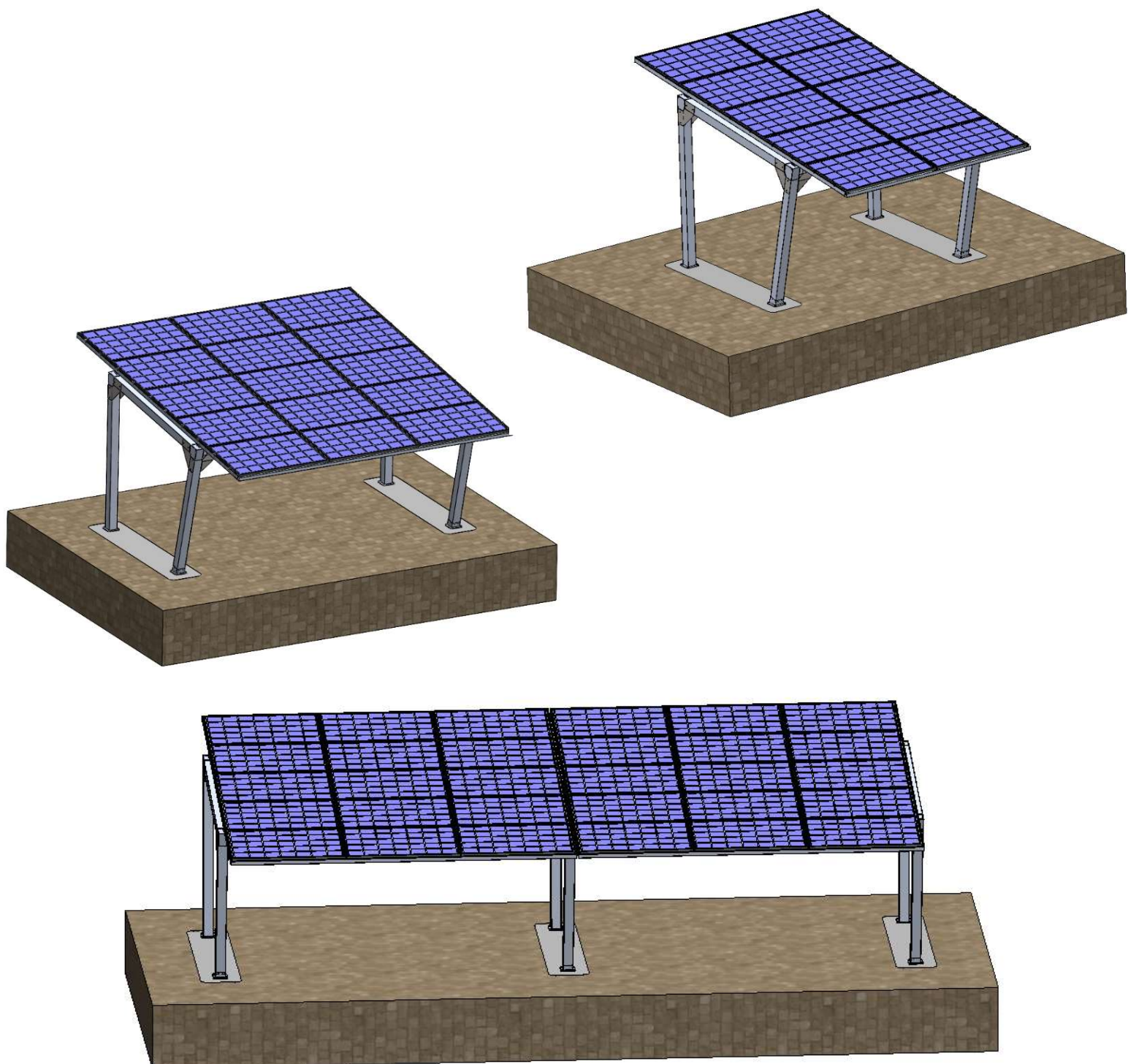




PARK-E 400, CARPORT SOLAIRE / SOLAR MONO-PITCH CANOPY

PRODUCTION D'ÉNERGIE ET PROTECTION SOLAIRE POUR MODULES PHOTOVOLTAÏQUES
PROTECTION AND POWER STATION FOR PHOTOVOLTAIC MODULES

Notice de montage / Installation instructions





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INSTRUCTIONS DE SECURITE

La conception, le montage et la mise en service du carport monopan et de son système photovoltaïque ne doivent être effectués que par du personnel dûment qualifié et habilité. Une exécution inadéquate peut causer des dommages à l'installation et mettre des vies en danger.

La bonne qualification de l'installateur est exigée pour l'application des aides éventuelles (prime et tarif d'achat). Renseignez-vous localement.

Les normes électriques et de constructions nationales et locales, les règlements divers ainsi que les directives concernant la protection de l'environnement en vigueur doivent impérativement être respectés.

Avant le montage, il incombe à l'installateur de vérifier la capacité d'ancrage du sol et du mur attenant le cas échéant. MPS ne pourra être tenue pour responsable du non-respect des consignes concernant les ancrages et des conséquences qui en découleraient.

Avant le montage, vérifiez que vous êtes en possession de la version à jour des instructions de montage sur notre site internet : <http://mapergolasolaire.com/supports/>. Tout au long du montage, assurez-vous qu'au moins un exemplaire des instructions de montage soit disponible sur le chantier. Veuillez prendre en compte les instructions de montage du fabricant des modules photovoltaïques et vérifier que ces derniers sont en adéquation avec les surcharges climatiques du lieu d'implantation. Ces vérifications incombent à l'installateur.

Les carports MPS ne peuvent être installés qu'en respectant les règles précisées dans le document en annexe.

Procédez au démontage du système en suivant les étapes de montage dans le sens inverse.

Afin d'optimiser la production photovoltaïque, il est recommandé de nettoyer les modules PV, ainsi que les endroits permettant l'évacuation des eaux pluviales. La fréquence de nettoyage est tributaire de son environnement.

SAFETY INSTRUCTIONS

Design, installation, and commissioning of the carport and its photovoltaic system must be performed by qualified personnel only. Incorrect execution can result in damage to the system and can put lives in danger.

The qualification of the installer may be a prerequisite to incentives (subsidies and feed-in tariffs). Please check locally.

National and local electrical and construction standards, the various regulations and all directives in force concerning environmental protection must be observed.

It is your responsibility, before installation, to check the ground anchoring capability and the wall resistance if the pergola is contiguous to the house. MPS shall in no way be responsible for any consequences due to a bad anchoring.

Before installation, check that you have the up-to-date version of the installation instructions by visiting our website: <http://mapergolasolaire.com/supports/>. Throughout the installation operation, make sure that at least one copy of the installation instruction manual is available on site.

Please be aware of the installation instructions provided by the manufacturer of the photovoltaic modules or thermal sensors and check that they are compatible with the climatic loads of the site. The fitter is responsible for performing this check.

The rules to be observed when installing a PARK-E 400 can be found in the APPENDICES.

To remove the system, apply the installation procedure in reverse.

To optimise photovoltaic production, it is advisable to clean the PV modules, as well as the areas where rainwater drains off. The frequency of cleaning depends on the environment.

INFORMATION

Quelques informations et précisions sur nos carports :

Nos carports existent en modèle une place (M1) et en modèle deux places (M2) .
Ils peuvent être jumelés à l'infini.

Un carport ou ensemble de carports jumelés est composé de :

- 1 kit : PK-DEM-400-7016M-A
- Puis des kits de carports 1 place composés de
 - 1 kit : PK-1PEXT-400-7016M-A
 - 1 kit : PK-JON-01.
- Et/ou des kits de carports 2 places composés de :
 - 1 Kit : PK-2PEXT-400-7016M-A
 - 2 kits : PK-JON-01.

La notice explique le montage d'un carport 1 place ou 2 places (même principe). Puis dans un second temps le jumelage de plusieurs carports entre eux, pour permettre toutes les combinaisons possibles.

INFORMATION

Some information and details about our carports:

Our carports come in single-seater (M1) and double-seater (M2) models.
They can be infinitely twinned.

A carport or set of twin carports consists of :

- 1 kit: PK-DEM-400-7016M-A

Then carport kits (1-seat) consisting of

- 1 kit: PK-1PEXT-400-7016M-A
- 1 kit: PK-JON-01.

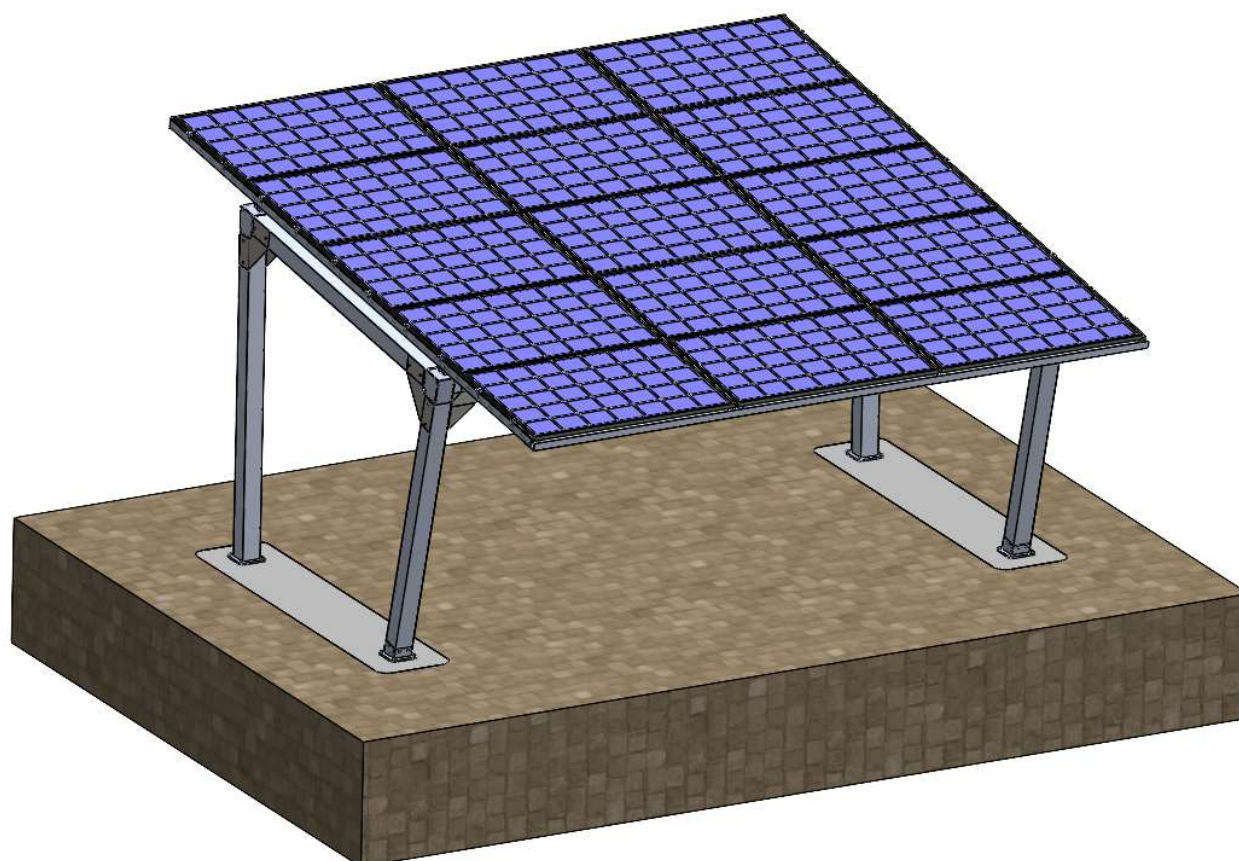
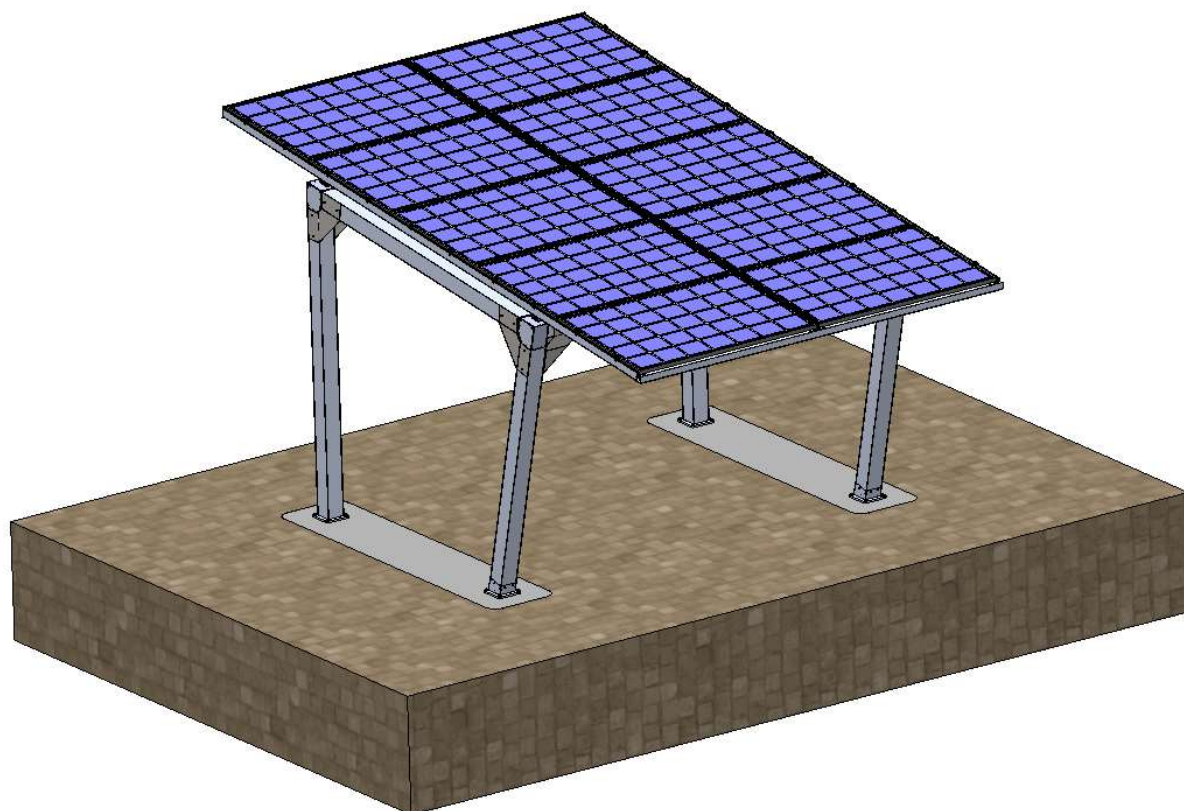
And/or 2-seater carport kits consisting of :

- 1 Kit : PK-2PEXT-400-7016M-A
- 2 kits: PK-JON-01.

The instructions explain how to assemble a carport for 1 or 2-seater model (same principle). It then goes on to explain how several carports can be paired up to create a wide range of possible combinations.

I)

CARPORT M1 & M2



Information and images are non-contractual. We reserve the right to make technical changes without notice.



I)
List of material

CARPORT M1

Components of the kit: PK-DEM-400-7016M-A

No item	Quantity	Designation	REFERENCE
1	1	FRONT FEET SUB-ASSEMBLY	ASM0P01315AA
2	1	REAR FEET SUB-ASSEMBLY	ASM0P01316AA
3	1	SIDE BEAM SUB-ASSEMBLY M1/M2	ASM0P01317AA
5	2	SMALL METAL SHEET	PRT0P00867AA
6	2	METAL SHEET U FEET	PRT0P00872AA
13	4	CLAMPING NUT COVER	PRT0P01306AA
14	2	SMALL CLAMPING NUT METAL SHEET	PRT0P01311AA
17	4	REINFORCEMENT PARK-E	PRT0P01334AA
20	8	SCREW CHC M8x30/30 EF	V157V02
26	20	FLAT SOCKET HEAD CAP SCREW M5x10/10 EF	V153V02
31	28	Plug BULTE 32000E	V115V02N
32	12	SCREW CHC M8x180 /28	V173V02
33	12	BRAKE NUT M8	V175V02

Components of the kit: PK-JON-01

No item	Quantity	Designation	REFERENCE
34	16	ADJUSTABLE FLOW CONNECTION	PRT0P00933AA

Options:

Components of the kit: PK-PL-G-7016M-1

No item	Quantity	Designation	REFERENCE
35	1	BATTERY MOUNTING METAL SHEET LEFT	PRT0P01260AA
37	1	BATTERY COVER METAL SHEET	PRT0P01327AA
38	8	Self-drilling screw H St4.8-13 with flange	
39	2	Rounded head screw M5x10 with flange	
40	2	Square nut Q M5	

Components of the kit: PK-PL-D-7016M-1

No item	Quantity	Designation	REFERENCE
36	1	BATTERY MOUNTING METAL SHEET RIGHT	PRT0P01259AA
37	1	BATTERY COVER METAL SHEET	PRT0P01327AA
38	8	Self-drilling screw H St4.8-13 with flange	
39	2	Rounded head screw M5x10 with flange	
40	2	Square nut Q M5	

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I)
List of material

CARPORT M1

Components of the kit: PK-1PEXT-400-7016M-A

No item	Quantity	Designation	REFERENCE
15	20	SINGLE CLAMP	A001V40
7	1	MAIN CROSSBAR M1-2a	PRT0P01287AA
5	1	SMALL METAL SHEET	PRT0P00867AA
6	1	METAL SHEET U FEET	PRT0P00872AA
12	1	TOP METAL SHEET M1a	PRT0P01313AA
11	1	GUTTER M1a	PRT0P0134AA
13	2	CLAMPING NUT COVER	PRT0P01306AA
8	2	SIDE CROSSBAR M1-2a	PRT0P01288AA
16	12	Top nut STD M8	PRT0P00402AA
1	1	FRONT FEET SUB-ASSEMBLY	ASM0P01315AA
2	1	REAR FEET SUB-ASSEMBLY	ASM0P01316AA
14	2	SMALL CLAMPING NUT METAL SHEET	PRT0P01311AA
9	1	MAIN DEFLECTOR M1-2a	PRT0P01289AA
10	8	ERM CROSS LANDSCAPE	PRT0P01027AA
3	2	BEAM SUB-ASSEMBLY / RAIL	ASM0P01346AA
3	1	SIDE BEAM SUB-ASSEMBLY M1/M2	ASM0P01317AA
18	2	RIGHT U-SHAPED LEG	PRT0P01337AA
19	2	LEFT U-SHAPED LEG	PRT0P01338AA
17	4	REINFORCEMENT PARK-E	PRT0P01334AA
38	1	BATTERY MOUNTING METAL SHEET	PRT0P01438AA
39	5	MICROINVERTER MOUNTING PLATE	PRT0P01437AA
40	2	COMPRIBAND TRS 15/1-3M length 12,5m :2 rolls of 12,5meters	PDC0P00533A
41	2	JUNCTION PLATE SIDE FEET HOLE	PRT0P01301AAb
20	40	Screw CHC M8x30/30 EF	V157V02
27	20	Screw CHC M6x80/80	V150V02
22	12	CHC low Socket Head Screws M8x90	V162V02
23	14	Self-drilling screw H St6.3-50 with flange	V169V02
24	24	Self-drilling screw H St4.8-13 with flange	V168V02
25	4	Self-drilling screw H St5.5-32 with flange	V149V02
26	40	Rounded head screw M5x10 with flange/10 EF	V153V02
27	15	Screw H M6x80/80 EF	V152V02
28	40	Screw TB M5x35	V001V02
30	40	Square nut Q M5	V002V02
29	35	H-nut M6x10	V154V02
31	56	Plug BULTE 32000E	V115V02N
32	24	Screw CHC M8x180 /28	V173V02
33	24	Break nut M8	V175V02

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I)
List of material

CARPORT M2



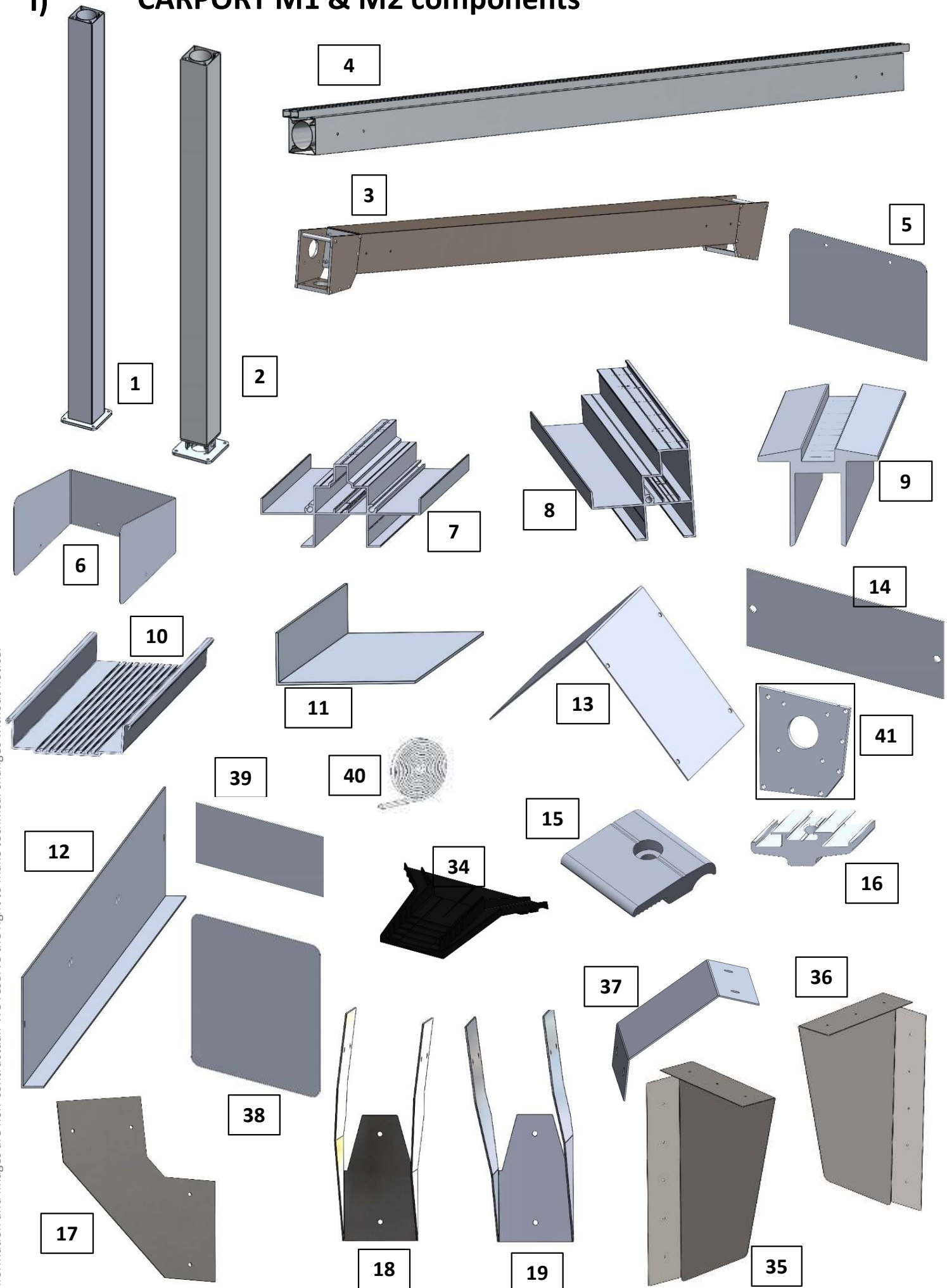
Components of the kit: PK-2PEXT-400-7016M-A

N° article	Quantité	Désignation	REFERENCE
15	20	SINGLE CLAMP	A001V40
7	2	MAIN CROSSBAR M1-2a	PRTOP01287AA
5	1	SMALL METAL SHEET	PRTOP00867AA
6	1	METAL SHEET U FEET	PRTOP00872AA
12	1	TOP METAL SHEET M2a	PRTOP01154AA
11	1	GUTTER M2a	PRTOP01153AA
13	2	CLAMPING NUT COVER	PRTOP01306AA
8	2	SIDE CROSSBAR M1-2a	PRTOP01288AA
16	16	Top nut STD M8	PRTOP00402AA
1	1	FRONT FEET SUB-ASSEMBLY	ASMOP01315AA
2	1	REAR FEET SUB-ASSEMBLY	ASMOP01316AA
14	2	SMALL METAL SHEET	PRTOP01311AA
9	2	MAIN DEFLECTOR M1-2a	PRTOP01289AA
10	12	ERM CROSS LANDSCAPE	PRTOP01027AA
3	4	SIDE BEAM SUB-ASSEMBLY / RAIL	ASMOP01343AA
3	1	SIDE BEAM SUB-ASSEMBLY M1/M2	ASMOP01317AA
18	2	RIGHT U-SHAPED LEG	PRTOP01337AA
19	2	LEFT U-SHAPED LEG	PRTOP01338AA
17	4	REINFORCEMENT PARK-E	PRTOP01334AA
38	1	BATTERY MOUNTING METAL SHEET	PRTOP01438AA
39	8	MICROINVERTER MOUNTING PLATE	PRTOP01437AA
40	3	COMPRIBAND TRS 15/1-3M length 12,5m :2 rolls of 12,5meters	PDCOP00533A
41	2	JUNCTION PLATE SIDE FEET HOLE	PRTOP01301AAb

20	32	Screw CHC M8x30/30 EF	V157V02
27	20	Screw CHC M6x80/80	V150V02
22	16	CHC low Socket Head Screws M8x90	V162V02
23	20	Self-drilling screw H St6.3-50 with flange	V169V02
24	28	Self-drilling screw H St4.8-13 with flange	V168V02
25	6	Self-drilling screw H St5.5-32 with flange	V149V02
26	20	Rounded head screw M5x10 with flange/10 EF	V153V02
27	30	Screw H M6x80/80 EF	V152V02
28	40	Screw TB M5x35	V001V02
30	40	Square nut Q M5	V002V02
29	50	H-nut M6x10	V154V02
31	28	Plug BULTE 32000E	V115V02N
32	12	Screw CHC M8x180 /28	V173V02
33	12	Break nut M8	V175V02

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I) CARPORT M1 & M2 components



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I) CARPORT M1 & M2

Outils / Accessoires nécessaires au montage Tools / Accessories required for installation



Serre-joints x6
Clamps x6



Élévateur portable
pouvant s'élever jusqu'à
3m de haut.
Portable lift with a height
of up to 3m.



Visseuse
Screwdriver



Embout cruciforme
Cruciform bit



Embouts noix de serrage
End caps clamping nuts



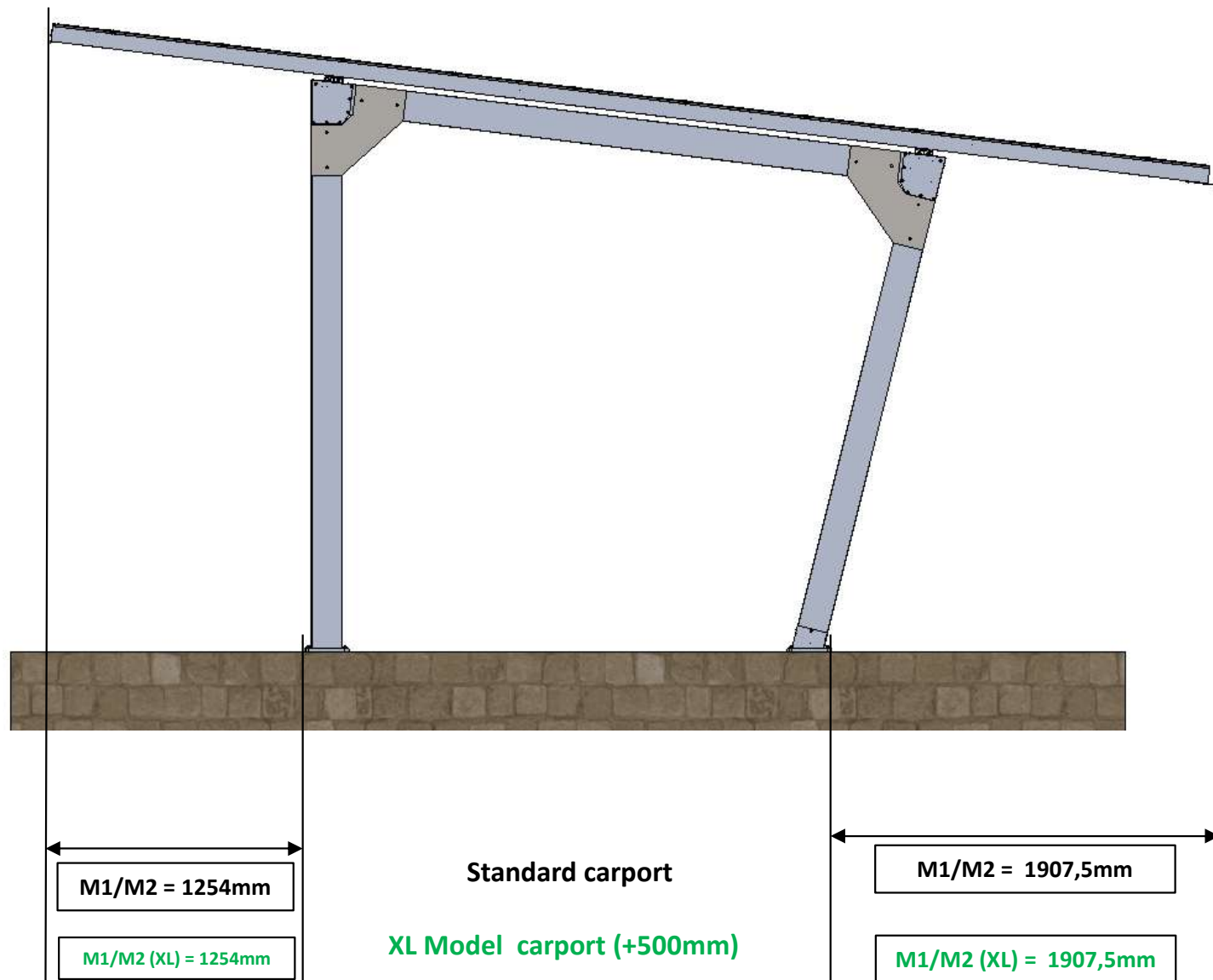
Jeu de clés mâles 6 pans
coudés
6-piece Allen key set,
angled

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I) CARPORT M1 & M2

1. Montage de la structure / Mounting of the structure

Informations importantes / Important information:



Les règles à respecter pour l'installation d'un PARK-E 400 se trouve en ANNEXES.

A lire impérativement avant le début de chaque installation.

The rules to be observed when installing a PARK-E 400 can be found in the APPENDICES.

It is essential to read them before starting each installation.

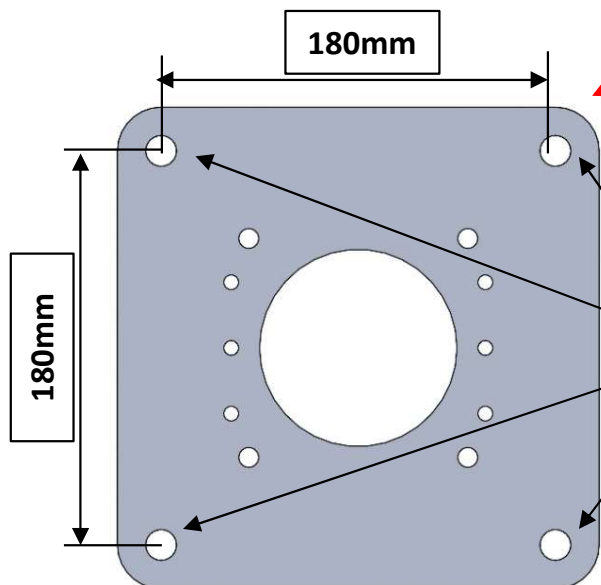
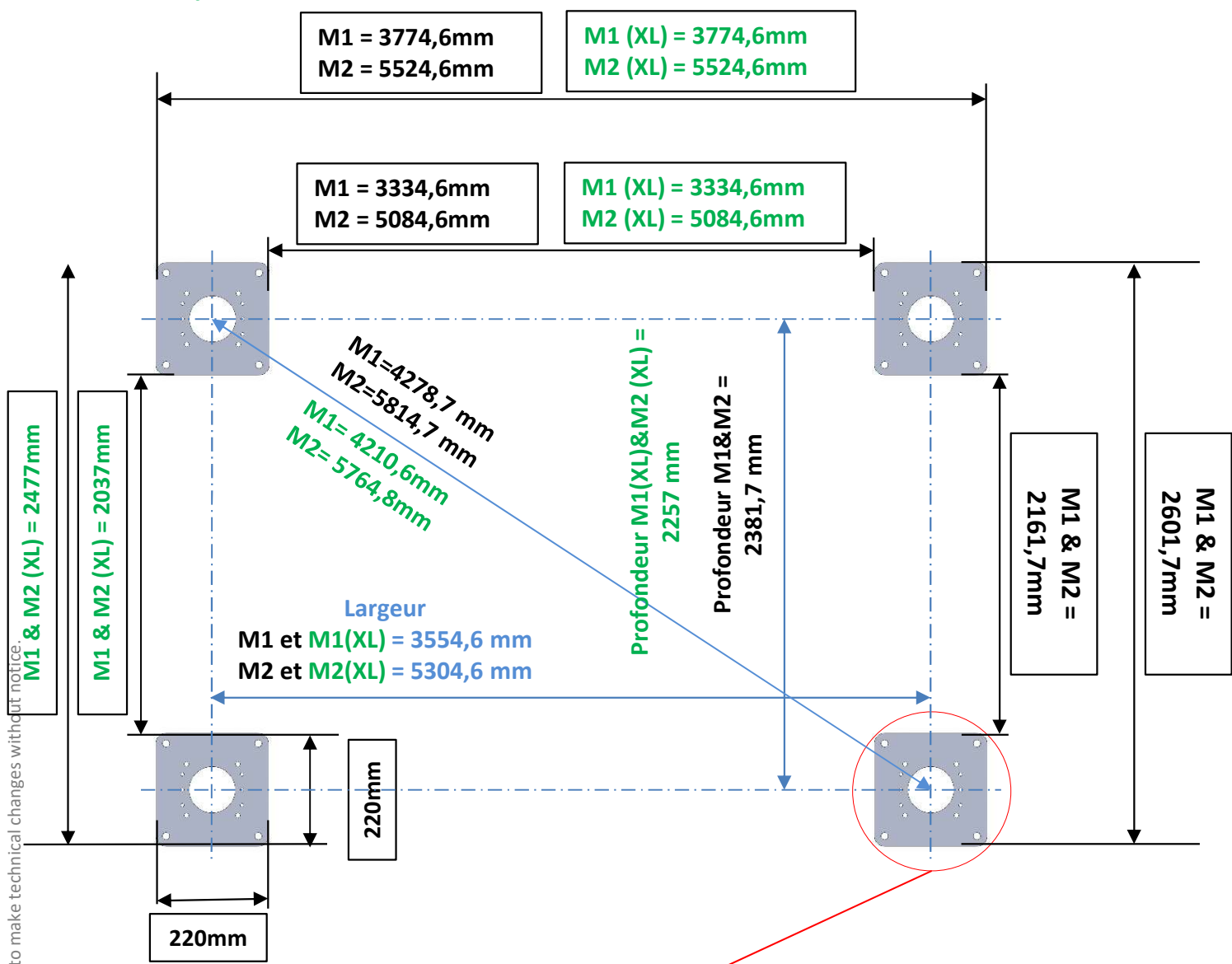
I) CARPORT M1 & M2

1. Montage de la structure / / Mounting of the structure

A. Perçage des plots béton / dalle - Drilling of the concrete blocks / slab

Carport hauteur standard

Carport XL (hauteur +500 mm)



Perçer le plot béton ou la dalle avec l'espacement indiqué.
 Veillez à ce que l'alignement des trous des embases de gauche et de droite soient bien alignés.
 Une fois les 16 trous réalisés, insérer dans chacun d'eux un goujon d'ancrage ayant au minimum 12mm de diamètre.
Drill the concrete block or slab with the spacing indicated.
Ensure that the holes in the left and right hand bases feet are aligned.
Once the 16 holes have been drilled, insert an anchor bolt with a minimum diameter of 12mm into each hole.

