



| Connecting Strength

K2 Base Report

ROBY ROAD

Customer	EVOLUTION
Project address	6 Roby Rd, Liverpool L36 4HD
Company	rolec electrical nw ltd
Address	devonshire road 684, fy20aw, blackpool
Tel.	
Website	www.rolecnw.co.uk
E-Mail	
Planner	jared rogan
Issue date	21/01/2026
Version	K2 Base Version 3.2.73.0



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About us

K2 Systems. Innovative mounting system from a strong team.

Since 2004 we have been developing pioneering and highly functional mounting system solutions for photovoltaic installations around the world. Our systems are designed in our own product development department where we continually optimize and adapt mounting systems to the ever-changing market.

A knowledgeable and friendly team

Just like a mountain climbing team, K2 Systems is built on mutual trust. This applies to our customer service as well as within the company itself, because we believe a trusting partnership leads to successful photovoltaic projects.

Our employees place total focus on the needs and wishes of our customer. This is true in all company departments.

10 locations and worldwide sales network

In our international team, everyone works together to provide customers with competent, comprehensive and entirely personalized service.

This is especially true in the constant training our employees undergo with regards to product optimization, quality assurance, or innovations in construction techniques.

Quality management and certificates

K2 Systems stands for Connecting Strength, the highest quality, and precision-crafted and customized components. Our customers and business partners deeply appreciate all of these factors. Three independent authorities have tested, confirmed, and certified our skills and components. External authorities are not the only ones to have put K2 Systems to the test. Our internal quality control ensures that all our products are subject to a constant review process.

These measures all ensure the outstanding quality standards that exemplify products from K2 Systems, and which we maintain through largely exclusive "Made in Germany" or "Made in Europe" practices.



Product guarantee

K2 Systems offers a 12-year product warranty on all products in its integrated range. The use of high quality materials and a three-level quality inspection ensure these standards.

In a nutshell

As roof-top specialists, we offer effective and economical solutions for roofs all around the world and provide professional, fast and reliable support for our customers in the solar industry.

The static report is not including module and building verification.



Project overview

Roofs

Roof	System	Module	Height	Quantity	Total power
Area 1  Tile	SolidRail	TSM-500NEG18R.28 (Vertex S+) 1,961×1,134×30 mm 500 Wp	6.00 m	10	5 kWp
Total				10	5.00 kWp

Project information

Address	6 Roby Rd, Liverpool L36 4HD
Customer	EVOLUTION
Author	jared rogan

Load settings

Design method	BS EN
Failure consequence class (CC)	CC2
Design working life	25 years
Terrain category	Town Terrain
Basic wind speed	23.0 m/s
Distance to shoreline	8.00 km
Distance inside town terrain	2.00 km
Snow load zone	3
Snow load on ground level	0.50 kN/m ²

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)



THE PROJECT IS VERIFIED.

The selected mounting system can be installed as planned
Thank you for choosing a K2 mounting system.

