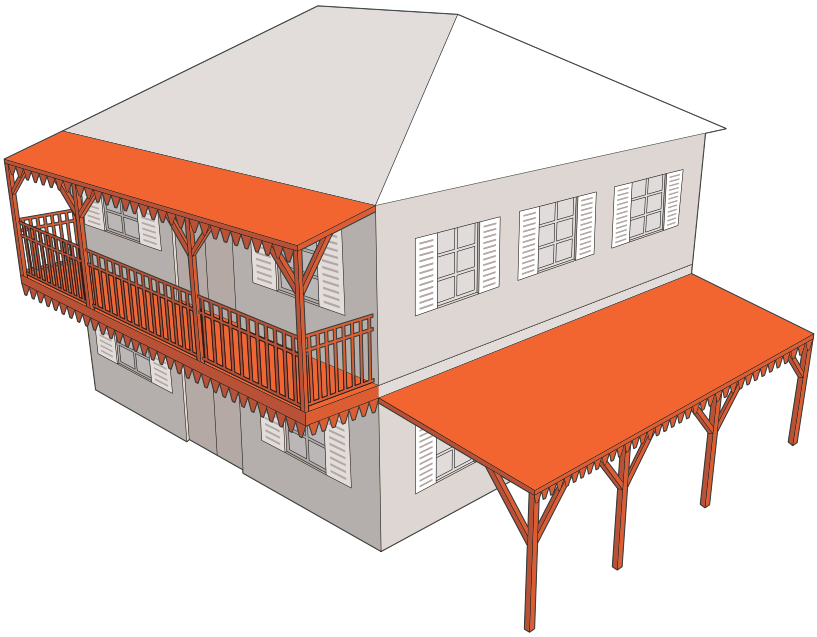
BUILD WELL!

AWNINGS



Practical Information Sheet

Public Information Sheet

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Saint-Martin
Caraïbe Française
French Caribbean

N°6

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FOREWORD

This practical information sheet provides indications on installing wooden structures.
Awnings are commonly referred to as small projecting roofs that are very useful since they enable us to shelter from the rain. They can be located above windows.
It presents individual points that have a direct influence on how well the structure will stand up to hurricane-force winds and seismic activity. Details on how to implement these features in relation to other requirements are not necessarily covered here.

FAILURE MODES UNDER THE EFFECTS OF WIND AND SEISMIC ACTIVITY

If awnings are not designed properly, they may exhibit two possible failure modes caused by the effects of wind and seismic activity.

- Failure of structural elements due to uplift

The roof has been torn off (see figure 1) due to the effect of wind. This can either be caused by unsuitable implementation or incorrect dimensioning (see figure 3).

