



Environmental Product Declaration for Rondo Products: Ceiling, Wall Framing and Finishing

Rondo furring channel

Environmental Product Declaration in accordance with ISO 14025 and EN 15804+A1

Programme:	EPD Australasia www.epd-australasia.com
Programme Operator:	EPD Australasia Limited
Technical Rules:	Australasian General Programme Instructions v3.0
Product Category Rules (PCR):	PCR 2012:01 Construction Products and Construction Services, Version 2.3, 2018-11-15
EPD Registration Number:	S-P-01548
Approval Date:	2020-11-02
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Revision Date:	2020-11-02
Geographical Scope:	Rondo products manufactured in Australia for the Australian and international market

About Rondo

Rondo is a highly focused business involved in the manufacture and supply of a wide range of lighter gauge rollformed steel products and systems, primarily for the construction industry in Australia, New Zealand, Asia Pacific and the Middle East.

This EPD covers products manufactured at the Rondo facility in Sydney, New South Wales, Australia for use in ceiling systems, wall framing systems, finishing and accessories products and associated clips.

Our primary purpose is 'To provide our customers with industry leading systems solutions incorporating high quality rollformed products and accessories complemented by outstanding customer service'.

Rondo is a proud Australian Company which is further developing internationally through the development of offshore businesses with manufacturing plants in Auckland and Christchurch NZ and Kuala Lumpur Malaysia. These businesses provide Rondo a base for further growth for what we plan will develop into several successful regional businesses in the long term and also allow us to provide a broader more integrated competitive product offer across all markets in which we operate.



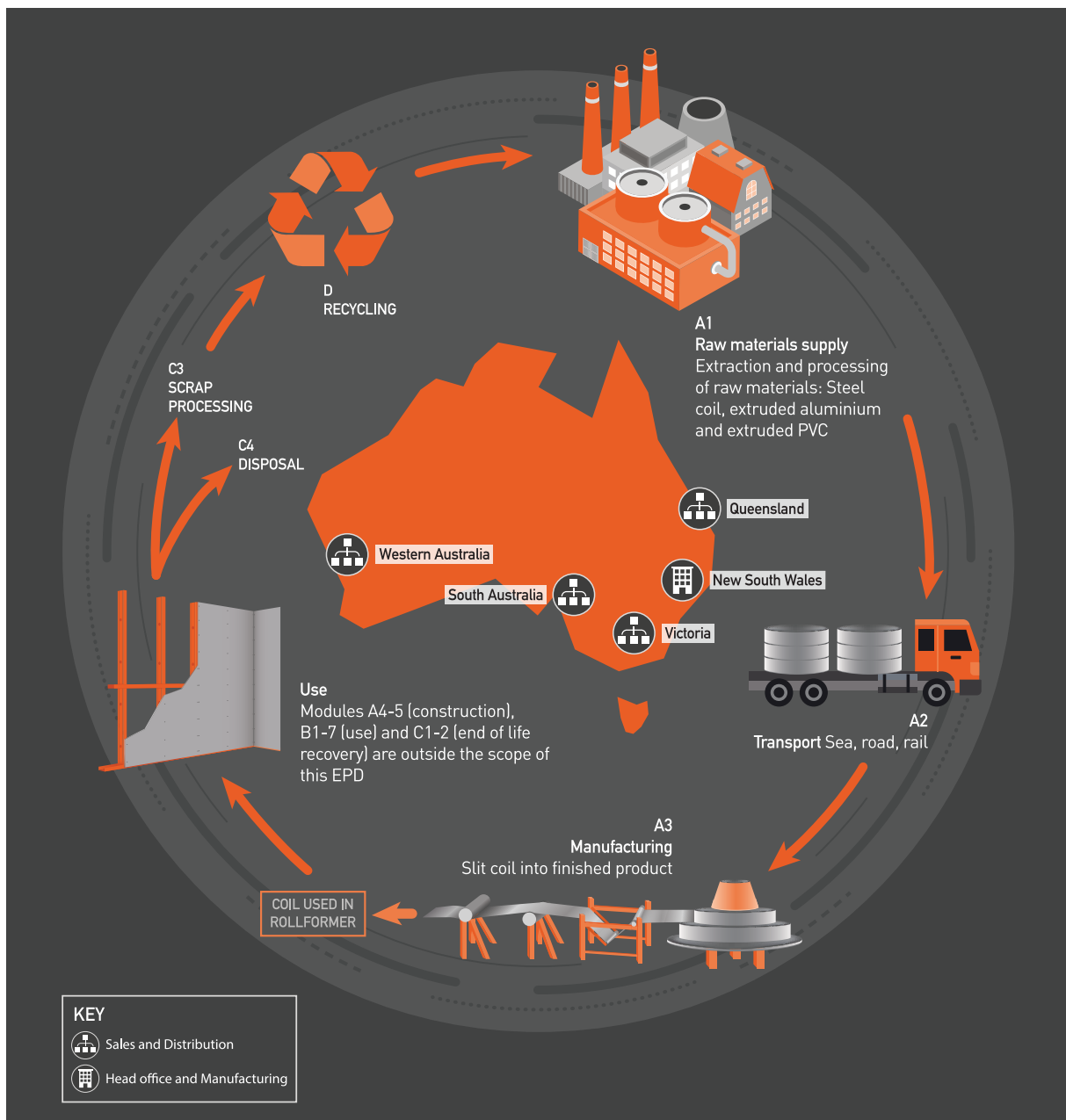
Rondo manufacturing plant, Erskine Park NSW

Rondo product manufacturing

Rondo uses state-of-the-art manufacturing technology in the production of all of our products and systems, enabling us to produce large customer orders quickly and efficiently. We also have the capacity to perform custom rollforming to meet specialised customer requirements.

High quality raw materials, stringent testing criteria, and world class quality control ensure that every product meets our exacting specifications.

Rondo’s product system involves purchase of input feed, mainly from BlueScope, and subsequent manufacture of respective Rondo products. Processes include punching, bending and cutting to size. This is followed by packaging ready for distribution to customer. The clips go through an additional neutral hardening and tempering process, using a gas fired continuous feed conveyor type furnace.



Rondo product life cycle

Rondo products covered by EPD

This EPD covers products manufactured at the Rondo facility in Sydney, New South Wales, Australia for use in:

1. Ceiling systems;
2. Wall framing systems;
3. Finishing and accessories products; and
4. Clips.

This EPD is valid for a declared unit of 1 kg of Rondo products.

The ceiling products included in this report and EPD are from Rondo's KEY-LOCK® concealed ceiling system, DUO® exposed grid ceiling system, Aluminium exposed grid system, and WALK-ABOUT trafficable ceiling system. The products include main tees, cross tees, top cross rails, furring channels, ceiling battens, wall tracks (to connect the ceiling to the wall) and wall trims (to cover connections), as shown in Figure 1. Clips, joiners and brackets are covered in the clips category.

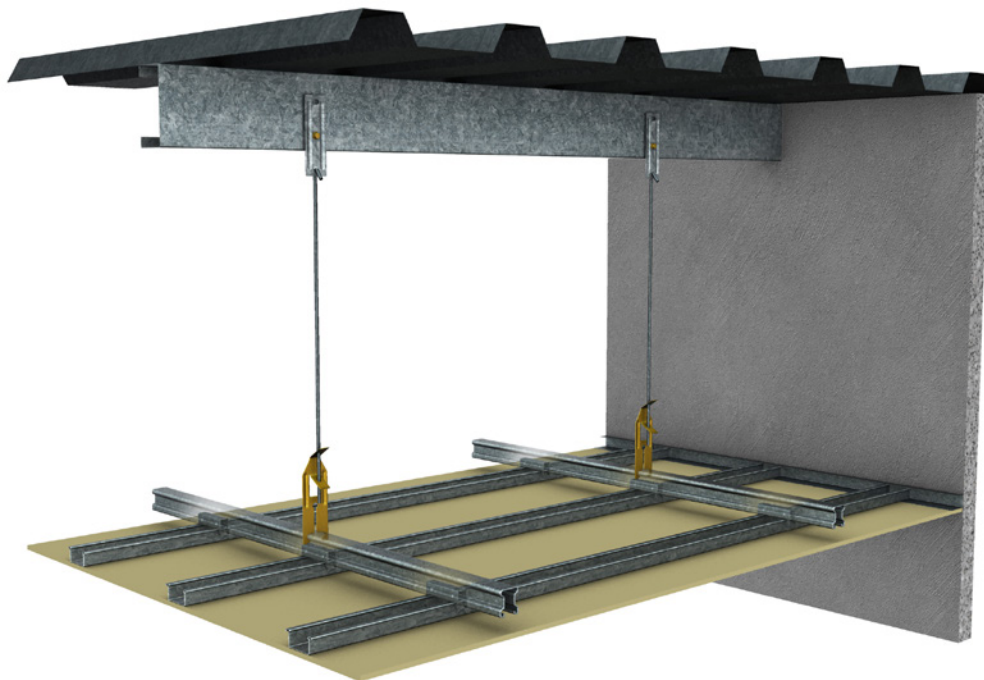


Figure 1: Rondo Ceiling Systems

Rondo KEY-LOCK® concealed suspended ceiling system

The wall framing products included are from Rondo's STEEL STUD drywall framing system, MAXIframe® external wall framing system, and SHAFTWALL one-way erected system. The products include wall studs, wall tracks, deflection head tracks, nogging tracks, as shown in Figure 2. Clips, joiners and brackets are covered in the clips category.