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I)

CARPORT M1 & M2

B. Montage des pieds avant / Mounting the front feet

Placez les sous-ensembles pieds avant à l'aide des goujons d'ancrage.

ATTENTION ! Les pieds avant sont situés du côté du monopan ayant la hauteur la plus élevée.

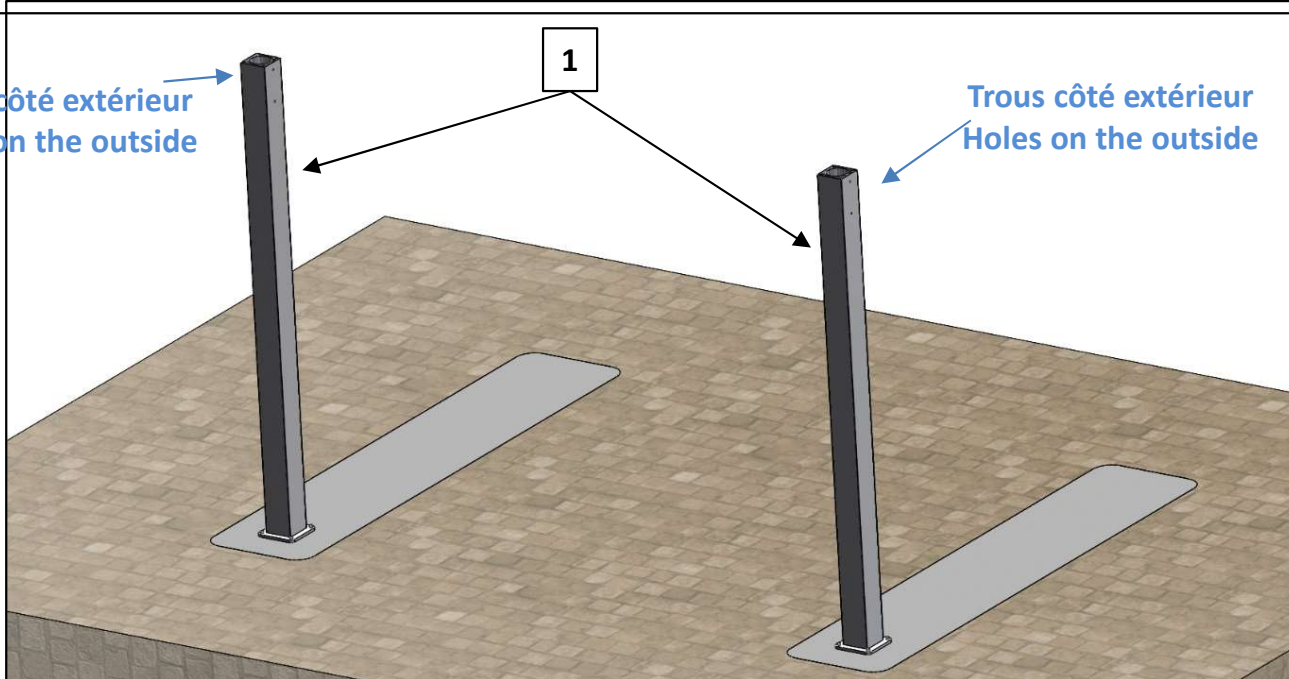
De plus, pour fixer au sol PARK-E 400, vous aurez besoin de goujons d'ancrages ayant au minimum un diamètre de **12mm** (selon le domaine d'emploi, cette valeur peut être modifiée).

Position the front leg sub-assemblies using the anchor bolts. CAUTION! The front feet are located on the side of the carport with the highest height. To secure PARK-E 400 to the ground, you will need anchor bolts with a minimum diameter of **12mm** (this value may vary depending on the application).

Trous côté extérieur
Holes on the outside

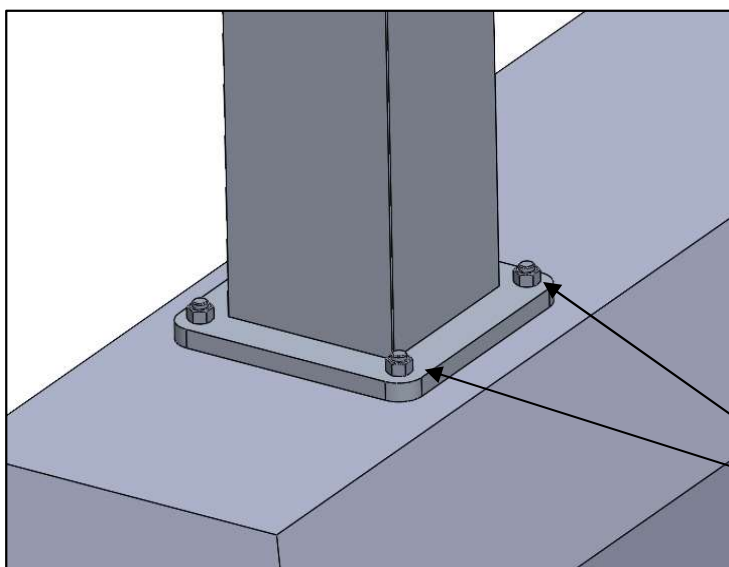
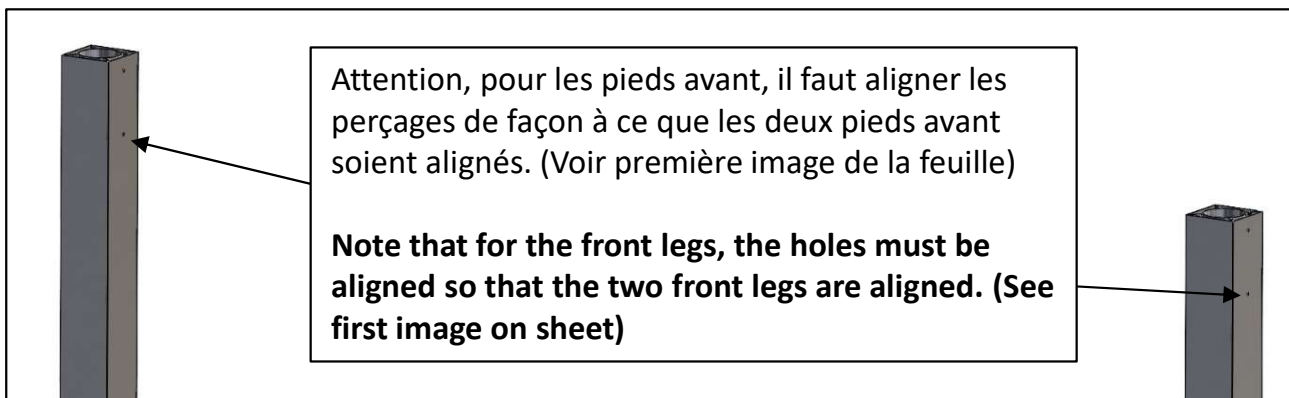
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Trous côté extérieur
Holes on the outside



Attention, pour les pieds avant, il faut aligner les perçages de façon à ce que les deux pieds avant soient alignés. (Voir première image de la feuille)

Note that for the front legs, the holes must be aligned so that the two front legs are aligned. (See first image on sheet)



Une fois les pieds avant placés, fixez-les à l'aide des écrous des goujons. Goujons M10x120mm mini dans du béton. (Tenue mini par goujon : 450 DaN)

Once the front legs are in place, secure them with the stud nuts. Minimum M10x120mm studs in concrete (Minimum tensile strength per stud: 450 DaN)

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I) CARPORT M1 & M2

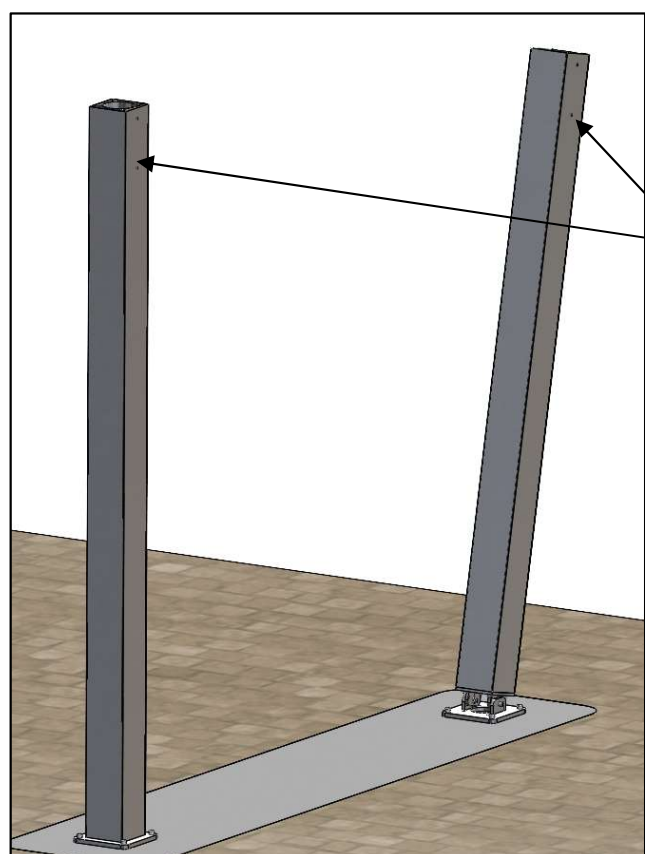
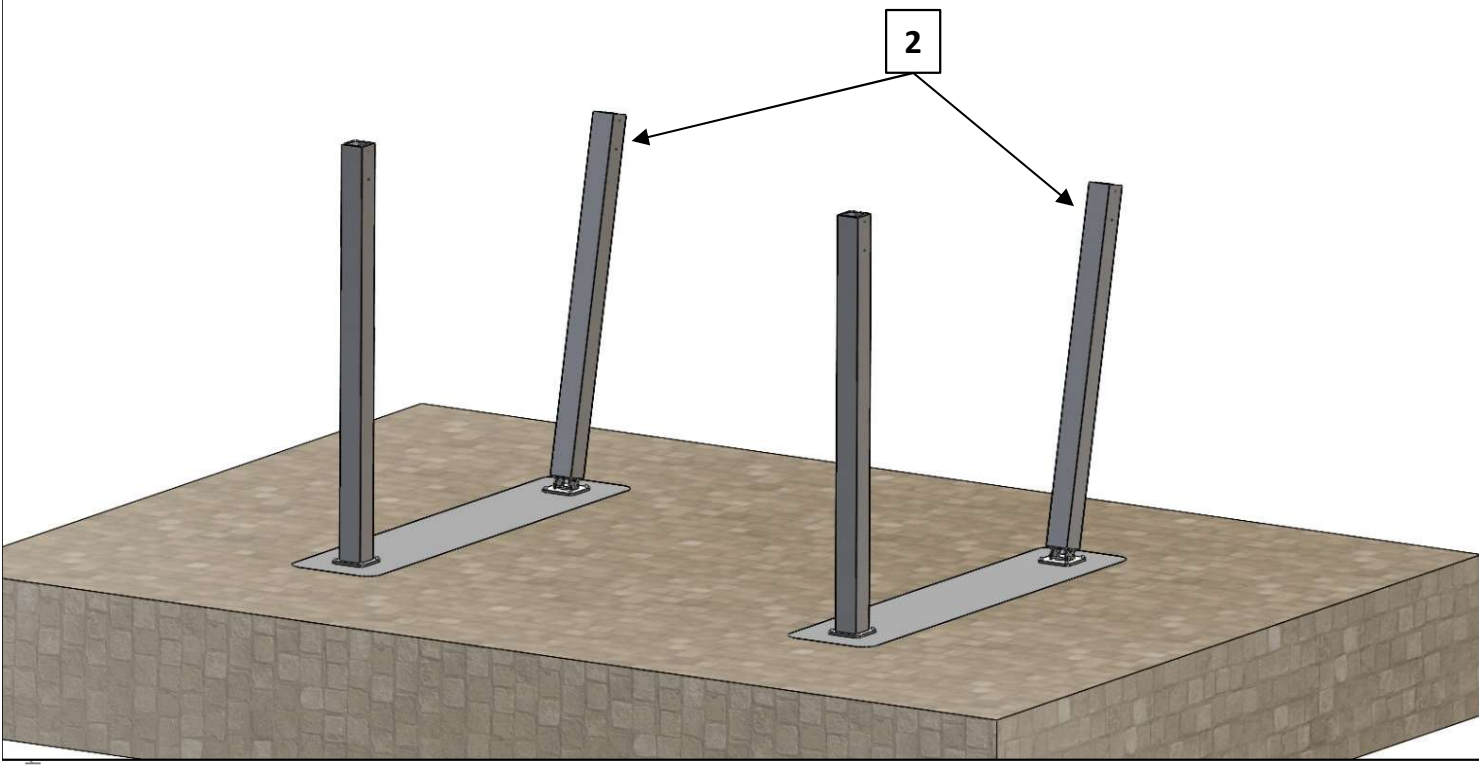
C. Montage des pieds arrière / Mounting the rear feet

Placer les sous-ensembles pieds arrière à l'aide des tirefonds.

ATTENTION ! Les pivots doivent être dans le même sens que les pieds avant, c'est-à-dire que les pieds arrière peuvent pivoter en direction du pied avant.

Place the rear feet sub-assemblies with the help of the bolts.

CAUTION: The pivots must be in the same direction as the front feet, i.e. the rear feet can pivot towards the front foot.



Les perçages dans les pieds avant et arrière doivent être du même côté.

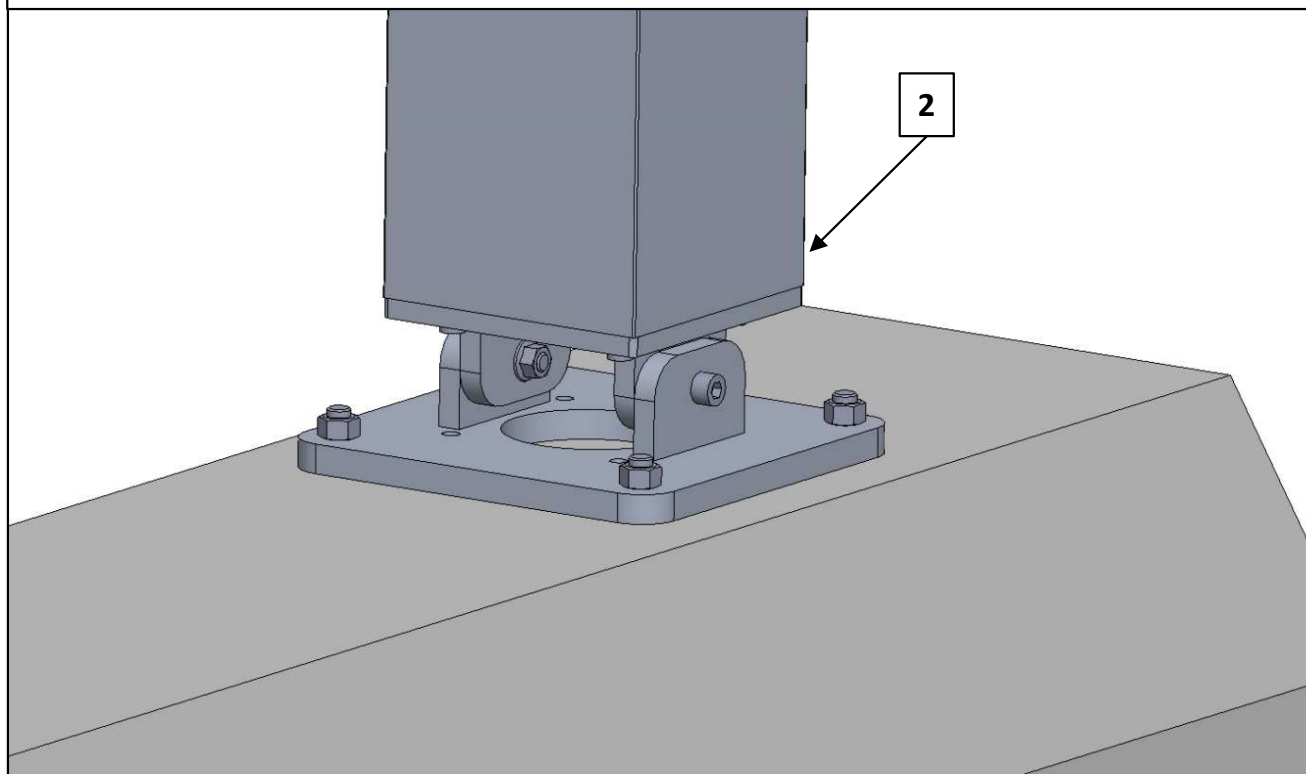
The holes in the front and rear feet must be on the same side.

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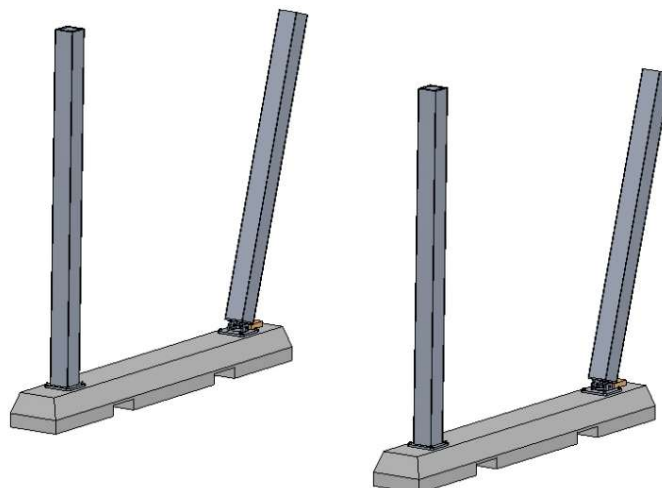
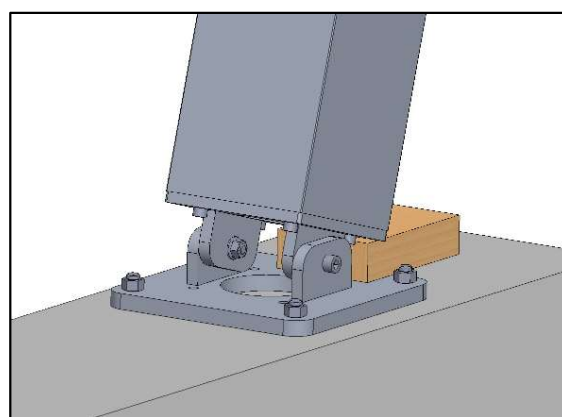
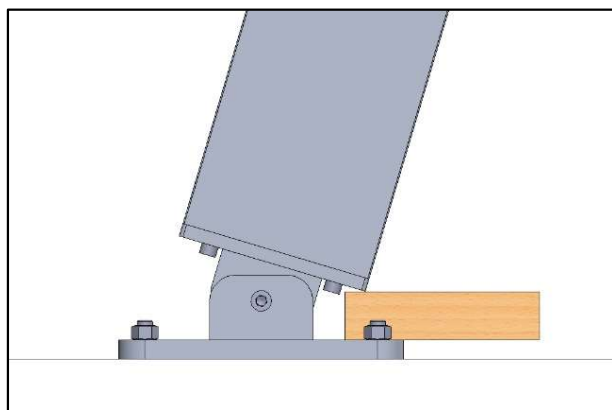
I)

CARPORT M1 & M2

Il est également important de maintenir les pieds bien à la verticale le temps de les fixer à l'aide des écrous des tirefonds. **It is also important to keep the feet upright while securing them with the lag bolt nuts.**

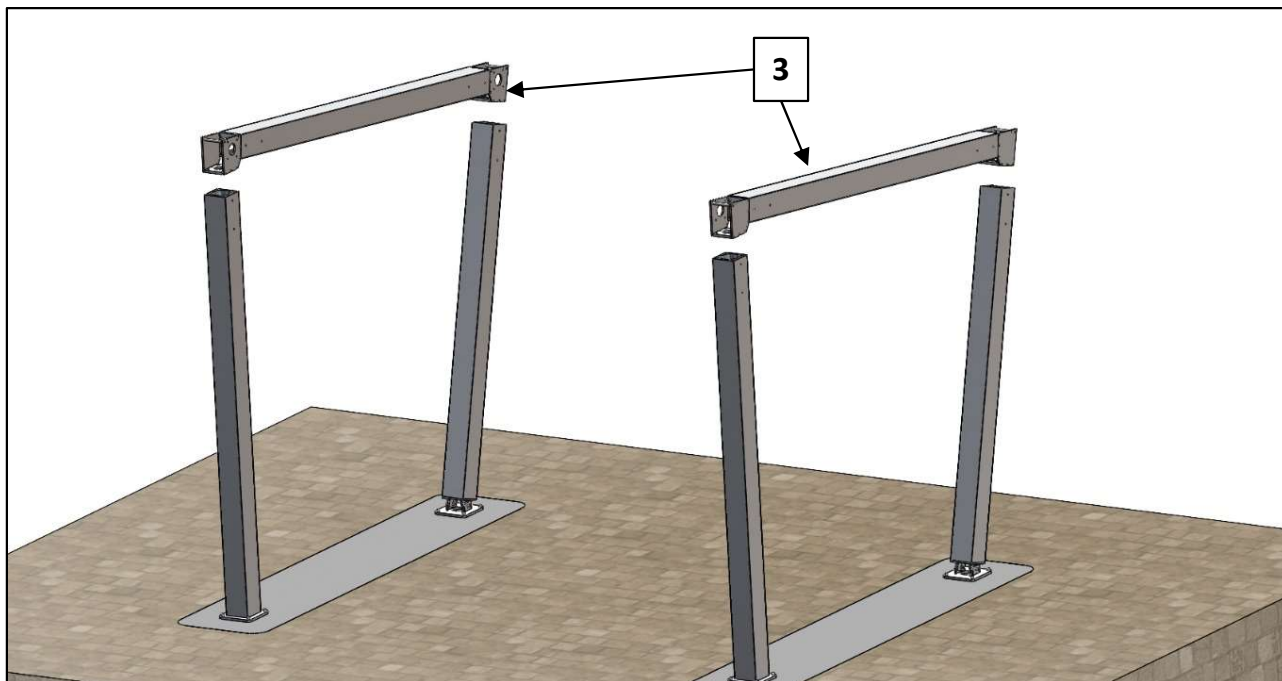


Une fois les pieds arrière fixés, utilisez une petite cale en bois pour ne pas qu'ils tombent. **Once the back feet are attached, use a small wooden wedge to prevent them from falling off.**



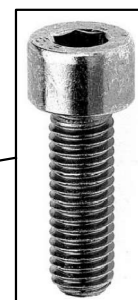
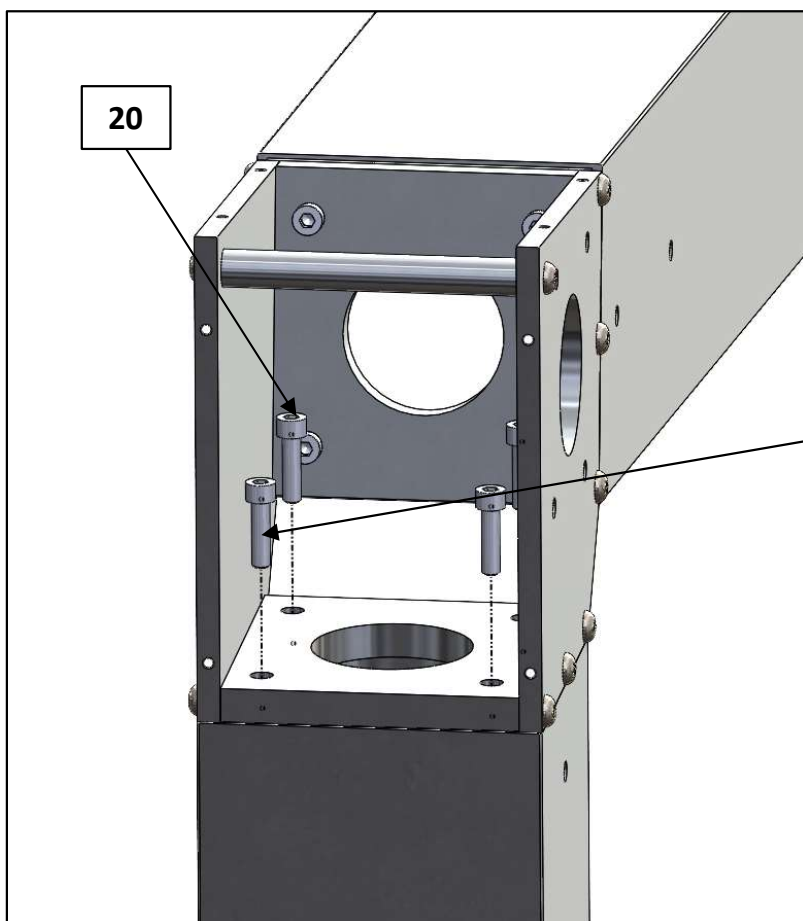
I) CARPORT M1 & M2

D. Montage des longerons latéraux / Mounting the side beams



Une fois les pieds avant et arrière montés, ajoutez les longerons transversaux.
ATTENTION ! Les faces trouées (passages de câbles) doivent être placées du côté intérieur.

Once the front and rear feet are mounted, add the cross beams.
CAUTION: The perforated faces (cable channels) must be placed on the inside.



x16 – VIS/SCREW
 CHC M8x30.

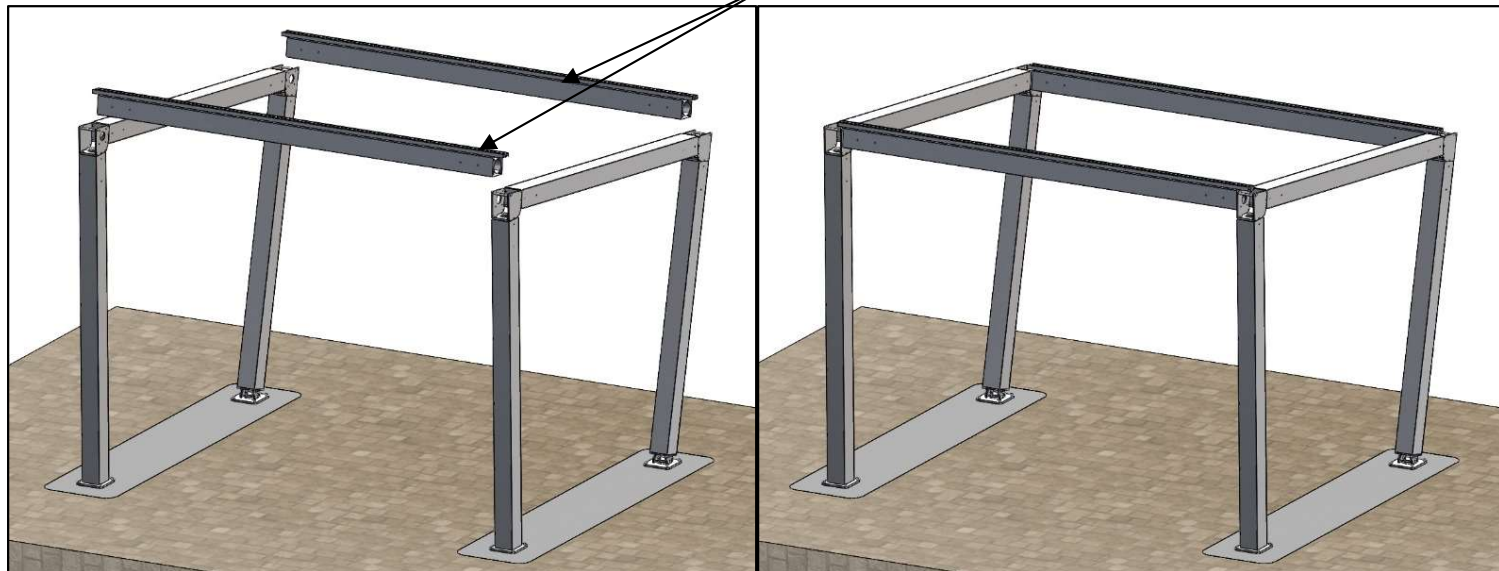
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CARPORT M1 & M2

E. Montage des longerons transversaux / Mounting the transversal beams

M1 = 4.1 / M2 = 4.2

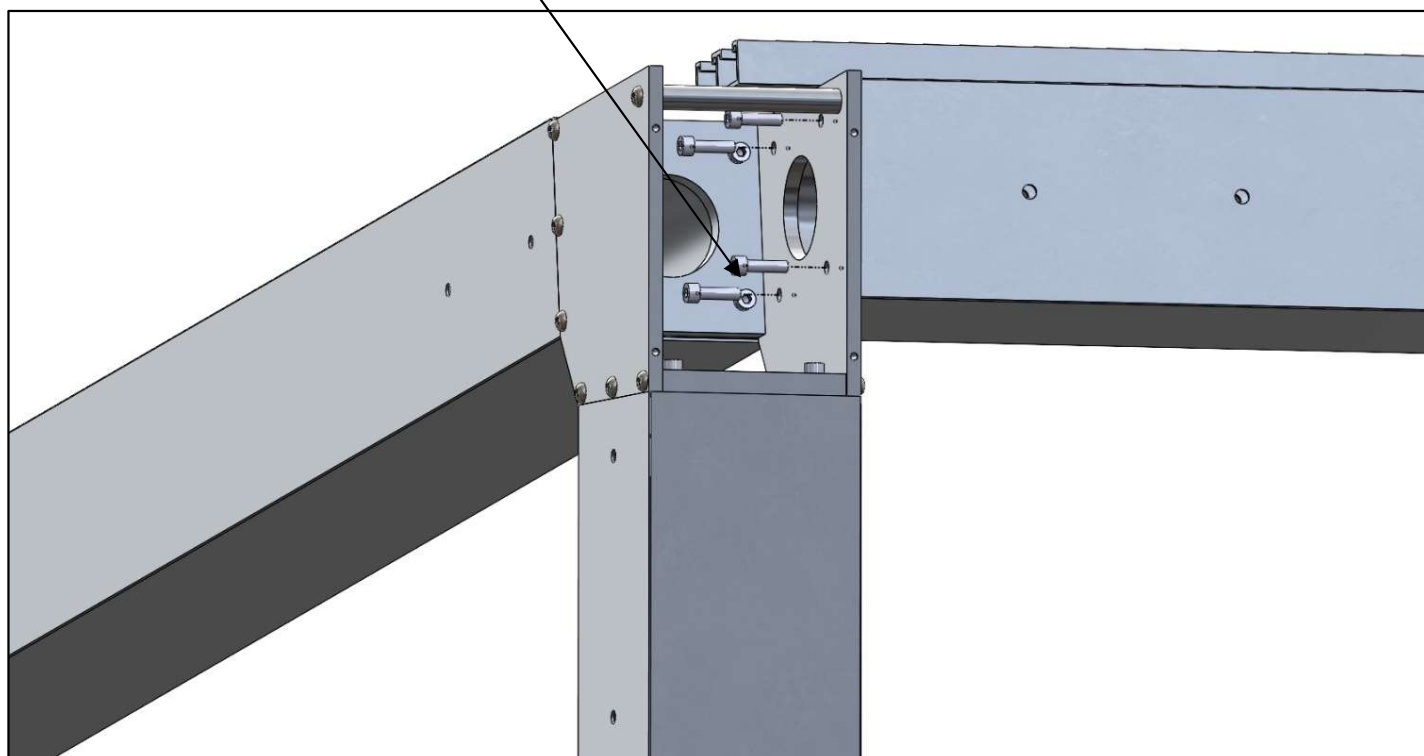


Longerons transversaux M1 : Sous-Assemblage n°4.1. **M1 transversal beams: Sub-assembly 4.1.**

