

FEAL



FNE-1300

SISTEM ZA FOTONAPONSKE ELEKTRANE
SYSTEM FOR PHOTOVOLTAIC POWER PLANTS

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Značajke sistema System characteristics

FOTONAPONSKE ELEKTRANE PHOTOVOLTAIC POWER PLANTS

Razvojem fotonaponskih elektrana i sve veća realizacija istih zahtjeva brzu, jednostavnu i prilagodljivu izvedbu podkonstrukcijskih sistema.

FEAL FNE rješenja omogućuju prihvrat većine komercionalno dobavljivih fotonaponskih modula, a svaka konstrukcija posjeduje mogućnost prilagodbe različitim dimenzijama solarnih panela.

FNE 1300 je sistem razvijen za montažu fotonaponskih elektrana na krovovima industrijskih hala. Kompletно rješenje dizajnirano je za brzu, jednostavnu i čistu montažu na licu mjesta, bez dodatnih zahtjeva za obradom na licu mjesta.

With the development of photovoltaic power plants and the increasing realization of the same requires fast, simple and flexible design of substructure systems.

FEAL FNE solutions enable the acceptance of most commercially available photovoltaic modules, and each construction has the ability to adapt to different dimensions of solar panels.

FNE 1300 is a system developed for mounting photovoltaic power plants on the roofs of industrial halls. The complete solution is designed for quick, easy and clean on-site installation, without additional on-site processing requests.

Zašto solarne elektrane?

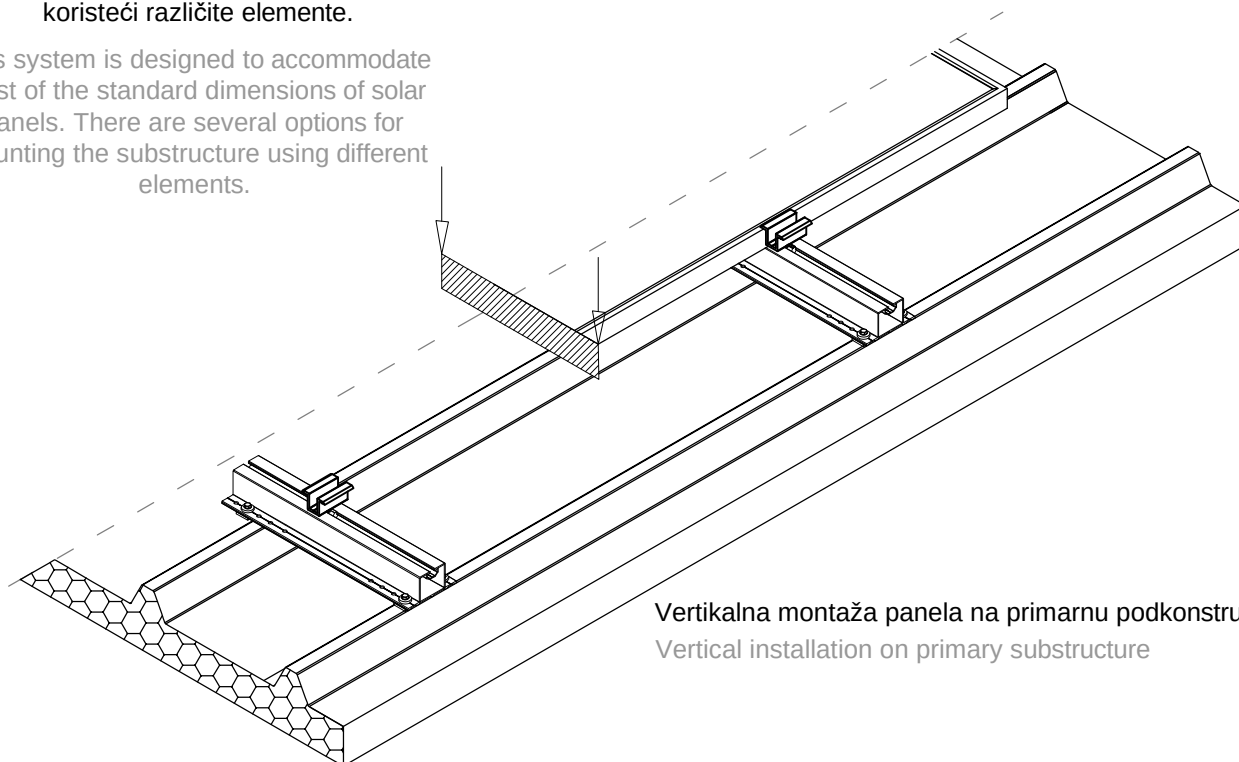
1. To je jedan od ekološki najčistijih izvora energije, ne stvara buku i ne zagađuje okolinu!
2. Sunce je vječno, besplatno te svakog dana ponovno izlazi!
3. Solarnim elektranama pomažemo u očuvanju zaštite našeg planeta sa drastičnim smanjenjem ispuštanja CO₂ u atmosferu.
- 4.
5. Samo jedan kWh električne energije dobivene iz Sunca smanjuje emisiju CO₂ za 1 kg.
6. Ulaganje u obnovljive izvore energije zadatak je svakog čovjeka koji u budućnosti teži osvještanoj potrošnji električne energije.

Why solar power plants?

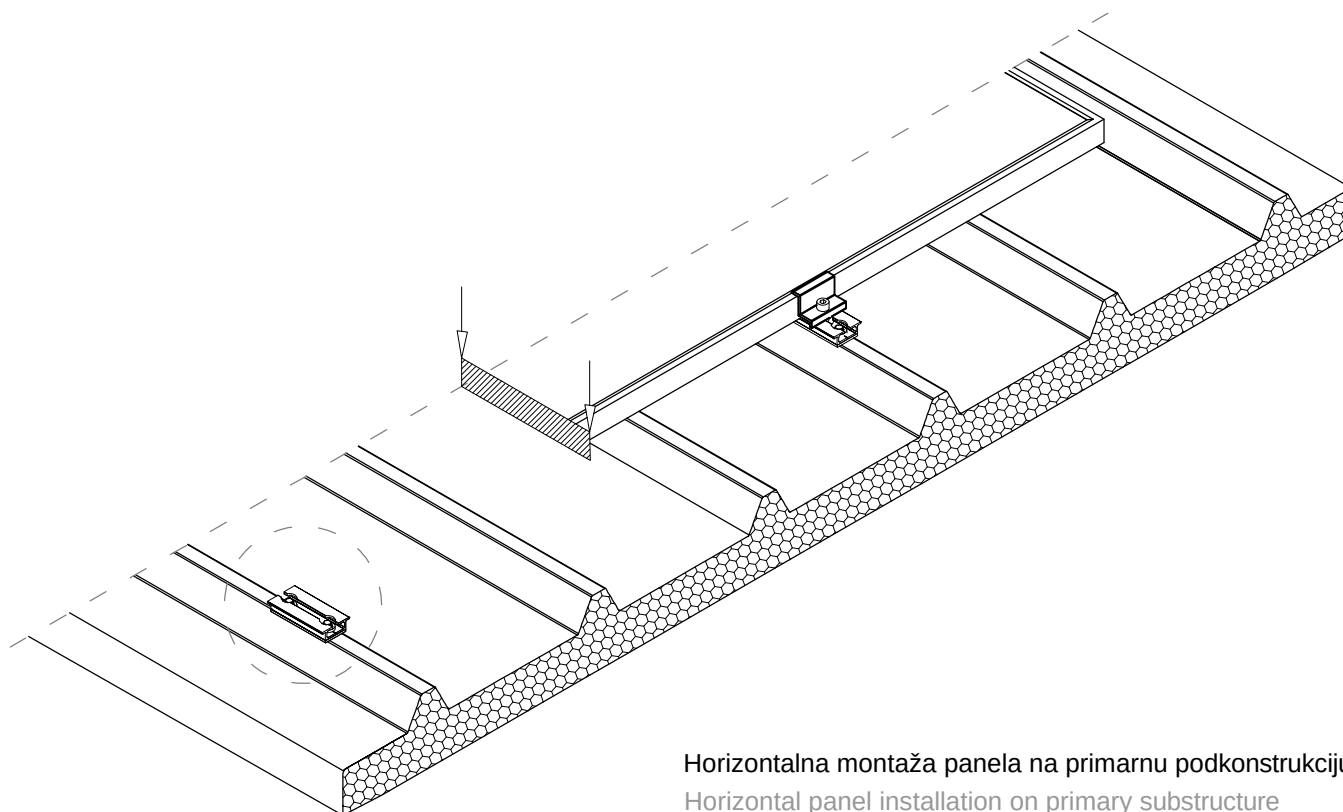
1. It is one of the most environmentally friendly sources of energy, does not create noise and does not pollute the environment!
2. The sun is eternal, free and rises again every day!
3. Solar power plants help preserve the protection of our planet by drastically reducing CO₂ emissions.
4. Solar power plants help preserve the protection of our planet by drastically reducing CO₂ emissions into ozone.
5. Investing in renewable energy sources is the task of every person who strives for conscious electricity consumption in the future.

Ovaj sistem dizajniran je za prihvat većine standardnih dimenzija solarnih panela. Postoji više opcija montaže podkonstrukcije koristeći različite elemente.

This system is designed to accommodate most of the standard dimensions of solar panels. There are several options for mounting the substructure using different elements.

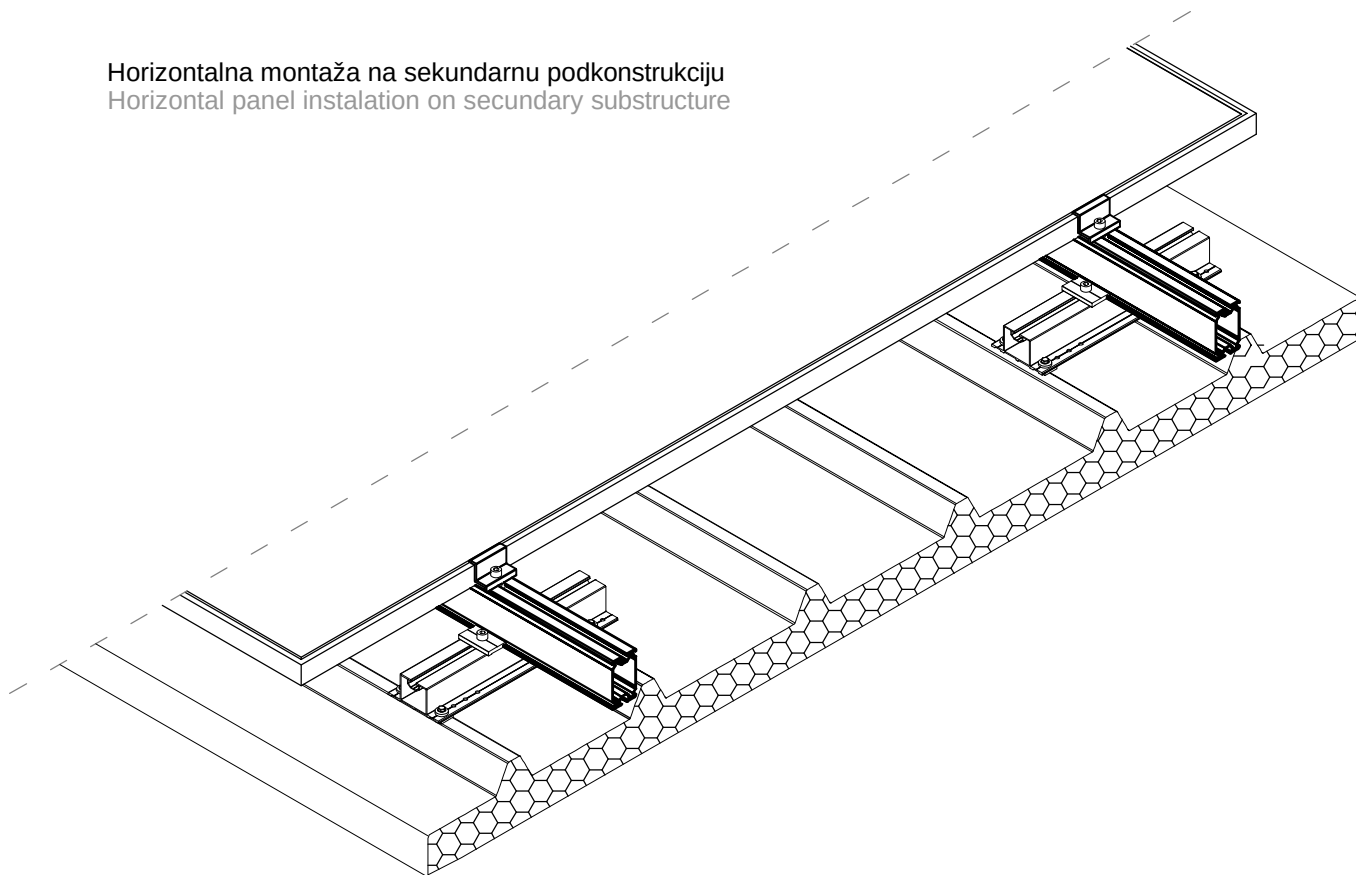


Vertikalna montaža panela na primarnu podkonstrukciju
Vertical installation on primary substructure

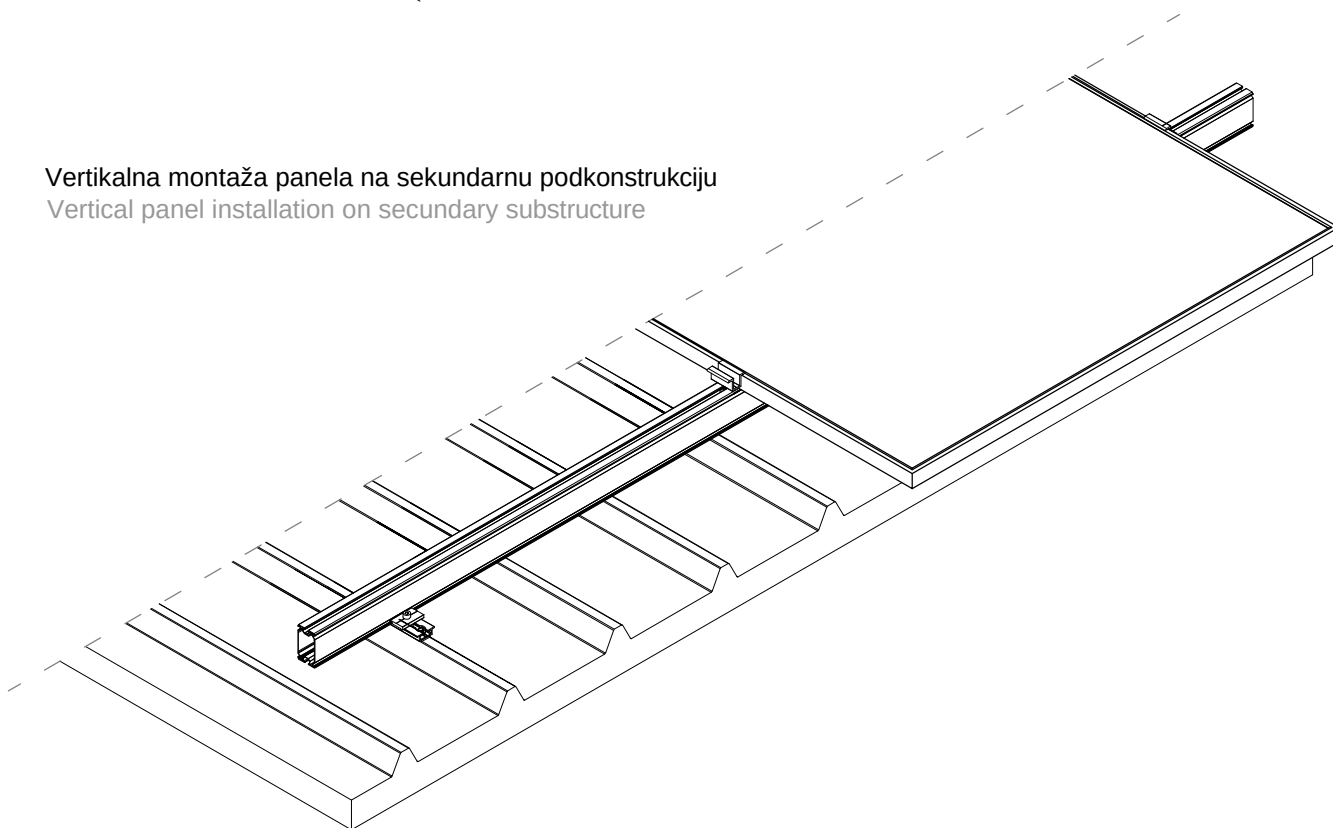


Horizontalna montaža panela na primarnu podkonstrukciju
Horizontal panel installation on primary substructure

Horizontalna montaža na sekundarnu podkonstrukciju
Horizontal panel instalation on secondary substructure



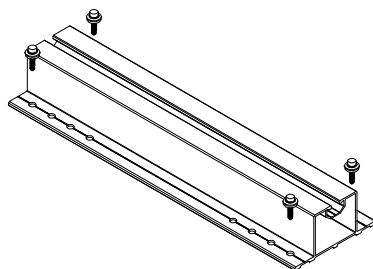
Vertikalna montaža panela na sekundarnu podkonstrukciju
Vertical panel installation on secondary substructure



Ispitivanja i certifikati

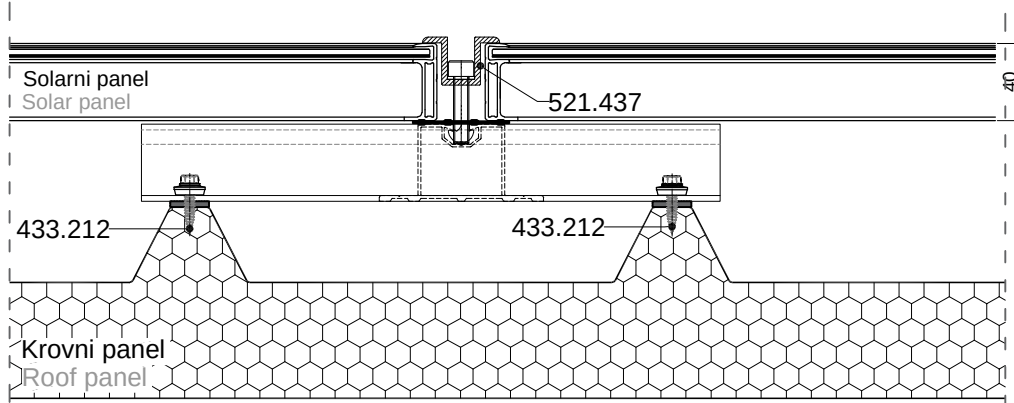
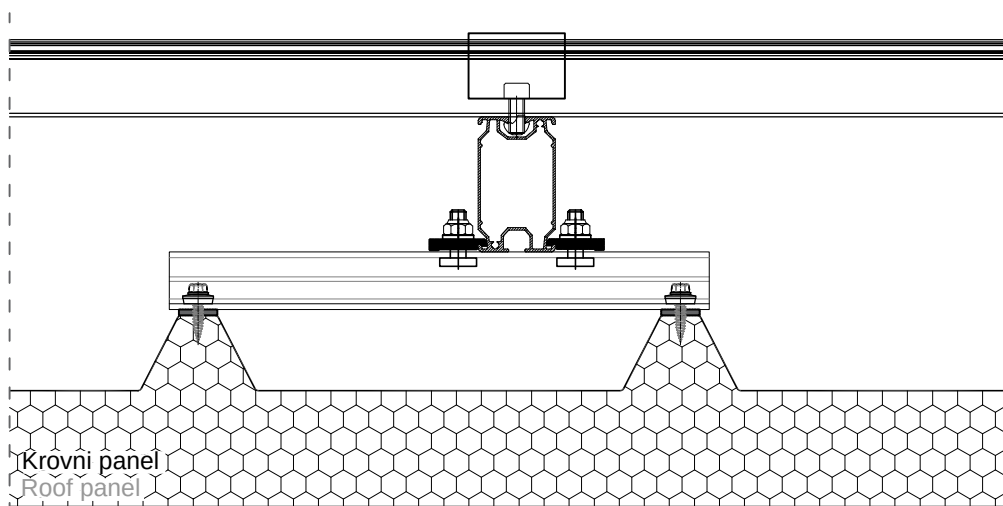
Testing and certificates

Sila čupanja vijka korištenog na spoju primarne konstrukcije s 4 vijka.
Resistance design forces for primary construction attached with 4 screws.

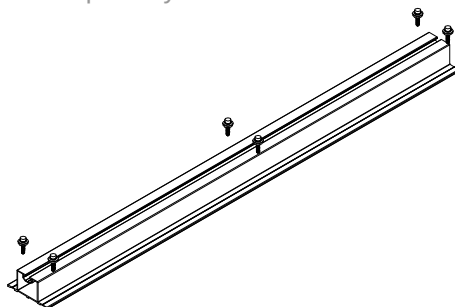


Čelik Steel S280GD - S350GD --- EN 10346					
Debljina materijala [mm] Material thickness [mm]	0.50	0.55	0.63	0.75	0.88
Sila čupanja [kN] Tension load [kN]	2.68	3.12	3.76	4.84	6.00
Sila smicanja [kN] Shear load [kN]	3.24	3.96	5.04	6.84	9.84

Aluminij gdje je aluminium where $f_{y,min}=165$ MPa ---- EN 573						
Debljina materijala [mm] Material thickness [mm]	0.50	0.60	0.70	0.80	0.90	1.00
Sila čupanja [kN] Tension load [kN]	1.28	1.68	2.04	2.44	2.84	3.20
Sila smicanja [kN] Shear load [kN]	1.80	2.64	3.52	4.36	5.84	7.32

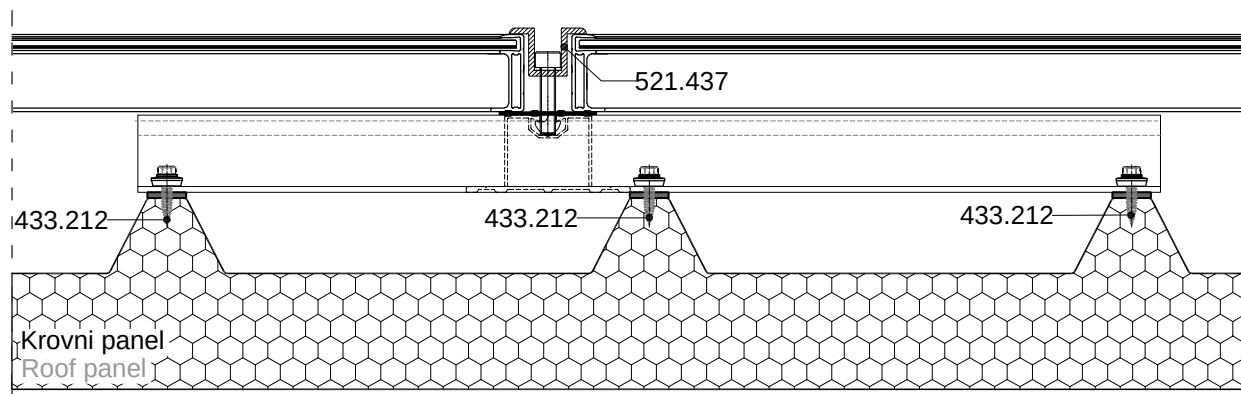
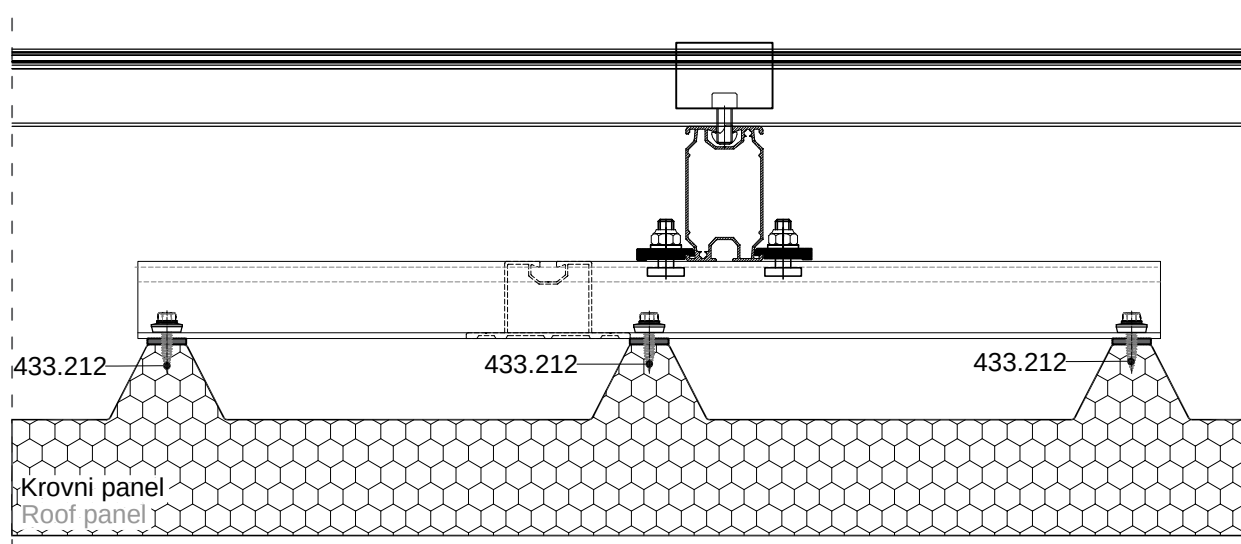


Sila čupanja vijka korištenog na spoju primarne konstrukcije s 6 vijka.
Resistance design forces for primary construction attached with 6 screws.

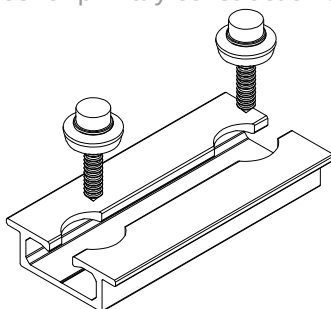


Čelik Steel S280GD - S350GD --- EN 10346					
Debljina materijala [mm] Material thickness [mm]	0.50	0.55	0.63	0.75	0.88
Sila čupanja [kN] Tension load [kN]	4.02	4.68	5.64	7.26	9.00
Sila smicanja [kN] Shear load [kN]	4.86	5.94	7.56	10.26	14.76

Aluminij gdje je aluminium where $f_{y,min}=165$ MPa --- EN 573						
Debljina materijala [mm] Material thickness [mm]	0.50	0.60	0.70	0.80	0.90	1.00
Sila čupanja [kN] Tension load [kN]	1.92	2.52	3.06	3.66	4.26	4.8
Sila smicanja [kN] Shear load [kN]	2.7	3.96	5.28	6.54	7.26	10.98

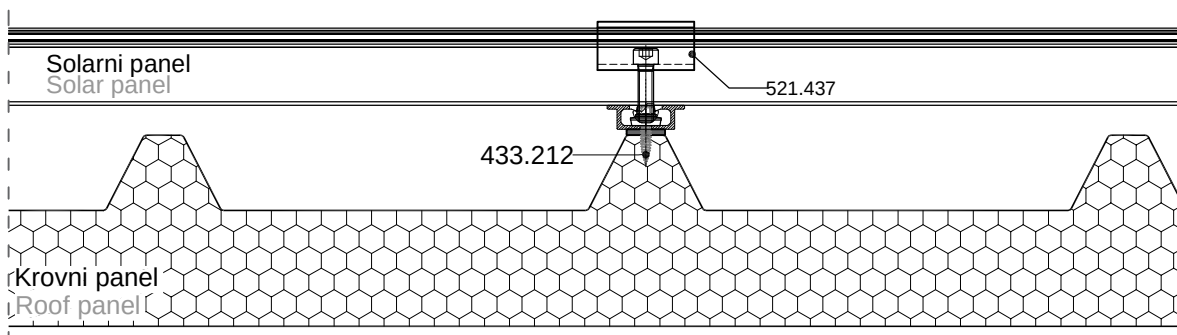
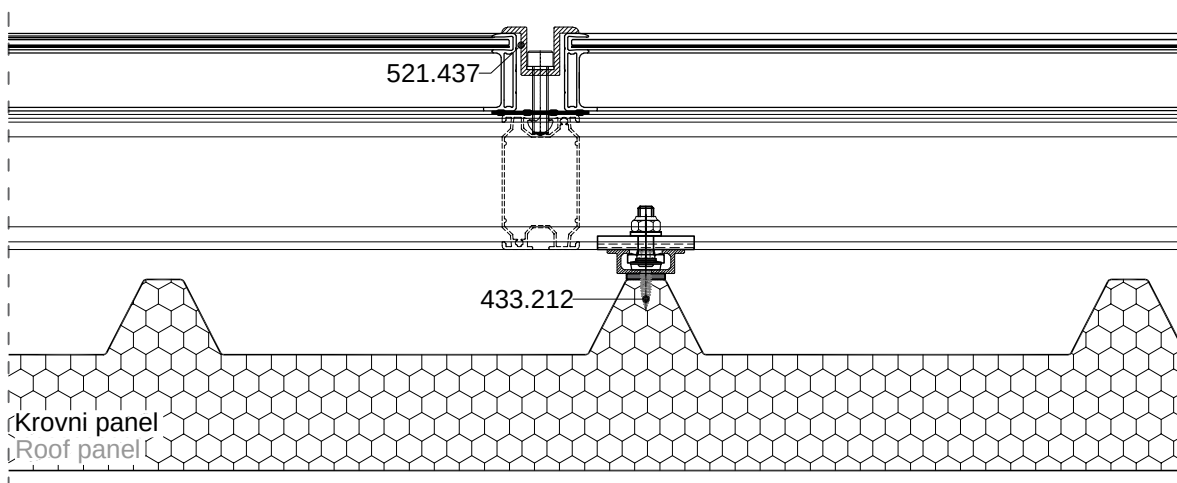


Sila čupanja vijka korištenog na spoju primarne konstrukcije s 2 vijka.
Resistance design forces for primary construction attached with 2 screws.

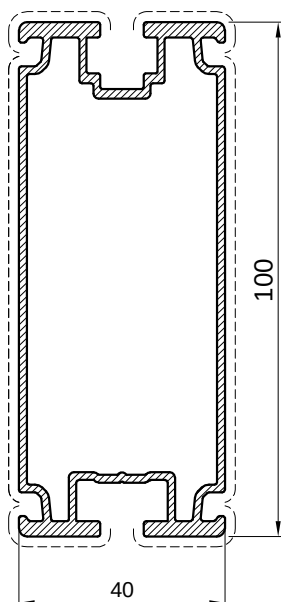


Čelik Steel S280GD - S350GD --- EN 10346					
Debljina materijala [mm] Material thickness [mm]	0.50	0.55	0.63	0.75	0.88
Sila čupanja [kN] Tension load [kN]	1.34	1.56	1.88	2.42	3.00
Sila smicanja [kN] Shear load [kN]	1.62	1.98	2.52	3.42	4.92

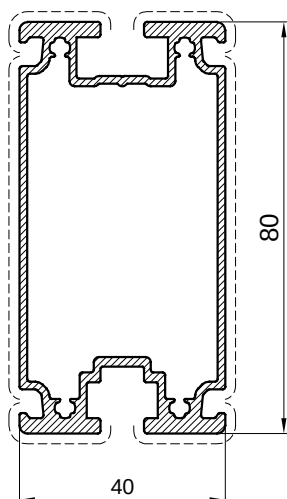
Aluminij gdje je aluminium where $f_{y,min}=165$ MPa --- EN 573						
Debljina materijala [mm] Material thickness [mm]	0.50	0.60	0.70	0.80	0.90	1.00
Sila čupanja [kN] Tension load [kN]	1.28	1.68	2.04	2.44	2.84	3.20
Sila smicanja [kN] Shear load [kN]	1.80	2.64	3.52	4.36	5.84	7.32



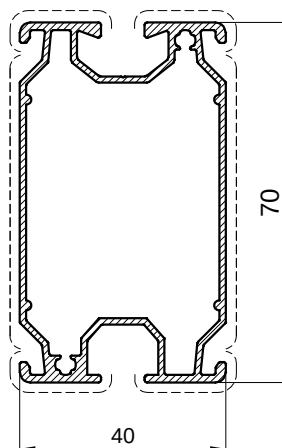
Profili Profiles



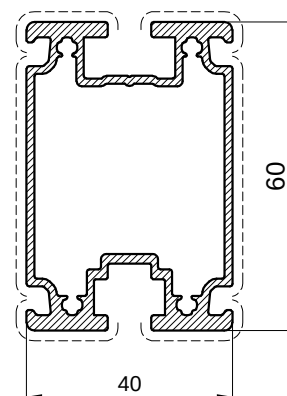
FNE-0001
kg/m 1.64



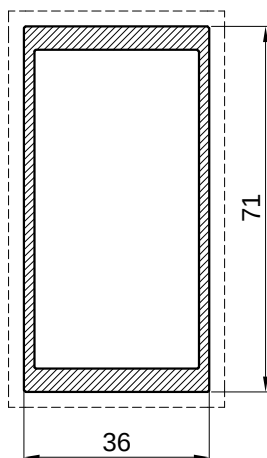
FNE-0005
kg/m 1.55



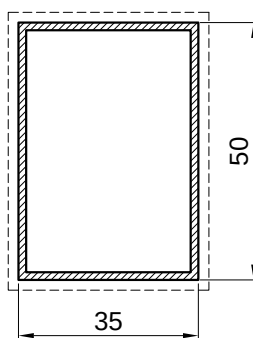
FNE-0006
kg/m 1.04



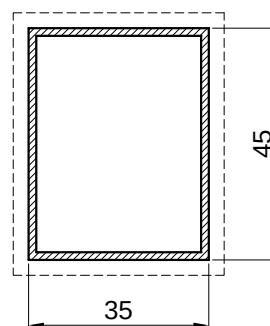
FNE-0004
kg/m 1.38



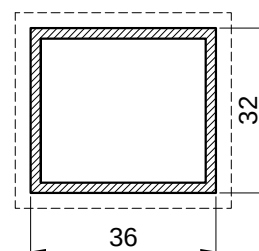
FNE-0002
kg/m 1.540



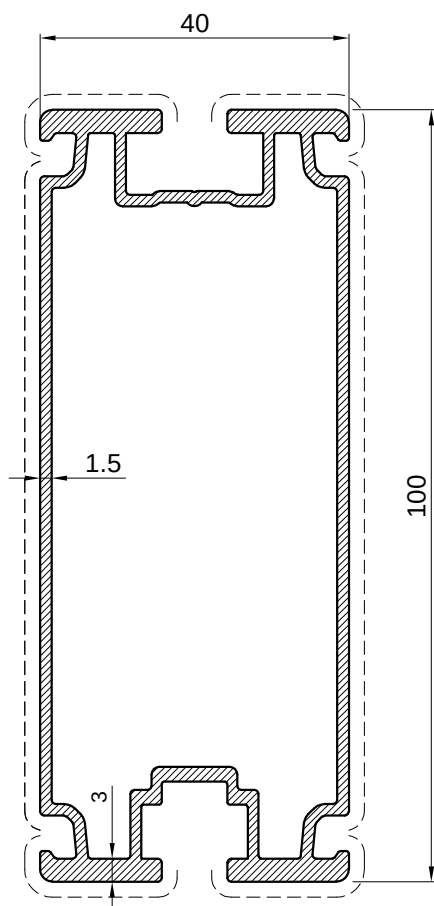
F-1777
kg/m 0.66



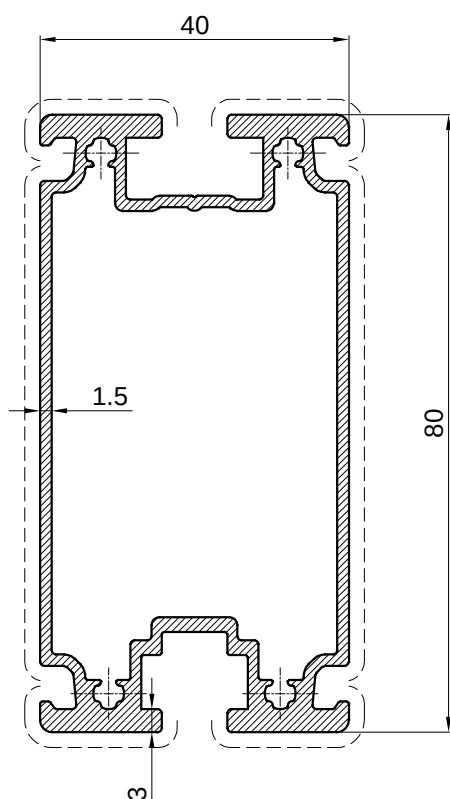
F-1767
kg/m 0.620



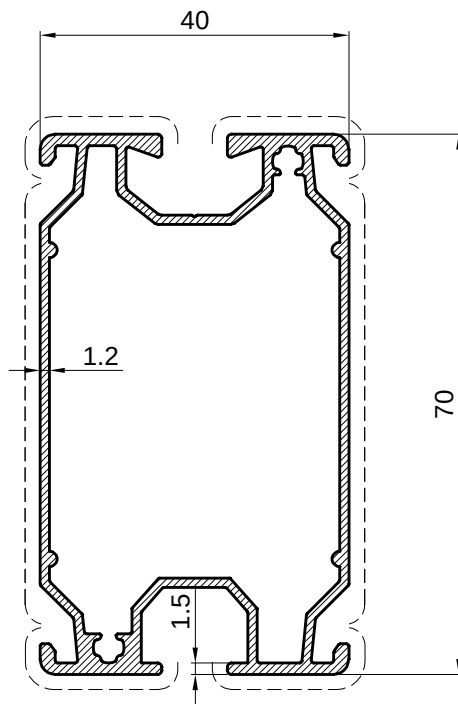
F-1766
kg/m 0.691



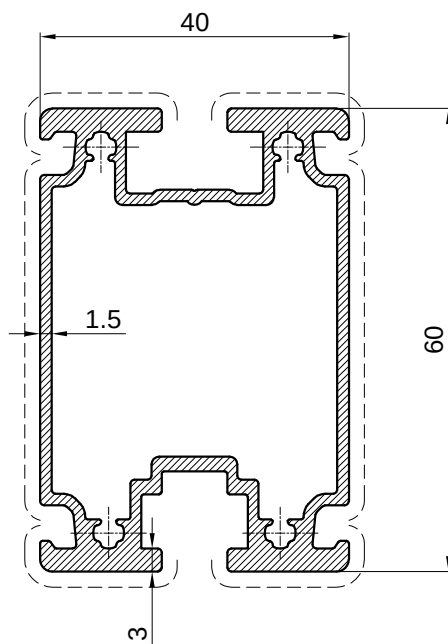
Profil Profile		
Art.Br. Art.No.	FNE-0001	
Težina Weight	kg/m	1.64
Opseg Perimeter	mm	389.23
Moment inercije Moment of inertia	I _x (cm ⁴)	87.42
	I _y (cm ⁴)	14.36
	W _x (cm ³)	17.41
	W _y (cm ³)	7.18
L	mm	-