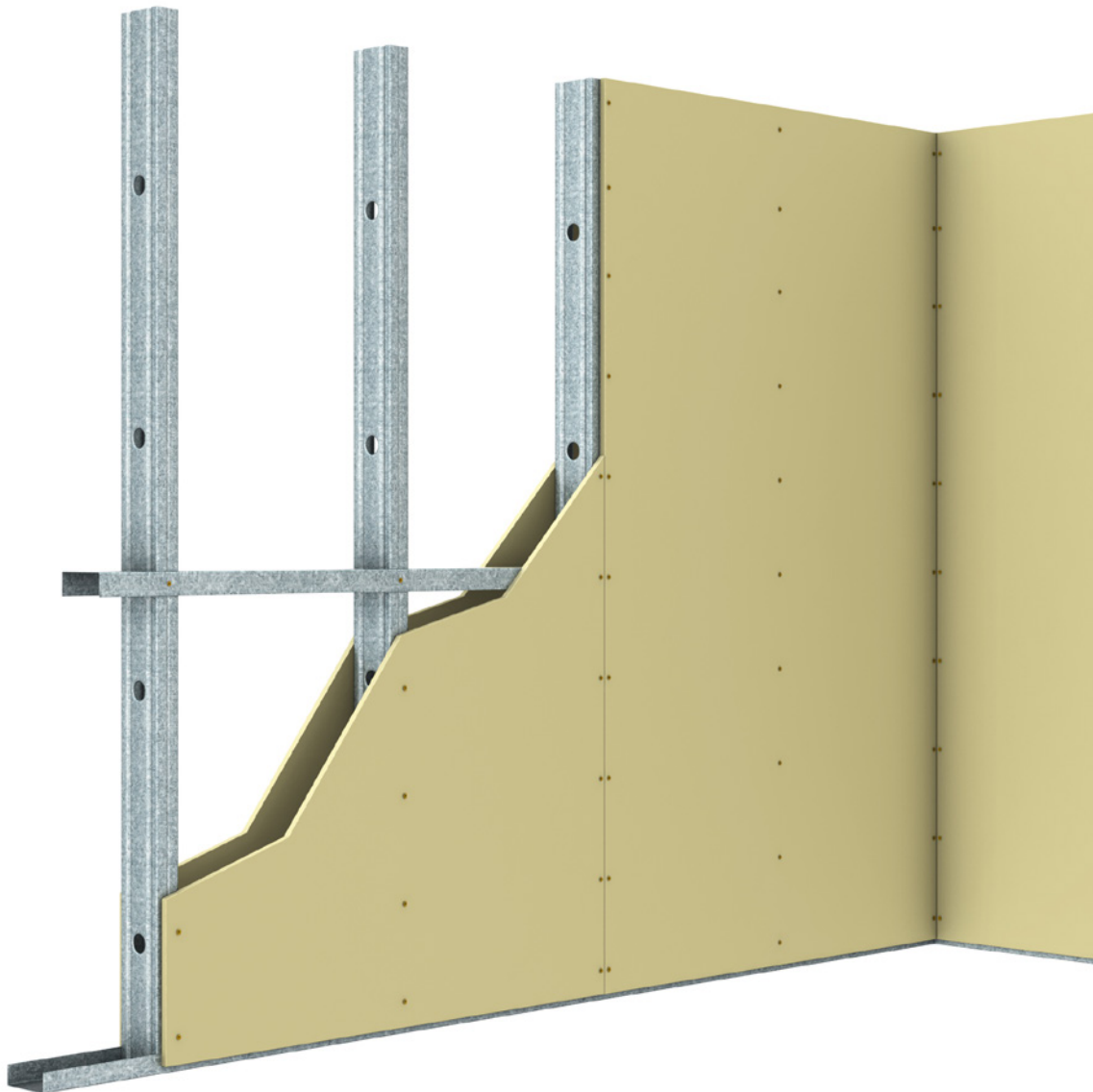


Figure 2: Rondo Wall Systems

Rondo stud and track system

The finishing and accessories products are from Rondo's EXANGLE® drywall finishing sections, EXANGLE® render and texture finishing sections, EXTREME® PVC render and plasterboard beads, and ACCESSORIES top hats and angles. An example is shown in Figure 3.



Figure 3: Rondo Finishing Sections

Rondo corner bead 0.30mm BMT

The clips, joiners and brackets used in these systems are all covered in the clips group.

Similarities between products in the first three categories (ceiling systems, wall framing systems, finishing and accessories products) have enabled them to be grouped according to substrate material, gauge and proportion of punch outs. LCA results have been calculated for a representative product within each group (not an average). The products in this EPD are represented by 26 products for Module A1-A3, 3 products for Module C and 7 products for Module D. The representative products used for Module A1-A3 are outlined in Table 1, while those used for Module D are shown in Table 2. The tables show the substrate materials, Base Metal Thickness (BMT) and percentage punch outs (A1-A3 only) represented by the group, with the parameters for the representative products in bold where required, as well as a list of all products included in the group.

The specific products covered by this EPD are outlined in Table 3 (ceiling systems), Table 4 (wall framing systems), and Table 5 (finishing and accessories), along with a length to mass conversion factor and the representative product for each LCA module.

Rondo's systems use a variety of clips, although the overall mass of clips is quite small in the scheme of a project. The manufacturing impacts for all clips are represented by a single product, 2534, which is Rondo's biggest seller. The base material is cold rolled annealed steel that goes through a further hardening process after roll forming. The energy intensive nature of the hardening process makes it a 'worst case' example. The clips covered by this EPD are outlined in Table 6, along with a mass per piece conversion factor and the representative product for each LCA module.



Rondo plaster internal angle 0.30mm BMT

Table 1: Product Groups for Module A1-A3 including Representative Product and the Materials, BMTs, % Punch Outs and Products represented

Bold text shows specifications for representative products

Product	Materials	BMT (mm)	Punch outs	Product List
DUO7	Aluminium	Extruded	0%	321, 357, 359, 242R, DUO7, DUO8, DUO9
2534	See Clips table			
P35	GALVABOND® steel G2 Z275 and PVC	0.4	60%	P35
P50	GALVABOND® steel G2 Z275	0.35- 0.4	25-33% (30)	P01A, PS17, PSIA, P50, P60
R50	GALVABOND® steel G2 Z275	0.4	0-13% (7)	P32, P28, P51, P52, P53, R50
P12	GALVABOND® steel G2 Z275	0.4	60%	P11, P12, P13, P14
P25	GALVABOND® steel G2 Z275	0.4	80%	P10, P25, P26, P27, R11
309A	GALVABOND® steel G2 Z275	0.45	0%	309A
107	GALVABOND® steel G2 Z275	0.5	15%	103, 107, 108, 109, 110
129	GALVABOND® steel G2 Z275, Polyester-coated GALVABOND® steel G2 Z275	0.5-0.55	0-4%	310, NZ31, 129, 155, 308, 333, 125, 140, 142, 143, 340, DUO5, DUO6, RQST, 570, 590, 480, 482, 483, 574, 594, 112, 401, 251, 403, 111, 250, 400, 402, R01, R02
495	GALVABOND® steel G2 Z275, Paper-lined GALVABOND® steel G2 Z275	0.7-0.8 (0.75)	0%	272, 872, 873, 127, 128, GQ75, RQ75, 488, 497, 498, 499, 510, 579, 599, 578, 598, Q488, Q497, Q498, Q499, Q490, Q492, Q496, 489, 491, 493, 495, 511, 490, 492, 494, 496, 552, 553, 554, 555, 557, HB50, M515, M525, M535, M545, M550, M560, M715, M725, M735, M750
506	GALVABOND® steel G2 Z275	0.7-0.75	9-10%	214, 215, 216, 217, 503, 504, 505, 506, 501, 507
592	GALVABOND® steel G2 Z275	0.9	4%	572, 592
681	GALVABOND® steel G2 Z275	1.15-1.2	0%	141, 559, 810, 820, S673, 690, 683, 673, 663, 200, 204, S683, S690, 661, 671, 681, 691, 660, 670, 680, 530, 556, 558, HB75, H515, H525, H535, H545, H550, H560, H715, H725, H735, H750
RE3530	Plastic – PVC	Extruded	0%	PCB0630, PCB1024, PCB1027, PCB1030, PCB1036, PCB1330, PDM0630, PDM4530, PE9030, PE90SL30, PEA9030, RE2530, RE3530, RE6030, RE902530, RE903530, RESC8030, RSBSC8030, PADJIN, PFTLB30, PTLB1030, PTLB1330, PTLB630, PTSH1030, PEXPH30
SR02	Stainless Steel	0.45	0%	SR02
P01S	Stainless Steel	0.45	25%	P01S
121	OneSteel Rod	n/a	0%	121, 122
301	ZINCALUME® steel G550 ZM125	0.42	0%	301, 303
P05	ZINCANNEAL® steel G2S ZF100	0.5	0%	P03, P05, P07, P08, P06, P09
R06	ZINCANNEAL® steel G2S ZF100	0.5	45%	R06
R05	ZINCANNEAL® steel G2S ZF100	0.5	60%	R05
REVB030	ZINCANNEAL® steel G2S ZF100	0.9	17-26% (22)	REVB045, REVB040, REVB035, REVB030, REVB025, REVB020
REVB080	ZINCANNEAL® steel G2S ZF100	0.9	7-16% (12)	REVB150, REVB120, REVB110, REVB100, REVB090, REVB080, REVB075, REVB065, REVB060, REVB050
DUO2	Plain & Polyester-coated ZINCFORM® steel G300 Z200	0.3	0-3% (2)	371, DUO2, DUO1, P18, P40
P01	ZINCFORM® steel G300 Z200	0.3	25%	P01, P01L

Table 2: Product Groups for Modules C3-C4 including Representative Product and the Materials and Products represented

Code	Materials	Representative Products Included
P35	GALVABOND® G2 Z275 and PVC	P35
RE3530	PVC	RE3530
506	Metals, all thicknesses & punch outs	DUO7, DUO2, 309A, P25, P50, P01S, R50, SR02, P12, 129, 107, P01, 495, 592, 506, R06, R05, P05, 301, 121, 681, REVB080, REVB030, 2534

Table 3: Product Groups for Module D including Representative Product and the Materials, BMTs and Products represented

Bold text shows specifications for representative products

Product	Materials	BMT (mm)	Representative Products Included
DUO7	Aluminium	Extruded	DUO7
P35	GALVABOND® steel G2 Z275 and PVC		P35
P50	GALVABOND® steel G2 Z275, Stainless Steel, ZINCFORM® G300 Z200, Plain & Polyester-coated ZINCFORM® steel G300 Z200	0.3-0.45 (0.4)	DUO2, 309A, P25, P50, P01S, R50, SR02, P12
129	GALVABOND® steel G2 Z275, Polyester-coated GALVABOND® steel G2 Z275, ZINCFORM® steel G300 Z200	0.3-0.55 (0.5)	129, 107, P01
506	GALVABOND® steel G2 Z275, Paper-lined GALVABOND® steel G2 Z275, ZINCANNEAL® steel G2S ZF100	0.5-0.9 (0.7)	495, 592, 506, R06, R05, P05
RE3530	Plastic – PVC	Extruded	RE3530
301	ZINCALUME® steel G550 ZM125, OneSteel Rod, GALVABOND® steel G2 Z275, ZINCANNEAL® steel G2S ZF100	0.42-1.2 (0.42)	301, 2534, 121, 681, REVB080, REVB030