Longerons transversaux M2 : Sous-Assemblage n°4.2. **M2 transversal beams: Sub-Assembly No. 4.2.**

Utiliser un élévateur pour monter les longerons transversaux. **Use a portable lift to assemble the cross beams.**

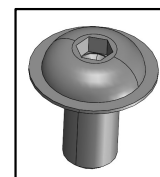
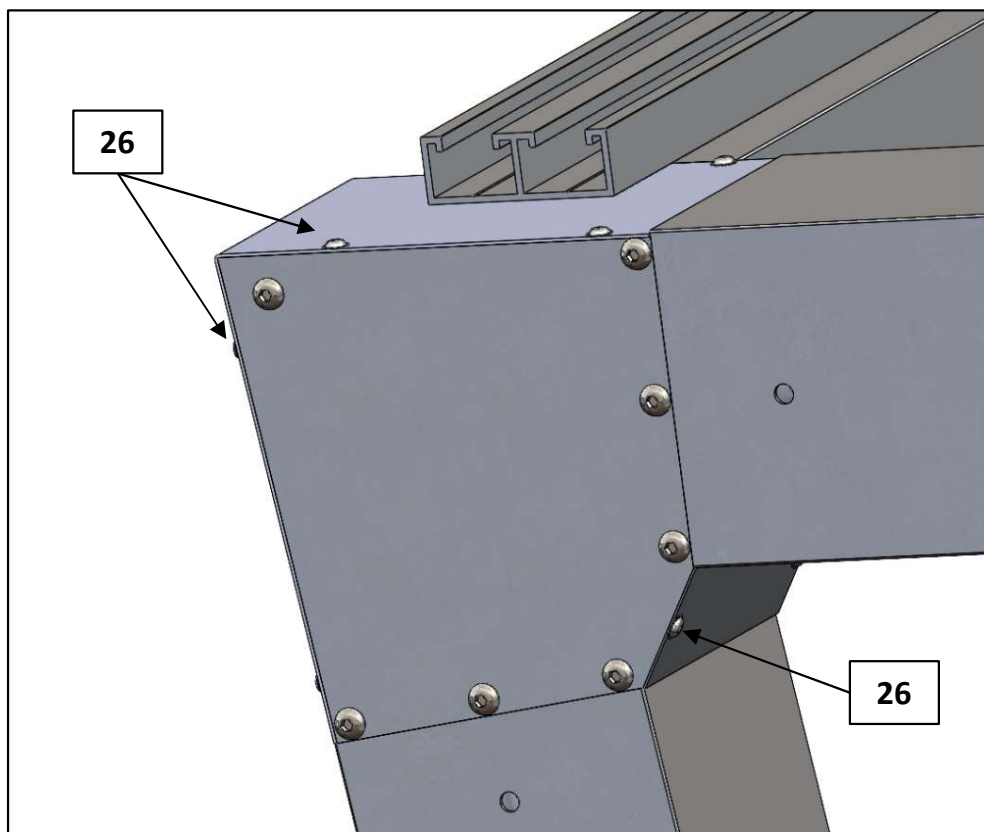
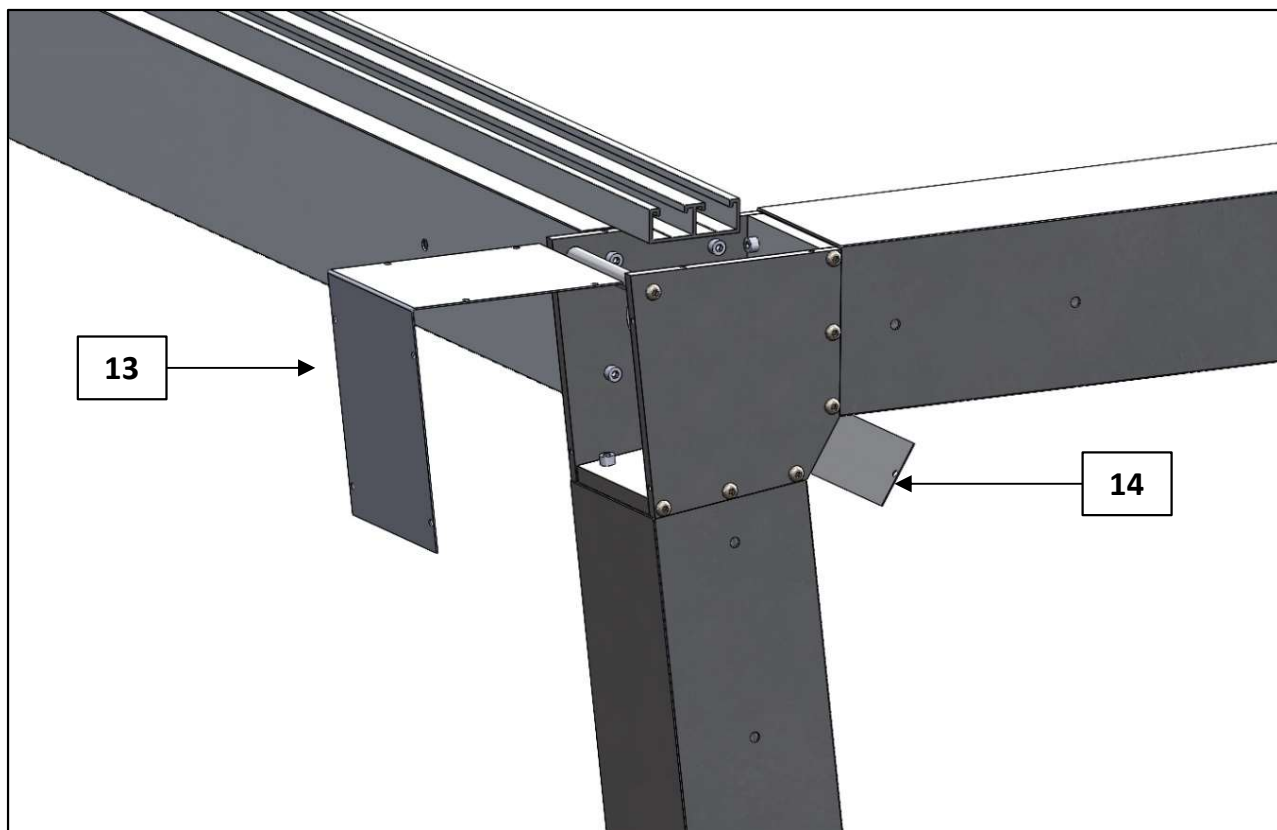
x16 – VIS/SCREW
CHC M8x30.



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I) CARPORT M1 & M2

F. Montage des petites tôles et des capots / Use a portable lift to assemble the cross beams.

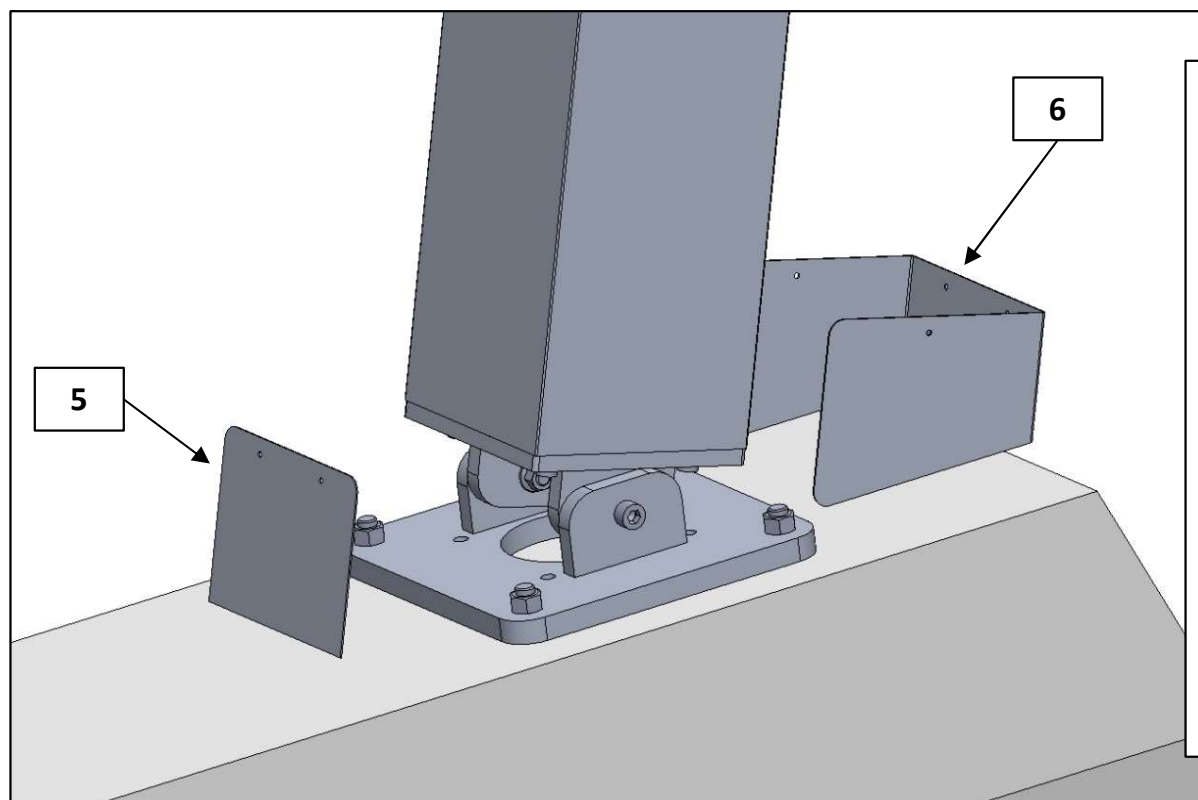


x40 – Vis/Screw M5x10

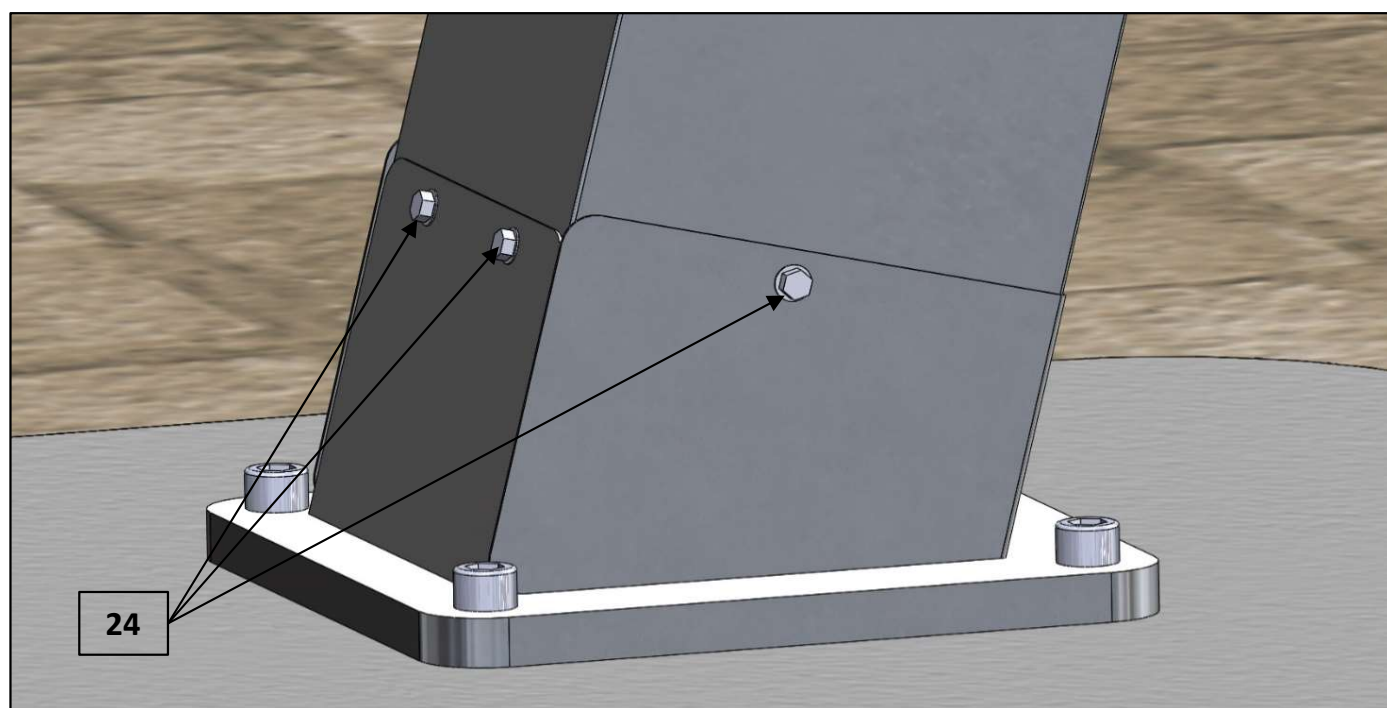
Information and images are non-contractual. We reserve the right to make technical changes without notice.

I) CARPORT M1 & M2

F. Montage des petites tôles et des capots / Assembly of small metal sheets and covers



Étape pouvant être réalisée à la fin du montage pour les sorties des câbles si vous décidez de les faire sortir sur le pied arrière.
This step can be carried out at the end of assembly for the cable outlets if you decide to run them out on the rear foot.



Elles sont vissées dans le pied à l'aide de vis auto-foreuses St4,8-13 (24).
 La tôle (6) a besoin de 4 vis et la tôle (5) de 2 vis.

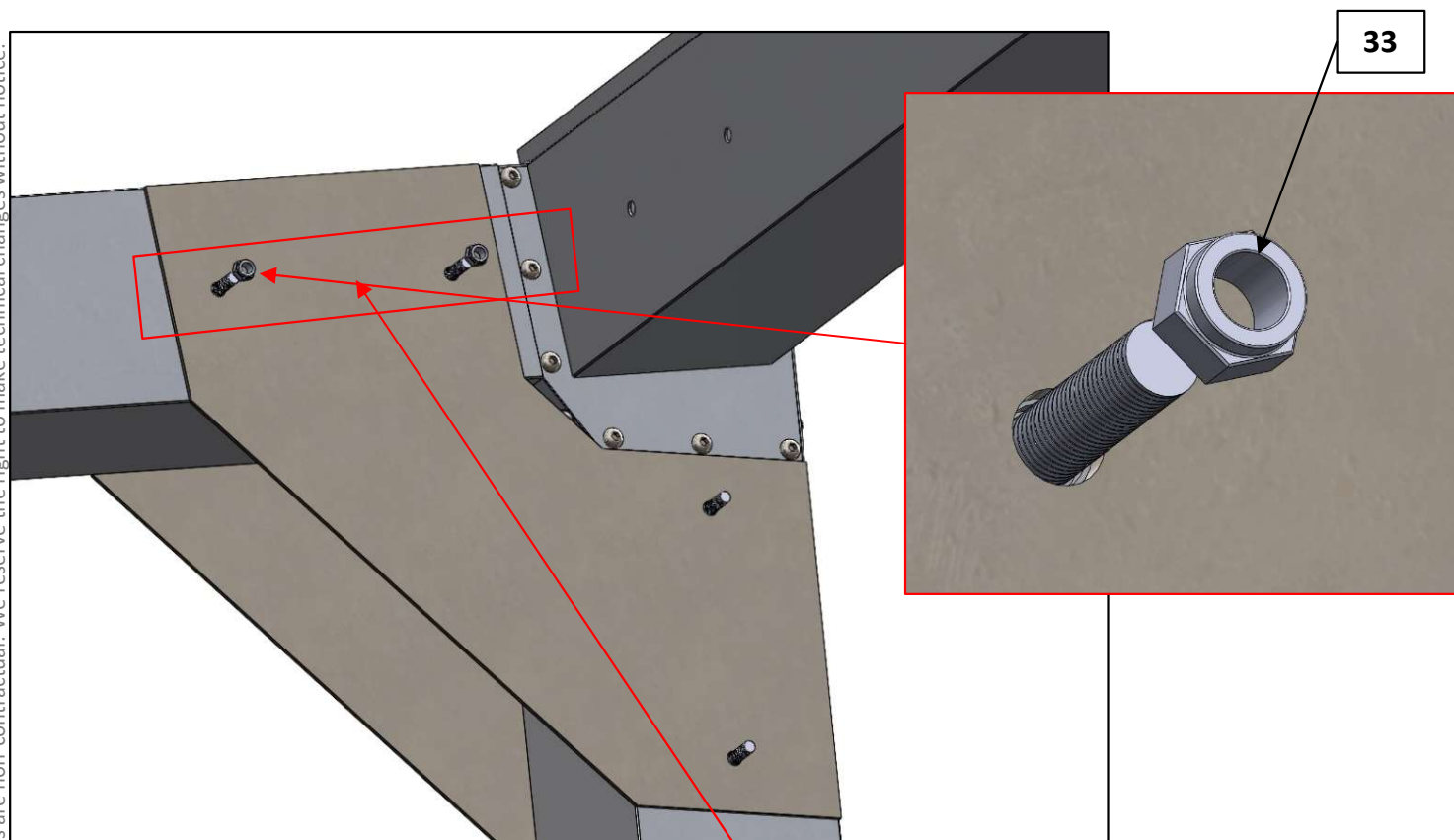
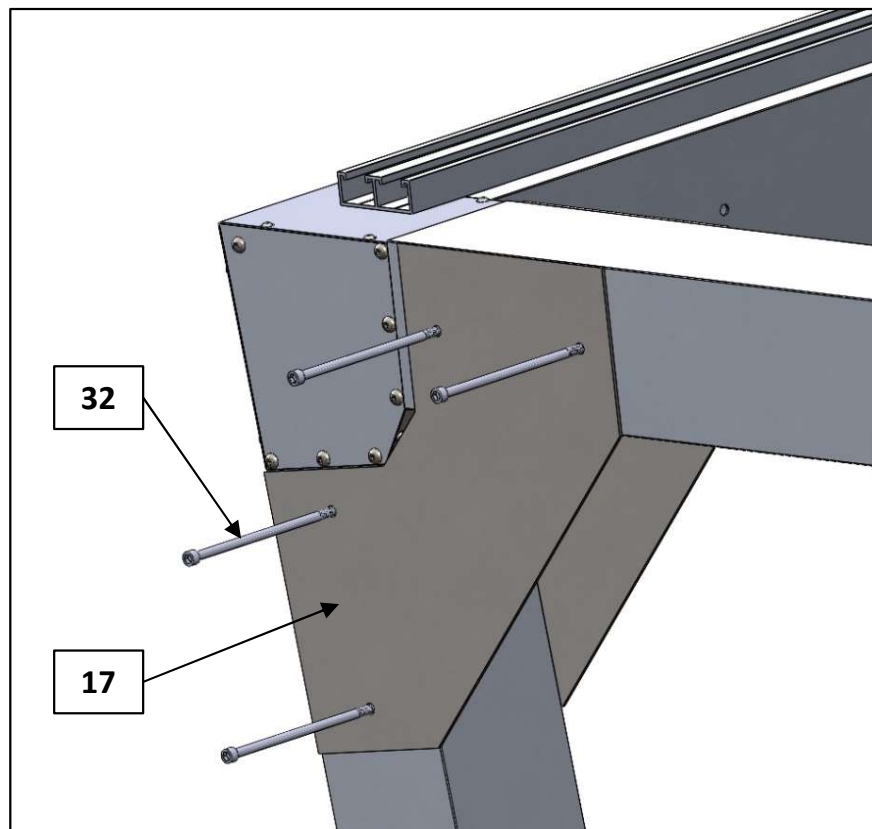
They are screwed into the foot with self tapping screws St4.8-13 (21). The metal sheet (6) needs 4 screws and the metal sheet (5) needs 2 screws.

x12 – Vis auto-foreuse / Self tapping flange screw St4,8-13

I) CARPORT M1 & M2

G. Montage des renforts / Fitting reinforcements

Placez les renforts de la manière suivante. Insérez ensuite les vis M8x180 afin de tenir les renforts. **Position the reinforcements as follows. Then insert the M8x180 screws to hold the reinforcements in place.**

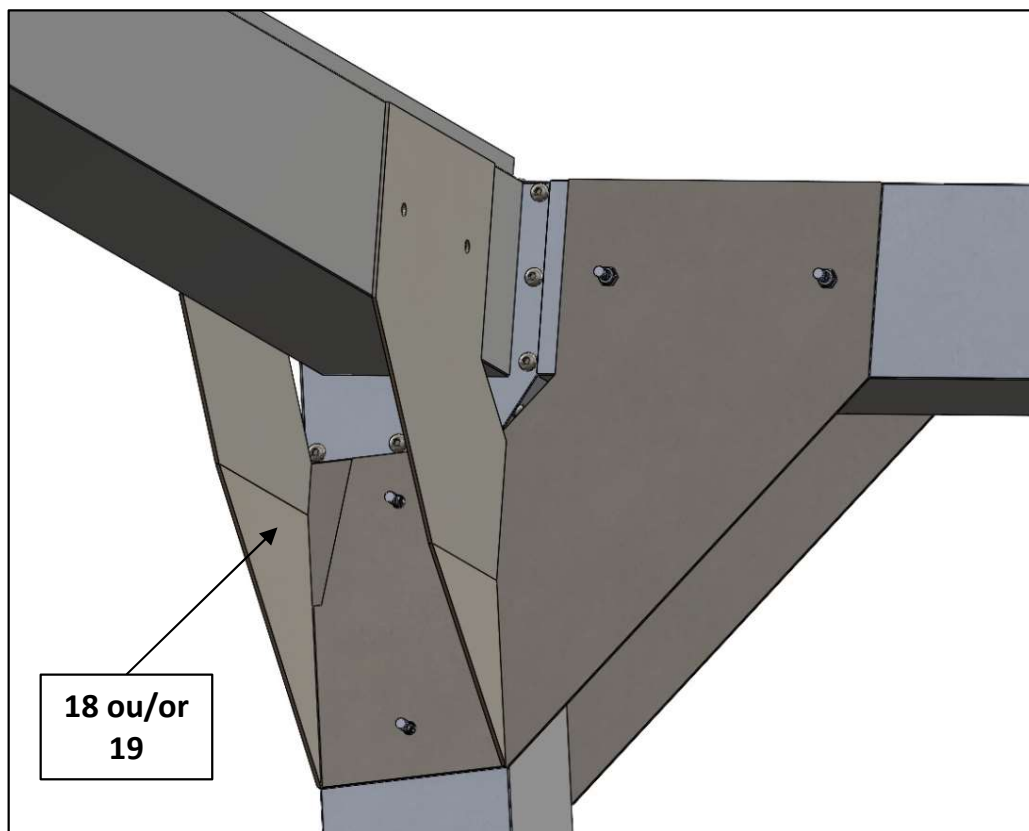


Utilisez les écrous frein M8 pour fixer les renforts, mais seulement sur la partie supérieure. Use M8 locknuts to secure the reinforcements, but only on the upper part.

Information and images are non-contractual. We reserve the right to make technical changes without notice.

I) CARPORT M1 & M2

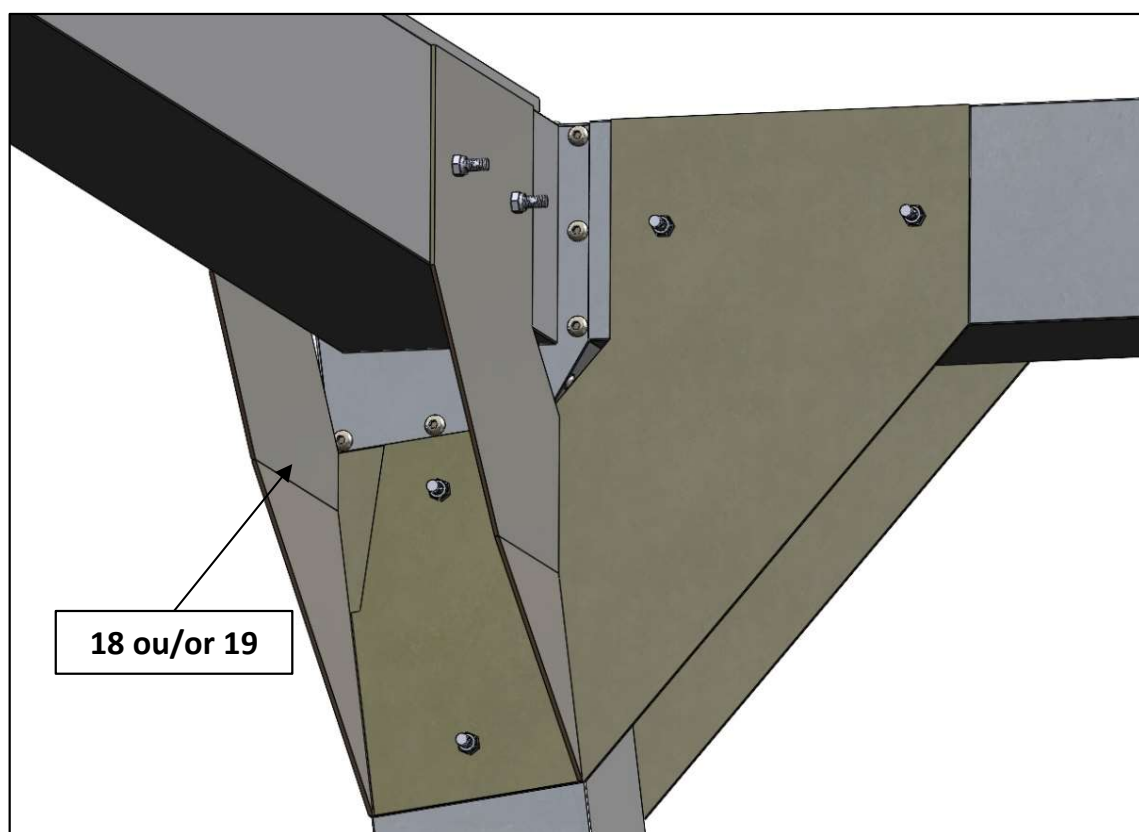
G. Montage des renforts / Fitting reinforcements



18 ou/or
19

Ajoutez les autres renforts en les insérant dans les deux vis M8x180.
Add the other reinforcements by inserting them into the two M8x180 screws.

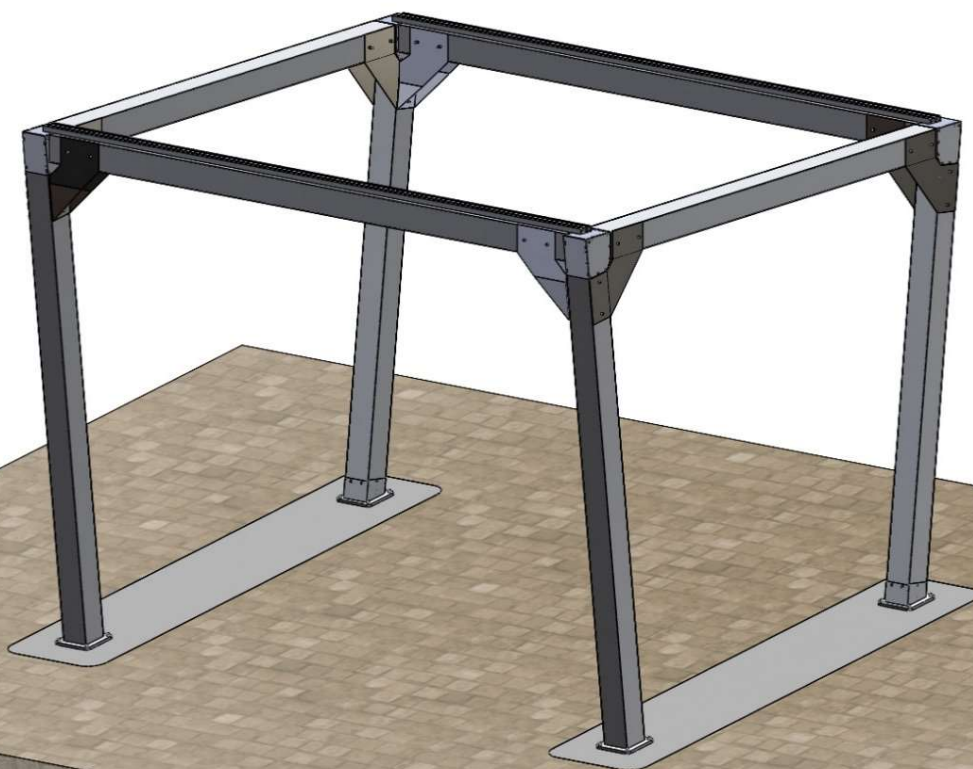
Ensuite, insérez de nouveau 2 vis M8x180, puis serrez toutes les vis à l'aide d'écrous frein M8. / **Then re-insert 2 M8x180 screws, and tighten all the screws using M8 lock nuts.**



18 ou/or 19

I)

CARPORT M1 & M2



Mettre tous les bouchons BULTE sur les têtes de vis
des vis M8x20.

**Put all BULTE plugs on the screw heads
of the M8x20 screws**

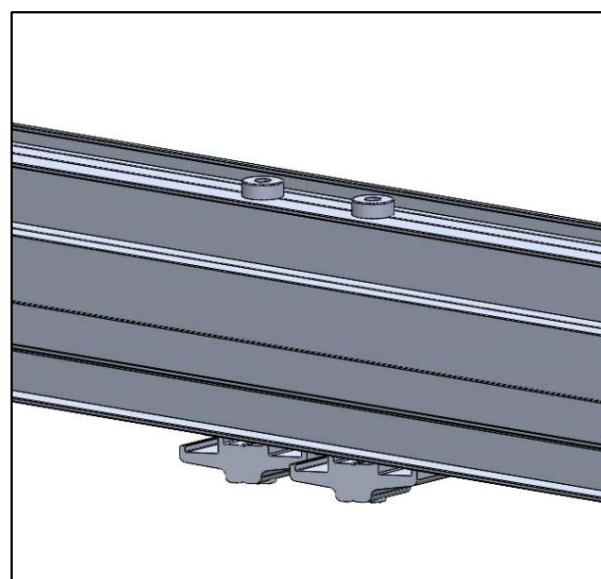
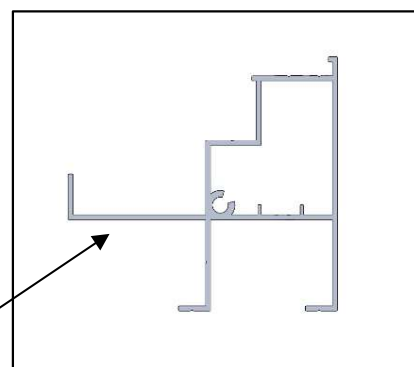
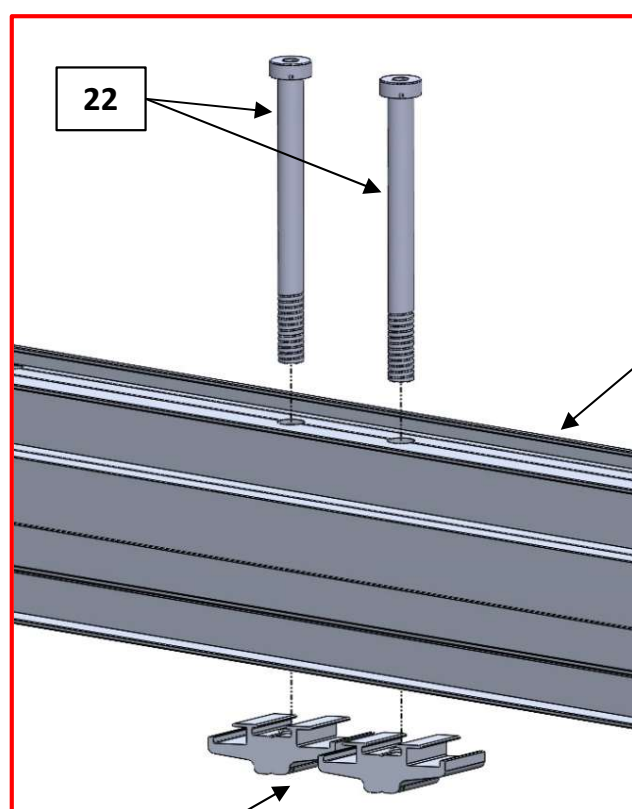
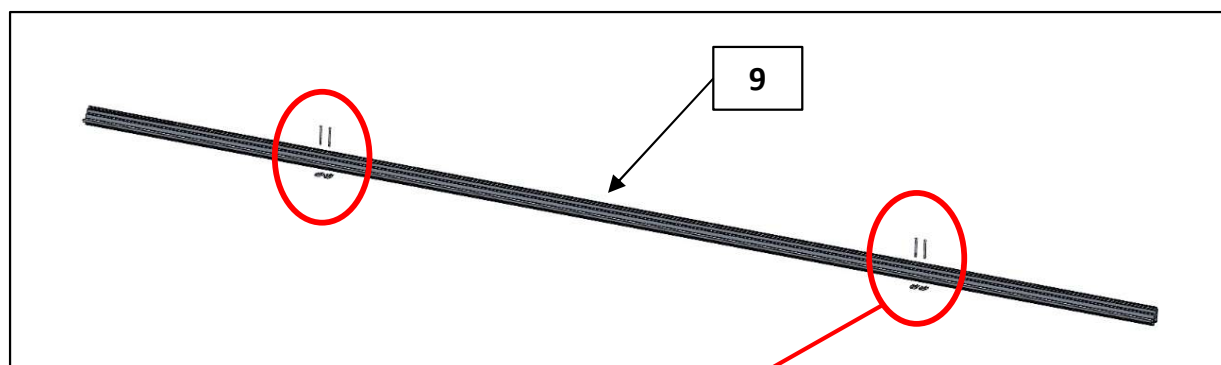
Vous avez terminé le montage de la structure.