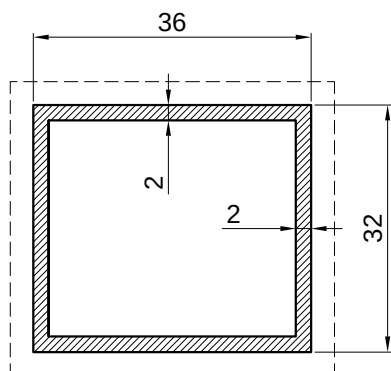
Profil Profile		
Art.Br. Art.No.	FNE-0005	
Težina Weight	kg/m	1.55
Opseg Perimeter	mm	349.24
Moment inercije Moment of inertia	I _x (cm ⁴)	53.75
	I _y (cm ⁴)	12.47
	W _x (cm ³)	13.09
	W _y (cm ³)	6.23
L	mm	-



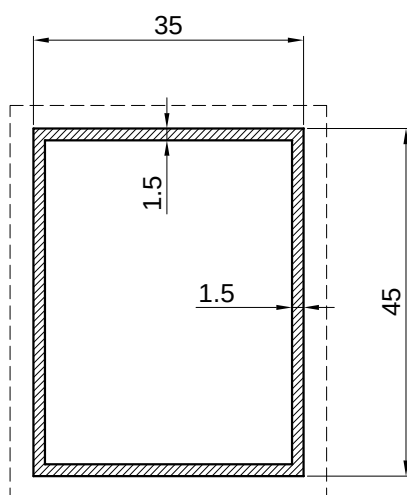
Profil Profile		
Art.Br. Art.No.	FNE-0006	
Težina Weight	kg/m	1.04
Opseg Perimeter	mm	325.75
Moment inercije Moment of inertia	I _x (cm ⁴)	27.44
	I _y (cm ⁴)	8.60
	W _x (cm ³)	7.79
	W _y (cm ³)	4.26
L	mm	-



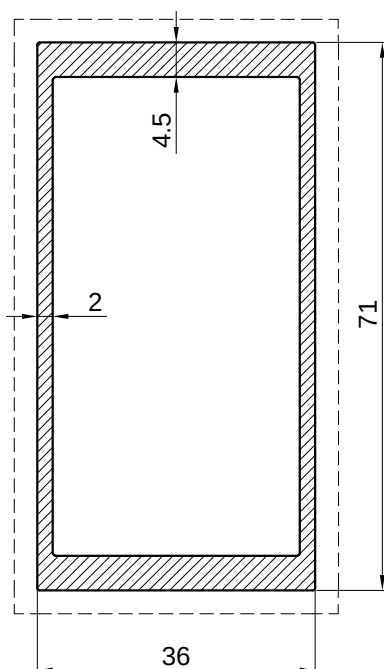
Profil Profile		
Art.Br. Art.No.	FNE-0004	
Težina Weight	kg/m	1.380
Opseg Perimeter	mm	309.25
Moment inercije Moment of inertia	I _x (cm ⁴)	26.53
	I _y (cm ⁴)	10.24
	W _x (cm ³)	8.61
	W _y (cm ³)	5.12
L	mm	-



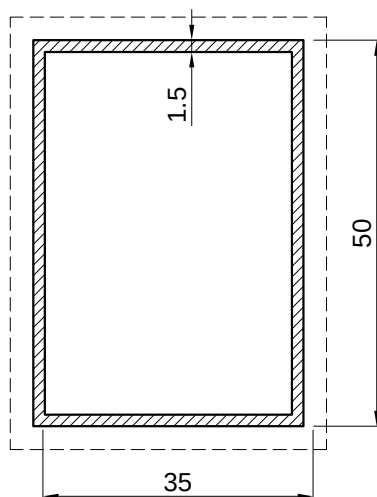
Profil Profile		
Art.Br. Art.No.	F-1766	
Težina Weight	kg/m	0.691
Opseg Perimeter	mm	136.00
Moment inercije Moment of inertia	I _x (cm ⁴)	3.98
	I _y (cm ⁴)	4.80
	W _x (cm ³)	2.49
	W _y (cm ³)	2.66
L	mm	-



Profil Profile		
Art.Br. Art.No.	F-1767	
Težina Weight	kg/m	0.620
Opseg Perimeter	mm	160.00
Moment inercije Moment of inertia	I _x (cm ⁴)	6.82
	I _y (cm ⁴)	4.61
	W _x (cm ³)	3.03
	W _y (cm ³)	2.63
L	mm	-



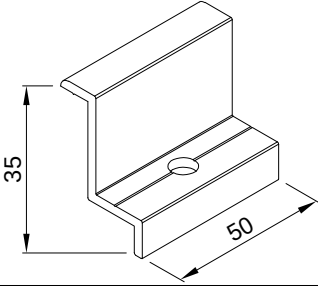
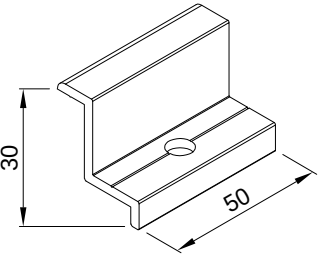
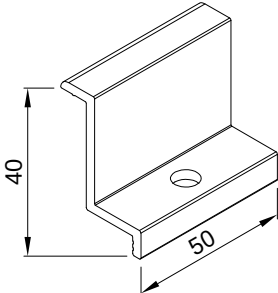
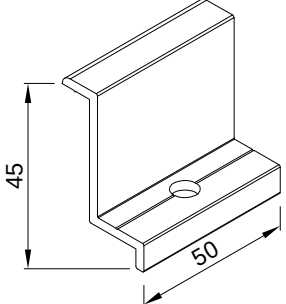
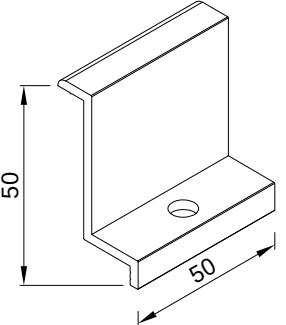
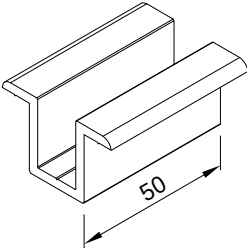
Profil Profile		
Art.Br. Art.No.	FNE-0002	
Težina Weight	kg/m	1.540
Opseg Perimeter	mm	213.49
Moment inercije Moment of inertia	Ix (cm ⁴)	43.82
	Iy (cm ⁴)	10.67
	Wx (cm ³)	12.34
	Wy (cm ³)	5.93
L	mm	-

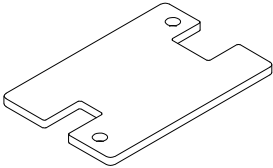
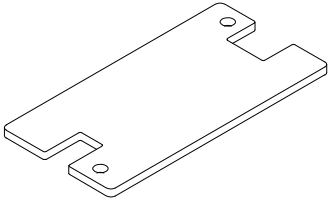
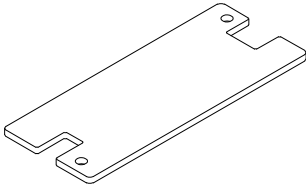
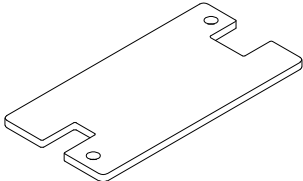
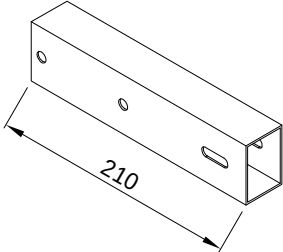
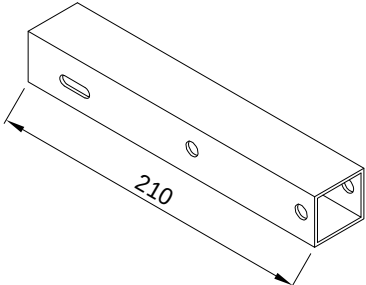


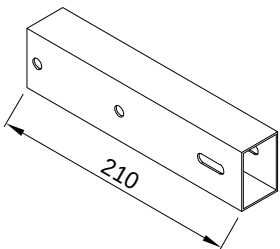
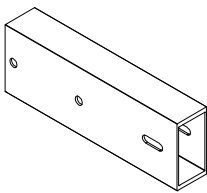
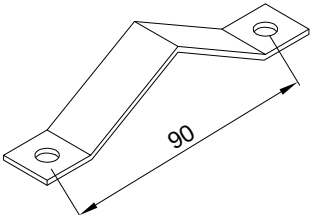
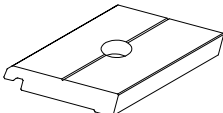
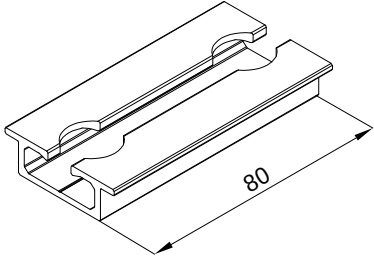
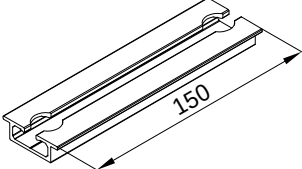
Profil Profile		
Art.Br. Art.No.	FNE-1777	
Težina Weight	kg/m	0.660
Opseg Perimeter	mm	170.00
Moment inercije Moment of inertia	Ix (cm ⁴)	8.77
	Iy (cm ⁴)	5.03
	Wx (cm ³)	3.51
	Wy (cm ³)	2.87
L	mm	-

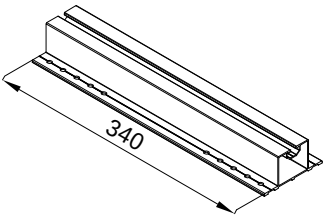
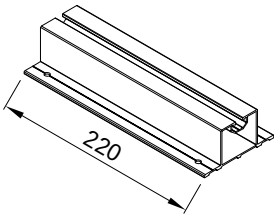
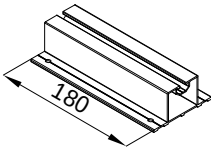
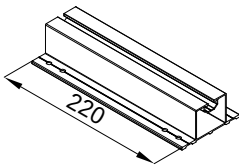
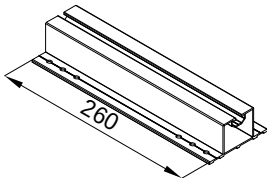
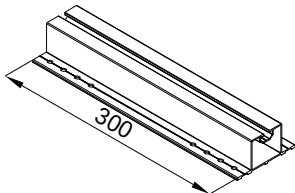
Vezni elementi

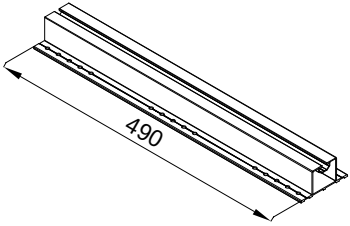
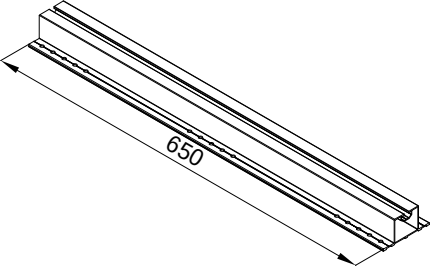
Connection elements

Oznaka Code	Izgled-presjek View-cross section	Opis Description	Materijal Material	Napomena Remark
521.421		-Jednostrana kopča za solare-35 mm -Solar panel holder - single sided-35 mm	Al	
521.426		-Jednostrana kopča za solare-30 mm -Solar panel holder - single sided-30 mm	Al.	
521.427		-Jednostrana kopča za solare-40 mm -Solar panel holder - single sided-40 mm	Al	
521.428		-Jednostrana kopča za solare-45 mm -Solar panel holder - single sided-45 mm	Al	
521.429		-Jednostrana kopča za solare-50 mm -Solar panel holder - single sided-50 mm	Al	
521.437		-Srednja kopča za solare -Solar panel holder - double sided	Al.	

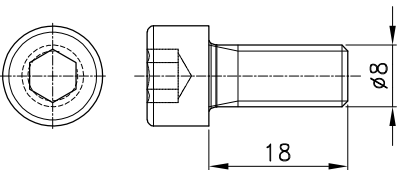
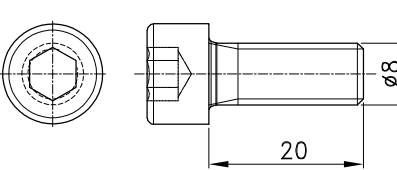
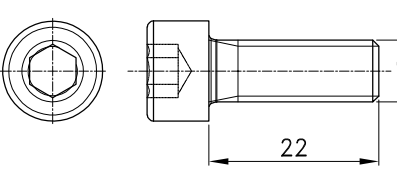
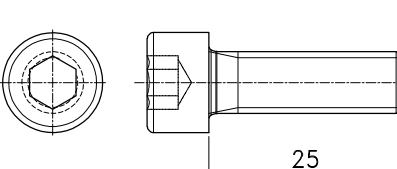
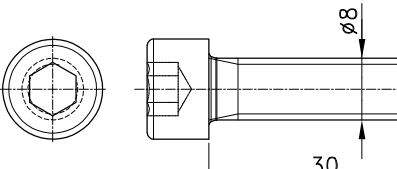
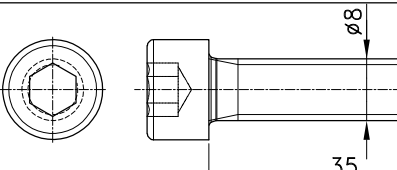
Oznaka Code	Izgled-presjek View-cross section	Opis Description	Materijal Material	Napomena Remark
521.390		- FNE bočni poklopac 60 (FNE-0004) - FNE side cover 60 (FNE-0004)	Al.	
521.391		- FNE bočni poklopac 80, (FNE-0005) - FNE side cover 80 (FNE-0005)	Al.	
521.392		- FNE bočni poklopac 100, (FNE-0001) - FNE side cover 100 (FNE-0001)	Al.	
521.418		- FNE bočni poklopac 70, (FNE-0006) - FNE side cover 70 (FNE-0006)	Al.	
521.408		- Spojni element sekundarnih nosača, FNE-0005 - Connecting element of secondary supports FNE 0005	Al	
521.409		- Spojni element sekundarnih nosača, FNE-0004 - Connecting element of secondary supports FNE-0004	Al.	

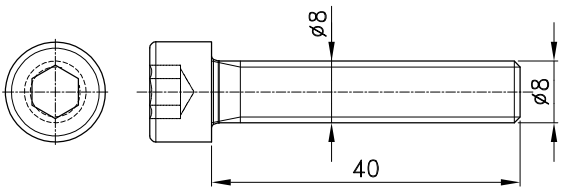
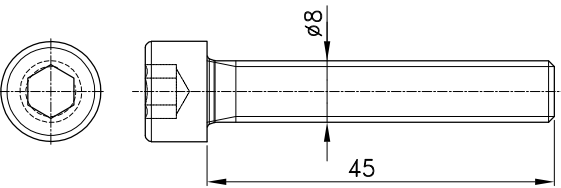
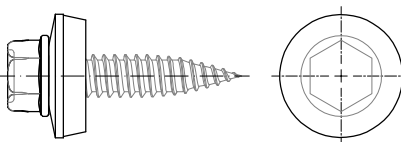
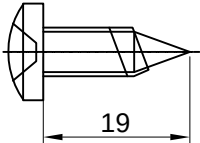
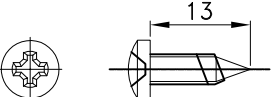
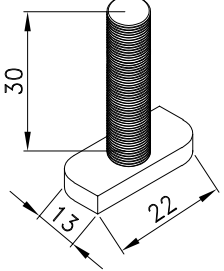
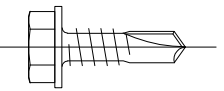
Oznaka Code	Izgled-presjek View-cross section	Opis Description	Materijal Material	Napomena Remark
521.419		- Spojni element sekundarnih nosača, FNE-0006 - Connecting element of secondary supports FNE-0006	Al.	
521.439		- Spojni element sekundarnih nosača FNE-0001 - Connecting element of secondary supports FNE-0001	Al.	
521.399		- Premosnica dilatacije 90, FNE - Dilatation bypass 90, FNE	Al	
521.345		- Drzac primarnog i sekundarnog nosaca(profila) - Primary and secondary support holder (profile)	Al	
521.468		- Nosač solara na krovnom panelu - 80 mm	Al	
521.478		- Nosač solara na krovnom panelu - 150 mm	Al	

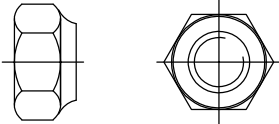
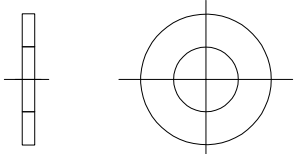
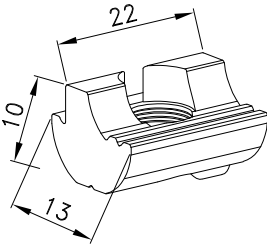
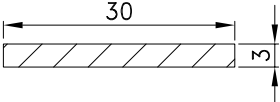
Oznaka Code	Izgled-presjek View-cross section	Opis Description	Materijal Material	Napomena Remark
521.470		- Držáč solara za trapezoidni krovni panel L=340 mm - Solar panel support for trapezoidal sheet metal L=340 mm	Al	
521.471		- Držáč solara za trapezoidni krovni panel L=220 mm - Solar panel support for trapezoidal sheet metal L=220 mm	Al	
521.472		- Držáč solara za trapezoidni krovni panel L=180 mm - Solar panel support for trapezoidal sheet metal L=180 mm	Al	
521.473		- Držáč solara za trapezoidni krovni panel L=220 mm - Solar panel support for trapezoidal sheet metal L=220 mm	Al	
521.474		- Držáč solara za trapezoidni krovni panel L=260 mm - Solar panel support for trapezoidal sheet metal L=260 mm	Al	
521.475		- Držáč solara za trapezoidni krovni panel L=300 mm - Solar panel support for trapezoidal sheet metal L=300 mm	Al	

Oznaka Code	Izgled-presjek View-cross section	Opis Description	Materijal Material	Napomena Remark
521.476		- Držalč solara za trapezoidni krovni panel L=490 mm - Solar panel support for trapezoidal sheet metal L=490 mm	Al.	
521.477		- Držalč solara za trapezoidni krovni panel L=650 mm - Solar panel support for trapezoidal sheet metal L=650 mm	Al.	

Dodaci Accessories

Oznaka Code	Izgled-presjek View- cross section	Opis Description	Materijal Material	Napomena Remark
431.561		- Vijak M8x18 - DIN 912 - Screw M8x18 - DIN 912	Inox A2	
431.565		- Vijak M8x20 - DIN 912 - Screw M8x20 - DIN 912	Inox A2	
431.559		- Vijak M8x22 - DIN 912 - Screw M8x22 - DIN 912	Inox A2	
431.560		- Vijak M8x25 - DIN 912 - Screw M8x25 - DIN 912	Inox A2	
431.567		- Vijak M8x30 - DIN 912 - Screw M8x30 - DIN 912	Inox A2	
431.568		- Vijak M8x35 - DIN 912 - Screw M8x35 - DIN 912	Inox A2	

Oznaka Code	Izgled-presjek View- cross section	Opis Description	Materijal Material	Napomena Remark
431.566		- Vijak M8x40 - DIN 912 - Screw M8x40 - DIN 912	Inox A2	
431.569		- Vijak M8x45 - DIN 912 - Screw M8x45 - DIN 912	Inox A2	
433.212		-Vijak JF3-2-5,5x25	A2	
433.075		-Vijak 6.3x19 -DIN 7981 -Screw M6.3x19 -DIN 7981	Inox A2	
433.016		-Vijak 3.9x13 -DIN 7982 -Screw M3.9x19 -DIN 7981	Inox A2	
431.562		- T Vijak M8 x 30 (22 x 13 x 4) - DIN 125 - T Screw M8 x 30 (22 x 13 x 4) - DIN 125	Inox A2	
433.200		Vijak 6.3x25 DIN 7504-K	Čelik Zn	

Oznaka Code	Izgled-presjek View- cross section	Opis Description	Materijal Material	Napomena Remark
432.014		- Sigurnosna Matica M8 - DIN 985 - Security Nut M8 - DIN 985	Inox A2	
432.113		- Podloška U8 - DIN 125 - Washer U8 - DIN 125	Inox A2	
432.048		- Matica sa oprugom M8 (22 x 13 x 10) - Nut with spring M8 (22 x 13 x 10)	Al	
421.008		-Samoljepljiva traka (silikonski papir + PE pjena ispuna) -Self-adhesive tape (silicone paper + PE foam filling)	Silikonski papir + PE pjena	

Presjeci Cross Sections

Projektiranje solarne elektrane i slaganje solarnih panela na krovnoj plohi

Solar power plant design and installation of solar panels on the roof surface

Prilikom projektiranja solarnih elektrana na krovovima hala potrebno je voditi računa o čitavom nizu pravilnika, a neki od njih utječu i na sam raspored podkonstrukcije.

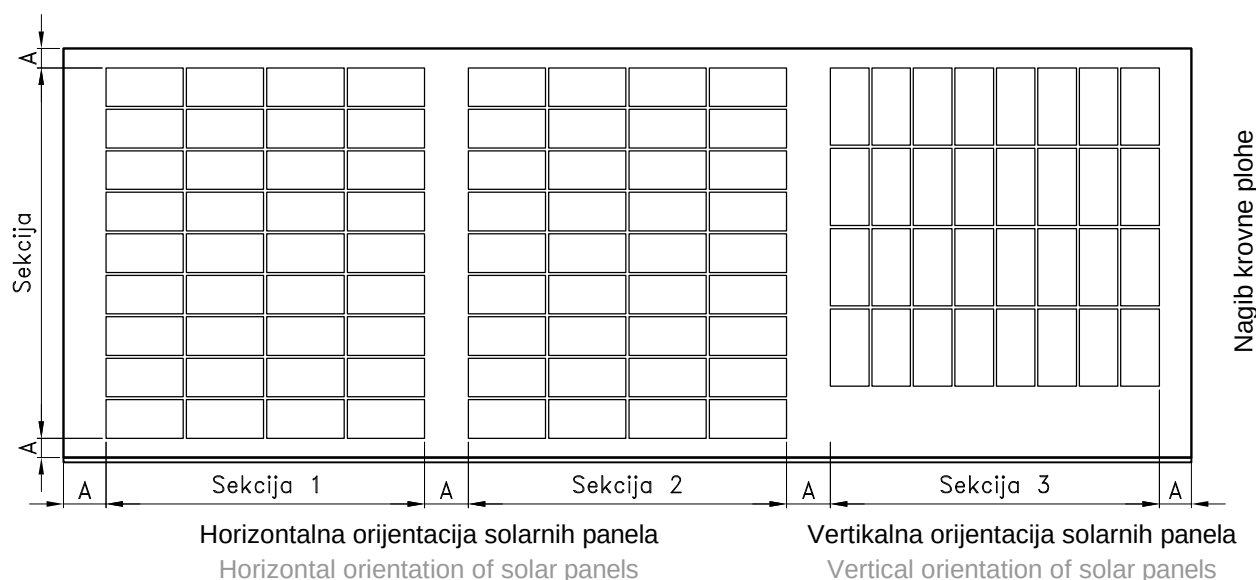
Velika pozornost posvećena je protupožarnoj zaštiti i zaštiti na radu, pri čemu se definiraju evakuacijski putevi oko i između solarnih panela u minimalnoj širini od 800mm.

Evakuacijski putevi definiraju i sekcije elektrane gdje je okvir za dimensioniranje polja 25x10m, a što će se definirati glavnim projektom solarne elektrane.

When designing solar power plants on the roofs of halls, it is necessary to take into account a number of regulations, and some of them affect the layout of the substructure.

Great attention is paid to fire protection and work safety, while defining evacuation routes around and between solar panels in a minimum width of 800mm.

Evacuation routes also define the sections of the power plant where there is a frame for dimensioning a field of 25x10m, which will be defined by the main project of the solar power plant.



A - Hodne staze minimalno 80cm širine

A - Walking paths at least 80 cm wide

Da bi postigli što veću pokrivenost krovne površine solarnim panelima te poštujući sve pravilnike, projektantima je dozvoljeno mijenjati orijentaciju solarnih panela u **horizontalnu** ili **vertikalnu** orijentaciju, a samim tim utječe se na plan aluminijske podkonstrukcije.

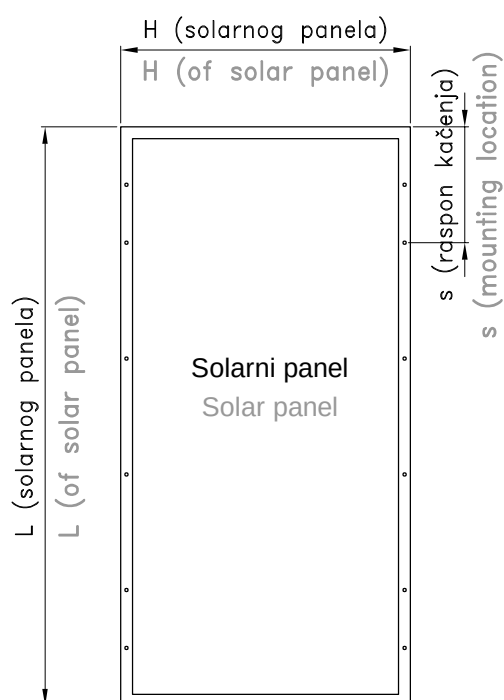
Pored ovoga svaki krov se treba analizirati u pogledu prepreka kojih ima na svakom krovu, a koje će stvarati sjene (prozori, dimnjaci, parapetni zidovi, antene itd.), pa sve te prepreke kao i njihove sjene trebaju biti izbjegnute.

In order to achieve the highest possible coverage of the roof surface with solar panels and respecting all regulations, designers are allowed to change the orientation of solar panels to **horizontal** or **vertical**, and thus affect the plan of the aluminum substructure.

In addition, each roof should be analyzed in terms of the obstacles that exist on each roof, which will create shadows (windows, chimneys, parapet walls, antennas, etc.), so all these obstacles as well as their shadows should be avoided.

Solarni panel i bitne karakteristike za projektiranje aluminijske podkonstrukcije

Solar panel and essential characteristics for the design of aluminum substructure



Orijentacija solarnog panela

Horizontalna ili vertikalna - utječe na smjer podkonstrukcije

Orientation of the solar panel

Horizontal or vertical - affects the direction of the substructure

Dimenzija solarnog panela

Utječe na vrijednost "s" (mjesto kopčanja solarnog panela)

Solar panel dimension

Affects the value of "s" (solar panel mounting location)

"s" mjesto kopčanja

"s" je pozicija kopče koja veže solarni panel i aluminijsku podkonstrukciju, čime je raspored konstrukcije definiran. (Za točnu dimenziju "s" pogledati tehničke specifikacije panela koji se ugrađuje)

"s" mounting location

"s" is the position of the buckle that connects the solar panel and the aluminum substructure, thus defining the layout of the structure.

(For the exact position of dimension "s" look at technical specifications of installing panel).



Solarni panel	L x H= 1600±5 x 1000±50	: s=200-400mm
Solarni panel	L x H= 2000±5 x 1000±50	: s=200-500mm
Solarni panel	L x H= 2300±5 x 1150±50	: s=200-580mm

Solar panel	L x H= 1600±5 x 1000±50:	s=200-400mm
Solar panel	L x H= 2000±5 x 1000±50:	s=200-500mm
Solar panel	L x H= 2300±5 x 1150±50:	s=200-580mm

Solarni panel se vijčanom vezom i kopčama vežu za primarnu ili sekundarnu podkonstrukciju. Ovisno o dimenzijama solarnog panela, definiran je i položaj kopči, a time i položaj nosača.

The solar panel is connected to the primary or secondary substructure with a screw connection and clips. Depending on the dimensions of the solar panel, the position of the clips is defined, and thus the position of the supports.

Industrijski objekti sa kosim krovom Industrial buildings with sloping roofs

Kod montaže na industrijske objekte sa kosim krovom jako je važna sama orijentacija krovnih ploha objekta, pa tako razlikujemo 4 strane svijeta i 4 orijentacije krovnih ploha.

Shodno ovome, konstrukciju za prilagodbu različitim nagibima možemo promatrati kroz tri različite orijentacije i to:

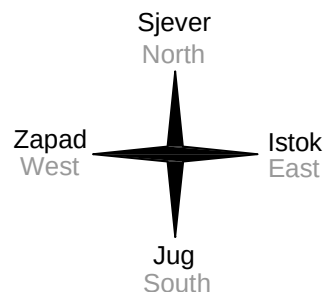
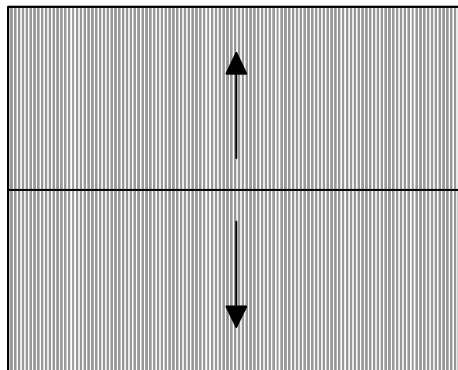
1. Južna orijentacija krovnih ploha
2. Sjeverna orijentacija krovnih ploha
3. Istočna ili zapadna orijentacija krovnih ploha

When mounting on industrial buildings with a sloping roof the orientation of the roof surfaces of the building is very important, so we distinguish 4 main directions and 4 orientations of the roof surfaces.

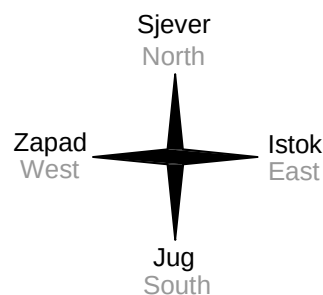
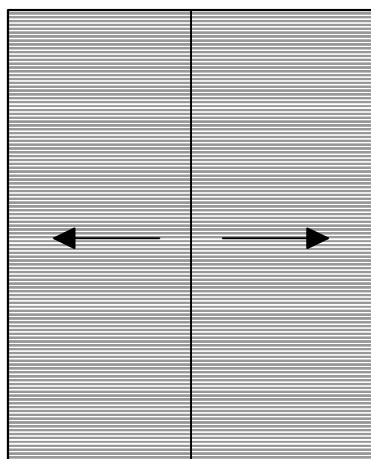
The construction for adaptation to different slopes can be observed through 3 different orientations, as follows:

1. South orientation of roof surfaces
2. North orientation of roof surfaces
3. East or west orientation of roof surfaces

1., 2.)



3.)



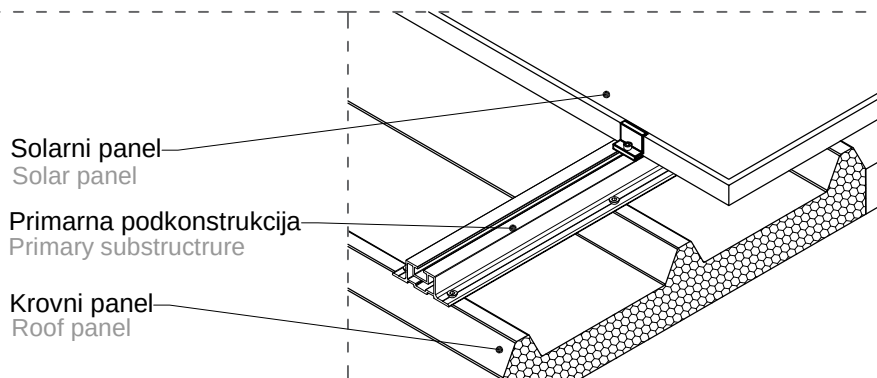
Montaža solarnih panela na industrijske krovove Installation of solar collectors on industrial roofs

Nakon izrade analize opterećenja potrebno je definirati aluminijsku podkonstrukciju za prihvatanje solarnih panela. Podkonstrukcija za orijentaciju krovnih ploha može se dizajnirati na više različitih načina, a njih će odabrati statičar na osnovu definiranih opterećenja, vrste i kvalitete krovne obloge.

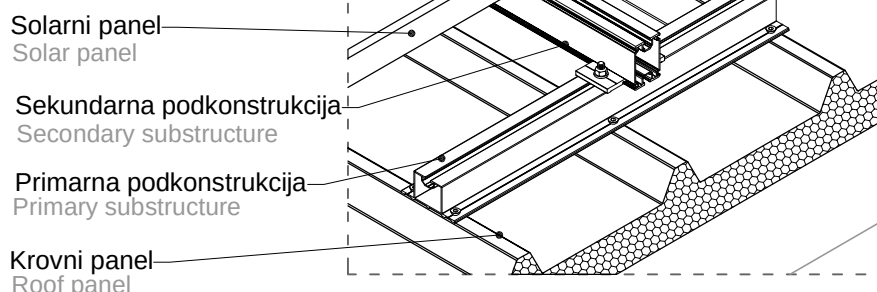
After making the load analysis, it is necessary to define the aluminum substructure for the reception of solar panels. The substructure for the orientation of the roof surfaces can be designed in different ways, and they will be selected by the statician based on the defined loads and the quality of the roof covering itself.

