

SOLAR PANELS V-PLUS X,XXm ² SPECIFICATIONS-PAPAEMMANOUEL S.A.											
Panel	Parameters	V-PLUS-1,50m ²	V-PLUS-1,82m ²	V-PLUS-2,00m ² vertical	V-PLUS-2,00m ² H horizontal	V-PLUS-2,37m ²	V-PLUS-2,37m ² H horizontal	V-PLUS-2,72m ²	V-PLUS-2,72m ² H horizontal	Units	
Panel	Installation positioning	VERTICAL	VERTICAL	VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL		
	Gross area	1,50	1,82	2,00	2,00	2,37	2,37	2,72	2,72	square meter	
	Aperture area	1,38	1,72	1,86	1,86	2,23	2,23	2,57	2,57	square meter	
	Total Dimensions	1480X1010X86	1480X1230X86	1980X1010X86	1980X1010X86	1930X1230X86	1930X1230X86	2160X1260X86	2160X1260X86	2160X1260X86	mm*mm*mm
	Total weight of collector without fluid	26,20	31,50	34,00	34,80	41,50	42,50	47,50	48,50	Kg	
	Total weight of collector with fluid	27,64	32,70	35,40	36,85	43,20	44,70	49,32	50,80	Kg	
	Fluid content	1,44	1,20	1,40	1,70	2,05	1,70	2,20	1,82	2,30	Kg
	Number of covers	1	1	1	1	1	1	1	1	1	piece
	Maximum operating Pressure	10	10	10	10	10	10	10	10	10	bars
	Maximum working temperature	210	210	210	210	210	210	210	210	210	°C
	Collector cover material	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	LOW IRON TEMPERED MISTLITE GLASS	
	Collector cover thickness	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	mm
	Solar transmittance (AM1.5) glass cover	0,91	0,91	0,91	0,91	0,91	0,91	0,91	0,91	0,91	
	Distance between cover and absorber	25	25	25	25	25	25	25	25	25	mm
	Collector length	1480	1480	1980	1980	1930	1930	2160	2160	2160	mm
	Collector width	1010	1230	1010	1010	1230	1230	1260	1260	1260	mm
	Collector depth	86	86	86	86	86	86	86	86	86	mm
	Casing material	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	
	Thickness of casing material	1	1	1	1	1	1	1	1	1	mm
	Back material type	ALUZINC	ALUZINC	ALUZINC	ALUZINC	ALUZINC	ALUZINC	ALUZINC	ALUZINC	ALUZINC	
Back material thickness	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	mm	
Sealing back material	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber	Polyurethane sealant+PVC rubber		
Sealing material front cover	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant	Polyurethane sealant		
Front cover covers' covers	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED	ALUMINIUM POWDER COATED		
Air vents	SILICON	SILICON	SILICON	SILICON	SILICON	SILICON	SILICON	SILICON	SILICON		
Sealing Washers	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	mm	
Absorber	Absorber area	1,38	1,72	1,86	1,86	2,23	2,23	2,57	2,57	square meter	
	Absorber sheet material	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM		
	Absorber sheet paint technology	PVD coating	PVD coating	PVD coating	PVD coating	PVD coating	PVD coating	PVD coating	PVD coating		
	Absorber sheet surface treatment	HIGH SELECTIVE	HIGH SELECTIVE	HIGH SELECTIVE	HIGH SELECTIVE	HIGH SELECTIVE	HIGH SELECTIVE	HIGH SELECTIVE	HIGH SELECTIVE		
	Efficiency factors	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	$\alpha=0,95\pm0,02 / \epsilon=0,05\pm0,02$	
	Manufacturer/product name	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	ALANOD/MIROTHERM OR TINOX/ENERGY	
	Absorber sheet thickness	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	mm	
	Number of vertical tubes per collector	9	11	9	9	18	11	18	11	18	
	Vertical tube material	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	
	Vertical tube outer diameter	8	8	8	8	8	8	8	8	8	mm
	Vertical tube inner diameter	7,2	7,2	7,2	7,2	7,2	7,2	7,2	7,2	7,2	mm
	Vertical tubes pitch	105	105	105	105	105	105	105	105	105	mm
	Absorber tube construction type	LASER WELDING	LASER WELDING	LASER WELDING	LASER WELDING	LASER WELDING	LASER WELDING	LASER WELDING	LASER WELDING	LASER WELDING	
	Number of horizontal tubes per collector	2	2	2	2	2	2	2	2	2	
Horizontal tube material (header)	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER		
Horizontal tube outer diameter(header)	22	22	22	22	22	22	22	22	22	mm	
Horizontal tube inner diameter (header)	20,6	20,6	20,6	20,6	20,6	20,6	20,6	20,6	20,6	mm	
Thermal Insulation	Back thermal insulation material	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL		
	Back thermal insulation thickness	30	30	30	30	30	30	30	30	mm	
	Side thermal insulation material	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL	ROCK MINERAL WOOL		
	Side thermal insulation thickness	20	20	20	20	20	20	20	20	mm	
	Density of thermal insulation	50	50	50	50	50	50	50	50	Kg/m ³	
	Thermal conductivity [W/(mK)]	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035		
	Heat capacity [kJ/(kgK)]	0,84	0,84	0,84	0,84	0,84	0,84	0,84	0,84		
	Product name	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	KNAUF TSP SOLAR BOARD	
Sealing material	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT	EPDM+POLYURETHANE SEALANT		
Others	Warranty	10	10	10	10	10	10	10	10	Years	
	Test and Certifications	SOLAR KEYMARK	SOLAR KEYMARK	SOLAR KEYMARK	SOLAR KEYMARK	SOLAR KEYMARK	SOLAR KEYMARK	SOLAR KEYMARK	SOLAR KEYMARK		
	Quantity in a complete truck*									pieces	
Ex-Works Price per item										€	

* Collectors are packed on pallets and the truck dimensions are 13,6m X 2,45m X 2,80m