You have finished assembling the structure.

I) CARPORT M1 & M2

2. Assemblage de la toiture / Assembly of the roof

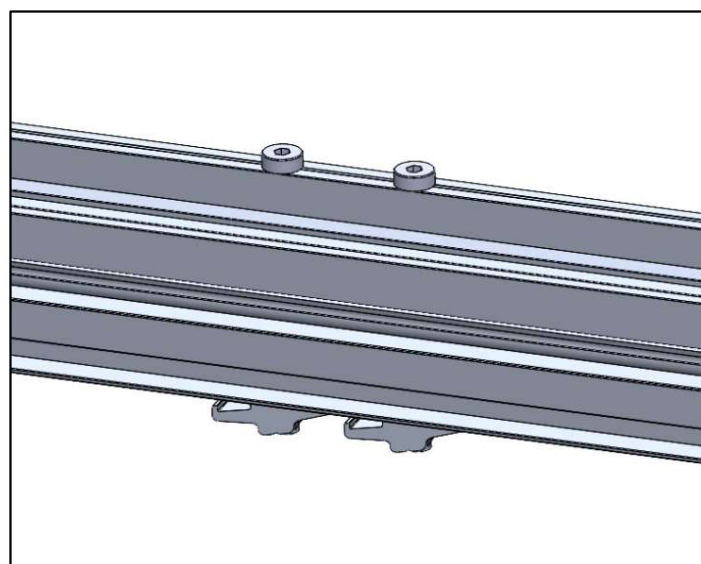
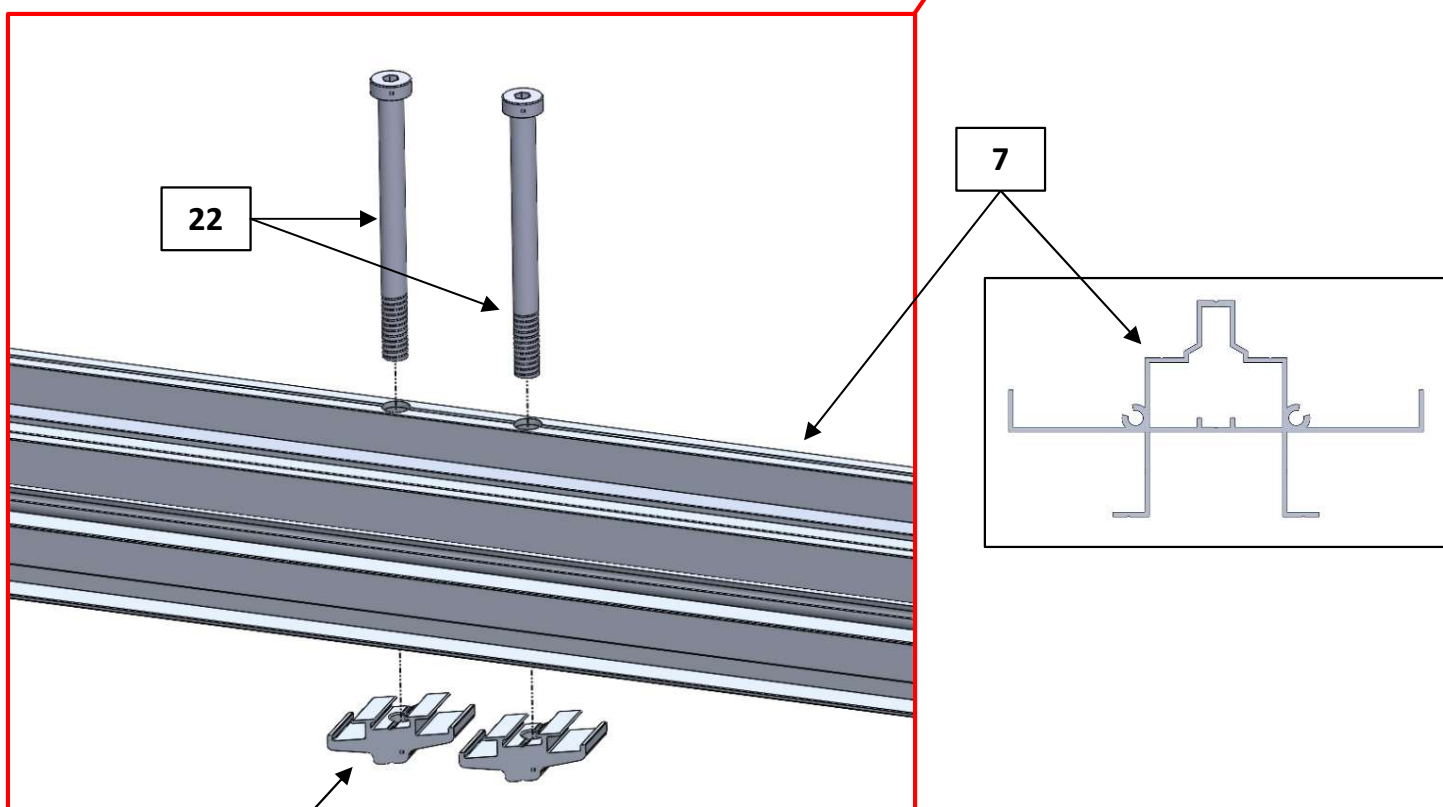
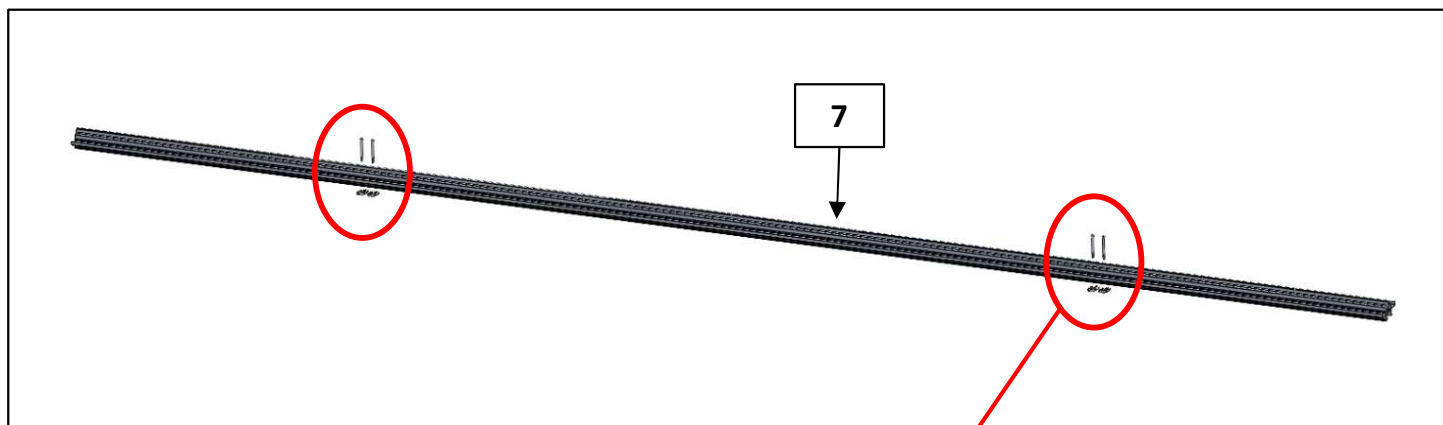
A. Assemblage des grandes traverses / Assembly of the large crossbeams



Attention ! Ne pas serrer à fond les Top écrous (16).
 Faire deux assemblages comme celui-ci.
Caution! Do not overtighten the Top nuts (16).
Make two assemblies like this one.

Information and images are non-contractual. We reserve the right to make technical changes without notice.

I) CARPORT M1 & M2



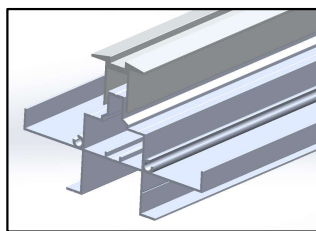
**Attention ! Ne pas serrer à fond les Top écrous (16).
Faire deux assemblages comme celui-ci.
Caution! Do not overtighten the Top nuts (16).
Make two assemblies like this one.**

Information and images are non-contractual. We reserve the right to make technical changes without notice.

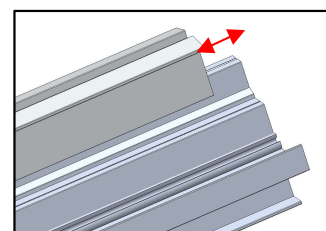
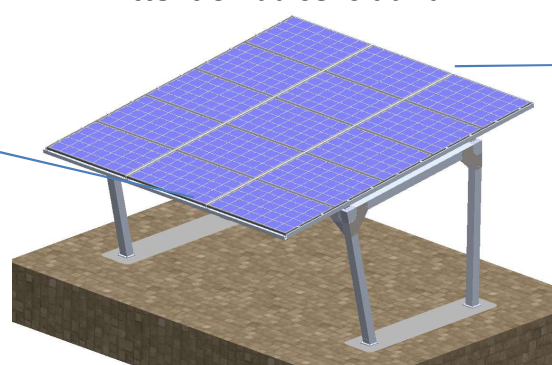
I)

CARPORT M1 & M2

Attention au sens du rail



Rail et déflecteur alignés en bas de champ
Rail and deflector aligned at the bottom of the field

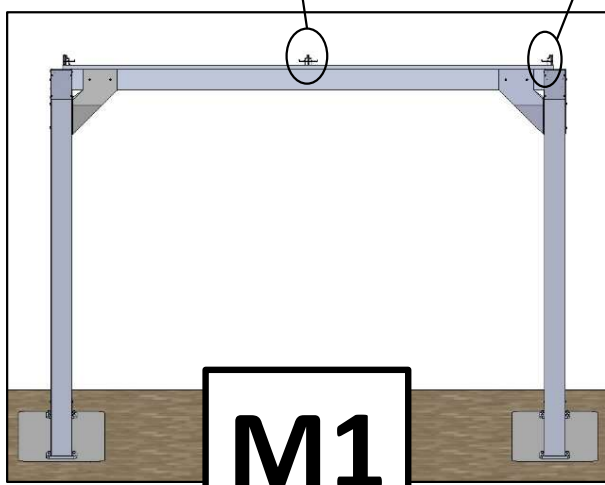
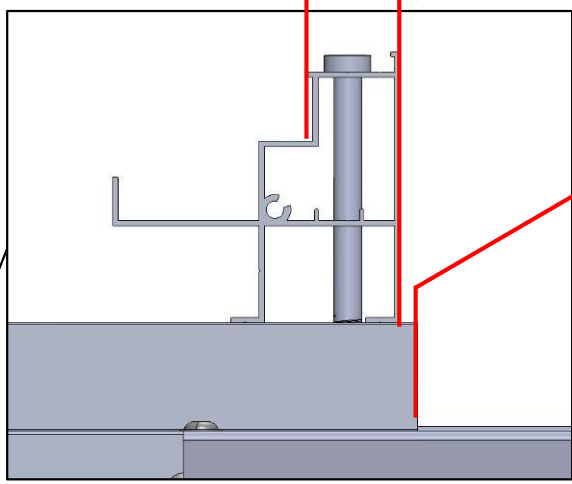
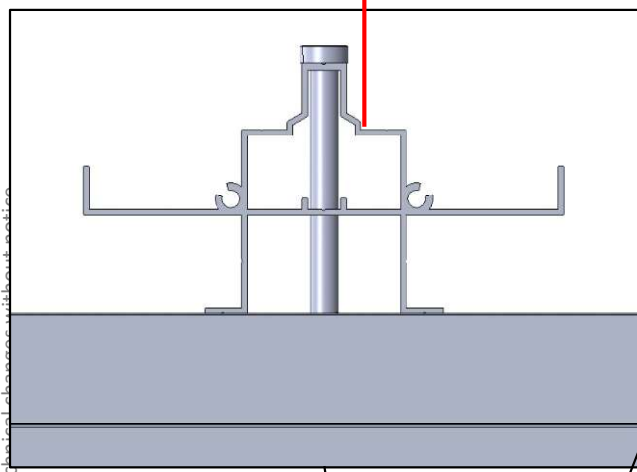


Rail et déflecteur décalé en haut de champ
Rail and deflector aligned at the top of the field

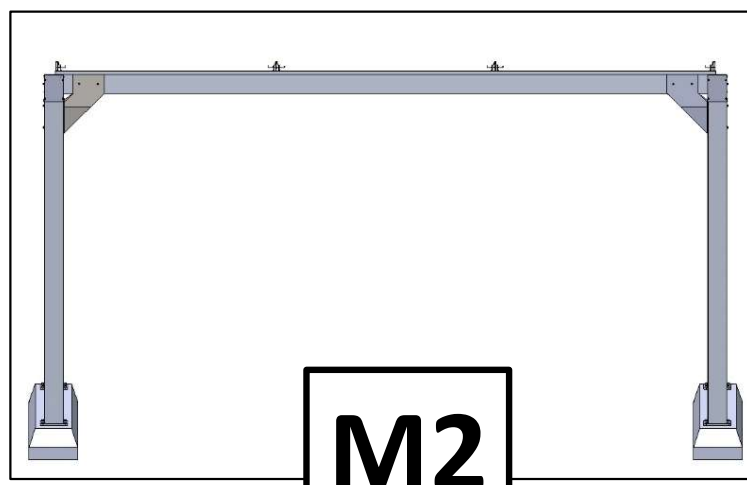
Placez les assemblages dans l'ordre comme indiqué sur l'image ci-dessous.
Espacez-les de la longueur du module + 3-4 mm pour faciliter le montage des modules photovoltaïques. Place the assemblies in the order shown in the picture below. Space them out by the length of the module + 2-3mm to facilitate the mounting of the photovoltaic modules.

1724mm + 3-4mm de jeu / clearance

5mm OBLIGATOIRE REQUIRED



M1

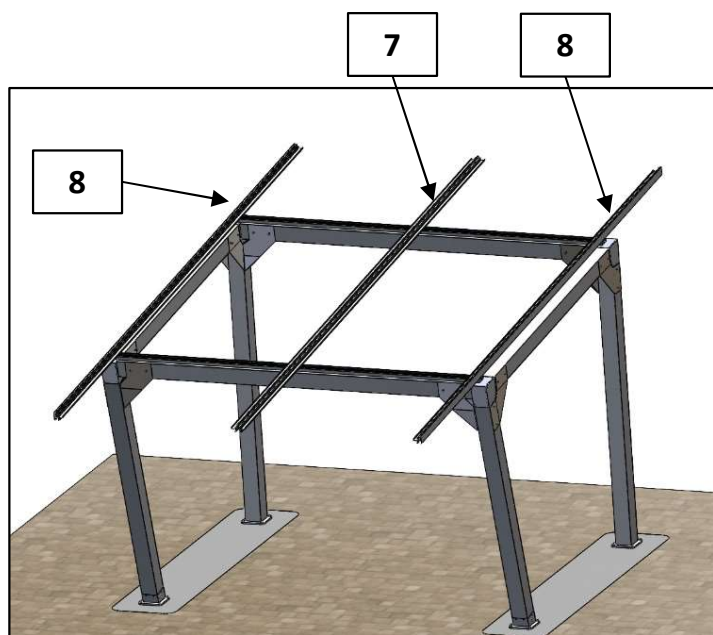


M2

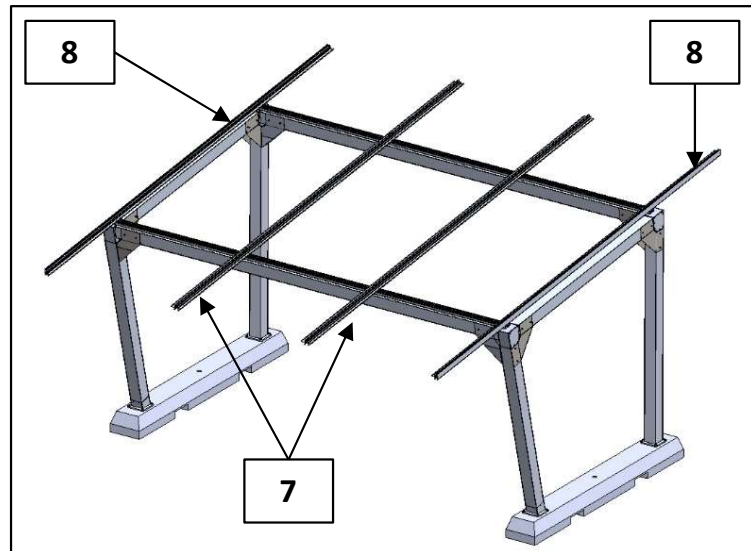
Le jeu peut varier de 3 à 4mm / The clearance can vary from 3 to 4 mm.

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I) CARPORT M1 & M2

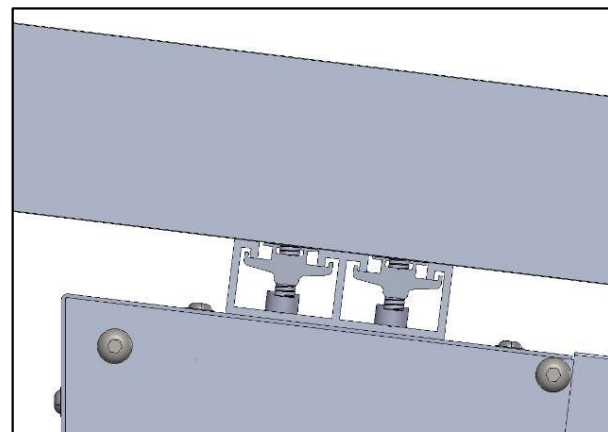
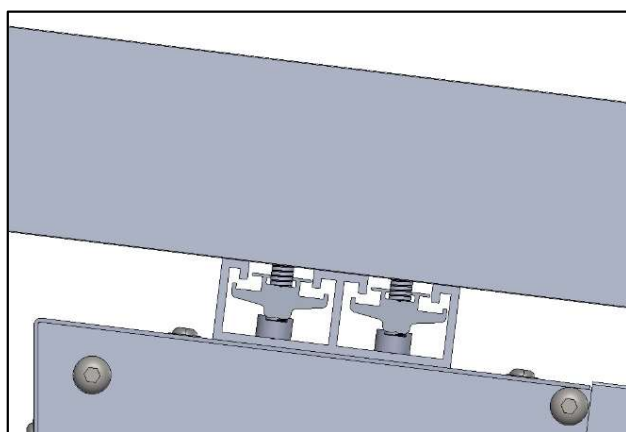


M1



M2

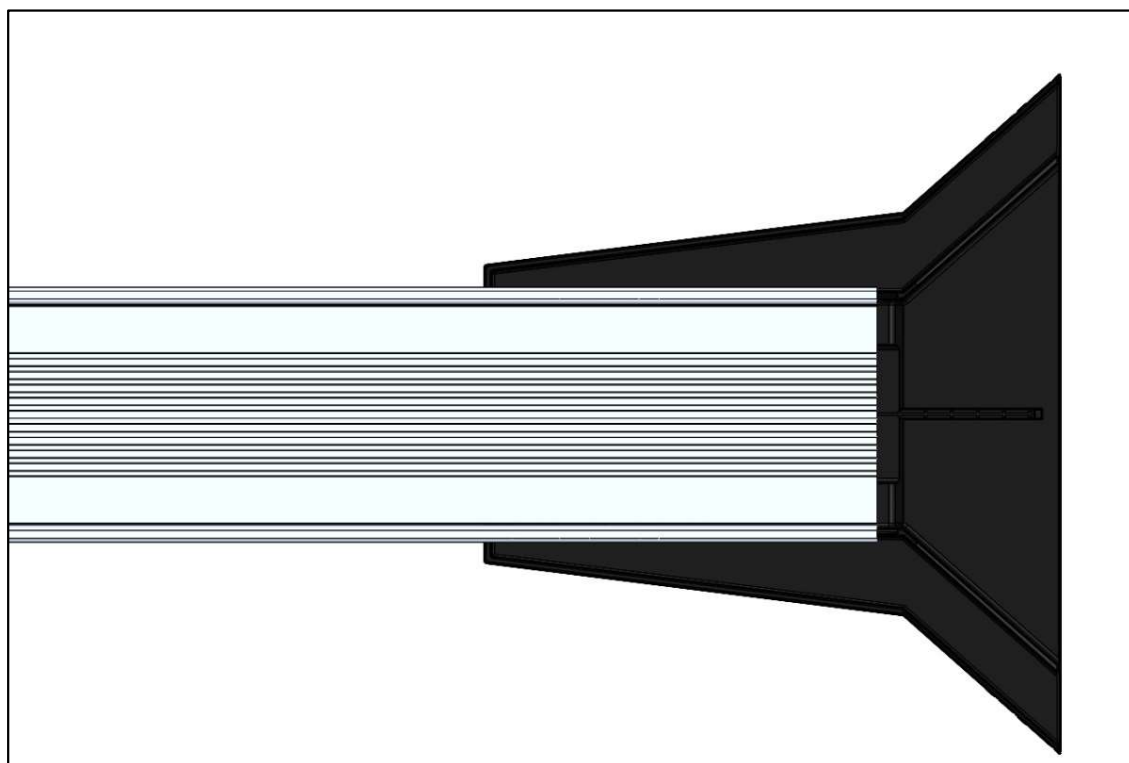
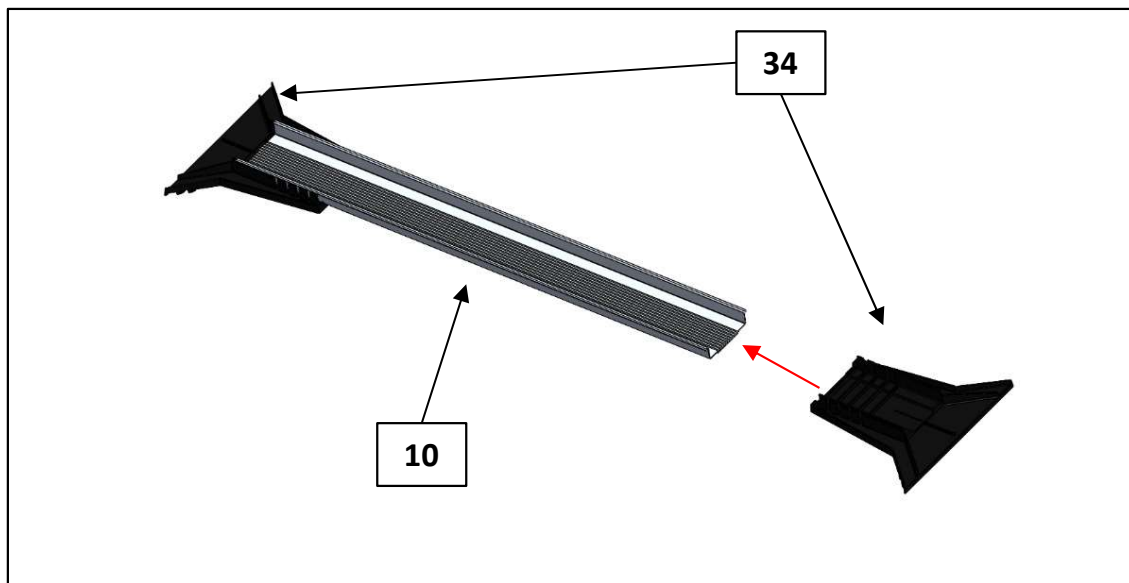
Après avoir placé les assemblages et les traverses sur la toiture en mettant les Top écrous (16) dans le rail double, serrez les Top écrous comme sur l'image ci-dessous.
After placing the assemblies and crossbars on the roof by putting the Top nuts (16) into the double rail, tighten the Top nuts as shown in the picture below.



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I) CARPORT M1 & M2

B. Préparation des jonctions d'écoulement réglables // Preparation of the adjustable flow junctions



Faire 8 ensembles comme celui-ci pour le M1.
Faire 12 ensembles comme celui-ci pour le M2.

Make 8 sets like this for M1.
Make 12 sets like this for M2.

I) CARPORT M1 & M2

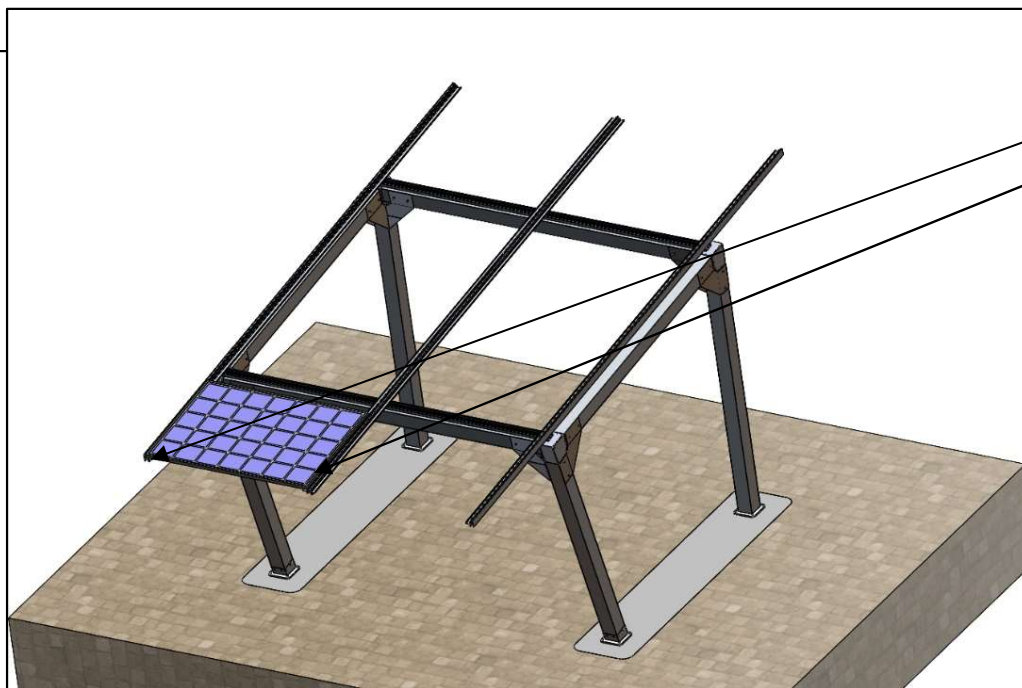
C. Montage des modules photovoltaïques / Installation of photovoltaic modules

Les montages de la toiture du M1 ainsi que du M2 sont identiques. Il y a seulement plus de pièces pour le M2 que pour le M1. Ce qui suit est un montage de M1.

The roof assemblies of both the M1 and M2 are identical. There are only more parts for the M2 than for the M1. The following is an assembly of the M1.

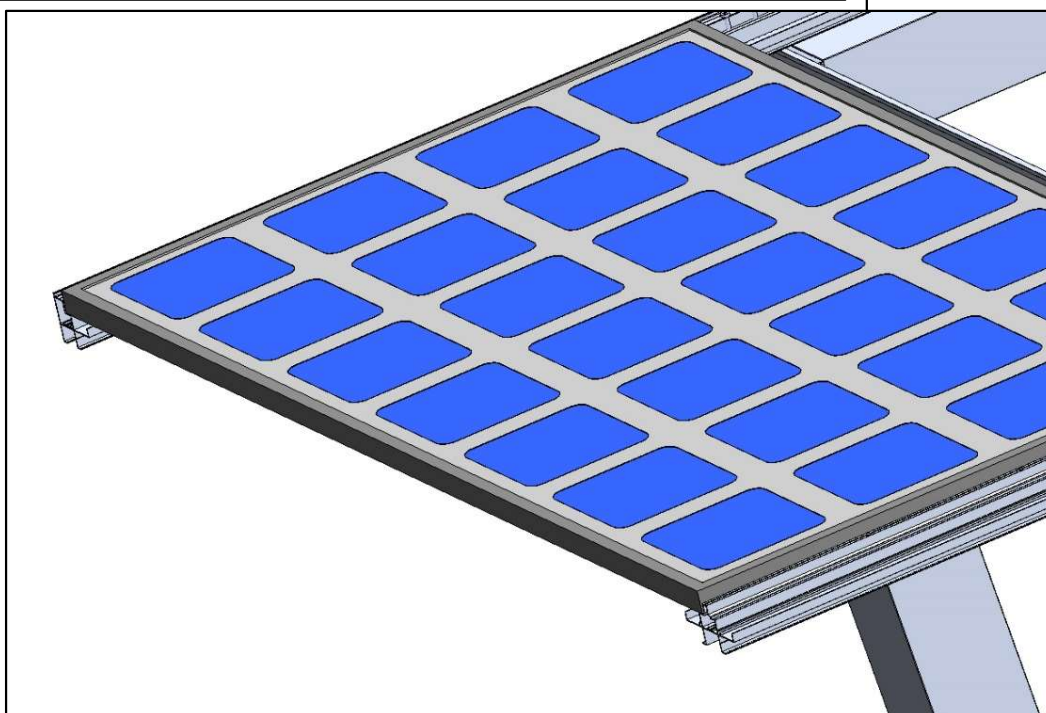
Le nombre de pièces / **The number of components:**

- PRTOP01287AA : 1 pièce pour le M1, 2 pièces pour le M2 / 1 unit for M1, 2 units for M2.
- PRTOP01289AA : 1 pièce pour le M1, 2 pièces pour le M2 / 1 unit for M1, 2 units for M2.
- Il y a également + de vis dans le M2 que dans le M1. / There are also more screws in the M2 than in the M1.
- PRTOP01027AA : 8 pièces pour le M1, 12 pièces pour le M2 / 8 units for M1, 12 units for M2.
- PRTOP00933AA : 16 pièces pour le M1, 24 pièces pour le M2 / 16 units for M1, 24 units for M2.



Placez le premier module en format « Paysage » en bas du champ et le maintenir en position à l'aide de serre-joint.

Place the first module in "landscape" format at the bottom of the field and hold it in position with clamps.

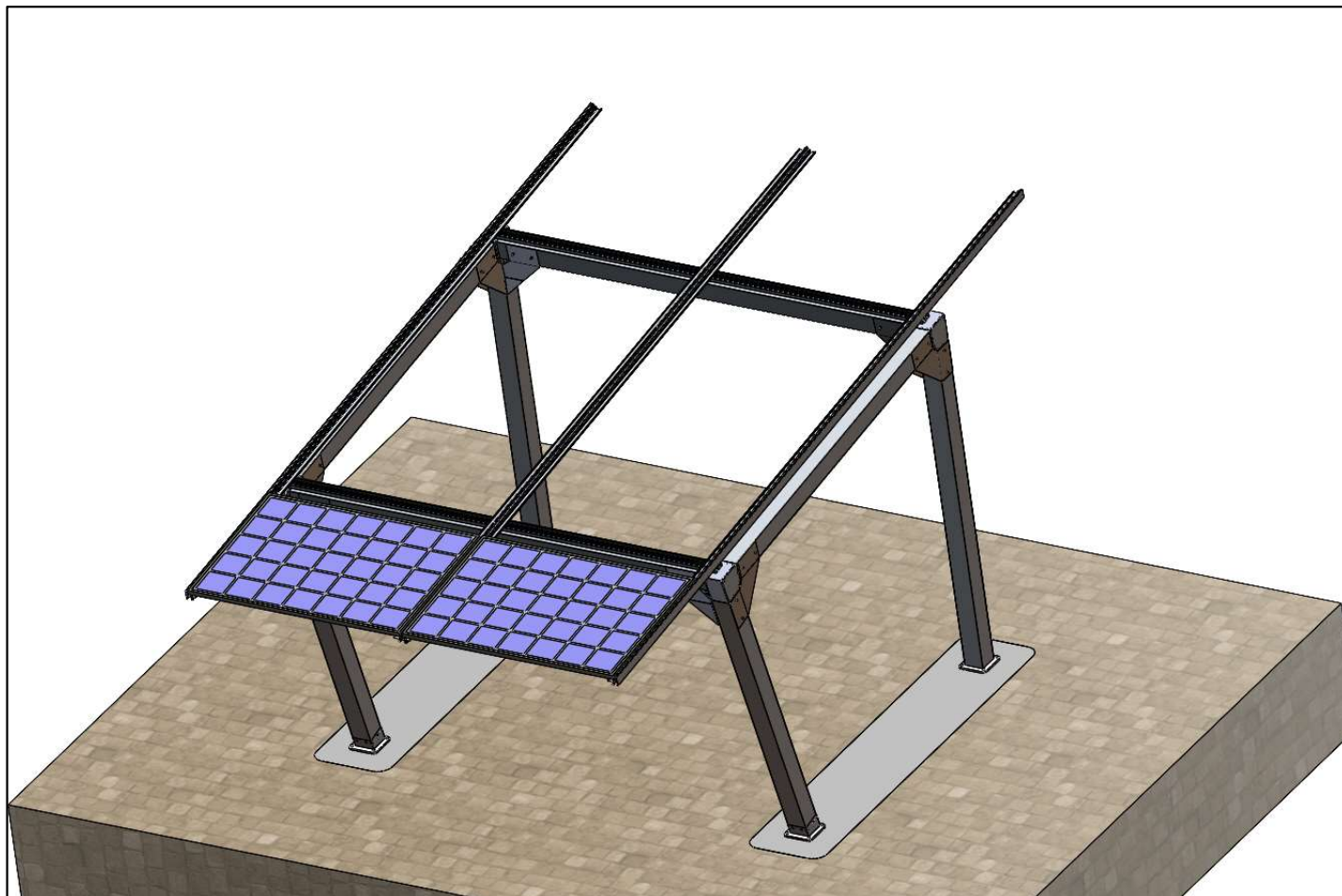


Le module photovoltaïque doit être aligné avec l'extrémité de la toiture. / **Place the first module in "Portrait" format at the bottom of the field and hold it in position with clamps.**

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I) CARPORT M1 & M2

Répétez l'opération en montant l'autre module photovoltaïque de bout de champ, tout en le maintenant avec des serre-joints.
Repeat the operation by mounting the other end-of-field photovoltaic module, while holding it with clamps.