ROBY ROAD

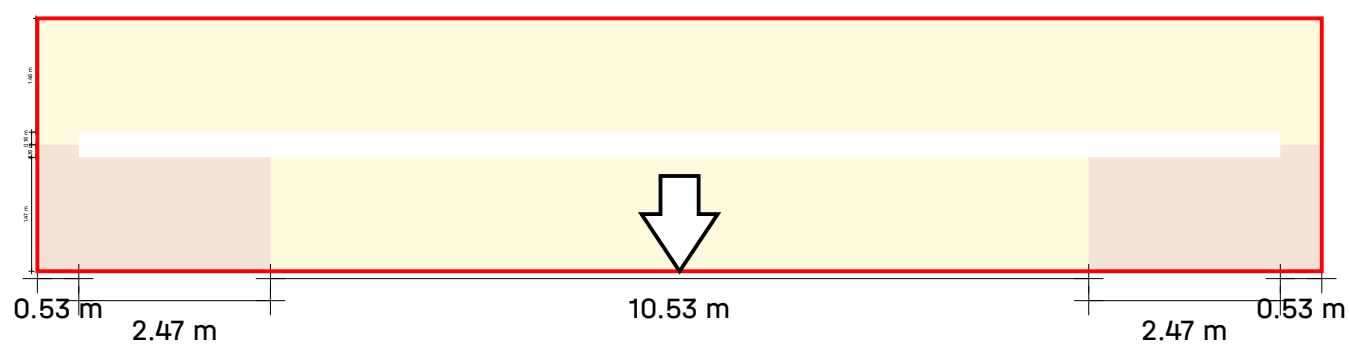


Project information

Address	6 Roby Rd, Liverpool L36 4HD
Customer	EVOLUTION
Author	jared rogan

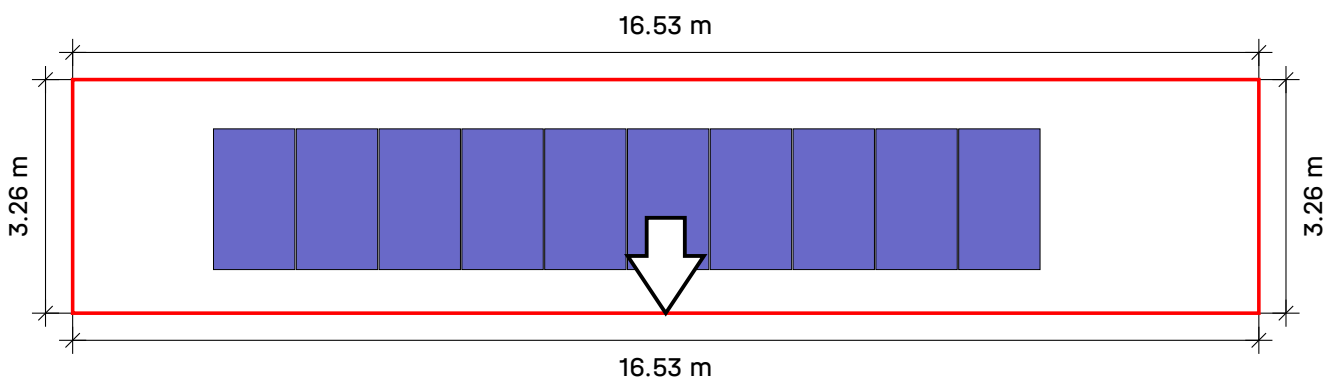


Area 1





Area 1



Roof	System	Module	Height	Quantity	Total power
Area 1	SolidRail	TSM-500NEG18R.28 (Vertex S+) 1,961×1,134×30 mm 500 Wp	6.00 m	10	5 kWp
 Tile					



Area 1 | Assembly plan

Base Rails

Type	Whole Rails			Rail cutting		
	Total Rail Length	Quantity 3.65 m	Quantity 3.30 m	Part of Rail / Rest	Length	Rest
2*A	11.620 m		3*3.30 m	3.300	1.720 from 3.300	1.570

1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer

Fastener Spacing

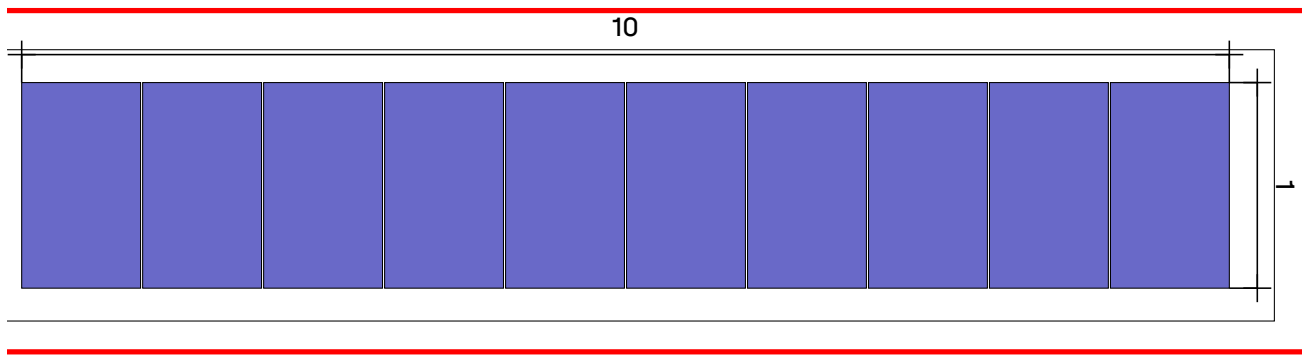
Module	Array	Distance	maximum cantilever length [m]	maximum fastener spacing [m]
1	eaves	0.50 m	0.500	0.985
1	ridge	1.00 m	0.512	1.003
1	corner region (eave)	0.50 m	0.500	0.845