Table 4: Rondo Ceiling products and representative products for each LCA module

Purpose	Material	BMT (mm)	Punch outs	Product	Conversion linear m/kg	Representative products		
						A1-A3	C3-C4	D
Bulkhead Trim	Aluminium	Extruded	0%	321	3.13	DU07	506	DU07
Ceiling Batten	GALVABOND® steel G2 Z275	0.55	0%	310	1.66	129	506	129
		0.55	0%	NZ31	3.68	129	506	129
	ZINCALUME® steel G550 AM125	0.42	0%	301	3.92	301	506	301
		0.42	0%	303	2.80	301	506	301
Concealed T-Spline	ZINCFORM® steel G300 Z200	0.3	0%	371	4.09	DUO2	506	P50
		0.45	0%	309A	2.44	309A	506	P50
Furring Channel	GALVABOND® steel G2 Z275	0.5	0%	129	1.99	129	506	129
		0.5	0%	155	1.83	129	506	129
		0.5	0%	308	2.51	129	506	129
		0.5	0%	333	1.93	129	506	129
		Extruded	0%	357	4.62	DU07	506	DU07
Primary Section Cross Tee	Aluminium	Extruded	0%	359	4.80	DU07	506	DU07
		Plain & Polyester-coated ZINCFORM® steel G300 Z200	0.3	2%	DUO2	0.00	DUO2	506
Primary Section Main Tee	Plain & Polyester-coated ZINCFORM® steel G300 Z200	0.3	3%	DUO1	2.81	DUO2	506	P50
Section Joiner	GALVABOND® steel G2 Z275	0.75	0%	272	2.00	495	506	506
Seismic Deflection Head Track	GALVABOND® steel G2 Z275	0.7	0%	872	0.90	495	506	506
		0.7	0%	873	0.65	495	506	506
Suspension Rod	OneSteel Rod	n/a	0%	121	6.67	121	506	301
		n/a	0%	122	5.63	121	506	301
Top Cross Rail	GALVABOND® steel G2 Z275	0.55	0%	125	2.57	129	506	129
		0.75	0%	127	1.91	495	506	506
		0.75	0%	128	1.48	495	506	506
		0.5	0%	140	3.06	129	506	129
Wall Track	GALVABOND® steel G2 Z275	0.5	0%	142	4.29	129	506	129
		0.5	0%	143	3.33	129	506	129
		0.5	0%	340	2.52	129	506	129
		1.15	0%	141	1.40	681	506	301
		Extruded	0%	242R	3.56	DU07	506	DU07
Wall Trim	Aluminium	Extruded	0%	DUO7	5.90	DU07	506	DU07
		Extruded	0%	DUO8	4.62	DU07	506	DU07
		Extruded	0%	DUO9	4.09	DU07	506	DU07
		Extruded	0%	DUO9	4.09	DU07	506	DU07
	Polyester-coated GALVABOND® steel G2 Z275	0.5	0%	DUO5	4.74	129	506	129
		0.5	0%	DUO6	3.91	129	506	129

Table 5: Rondo Wall Framing products and representative products for each LCA module

Purpose	Material	BMT (mm)	Punch outs	Product	Conversion linear m/kg	Representative products		
						A1-A3	C3-C4	D
Acoustic Stud System	GALVABOND® steel G2 Z275	0.55	0.02%	RQST	0.86	129	506	129
		0.75	0.02%	GQ75	0.64	495	506	506
		0.75	0.02%	RQ75	0.64	495	506	506
Angle & C-Channel	GALVABOND® steel G2 Z275	1.15	0%	559	1.05	681	506	301
		1.15	0%	810	0.66	681	506	301
		1.15	0%	820	0.60	681	506	301
CH Stud	GALVABOND® steel G2 Z275	0.55	4%	570	1.06	129	506	129
		0.55	4%	590	0.90	129	506	129
		0.9	4%	572	0.68	592	506	506
		0.9	4%	592	0.57	592	506	506
Deflection Head Track	GALVABOND® steel G2 Z275	0.5	0%	480	1.46	129	506	129
		0.5	0%	482	1.35	129	506	129
		0.5	0%	483	1.23	129	506	129
		0.7	0%	488	1.15	495	506	506
		0.7	0%	497	1.06	495	506	506
		0.7	0%	498	0.99	495	506	506
		0.7	0%	499	0.90	495	506	506
		0.75	0%	510	0.65	495	506	506
		0.8	0%	579	0.81	495	506	506
		0.8	0%	599	0.68	495	506	506
		1.15	0%	5673	0.61	681	506	301
		1.15	0.03%	690	0.43	681	506	301
		1.15	0.04%	683	0.56	681	506	301
1.15	0.05%	673	0.60	681	506	301		
1.15	0.06%	663	0.66	681	506	301		
Double Punched Nogging Track	GALVABOND® steel G2 Z275	0.7	10%	214	1.33	506	506	506
		0.7	10%	215	1.22	506	506	506
		0.7	10%	216	1.10	506	506	506
		0.75	10%	217	0.74	506	506	506
E Stud	GALVABOND® steel G2 Z275	0.55	0%	574	1.51	129	506	129
		0.55	0%	594	1.14	129	506	129
Flexible Track	GALVABOND® steel G2 Z275	0.5	15%	103	2.26	107	506	129
		0.5	15%	107	0.85	107	506	129
		0.5	15%	108	1.14	107	506	129
		0.5	15%	109	1.02	107	506	129
		0.5	15%	110	0.73	107	506	129
J Runner Track	GALVABOND® steel G2 Z275	0.8	0%	578	1.04	495	506	506
		0.8	0%	598	0.84	495	506	506
Jamb Stud	GALVABOND® steel G2 Z275	1.2	0.02%	200	0.35	681	506	301
		1.2	0.02%	204	0.29	681	506	301

Table 5: Continued

Purpose	Material	BMT (mm)	Punch outs	Product	Conversion linear m/kg	Representative products		
						A1-A3	C3-C4	D
Nogging Bracket & Track	GALVABOND® steel G2 Z275	0.7	9%	503	1.49	506	506	506
		0.7	9%	504	1.34	506	506	506
		0.7	9%	505	1.22	506	506	506
		0.7	9%	506	1.10	506	506	506
		0.75	9%	501	1.28	506	506	506
		0.75	9%	507	0.74	506	506	506
'Quiet' Deflection Head Track	Paper-lined GALVABOND® steel G2 Z275	0.7	0%	Q488	1.17	495	506	506
		0.7	0%	Q497	1.08	495	506	506
		0.7	0%	Q498	1.00	495	506	506
		0.7	0%	Q499	0.91	495	506	506
'Quiet' Wall Track	Paper-lined GALVABOND® steel G2 Z275	0.7	0%	Q490	1.60	495	506	506
		0.7	0%	Q492	1.43	495	506	506
		0.7	0%	Q496	1.15	495	506	506
Slotted Deflection Head Track	GALVABOND® steel G2 Z275	1.15	0%	S683	0.73	681	506	301
		1.15	0%	S690	0.54	681	506	301
Wall Stud	GALVABOND® steel G2 Z275	0.5	0.02%	112	1.67	129	506	129
		0.5	0.02%	401	1.82	129	506	129
		0.55	0.02%	251	1.27	129	506	129
		0.55	0.02%	403	1.40	129	506	129
		0.75	0.02%	489	1.28	495	506	506
		0.75	0.02%	491	1.12	495	506	506
		0.75	0.02%	493	1.03	495	506	506
		0.75	0.02%	495	0.94	495	506	506
		0.75	0.02%	511	0.72	495	506	506
		1.15	0.02%	661	0.80	681	506	301
		1.15	0.02%	671	0.73	681	506	301
		1.15	0.02%	681	0.65	681	506	301
Wall Track	GALVABOND® steel G2 Z275	0.5	0%	111	1.88	129	506	129
		0.5	0%	250	1.54	129	506	129
		0.5	0%	400	2.08	129	506	129
		0.5	0%	402	1.70	129	506	129
		0.7	0%	490	1.43	495	506	506
		0.7	0%	492	1.37	495	506	506
		0.7	0%	494	1.24	495	506	506
		0.7	0%	496	1.12	495	506	506
		1.15	0%	660	0.87	681	506	301
		1.15	0%	670	0.79	681	506	301
		1.15	0%	680	0.70	681	506	301

Table 6: Rondo Finishing products and representative products for each LCA module