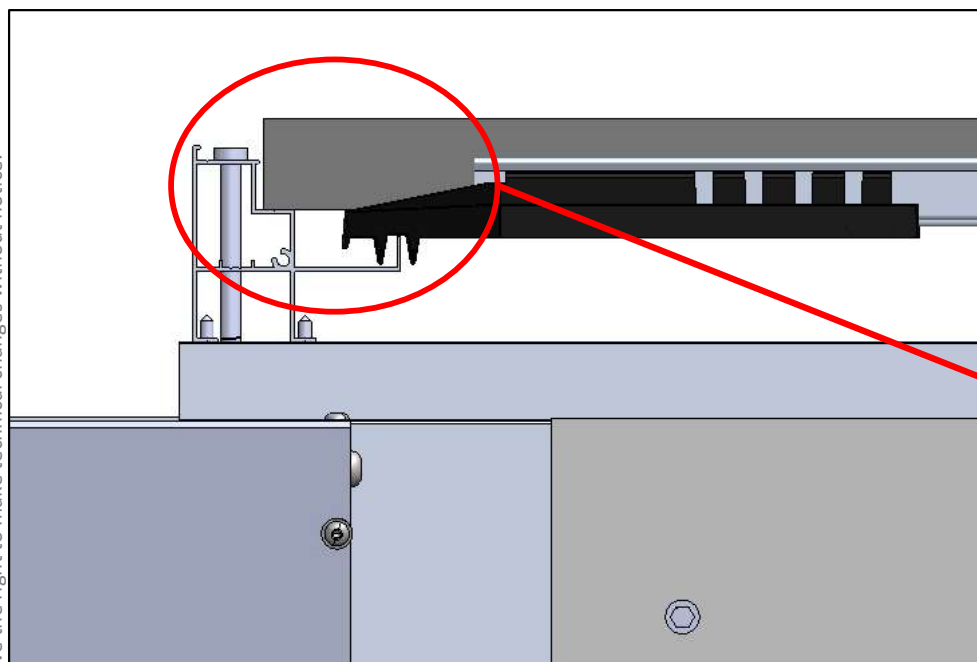
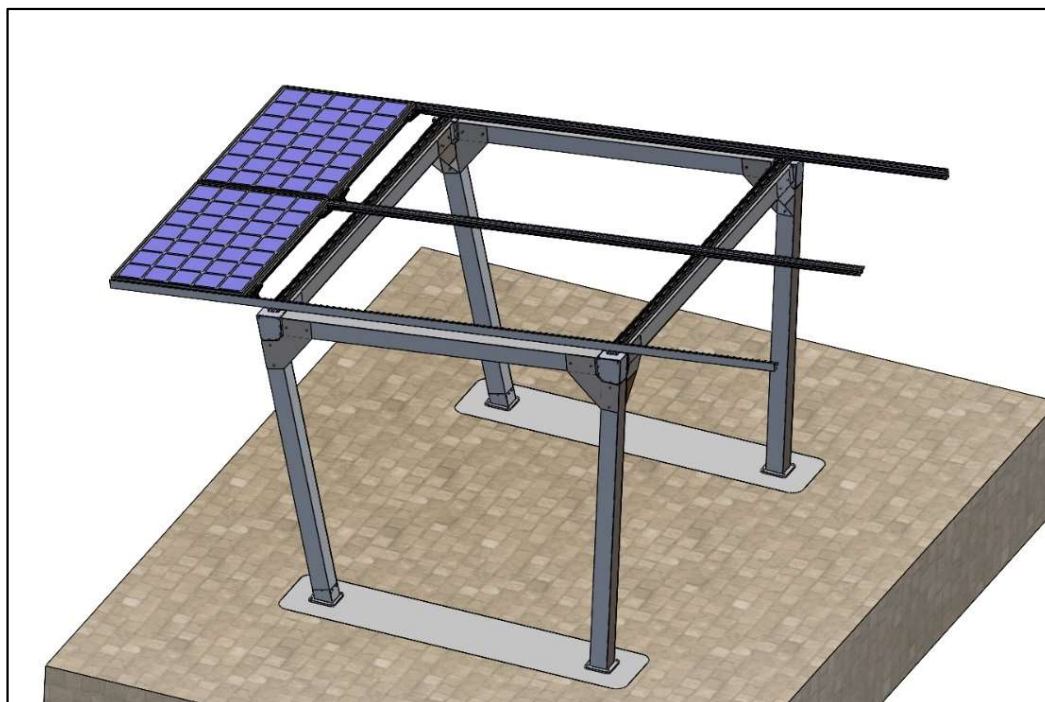


Une fois que les 2 modules de fin de champ ont été posés en étant toujours maintenus avec les serre-joints, ajoutez un ensemble de jonctions d'écoulement réglables sous chacun des deux modules.

Once the 2 end of field modules have been installed, still held in place with the clamps, add a set of adjustable flow joints under each of the two modules.

I)

CARPORT M1 & M2



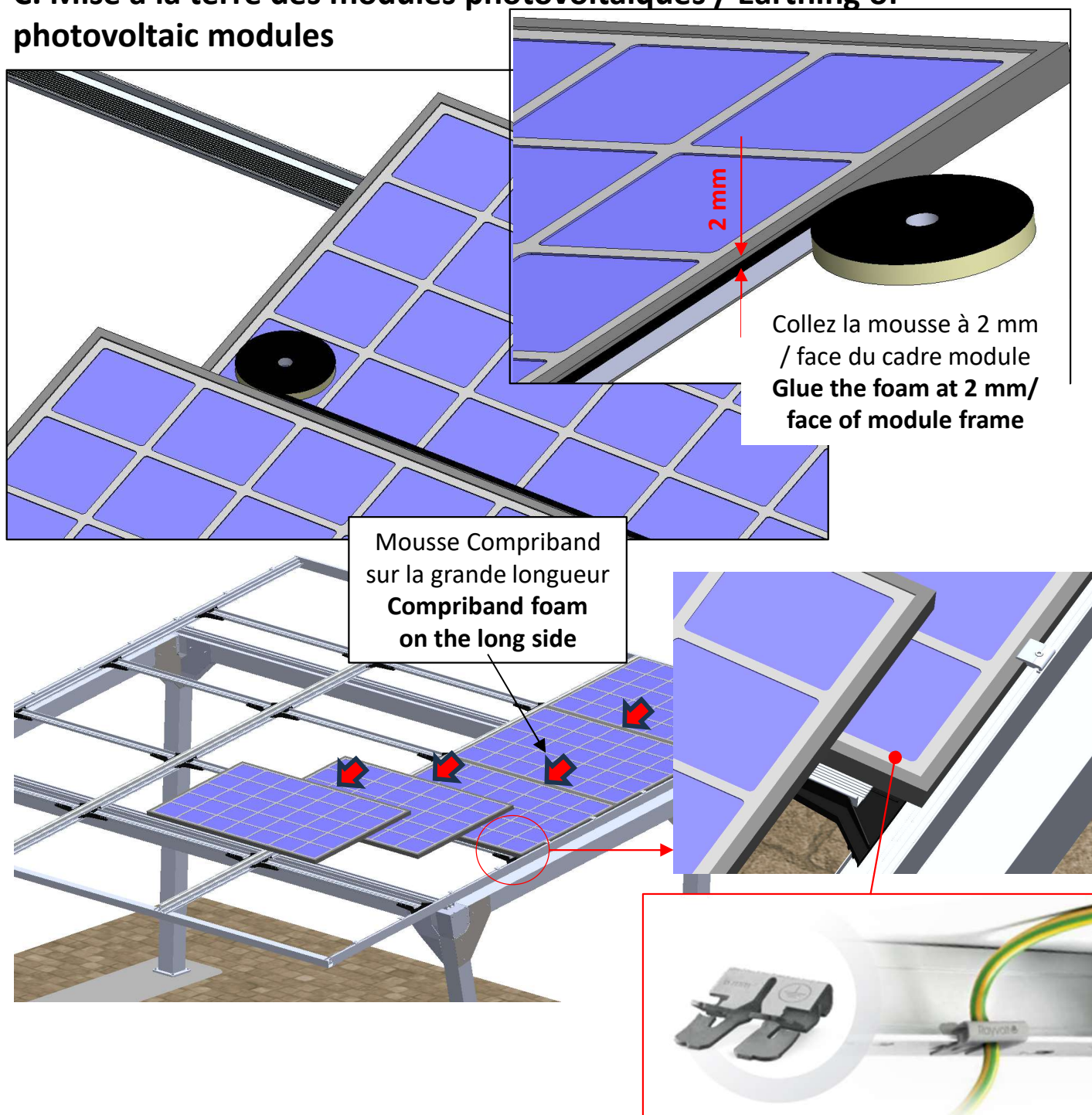
ATTENTION
à la position
d'emboîtement
des pièces.
**Pay attention to
the position in
which the parts
fit together.**

Répétez l'opération pour l'autre module photovoltaïque.
Attention ! Les 2 modules doivent être toujours maintenus par les serre-joints.
Repeat the operation for the other PV module.
Caution! The 2 modules must always be held together by the clamps.

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I) CARPORT M1 & M2

C. Mise à la terre des modules photovoltaïques / Earthing of photovoltaic modules



ATTENTION - Au fur et à mesure de la mise en place des panneaux :

- Pensez à coller la Compriband en haut du module.
- Mettez la griffe de mise à la terre sur chaque module (selon norme en vigueur dans le pays d'installation).

Ces 2 opérations ne sont plus possibles une fois que les panneaux sont mis en place.

CAUTION - As You install the panels:

- Remember to stick the Compriband to the top of the module.
- Put the earthing claw on each module (according to the standard in force in the country of installation).

These 2 operations are no longer possible once the panels have been installed.

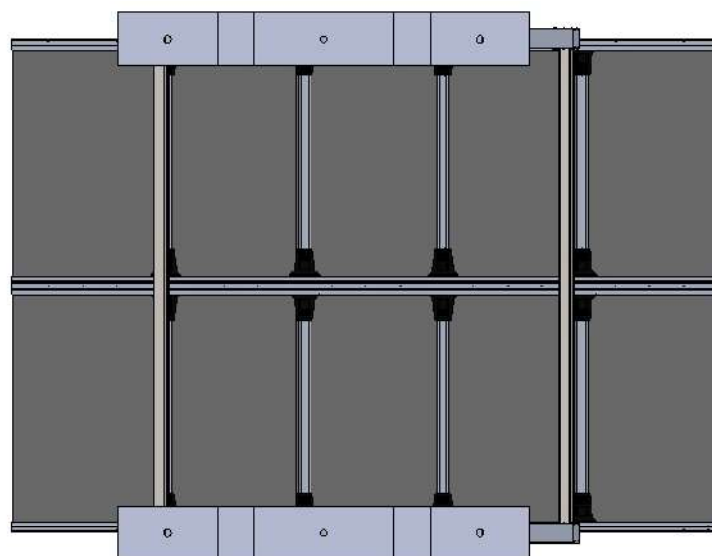
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I)

CARPORT M1 & M2

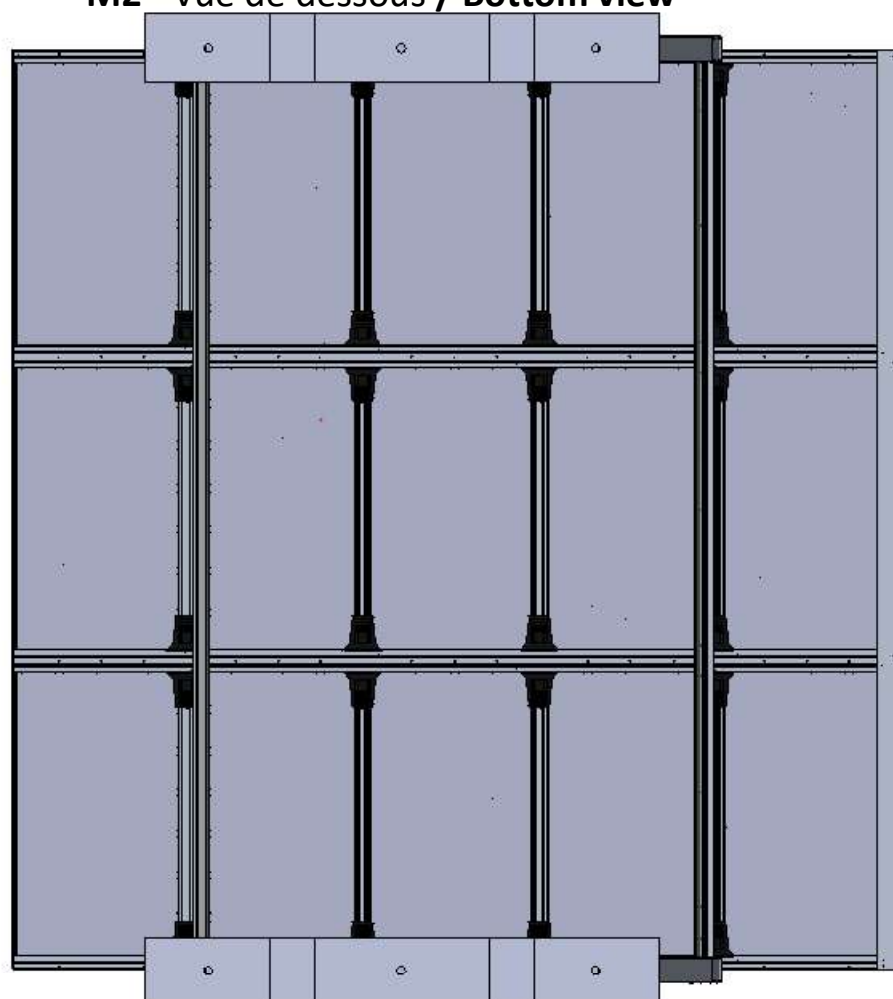
Répétez l'opération jusqu'à avoir recouvert l'intégralité de la toiture.

Repeat the process until the entire roof is covered.



M1 - Vue de dessous / Bottom view

M2 - Vue de dessous / Bottom view



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I)

CARPORT M1 & M2

Pour des modules ayant une largeur de 1150mm, le module du bas et le module du haut seront alignés au bout des latérales et principales.

Or, si les modules ont une largeur inférieure à 1150, c'est-à-dire de 1132 à 1149, il y aura donc un écart. Dans ce cas-là, vous devez remonter les modules PV pour qu'ils soient alignés aux traverses latérales et principales sur la partie haute du PARK-E 400 afin de laisser l'espace en moins au niveau du caniveau.

For modules with a width of 1150mm, the bottom and top modules will be aligned at the end of the side and main rails. However, if the modules are narrower than 1150, i.e. from 1132 to 1149, there will be a gap. In this case, you will need to reassemble the PV modules so that they are aligned with the side and main rails at the top of the PARK-E 400, to leave the gap at gutter level.

EXAMPLE:

Les traverses latérales et principales mesurent 5750mm de long.

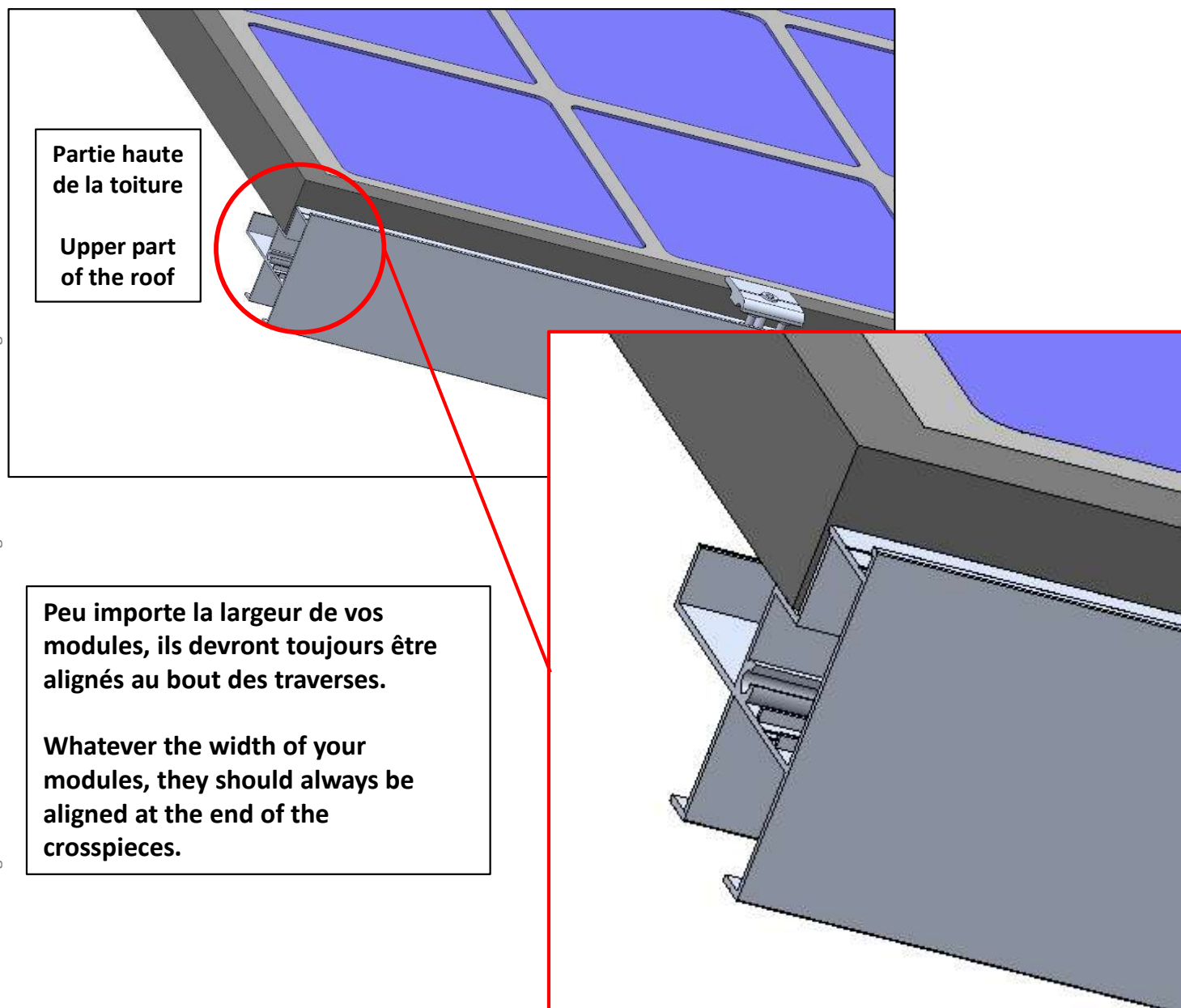
- En choisissant des modules PV de 1150mm de largeur, il n'y aura pas d'espace car la toiture est composée de 2 ou 3 colonnes de 5 modules, donc $5 \times 1150 = 5750\text{mm}$.

- En choisissant des modules PV de 1132mm de largeur, il y aura un espace car $5 \times 1132 = 5660\text{mm} \rightarrow 5750 - 5660 = 90\text{mm}$.

The side and main rails are 5750mm long.

-If you choose PV modules 1150mm wide, there will be no space because the roof is made up of 2 or 3 columns of 5 modules, so $5 \times 1150 = 5750\text{mm}$.

-If you choose PV modules 1132mm wide, there will be a space because $5 \times 1132 = 5660\text{mm} \rightarrow 5750 - 5660 = 90\text{mm}$.



Partie haute
de la toiture

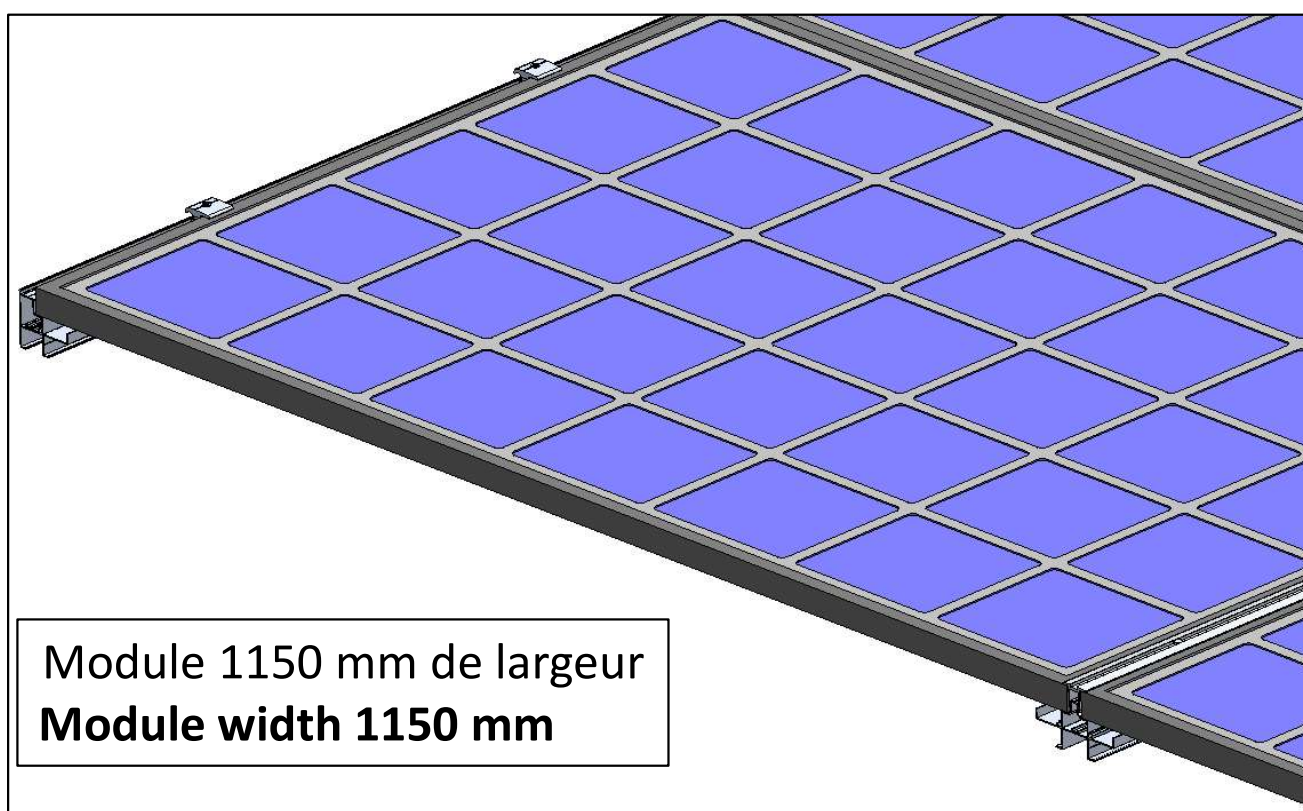
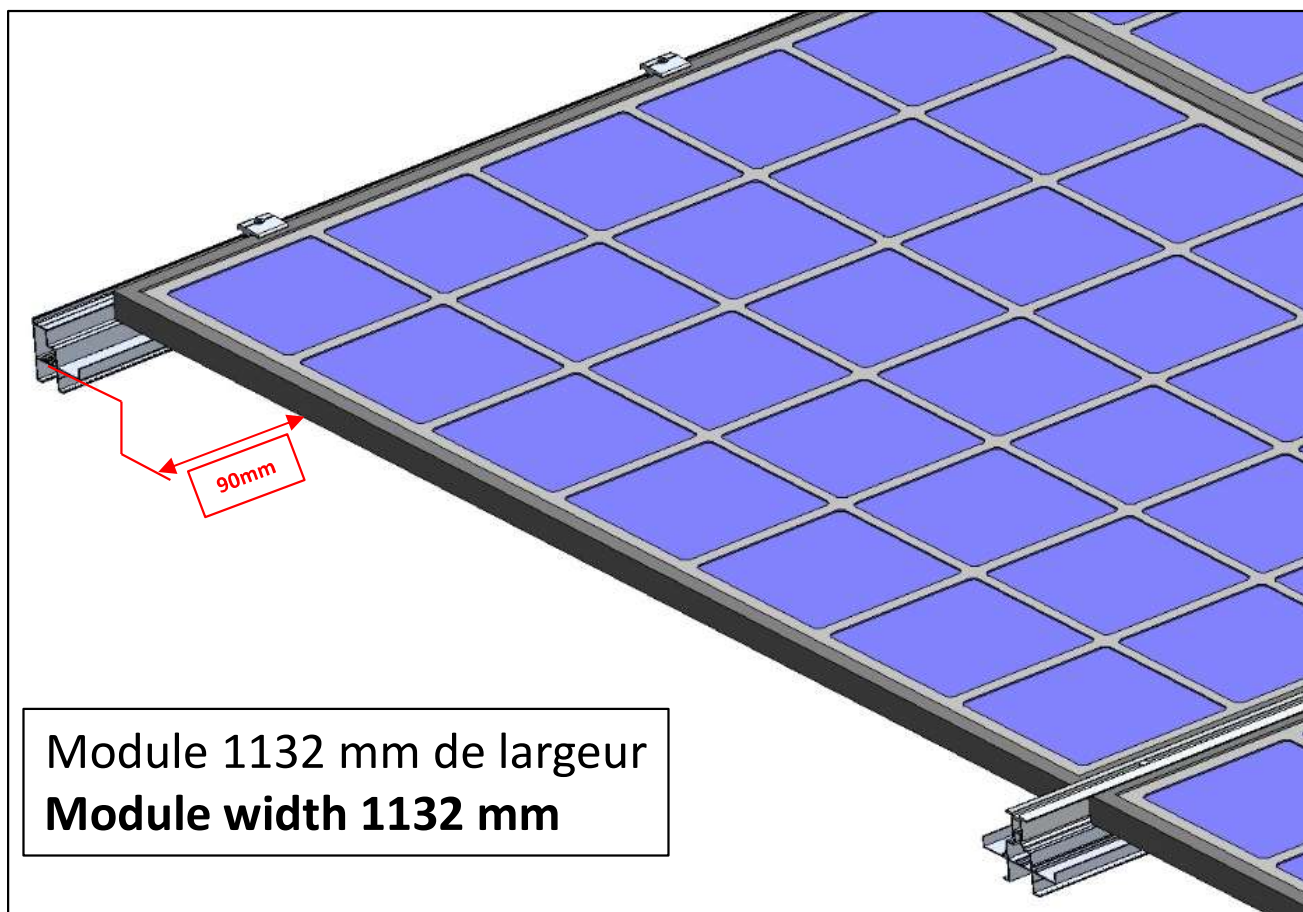
Upper part
of the roof

Peu importe la largeur de vos modules, ils devront toujours être alignés au bout des traverses.

Whatever the width of your modules, they should always be aligned at the end of the crosspieces.

I)

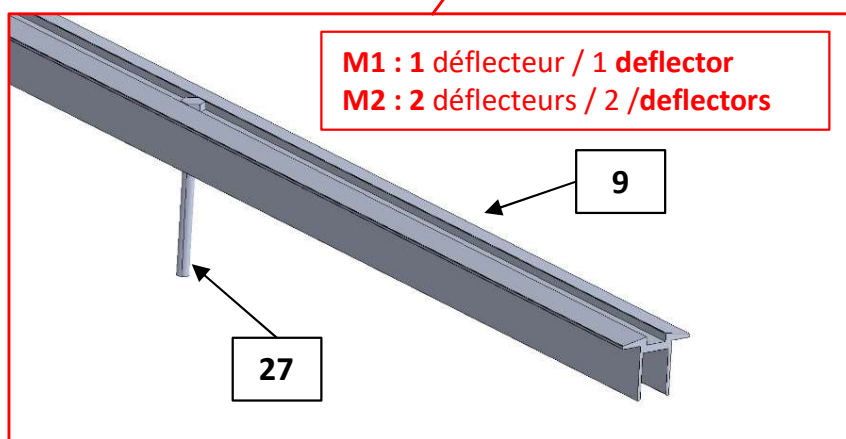
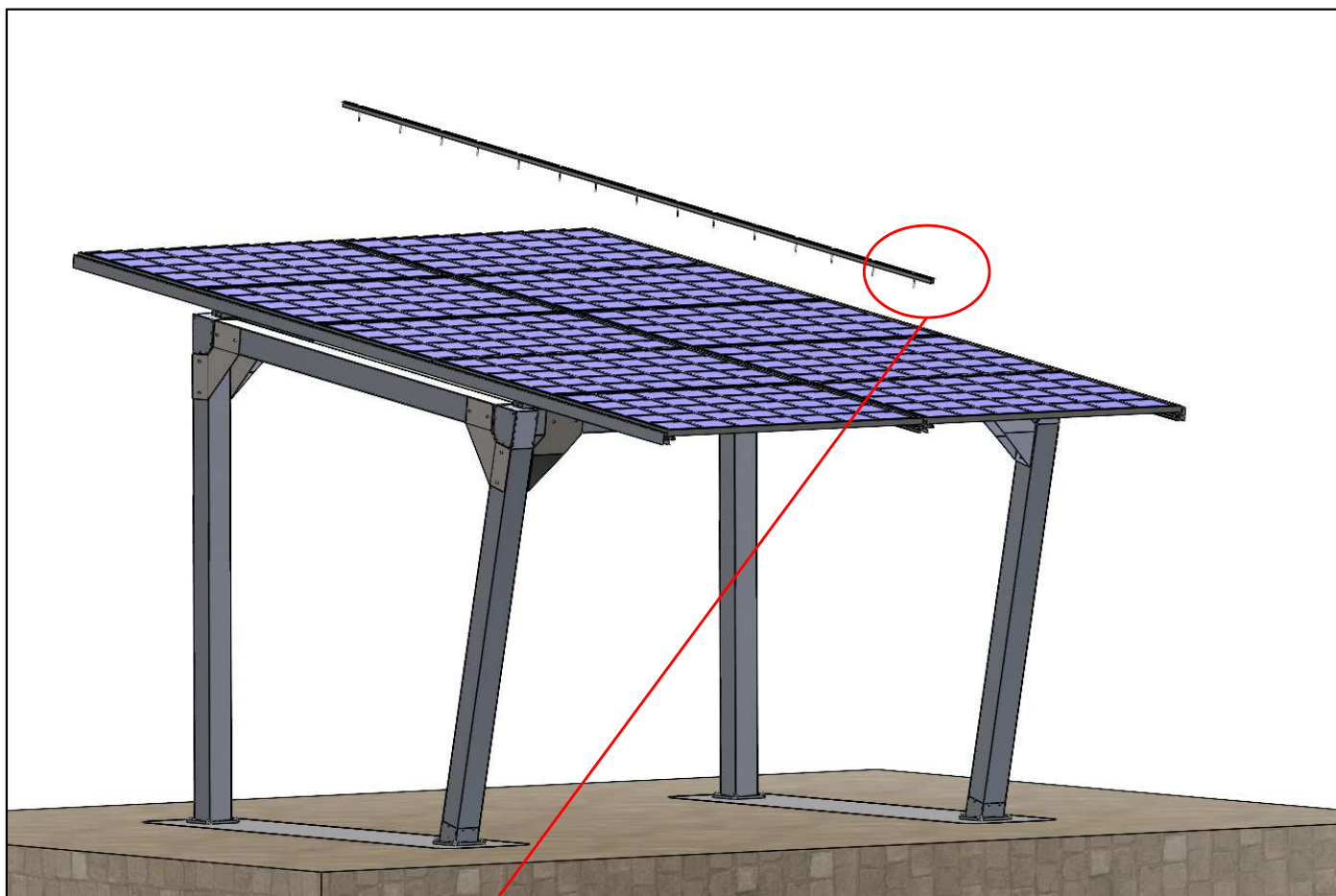
CARPORT M1 & M2



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I) CARPORT M1 & M2

D. Préparation et montage des déflecteurs / Preparation and installation of deflectors



Préparez-le ou les déflecteur(s) en insérant les vis H M6x80 (27) dans chacun des trous prévus à cet effet, puis déposez les déflecteurs par-dessus les traverses principales (7).

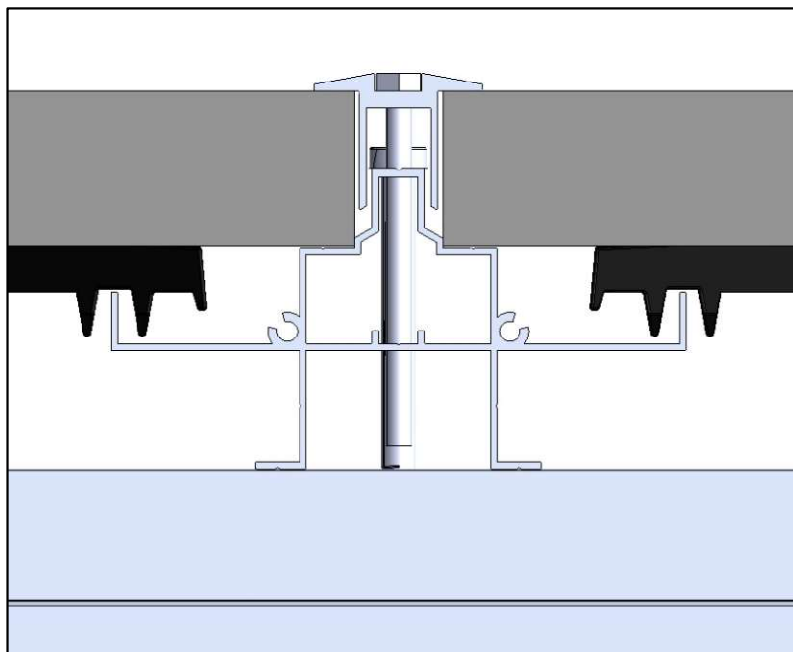
Prepare the deflector(s) by inserting the M6x80 H-screws (27) into each of the holes provided, then place the deflector(s) over the main cross bars (7).