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	11.52	1.96	10	1



Area 1 | Module array 1



Roof ① Module array ①

Mounting System

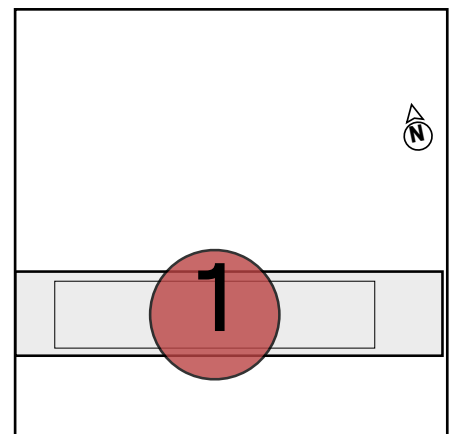
[SolidRail](#)

Module

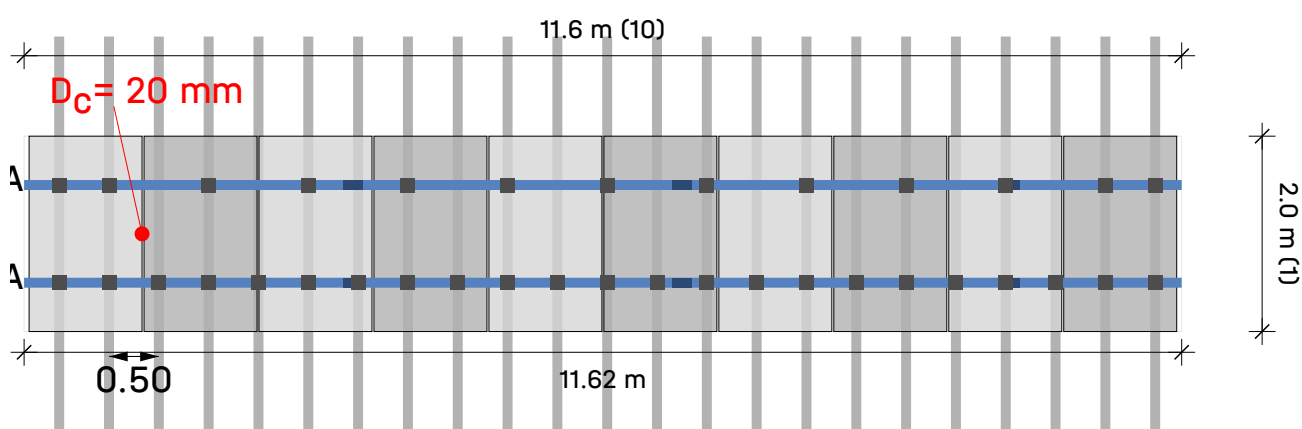
10(5 kWp) x
TSM-500NEG18R.28 (Vertex
S+)

Row spacing

1.97 m



Area 1 | Module array 1 | Module block 1

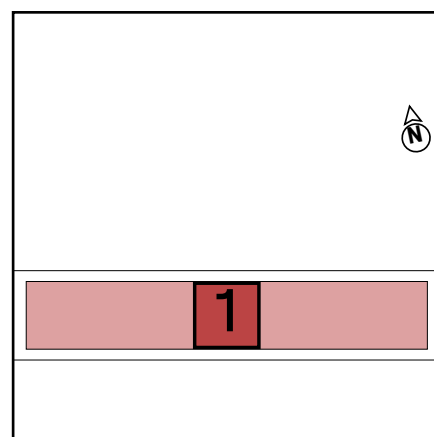


Roof ① Module array ① Module block 1

Modules $10 \times 1 = 10$

Legend

- Fastener
- Mounting rail: K2 SolidRail UltraLight 32
- D_c Distance for clamping between modules
- D_m Distance between modules