Purpose	Material	BMT (mm)	Punch outs	Product	Conversion linear m/kg	Representative products		
						A1-A3	C3-C4	D
Angles	GALVABOND® steel G2 Z275	0.7	0%	552	3.46	495	506	506
		0.7	0%	553	2.54	495	506	506
		0.7	0%	554	1.72	495	506	506
		0.75	0%	555	1.12	495	506	301
		0.75	0%	557	0.85	495	506	301
		0.75	0.05%	HB50	1.61	495	506	301
		1.15	0%	530	1.40	681	506	301
		1.15	0%	556	0.73	681	506	P50
		1.15	0%	558	0.56	681	506	506
		1.15	0.02%	HB75	0.87	681	506	506
Archway Bead	GALVABOND® steel G2 Z275	0.4	80%	P10	7.50	P25	506	RE3530
Bullnose Corner Beads	ZINCANNEAL® steel G2S ZF100	0.5	45%	R06	2.61	R06	506	RE3530
		0.5	60%	R05	5.08	R05	506	RE3530
Casing Beads	Plastic – PVC	Extruded	0%	PCB0630	16.67	RE3530	RE3530	RE3530
		Extruded	0%	PCB1024	12.00	RE3530	RE3530	RE3530
		Extruded	0%	PCB1027	12.27	RE3530	RE3530	RE3530
		Extruded	0%	PCB1030	12.50	RE3530	RE3530	RE3530
		Extruded	0%	PCB1036	13.85	RE3530	RE3530	RE3530
		Extruded	0%	PCB1330	9.38	RE3530	RE3530	129
		Extruded	0%	PDM0630	11.54	RE3530	RE3530	129
		Extruded	0%	PDM4530	12.50	RE3530	RE3530	P35
	GALVABOND® steel G2 Z275	0.5	0%	R01	3.13	129	506	P50
		0.5	0%	R02	3.13	129	506	P50
Expansion Joint	GALVABOND® steel G2 Z275 and PVC	0.4	60%	P35	3.09	P35	P35	129
Ext Corner	GALVABOND® steel G2 Z275	0.35	25%	P01A	7.50	P50	506	129
	Stainless Steel	0.45	25%	P01S	6.38	P01S	506	P50
	ZINCFORM® steel G300 Z200	0.3	25%	P01	8.57	P01	506	P50
		0.3	25%	P01L	8.57	P01	506	RE3530
External Beads	GALVABOND® steel G2 Z275	0.4	0%	P32	6.67	R50	506	RE3530
	Stainless Steel	0.45	0%	SR02	3.66	SR02	506	RE3530
External Plasterboard Trim	Plastic – PVC	Extruded	0%	PE9030	10.00	RE3530	RE3530	RE3530
		Extruded	0%	PE90SL30	11.54	RE3530	RE3530	RE3530
		Extruded	0%	PEA9030	10.00	RE3530	RE3530	RE3530

Table 6: Continued

Purpose	Material	BMT (mm)	Punch outs	Product	Conversion linear m/kg	Representative products		
						A1-A3	C3-C4	D
External Render Trim	Plastic – PVC	Extruded	0%	RE2530	11.54	RE3530	RE3530	RE3530
		Extruded	0%	RE3530	10.71	RE3530	RE3530	RE3530
		Extruded	0%	RE6030	10.00	RE3530	RE3530	RE3530
		Extruded	0%	RE902530	11.54	RE3530	RE3530	RE3530
		Extruded	0%	RE903530	11.54	RE3530	RE3530	301
		Extruded	0%	RESC8030	6.00	RE3530	RE3530	301
		Extruded	0%	RSBSC8030	8.82	RE3530	RE3530	301
Heavy Weight Top Hats	GALVABOND® steel G2 Z275	1.15	0%	H515	1.05	681	506	301
		1.15	0%	H525	0.84	681	506	301
		1.15	0%	H535	0.73	681	506	301
		1.15	0%	H545	0.64	681	506	301
		1.15	0%	H550	0.62	681	506	301
		1.15	0%	H560	0.54	681	506	301
		1.15	0%	H715	0.84	681	506	301
		1.15	0%	H725	0.70	681	506	P50
		1.15	0%	H735	0.62	681	506	P50
Int Corner	GALVABOND® steel G2 Z275	0.35	25%	PS17	7.50	P50	506	RE3530
		0.35	25%	PSIA	7.50	P50	506	RE3530
Internal Plasterboard Trim	Plastic – PVC	Extruded	0%	PADJIN	11.54	RE3530	RE3530	RE3530
L Beads & Shadow Trims	Plastic – PVC	Extruded	0%	PFLB30	13.64	RE3530	RE3530	RE3530
		Extruded	0%	PTLB1030	12.50	RE3530	RE3530	RE3530
		Extruded	0%	PTLB1330	11.54	RE3530	RE3530	506
		Extruded	0%	PTLB630	12.50	RE3530	RE3530	506
		Extruded	0%	PTSH1030	12.50	RE3530	RE3530	506
Medium Weight Top Hats	GALVABOND® steel G2 Z275	0.75	0%	M515	1.53	495	506	506
		0.75	0%	M525	1.24	495	506	506
		0.75	0%	M535	1.08	495	506	506
		0.75	0%	M545	0.94	495	506	506
		0.75	0%	M550	0.92	495	506	506
		0.75	0%	M560	0.81	495	506	506
		0.75	0%	M715	1.24	495	506	506
		0.75	0%	M725	1.05	495	506	506
		0.75	0%	M735	0.92	495	506	506
Plaster Casing Beads	ZINCANNEAL® steel G2S ZF100	0.5	0%	P03	5.00	P05	506	506
		0.5	0%	P05	5.00	P05	506	P50
		0.5	0%	P07	5.00	P05	506	P50
		0.5	0%	P08	4.48	P05	506	P50

Table 6: Continued

Purpose	Material	BMT (mm)	Punch outs	Product	Conversion linear m/kg	Representative products				
						A1-A3	C3-C4	D		
Plaster Internal Angles	ZINCFORM® steel G300 Z200	0.3	0%	P18	6.86	DUO2	506	P50		
		0.3	0%	P40	4.90	DUO2	506	P50		
Plaster Stopping Angle	GALVABOND® steel G2 Z275	0.4	13%	P28	5.66	R50	506	P50		
		0.4	80%	P25	9.09	P25	506	P50		
		0.4	80%	P26	8.33	P25	506	P50		
		0.4	80%	P27	7.69	P25	506	P50		
Plaster Stopping Bead	GALVABOND® steel G2 Z275	0.4	60%	P11	7.50	P12	506	P50		
		0.4	60%	P12	7.50	P12	506	RE3530		
		0.4	60%	P13	7.50	P12	506	301		
		0.4	60%	P14	5.77	P12	506	301		
Plasterboard Expansion Trim	Plastic – PVC	Extruded	0%	PEXPH30	6.00	RE3530	RE3530	301		
		0.9	7%	REVB150	0.78	REVB080	506	301		
		0.9	8%	REVB120	0.94	REVB080	506	301		
		0.9	9%	REVB110	1.01	REVB080	506	301		
		0.9	10%	REVB100	1.08	REVB080	506	301		
		0.9	11%	REVB090	1.18	REVB080	506	301		
		0.9	12%	REVB080	1.29	REVB080	506	301		
		0.9	12%	REVB075	1.35	REVB080	506	301		
		0.9	13%	REVB065	1.49	REVB080	506	301		
		0.9	14%	REVB060	1.58	REVB080	506	301		
Reveal Beads	ZINCANNEAL® steel G2S ZF100	0.9	16%	REVB050	1.78	REVB080	506	301		
		0.9	17%	REVB045	1.91	REVB030	506	301		
		0.9	18%	REVB040	2.05	REVB030	506	301		
		0.9	20%	REVB035	2.21	REVB030	506	301		
		0.9	22%	REVB030	2.40	REVB030	506	506		
		0.9	23%	REVB025	2.61	REVB030	506	506		
		0.9	26%	REVB020	2.88	REVB030	506	P50		
		Shadowline Plaster Casing Beads	ZINCANNEAL® steel G2S ZF100	0.5	0%	P06	4.17	P05	506	P50
				0.5	0%	P09	2.88	P05	506	P50
		Shadowline Plaster Stopping Angle	GALVABOND® steel G2 Z275	0.4	6%	P51	3.57	R50	506	P50
0.4	6%			P52	3.49	R50	506	P50		
0.4	6%			P53	3.26	R50	506	P50		
0.4	30%			P50	7.32	P50	506	P50		
0.4	33%			P60	8.33	P50	506	506		
Stopping Beads	GALVABOND® steel G2 Z275	0.4	7%	R50	3.66	R50	506	506		
		0.4	80%	R11	5.77	P25	506	506		

Table 7: Clips used in Rondo systems.

All clips are represented by 2534 (A1-A3), 506 (C3-C4) and 301 (D).

Use Area	Material	BMT (mm)	Product	Mass per Part (kg)	Representative products			
					A1-A3	C3-C4	D	
Ceiling	Cold Rolled Annealed Coil – Hardened	0.8	2534	0.020	2534	506	301	
		ZINCALUME® steel G550 AM125	0.42	B005	0.080	2534	506	301
		0.75	138	0.040	2534	506	301	
		0.9	312	0.040	2534	506	301	
		0.55	315	0.030	2534	506	301	
		0.75	119	0.020	2534	506	301	
		0.75	139	0.020	2534	506	301	
		0.75	159	0.020	2534	506	301	
		0.9	156	0.030	2534	506	301	
		0.9	226	0.030	2534	506	301	
		1.15	237	0.030	2534	506	301	
	1.15	239	0.030	2534	506	301		
	0.9	282	0.030	2534	506	301		
	0.9	394	0.070	2534	506	301		
	Ceiling	GALVABOND® steel G2 Z275	1.15	A239	0.060	2534	506	301
			1.15	BG01	0.040	2534	506	301
			1.15	BG02	0.040	2534	506	301
			1.15	BG03	0.040	2534	506	301
			1.15	BG05	0.050	2534	506	301
			1.5	BG05K	0.050	2534	506	301
			1.5	FC-INFIN0030	0.050	2534	506	301
			1.5	FC-INFIN0080	0.050	2534	506	301
			0.9	305	0.040	2534	506	301
0.9			307	0.030	2534	506	301	
0.9			311D	0.040	2534	506	301	
0.9			313	0.110	2534	506	301	
0.9	314	0.020	2534	506	301			
0.8	166	0.020	2534	506	301			
	Cold Rolled Annealed Coil – Hardened	0.8	A124	0.010	2534	506	301	