Une fois toutes les brides et déflecteurs installés, vous pouvez désormais retirer les serre-joints car ce sont les déflecteurs et les brides qui maintiennent les modules. **Once all the flanges and deflectors have been installed, you can now remove the clamps, as it is the deflectors and flanges that hold the modules together.**

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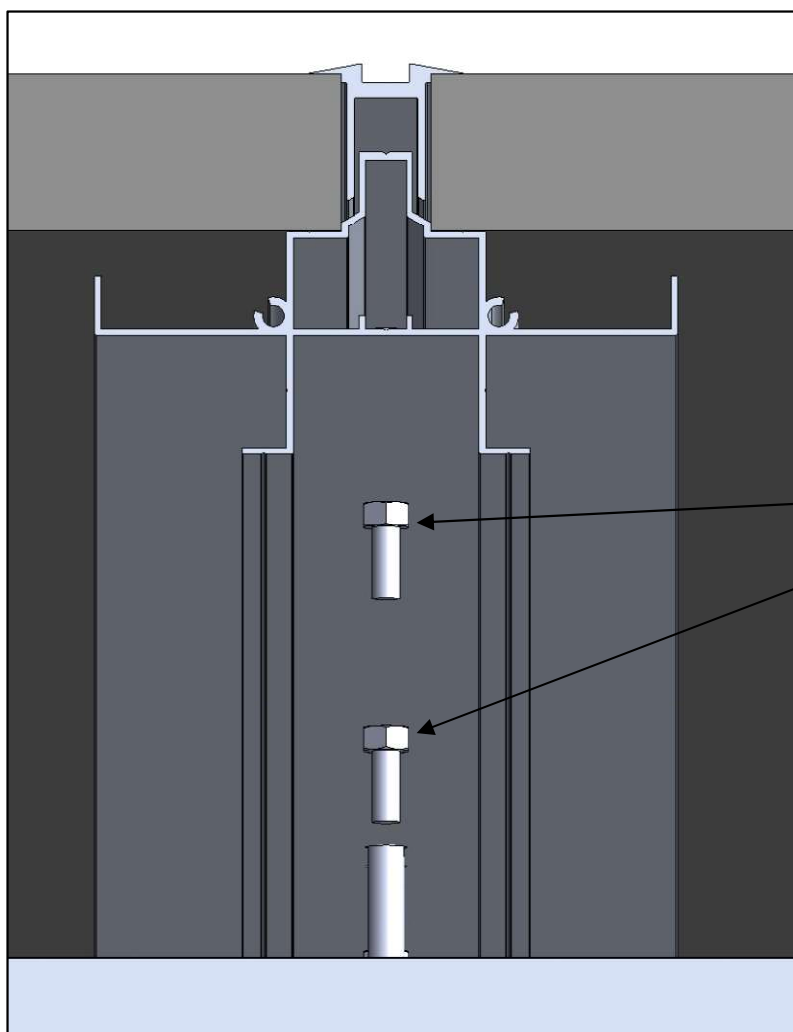
I)

CARPORT M1 & M2



Une fois le ou les déflecteur(s) placé(s), ajoutez des écrous M6 pour chacune des vis H M6x80. Il y a 15 vis H M6x80 par déflecteur, donc il y a autant d'écrous.

Once the deflector(s) have been placed, add M6 nuts for each of the M6x80 H-screws. There are 15 M6x80 H-screws per deflector, so there are as many nuts.



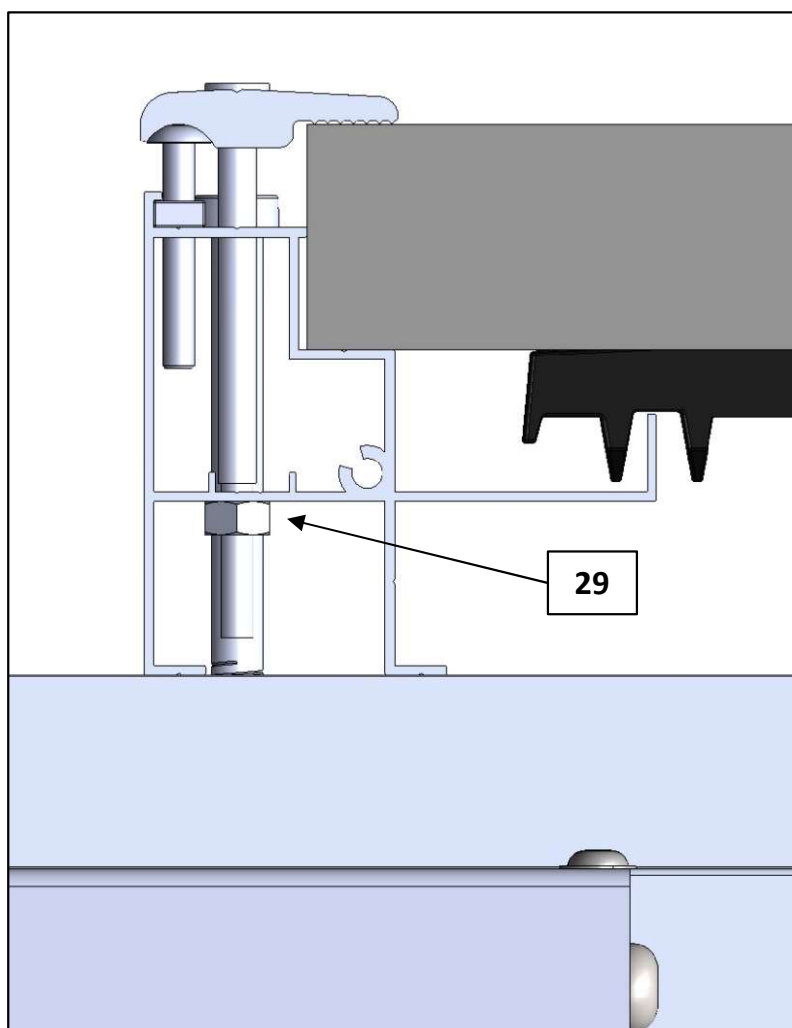
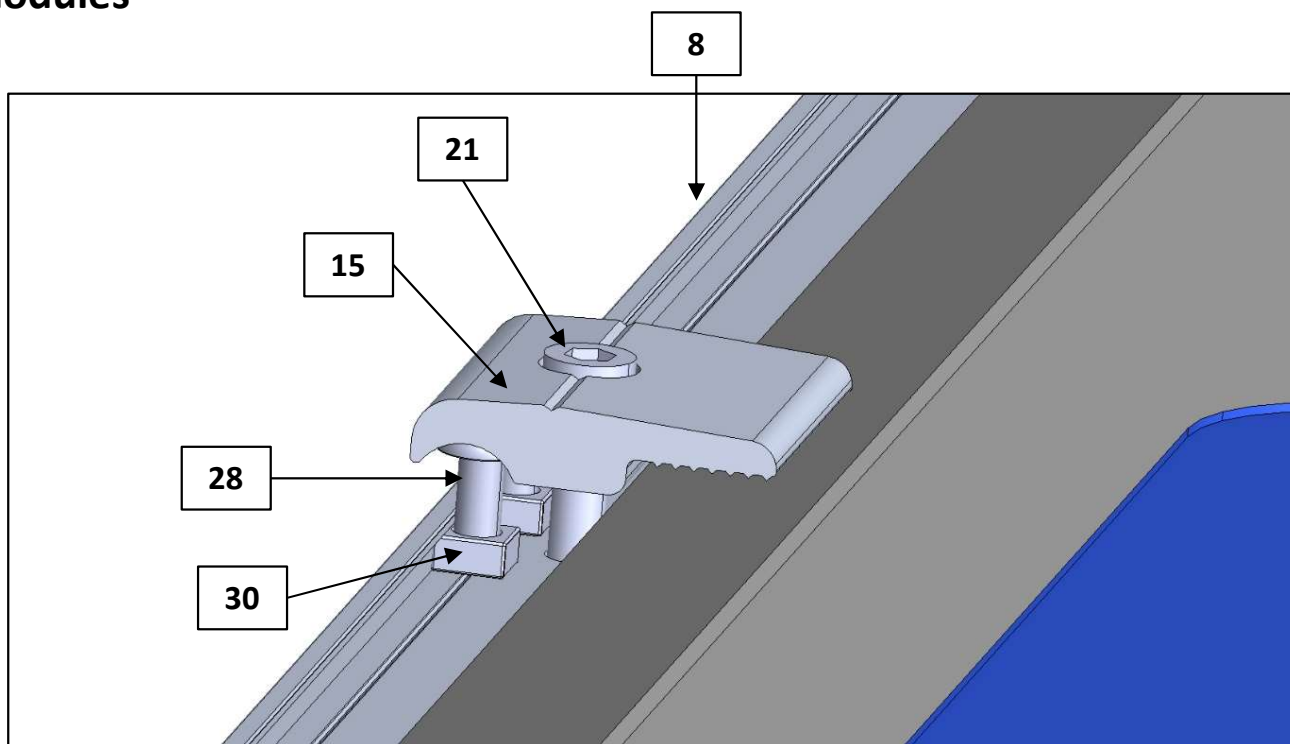
29

Attention ! Les serre-joints maintiennent toujours les modules photovoltaïques de fin de champ.
Caution! The clamps always hold the end-of-field photovoltaic modules.

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I) CARPORT M1 & M2

E. Fixation des modules photovoltaïques / Fixing of photovoltaic modules



Pour chaque trio de trous, il vous faudra /
For each trio of holes, you will need :

- N°21 : x1
- N°29 : x1
- N°28 : x2
- N°30 : x2
- N°15 : x1

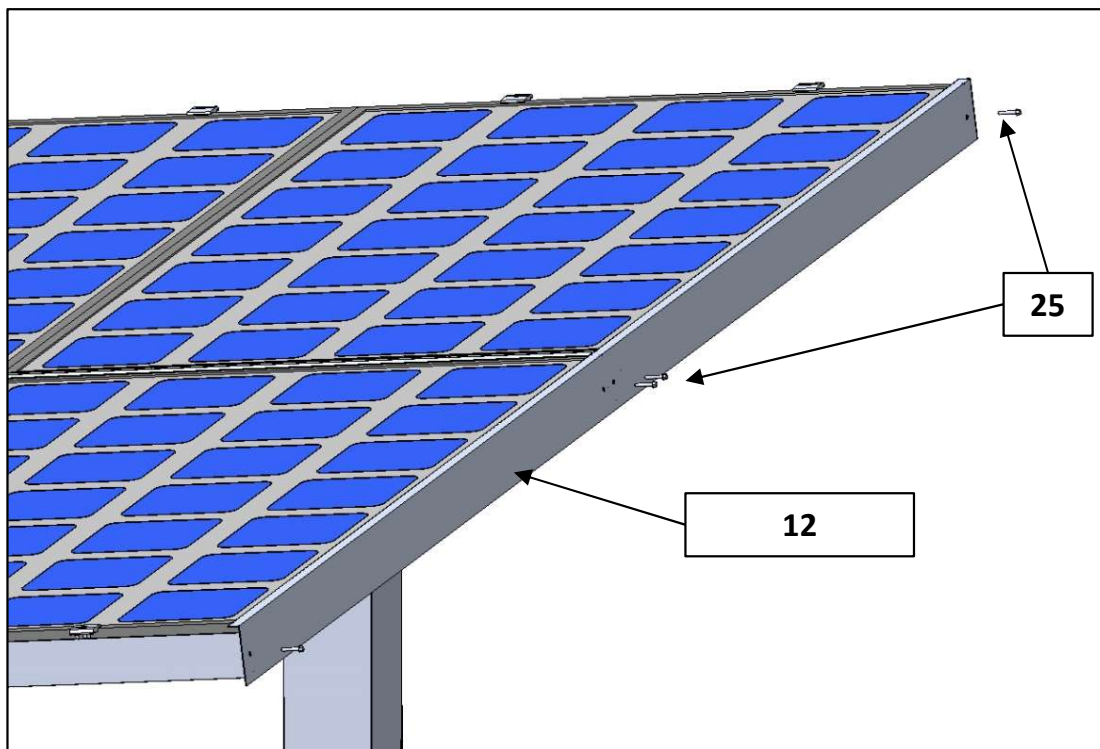
Réglez la hauteur des vis n°28 afin que la bride simple épouse bien la surface du module. Serrez la vis M6x80 à l'aide de l'écrou M6 pour brider le module. Répétez l'opération sur chacun des trios de trous.

Adjust the height of the screws no 28 so that the single clamp fits the surface of the module. Tighten the M6x80 screw with the M6 nut to clamp the module. Repeat the operation on each of the three holes.

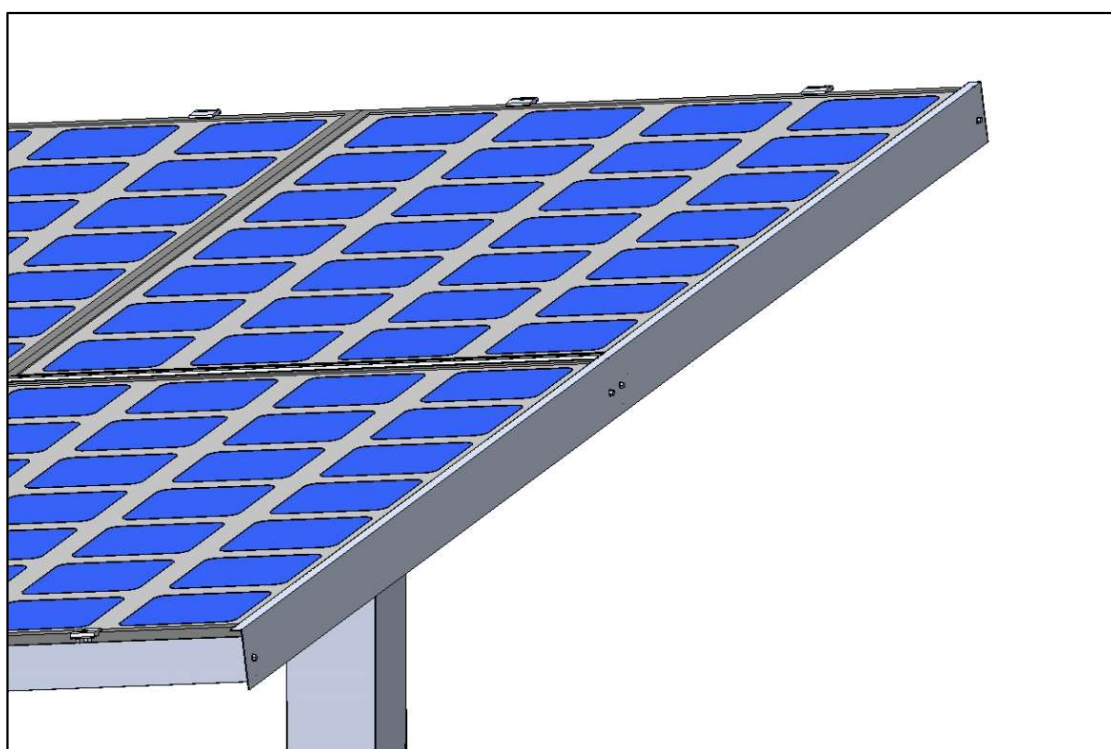
Une fois toutes les brides installées, vous pouvez désormais retirer les serre-joints car ce sont les déflecteurs et les brides qui maintiennent les modules. **Once all the clamps have been installed, you can now remove the clamps, as it is the baffles and clamps that hold the modules together.**

I) CARPORT M1 & M2

F. Mise en place de la tôle haut / Installation of the top metal sheet

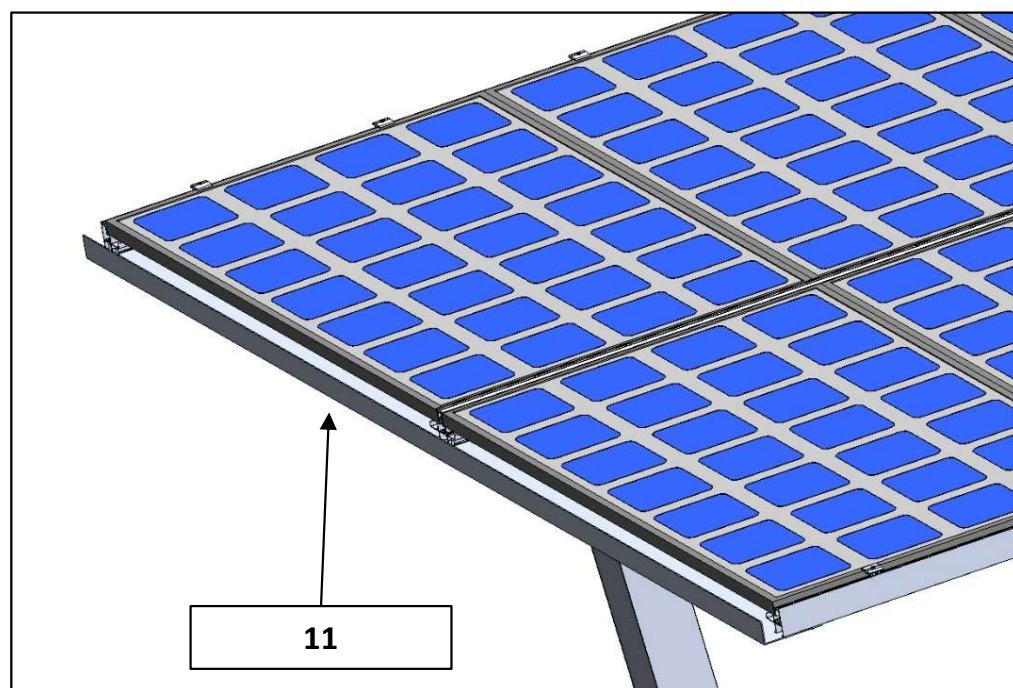


Placez la tôle haut (12),
 puis fixez-la à l'aide de Vis ST5,5-32 (25).
**Place the top metal sheet (12),
 then fix it with ST5.5-32 screws (25).**



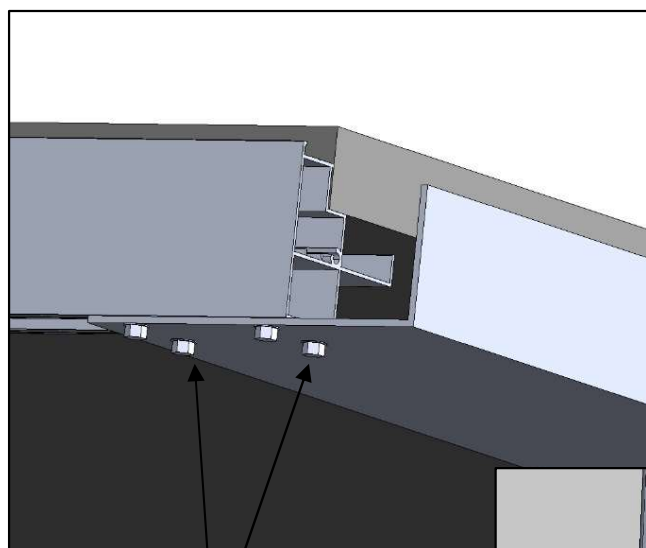
I) CARPORT MONOPAN M1 & M2

G. Mise en place du caniveau / Installation of the gutter



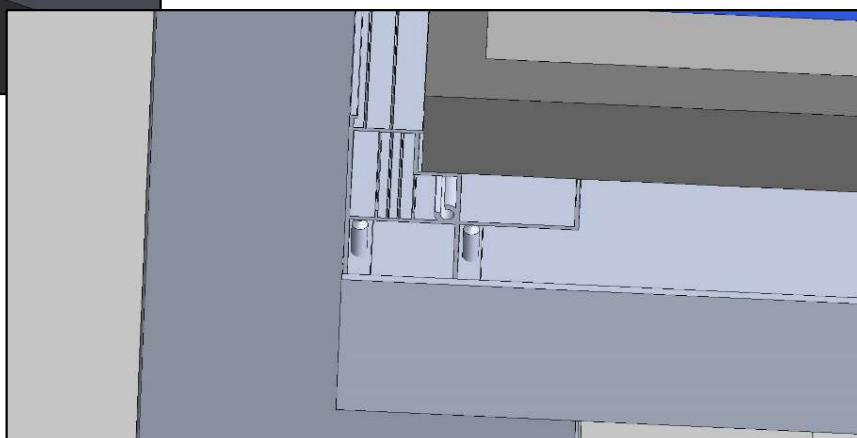
Placez le caniveau (11) comme sur l'image ci-dessus,
puis fixez-le à l'aide de VIS ST4,8-13 (24).

**Place the gutter (11) as shown in the picture above,
then fix it with SCREWS ST4.8-13 (24).**



Vis par lots de 4 vis
st4,8-13 (24) à chaque traverse
comme montré sur l'image ci-jointe.

**Screws in sets of 4
st4,8-13 (24) to each crossbar as
shown in the attached picture.**



24

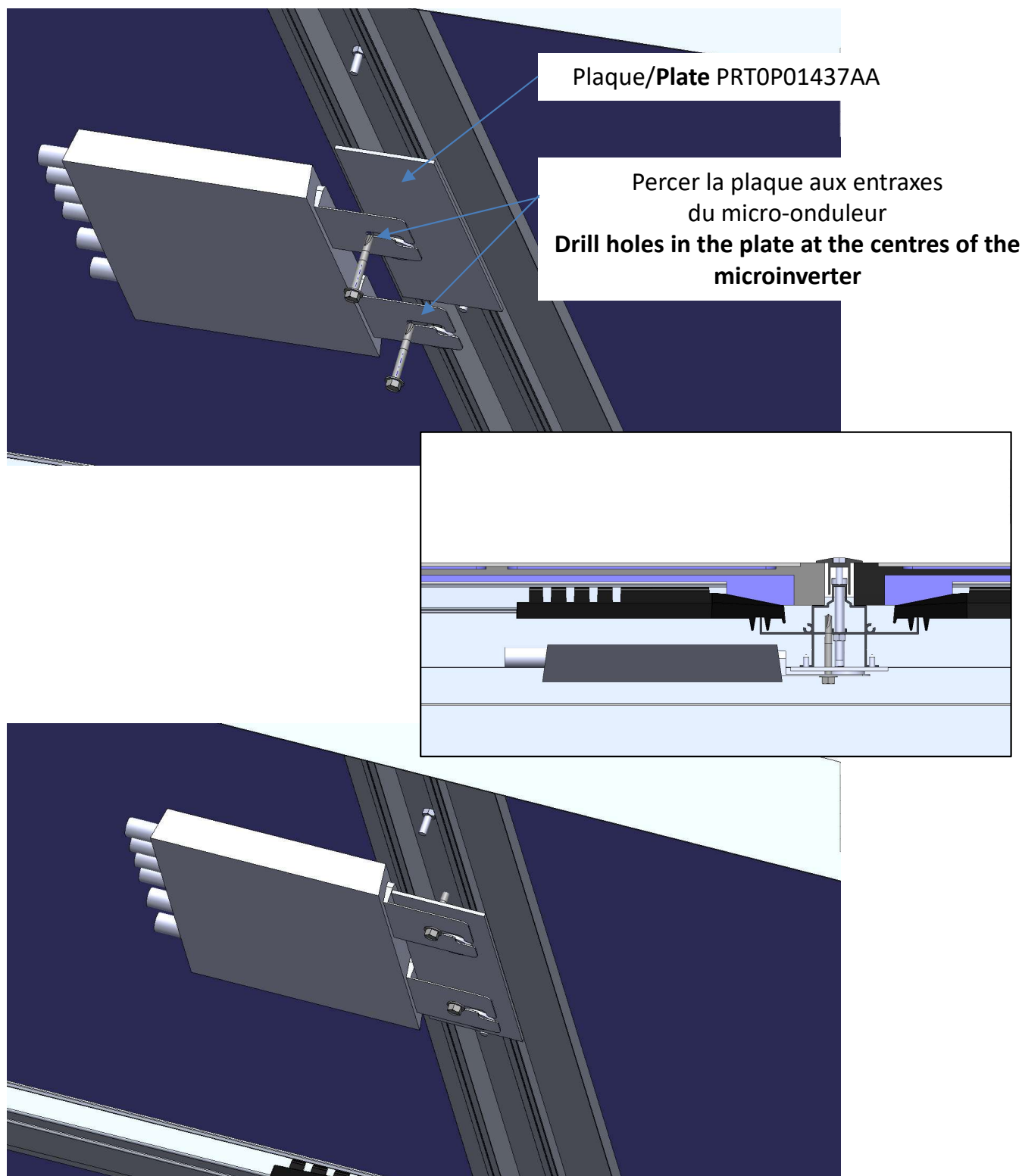
I) CARPORT M1 & M2

3. Partie électrique / Electrical part

A. Positionnement et montage des micro-onduleurs / Positioning and mounting of microinverters

Les micro-onduleurs doivent être fixés sous la ou les traverse(s) principale(s) à l'aide des vis auto-foreuses à embase St6,3-50.

The microinverters must be attached to the underside of the main crossbar(s) using self-drilling screws with St6.3-50 flange.



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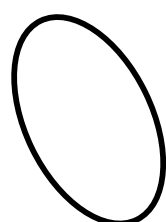
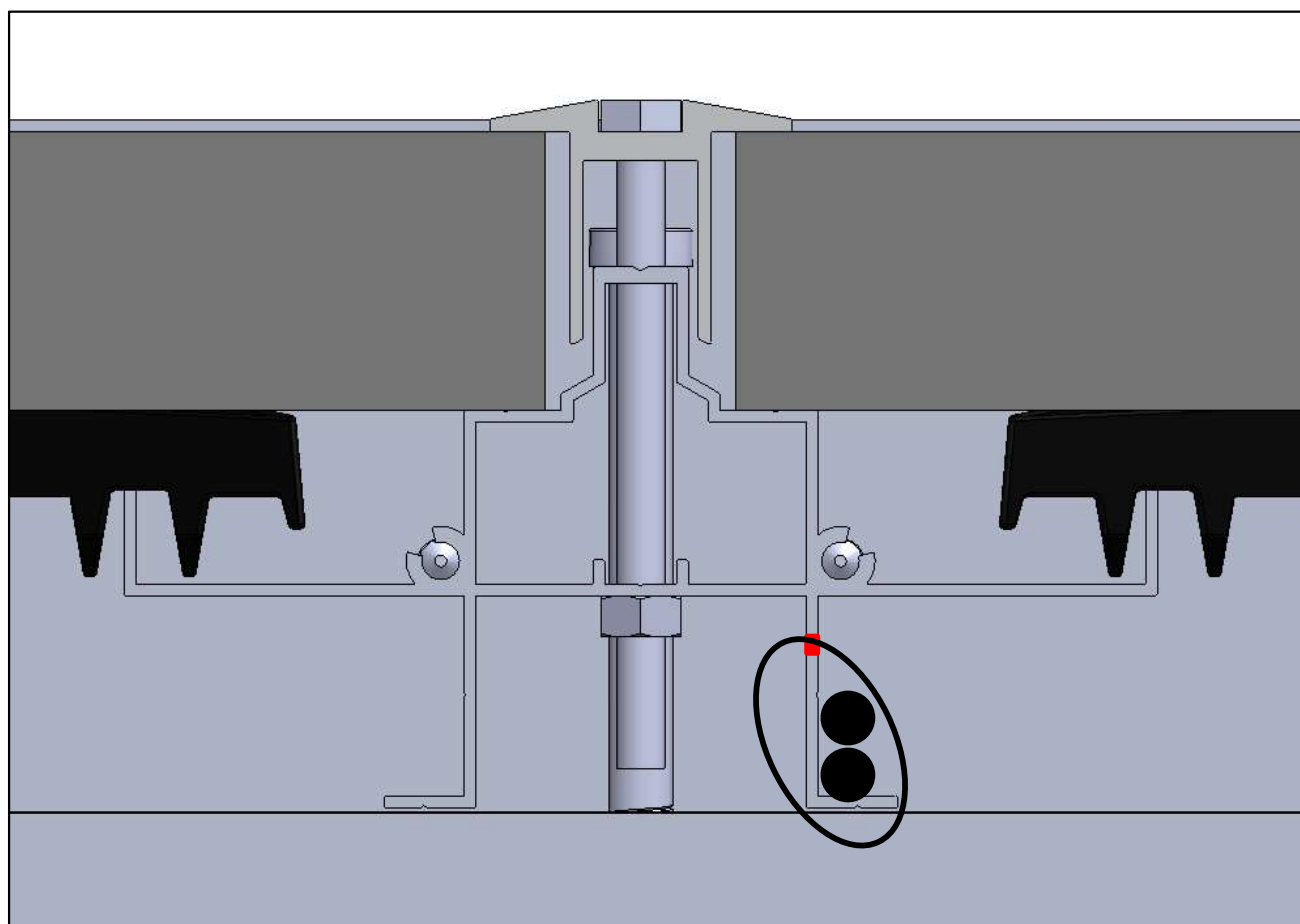
I) CARPORT M1 & M2

B. Fixation des câbles / Cable fixing

Tous les câbles du carport monopan seront fixés de la manière suivante : percez un trou dans la traverse principale ou latérale, puis fixer les câbles contre la traverse à l'aide d'un serflex.

De plus, l'arrivée du câblage doit se faire dans l'un des pieds du carport monopan.

All cables in the carport should be fixed in the following way: drill a hole in the main or side crossbar and fix the cables to the crossbar with a serflex.
In addition, the cable entry should be in one of the feet of the carport.



Serflex

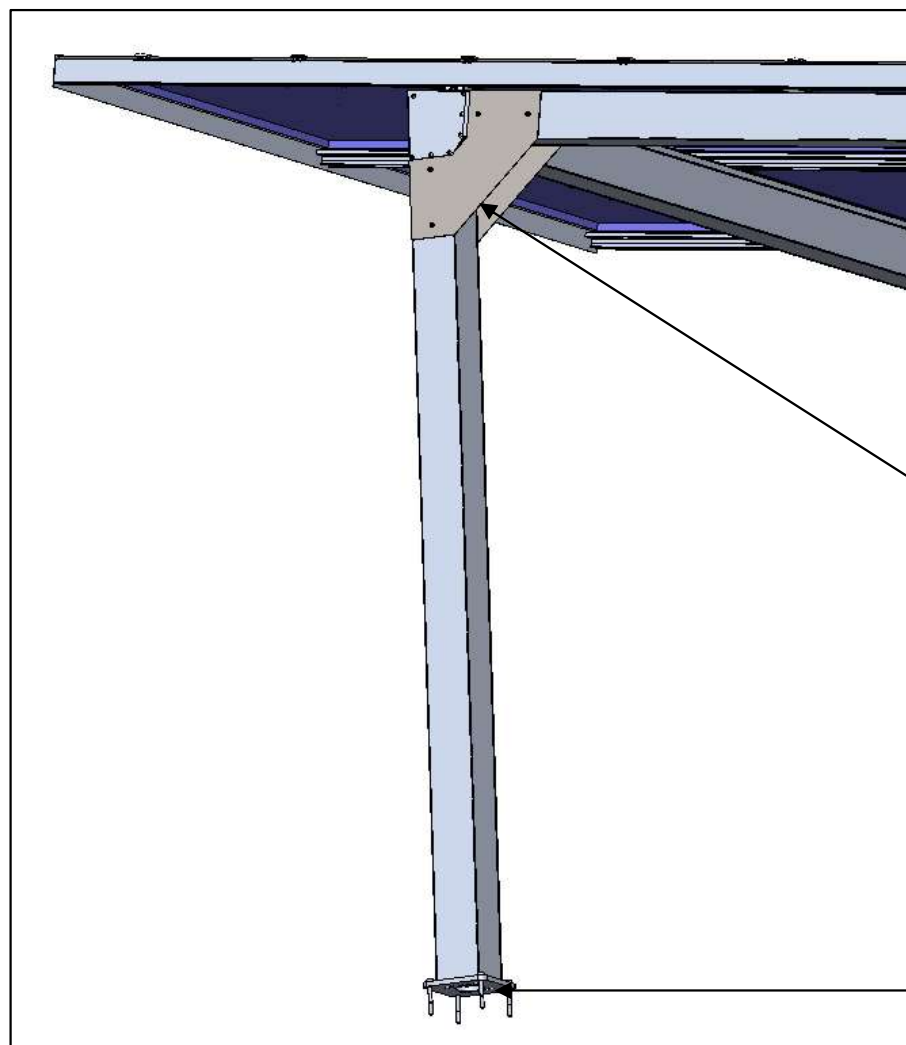


Câbles
Cables



Perçage pour passage
Serflex (M5-M6-M8)
**Drilling for Serflex
passage (M5-M6-M8)**

I) CARPORT M1 & M2



Sorties des câbles (par la petite tôle de la noix d'angle)
Cable outlets (through the small metal sheet of the clamping nut/ boshead)

Arrivée des câbles
Cable feed

Les câbles passent donc dans le pied et sortent au niveau de la noix d'angle.
The cables therefore run through the foot and exit at the clamping nut/ boshead.