Results | Area 1

Roof	System	Module	Height	Quantity	Total power
Area 1	SolidRail	TSM-500NEG18R.28 (Vertex S+) 1,961×1,134×30 mm 500 Wp	6.00 m	10	5 kWp
 Tile					

Module

Name	TSM-500NEG18R.28 (Vertex S+)
Manufacturer	Trina Solar Energy
Output power	500 Wp
Dimensions	1,961×1,134×30 mm
Weight	23.5 kg

Components

Fastener	SolidHook Vario 2
Base rails	K2 SolidRail UltraLight 32

Loads on modules (module dimensioning)

No. Module Array	Array	A-TrA [m ²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	eaves	2.22	777.3	353.1	-415.5	67.5	527.8	242.1	-244.8	67.5
1	ridge	2.22	760.2	353.1	-643.0	67.5	516.4	242.1	-396.5	67.5
1	corner region (eave)	2.22	999.8	353.1	-927.4	67.5	676.2	242.1	-586.1	67.5

Utilisation result

No. Module Array	roof areas	ultimate limit state			Usab.	Distances		maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst Fst D _{max} [m]
1	eaves	8.4	0.0	50.7	2.5	0.500	---	0.500	0.985
1	ridge	32.8	20.4	99.7	19.4	1.000	---	0.512	1.003
1	corner region (eave)	10.3	25.5	59.2	3.2	0.500	---	0.500	0.845

Pr	Profile	Fst D _{max}	maximum fastener spacing [m]
Fst	Fastener	BR	Base Rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		



Results | Area 1

CL/L_{max} maximum cantilever length [m]



Results | Area 1

Notes

- The dimensioning of the timber construction screws is not part of this structural analysis. This must be done on site. If the rafters are made of solid wood, glued laminated timber, cross laminated timber and laminated veneer lumber, assembly with 2 timber construction screws is usually sufficient. The edge distances must be upheld in accordance with the manufacturer's specifications.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (DIN EN 1999-1-1:2021) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to DIN EN 1991-1-4/ NA, NDP for 4.2 (2P) note 5, table 3
- Adjustment factor for snow load regarding service life period, f_S , is according to DIN EN 1991-1-3/ annex D, table 4
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
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Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").



Structural analysis report | Area 1

General information

Name	ROBY ROAD
Mounting System	SolidRail
Author	jared rogan

Location information

Address	6 Roby Rd, Liverpool L36 4HD
Ground elevation	38.03 m

Roof information

Building height	6.00 m
Roof type	Gable roof
Roof pitch	35°
Roof covering	Tile
Min. roof edge distance	0.00 m
Rafter Spacing	0.500 m
Rafter width	75.0 mm
set edge rafter left	No
Rafter spacing left	265.0 mm
set edge rafter right	No
Rafter spacing right	265.0 mm
Batten spacing	340.0 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC2
Design working life	25 years
Terrain category	Town Terrain
Distance to shoreline	8.00 km
Distance inside town terrain	2.00 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.618 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 0.921$
Velocity pressure, 25 years	$q_{p,25} = 0.569 \text{ kN/m}^2$



Structural analysis report | Area 1

Roof areas

No. Module Array	Array	load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	eaves	10.00	0.533	-0.600	0.303	-0.341
1	ridge	10.00	0.500	-0.867	0.284	-0.493
1	corner region (eave)	10.00	0.800	-1.200	0.455	-0.683

Snow load

Snow load zone	3
Snow guard	Yes
Snow load on ground level	$s_k = 0.500 \text{ kN/m}^2$
Shape Coefficient for Snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.819$
Snow load on roof, 50 year	$s_{i,50} = 0.328 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 0.929$
Snow load on roof, 25 years	$s_{i,25} = 0.304 \text{ kN/m}^2$