Table 7: Continued

Use Area	Material	BMT (mm)	Product	Mass per Part (kg)	Representative products			
					A1-A3	C3-C4	D	
Ceiling	GALVABOND® steel G2 Z275	1.45	TCR-INFIN090	0.060	2534	506	301	
		1.15	247	0.020	2534	506	301	
		1.15	249	0.020	2534	506	301	
		1.15	274	0.020	2534	506	301	
		0.8	534	0.020	2534	506	301	
	Cold Rolled Annealed Coil – Hardened	0.8	547	0.020	2534	506	301	
		0.8	124	0.020	2534	506	301	
		0.8	124N	0.020	2534	506	301	
		0.8	167	0.020	2534	506	301	
		GALVABOND® steel G2 Z275	1.15	188	0.010	2534	506	301
	Spring steel	0.8	254	0.010	2534	506	301	
	GALVABOND® steel G2 Z275	1.5	545	0.090	2534	506	301	
		0.42	709	0.010	2534	506	301	
		0.75	717	0.020	2534	506	301	
		Cold Rolled Annealed Coil – Hardened	0.8	700	0.020	2534	506	301
			0.8	701	0.020	2534	506	301
	GALVABOND® steel G2 Z275	1	702	0.020	2534	506	301	
	Cold Rolled Annealed Coil – Hardened	0.8	719	0.030	2534	506	301	
	Wall Framing	Cold Rolled Annealed Coil – Hardened	0.8	126	0.020	2534	506	301
			2.9	201	0.220	2534	506	301
1.5		202	0.170	2534	506	301		
GALVABOND® steel G2 Z275		2.9	203	0.190	2534	506	301	
		3	205	0.350	2534	506	301	
		1.5	206	0.350	2534	506	301	
2.9		207	0.350	2534	506	301		
Finishing	GALVABOND® steel G2 Z275	1.9	535	0.160	2534	506	301	
		1.9	550	0.220	2534	506	301	
		1.9	735	0.190	2534	506	301	
		1.9	750	0.250	2534	506	301	

Table 8: Industry classification

Products	Classification	Code	Category
Ceiling products, Wall framing, Finishing and accessories, and clips	UN CPC Ver.2	41261	Bars and rods, cold-formed, cold-finished or further worked, of iron or non-alloy steel
		41262	Angles, shapes and sections, cold-formed, cold finished or further worked, of iron or non-alloy steel
		41532	Bars, rods and profiles, of aluminium
	ANZSIC 2006	C222100	Structural Steel Fabricating
		C222900	Other Structural Metal Product Manufacturing



Rondo wall stud 0.50mm BMT

Product Content

Rondo uses a variety of materials to suit the purpose of each product. A sample of the BlueScope feeds is used to represent the range of BlueScope products in Table 8. The products do not exceed the limits for registration of substances of very high concern.

Table 9: BlueScope Product Content

Product	BMT (mm)	Steel Base	Metallic Coating					Surface Treatments
			Carbon Steel	Zinc	Aluminium	Magnesium	Silicon	Iron
GALVABOND® steel G2 Z275	0.35	>90%	<9.4%	<0.1%	n/a	n/a	n/a	<0.01%
GALVABOND® steel G2 Z275	0.5	>93%	<6.8%	<0.1%	n/a	n/a	n/a	<0.01%
GALVABOND® steel G2 Z275	0.55	>93%	<6.2%	<0.1%	n/a	n/a	n/a	<0.01%
GALVABOND® steel G2 Z275	0.75	>95%	<4.7%	<0.1%	n/a	n/a	n/a	<0.01%
GALVABOND® steel G2 Z275	1.15	>96%	<3.1%	<0.1%	n/a	n/a	n/a	<0.01%
ZINCALUME® steel G550 AM125	0.42	>96%	<1.7%	<2.1%	<0.1%	<0.1%	n/a	<0.01%
ZINCANNEAL® steel G2S ZF100	0.5	>97%	<2.4	<0.1%	n/a	n/a	<0.5%	<0.01%
ZINCFORM® steel G300 Z200	0.3	>91%	<8.3%	<0.1%	n/a	n/a	n/a	<0.01%

* = Includes chrome compounds and zinc phosphate, depending upon product.

The compositions of other products are:

- P35 is a composite product, of GALVABOND® steel G2 Z275 0.4mm (74%) and PVC (26%)
- Q488-Q499 are GALVABOND® steel G2 Z275 0.7mm (98%) with a paper lining (1.6%) glued in (0.4%)
- DUO5 and DUO6 are galvanised steel (>99%) with a polyester coating (<1%)
- DUO1 and DUO2 are made from two parts, galvanised steel and polyester coated galvanised steel, where the total polyester coating is <0.2%
- DUO7 and the other aluminium products are 100% aluminium
- SR02, P01S and other stainless steel products are produced from 304 stainless steel
- RE3530 and all plastic products are 100% extruded PVC

System boundaries

As shown in the table below, this EPD is of the ‘cradle-to-gate’ type with options. The options include end-of-life processing (Modules C3-C4) and recycling potential (Module D).

Other life cycle stages (Modules A4-A5, B1-B7 and C1-C2) are dependent on particular scenarios and best modelled at the building level.

Table 10: Modules included in the scope of the EPD

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundary	
Raw material supply	Transport of raw materials	Manufacturing	Transport to customer	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to waste processing	Waste processing	Disposal	Reuse – Recovery – Recycling – potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X

X = included in the EPD; MND = Module not declared (such a declaration shall not be regarded as an indicator result of zero).

Production (Module A)

The production stage includes the environmental impacts associated with raw materials extraction and processing of steel inputs, transport to, and within Rondo’s manufacturing site, manufacturing, and packaging of Rondo products at the exit gate of the manufacturing site.

End of Life (Module C)

When a building reaches its end-of-life, Rondo products are disposed of. In Australia, the waste materials are typically disposed of in a landfill or recycled. Module C includes waste processing followed by recycling/landfill of the product.

Table 11: End of life scenarios for Rondo products

End of Life scenario	Metal	Plastic	Metal & Plastic
Recovery for recycling	89%	0%	66%
Disposal to landfill	11%	100%	34%

Recovery and Recycling potential (Module D)

Module D declares a potential credit or burden for the net scrap associated with Rondo product. Net scrap is the difference between the amount of scrap that enters the life cycle of our products (e.g. scrap used in steel production) and the amount of useful scrap that leaves the life cycle at the end of life (i.e. product collected for recycling).

If the net balance is positive, that means more scrap leaves the product system (in Module C) than enters the product system (in Module A), a credit is given (in Module D) that reflects the impacts and benefits associated with the net amount of scrap made available for recycling.

Cut off criteria

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary as per the PCR (IEPDS 2018, §6.5.4). Packaging for auxiliary materials (such as oils) were excluded from the assessment. All other reported data were incorporated and modelled using the best available life cycle inventory data.

Allocation

Where subdivision of processes was not possible, allocation rules listed in PCR chapter 6.7 have been applied. Production data (such as energy use) is attributed across all the different products on a mass basis. Offcuts and losses from our production process mostly consist of valuable metals, which are therefore considered a by-product. Economic allocation was used to allocate the impacts of the production process (Module A3) to our main products and the valuable by-products, using the average price of Rondo's products in FY16/17. No secondary materials are directly used in Rondo's processes. Allocation for input materials that contain secondary material (such as steel) occurs in the upstream datasets, which have been checked and found to comply with EN 15804.

End-of-life allocation follows the requirements of EN15804. At the end-of-life of Rondo product, scrap is collected for recycling and is thus available to produce a recycling credit within Module D. A credit for net scrap is given in Module D based on the base metal used in the product. The net flow data is confidential and so not included here.

Life cycle inventory (LCI) data and assumptions

Primary data were used for all manufacturing operations up to the factory gate including upstream data for input steel from BlueScope. Primary data for Rondo's own operations was sourced from the period 1 July 2016 to 30 June 2017.

Background data was used for input materials sourced from other suppliers, specifically aluminium, stainless steel and PVC.

All data in the background system were sourced from the GaBi Life Cycle Inventory Database 2018 (thinkstep 2018). Most datasets have a reference year between 2013 and 2017 and all fall within the 10 year limit allowable for generic data under EN 15804.

Upstream data

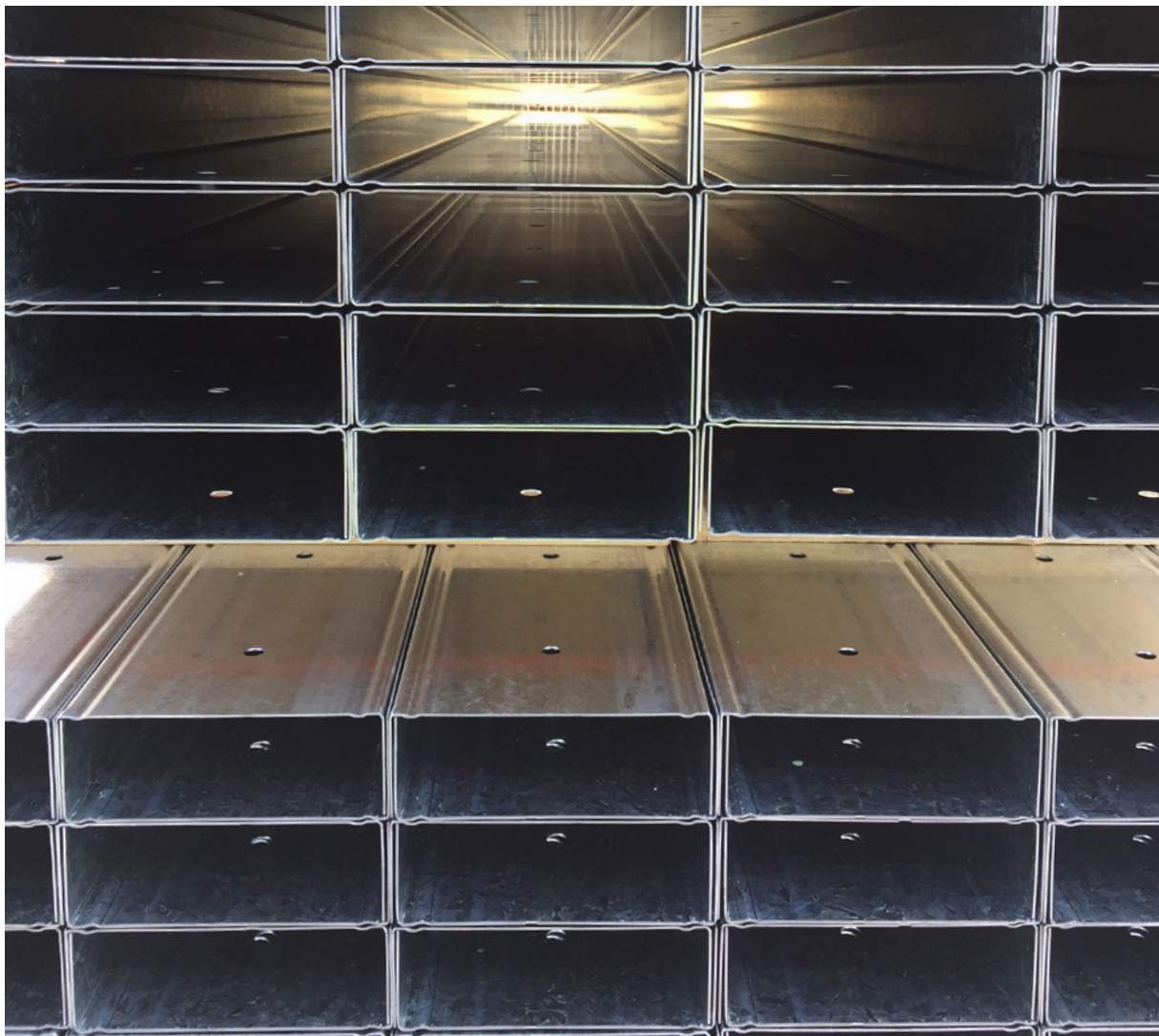
Data for steel input from BlueScope (GALVABOND® steel, ZINCALUME® steel, ZINCANNEAL® steel and ZINCFORM® steel) are taken from BlueScope's Coated Products Life Cycle Assessment, for which the data and methodology are in line with published BlueScope EPDs. Data for steel input from OneSteel's (now InfraBuild) Steel Rods was taken from OneSteel's EPD for Reinforcing Rod, Bar and Wire.

