**0.00**
NRSF	MJ, LHV	0.00	0.00	0.00	**0.00**
RE	MJ, LHV	0.00	0.00	0.00	**0.00**
FW	m^3	53.8	0.970	0.859	**55.6**

Table 18. *Resource use indicators Results for 100m² of 63.5mm (2.5") thick FALK **RRP-40** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
RRP-40					
RPR_E	MJ, LHV	5,230	101	1,020	**6,360**
RPR_M	MJ, LHV	0.00	0.00	0.00	**0.00**
$NRPR_E$	MJ, LHV	68,500	7,750	3,280	**79,500**
$NRPR_M$	MJ, LHV	0.00	0.00	0.00	**0.00**
SM	kg	865	0.00	37.4	**902**
RSF	MJ, LHV	0.00	0.00	0.00	**0.00**
NRSF	MJ, LHV	0.00	0.00	0.00	**0.00**
RE	MJ, LHV	0.00	0.00	0.00	**0.00**
FW	m^3	57.5	1.04	0.715	**59.2**

Table 19. *Waste and Output Indicator Results for 100m² of 76.2mm (3") thick FALK **HFW-40 and RDEK-40** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
HFW-40/RDEK-40					
HWD	kg	0.00	0.00	0.00	**0.00**
NHWD	kg	0.00	0.00	6.84	**6.84**
HLRW/ILLRW	kg	0.00	0.00	0.00	**0.00**
CRU	kg	0.00	0.00	0.00	**0.00**
MR	kg	0.00	0.00	237	**237**
MER	kg	0.00	0.00	0.00	**0.00**
EE	MJ, LHV	0.00	0.00	0.00	**0.00**

Table 20. *Waste and Output Indicator Results for 100m² of 102mm (4") thick FALK **CSW-44 and MRP-44** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
CSW-44/MRP-44					
HWD	kg	0.00	0.00	0.00	**0.00**
NHWD	kg	0.00	0.00	7.11	**7.11**
HLRW/ILLRW	kg	0.00	0.00	0.00	**0.00**
CRU	kg	0.00	0.00	0.00	**0.00**
MR	kg	0.00	0.00	246	**246**
MER	kg	0.00	0.00	0.00	**0.00**
EE	MJ, LHV	0.00	0.00	0.00	**0.00**

Table 21. *Waste and Output Indicator Results for 100m² of 76.2mm (3") thick FALK **SSR-42** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
SSR-42					
HWD	kg	0.00	0.00	0.00	**0.00**
NHWD	kg	0.00	0.00	6.68	**6.68**
HLRW/ILLRW	kg	0.00	0.00	0.00	**0.00**
CRU	kg	0.00	0.00	0.00	**0.00**
MR	kg	0.00	0.00	231	**231**
MER	kg	0.00	0.00	0.00	**0.00**
EE	MJ, LHV	0.00	0.00	0.00	**0.00**

Table 22. *Waste and Output Indicator Results for 100m² of 63.5mm (2.5") thick FALK **RRP-40** IMP.*

Impact Category	Unit	A1	A2	A3	A1-A3 Total
RRP-40					
HWD	kg	0.00	0.00	0.00	**0.00**
NHWD	kg	0.00	0.00	6.65	**6.65**
HLRW/ILLRW	kg	0.00	0.00	0.00	**0.00**
CRU	kg	0.00	0.00	0.00	**0.00**
MR	kg	0.00	0.00	230	**230**
MER	kg	0.00	0.00	0.00	**0.00**
EE	MJ, LHV	0.00	0.00	0.00	**0.00**

5. LCA: Interpretation

Figure 3 and Figure 4 illustrate the contribution analysis for all assessed LCIA indicator results for the insulated metal panels. Results demonstrate that the raw material extraction and processing life cycle stage (A1) is the dominant contributor to all LCIA indicators assessed, making up between 77% and 96% of impact.