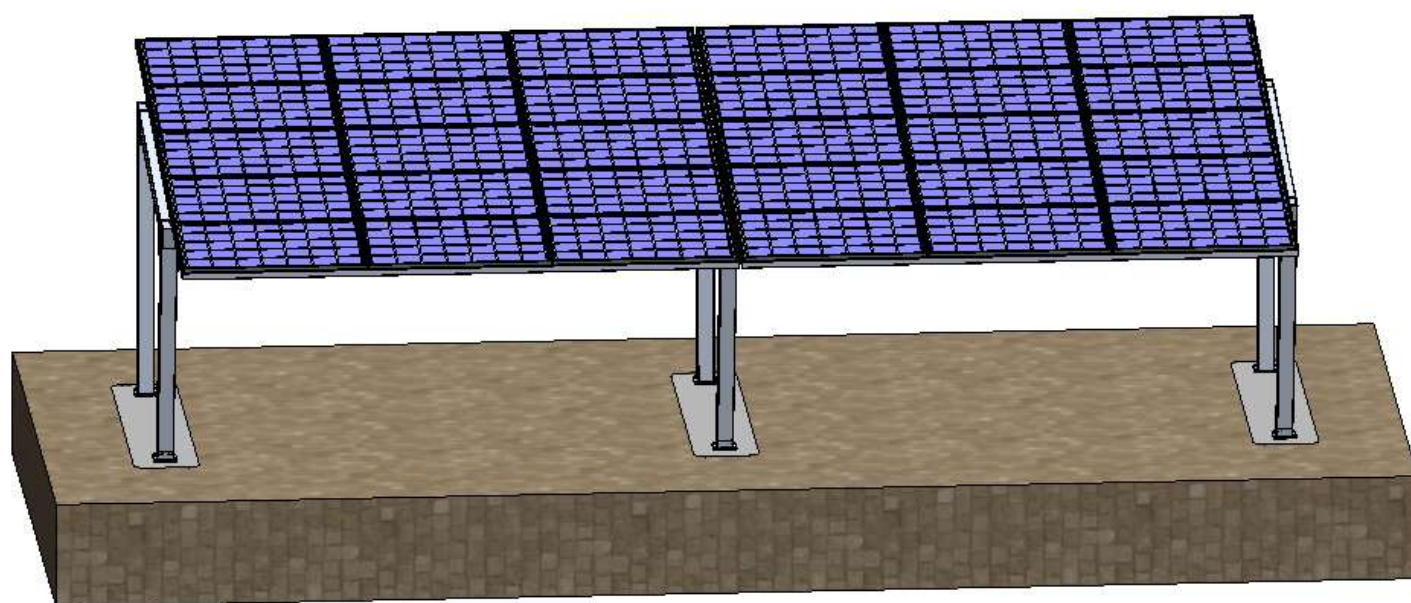
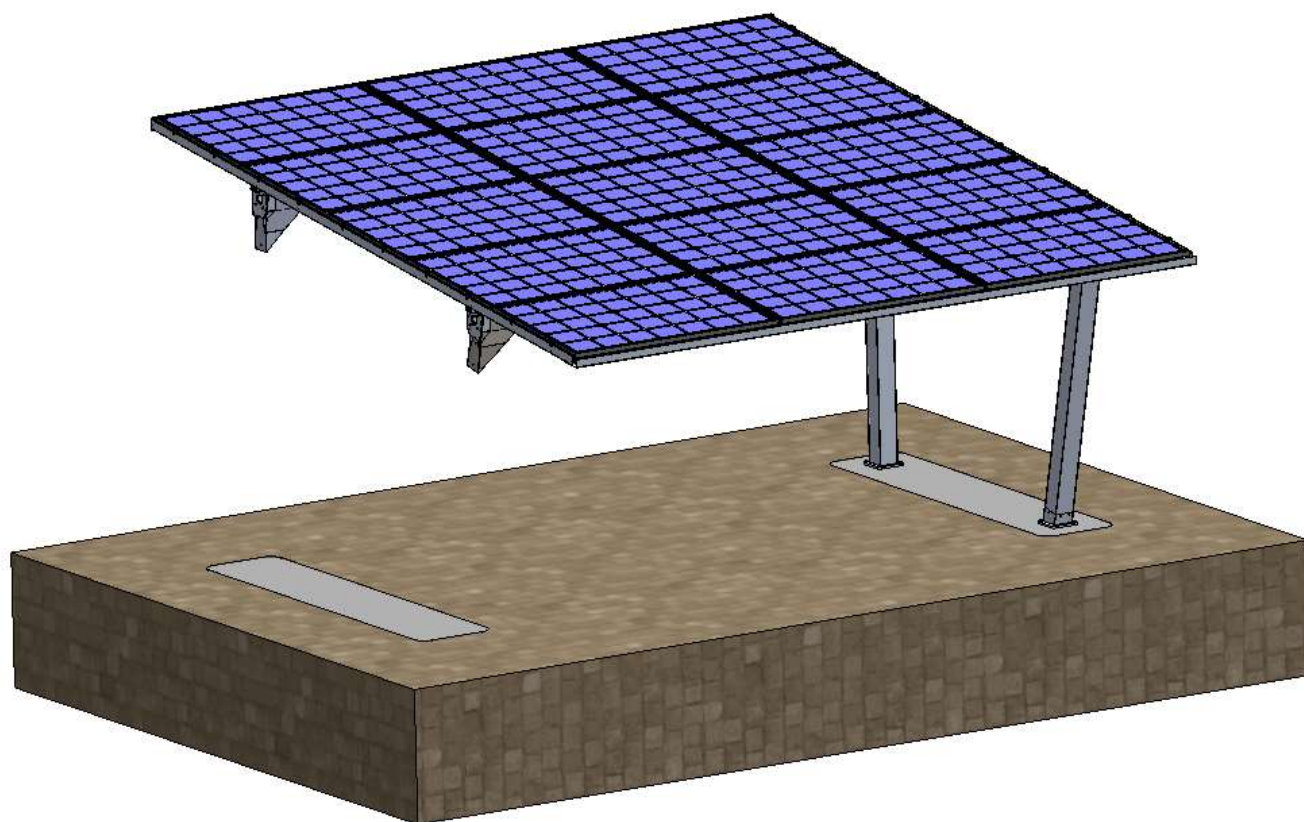
Une plaque (référence 38) est fournie. Cette plaque peut être utilisée comme support pour une borne de charge de véhicule. Cette plaque peut être vissée sur l'un des pieds.

A plate (reference 38) is supplied. This plate can be used to support a vehicle charging station. This plate can be screwed onto one of the feet.

Raccorder la structure et les micro-onduleurs à la terre selon la norme en vigueur dans le pays d'installation.

Connect structure and microinverters to earth according to the standard in force in the country of installation.

II) Jumelage de plusieurs carports / Twinning several carports



Information and images are non-contractual. We reserve the right to make technical changes without notice.

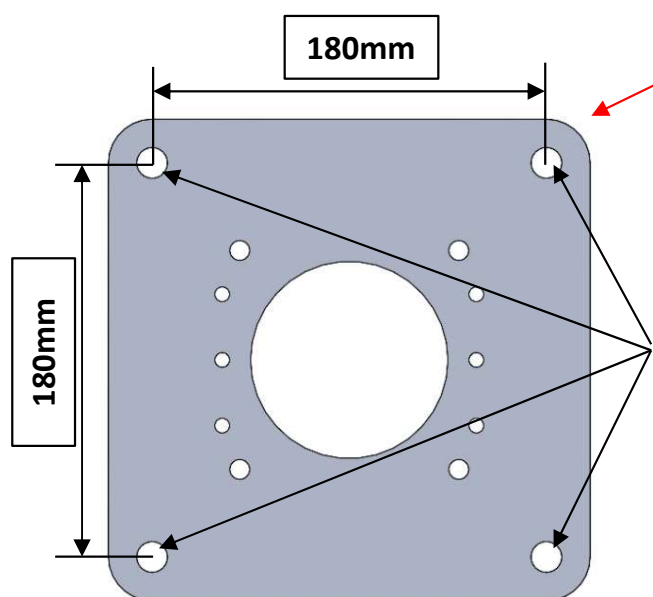
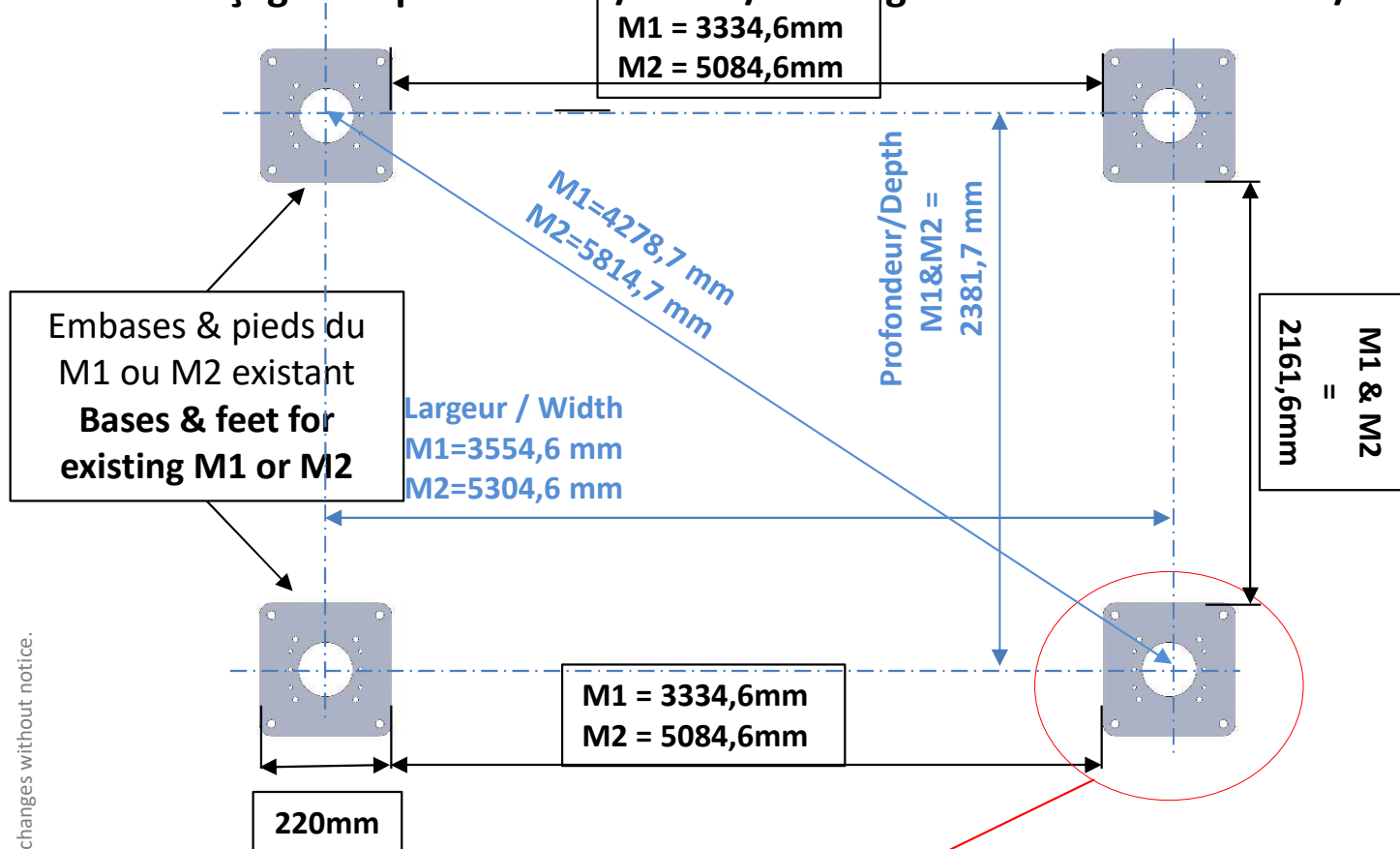
II) Jumelage de plusieurs carports / Twinning several carports

1. Qu'est qu'un jumelage de carport ? What is carport twinning?

Comme expliqué page 4 de cette notice, il est possible de jumeler des carports 1 place et 2 places de manière infinie. Les pages suivantes présentent la méthode pour jumeler un carport sur un carport existant. As explained on page 4 of these instructions, it is possible to combine 1 and 2 carports in an infinite number of ways. The following pages show how to combine a carport with an existing carport.

2. Montage de la structure / Mounting the structure

A. Perçage des plots béton / dalle / Drilling of the concrete blocks / slab

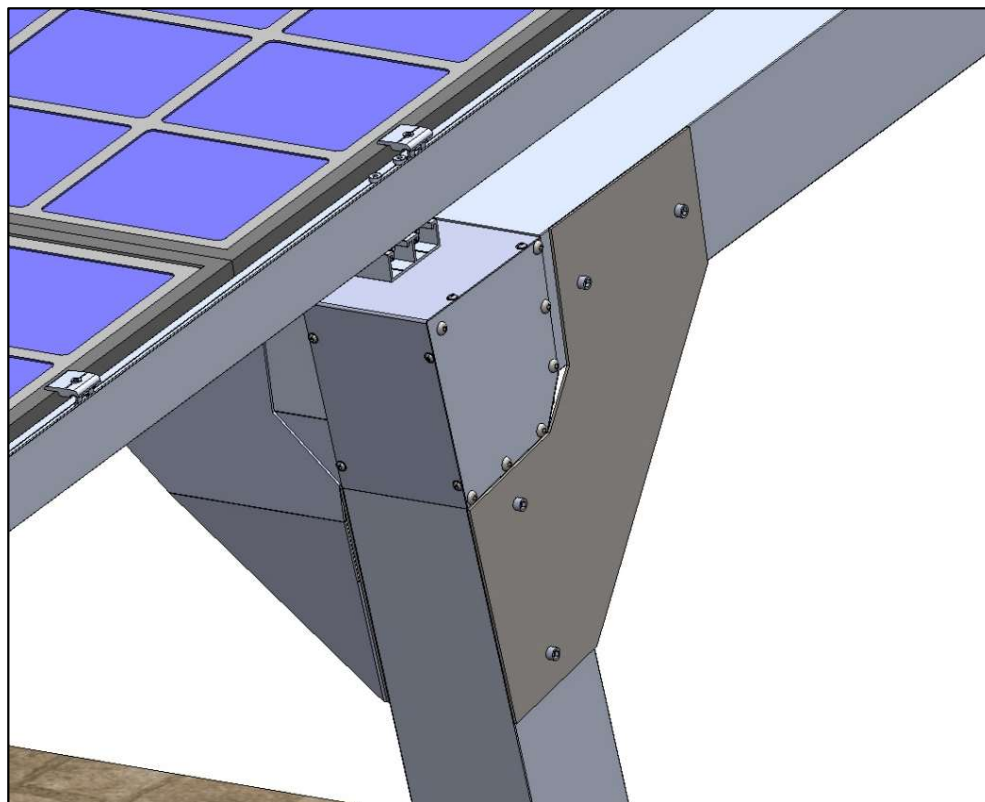


Perçer le plot béton ou la dalle avec l'espacement indiqué.
 Veuillez à ce que l'alignement des trous des embases de gauche et de droite soient bien alignés.
 Une fois les 16 trous réalisés, insérez dans chacun d'eux un goujon.
Drill the concrete block or slab with the spacing indicated.
Ensure that the holes in the left and right hand bases feet are aligned.
Once the 16 holes have been drilled, insert an anchor bolt into each hole.

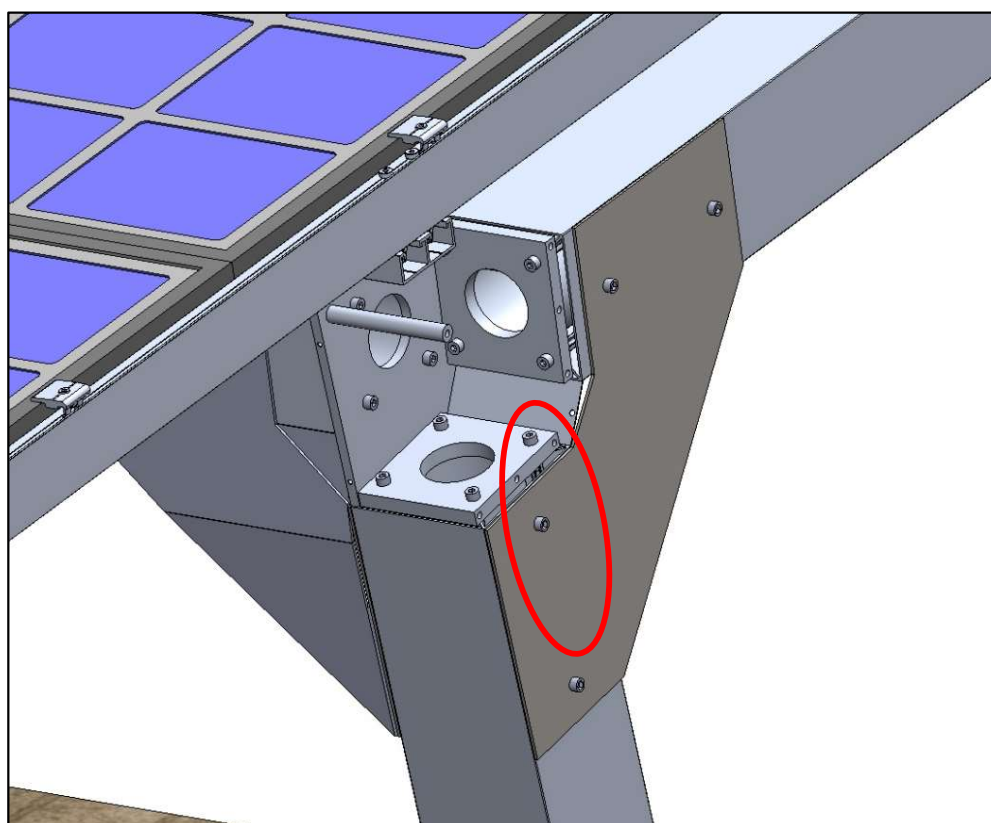
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II) Jumelage de plusieurs carports / Twinning several carports

B. Préparation du M1 ou M2 existant / Preparation for an existing M1 or M2



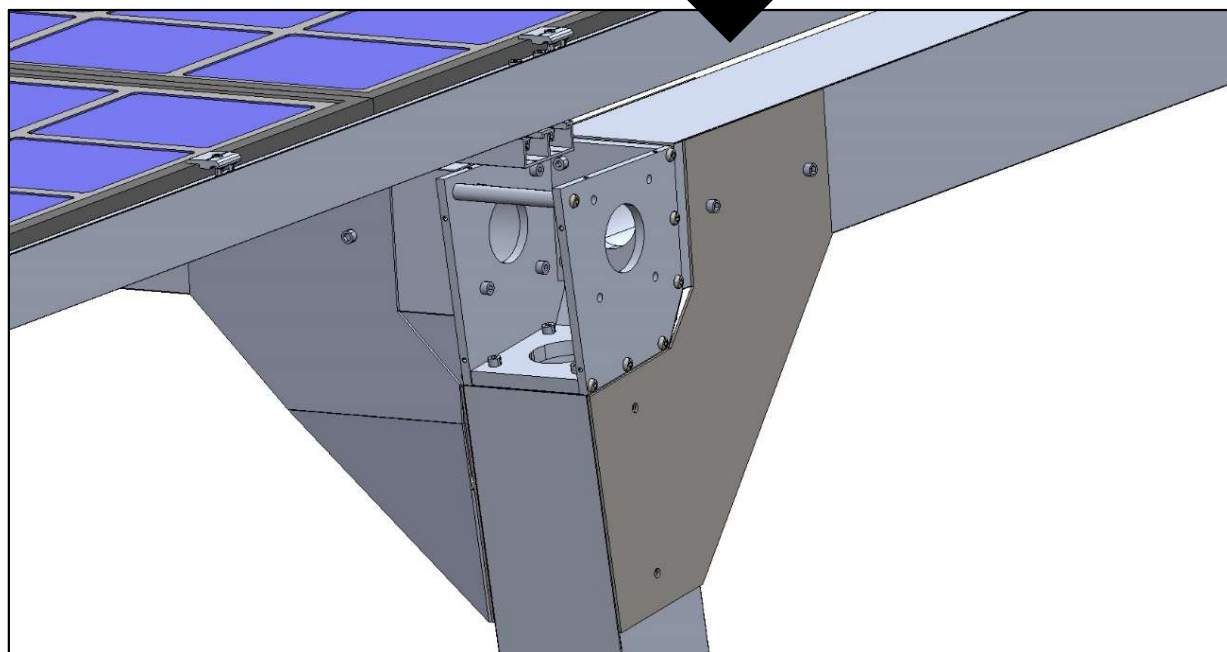
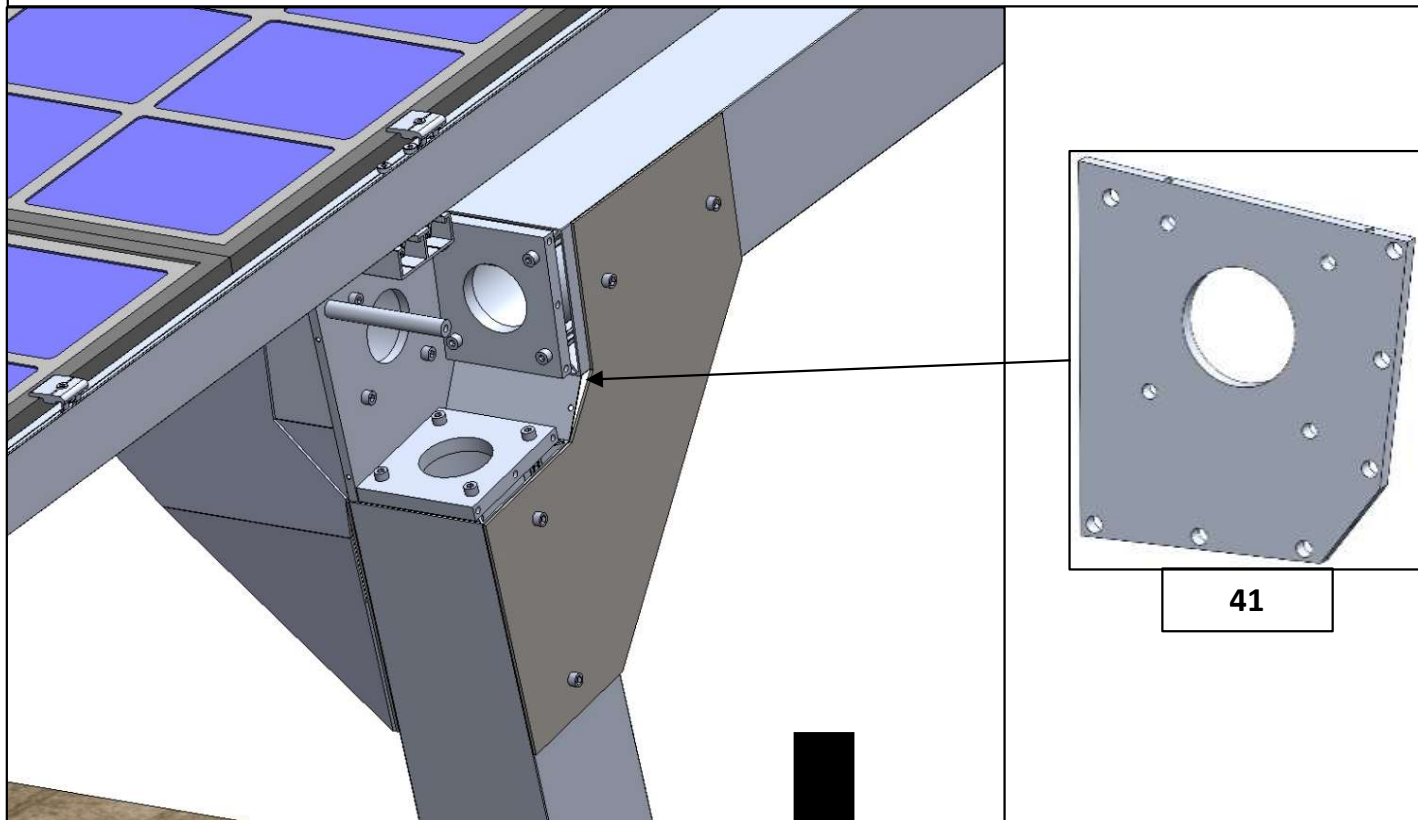
Retirer les capots de la partie droite ou gauche sur laquelle va être couplé le M2' ainsi que les plaques qui sont sur le côté. Retirez également les deux vis du bas M8x180 (entourées en rouge).
Remove the covers from the right or left side to which the M2' will be connected, as well as the plates on the side. Also remove the two bottom M8x180 screws (circled in red).



II) Jumelage de plusieurs carports / Twinning several carports

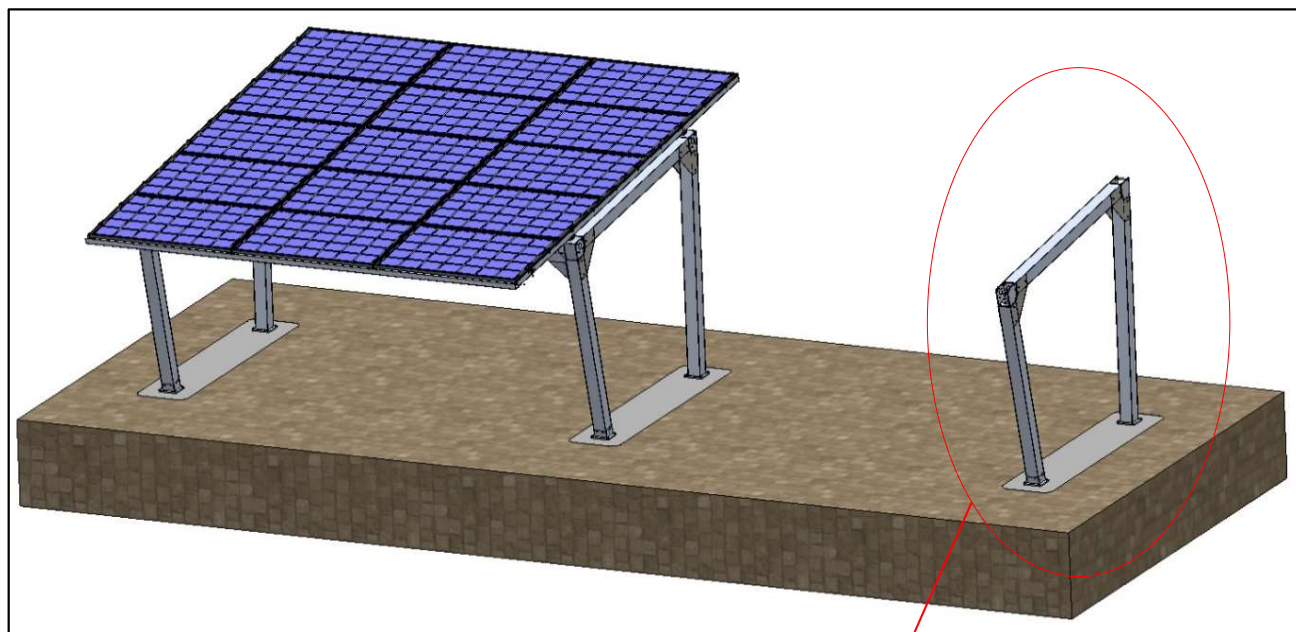
Remplacez les deux plaques que vous avez enlevées par les deux plaques de jonction pieds latéral trou (PRTOP01301AA), en les vissant à l'aide des vis de la plaque que vous avez enlevées (Vis CHC tête bombée M8x20).

Replace the two plates you removed with the two side foot hole junction plates (PRTOP01301AA), screwing them in using the screws from the plate you removed (M8x20 domed head CHC screws).



II) Jumelage de plusieurs carports / Twinning several carports

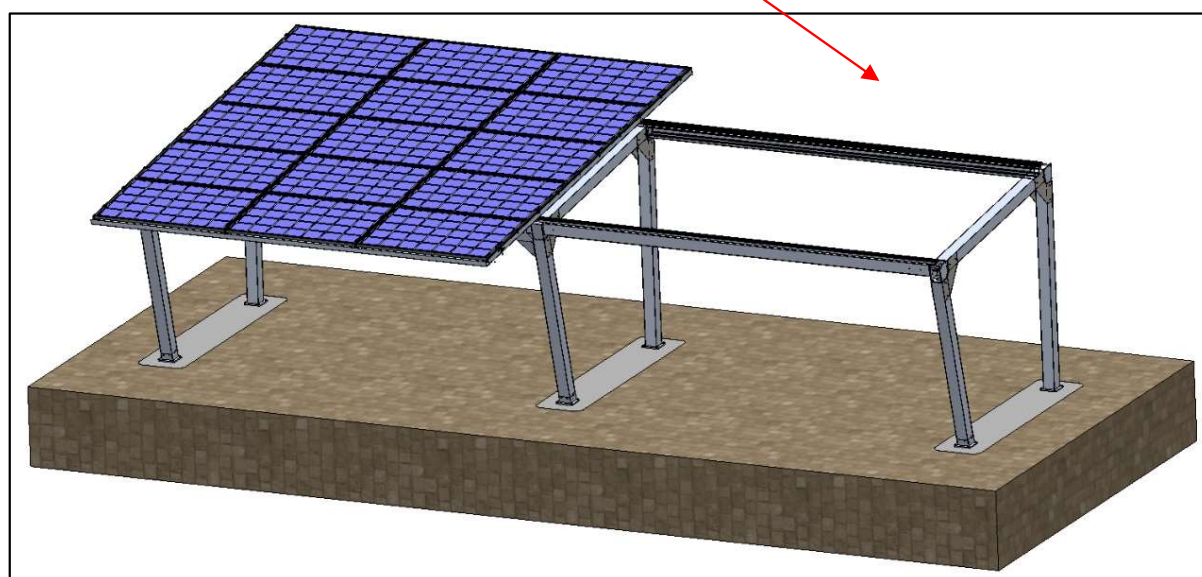
C. Montage du pied avant ainsi que du pied arrière et du longeron latéral / Fitting the front foot, rear foot and side beam



Veuillez suivre les instructions données dans le montage M1 & M2 pour monter le pied avant, le pied arrière et le longeron latéral / Please follow the instructions given in assembly M1 & M2 to assemble the front foot, rear foot and side beam.

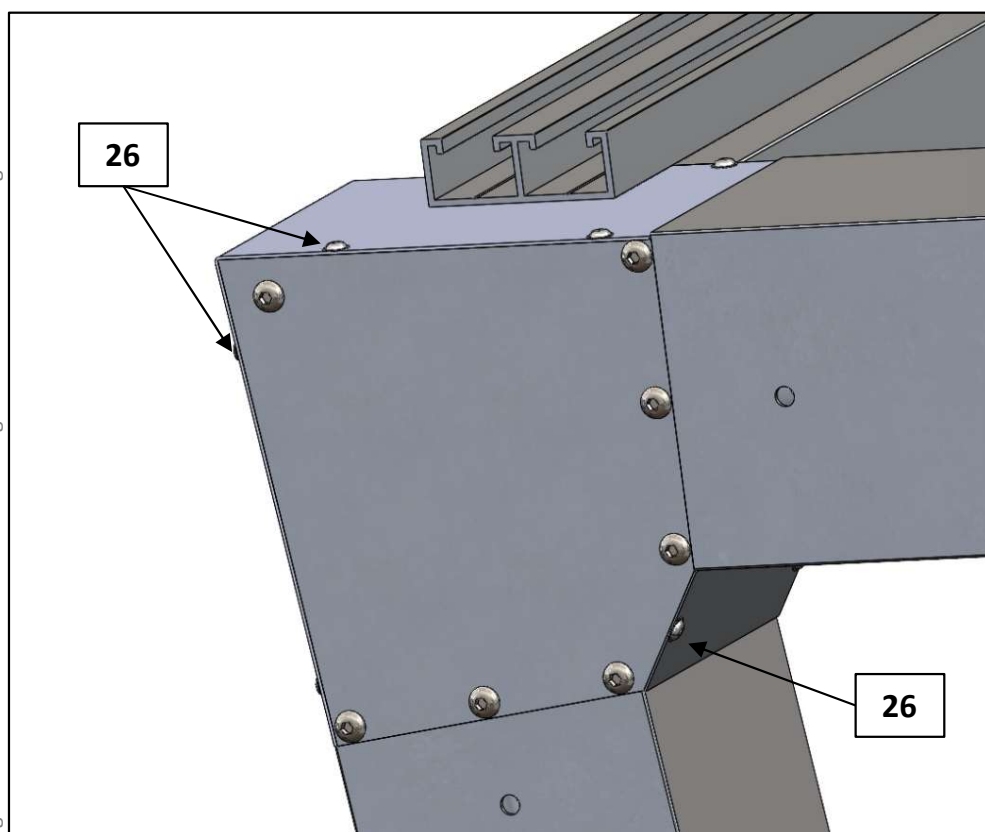
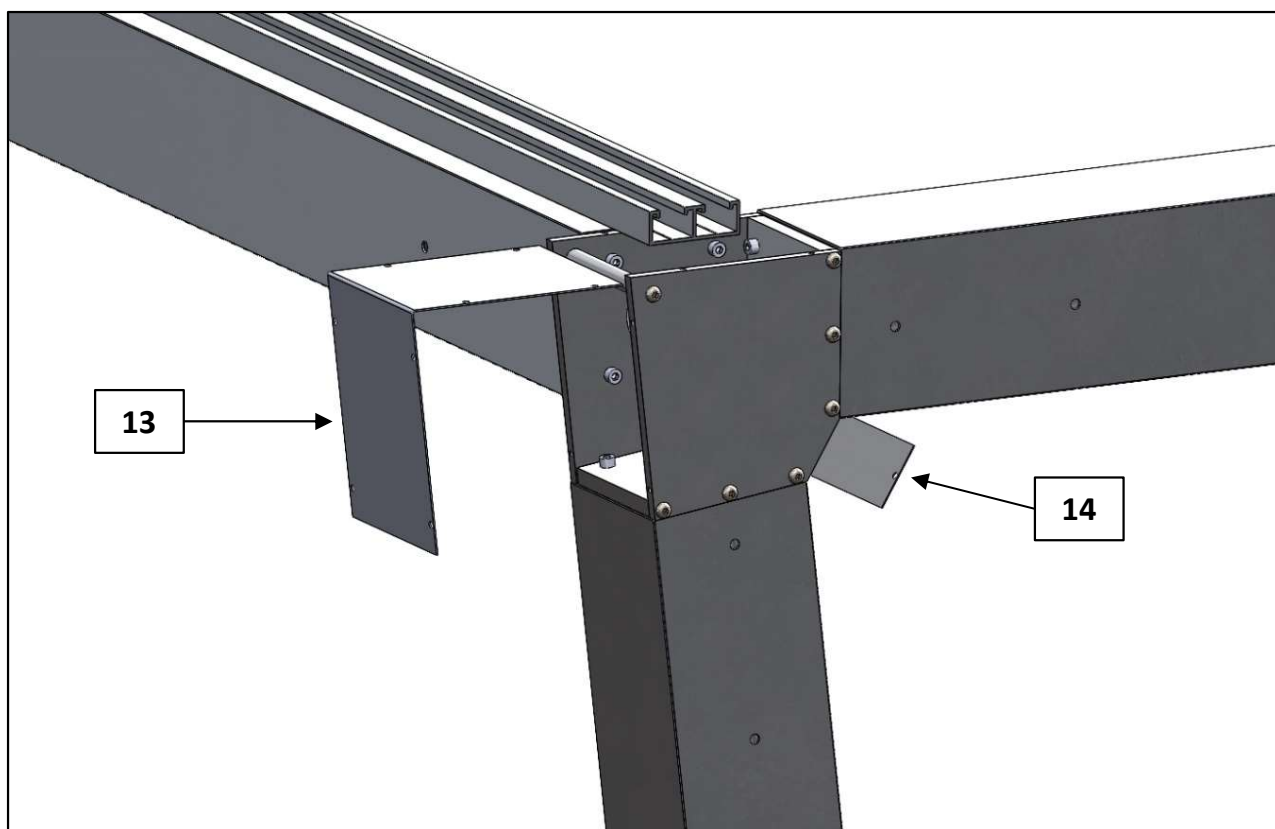
D. Montage des longerons transversaux / Mounting the cross-beams

Veuillez suivre les instructions données dans le montage M1 & M2 pour monter les longerons transversaux / Please follow the instructions given in assembly M1 & M2 to fit the cross-beams.