With the exception of Australian produced steel and energy (which correctly reflect Australian conditions), minor upstream (supply chain) data used were European/US due to a lack of consistent LCI data for the source of the products at the time this study was conducted. Aluminium from Vietnam, stainless steel from China, and extruded PVC from Australia, are all represented by European proxies. The results for the products based on aluminium, stainless steel and PVC (plastic) are all sensitive to the dataset used for the input material.

Some of Rondo's products are produced by third-party suppliers, with no primary data available. The production process is very similar to Rondo's, so the same production impacts are attributed to non-Rondo produced materials.

Electricity

The modelled electricity supply was the standard GaBi Australian grid mix for New South Wales, which is dominated by hard coal supply.



Rondo wall track 1.15mm BMT

Recycling

The recycling scenario for metal products was based on Hyder Consulting reports (Hyder Consulting, 2012) which indicate that the average steel recycling rate in Australia is 89%. This is considered to be a conservative estimate for steel construction products but was used in the absence of verified higher recycling rates. The steel recycling rates were used as a proxy for aluminium, which is a reasonable assumption given the high value of aluminium.

The plastic products are likely to be highly contaminated at end of life, making recycling difficult and uneconomic, so a conservative assumption has been made that plastic products will not be recycled.

Explanation of Representative Products and Variation

Rondo produces a large number of products, each with unique characteristics suited to its purpose (e.g. material, thickness, shape, dimensions, punch outs). The environmental profile of the production of these products is highly dependent on:

- Material type
- Ratio of galvanising alloy to steel, dependent on base metal thickness (BMT)
- Ratio of material input to output, dependent on % punch outs and coil scrap

After careful consideration of the range of products, they have been grouped around the above three characteristics, with a single product used to represent each group at production stage (A1-A3). Statistical analysis was used to determine the lowest number of groups while still achieving a variation of less than $\pm 10\%$ for the environmental profile of each group for module A1-A3 in line with the requirements of the PCR (IEPDS 2018). An exception is made for the group of products represented by 495, where the variation for the ODP indicator ranges from -1% to +19%. The high end of this variance is caused by a paper-lined product, with the paper having higher ODP impacts relative to the base metal. The results for module A1-A3 are presented for each representative product in Table 14 to Table 16, with the variation range displayed in Table 17.

The impacts of the product when they reach end of life (Module C) are less variable, enabling wider groupings to be used. The treatment of the products varies with material type (metal, metal with plastic parts, plastic), enabling three products to represent the entire range with no variation.

The recovery and recycling potential of the products (Module D) is slightly more variable. Aluminium and Steel follow different recycling paths with different credits, while the amount of paint and alloy on the steel affect the amount of base steel available credit. The 'metal' group used for Modules C3 and C4 is therefore split into seven groups for Module D, with steel grouped around alloy content and aluminium grouped separately. The environmental profile of each group is within $\pm 10\%$ of the representative product across all indicators.

Life Cycle Impact Assessment

Assessment Indicators

The following tables describe the different environmental indicators for each product per declared unit, for each declared module. The first section of each table contains the environmental impact indicators, describing the potential environmental impacts of the product as shown in Table 11. The second section shows the resource indicators, describing the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water, as shown in Table 12. The final section of each table displays the waste and other outputs, as shown in Table 13.

Table 12: Indicators for life cycle impact assessment

Abbreviation	Unit	Indicator
GWP	kg CO ₂ eq.	Global warming potential
ODP	kg CFC 11 eq.	Ozone depletion potential
AP	kg SO ₂ eq.	Acidification potential
EP	kg PO ₄ ³⁻ eq.	Eutrophication potential
POCP	kg ethene eq.	Photochemical ozone creation potential
ADPE	kg Sb eq.	Abiotic depletion potential for non-fossil resources
ADPF	MJ	Abiotic depletion potential for fossil resources

Table 13: Life cycle inventory indicators on use of resources

Abbreviation	Unit	Indicator
PERE	MJ, net calorific value	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	MJ, net calorific value	Use of renewable primary energy resources used as raw materials
PERT	MJ, net calorific value	Total use of renewable primary energy resources
PENRE	MJ, net calorific value	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	MJ, net calorific value	Use of non-renewable primary energy resources used as raw materials
PENRT	MJ, net calorific value	Total use of non-renewable primary energy resources
SM	kg	Use of secondary material
RSF	MJ, net calorific value	Use of renewable secondary fuels
NRSF	MJ, net calorific value	Use of non-renewable secondary fuels
FWT	m ³	Total use of net fresh water

Table 14: Life cycle inventory indicators on waste categories and output flows

Abbreviation	Unit	Indicator
HWD	kg	Hazardous waste disposed
NHWD	kg	Non-hazardous waste disposed
RWD	kg	Radioactive waste disposed
CRU	kg	Components for reuse
MER	kg	Materials for energy recovery
MFR	kg	Materials for recycling
EEE	MJ	Exported electrical energy
EET	MJ	Exported thermal energy

For Rondo, the following indicators result in zero values:

- Components for re-use (CRU) is zero since there are none produced.
- Materials for energy recovery (MER) is zero since no credits are claimed for any incinerated wastes, applying the cut-off approach.
- Exported electrical energy (EEE) is zero since there is none produced.
- Exported thermal energy (EET) is zero since there is none produced.

Materials for recycling (MFR) for module A1-A3 reflects waste paper sent to recycling. The metal scrap (punch outs and offcuts) are collected for recycling by third parties. Because scrap material is sold, economic co-product allocation is applied in the model. This cuts off the scrap flow from the model and results in a zero value for MFR. MFR is relevant for all metal products for module C.

Use of non-renewable primary energy as raw materials (PENRM) is non-zero for plastic products and polyester coated products.

Use of renewable primary energy as raw materials (PERM) is non-zero for products using timber and cardboard packaging, and would also be non-zero for paper-lined products.

Results of Assessment

The results of the assessment are presented on the following pages, with the module A1-A3 results for the representative products in Table 14 to Table 16, and the range in results for A1-A3 in Table 17. The results for modules C3 and C4 are given in Table 18, while the results for module D are in Table 19. The results for the products based on aluminium, stainless steel and PVC (plastic) are all sensitive to the dataset used for the input material.

Table 15: Environmental Indicators, modules A1-A3, per kg of Rondo product (part 1)

Environmental impact	DUO7	2534	P35	P50	R50	P12	P25	309A	107
GWP [kg CO ₂ -eq.]	9.07	5.51	6.86	4.75	3.65	8.45	16.5	3.35	3.86
ODP [kg CFC11-eq.]	1.31E-11	4.12E-12	5.22E-11	3.61E-12	3.09E-12	5.82E-12	1.09E-11	2.16E-12	2.45E-12
AP [kg SO ₂ -eq.]	0.0446	0.0167	0.0215	0.0161	0.0122	0.0278	0.0544	0.0109	0.0125
EP [kg PO ₄ ³⁻ -eq.]	0.00280	0.00198	0.00222	0.00163	0.00124	0.00279	0.00546	0.00110	0.00126
POCP [kg C ₂ H ₄ eq.]	0.00250	0.00259	0.00362	0.00267	0.00202	0.00465	0.00912	0.00183	0.00210
ADPE [kg Sb eq.]	2.30E-06	5.04E-07	3.63E-04	2.81E-04	2.12E-04	4.90E-04	9.64E-04	1.77E-04	1.88E-04
ADPF [MJ]	101	67.5	85.8	56.1	42.5	97.1	190	38.2	43.8
Resource use	DUO7	2534	P35	P50	R50	P12	P25	309A	107
PERE [MJ]	51.4	2.54	4.65	2.59	2.63	4.60	8.11	1.43	1.64
PERM [MJ]	0.896	1.16	1.62	2.16	0.745	0.545	2.16	0.0975	0
PERT [MJ]	52.3	3.70	6.27	4.76	3.38	5.15	10.3	1.53	1.64
PENRE [MJ]	121	67.7	82.0	57.0	43.1	98.4	193	38.7	44.3
PENRM [MJ]	0	0	5.91	0	0	0	0	0	0
PENRT [MJ]	121	67.7	87.9	57.0	43.1	98.4	193	38.7	44.3
SM [kg]	0	0.223	0.209	0.162	0.122	0.283	0.556	0.116	0.139
RSF [MJ]	8.74E-09	9.77E-09	1.22E-07	4.35E-09	5.89E-09	4.35E-09	4.27E-09	9.42E-10	9.40E-10
NRSF [MJ]	1.03E-07	5.13E-04	5.54E-04	4.28E-04	3.23E-04	7.47E-04	0.00147	3.03E-04	3.58E-04
FW [kg]	0.127	0.00645	0.0168	0.0113	0.00880	0.0191	0.0370	0.00731	0.00799
Waste categories and output flows	DUO7	2534	P35	P50	R50	P12	P25	309A	107
HWD [kg]	1.18E-07	9.60E-08	4.32E-07	1.24E-07	9.87E-08	1.92E-07	3.66E-07	7.27E-08	7.70E-08
NHWD [kg]	2.50	0.0239	0.101	0.0740	0.0567	0.126	0.244	0.0482	0.0517
RWD [kg]	0.00807	7.87E-05	8.21E-04	3.25E-04	2.46E-04	5.43E-04	0.00107	1.97E-04	2.12E-04
CRU [kg]	0	0	0	0	0	0	0	0	0
MFR [kg]	2.00E-04	1.99E-04	1.98E-04	1.99E-04	2.00E-04	1.99E-04	1.96E-04	2.01E-04	2.00E-04
MER [kg]	0	0	0	0	0	0	0	0	0
EEE [MJ]	0	0	0	0	0	0	0	0	0
EET [MJ]	0	0	0	0	0	0	0	0	0