Južna orijentacija krovnih ploha Istočna ili zapadna orijentacija krovnih ploha South orientation of roof surfaces East or west orientation of roof surfaces

- primarna podkonstrukcija
- primary substructure

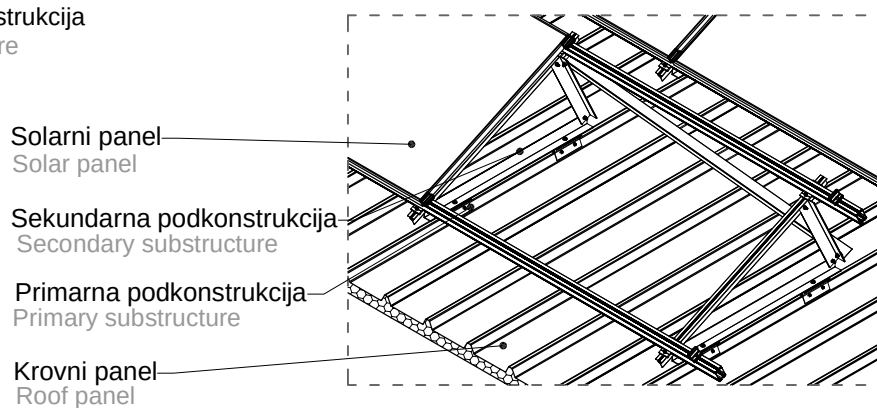


- primarna + sekundarna podkonstrukcija
- primary + secondary substructure



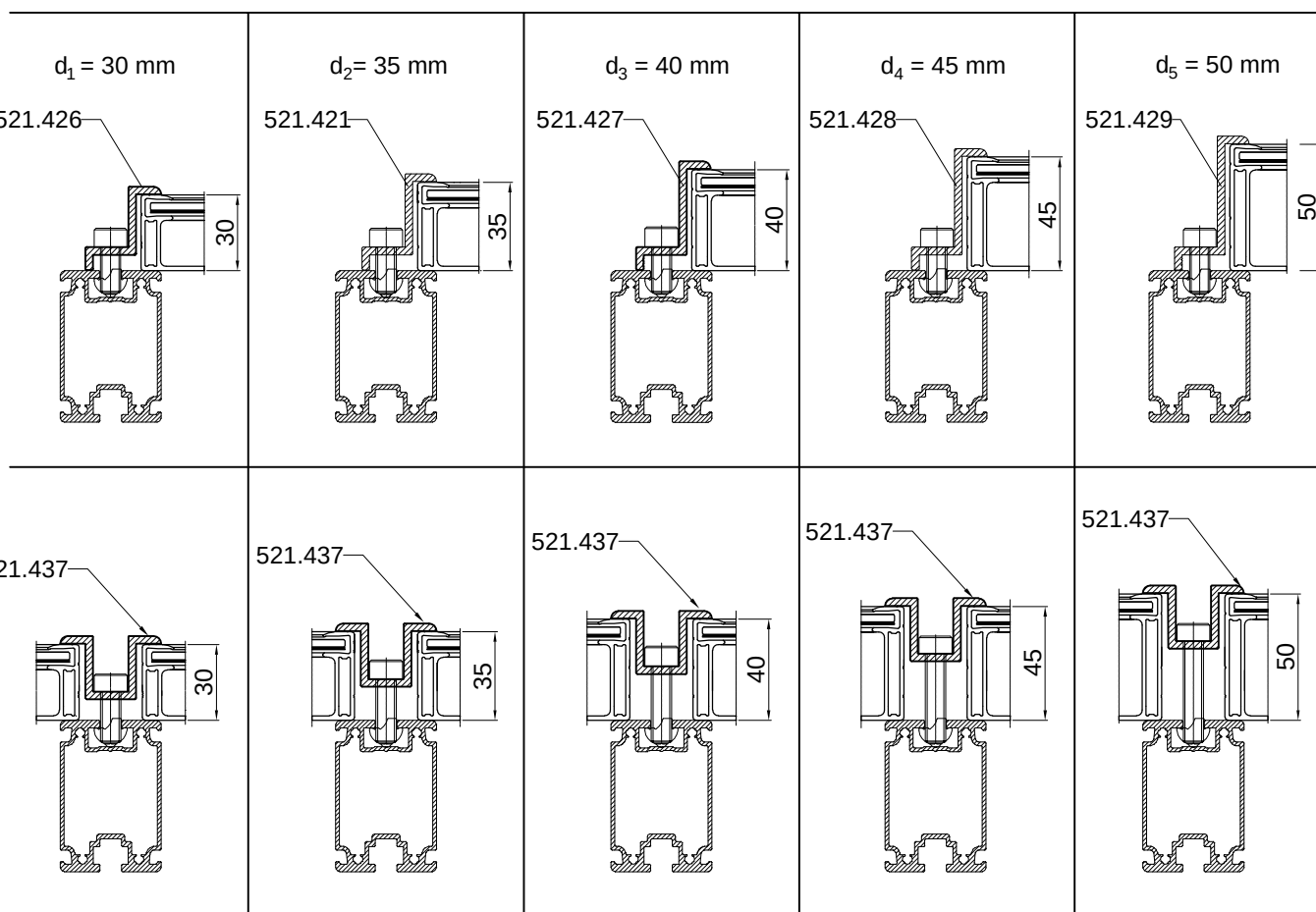
Sjeverna orijentacija krovnih ploha North orientation of roof surfaces

- primarna + sekundarna podkonstrukcija
- primary + secondary substructure



Dimenzije kopči i vijaka za različite visine solarnih panela
Dimensions of side holders and screws for different
heights of solar panels

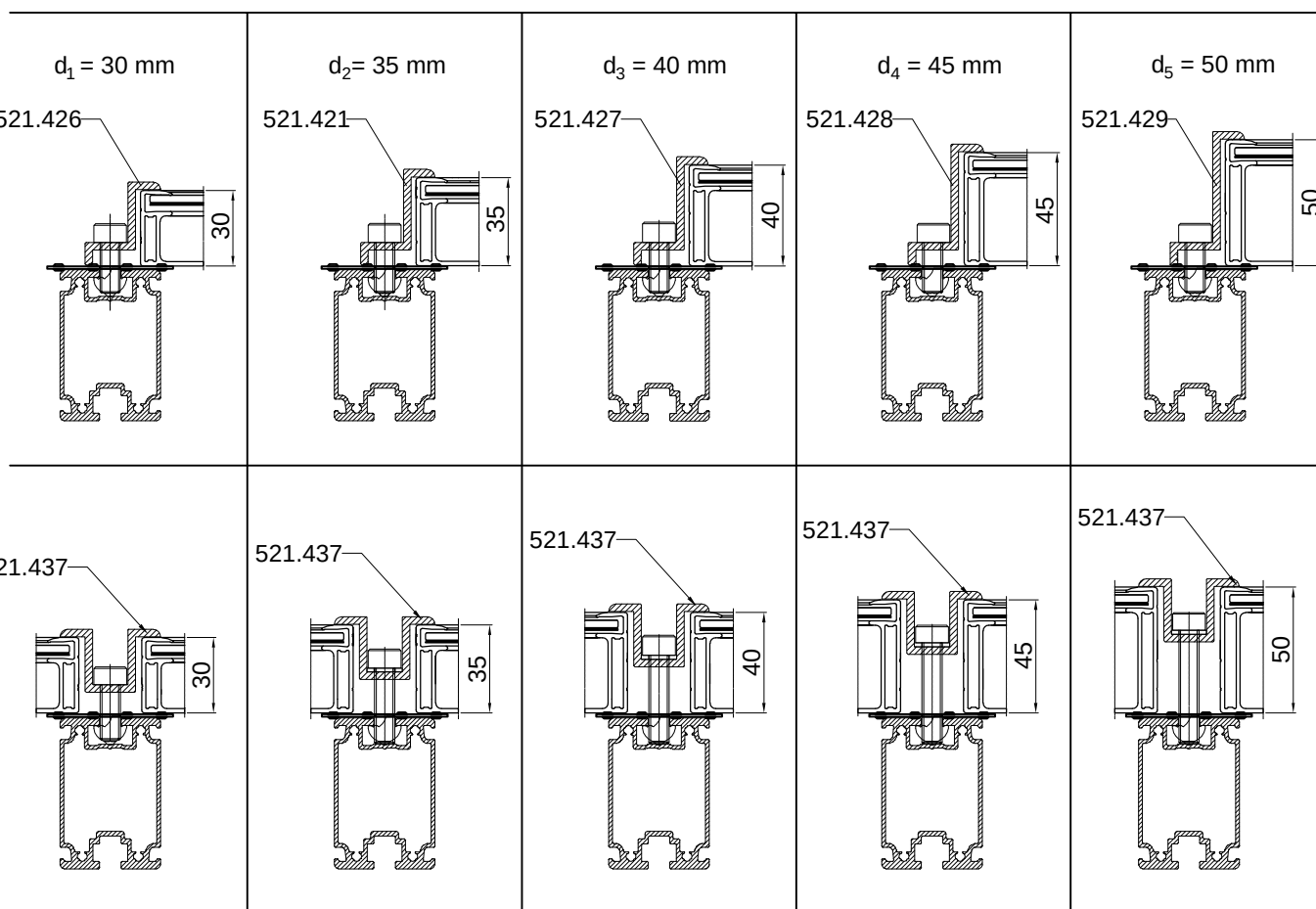
Visina panela (d) Panel height (d)		Korišteni vijak za bočnu kopču Used screw for side holder- single sided	Korišteni vijak za srednju kopču Used screw for side holder- double sided
d ₁	30 mm	Vijak M8x18 431.561	Vijak M8x20 431.565
d ₂	35 mm	Vijak M8x18 431.561	Vijak M8x25 431.560
d ₃	40 mm	Vijak M8x18 431.561	Vijak M8x30 431.567
d ₄	45 mm	Vijak M8x18 431.561	Vijak M8x35 431.568
d ₅	50 mm	Vijak M8x18 431.561	Vijak M8x40 431.566



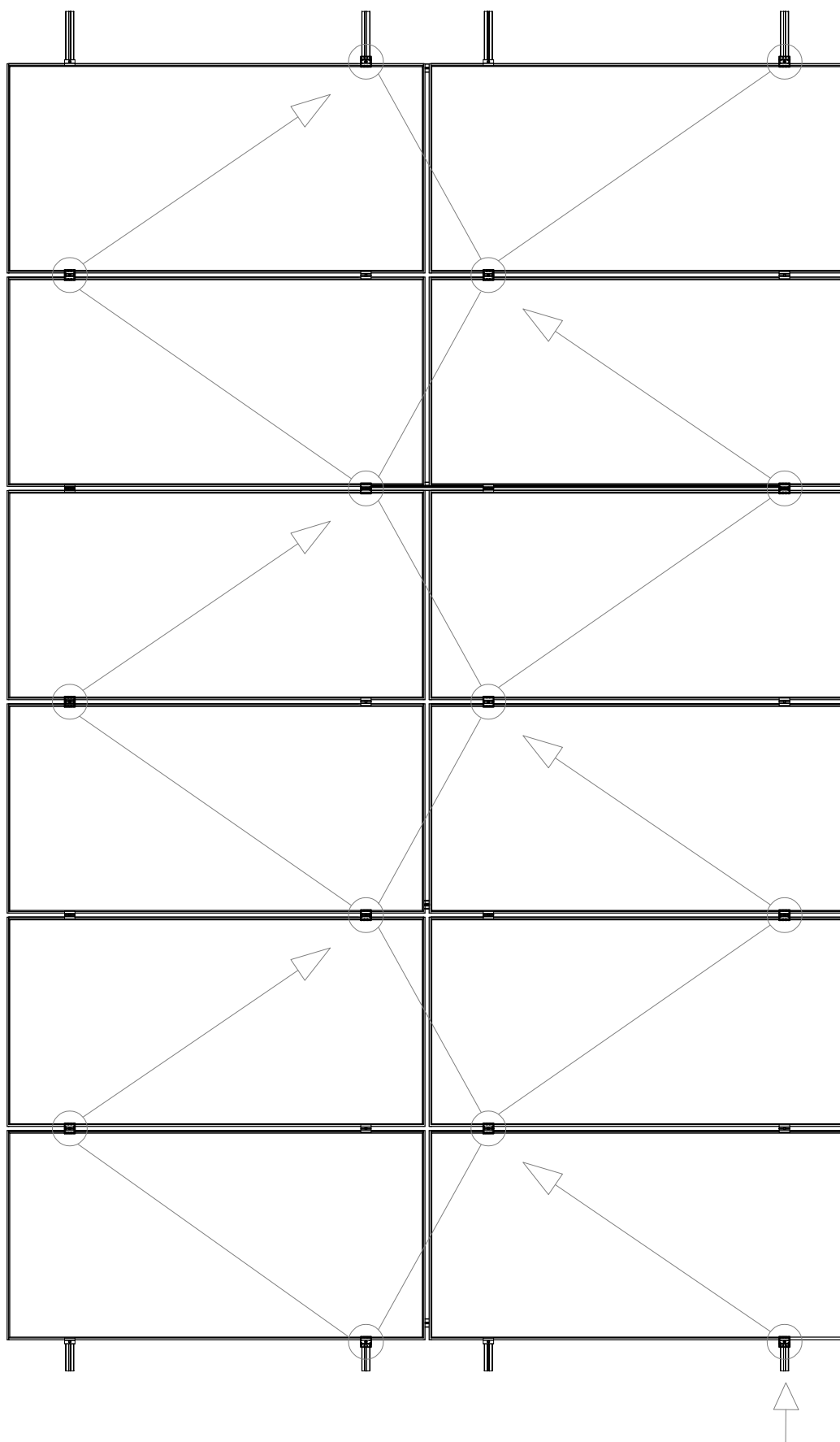
Detalj kopči s pločicom za galvanski kontakt 522.001. Preporučeni broj pločica za jednu sekciju od 12 vertikalno montiranih panela je 14, odnosno pola od ukupnog broja korištenih kopči.

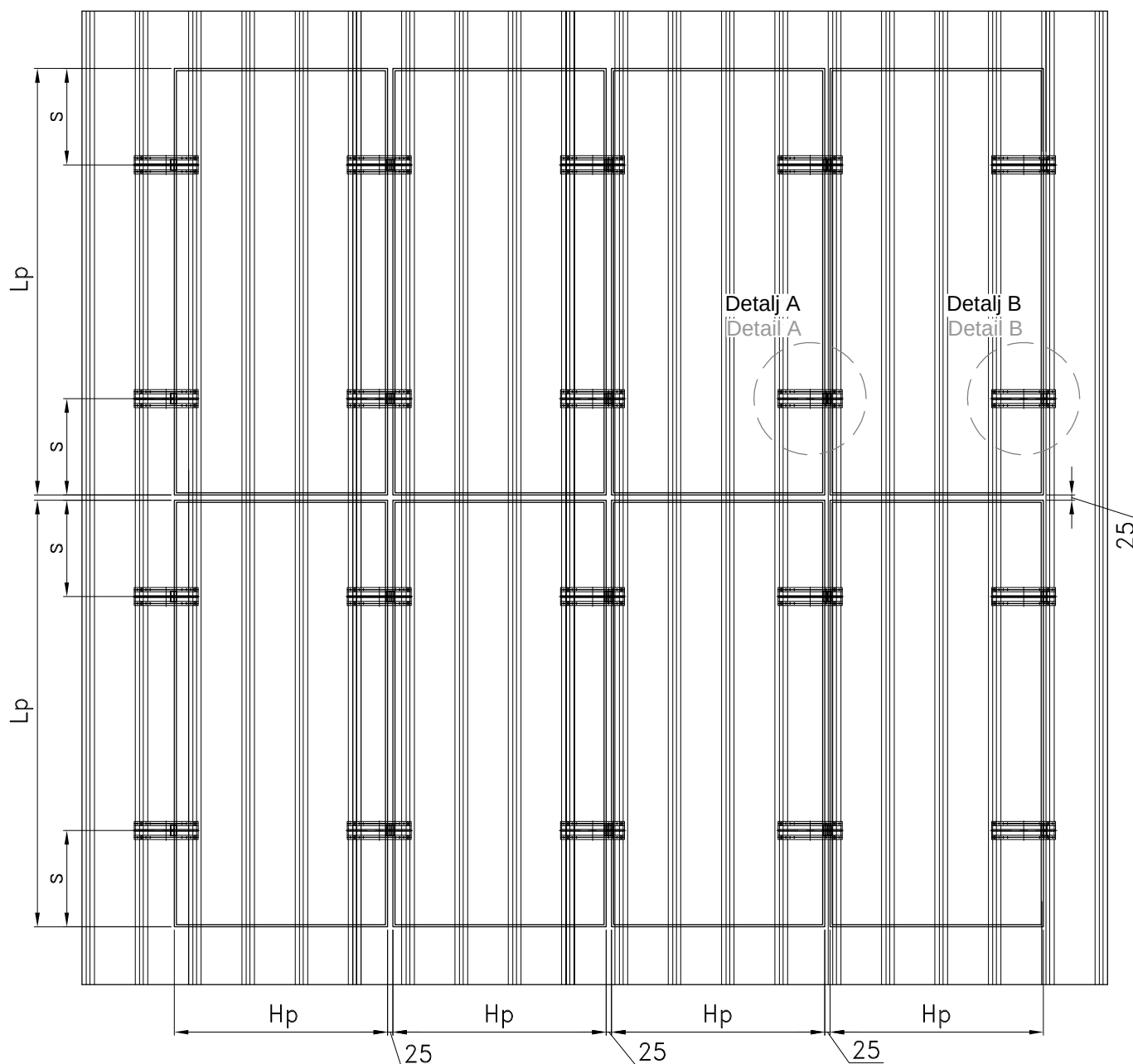
Detail with the galvanic contact plate 522.001. The recommended number of plates for one section of 12 vertically-mounted panels is 6, that is half of the total number of clamps used.

Visina panela (d) Panel height (d)		Korišteni vijak za bočnu kopču Used screw for side holder- single sided	Korišteni vijak za srednju kopču Used screw for side holder- double sided
d ₁	30 mm	Vijak M8x20 431.565	Vijak M8x22 431.559
d ₂	35 mm	Vijak M8x20 431.565	Vijak M8x30 431.567 + podloška 432.129
d ₃	40 mm	Vijak M8x20 431.565	Vijak M8x35 431.568 + podloška 432.129
d ₄	45 mm	Vijak M8x20 431.565	Vijak M8x40 431.566 + podloška 432.129
d ₅	50 mm	Vijak M8x20 431.565	Vijak M8x45 431.569 + podloška 432.129



Prikaz prijedloga rasporeda pločica za galvanski kontakt.
Proposal of the layout how side holders should be arranged.



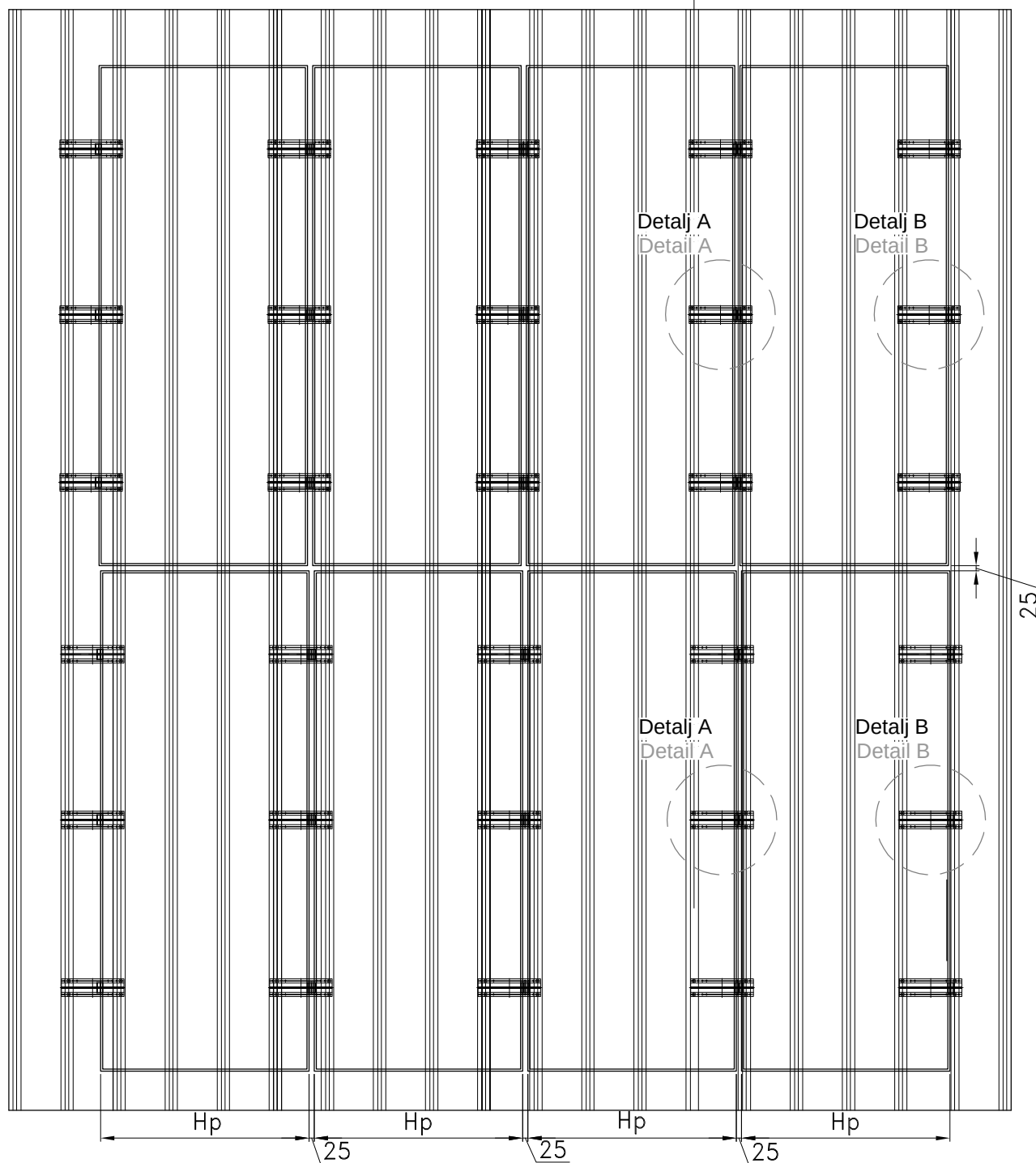
Vertikalna montaža panela na primarnu podkonstrukciju
Vertical installation on primary substructure

L_p - dužina solarnog panela
 H_p - širina solarnog panela
 s - definirano mjesto za položaj kopče solarnog panela

L_p - solar panel length
 H_p - solar panel width
 s - defined location for the position of the solar panel clips

Na osnovu odabrane dužine panela (L_p) i pripadajućeg (s), definiran je položaj podkonstrukcije.

Based on the selected length of the panel (L_p) and the corresponding (s),
the position of the substructure is defined.

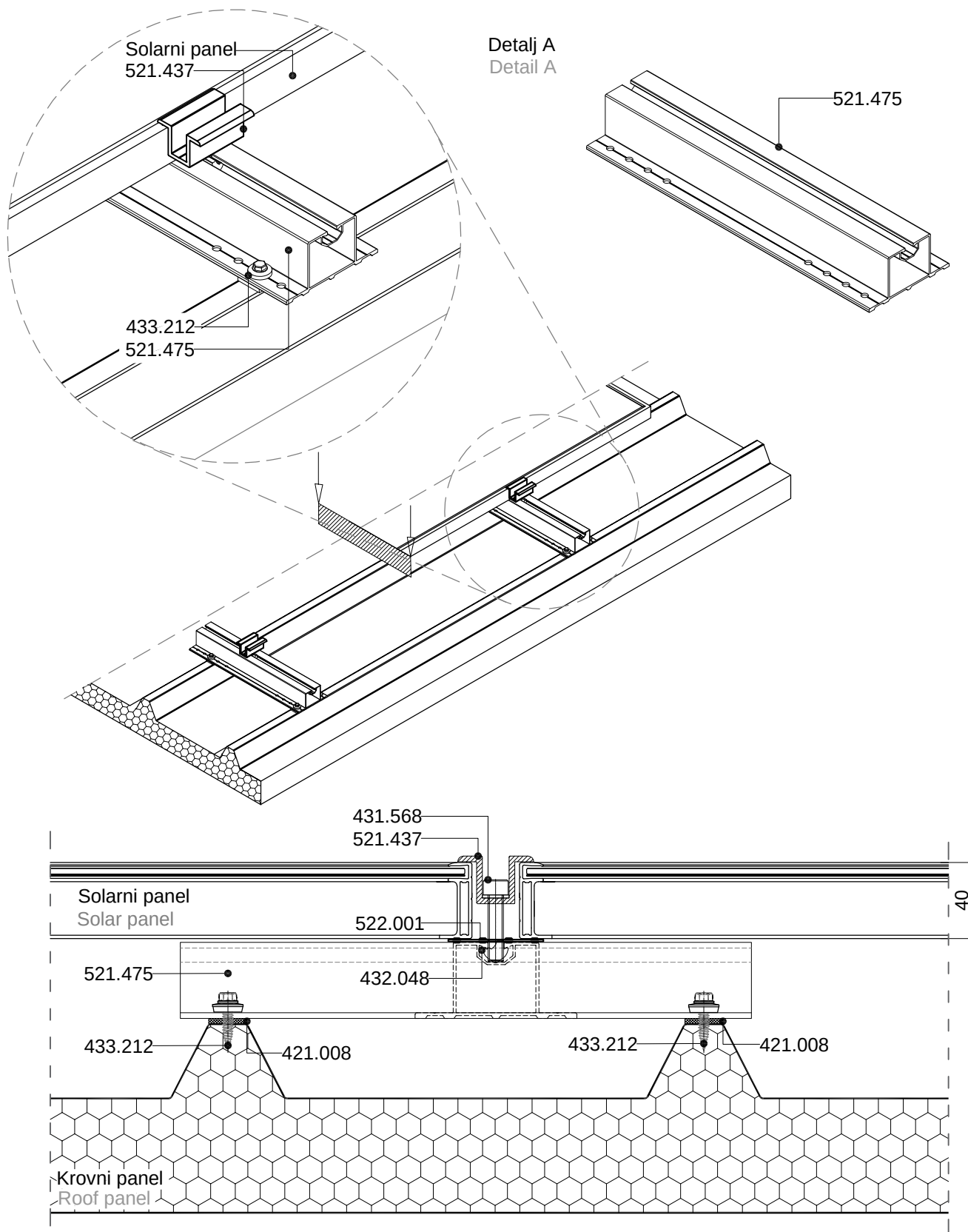
Vertikalna montaža panela na primarnu podkonstrukciju za panele >2000 mm
Vertical installation on primary substructure for panels >2000 mm

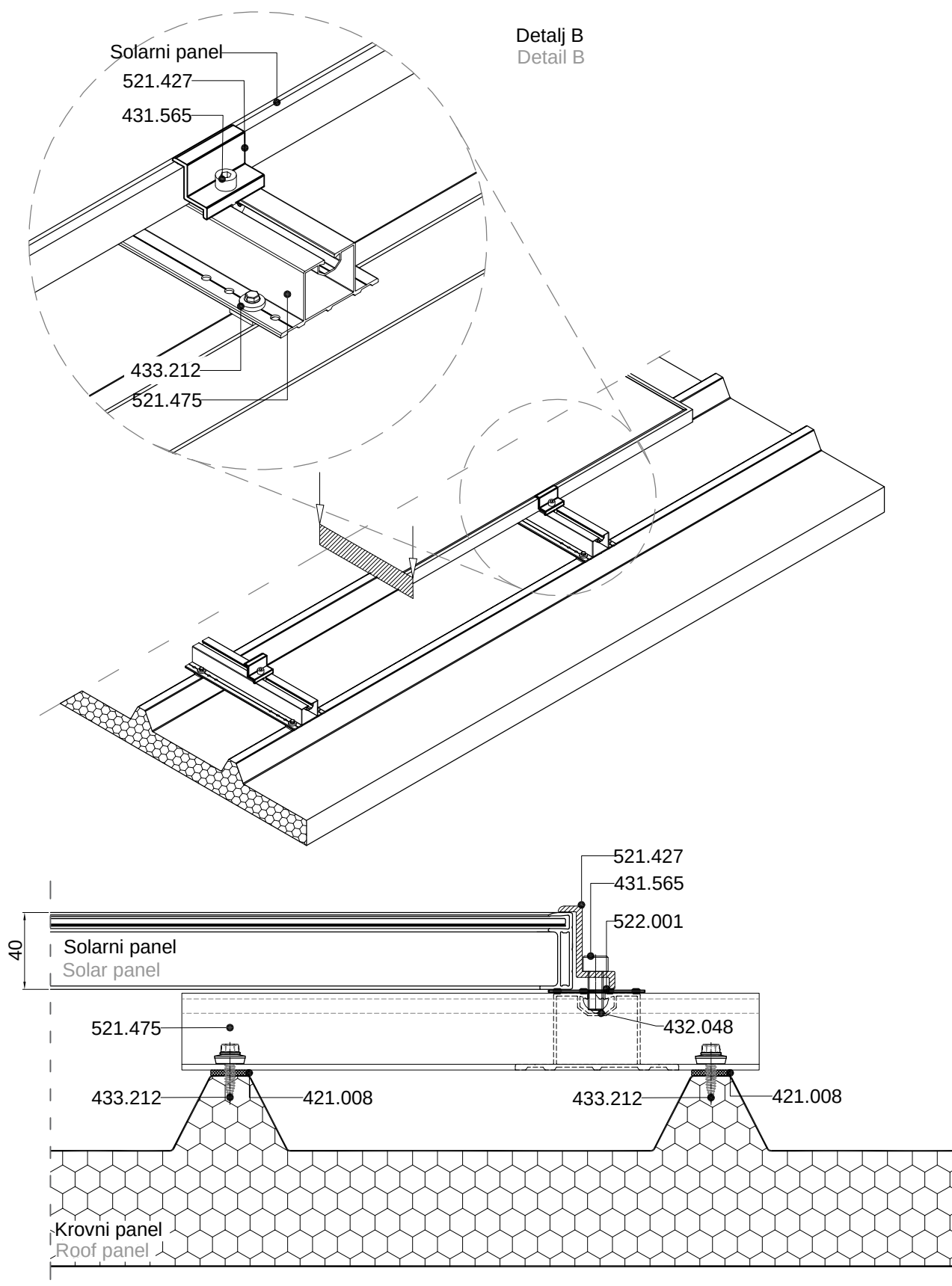
Lp - dužina solarnog panela
Hp - širina solarnog panela
s - definirano mjesto za položaj kopče solarnog panela

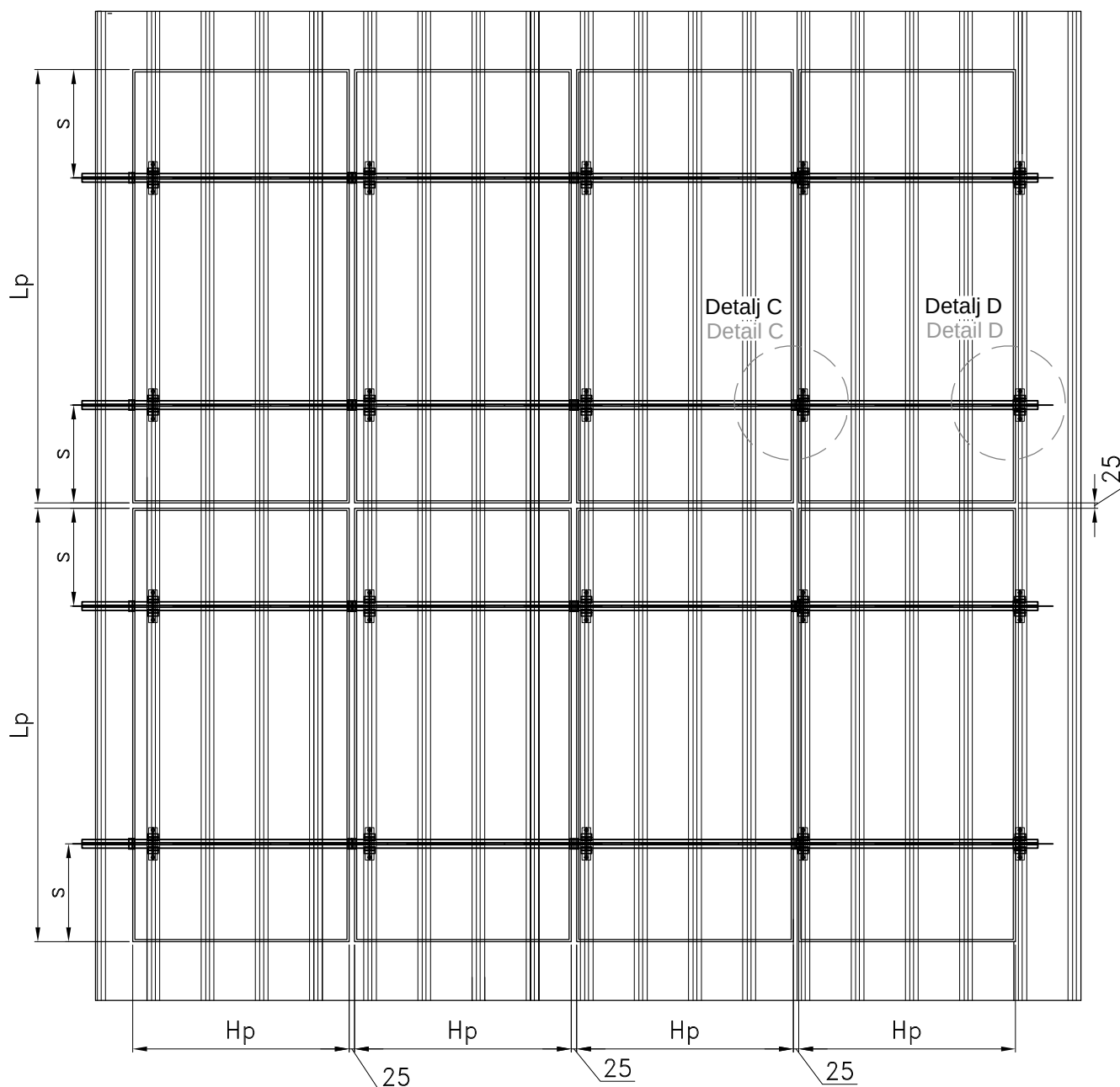
Lp - solar panel length
Hp - solar panel width
s - defined location for the position of the solar panel clips

Na osnovu odabrane dužine panela (Lp) i pripadajućeg (s), definiran je položaj podkonstrukcije. U slučaju da je panel veći od 2000mm, potrebno ga je fiksirati u 6 točaka kao što je prikazano na slici.

Based on the selected length of the panel (Lp) and the corresponding (s), the position of the substructure is defined. In case the PV panel is bigger than 2000mm, it should be fixed in 6 points, as shown in the image.

Vertikalna montaža panela na primarnu podkonstrukciju
Vertical installation on primary substructure

Vertikalna montaža panela na primarnu podkonstrukciju
Vertical installation on primary substructure

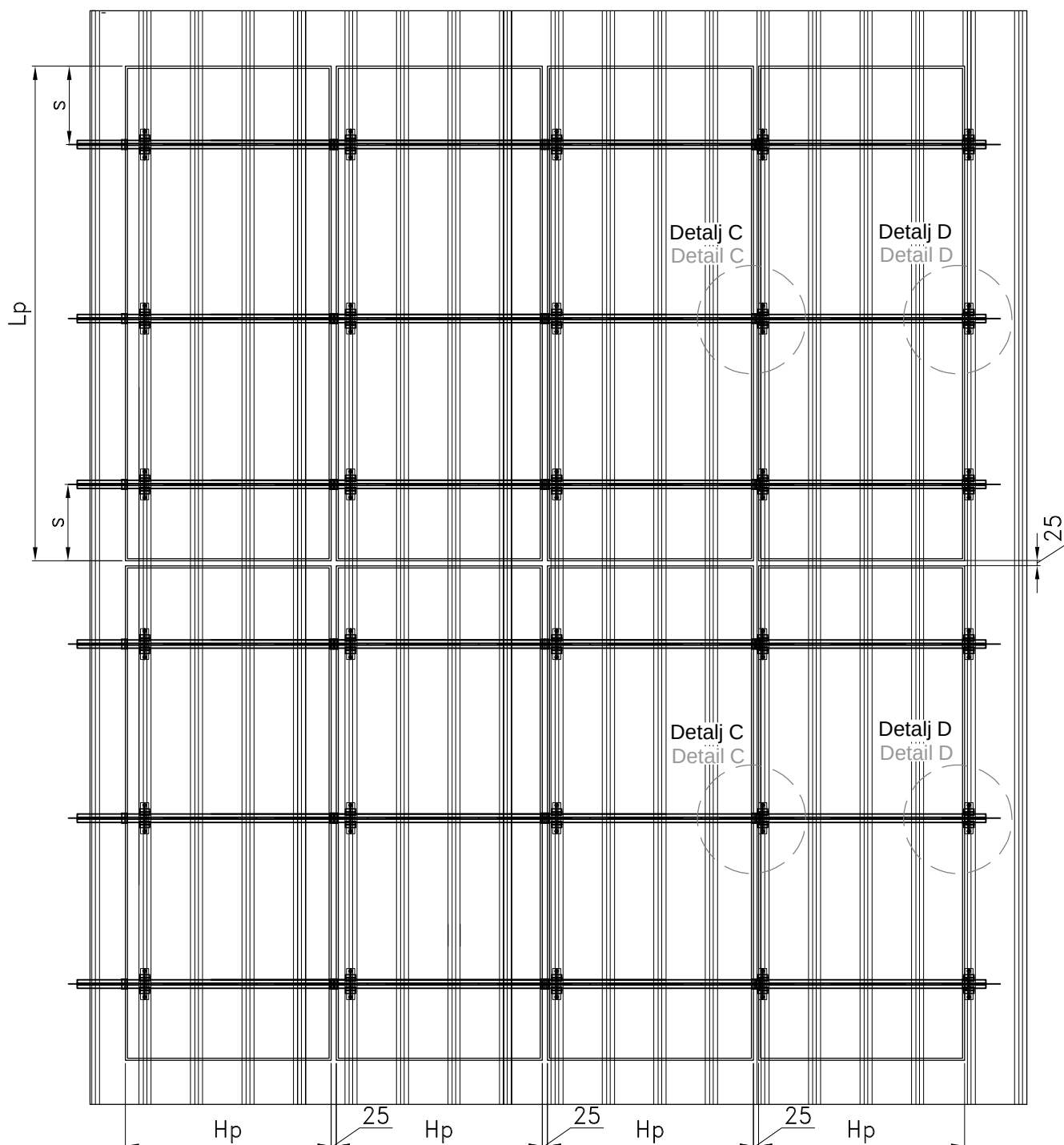
Vertikalna montaža panela na sekundarnu podkonstrukciju
Vertical panel installation on secondary substructure

L_p - dužina solarnog panela
 H_p - širina solarnog panela
 s - definirano mjesto za položaj kopče solarnog panela

L_p - solar panel length
 H_p - solar panel width
 s - defined location for the position of the solar panel clips

Na osnovu odabrane dužine panela (L_p) i pripadajućeg (s), definiran je položaj podkonstrukcije.

Based on the selected length of the panel (L_p) and the corresponding (s),
the position of the substructure is defined.