Figure 1: Awning ripped off

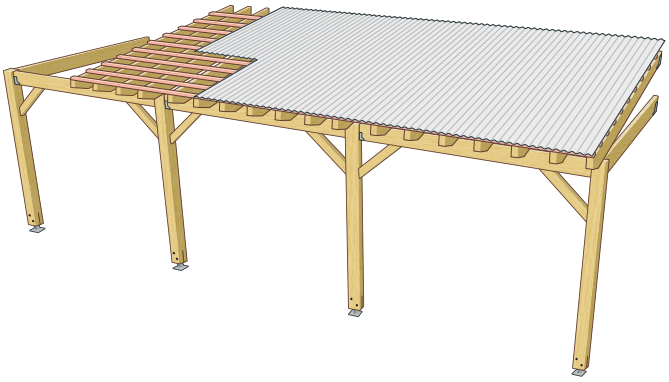


Figure 2: Example of awning

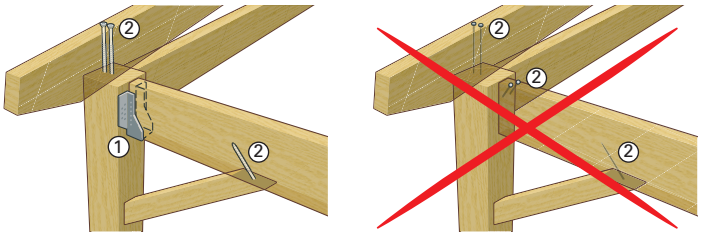


Figure 3: Roof joints

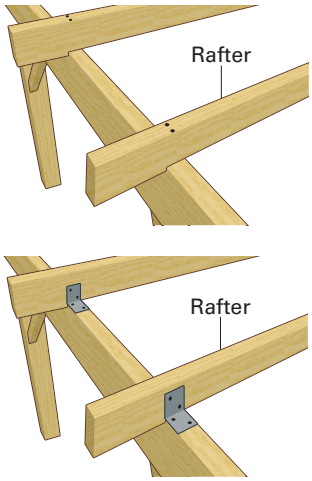


Figure 4: Roof assembly

Good	Bad
1: Stainless steel ETA purlin hangers fixed in place using stainless steel wood screws	2: Avoid using nails under tension
2: Stainless steel wood screws with a timber anchoring depth of at least 30 mm or 40x60x60 mm, 2.5 mm thick fixing bracket fixed in place using 3x3 mm nails or screws	

■ Ripping out or breaking of joints

The joint components have been ripped out or torn. This can be due to unsuitable assembly methods, installation errors or wrong sizing.

Figure 5: Post base bending

Figure 6: Posts with ripped out right-angled fixing brackets

✓ *Notes:*

- *post bases must be rigid in both bending directions (see paragraph on materials);*
- *right-angled fixing brackets should not be used instead of post bases: they are less rigid in one direction and have a tendency to weaken the post.*

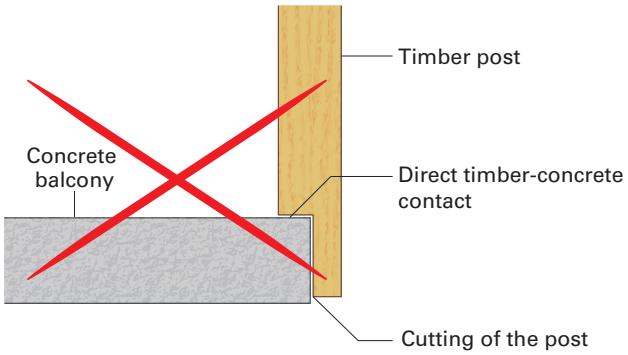


Figure 7: Bad post base design offering only partial support and leaving the post in direct contact with the floor.

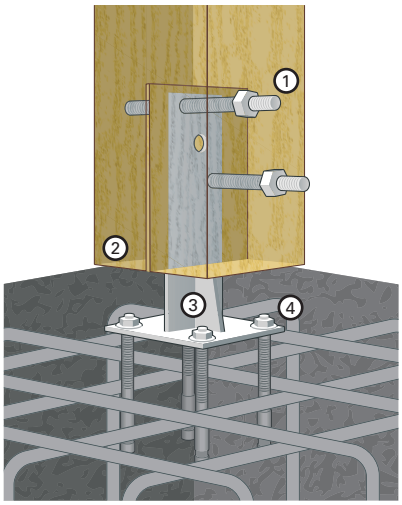


Figure 8: Wooden post on post base

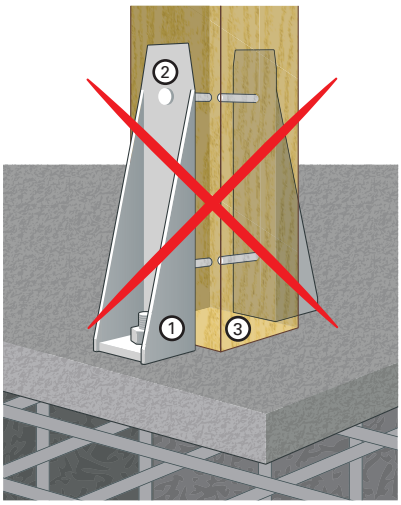


Figure 9: Wooden post simply pressed onto the ground

Good
1: Hex head bolt (with CE mark) and rods
2: Timber post with a cross-section of at least 150x150 mm
3: Concealed stainless steel post base with flitch plate and base plate (ETA)
4: Stainless steel anchor bolt (ETA)

Bad
1: Bracket at the base
2: Nails
3: Post in contact with the ground

✓ *Note: There shall be no water stagnation at the post bases.*

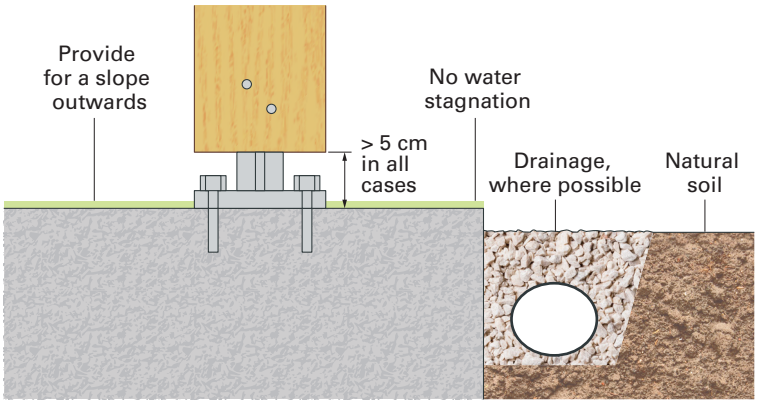


Figure 10: Possible configuration at post base

The structure must be designed to resist:

1. Seismic activity and positive and negative wind pressure on the parallel faces of the building.

   To do this, the structure must be:
   - stabilised on the inside by being fixed to the structure
   - stabilised on the outside by bracing (strong post or brace assembly)

2. Seismic activity and positive and negative wind pressure perpendicular to the building façades.

   The structure must be connected to the main structure by high tensile, shear-resistant components (structure tipping over).

3. The vertical effects caused by negative wind pressure and vertical acceleration during seismic activity.

   The structure must be anchored to the ground (uplift risk) by its posts.

   Referred weight on the roof structure is strictly forbidden.

CHOICE OF MATERIALS

Choosing the right building materials and products is of prime importance to the safety and durability of the buildings. This information sheet provides selection criteria for choosing these products. The performance levels meeting the criteria must be specified by the manufacturer and marked directly on the product or the label accompanying it. For this information to be usable, it must be specified in a precise format, namely the format associated with the CE mark.

Figure 11: Logo that must be displayed on products bearing the CE mark

Timber

Because of the marine environment on the Island of Saint-Martin, only the following should be used as structural components:

- softwood;
- tropical hardwood;

for which the maximum moisture content is less than or equal to 20%. Choosing the right timber has a considerable influence on the durability of the structure.

Timber used for the structural elements must meet class 4 requirements and have anti-termite protection.

Timber used for the non-structural elements must meet class 3 requirements (through natural durability or treatment).

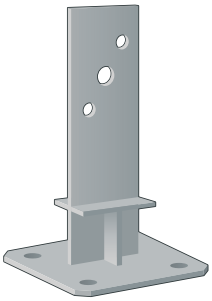
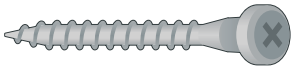
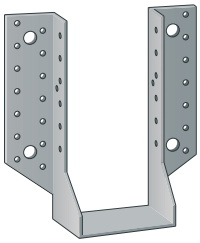
Joints

Timber structure joining and fixing systems must be made out of stainless steel.

Structural joints created with metal components are subject to CE marking, a "European Technical Assessment" (ETA) and technical specifications by the supplier.

Nails of any type, including twist nails working under tension, should never be used. Joints that work under tension can be made using exterior construction wood screws or bolts, and these can be combined with plates or corner braces where necessary.

The timber structure should rest on reinforced concrete works (foundations, floor slabs, etc.) defined in the corresponding NF DTUs. It is important to make sure that these works do not have major defects (cracks or visible corrosion of reinforcements, in particular).

Choice of materials	
Hex head bolts Fields of application: purlin hangers, mixed reinforced brackets, post bases.	
Stainless steel anchor bolt Fields of application: purlin hangers, post bases.	
Concealed stainless steel post base with flitch plate and base plate Fields of application: awnings.	
Stainless steel screw Fields of application: purlin hangers	
Structural wood screws Ø 5 mm Field of application: timber component assembly.	
Stainless steel purlin hanger Fields of application: beams, purlins, stringer beams and rafter abutments.	

BRACING

Bracing can be done by using braces on the post/beam joints. Using strong joints instead of braces is the preserve of professionals.