Table 16: Environmental Indicators, modules A1-A3, per kg of Rondo product (part 2)

Environmental impact	129	495	506	592	681	RE3530	SR02	P01S	121
GWP [kg CO ₂ -eq.]	3.29	3.09	3.43	3.14	2.94	2.63	3.53	4.71	2.50
ODP [kg CFC11-eq.]	2.13E-12	2.03E-12	2.20E-12	2.07E-12	1.96E-12	1.90E-10	3.62E-12	4.31E-12	1.18E-11
AP [kg SO ₂ -eq.]	0.0106	0.00976	0.0108	0.00984	0.00913	0.00384	0.0249	0.0331	0.00691
EP [kg PO ₄ ³⁻ -eq.]	0.00108	0.00101	0.00111	0.00102	9.52E-04	6.74E-04	0.00159	0.00209	8.05E-04
POCP [kg C ₂ H ₄ eq.]	0.00179	0.00168	0.00185	0.00170	0.00159	7.71E-04	0.00137	0.00181	0.00141
ADPE [kg Sb eq.]	1.60E-04	1.09E-04	1.28E-04	9.55E-05	7.24E-05	9.75E-07	1.64E-04	2.19E-04	8.56E-06
ADPF [MJ]	37.4	34.8	38.6	35.3	32.9	56.0	44.1	58.2	27.9
Resource use	129	495	506	592	681	RE3530	SR02	P01S	121
PERE [MJ]	1.33	1.02	1.24	0.945	0.787	10.1	9.08	11.5	1.40
PERM [MJ]	0.0975	0.0975	0	0.0975	0.0975	1.58	0.745	0.545	0
PERT [MJ]	1.43	1.11	1.24	1.04	0.884	11.7	9.82	12.0	1.40
PENRE [MJ]	37.8	35.1	39.0	35.6	33.2	37.3	48.9	64.6	28.1
PENRM [MJ]	0	0	0	0	0	22.9	0	0	0
PENRT [MJ]	37.8	35.1	39.0	35.6	33.2	60.2	48.9	64.6	28.1
SM [kg]	0.119	0.126	0.137	0.133	0.131	0	0	0	0.556
RSF [MJ]	9.42E-10	9.42E-10	9.42E-10	9.35E-10	9.42E-10	4.85E-07	5.91E-09	4.36E-09	9.39E-10
NRSF [MJ]	3.05E-04	3.11E-04	3.41E-04	3.26E-04	3.16E-04	6.14E-06	6.96E-08	5.14E-08	1.11E-08
FW [kg]	0.00687	0.00553	0.00623	0.00525	0.00455	0.0119	0.0367	0.0484	0.0103
Waste categories and output flows	129	495	506	592	681	RE3530	SR02	P01S	121
HWD [kg]	6.99E-08	6.15E-08	6.42E-08	6.07E-08	5.54E-08	1.20E-06	1.94E-07	2.45E-07	3.33E-07
NHWD [kg]	0.0449	0.0348	0.0390	0.0324	0.0274	0.0338	0.412	0.547	0.505
RWD [kg]	1.81E-04	1.34E-04	1.55E-04	1.22E-04	9.95E-05	0.00167	0.00190	0.00251	5.43E-05
CRU [kg]	0	0	0	0	0	0	0	0	0
MFR [kg]	2.01E-04	2.01E-04	2.01E-04	1.99E-04	2.01E-04	2.00E-04	2.01E-04	2.00E-04	0.00705
MER [kg]	0	0	0	0	0	0	0	0	4.80E-04
EEE [MJ]	0	0	0	0	0	0	0	0	0
EET [MJ]	0	0	0	0	0	0	0	0	0

Table 17: Environmental Indicators, modules A1-A3, per kg of Rondo product (part 3)

Environmental impact	301	P05	R06	R05	REVB030	REVB080	DUO2	P01
GWP [kg CO ₂ -eq.]	3.11	3.24	5.87	8.04	3.67	3.24	3.13	4.11
ODP [kg CFC11-eq.]	2.80E-12	4.71E-12	7.75E-12	1.05E-11	4.71E-12	4.27E-12	3.11E-12	3.78E-12
AP [kg SO ₂ -eq.]	0.0100	0.00998	0.0178	0.0244	0.0116	0.0103	0.0114	0.0147
EP [kg PO ₄ ³⁻ -eq.]	0.00101	0.00108	0.00192	0.00262	0.00126	0.00112	0.00112	0.00145
POCP [kg C ₂ H ₄ eq.]	0.00157	0.00169	0.00305	0.00418	0.00200	0.00178	0.00185	0.00240
ADPE [kg Sb eq.]	9.80E-06	5.12E-05	9.28E-05	1.27E-04	3.63E-05	3.22E-05	2.70E-04	3.52E-04
ADPF [MJ]	34.4	37.2	66.7	91.3	43.2	38.4	37.7	48.7
Resource use	301	P05	R06	R05	REVB030	REVB080	DUO2	P01
PERE [MJ]	1.50	1.72	2.24	2.98	1.60	1.48	2.48	3.01
PERM [MJ]	0.0975	0.545	0.297	0.297	2.36	2.36	2.62	2.69
PERT [MJ]	1.60	2.26	2.54	3.28	3.97	3.84	5.11	5.70
PENRE [MJ]	34.9	37.6	67.3	92.0	43.5	38.7	38.3	49.5
PENRM [MJ]	0	0	0	0	0	0	0.0447	0
PENRT [MJ]	34.9	37.6	67.3	92.0	43.5	38.7	38.3	49.5
SM [kg]	0.125	0.113	0.205	0.282	0.160	0.142	0.120	0.156
RSF [MJ]	9.42E-10	4.38E-09	2.46E-09	2.46E-09	5.89E-09	5.87E-09	7.92E-09	8.41E-09
NRSF [MJ]	3.16E-04	3.19E-04	5.78E-04	7.93E-04	4.09E-04	3.63E-04	3.03E-04	3.95E-04
FW [kg]	0.00618	0.00640	0.0108	0.0147	0.00615	0.00556	0.00751	0.00947
Waste categories and output flows	301	P05	R06	R05	REVB030	REVB080	DUO2	P01
HWD [kg]	4.77E-08	7.97E-08	1.23E-07	1.64E-07	9.38E-08	8.64E-08	8.97E-08	1.08E-07
NHWD [kg]	0.0698	0.0226	0.0377	0.0504	0.0233	0.0211	0.0479	0.0612
RWD [kg]	1.93E-04	1.31E-04	2.22E-04	3.03E-04	1.27E-04	1.15E-04	2.49E-04	3.09E-04
CRU [kg]	0	0	0	0	0	0	0	0
MFR [kg]	2.01E-04	2.01E-04	2.00E-04	1.99E-04	2.00E-04	1.99E-04	2.00E-04	2.00E-04
MER [kg]	0	0	0	0	0	0	0	0
EEE [MJ]	0	0	0	0	0	0	0	0
EET [MJ]	0	0	0	0	0	0	0	0

Table 18: Range in LCA results (modules A1-A3)

Environmental impact	DUO7		2534		P35		P50		R50		P12		P25		309A		107	
Range	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
GWP [kg CO ₂ -eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-3.9%	4.4%	-6.9%	6.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ODP [kg CFC11-eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-4.4%	4.5%	-7.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AP [kg SO ₂ -eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-2.9%	4.4%	-6.9%	6.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
EP [kg PO ₄ ³⁻ -eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-3.5%	4.4%	-6.9%	6.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
POCP [kg C ₂ H ₄ eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-3.7%	4.5%	-7.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADPE [kg Sb eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.5%	-7.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADPF [MJ]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-3.5%	4.4%	-6.9%	6.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Environmental impact	129		495		506		592		681		RE3530		SR02		P01S		121	
Range	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
GWP [kg CO ₂ -eq.]	-1.6%	2.4%	-1.8%	0.9%	-0.9%	1.1%	0.0%	0.0%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ODP [kg CFC11-eq.]	-1.3%	2.8%	-0.7%	19.6%	-0.7%	1.1%	0.0%	0.0%	-0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AP [kg SO ₂ -eq.]	-2.2%	1.8%	-1.2%	1.3%	-1.3%	1.1%	0.0%	0.0%	-0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
EP [kg PO ₄ ³⁻ -eq.]	-1.8%	2.2%	-1.0%	1.1%	-1.1%	1.1%	0.0%	0.0%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
POCP [kg C ₂ H ₄ eq.]	-1.8%	2.3%	-0.9%	1.0%	-1.0%	1.1%	0.0%	0.0%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADPE [kg Sb eq.]	-8.5%	0.0%	-6.0%	6.8%	-6.4%	1.1%	0.0%	0.0%	-4.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ADPF [MJ]	-1.9%	2.2%	-1.0%	1.1%	-1.1%	1.1%	0.0%	0.0%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Environmental impact	301		P05		R06		R05		REVB030		REVB080		DUO2		P01	
Range	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
GWP [kg CO ₂ -eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.4%	6.0%	-4.9%	5.2%	-2.0%	1.0%	0.0%	0.0%
ODP [kg CFC11-eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.4%	6.1%	-4.9%	5.2%	-2.3%	1.0%	0.0%	0.0%
AP [kg SO ₂ -eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.3%	6.0%	-4.9%	5.1%	-1.9%	1.0%	0.0%	0.0%
EP [kg PO ₄ ³⁻ -eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.4%	6.0%	-4.9%	5.2%	-1.9%	1.0%	0.0%	0.0%
POCP [kg C ₂ H ₄ eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.4%	6.1%	-4.9%	5.2%	-1.9%	1.0%	0.0%	0.0%
ADPE [kg Sb eq.]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.4%	6.1%	-4.9%	5.2%	-1.8%	1.0%	0.0%	0.0%
ADPF [MJ]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.4%	6.0%	-4.9%	5.2%	-2.3%	1.0%	0.0%	0.0%