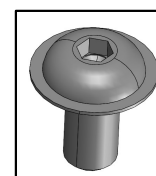


II) Jumelage de plusieurs carports / Twinning several carports

E. Montage des petites tôles et des capots / Fitting small metal sheets and covers



Montez les capots du M2' et remontez ceux du monopan existant qui ont été retirés /
Fit the covers for the M2' and refit those removed from the existing carport



x40 – Vis M5x10 à embase
x40 - M5x10 flange screw

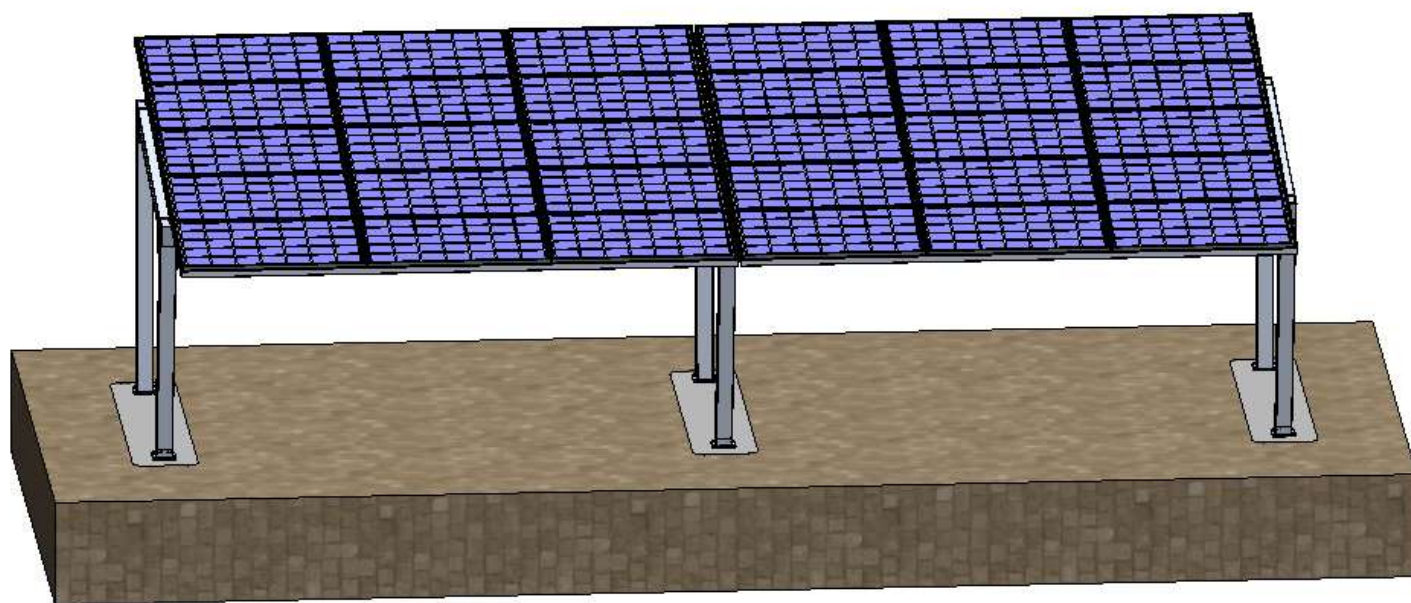
Montez ensuite les renforts comme dans la partie M1 & M2 ainsi que les tôles coiffant le pied arrière.
Then fit the reinforcements as in sections M1 & M2, as well as the plates covering the rear foot.

Information and images are non-contractual. We reserve the right to make technical changes without notice.

II) Jumelage de plusieurs carports / Twinning several carports

F. Montage de la toiture / Mounting the roof

Pour le montage de la toiture, suivre les instructions de montage données dans la partie M1 & M2 (Pages 22 à 40).
To fit the roof, follow the installation instructions given in section M1 & M2 (Pages 22 to 40).



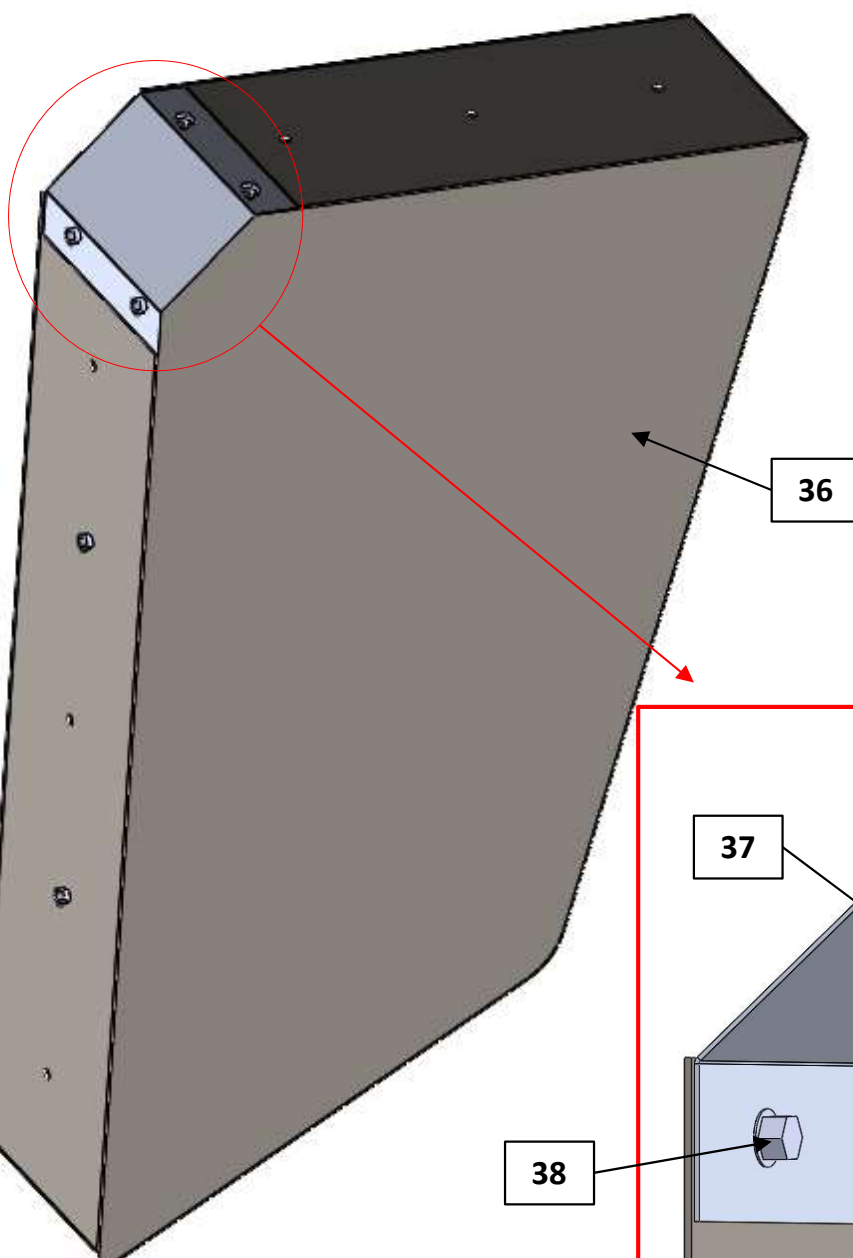
III)

OPTION: PARK-E 400 M1 ou M2

1 kit : PK-PL-G-7016M-1			
N° Article	Quantité	Désignation	REFERENCE
35	1	TÔLE FIXATION BATTERIE GAUCHE	PRTOP01260AA
37	1	CAPOT TÔLE BATTERIE	PRTOP01327AA
38	8	VIS auto-perceuse H St4.8-13 à embase	
39	2	VIS tête bombée plate M5x10 à embase	
40	2	Écrou carré Q M5	

1 kit : PK-PL-D-7016M-1			
N° Article	Quantité	Désignation	REFERENCE
36	1	TÔLE FIXATION BATTERIE DROIT	PRTOP01259AA
37	1	CAPOT TÔLE BATTERIE	PRTOP01327AA
38	8	VIS auto-perceuse H St4.8-13 à embase	
39	2	VIS tête bombée plate M5x10 à embase	
40	2	Écrou carré Q M5	

1. Tôle batterie étant fixée sur le poteau / Battery metal sheet being fixed to the post



Côté poteau, fixez la tôle batterie avec les vis (38). Fixez le capot côté poteau avec les vis (38) et au-dessus à l'aide des vis et écrous (39-40).
On the post side, fix the battery metal sheet with the screws (38). Secure the cover on the post side with the screws (38) and on top with the screws and nuts (39-40).

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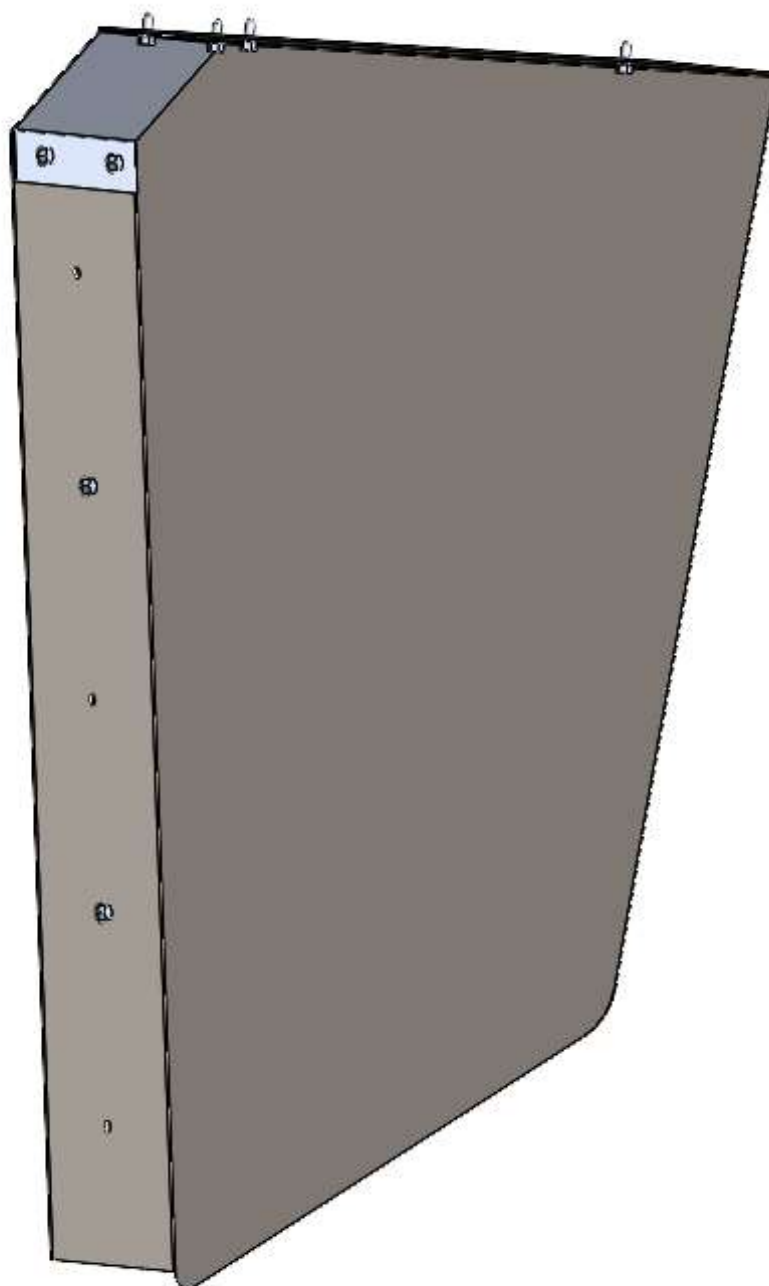
Côté poteau - Post side

III)

OPTION: PARK-E 400 M1-M2-M2'**2. Tôle batterie étant fixée sur le poteau et sur le longeron
Battery metal sheet being fixed to the post and to the beam**

Si vous voulez fixer votre tôle de batterie dans un angle du carport monopan, vous n'aurez besoin que des vis auto-perceuses St4.8-13 (38). Vous aurez besoin de 4 vis pour fixer le petit capot, à la fois dans la tôle, et à la fois dans le longeron et le pied. Les 4 vis restantes seront utilisées pour visser la tôle contre le longeron et le pied arrière.

If you want to fix your battery metal sheet in a corner of the carport, you will only need self-drilling screws St4.8-13 (35). You will need 4 screws to fix the small cover, both in the metal sheet, and in the side beam and foot. The remaining 4 screws will be used to screw the sheet metal against the beam and the rear foot.





IV) Annexes

Park-E 400 installation guideline

The purpose of this note is to specify the maximum permissible climatic zones and the loads required when installing the Park-E 400 product on concrete blocks.

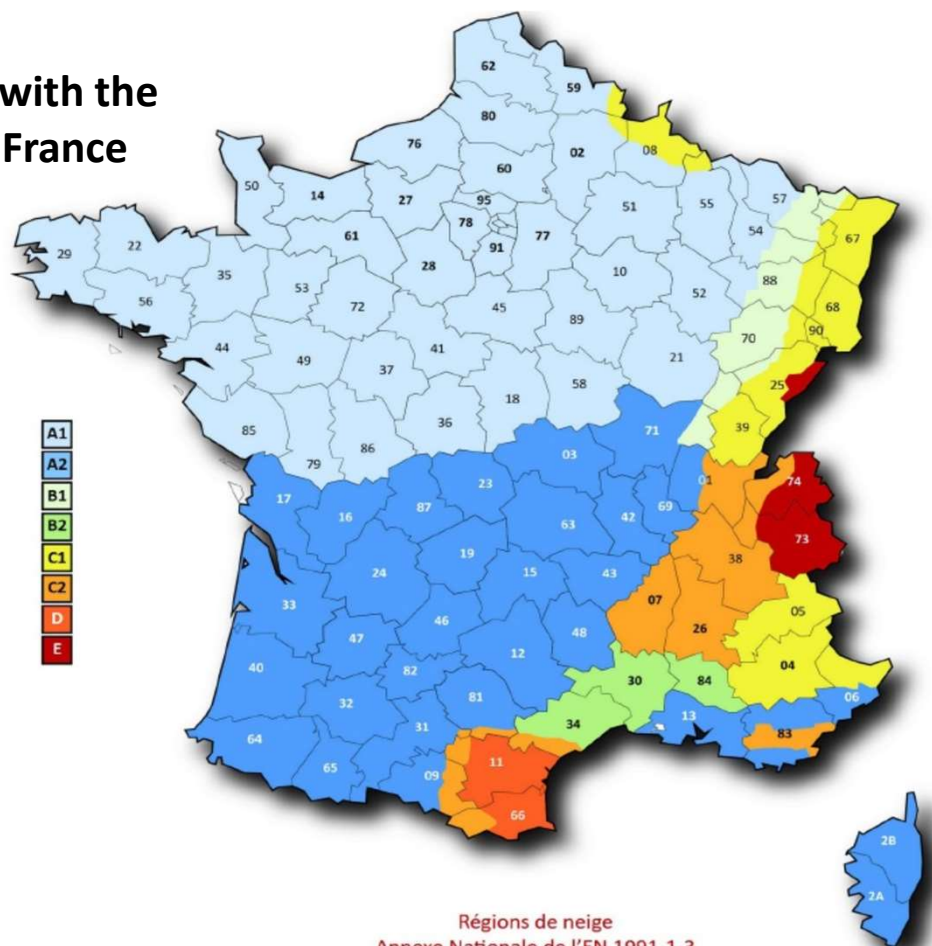
The following data were determined by APAVE in application of the following rules and regulations:

- Eurocode 0 - NF EN 1990 - Structural Eurocodes - Basis of calculation of structures and national application document. (12/07)
- Eurocode 1 - NF EN 1991-1-1 - General actions - Volumetric weight, dead weight and operating loads of buildings. (04/03)
- Eurocode 1 - NF EN 1991-1-3 - Actions on structures - Part 1-3: General actions - Snow loads. (04/04)
- Eurocode 1 - NF EN 1991-1-4 - Actions on structures - Part 1-4: General actions - Wind actions. (11/05)
- Eurocode 9 - NF EN 1999-1-1 - Design of aluminium structures - Part 1-1: General rules. (08/07)

In order to verify the possibility of installing Park-E in the desired area, it is first necessary to determine the snow and wind zone in which the installation is planned using the following maps :

- Determination of the snow area:

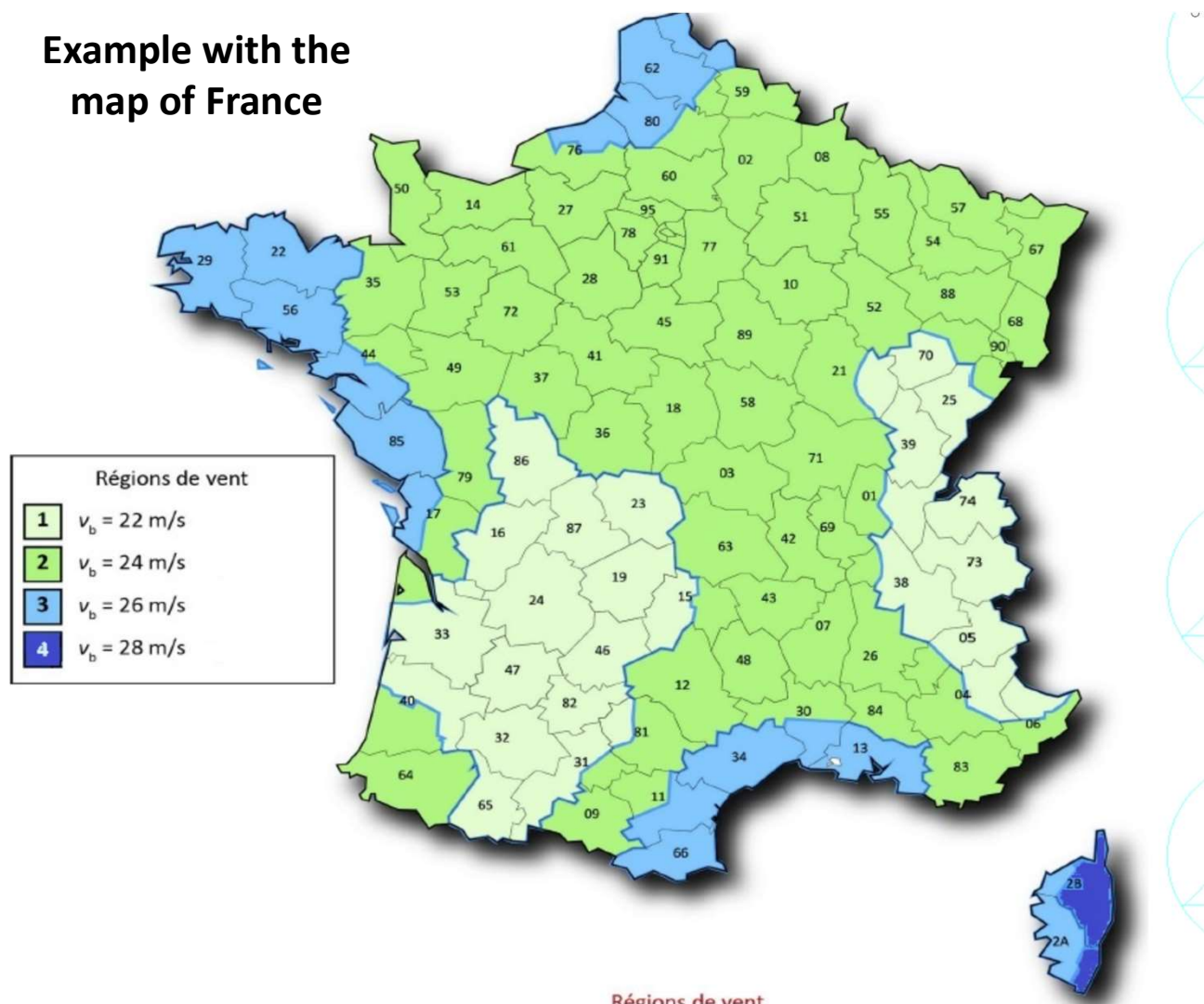
Example with the map of France





- Determination of the wind area:

Example with the map of France



The next step is to define the category of land that specifies the installation environment from the following proposals:

Land category	
0	Sea or coastal area exposed to sea winds; lakes and water bodies with a wind distance of at least 15 km
II	Open country with or without some isolated obstacles (trees, buildings etc.) separated from each other by more than 40 times their height
IIIa	Countryside with hedges; vineyards; bocage; scattered settlement
IIIb	Urbanised or industrial areas; dense bocage; orchards
IV	Urban areas where at least 15% of the area is covered by buildings with an average height of over 15 m ; forests



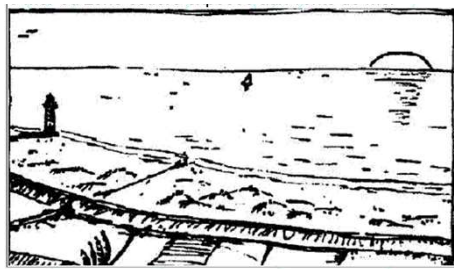
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Examples:

• **Area 0:**

0 Sea or coastal area exposed to sea winds



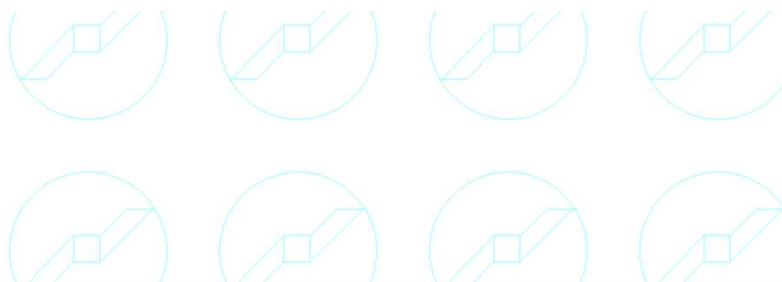
Roughness 0 (sea)



Sea or coastal area exposed to sea winds; lakes and water bodies with a wind distance of at least 5 km

• **Area II:**

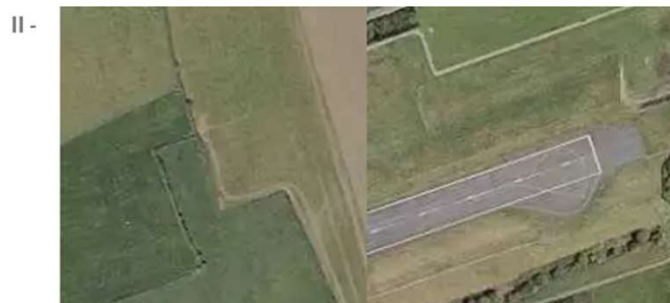
II Area with low vegetation such as grass, with or without some isolated obstacles (trees, buildings), separated from each other by at least 20 times their height



Roughness 2 (open country)



Roughness 2 (airport)



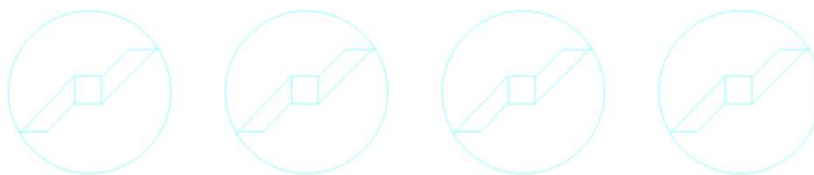
Open country with or without some isolated obstacles (trees, buildings etc.) separated from each other by more than 40 times their height

Information and images are non-contractual. We reserve the right to make technical changes without notice.



• **Area III:**

III area with regular vegetation cover or buildings, or with isolated obstacles separated by up to 20 times their height (e.g. villages, suburban areas, permanent forests).



Roughness 3a (bocage)



Roughness 3b (dense bocage)



Roughness 3b (industrial area)



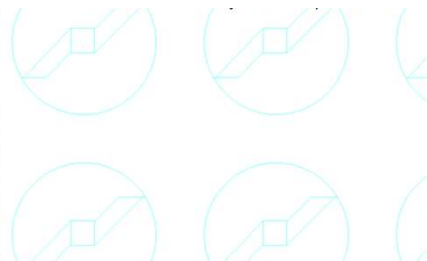
IIIa - Countryside with hedges; vineyards; bocage; scattered settlement



IIIb -

• **Area IV:**

IV Areas where at least 15% of the area are covered by buildings with an average height of over 15 m.



Roughness 4 (forest)



Roughness 4 (town)



IV - Urban areas where at least 15% of the area are covered by buildings with an average height of over 15 m; forests.

Information and images are non-contractual. We reserve the right to make technical changes without notice.



IV)

Annexes

From there on:

Snow area, between A1 and E

Wind area, from 1 to 4

Land category, between 0 and IV

Depending on the altitude of the location where the Park-E 400 is to be installed, it must be ensured that, depending on the model, these values are compatible with the following tables drawn up by APAVE:

M1-400 :

Category of land	French zone of acceptable MAX wind	French snow zone	Max. Altitude
0	4	A	1720
		B	1674
		C	1628
		D	1520
		E	798
II	4	A	1812
		B	1781
		C	1735
		D	1628
		E	891
IIIa	4	A	1889
		B	1858
		C	1812
		D	1704
		E	975
IIIb	4	A	1907
		B	1884
		C	1857
		D	1766
		E	1029
IV	4	A	1907
		B	1884
		C	1857
		D	1794
		E	1090

M2-400 :

Category of land	French zone of acceptable MAX wind	French snow zone	Max. Altitude
0	4	A	1120
		B	1090
		C	1060
		D	990
		E	520
II	4	A	1180
		B	1160
		C	1130
		D	1060
		E	580
IIIa	4	A	1230
		B	1210
		C	1180
		D	1110
		E	635
IIIb	4	A	1270
		B	1250
		C	1220
		D	1150
		E	670
IV	4	A	1310
		B	1280
		C	1250
		D	1180
		E	710

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IV)

Annexes

M'2-400 combined with M2-400 or M1-400:

Category of land	French zone of acceptable MAX wind	French snow zone	Max. Altitude
0	3	A	840
		B	770
		C	700
		D	540
		E	X
II	4	A	920
		B	850
		C	790
		D	620
		E	200
IIIa	4	A	1010
		B	950
		C	890
		D	720
		E	290
IIIb	4	A	1050
		B	1020
		C	980
		D	810
		E	380
IV	4	A	1080
		B	1050
		C	1020
		D	880
		E	450

If the Park-E 400 is installed on concrete blocks, the mass of the concrete block on which the **2 end feet** are to be fixed must be at least, depending on the model, that given in the tables below.

For the intermediate legs, the mass must be doubled.

The 2 side feet of a Park-E 400 must be fixed to the same concrete block.

Also check that the sum of the load taken by each of the screws fixing the Park-E 400 feet to the blocks is greater than the total load to be taken in order to install the product.

If the mass of the concrete block is not sufficient, there is always the possibility of installing a prefabricated concrete sill or cast-in-place sill of sufficient size, bearing in mind that 1m³ of concrete weighs approximately 2400kg.

To increase the load-bearing capacity, it is also possible to use foundation bolts. Depending on the nature of the soil and the geometry of the screw, these can take up to several hundred kilograms of load. Do not hesitate to install 2 or 3 per post to secure the installation.

Note that these foundation screws, depending on the load bearing calculations and if the concrete studs are not necessary, can be used to anchor Park-E 400 directly in the ground.

Finally, it is always possible to have a local study carried out in order to refine the various parameters (category of land, snow and wind areas, altitude, nature of the soil, etc.) in order to check that they are compatible with Apave's recommendations.

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IV)

Annexes

• **M1-400 :**

Ballast (kg)	Land category				
	0	II	IIIa	IIIb	IV
1	1 244	863	598	285	99
2	1 515	1 148	686	394	156
3	1 821	1 380	836	496	228
4	2 406	1 515	1 006	618	302

• **M2-400 :**

Ballast (kg)	Land category				
	0	II	IIIa	IIIb	IV
1	1 865	1 295	897	428	148
2	2 273	1 723	1 030	591	234
3	2 732	2 069	1 254	744	341
4	3 609	2 273	1 509	928	454

• **M'2-400 combined with M2-400 or M1-400:**

Ballast (kg)	Land category				
	0	II	IIIa	IIIb	IV
1	2 125	1 458	902	494	148
2	2 615	1 799	1 152	652	250
3	3 135	2 197	1 412	831	372
4	X	2 599	1 713	1 030	499

Example:

Installation of a 10-parking spaces Park-E 400 (1xM2-400 + 4xM'2 400) on concrete blocks in an industrial zone in Colmar (Northeast in France) at an altitude of 186m

- Colmar, snow area C1 and wind area 2
- Industrial area: land category: IIIb

From the table below relating to the (M'2-400+M2 400) Park-E 400 (or M1-400) assemblies, we can see that:

Category of land	French zone of acceptable MAX wind	French snow zone	Max. Altitude
0	3	A	840
		B	770
		C	700
		D	540
		E	X
II	4	A	920
		B	850
		C	790
		D	620
		E	200
IIIa	4	A	1010
		B	950
		C	890
		D	720
		E	290
IIIb	4	A	1050
		B	1020
		C	960
		D	810
		E	380
IV	4	A	1080
		B	1050
		C	1020
		D	880
		E	450

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IV)

Annexes

In land category IIIb :

- Can install up to wind area 4 (28m/s), our wind area 2 (24m/s) is compatible
- Our C1 snow area is compatible up to an installation location of less than 980m
- It is possible to install a 10-parking spaces Park-E 400 at this location.

Concerning the dimensions of the concrete blocks, the table below indicates that they must have a minimum mass of :

- 652 kg on the 2 concrete blocks placed at the ends of the Park-E 400
- 1305 kg on the 4 concrete blocks on which the intermediate feet of the installation are fixed.

Ballast (kg) Wind area	Land category				
	0	II	IIIa	IIIb	IV
1	2 125	1 458	902	494	148
2	2 615	1 799	1 152	652	250
3	3 135	2 197	1 412	831	372
4	X	2 599	1 713	1 030	499

In this case and given the mass of the block to be provided to fix the intermediate feet (1304 kg):

- 1- Either a buried sill solution with a volume of 0.543m³ (1m³ of concrete weighs 2400 kg) would meet the need. Example: sill with a section of 0.2x0.5 and a length of 5.43m
- 2- Either the sealing of the concrete studs by means of sealing screws previously calculated to compensate for the load not taken up by the stud could be preferred.

Examples of references of complementary products that can be used for fixing Park-E 400:

(See directly with the manufacturers to define the products adapted to your project)

- Concrete blocks:
 - <https://www.fabemi.fr/produit/bute-roues/> (truck model)
 - <https://become-fabricant-beton.fr/catalogue/fiches/Chasse-roues%20-%20Become%20fabricant%20b%C3%A9ton.pdf>
 - ...
- Stringers:
 - <https://www.kp1.fr/produits/longrine>
 - <https://www.robert-thebault.fr/pro-agri/agri/elevage-porcins/sols-porcins/poutres-beton/>
 - ...
- Foundation screws:
 - <https://www.krinner.fr/>
 - <https://www.wovar.fr/via-fondation-63x580mm/>
 - ...

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