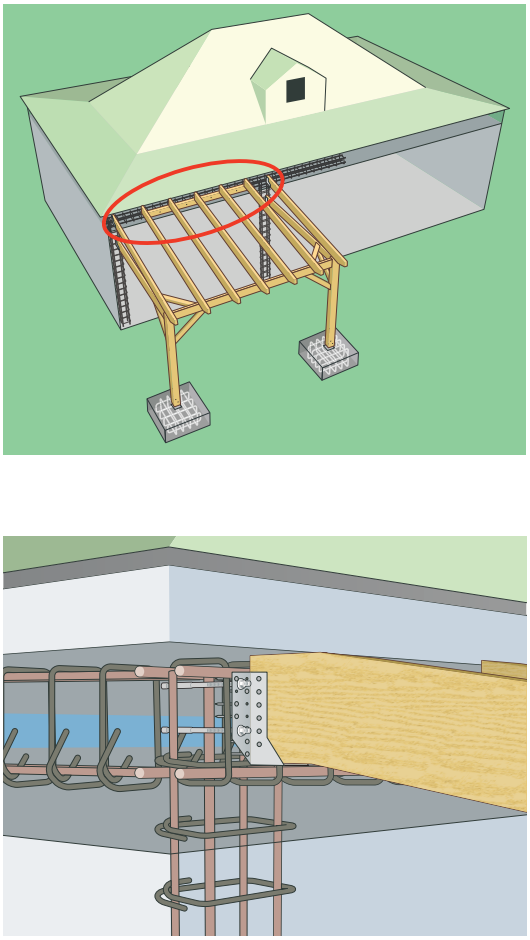


Figure 12: Bracing representation

Horizontal bracing taking up the torsion effects
Horizontal bracing taking up the tipping effects
Bracing using a brace

The foundations must be sufficiently heavy to counteract the uplift force generated by the wind.

✓ *Note: Fastening into the masonry is not authorized. Fastening into a tie beam.*

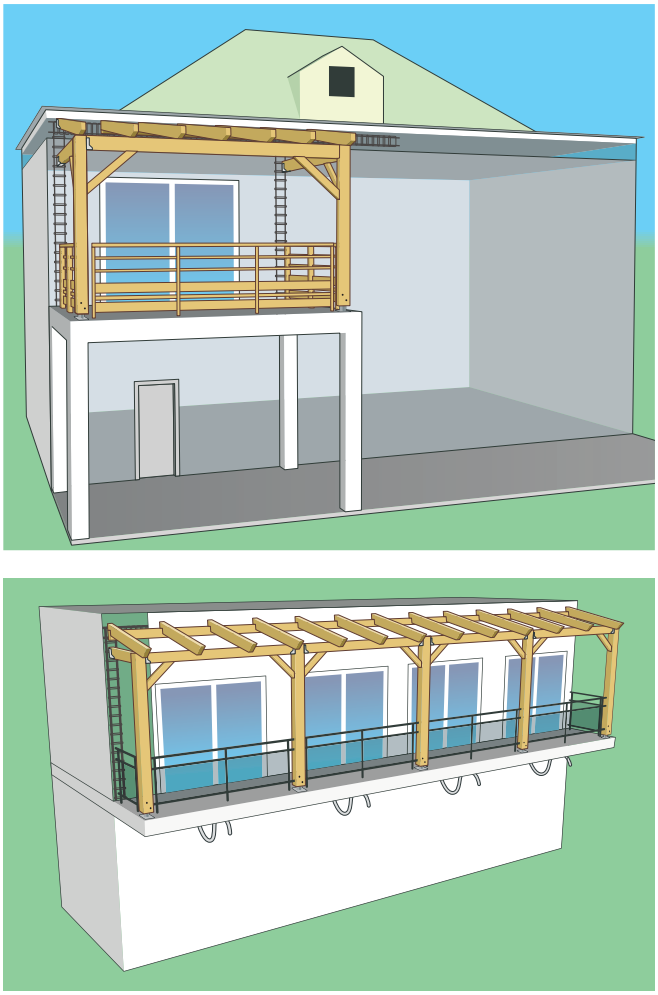


Figure 13: Examples of awnings on balconies

DIMENSIONING EXAMPLE

The foundations must be sufficiently heavy to counteract the uplift force generated by the wind. If in isolation, minimum dimensions of 1 x 1 x 0.8 m³ are required.