Vertikalna montaža panela na sekundarnu podkonstrukciju
Vertical panel installation on secondary substructure

L_p - dužina solarnog panela
 H_p - širina solarnog panela
 s - definirano mjesto za položaj kopče solarnog panela

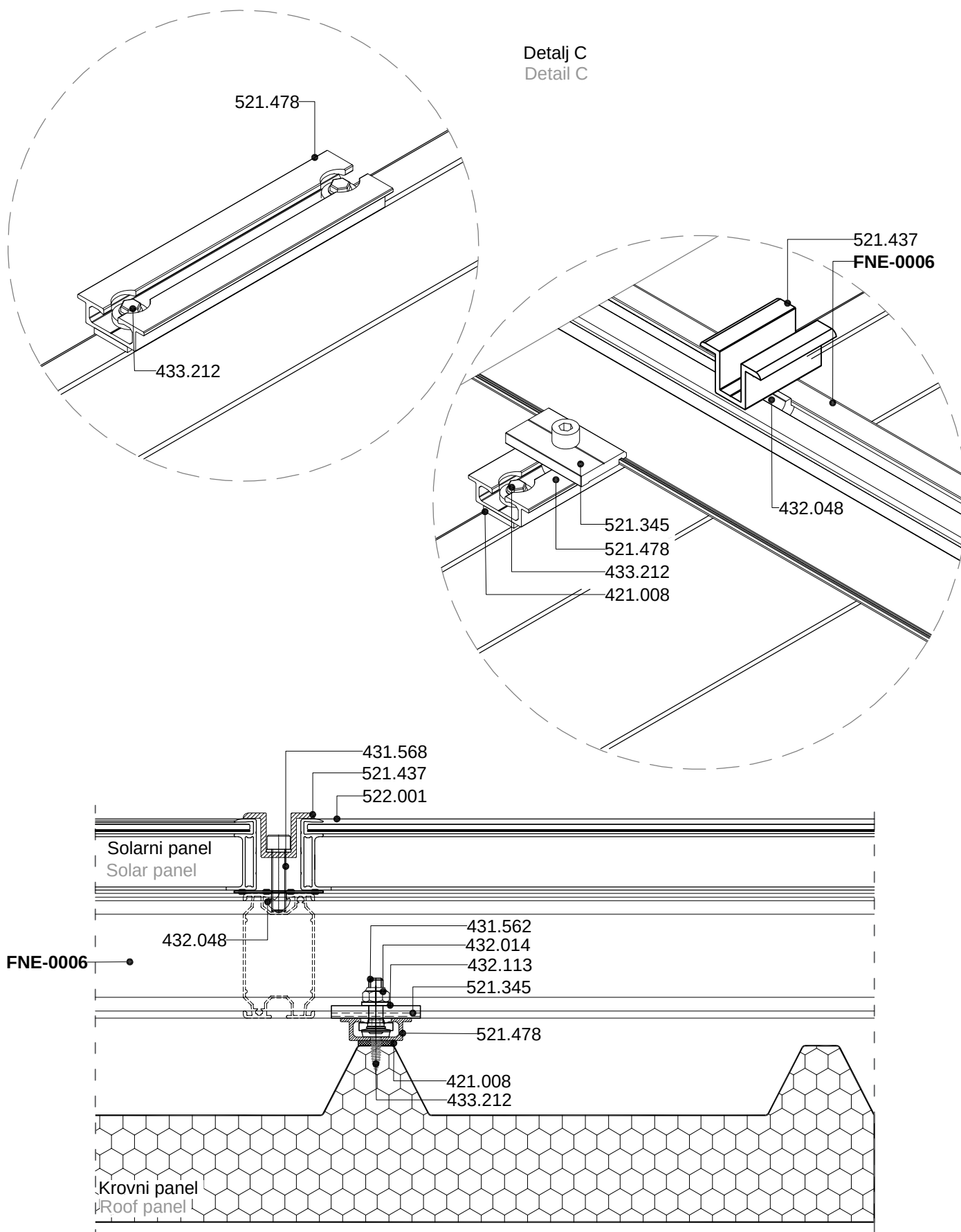
L_p - solar panel length
 H_p - solar panel width
 s - defined location for the position of the solar panel clips

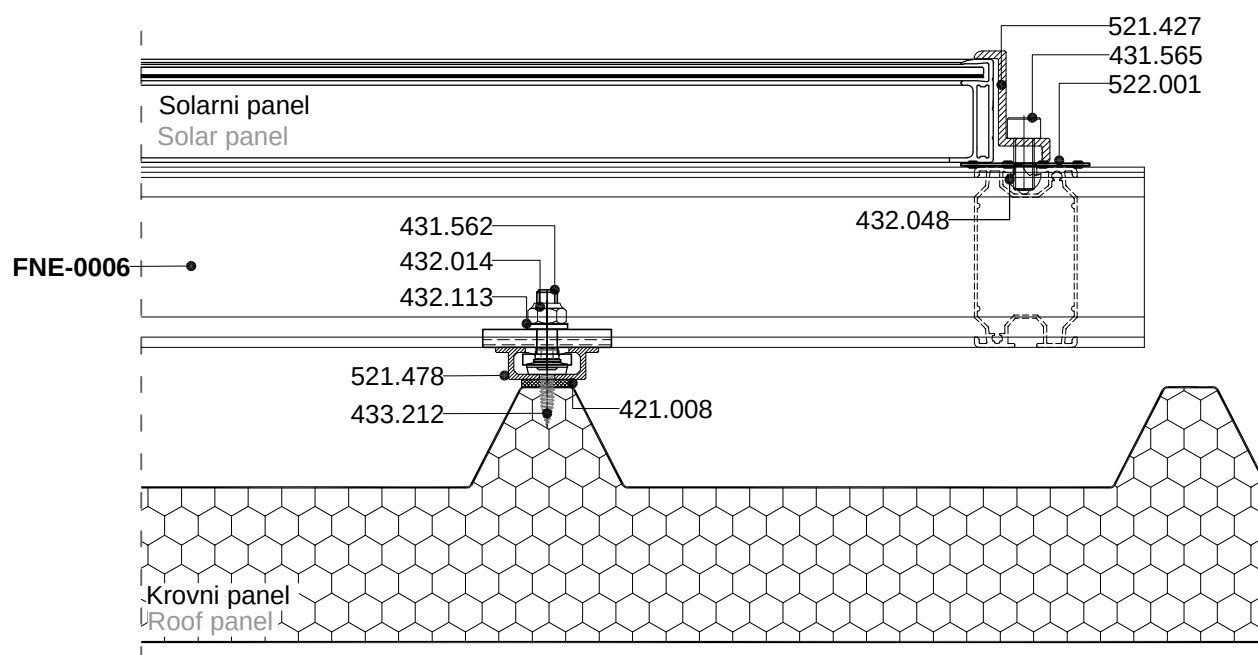
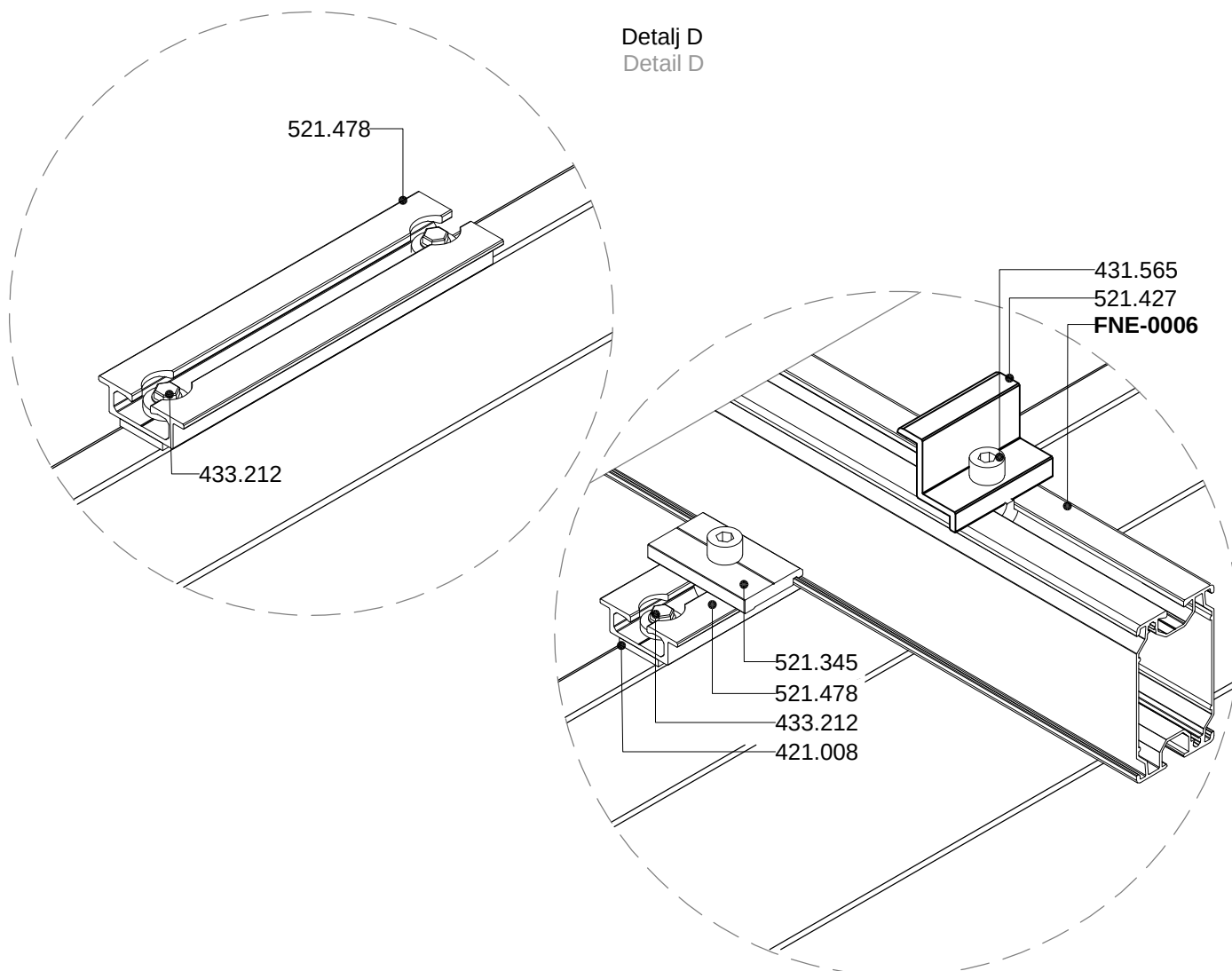
Na osnovu odabrane dužine panela (L_p) i pripadajućeg (s), definiran je položaj podkonstrukcije. U slučaju da je panel veći od 2000mm, potrebno ga je fiksirati u 6 točaka kao što je prikazano na slici.

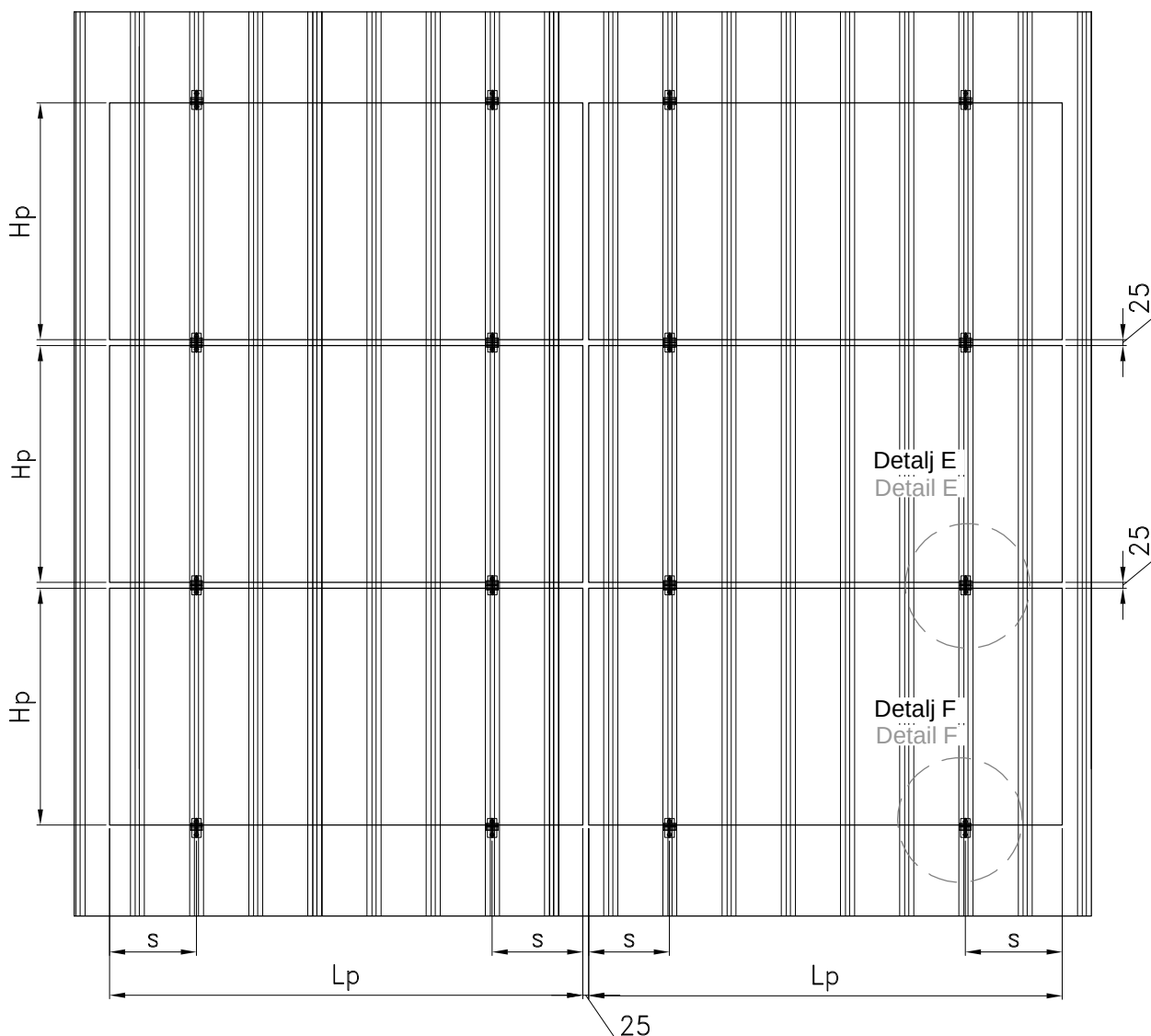
Based on the selected length of the panel (L_p) and the corresponding (s), the position of the substructure is defined. In case the PV panel is bigger than 2000mm, it should be fixed in 6 points, as shown in the image.

Vertikalna montaža panela na sekundarnu podkonstrukciju Vertical panel installation on secondary substructure

Detalj C
Detail C



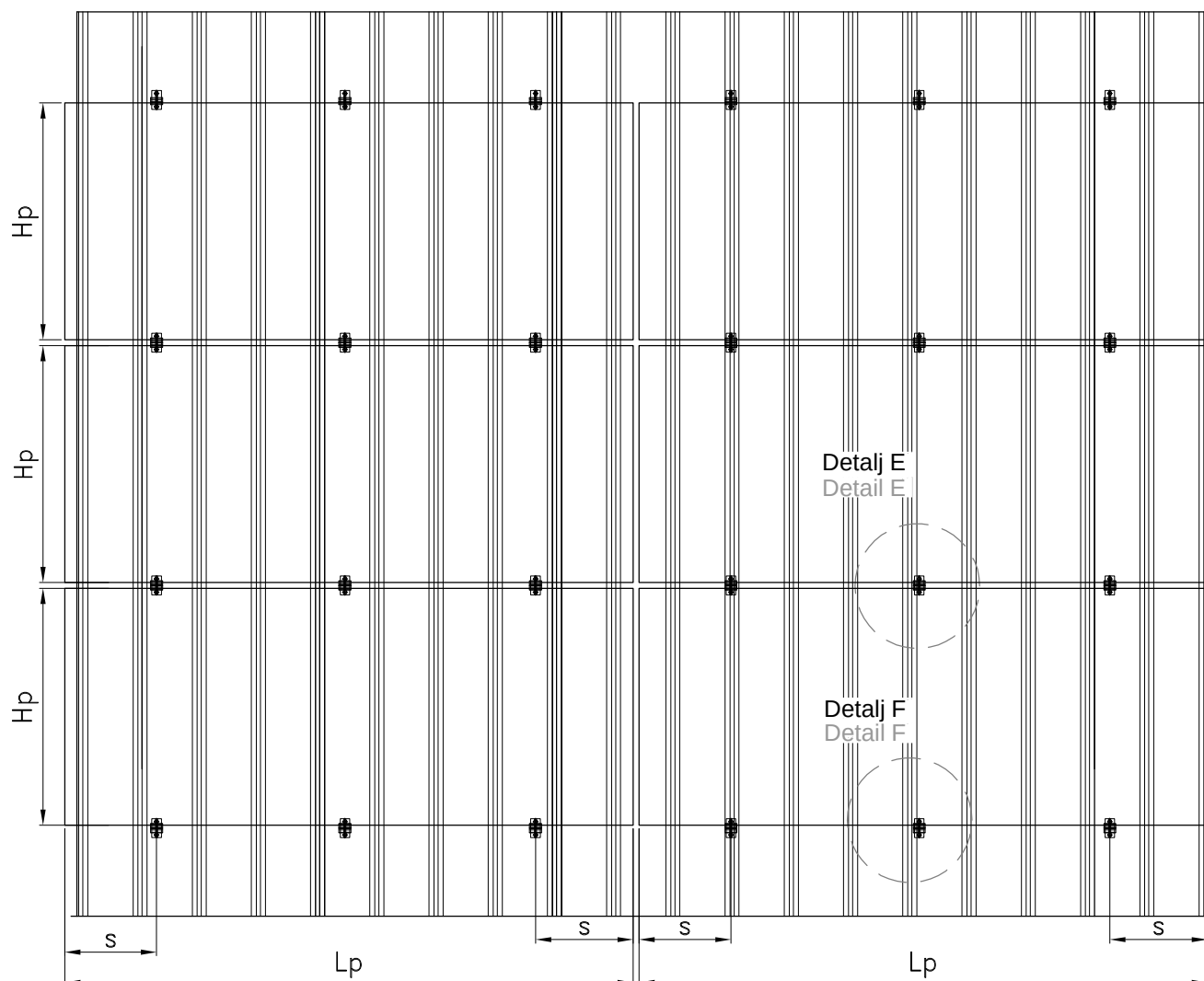
Vertikalna montaža panela na sekundarnu podkonstrukciju
Vertical panel installation on secondary substructureDetalj D
Detail D

Horizontalna montaža panela na primarnu podkonstrukciju
Horizontal panel installation on primary substructure

L_p - dužina solarnog panela
 H_p - širina solarnog panela
 s - definirano mjesto za položaj kopče solarnog panela

L_p - solar panel length
 H_p - solar panel width
 s - defined location for the position of the solar panel clips

Na osnovu odabrane dužine panela (L_p) i pripadajućeg (s), definiran je položaj podkonstrukcije.
Based on the selected length of the panel (L_p) and the corresponding (s), the position of the substructure is defined.

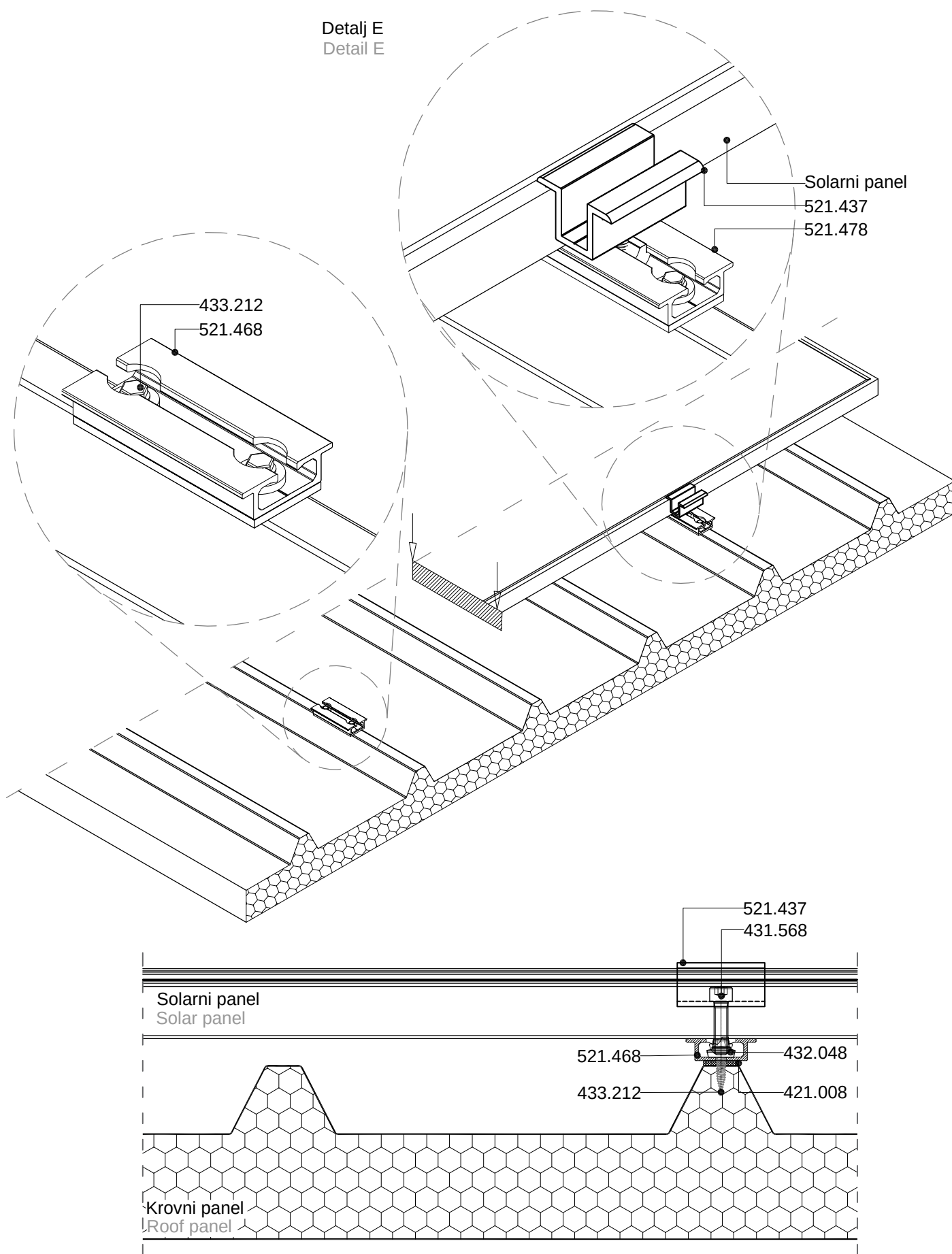
Horizontalna montaža panela na primarnu podkonstrukciju
Horizontal panel installation on primary substructure

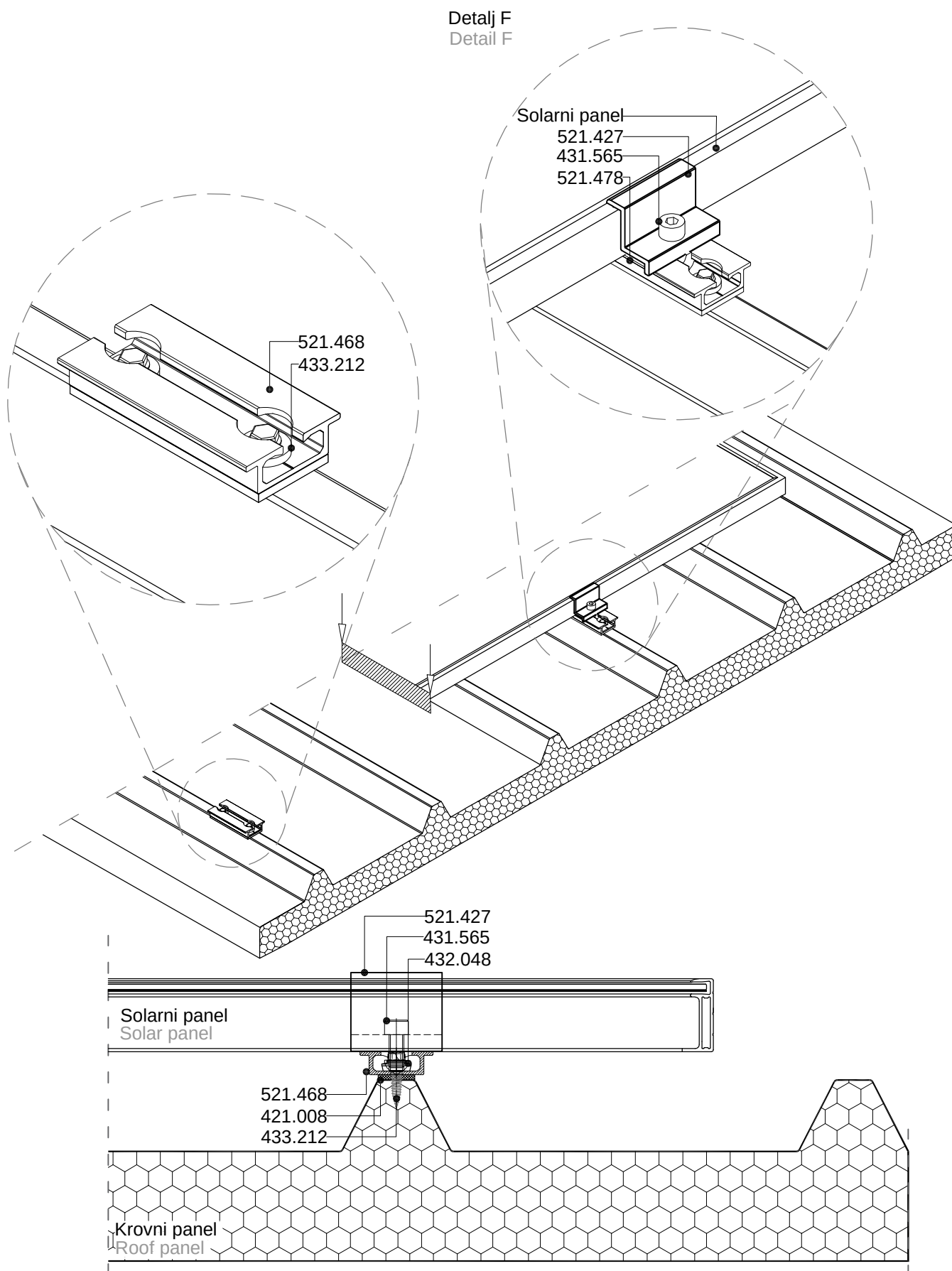
L_p - dužina solarnog panela
 H_p - širina solarnog panela
 s - definirano mjesto za položaj kopče solarnog panela

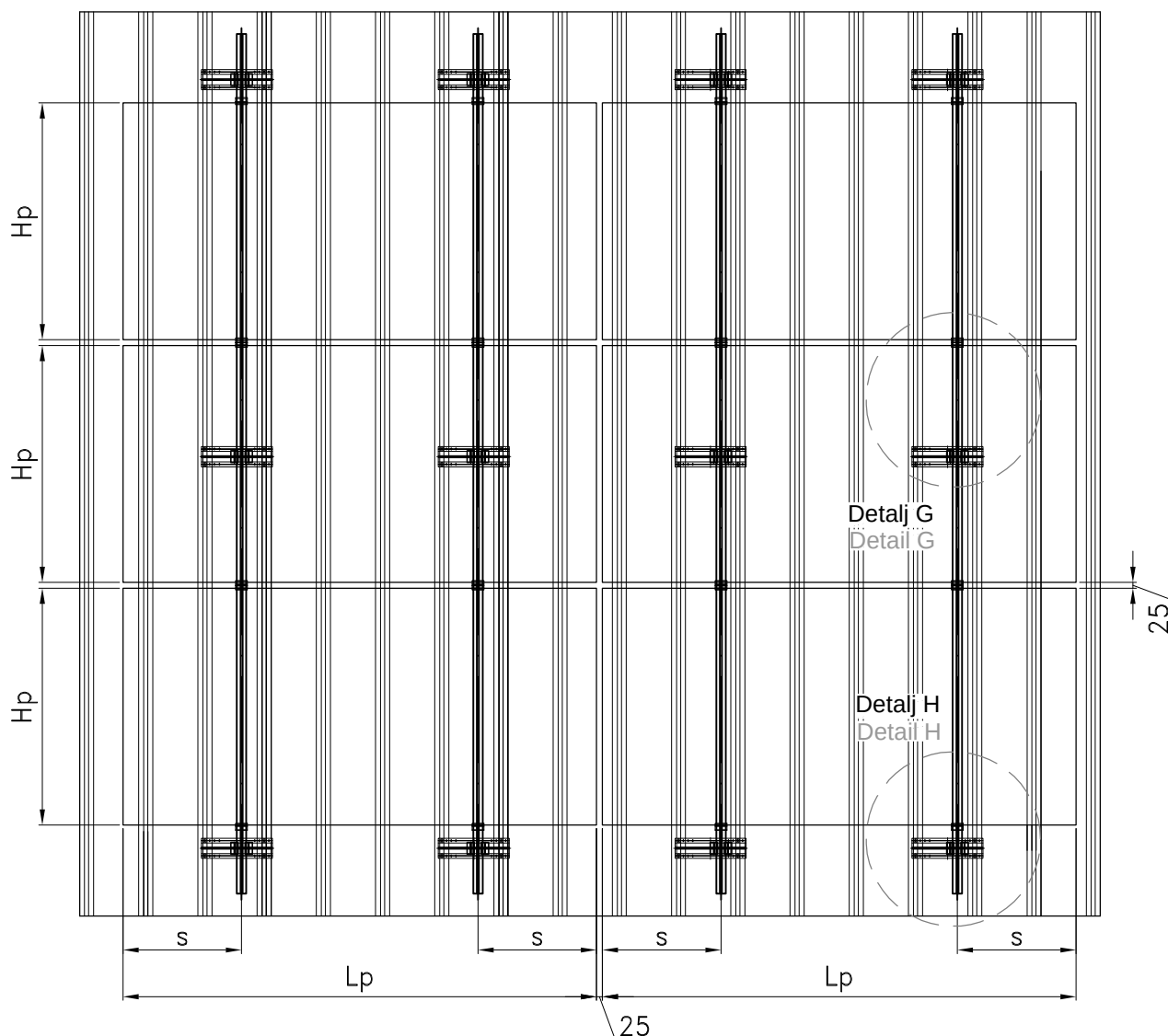
L_p - solar panel length
 H_p - solar panel width
 s - defined location for the position of the solar panel clips

Na osnovu odabrane dužine panela (L_p) i pripadajućeg (s), definiran je položaj podkonstrukcije. U slučaju da je panel veći od 2000mm, potrebno ga je fiksirati u 6 točaka kao što je prikazano na slici.

Based on the selected length of the panel (L_p) and the corresponding (s), the position of the substructure is defined. In case the PV panel is bigger than 2000mm, it should be fixed in 6 points, as shown in the image.

Horizontalna montaža panela na primarnu podkonstrukciju
Horizontal panel installation on primary substructureDetalj E
Detail E

Horizontalna montaža panela na primarnu podkonstrukciju
Horizontal panel installation on primary substructure

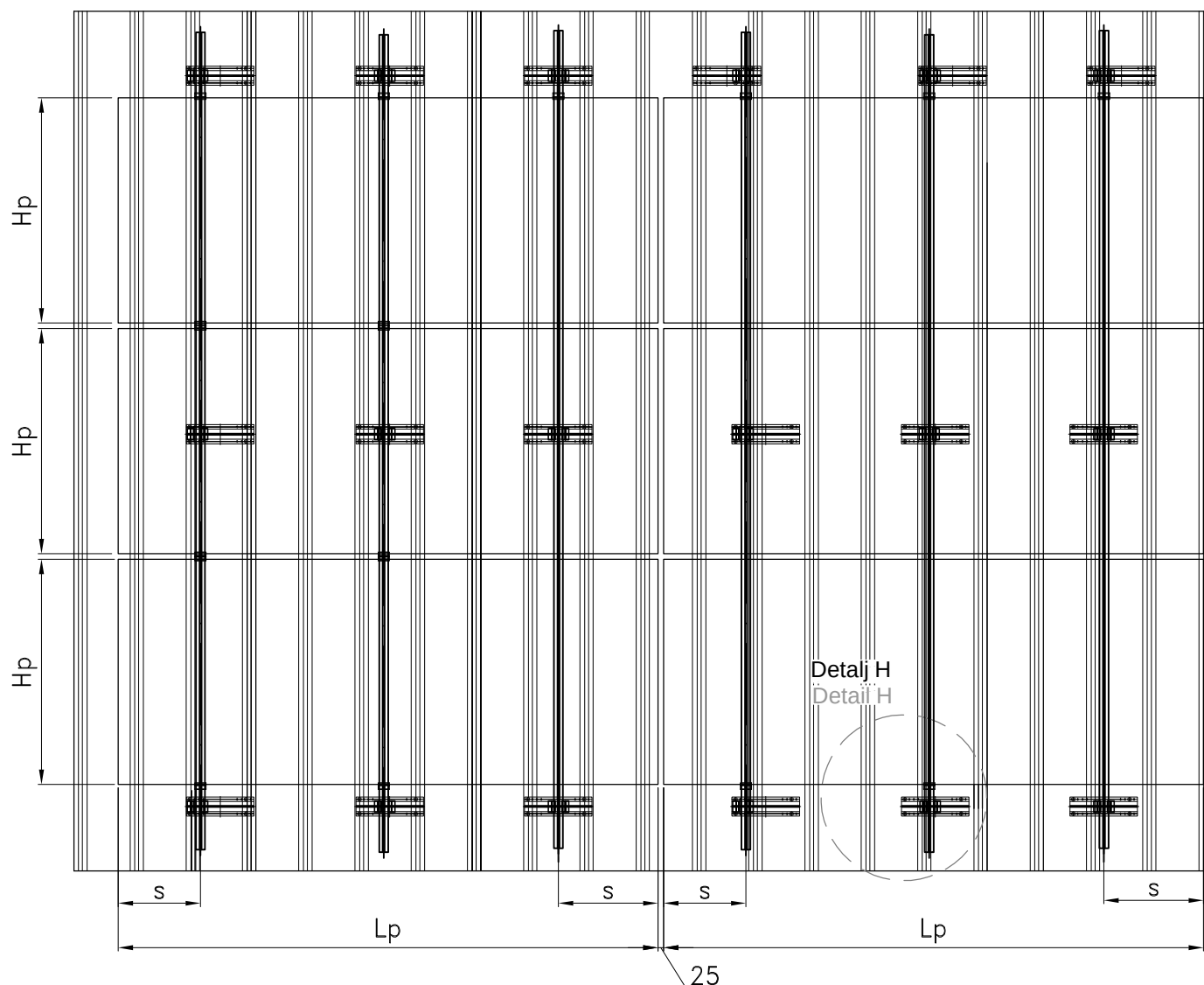
Horizontalna montaža na sekundarnu podkonstrukciju
Horizontal panel instalation on secondary substructure

Lp - dužina solarnog panela
Hp - širina solarnog panela
s - definirano mjesto za položaj kopče solarnog panela

Lp - solar panel length
Hp - solar panel width
s - defined location for the position of the solar panel clips

Na osnovu odabrane dužine panela (Lp) i pripadajućeg (s), definiran je položaj podkonstrukcije.

Based on the selected length of the panel (Lp) and the corresponding (s),
the position of the substructure is defined.