Dead Load

Weight of module	$G_M = 23.5 \text{ kg}$
Weight of mounting system per module	$= 3.2 \text{ kg}$
Module area	$A_M = 2.22 \text{ m}^2$
Dead weight of module per m ²	$= 10.57 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.44 \text{ kg/m}^2$
Total Dead Load (excl. ballast) per m ²	$= 0.12 \text{ kN/m}^2$



Structural analysis report | Area 1

Load Combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$V_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$V_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$V_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$V_{G,stab} = 0.90$
Partial safety factor variable loads	$V_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to Snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$K_{Fl,G} = 1.00$
Importance factor variable	$K_{Fl,Q} = 1.00$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k
Load case combination 01	$LCC\ 01_{uls} = V_{G,sup} * K_{Fl,G} * G_k + V_Q * K_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = V_{G,sup} * K_{Fl,G} * G_k + V_Q * K_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = V_{G,sup} * K_{Fl,G} * G_k + V_Q * K_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = V_{G,sup} * K_{Fl,G} * G_k + V_Q * K_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = V_{G,inf} * G_k + V_Q * K_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to Snow	$\psi_{0,S} = 0.50$
Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Maximum load on modules (Mounting system dimensioning)

No. Module Array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	eaves	10.00	0.777	0.353	-0.415	0.068	0.528	0.242	-0.245	0.068
1	ridge	10.00	0.760	0.353	-0.643	0.068	0.516	0.242	-0.397	0.068
1	corner region (eave)	10.00	1.000	0.353	-0.927	0.068	0.676	0.242	-0.586	0.068



Structural analysis report | Area 1

Max. load on fastener

No. Module Array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	eaves	10.00	0.419	0.190	-0.224	0.036	0.285	0.131	-0.132	0.036
1	ridge	10.00	0.820	0.381	-0.694	0.073	0.557	0.261	-0.428	0.073
1	corner region (eave)	10.00	0.539	0.190	-0.500	0.036	0.365	0.131	-0.316	0.036

Resistance Values of Components

Base Rails

Base Rails	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 SolidRail UltraLight 32	2.610	2.59	5.54	1.57	2.84

Fastener

Fastener	R _{D,Uplift,Perpendicular} [kN]	R _{D,Pressure,Perpendicular} [kN]	R _{D,Pressure,Parallel} [kN]
SolidHook Vario 2	1.36	1.01	2.06

Utilisation result

No. Module Array	roof areas	ultimate limit state			Usab.	Distances		maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst Fst D _{max} [m]
1	eaves	8.4	0.0	50.7	2.5	0.500	---	0.500	0.985
1	ridge	32.8	20.4	99.7	19.4	1.000	---	0.512	1.003
1	corner region (eave)	10.3	25.5	59.2	3.2	0.500	---	0.500	0.845

Pr	Profile	Fst D _{max}	maximum fastener spacing [m]
Fst	Fastener	BR	Base Rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/L _{max}	maximum cantilever length [m]		



Bill of material

Position	Item no.	Item description	Quantity	Weight
1	2004112	Wood screw 8×100	72	1.9 kg
2	2004545	K2 Clamp EC 25-40 Black	4	0.3 kg
3	2004244	SolidHook Vario 2	36	29.8 kg
4	1000041	T-Bolt 28/15 M10×30	36	0.8 kg
5	1000042	Hexagon flange nut M10	36	0.4 kg
6	2003072	OneMid Black Set 30-42	18	1.4 kg
7	2003228	SolidRail UltraLight; 3.30 m	8	18.5 kg
8	1004107	SolidRail UltraLight+Light RailConnector Set	6	1.4 kg
Total				54.5 kg



Thank you for choosing a K2 mounting system.

Systems from K2 Systems are quick and easy to install.

We hope these instructions have helped.

Please contact us with any questions or suggestions for improvement.

Our contact data:

k2-systems.com/en/contact

Our General Terms of Business apply. Please refer to k2-systems.com

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