Table 19: Environmental Indicators, end-of-life modules C3-C4, per 1 kg of Rondo product

Environmental impact	P35 (metal and PVC)		506 (metal)		RE3550 (PVC)	
	C3	C4	C3	C4	C3	C4
GWP [kg CO ₂ -eq.]	0.00253	0.00685	0.00253	0.00386	0.00253	0.0154
ODP [kg CFC11-eq.]	1.14E-15	1.66E-15	1.14E-15	1.02E-15	1.14E-15	3.50E-15
AP [kg SO ₂ -eq.]	1.80E-05	3.14E-05	1.80E-05	1.08E-05	1.80E-05	9.06E-05
EP [kg PO ₄ ³⁻ -eq.]	4.31E-06	4.21E-06	4.31E-06	1.35E-06	4.31E-06	1.24E-05
POCP [kg C ₂ H ₄ eq.]	1.97E-06	2.55E-06	1.97E-06	9.67E-07	1.97E-06	7.10E-06
ADPE [kg Sb eq.]	3.32E-09	8.58E-10	3.32E-09	4.18E-10	3.32E-09	2.12E-09
ADPF [MJ]	0.0491	0.0931	0.0491	0.0561	0.0491	0.200

Resource use	P35 (metal and PVC)		506 (metal)		RE3550 (PVC)	
	C3	C4	C3	C4	C3	C4
PERE [MJ]	0.00343	0.00981	0.00343	0.00430	0.00343	0.0257
PERM [MJ]	0	0	0	0	0	0
PERT [MJ]	0.00343	0.00981	0.00343	0.00430	0.00343	0.0257
PENRE [MJ]	0.0511	0.0966	0.0511	0.0581	0.0511	0.207
PENRM [MJ]	0	0	0	0	0	0
PENRT [MJ]	0.0511	0.0966	0.0511	0.0581	0.0511	0.207
SM [kg]	0	0	0	0	0	0
RSF [MJ]	0	0	0	0	0	0
NRSF [MJ]	0	0	0	0	0	0
FW [kg]	1.55E-05	1.48E-05	1.55E-05	6.15E-06	1.55E-05	3.96E-05

Waste categories and output flows	P35 (metal and PVC)		506 (metal)		RE3550 (PVC)	
	C3	C4	C3	C4	C3	C4
HWD [kg]	1.65E-09	1.15E-09	1.65E-09	3.11E-10	1.65E-09	3.56E-09
NHWD [kg]	1.08E-05	0.311	1.08E-05	0.0810	1.08E-05	0.972
RWD [kg]	7.83E-07	1.38E-06	7.83E-07	8.10E-07	7.83E-07	3.00E-06
CRU [kg]	0	0	0	0	0	0
MFR [kg]	0.660	0	0.889	0	0	0
MER [kg]	0	0	0	0	0	0
EEE [MJ]	0	0	0	0	0	0
EET [MJ]	0	0	0	0	0	0

Table 20: Environmental Indicators, end-of-life module D, per 1 kg of Rondo product

Environmental impact	DUO7	P35	P50	129	506	RE3530	301
GWP [kg CO ₂ -eq.]	-13.4	-0.933	-1.22	-1.25	-1.28	0	-1.34
ODP [kg CFC11-eq.]	-1.06E-12	5.47E-09	7.16E-09	7.31E-09	7.49E-09	0	7.83E-09
AP [kg SO ₂ -eq.]	-0.0725	-8.49E-04	-0.00107	-0.00112	-0.00119	0	-0.00132
EP [kg PO ₄ ³⁻ -eq.]	-0.00444	-3.21E-05	-3.75E-05	-4.17E-05	-4.68E-05	0	-5.66E-05
POCP [kg C ₂ H ₄ eq.]	-0.00513	-3.96E-04	-5.16E-04	-5.29E-04	-5.44E-04	0	-5.73E-04
ADPE [kg Sb eq.]	-1.08E-06	-3.69E-06	-4.83E-06	-4.93E-06	-5.05E-06	0	-5.29E-06
ADPF [MJ]	-126	-8.95	-11.7	-12.0	-12.3	0	-12.9

Resource use	DUO7	P35	P50	129	506	RE3530	301
PERE [MJ]	-15.6	0.644	0.845	0.861	0.881	0	0.918
PERM [MJ]	0	0	0	0	0	0	0
PERT [MJ]	-15.6	0.644	0.845	0.861	0.881	0	0.918
PENRE [MJ]	-128	-8.60	-11.2	-11.5	-11.8	0	-12.4
PENRM [MJ]	0	0	0	0	0	0	0
PENRT [MJ]	-128	-8.60	-11.2	-11.5	-11.8	0	-12.4
SM [kg]	0	0	0	0	0	0	0
RSF [MJ]	-1.28E-17	0	0	0	0	0	0
NRSF [MJ]	-4.49E-06	0	0	0	0	0	0
FW [kg]	-0.0742	0.00134	0.00176	0.00180	0.00184	0	0.00192

Waste categories and output flows	DUO7	P35	P50	129	506	RE3530	301
HWD [kg]	-1.07E-07	-6.40E-07	-8.39E-07	-8.56E-07	-8.78E-07	0	-9.18E-07
NHWD [kg]	-3.26	0.156	0.229	0.215	0.198	0	0.166
RWD [kg]	-7.40E-04	1.34E-06	2.02E-06	1.86E-06	1.67E-06	0	1.31E-06
CRU [kg]	0	0	0	0	0	0	0
MFR [kg]	0	0	0	0	0	0	0
MER [kg]	0	0	0	0	0	0	0
EEE [MJ]	0	0	0	0	0	0	0
EET [MJ]	0	0	0	0	0	0	0

Module D representative products shown below for ease of reference

Bold text shows specifications for representative products

Product	Materials	BMT	Representative Products Included
DUO7	Aluminium	Extruded	DUO7
P35	GALVABOND® steel G2 Z275 and PVC		P35
P50	GALVABOND® steel G2 Z275, Stainless Steel, ZINCFORM® G300 Z200, Plain & Polyester-coated ZINCFORM® steel G300 Z200	0.3-0.45 (0.4)	DUO2, 309A, P25, P50, P01S, R50, SR02, P12
129	GALVABOND® steel G2 Z275, Polyester-coated GALVABOND® steel G2 Z275, ZINCFORM® steel G300 Z200	0.3-0.55 (0.5)	129, 107, P01
506	GALVABOND® steel G2 Z275, Paper-lined GALVABOND® steel G2 Z275, ZINCANNEAL® steel G2S ZF100	0.5-0.9 (0.7)	495, 592, 506, R06, R05, P05
RE3530	Plastic – PVC	Extruded	RE3530
301	ZINCALUME® steel G550 ZM125, OneSteel Rod, GALVABOND® steel G2 Z275, ZINCANNEAL® steel G2S ZF100	0.42-1.2 (0.42)	301, 2534, 121, 681, REVB080, REVB030

Interpretation of Results

The impacts of Rondo's products follow broadly predictable patterns across all environmental impact categories, linked to the type and thickness of the material and the percentage of punch outs. The production stage (A1-A3) contributes the bulk of the declared impacts across all products and all impact indicators except for ODP.

The End of Life stage (C3 and C4) contribution is very small while Recycling stage (D) varies from no impact (plastic products), to negative impacts (credits) for metal products across most categories and ODP impacts (burden) for steel products. Module D ODP burden is a surprising outcome, resulting mostly from the worldsteel value of scrap dataset.

The *Montreal Protocol on Substances that Deplete the Ozone Layer* was implemented in 1989 with the aim of phasing out emissions of ozone depleting gases. The protocol has been ratified by all members of the United Nations – an unprecedented level of international cooperation. With a few exceptions, use of CFCs, the most harmful chemicals, has been eliminated, while complete phase out of less active HCFCs will be achieved by 2030. As a result, it is expected that the ozone layer will return to 1980 levels between 2050 and 2070. For this reason, the ODP indicator is highly sensitive as so little ozone-depleting substance is being emitted.

The feed material contributes a large percentage of the production stage (A1-A3) impacts, with relatively low impacts arising from Rondo's manufacturing processes.

The impacts increase with the percentage of punch outs because the more input material is required the higher the percentage punch outs (i.e. for 80% punch outs, the input mass is five times higher than the product mass). These impacts appear particularly significant because impacts are given against a declared unit of kg. Rondo's products are generally used by the linear metre, where higher punch outs result in a lighter product per linear metre, reducing the relative impact of the punch outs on the overall result per linear metre. Similarly, it should be noted that products with higher BMT (thickness) will have a greater mass per linear metre, resulting in higher impacts per linear metre.

Analyses were conducted to test sensitivity of the results to the choices for proxy input materials. The products based on aluminium (represented by DUO7), stainless steel (represented by SR02 and P01S), and plastic (represented by RE3530) or including a plastic part (P35) were all found to be sensitive to the source of their respective input material.



Rondo wall stud 0.75mm BMT

General information

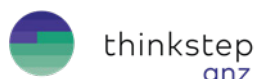
An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR (Product Category Rules).

Environmental product declarations within the same product category from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

Declaration owner:**Rondo**

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EPD produced by:**thinkstep Pty Ltd**

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EPD programme operator:**EPD Australasia Limited**

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CEN standard EN 15804 served as the core PCR

PCR: PCR 2012:01 Construction Products and Construction Services, Version 2.3, 2018-11-15

PCR review was conducted by: The Technical Committee of the International EPD® System

Chair: Massimo Marino. Contact via info@environdec.com

Independent verification of the declaration and data, according to ISO 14025:

- EPD process certification (Internal)
 EPD verification (External)
-

Third party verifier:

Rob Rouwette (start2see Pty Ltd)
Email: Rob.Rouwette@start2see.com.au

Approved by: EPD Australasia

References

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