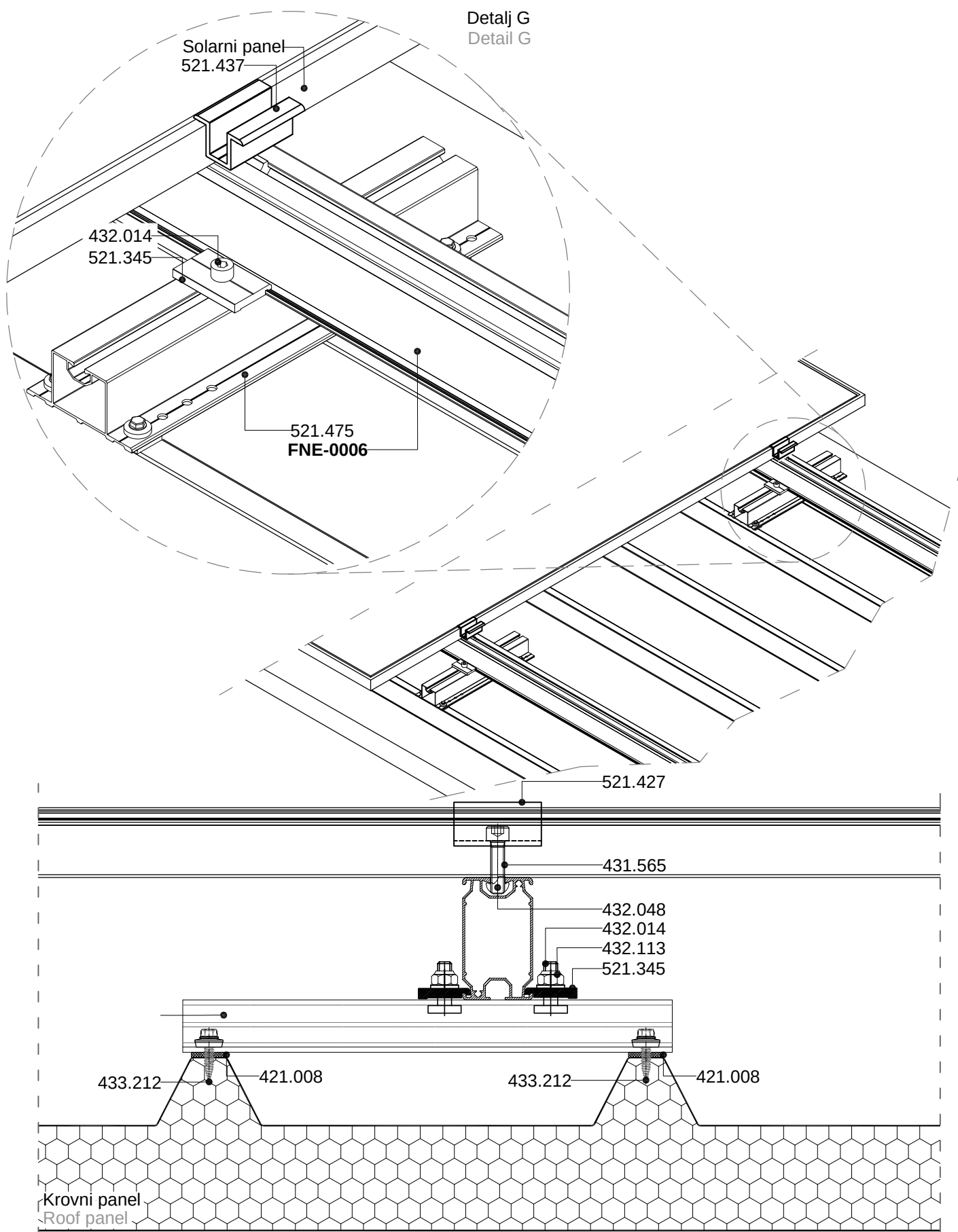
Horizontalna montaža na sekundarnu podkonstrukciju
Horizontal panel instalation on secondary substructure

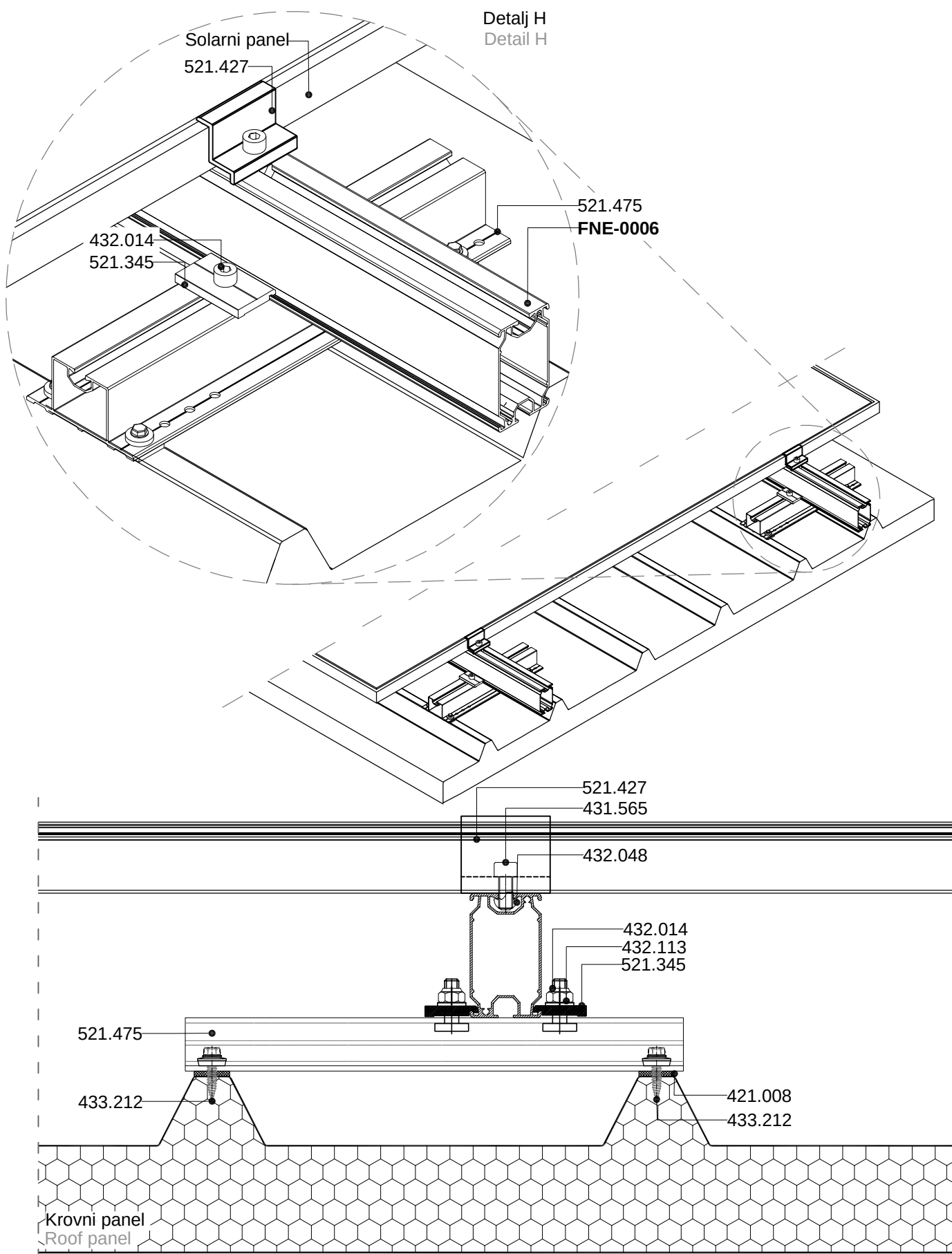
Lp - dužina solarnog panela
Hp - širina solarnog panela
s - definirano mjesto za položaj kopče solarnog panela

Lp - solar panel length
Hp - solar panel width
s - defined location for the position of the solar panel clips

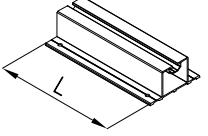
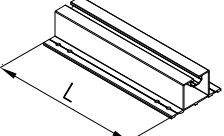
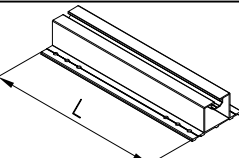
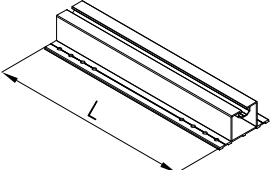
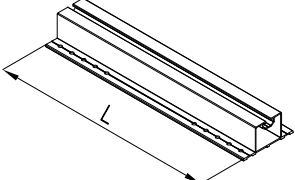
Na osnovu odabrane dužine panela (Lp) i pripadajućeg (s), definiran je položaj podkonstrukcije. U slučaju da je panel veći od 2000mm, potrebno ga je fiksirati u 6 točaka kao što je prikazano na slici.

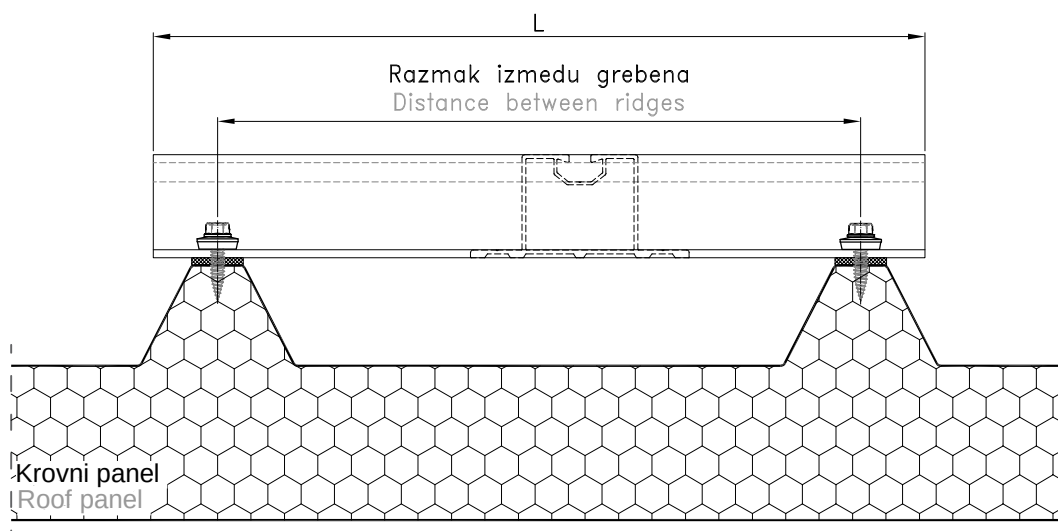
Based on the selected length of the panel (Lp) and the corresponding (s), the position of the substructure is defined. In case the PV panel is bigger than 2000mm, it should be fixed in 6 points, as shown in the image.

Horizontalna montaža na sekundarnu podkonstrukciju
Horizontal panel instalation on secondary substructure

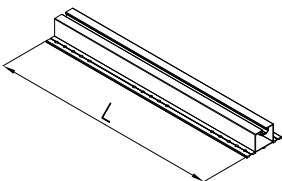
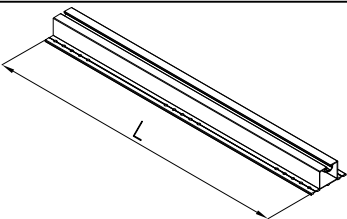
Horizontalna montaža na sekundarnu podkonstrukciju
Horizontal panel instalation on secondary substructure

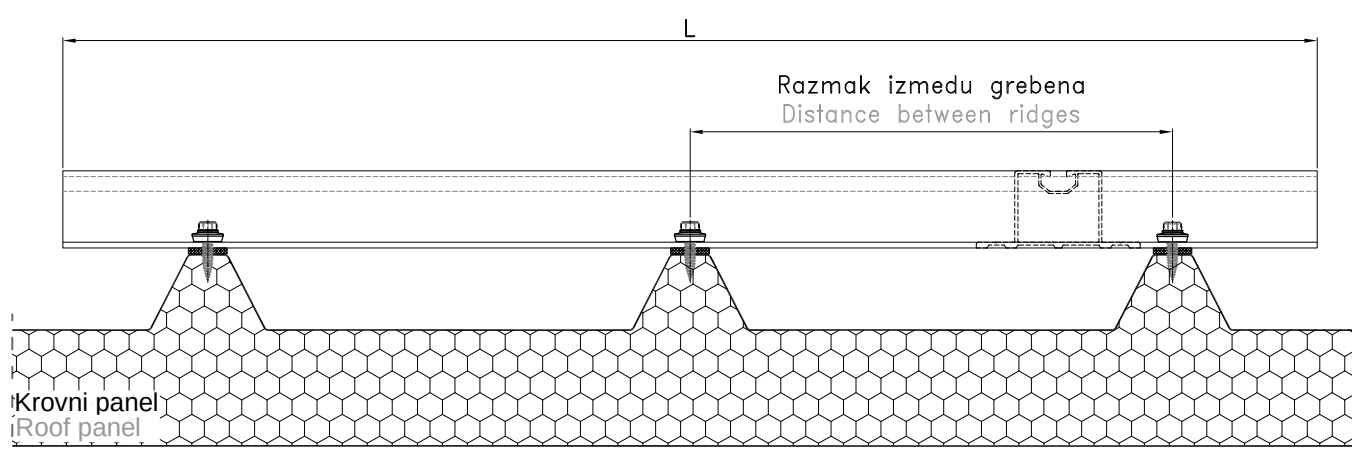
Tablica standardnih dimenzija poprečnog nosača preko dva grebena
Table of standard dimension of perpendicular support over two ridges

Kod Code	Izgled View	Razmak između grebena [mm] Distance between riffs [mm]	Dimenzija L [mm] Dimension L [mm]
521.472		150	180
521.473		150;170;190	220
521.474		150;170;190; 210;230	260
521.475		150;170;190; 210;230;250; 270	300
521.470		150;170;190; 210;230;250; 270;290;310	340



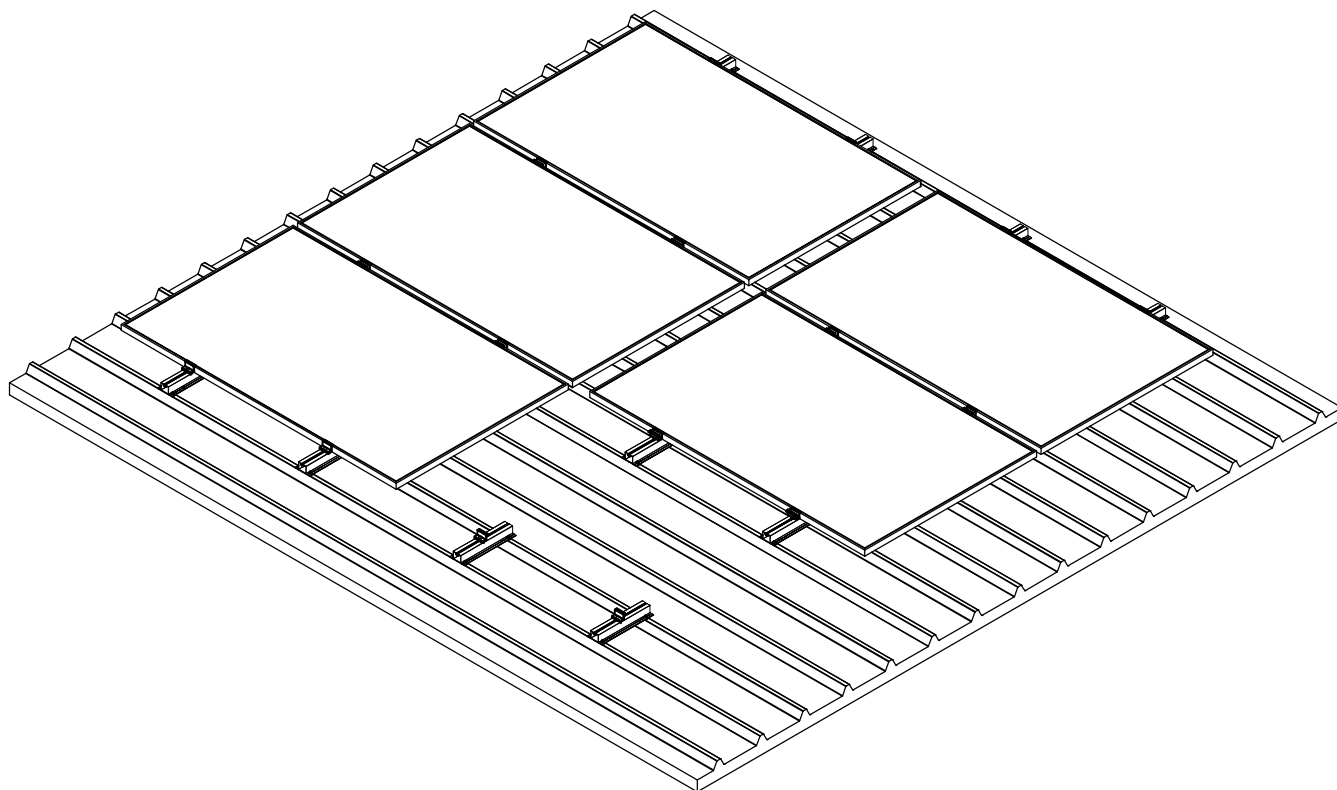
Tablica standardnih dimenzija poprečnog nosača preko tri grebena
Table of standard dimension of perpendicular support over tri ridges

Kod Code	Izgled View	Razmak između grebena [mm] Distance between riffs [mm]	Dimenzija L [mm] Dimension L [mm]
521.476		150	490
521.477		150;170;190	650



Obrada i montaža

Processing and montage

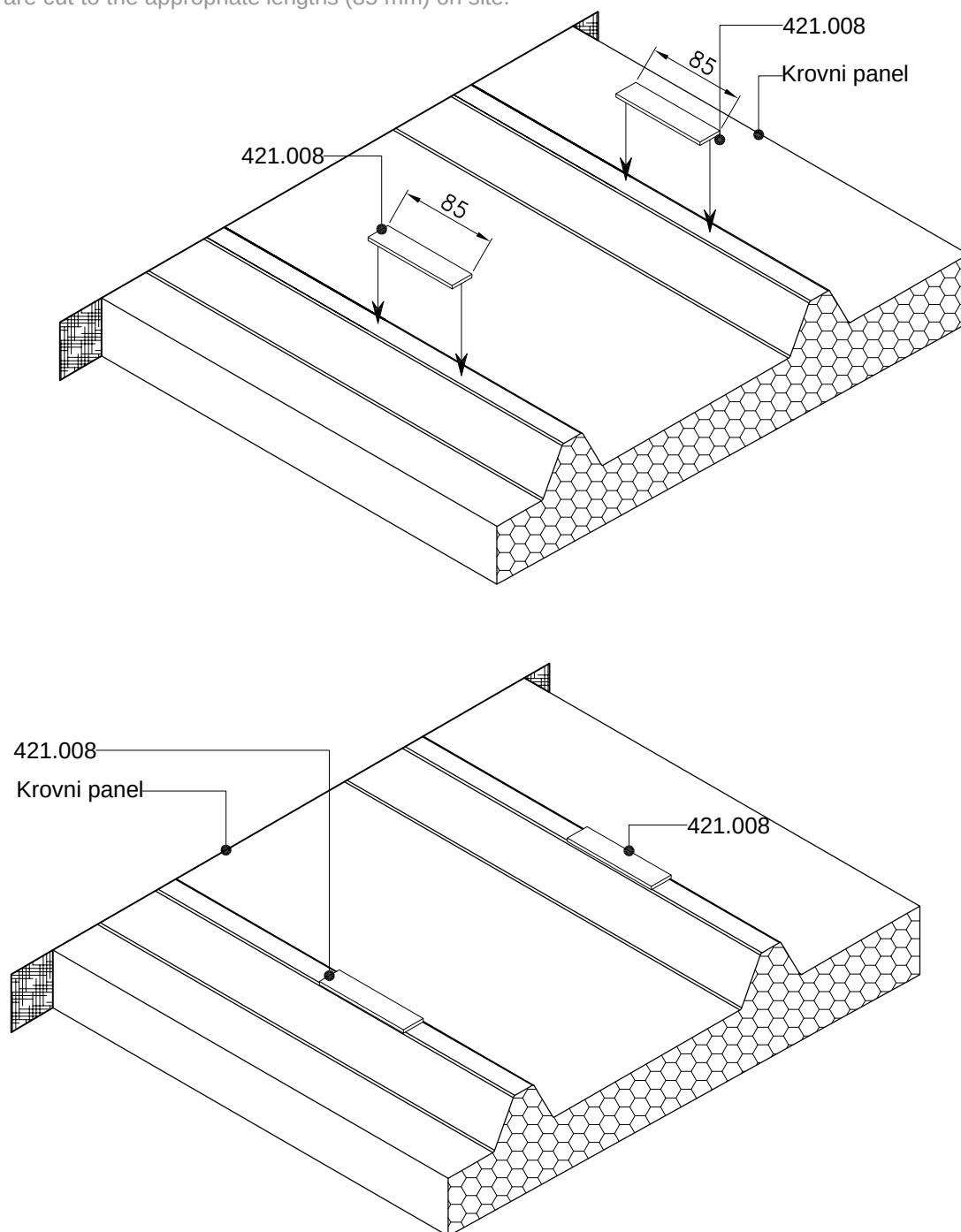
Vertikalna montaža solarnih panela na primarnu podkonstrukciju
Vertical mounting of solar panels on the primary substructure

Vertikalna montaža solarnih panela na primarnu podkonstrukciju
Vertical mounting of solar panels on the primary substructure**Korak 1:**

Prvi korak montaže je postavljanje samoljepljive PE trake (421.008) na unaprijed predviđena mjesta. Trake se režu na odgovarajuće dužine (85 mm) na licu mjesta.

Step 1:

The first step of assembly is to place the self-adhesive PE strips (421.008) in the predetermined places. The strips are cut to the appropriate lengths (85 mm) on site.



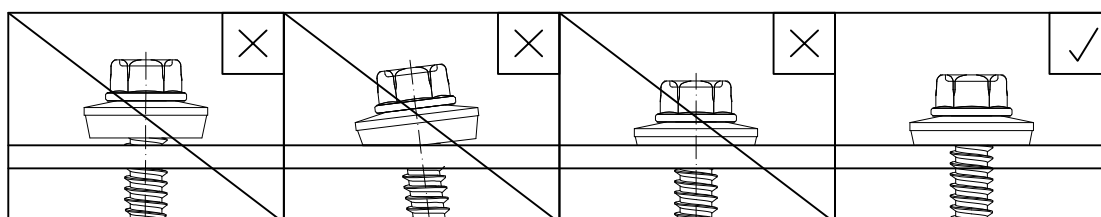
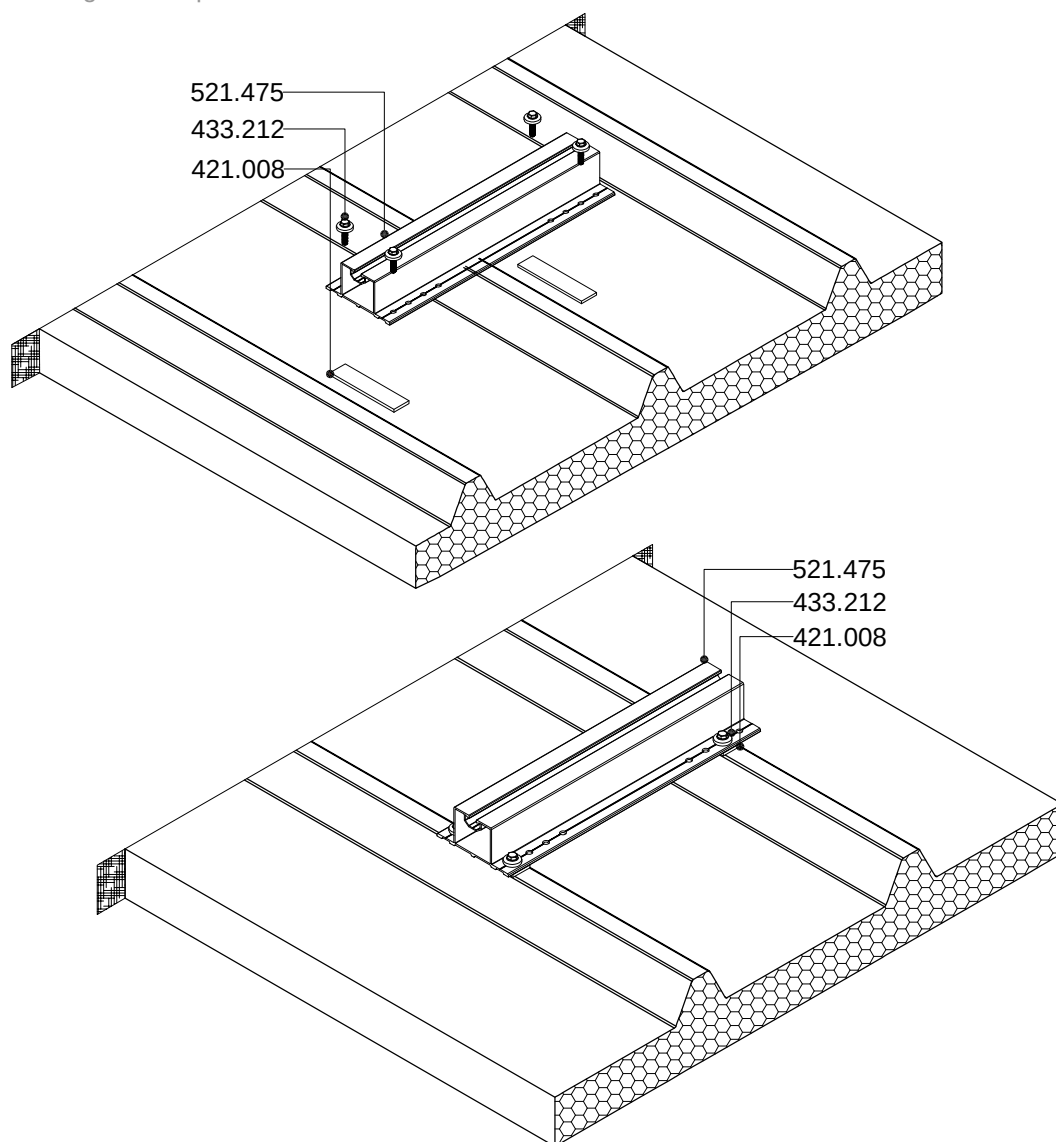
Vertikalna montaža solarnih panela na primarnu podkonstrukciju
Vertical mounting of solar panels on the primary substructure**Korak 2:**

Drugi korak montaže je postavljanje odgovarajućih nosača na PE trake (421.008).

Nosač se postavlja preko 2 susjedna vala. Ovaj tip nosača pokriva udaljenosti između grebena od 150mm do 620mm i koristi se prilikom vertikalne montaže solarnih panela.

Step 2:

The second assembly step is to place the appropriate support on the PE strips (421.008). Support is placed over 2 adjacent waves. This type of support covers distances between ridges from 150mm to 620mm and is used for vertical mounting of solar panels.

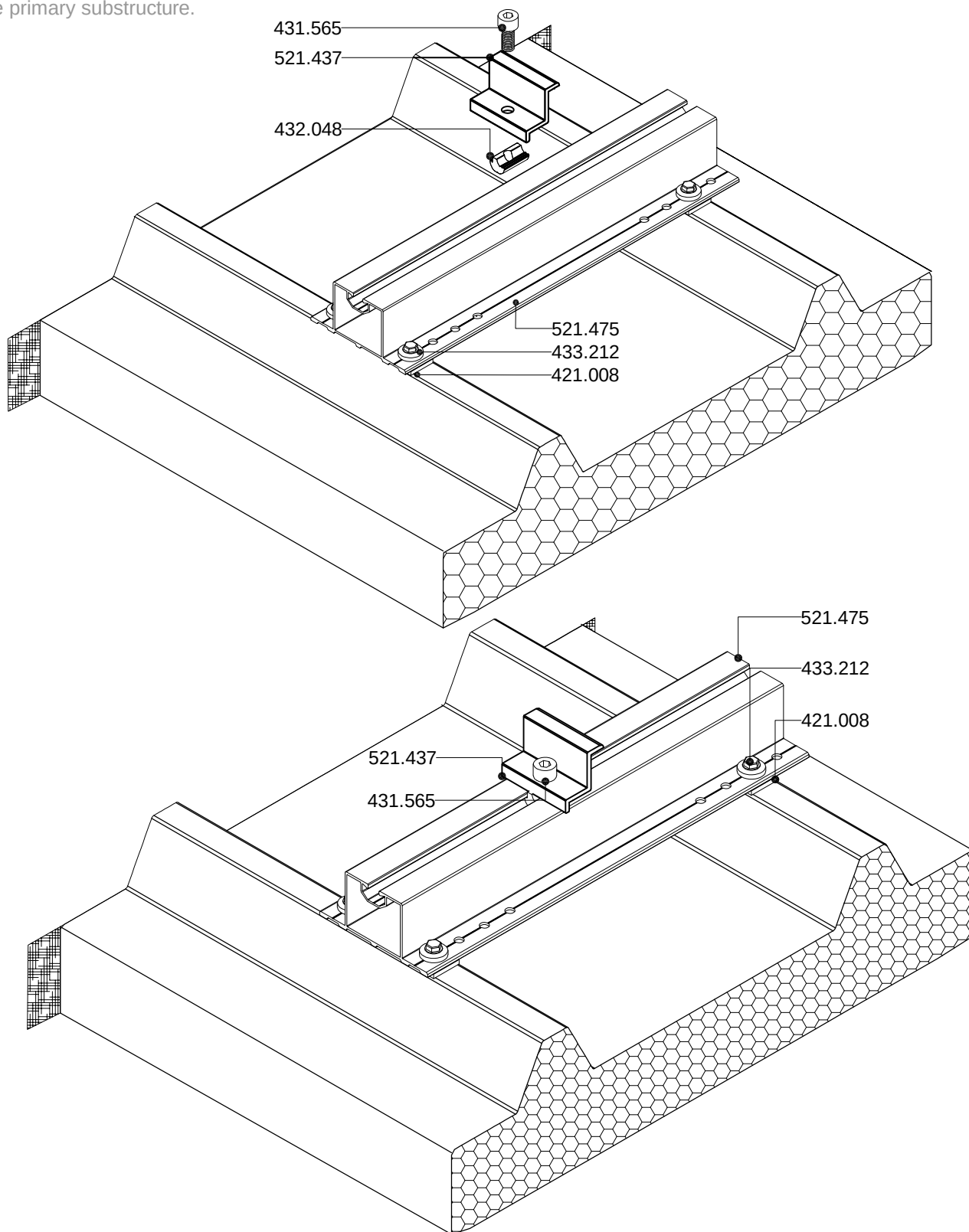


Vertikalna montaža solarnih panela na primarnu podkonstrukciju
Vertical mounting of solar panels on the primary substructure**Korak 3:**

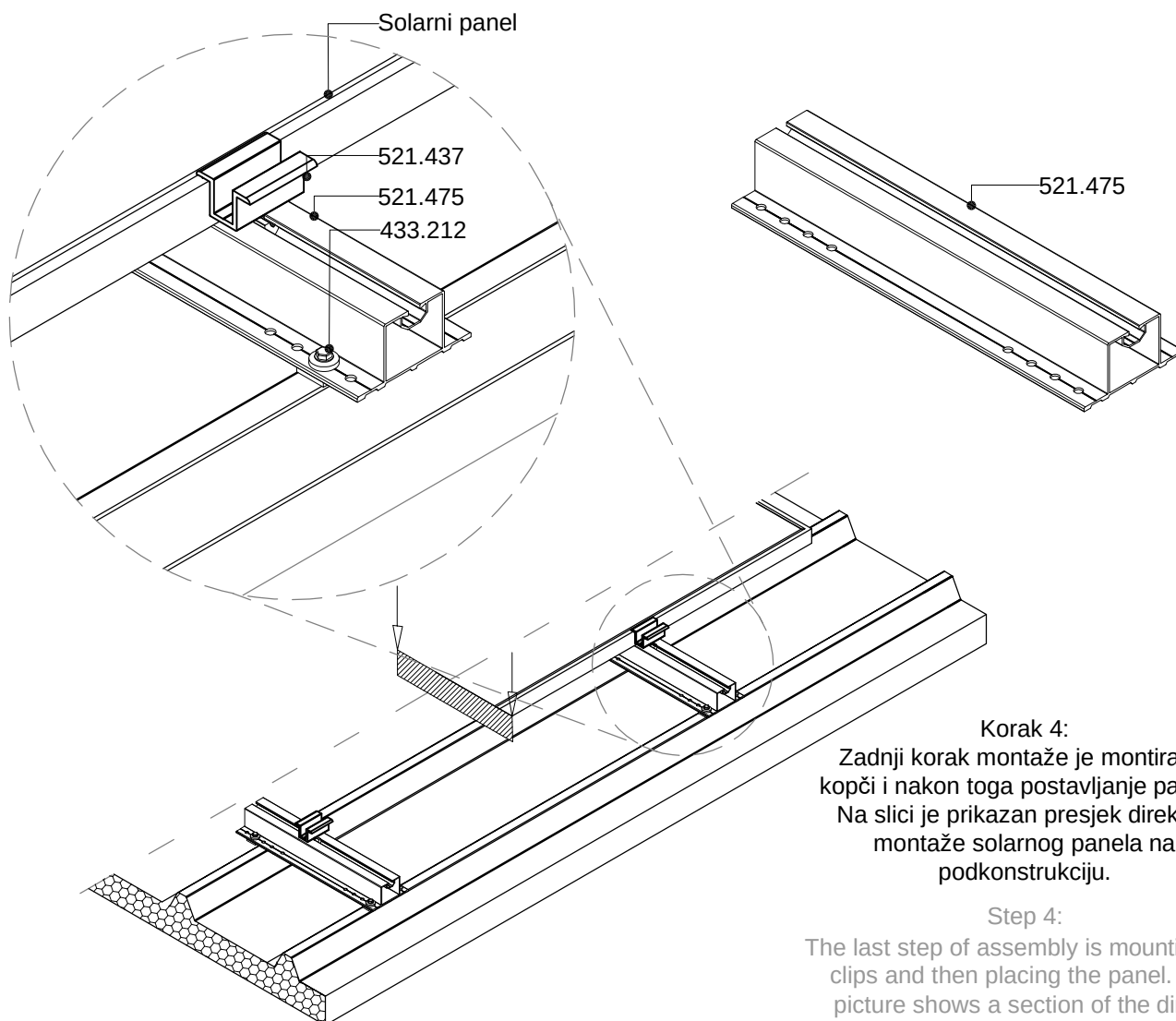
Nakon montiranja odgovarajućih nosača, montiramo kopče koje služe kao držači između solarnih panela i primarne podkonstrukcije.

Step 3:

After mounting the appropriate supports, we mount the clips that serve as holders between the solar panels and the primary substructure.

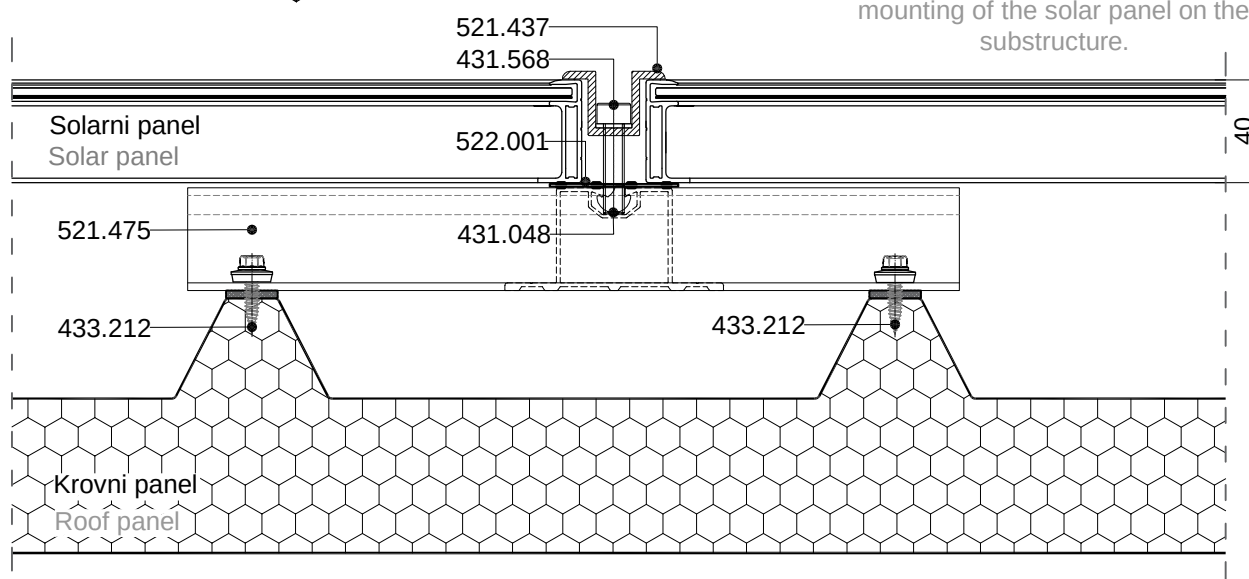


Vertikalna montaža panela na primarnu podkonstrukciju Vertical installation on primary substructure

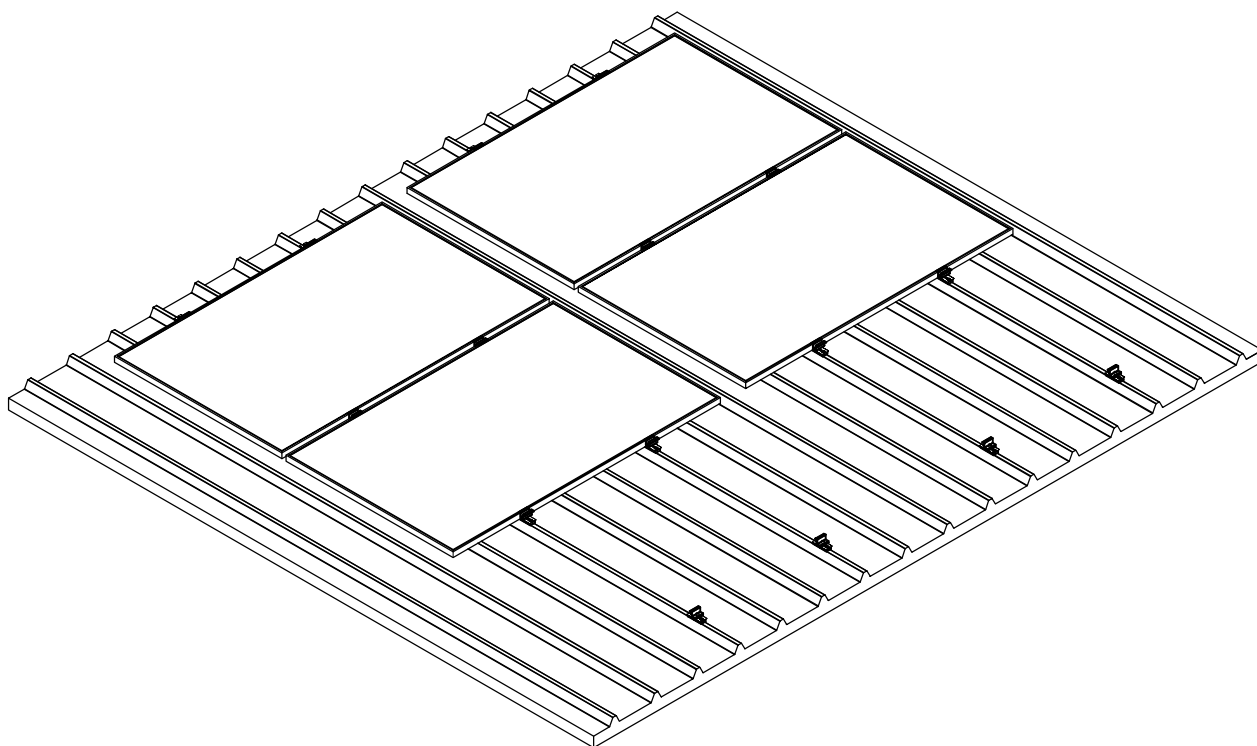


Korak 4:
Zadnji korak montaže je montiranje kopči i nakon toga postavljanje panela. Na slici je prikazan presjek direktne montaže solarnog panela na podkonstrukciju.

Step 4:
The last step of assembly is mounting the clips and then placing the panel. The picture shows a section of the direct mounting of the solar panel on the substructure.