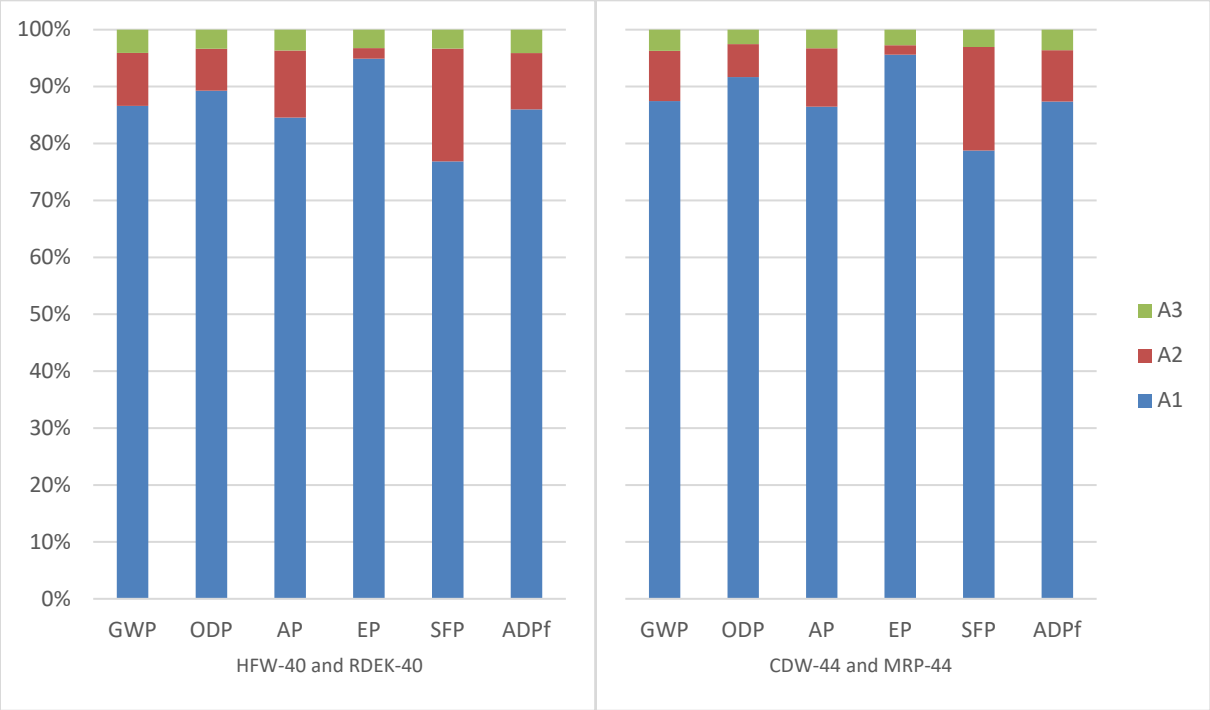


Figure 3. *Contribution analysis for the **HFW-40/RDEK-40 (3"), and CSW-44/MRP-44 (4")** IMPs.*

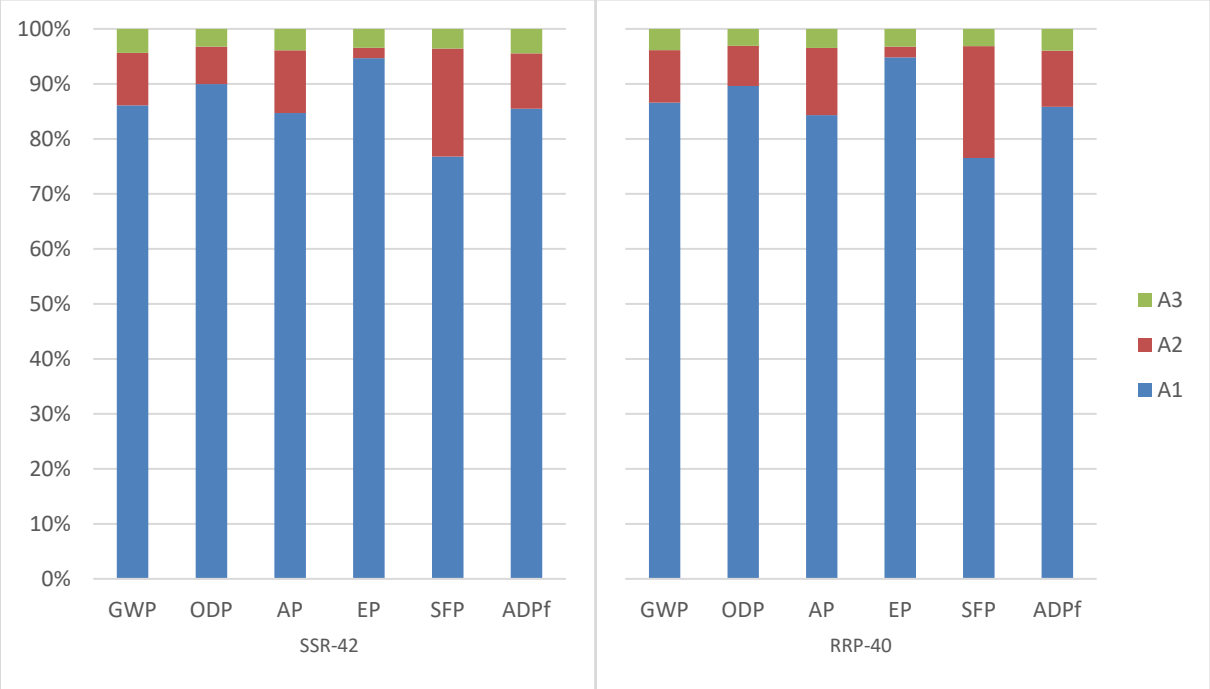


Figure 4. *Contribution analysis for the **SSR-42 (3") and RRP-40 (2.5")** IMPs.*

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