Horizontalna montaža solarnih panela na primarnu podkonstrukciju
Horizontal mounting of solar panels on the primary substructure

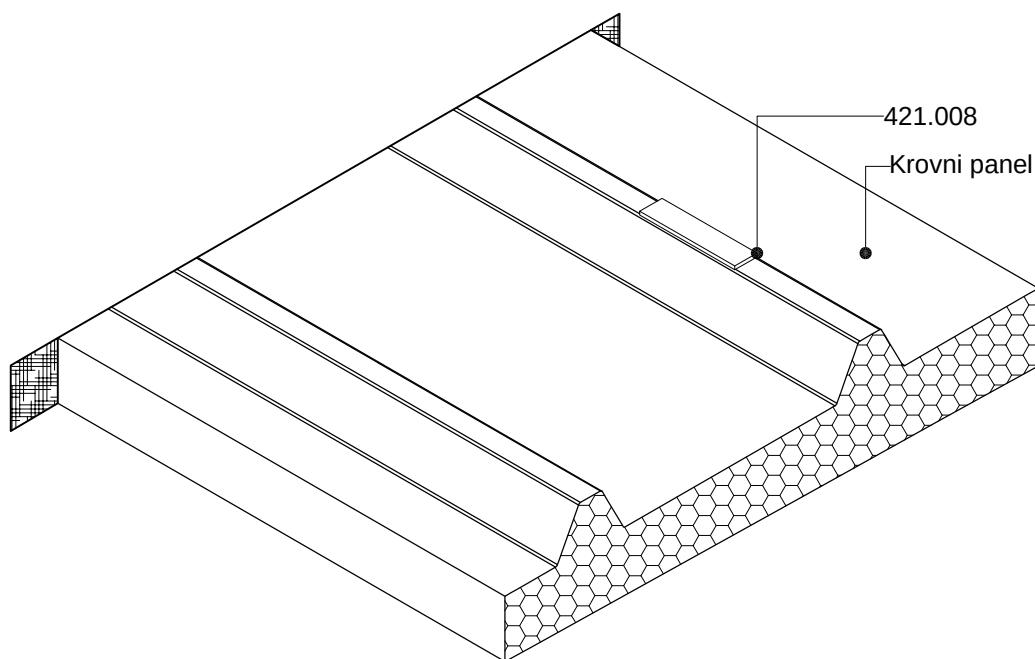
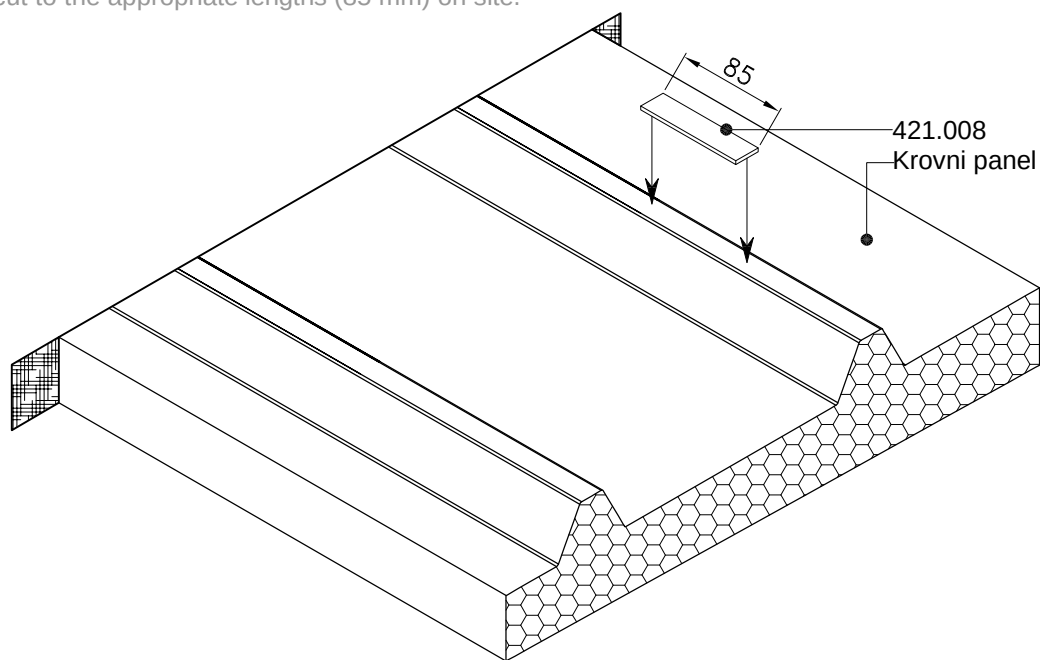


Horizontalna montaža solarnih panela na primarnu podkonstrukciju
Horizontal mounting of solar panels on the primary substructure**Korak 1:**

Prvi korak montaže je postavljanje samoljepljive PE trake (421.008) na unaprijed predviđena mjesta. Trake se režu na odgovarajuće dužine (85 mm) na licu mjesta.

Step 1:

The first step of assembly is to place the self-adhesive PE strips (421.008) in the predetermined places. The strips are cut to the appropriate lengths (85 mm) on site.

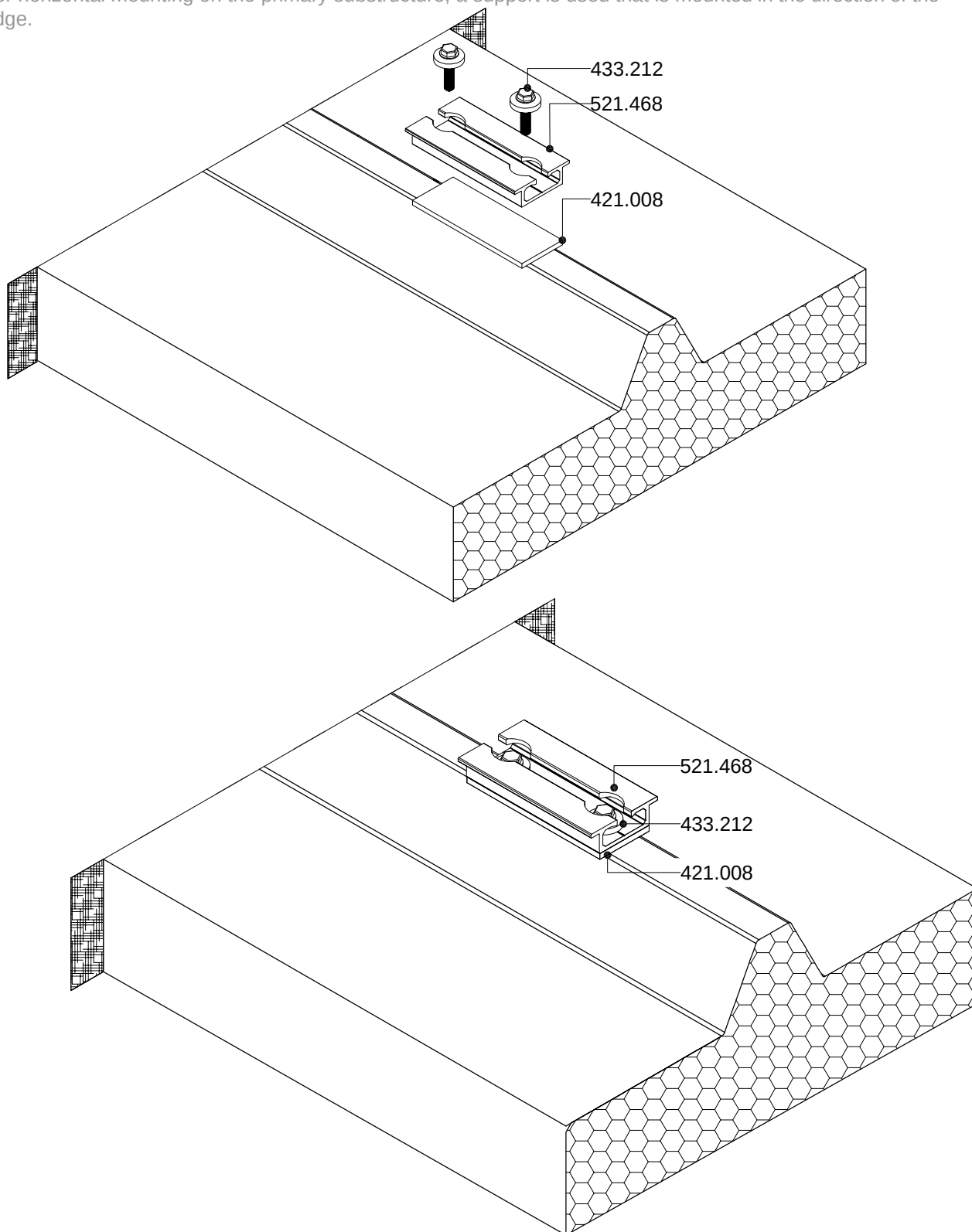


Horizontalna montaža solarnih panela na primarnu podkonstrukciju
Horizontal mounting of solar panels on the primary substructure**Korak 2:**

Za horizontalnu montažu na primarnu podkonstrukciju koristi se nosač koji se montira u pravcu grebena .

Step 2:

For horizontal mounting on the primary substructure, a support is used that is mounted in the direction of the ridge.

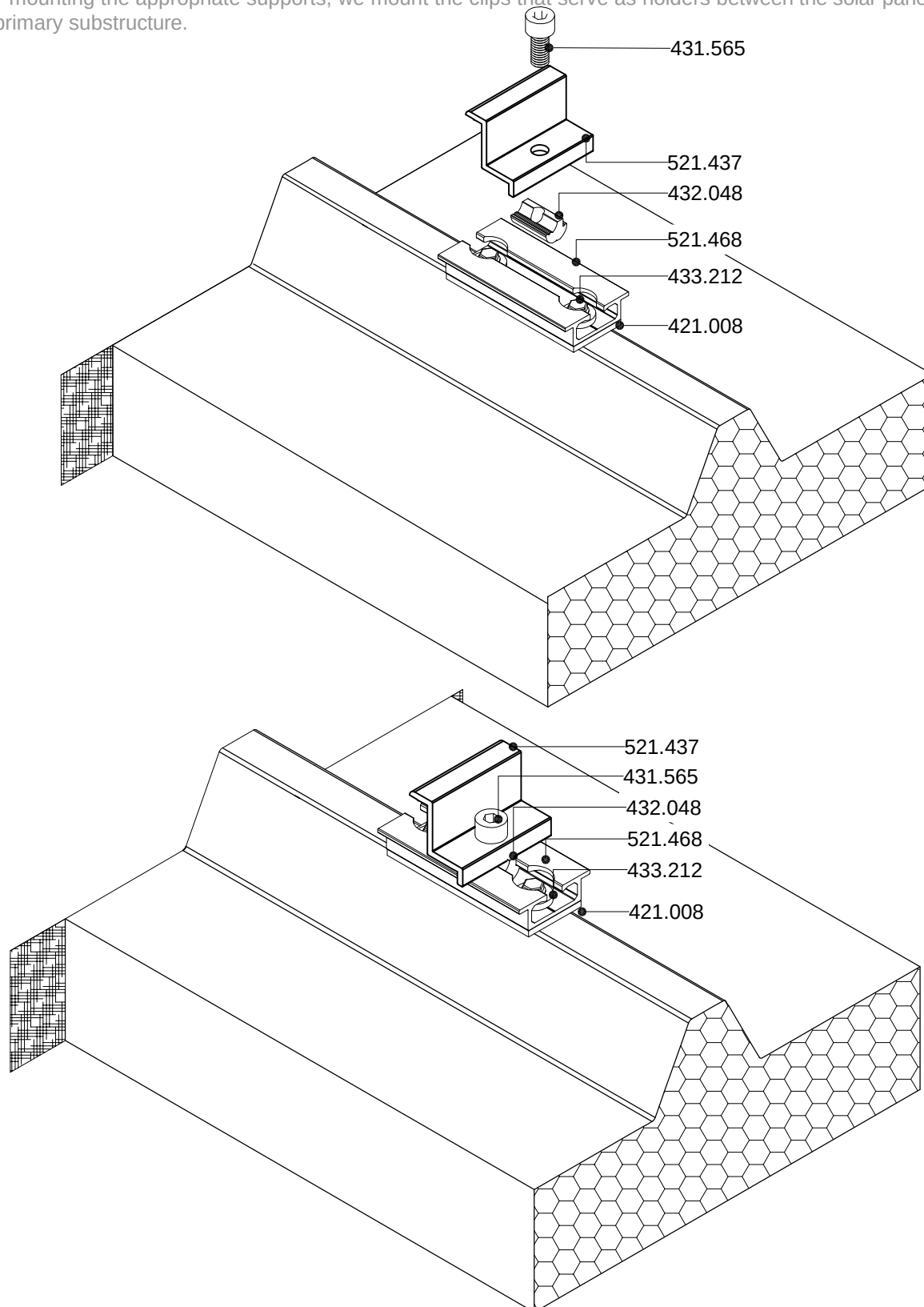


Horizontalna montaža solarnih panela na primarnu podkonstrukciju
Horizontal mounting of solar panels on the primary substructure**Korak 3:**

Nakon montiranja odgovarajućih nosača, montiramo kopče koje služe kao držači između solarnih panela i primarne podkonstrukcije.

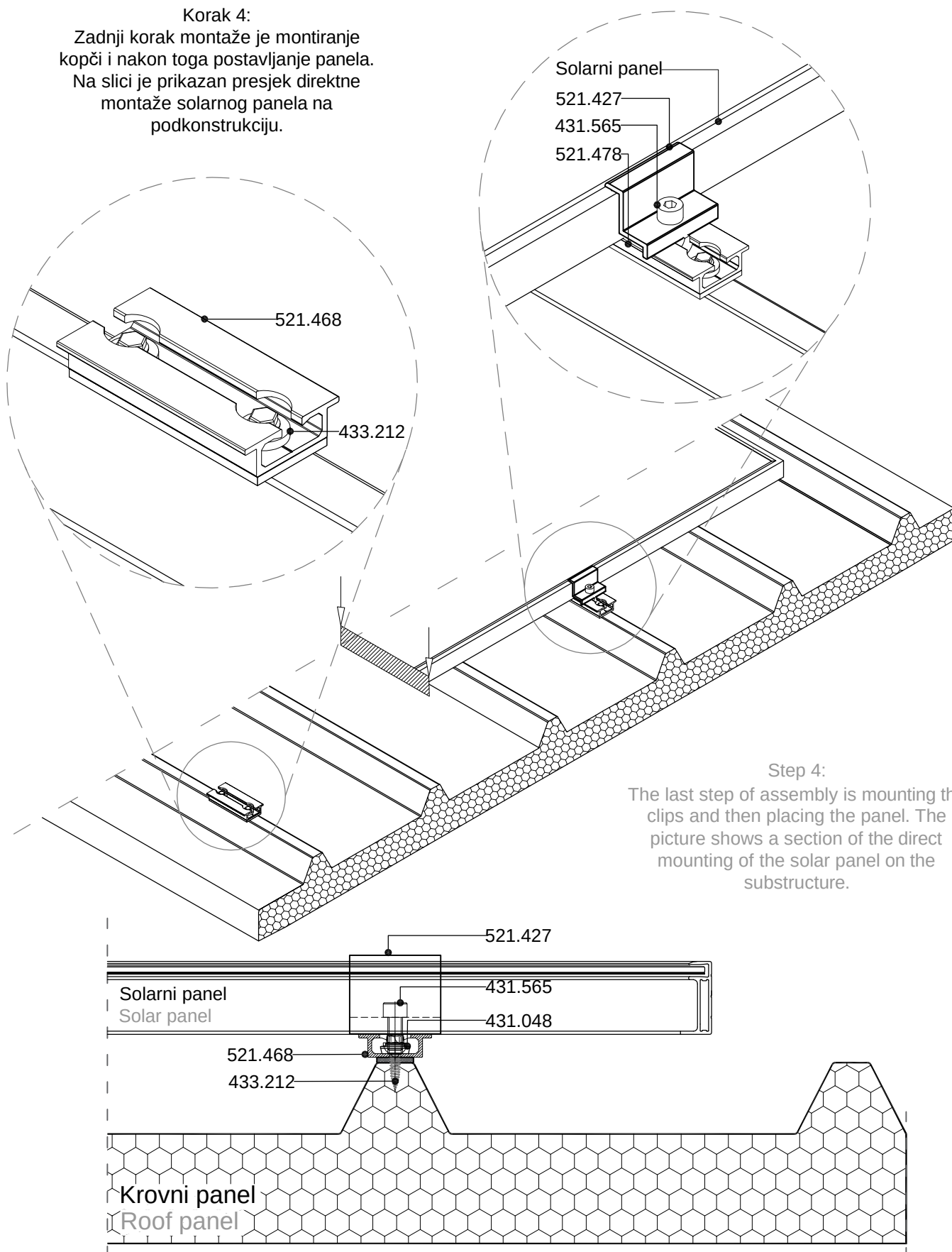
Step 3:

After mounting the appropriate supports, we mount the clips that serve as holders between the solar panels and the primary substructure.

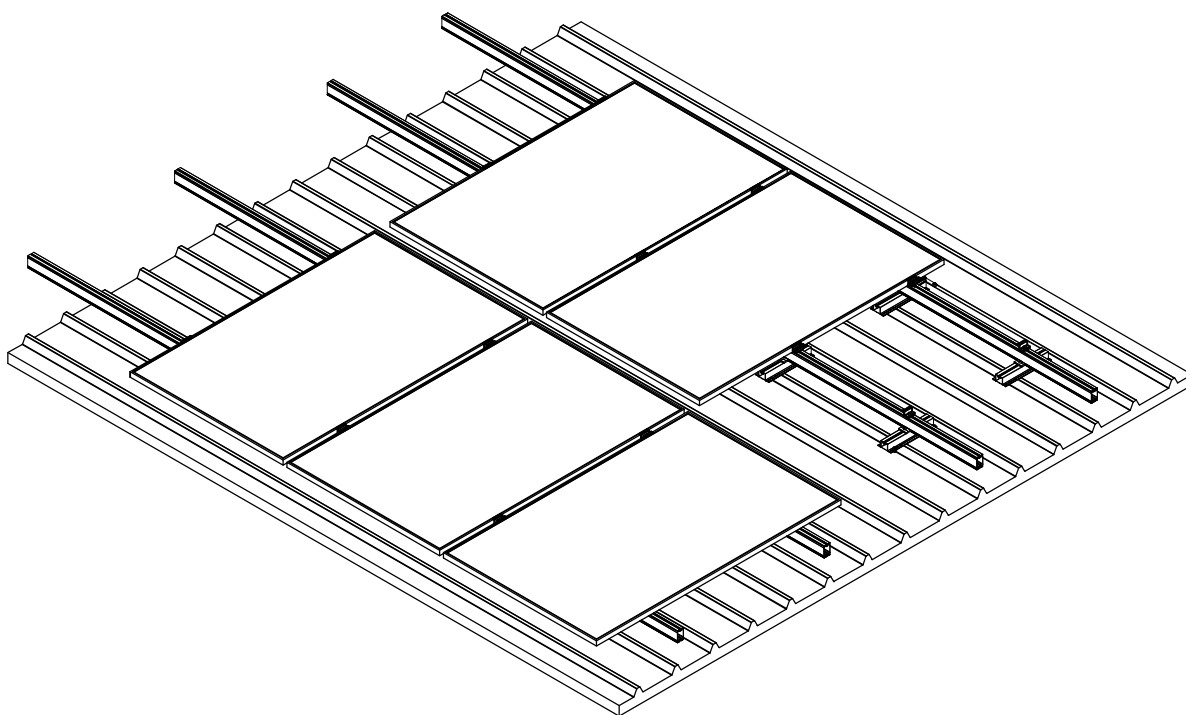


Horizontalna montaža panela na primarnu podkonstrukciju
Horizontal panel installation on primary substructure**Korak 4:**

Zadnji korak montaže je montiranje kopči i nakon toga postavljanje panela. Na slici je prikazan presjek direktne montaže solarnog panela na podkonstrukciju.



Horizontalna montaža solarnih panela na sekundarnu podkonstrukciju
Horizontal mounting of solar panels on the secondary substructure



Horizontalna montaža solarnih panela na sekundarnu podkonstrukciju
Horizontal mounting of solar panels on the secondary substructure**Korak 1:**

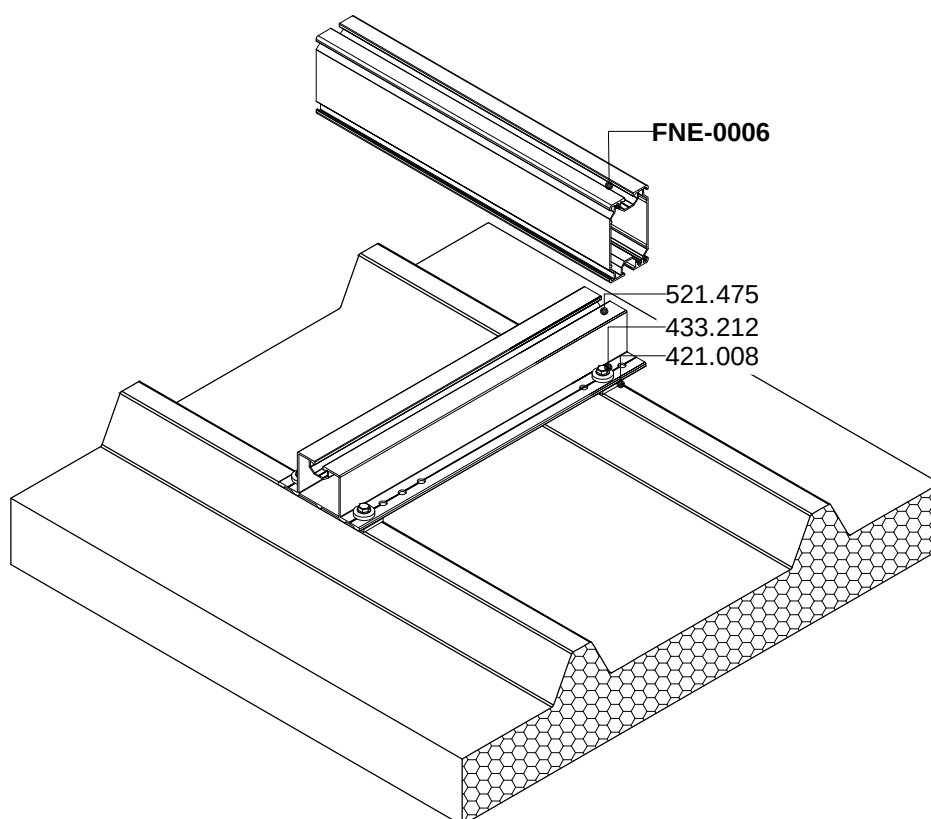
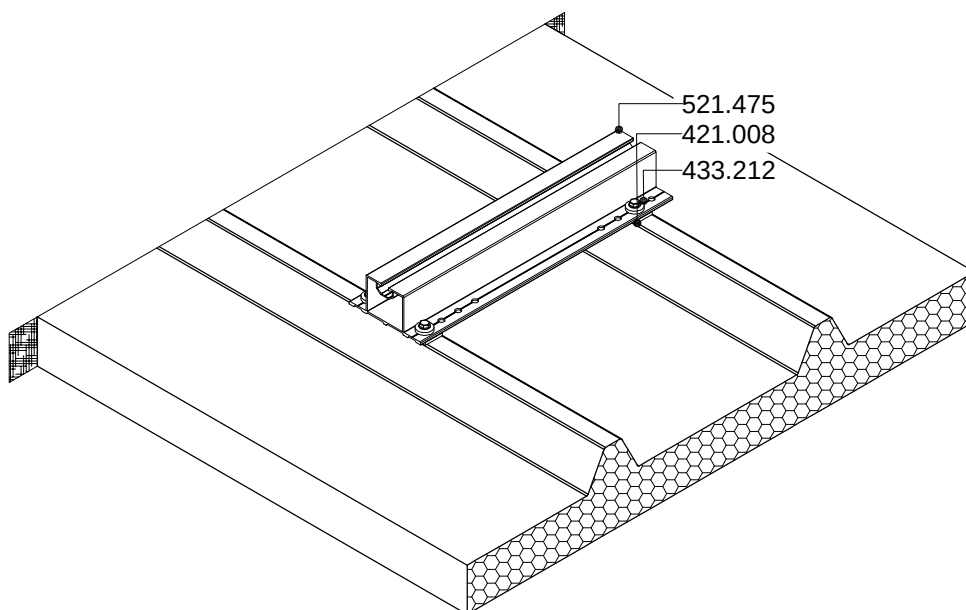
Nosač primarne konstrukcije se montira kao što je opisano na stranici 714.11.004.

Na nosač primarne konstrukcije se montira profil FNE kao što je prikazano na crtežu.

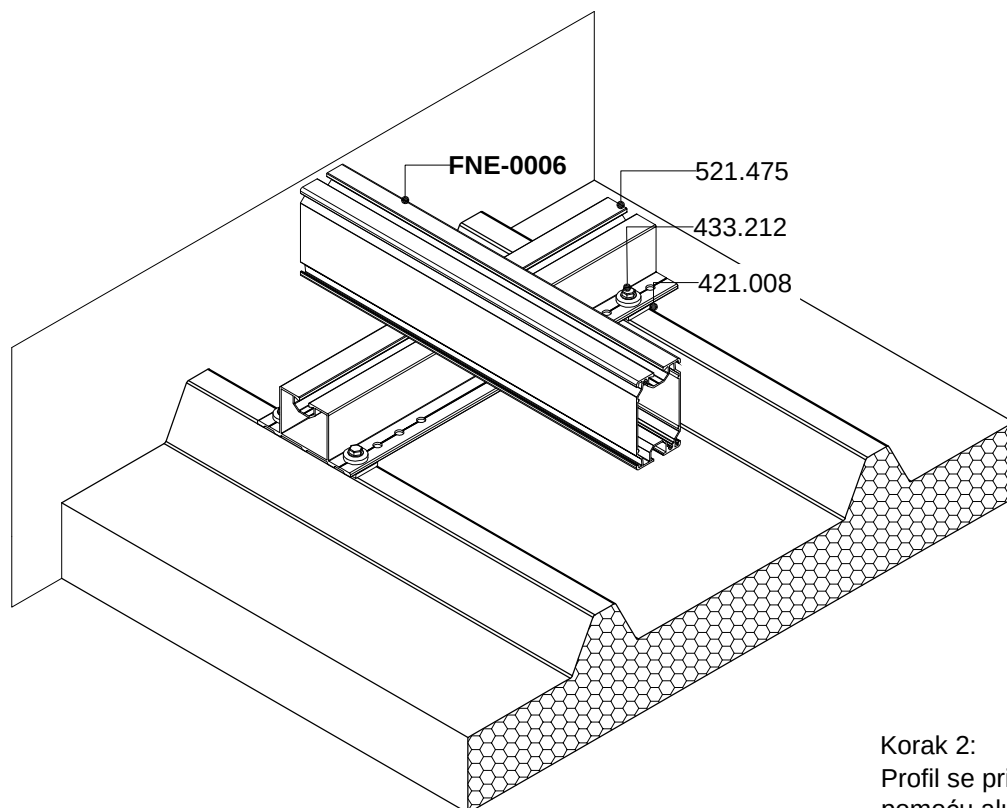
Step 1:

Primary substructure support is mounted as described on page 714.11.004.

The FNE profile is mounted on the support of the primary structure as shown in the drawing.

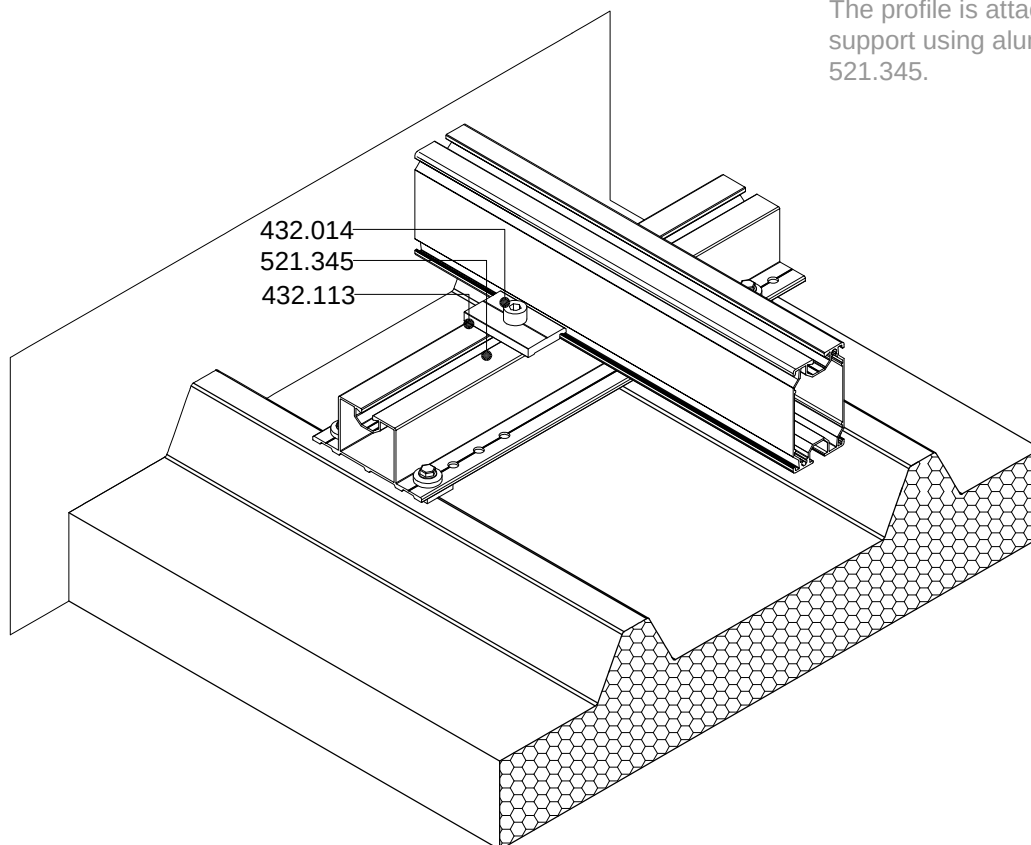


Horizontalna montaža solarnih panela na sekundarnu podkonstrukciju Horizontal mounting of solar panels on the secondary substructure

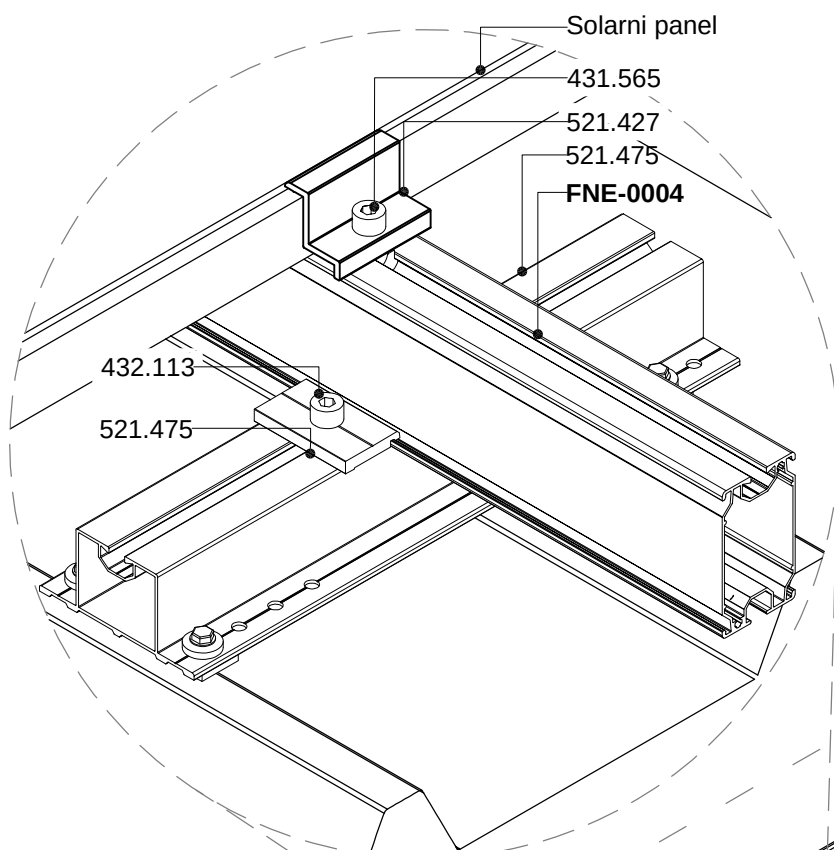


Korak 2:
Profil se pričvrsti za nosač
pomoću aluminijских pločica
521.345.

Step 2:
The profile is attached to
support using aluminum plates
521.345.

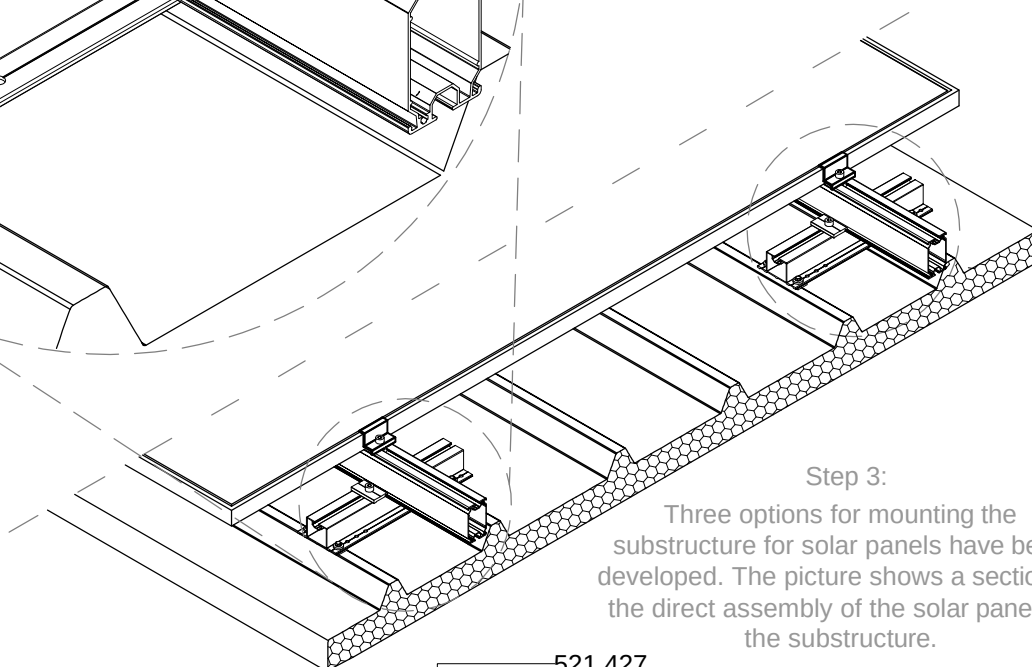


Horizontalna montaža na sekundarnu podkonstrukciju Horizontal panel instalation on secondary substructure



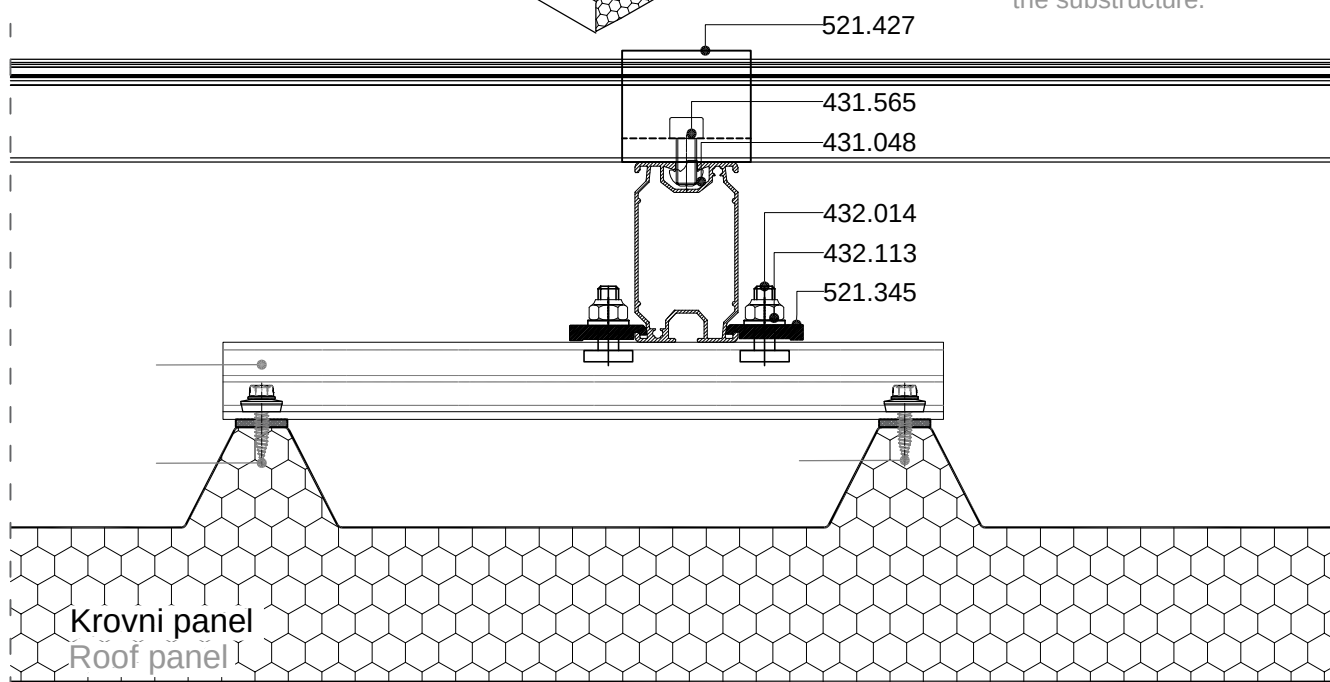
Korak 3:

Zadnji korak montaže je montiranje kopči i nakon toga postavljanje panela. Na slici je prikazan presjek direktne montaže solarnog panela na podkonstrukciju.

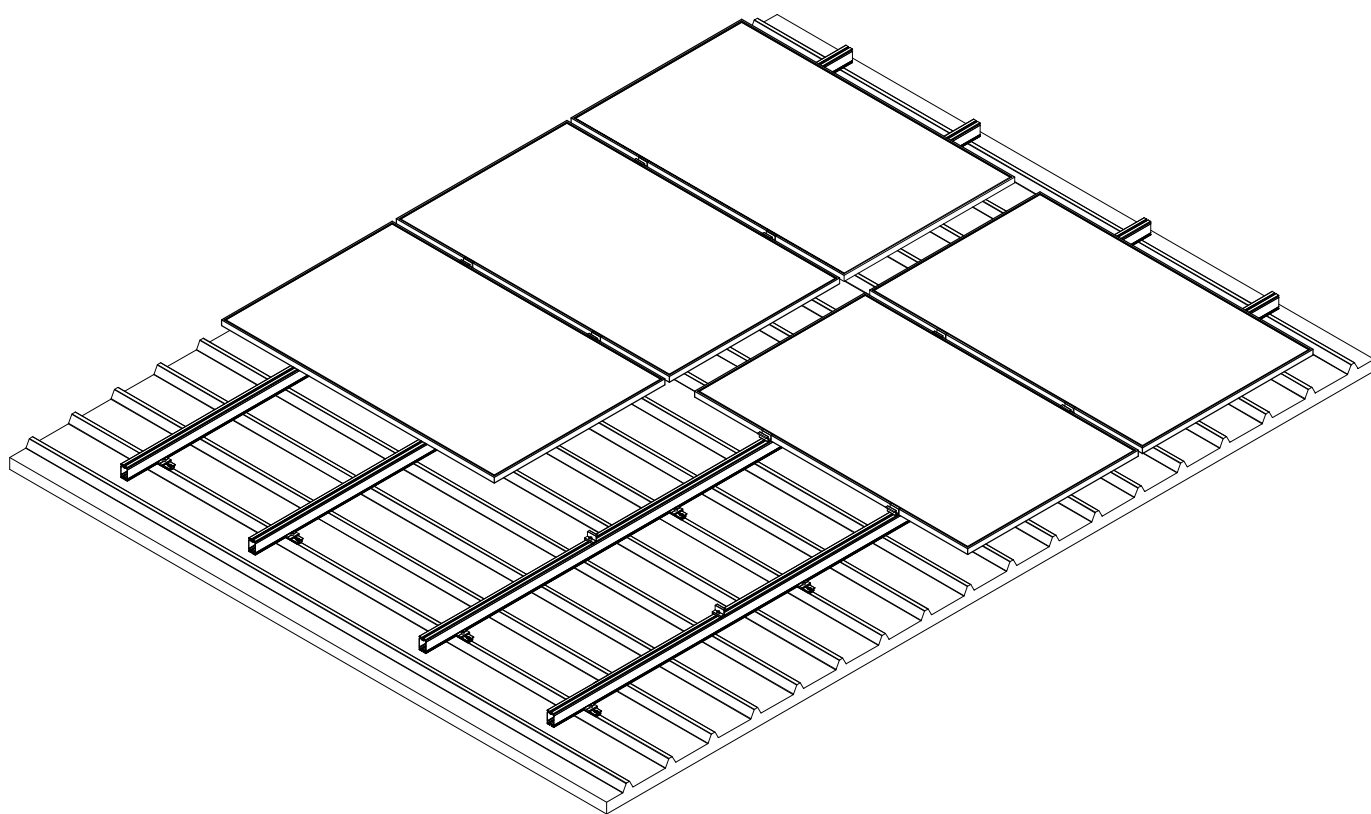


Step 3:

Three options for mounting the substructure for solar panels have been developed. The picture shows a section of the direct assembly of the solar panel on the substructure.



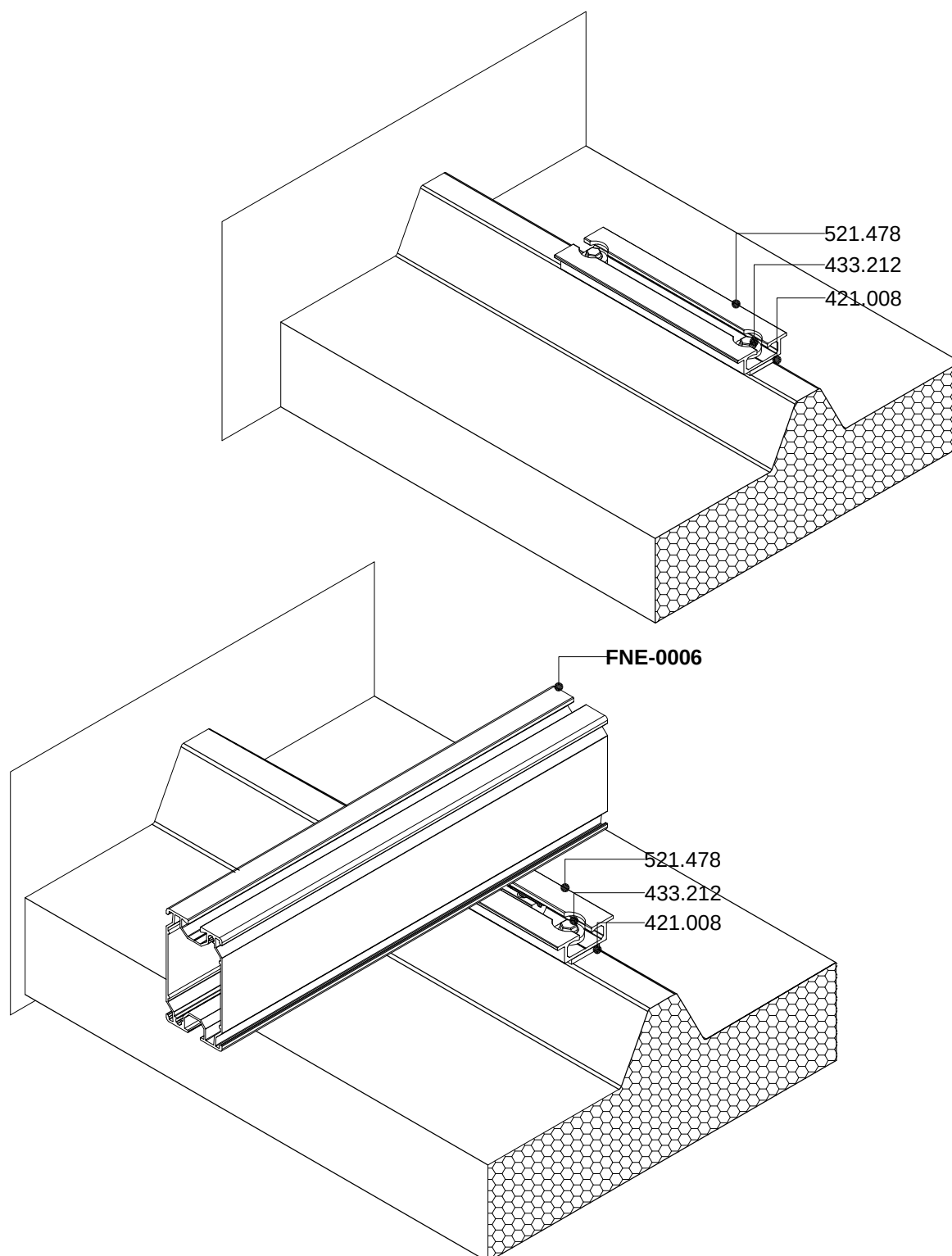
Vertikalna montaža solarnih panela na sekundarnu podkonstrukciju
Vertical mounting of solar panels on the secondary substructure



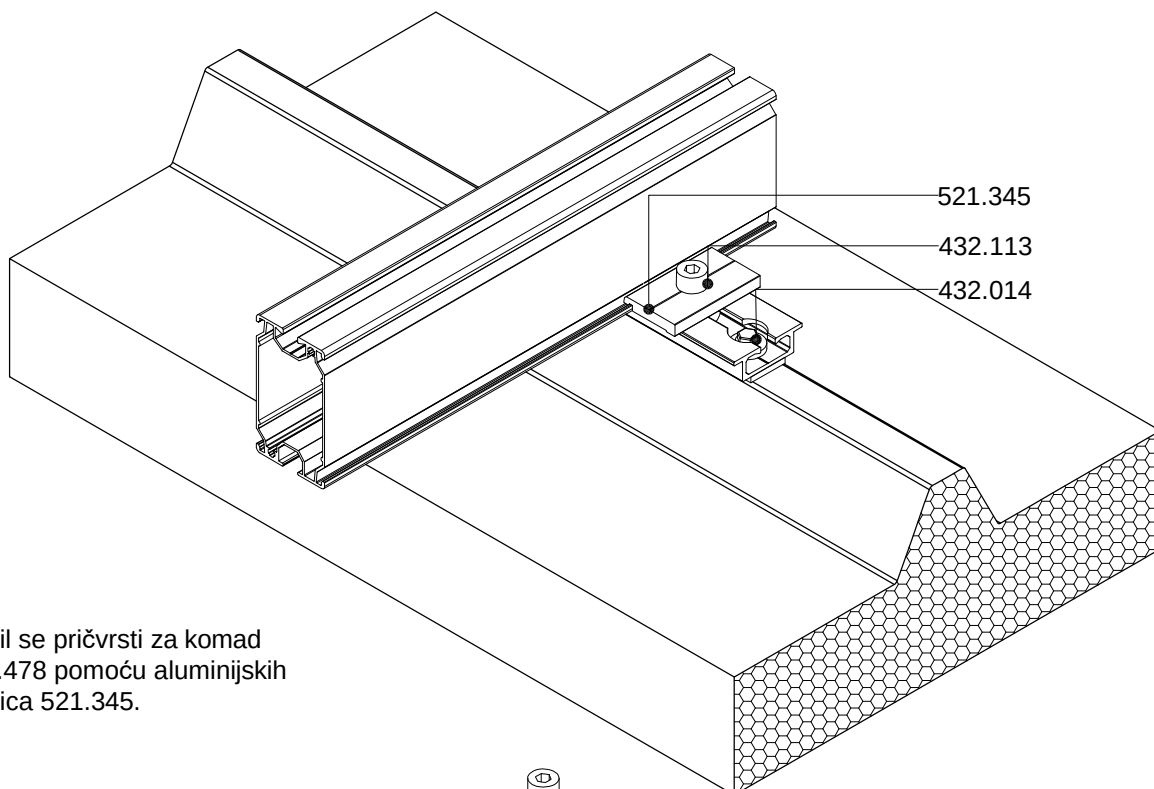
Vertikalna montaža solarnih panela na sekundarnu podkonstrukciju
Vertical mounting of solar panels on the secondary substructure

Prvi korak montaže se ponovi kao što je opisano na stranici 714.11.008. Nakon prvog koraka postavljamo profil FNE.

Repeat the first step as described on page 8. After that step, install the FNE profile.

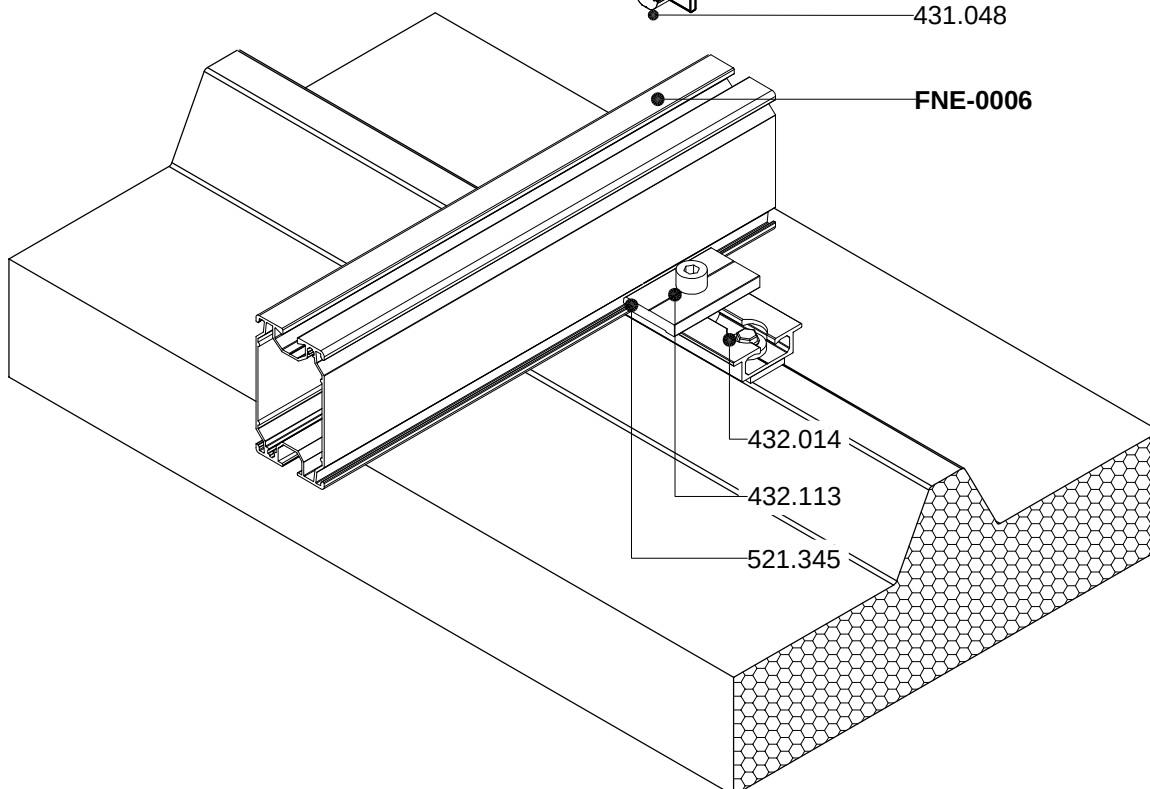
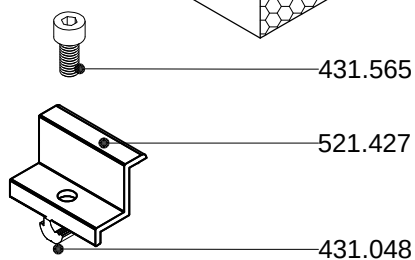


Vertikalna montaža solarnih panela na sekundarnu podkonstrukciju Vertical mounting of solar panels on the secondary substructure



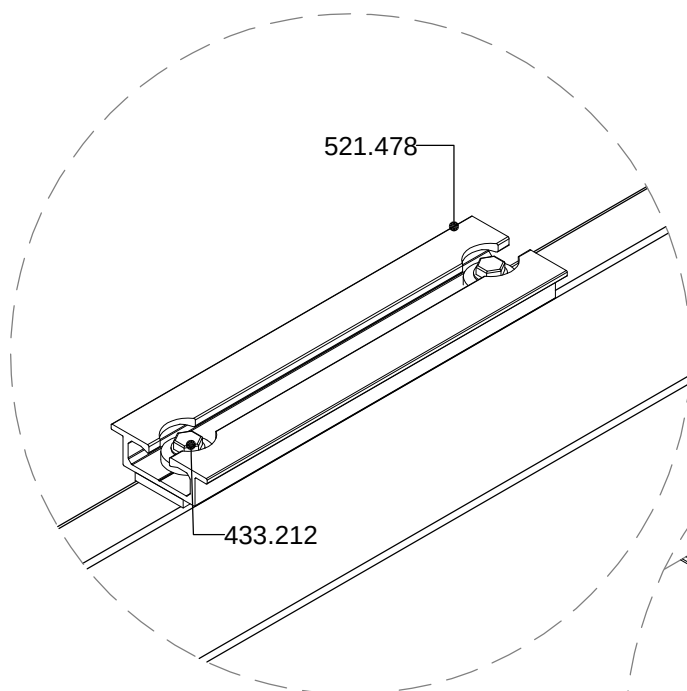
Profil se pričvrsti za komad 521.478 pomoću aluminijjskih pločica 521.345.

The profile is attached to piece 521.475 using aluminum plates 521.345.

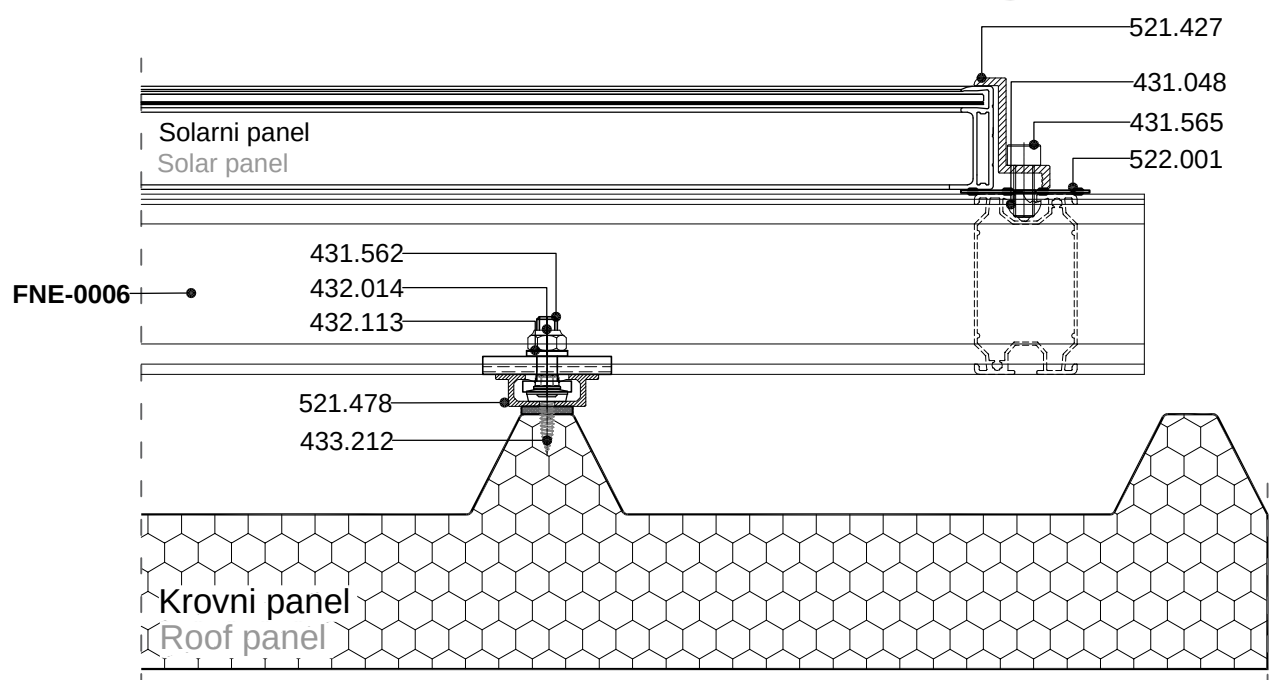
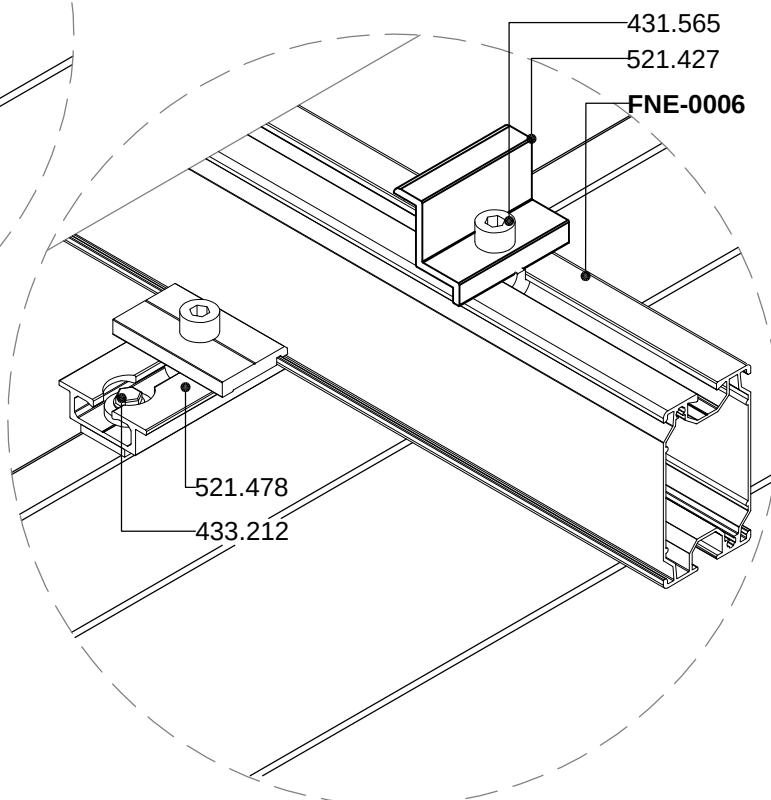


Vertikalna montaža panela na sekundarnu podkonstrukciju Vertical panel installation on secondary substructure

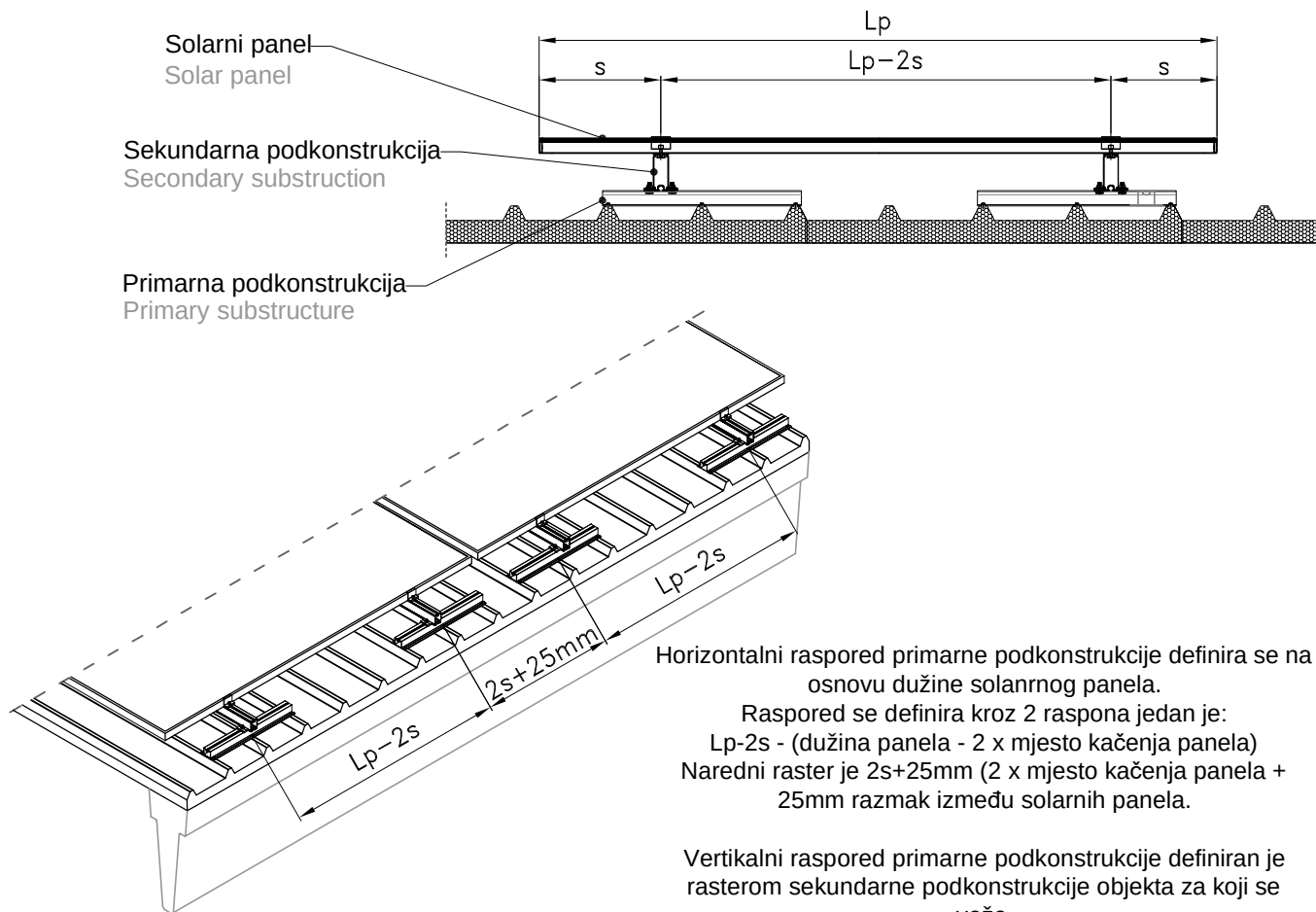
Zadnji korak montaže je montiranje kopči i nakon toga postavljanje panela. Na slici je prikazan presjek montaže solarnog panela na sekundarnu podkonstrukciju.



Zadnji korak montaže je montiranje kopči i nakon toga postavljanje panela. Na slici je prikazan presjek montaže solarnog panela na sekundarnu podkonstrukciju.



Pozicioniranje primarne podkonstrukcije na objektu Positioning of the primary substructure on the building



Horizontalni raspored primarne podkonstrukcije definira se na osnovu dužine solarnog panela.

Raspored se definira kroz 2 raspona jedan je:

$L_p - 2s$ - (dužina panela - 2 x mjesto kačenja panela)

Naredni raster je $2s + 25\text{mm}$ (2 x mjesto kačenja panela + 25mm razmak između solarnih panela).

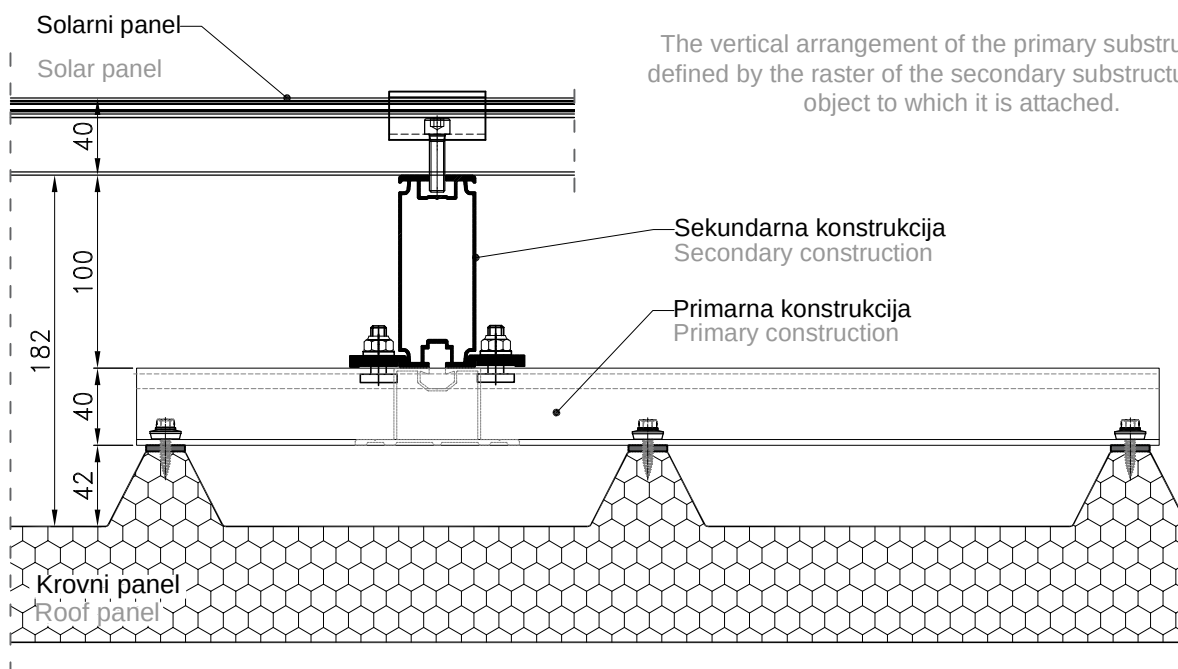
Vertikalni raspored primarne podkonstrukcije definiran je rasterom sekundarne podkonstrukcije objekta za koji se veže.

The horizontal layout of the primary substructure is defined based on the length of the solar panel.

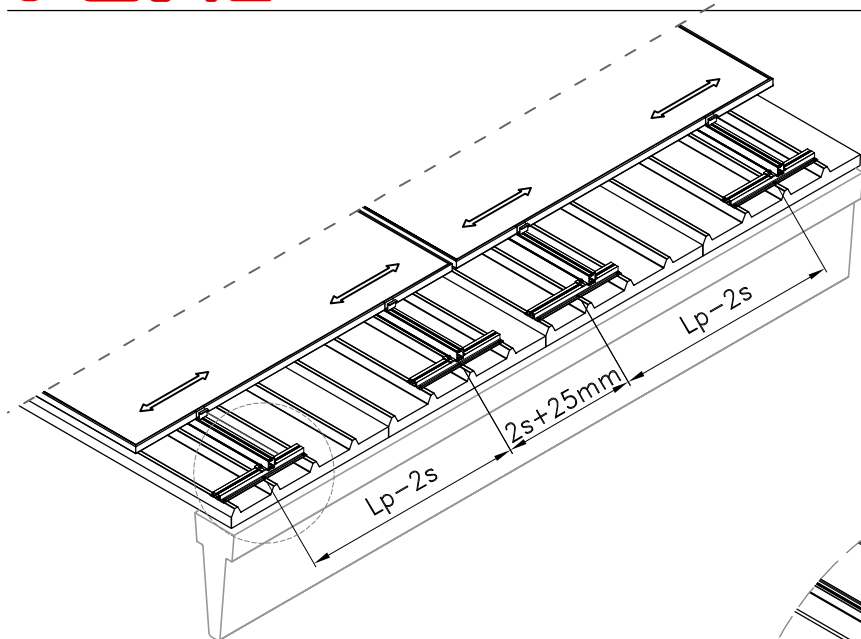
The schedule is defined through 2 ranges one is:

$L_p - 2s$ - (panel length - 2 x panel hanging place)

The next raster is $2s + 25\text{mm}$ (2 x place of hanging panels + 25mm distance between solar panels).



The vertical arrangement of the primary substructure is defined by the raster of the secondary substructure of the object to which it is attached.



Pozicioniranje sekundarne podkonstrukcije
na primarnoj podkonstrukciji

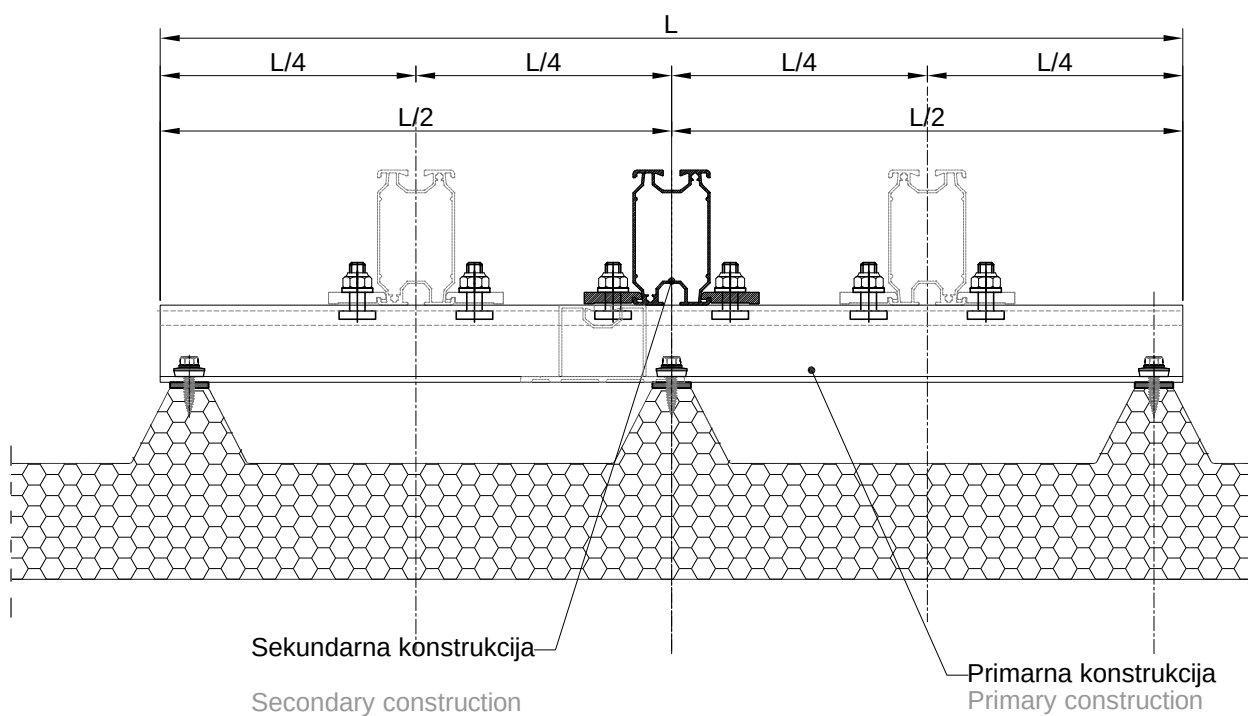
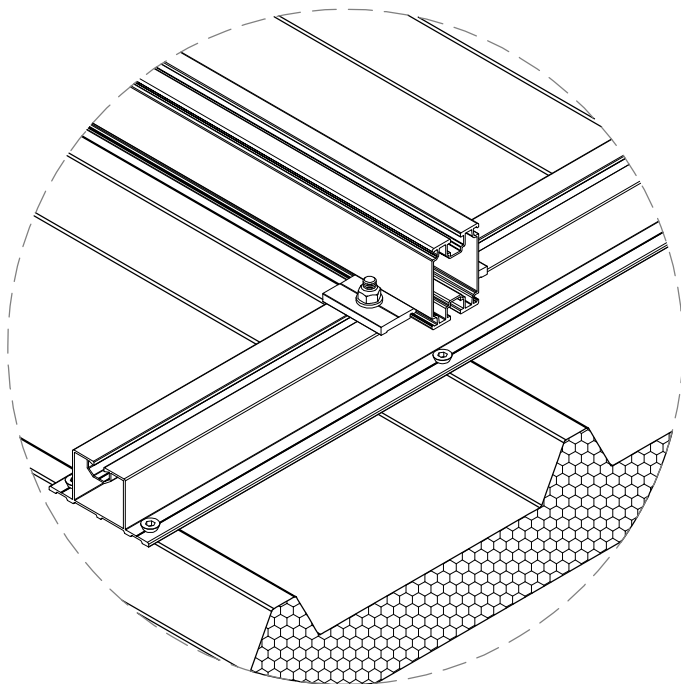
Positioning of the secondary substructure on
the primary substructure

Sekundarna podkonstrukcija se veže za primarnu podkonstrukciju i može se pomicati lijevo i desno kako bi se postigao planirani raster sekundarne podkonstrukcije.

Pri tome treba voditi računa da se sekundarna konstrukcija veže za primarnu konstrukciju unutar dvije srednje četvrtine primarnog nosača.

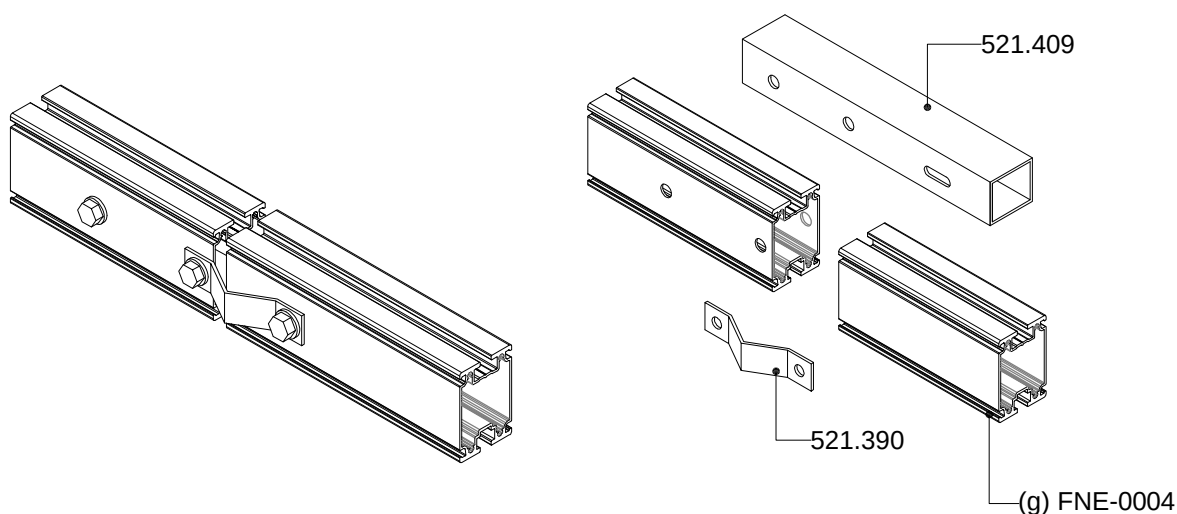
The secondary substructure is attached to the primary substructure and it can be moved left and right on it, in order to achieve the planned raster of the secondary substructure.

In doing so, care should be taken that the secondary substructure binds to the primary substructure within the two middle quarters of the primary girder.



Ukoliko se fotonaponska elektrana sastoji od više sekcija, njihovo međusobno povezivanje je nužno i ostvaruje se preko horizontalnih greda (g). Veza horizontalnih greda (g) ostvaruje se veznim elementom unutar cijevi i vijcima. Spojni element dozvoljava rad konstrukcije pri temperaturnim razlikama.

If the photovoltaic power plant consists of several sections, their interconnection is necessary and is realized through horizontal beams (g). The connection of horizontal beams (g) is realized by a connecting element inside the pipe and screws. The connecting element allows the construction the absorption of thermal expansions due to temperature changes.

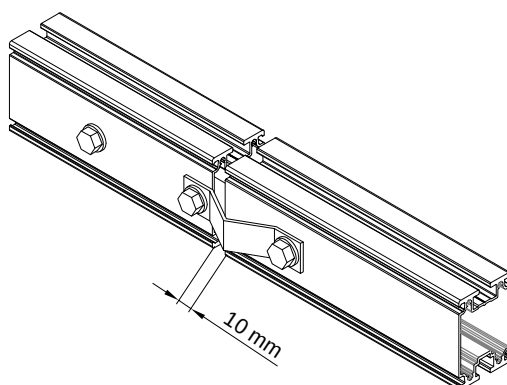


Kod konstrukcija čija je ukupna dužina manja od 40m spojeve izvesti sa 2 vijka M8x60 (431.060). Predvidjeti minimalno 10mm razmaka između dvije sekcije.

Po preporuci projektanta elektroinstalacija, moguće je izvesti povezivanje dilatacije veznim elementom 521.409, a čija je uloga da se ostavi jedna cjelina svih sekcija koja i na taj način se ostvari bolje uzemljenje konstrukcije.

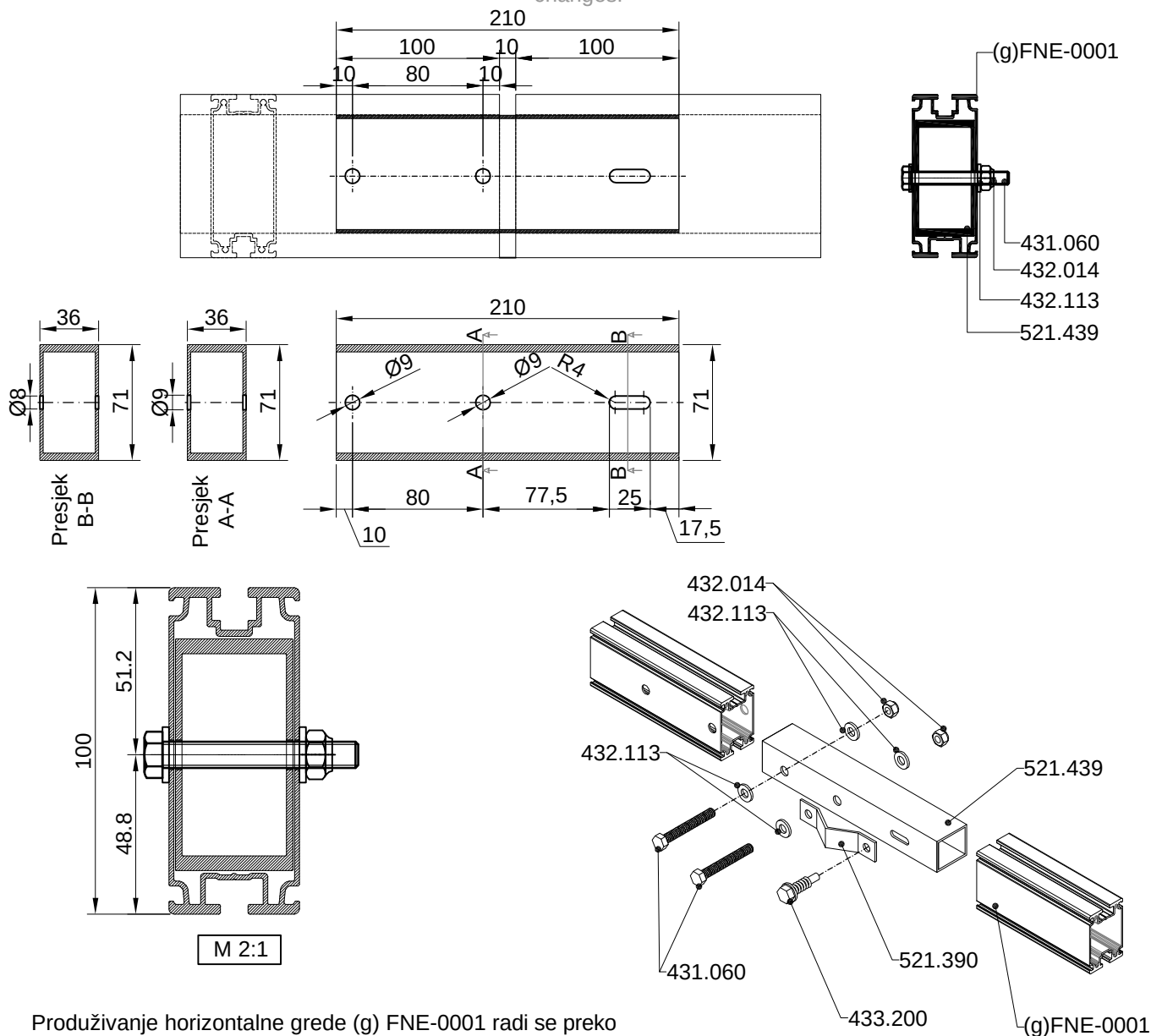
For constructions with a total length of less than 40 m, make connections with 2 M8x60 screws (431.060). Provide a minimum of 10mm distance between the two sections.

According to the recommendation of the designer of electrical installations, it is possible to report the connection of the expansion joint with the connecting element 521.409, whose role is to leave one unit of all sections, which in this way achieves better grounding of the structure.



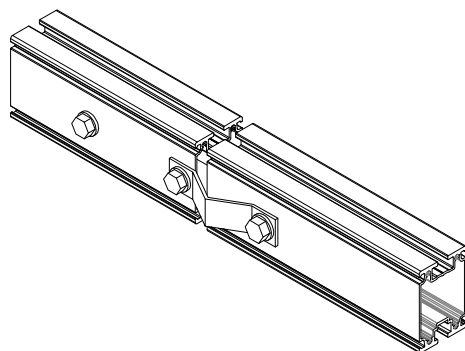
Detalj veze sekundarnih greda (g) FNE-0001
Veza horizontalnih greda (g) ostvaruje se veznim elementom unutar cijevi i vijcima. Spojni element dozvoljava rad konstrukcije pri temperaturnim razlikama.

Detail of the secondary carrier connection (g) FNE-0001
The connection of horizontal beams (g) is realized by a connecting element inside the pipe and screws. The connecting element allows the construction the absorption of thermal expansions due to temperature changes.



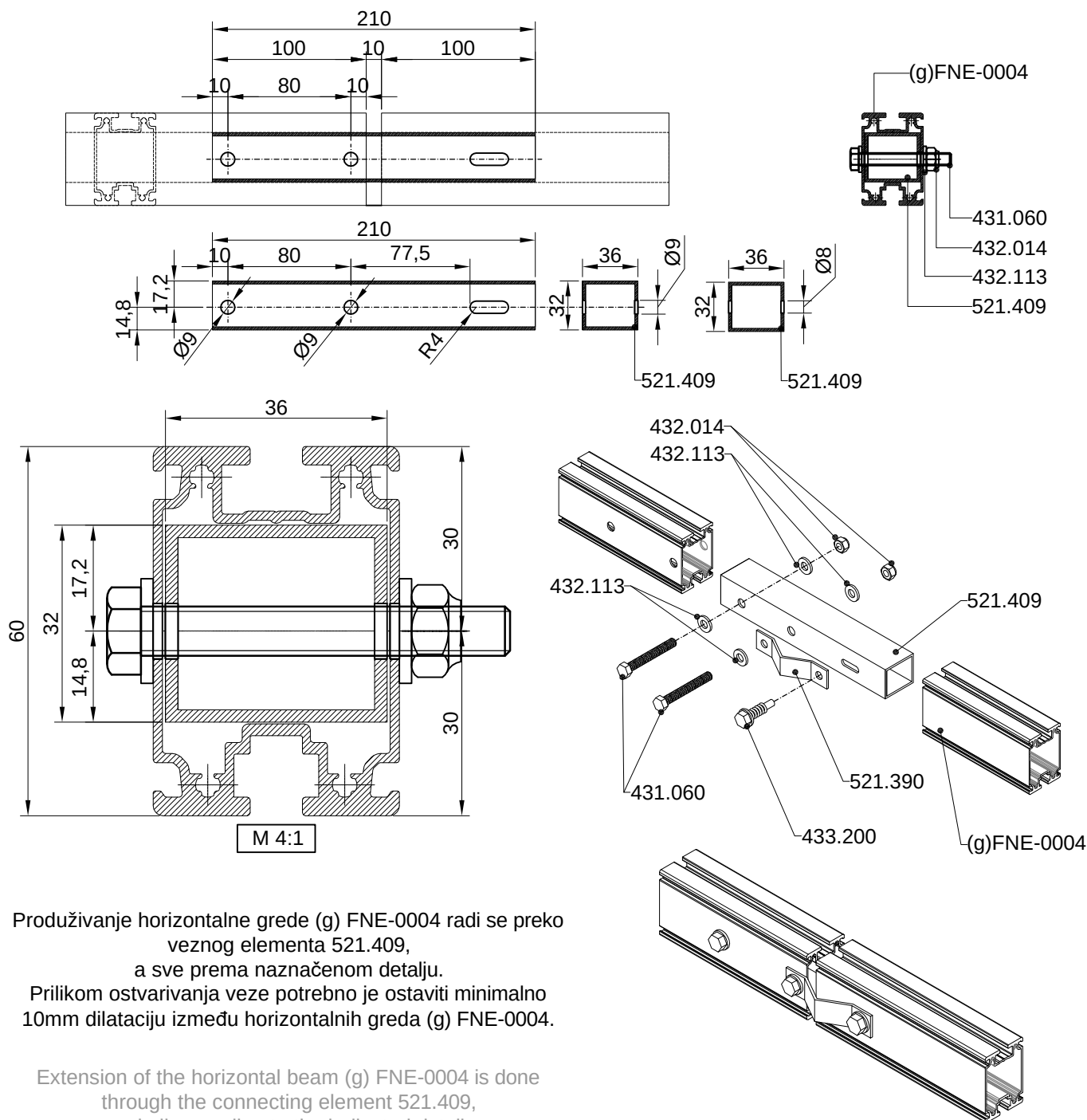
Produživanje horizontalne grede (g) FNE-0001 radi se preko
veznog elementa 521.439,
a sve prema naznačenom detalju.
Prilikom ostvarivanja veze potrebno je ostaviti minimalno
10mm dilataciju između horizontalnih greda (g) FNE-0001.

Extension of the horizontal beam (g) FNE-0001 is done
through the connecting element 521.439,
and all according to the indicated detail.
When making the connection, it is necessary to leave a
minimum of 10 mm dilatation between the horizontal beams
(g) FNE-0001.



Detalj veze sekundarnih greda (g) FNE-0004
Veza horizontalnih greda (g) ostvaruje se veznim elementom unutar cijevi i vijcima. Spojni element dozvoljava rad konstrukcije pri temperaturnim razlikama.

Detail of the secondary carrier connection (g) FNE-0004
The connection of horizontal beams (g) is realized by a connecting element inside the pipe and screws. The connecting element allows the construction the absorption of thermal expansions due to temperature changes.

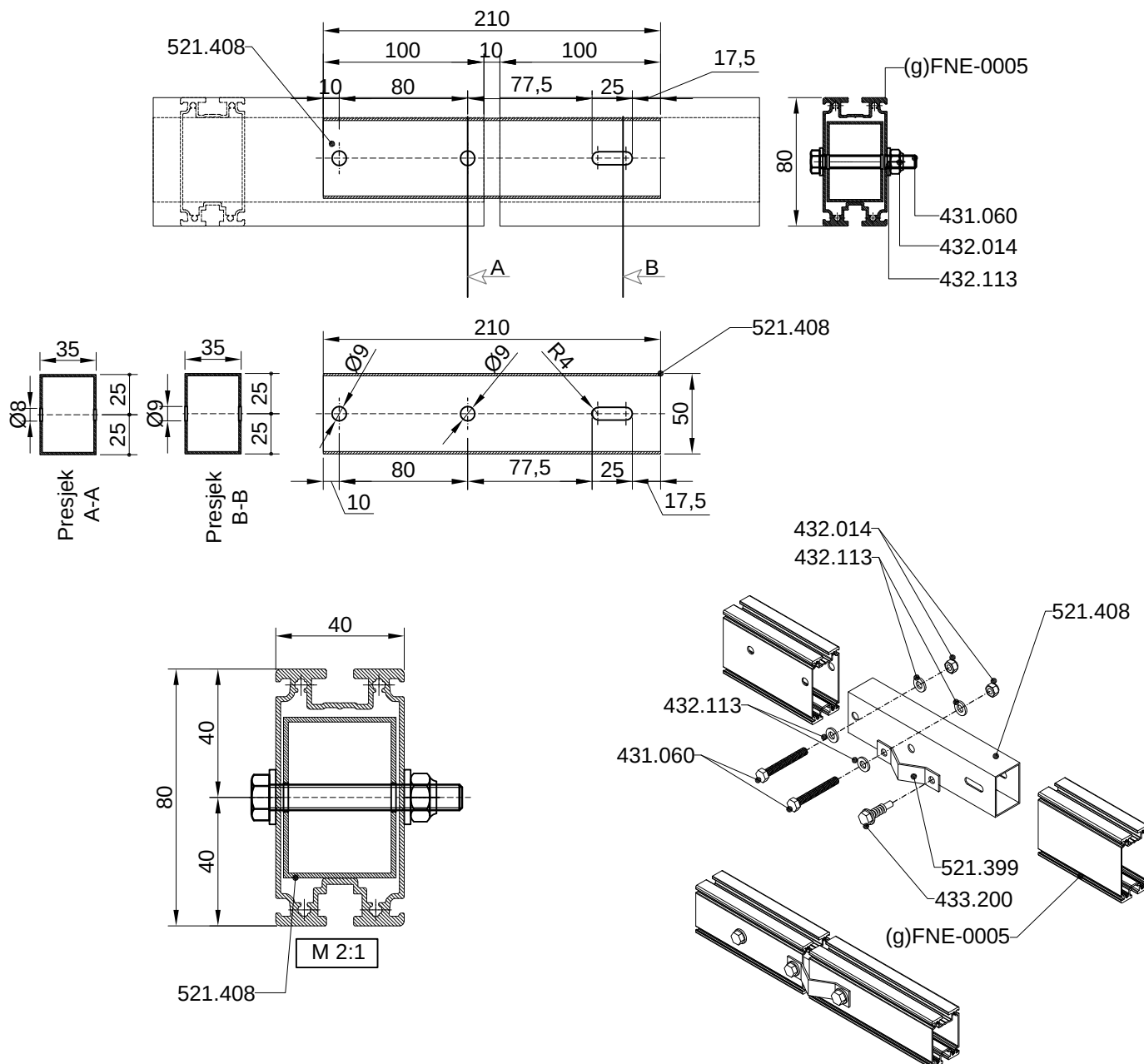


Produživanje horizontalne grede (g) FNE-0004 radi se preko
veznog elementa 521.409,
a sve prema naznačenom detalju.
Prilikom ostvarivanja veze potrebno je ostaviti minimalno
10mm dilataciju između horizontalnih greda (g) FNE-0004.

Extension of the horizontal beam (g) FNE-0004 is done
through the connecting element 521.409,
and all according to the indicated detail.
When making the connection, it is necessary to leave a
minimum of 10 mm dilatation between the horizontal beams
(g) FNE-0004.

Detalj veze sekundarnih greda (g) FNE-0005
Veza horizontalnih greda (g) ostvaruje se veznim elementom unutar cijevi i vijcima. Spojni element dozvoljava rad konstrukcije pri temperaturnim razlikama.

Detail of the secondary carrier connection (g) FNE-0005
The connection of horizontal beams (g) is realized by a connecting element inside the pipe and screws. The connecting element allows the construction the absorption of thermal expansions due to temperature changes.



Produživanje horizontalne grede (g) FNE-0005 radi se preko veznog elementa 521.408, a sve prema naznačenom detalju.

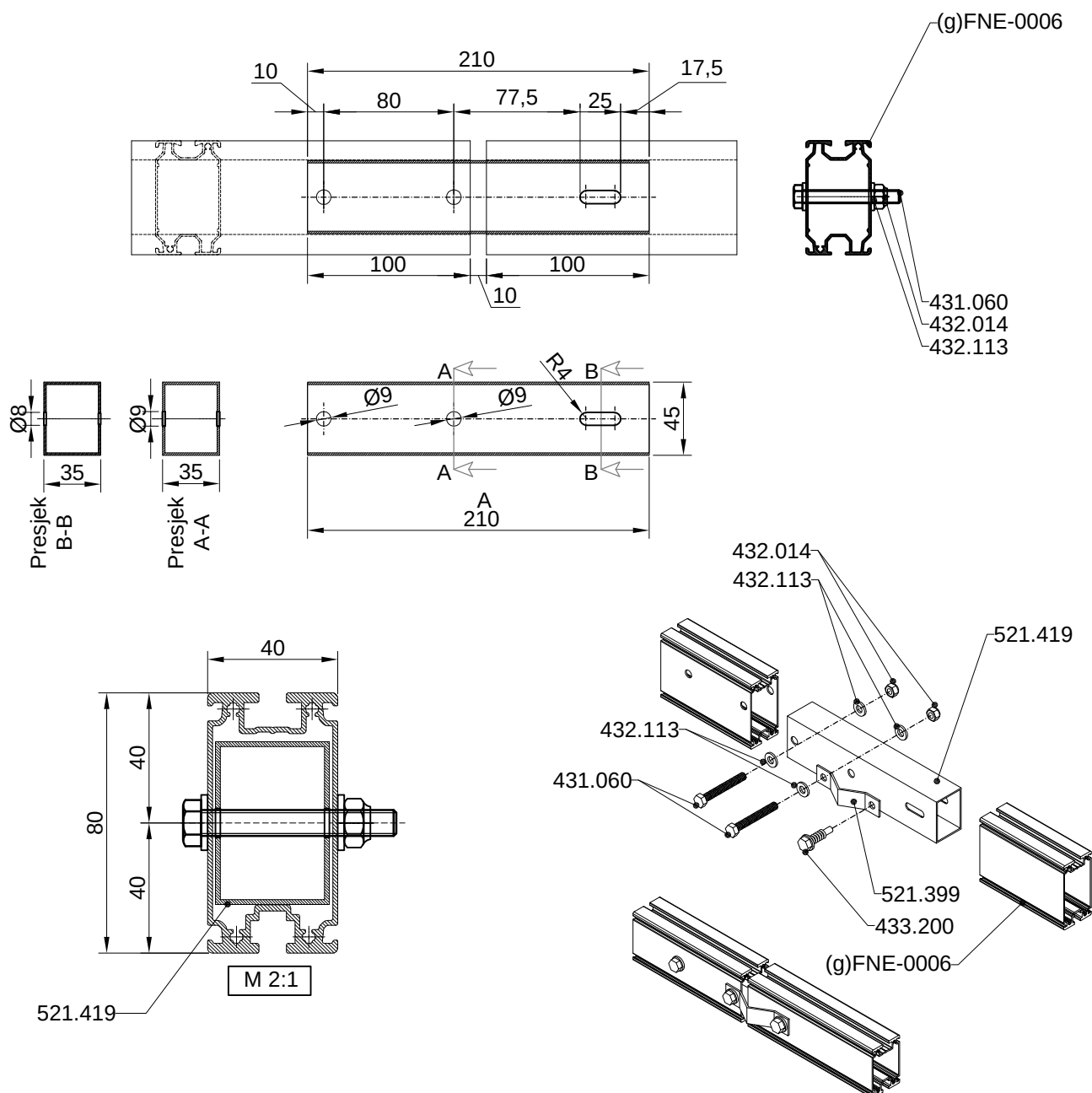
Prilikom ostvarivanja veze potrebno je ostaviti minimalno 10mm dilataciju između horizontalnih greda (g) FNE-0005.

Extension of the horizontal beam (g) FNE-0005 is done through the connecting element 521.408, and all according to the indicated detail.

When making the connection, it is necessary to leave a minimum of 10 mm dilatation between the horizontal beams (g) FNE-0005.

Detalj veze sekundarnih greda (g) FNE-0006.
Veza horizontalnih greda (g) ostvaruje se veznim elementom unutar cijevi i vijcima. Spojni element dozvoljava rad konstrukcije pri temperaturnim razlikama.

Detail of the secondary carrier connection (g) FNE-0006
The connection of horizontal beams (g) is realized by a connecting element inside the pipe and screws. The connecting element allows the construction the absorption of thermal expansions due to temperature changes.



Produživanje horizontalne grede (g) FNE-0006 radi se preko
veznog elementa 521.419,
a sve prema naznačenom detalju.

Prilikom ostvarivanja veze potrebno je ostaviti minimalno
10mm dilataciju između horizontalnih greda (g) FNE-0006.

Extension of the horizontal beam (g) FNE-0006 is done
through the connecting element 521.419,
and all according to the indicated detail.

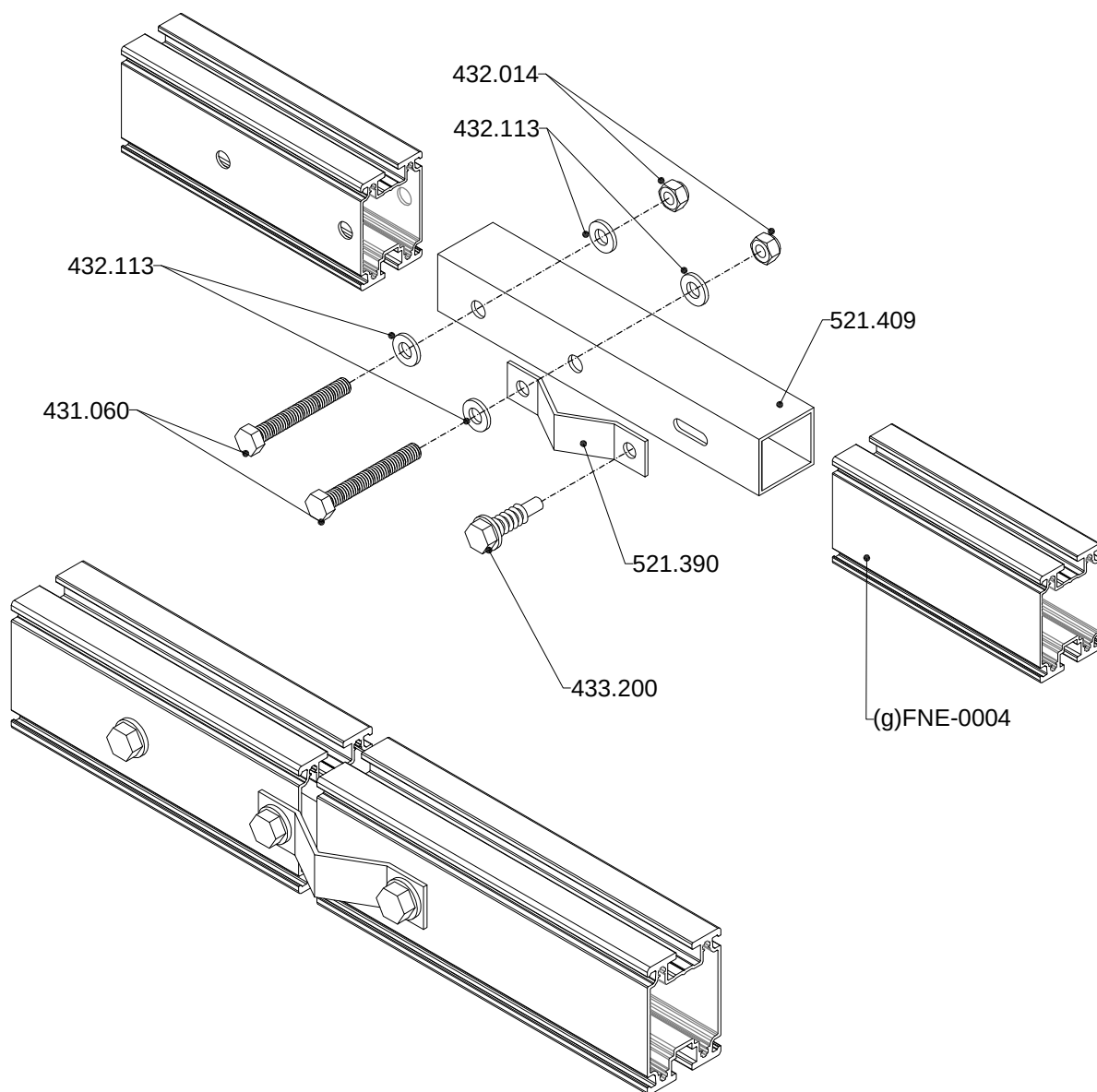
When making the connection, it is necessary to leave a
minimum of 10 mm dilatation between the horizontal beams
(g) FNE-0006.

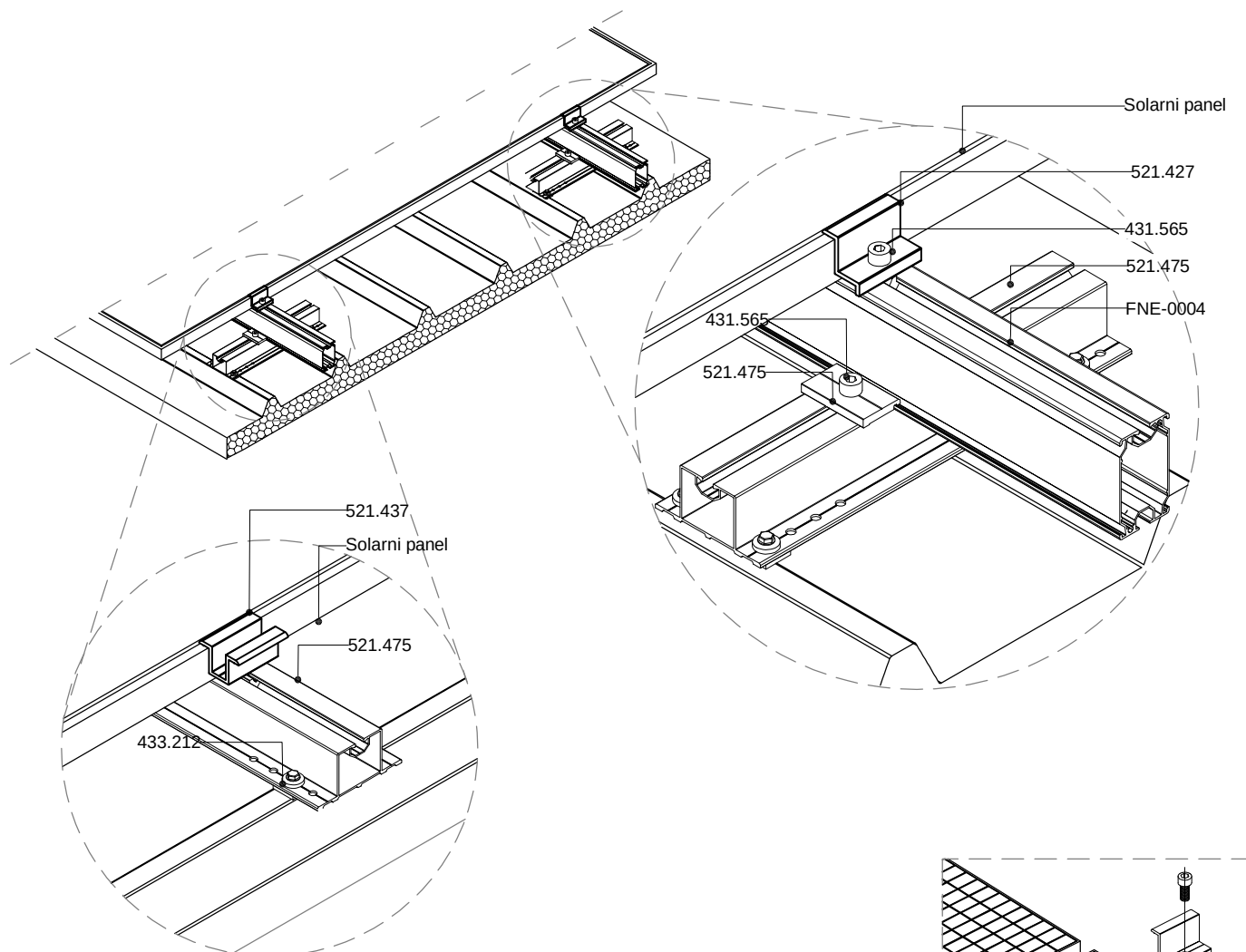
Kod ostvarivanja veze horizontalnih greda (g), ugrađuje se premosnica dilatacije, kao dodatni element. Premosnica dilatacije je poboljšanje veze kako bi se poboljšala povezanost elemenata i time pridonijelo boljem uzemljenju svih elemenata.

Premosnica je također izrađena od aluminija, a oblikovana je tako da omogući pravilan rad dilatacije.

When making the connection of horizontal beams (g), a dilatation bypass is installed, as an additional element. The dilatation bypass is to improve the connection in order to improve the connectivity of the elements and thus contribute to a better grounding of all elements.

The bypass is also made of aluminum and is designed to allow proper dilatation operation.





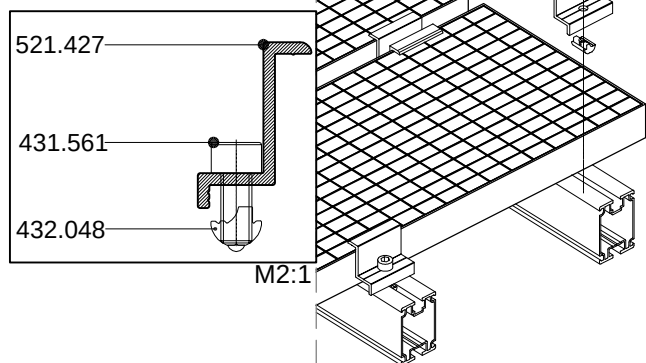
Držač solarnog panela-jednostrani

Pričvršćivanje krajnjih panela izvodi se jednostranim držačem 521.427 i veznim elementima 431.561 i 432.048.

Jednostrane držače učvrstiti uporabom moment ključa i silom od 15 Nm.

Fastening of the end panels is performed with a 521.427 clip and connecting elements 431.561 and 432.048.

Secure the edge clips using a torque wrench and a force of 15 Nm.



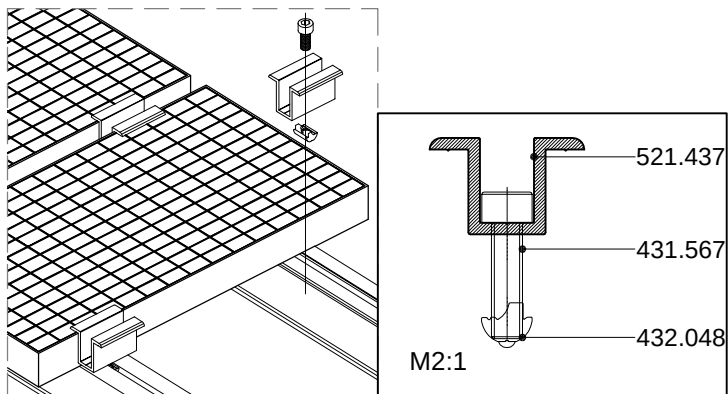
Držač solarnog panela-dvostrani

Pričvršćivanje srednjih panela izvodi se dvostranim držačem 521.437 i veznim elementima 431.567 i 432.048.

Srednje kopče učvrstiti uporabom moment ključa i silom od 15 Nm.

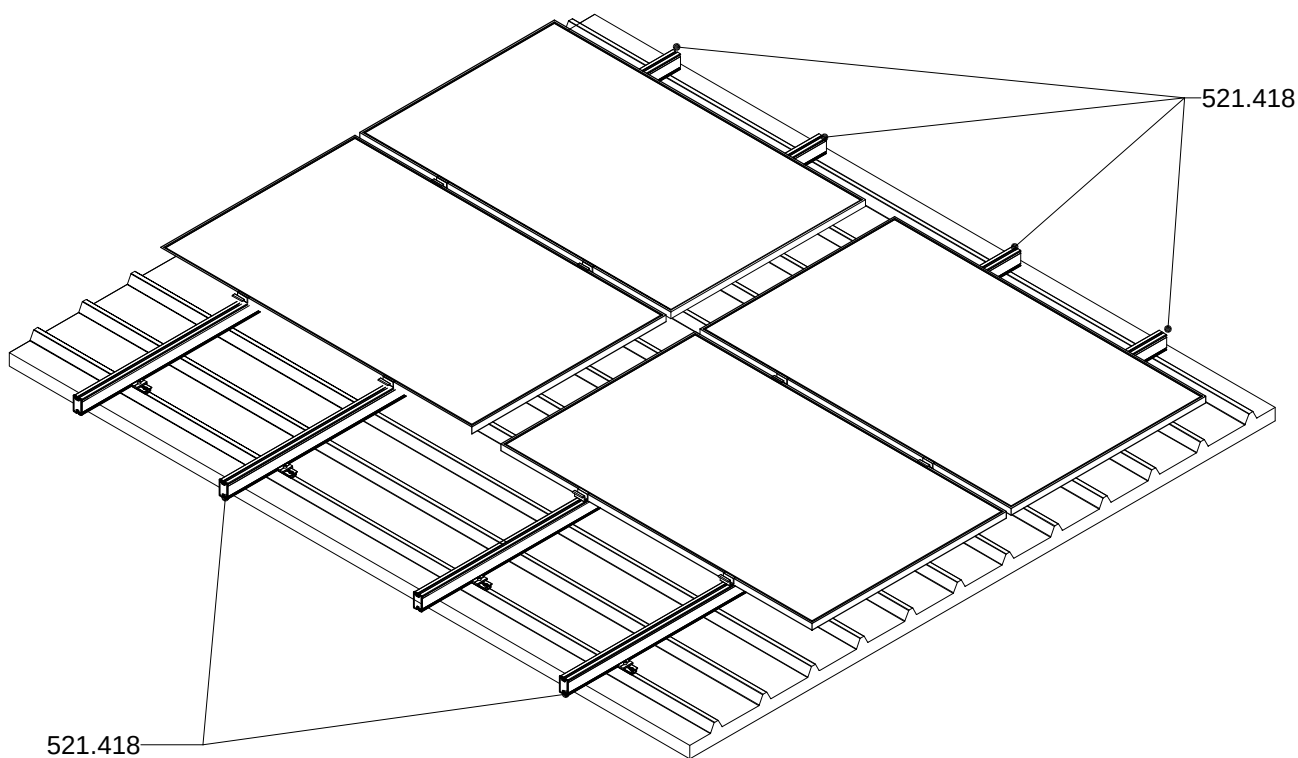
Fastening of the middle panels is performed with the 521.437 buckle and connecting elements 431.567 and 432.048.

Tighten the middle clips using a torque wrench and a force of 15 Nm.

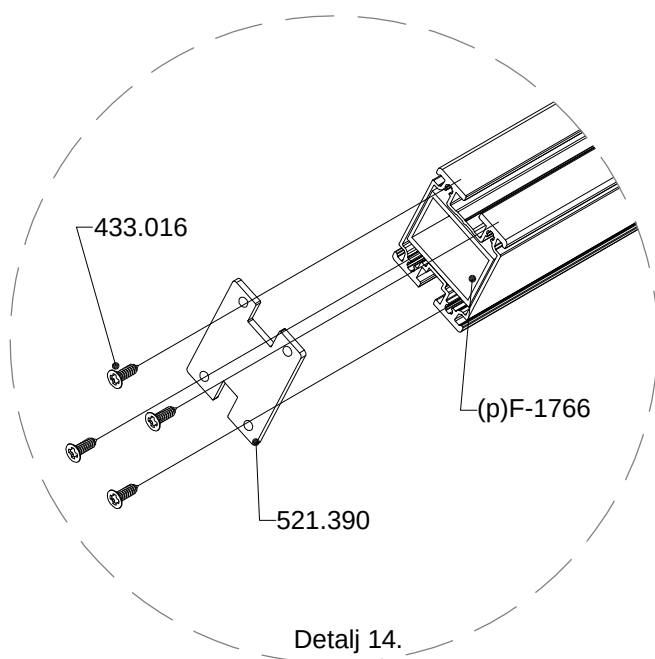


Na krajeve svih horizontalnih greda potrebno je montirati čepove.
Čepovi služe kako bi se spriječio ulazak vode i stvaranje osinjaka koji mogu prouzrokovati otežan pristup podkonstrukciji.

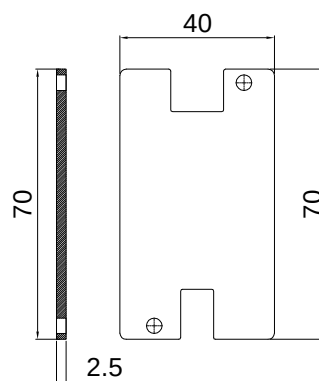
On all horizontal beams it is necessary to mount plugs at the ends. The plugs serve to prevent water from entering and the formation of wasp's nest which can cause difficult access to the substructure.



521.418



Detalj 14.



Profil FNE 0001 koristi čep 521.392
Profil FNE 0004 koristi čep 521.390
Profil FNE 0005 koristi čep 521.391
Profil FNE 0006 koristi čep 521.418

Profile FNE 0001 uses plug 521.392
Profile FNE 0004 uses plug 521.390
Profile FNE 0005 uses plug 521.391
Profile FNE 0006 uses plug 521.418

FEAL

FNE-1300

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