- Practical example

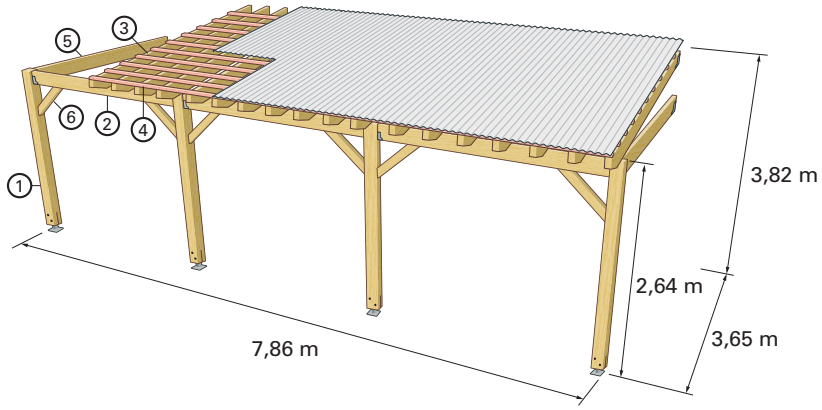


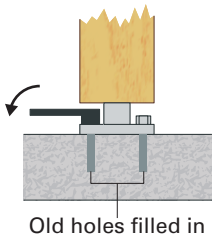
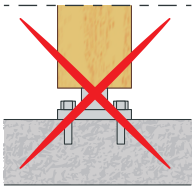
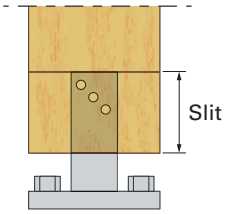
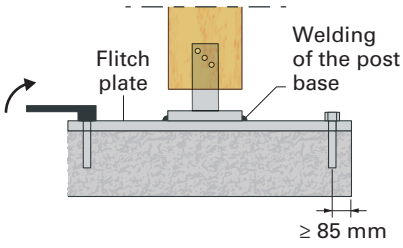
Figure 14: Fastening of the structure to the main structure

1: Post: 150 x 150 mm
2: Purlin: 165 x 75 mm
3: Rafter: 150 x 50 mm
4: Batten: 50 x 50 mm
5: Upright: 80 x 80 mm
6: Bracing arm: 80 x 80 mm

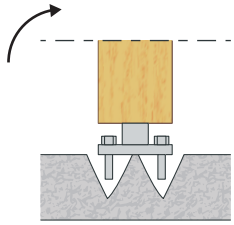
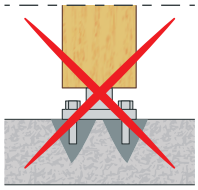
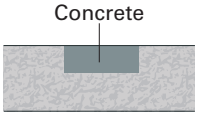
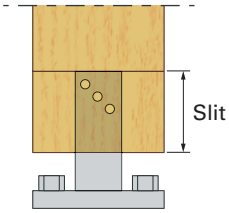
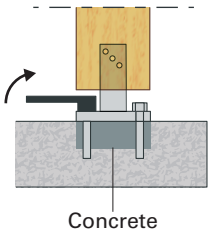
Hypotheses
Altitude: 10 m
Awning length: 786 cm
Awning depth: 365 cm
Height under upright: 240 cm
Height under ridge board: 383 cm
Height under rafter plate purlin: 265 cm
Rafter plate overhang: 30 cm
Roof type: Metal sheet
Roof slope: 32.50%
No ceiling or insulation
C18 class timber used
Density: 500 kg/m³
Eaves board: 190 mm x 20 mm

INSTALLATION

If the posts have been broken but the anchor fixings and base are undamaged:

	– Undo the existing bolts; – Remove the post bases and existing posts; – Remove the existing anchor bolts; – Fill the existing holes.
	– Never re-fix the structure using the same holes.
	– Make a wide enough vertical slit in the centre of the new post to receive the flitch plate of the recommended post base (see the chapter on materials). Professionals must create the vertical slit; – Identify the position of the rods (or bolts) on the sides of the post; – Drill through the post so that the rods can be inserted. (see the chapter on materials); – Insert the post base flitch plate into the post and insert the rods.
	– Weld the post base on a steel flitch plate; – Vertically drill into the concrete base to at least the depth of the existing holes (100 mm min); the minimum permissible distance to the sides of the slab is 85 mm; – Fix the ≥ Ø12 mm stainless steel anchor bolts in place (see the chapter on materials).

If the posts have been ripped out and the base has been damaged:

	– Remove the damaged post bases / posts.
	– Never re-fix a post base to a damaged location.
	– Remove the damaged concrete; – Prepare concrete to be used to fill the hole
	– Make a wide enough vertical slit in the centre of the post to receive the flitch plate of the recommended post base (see the chapter on materials). Professionals must create the vertical slit; – Identify the position of the rods (or bolts) on the sides of the post; – Drill through the post so that the rods can be inserted. (see the chapter on materials); – Insert the post base flitch plate into the post and insert the rods.
	– Vertically drill into the concrete base; the minimum permissible distance to the sides of the slab is 85 mm; – Fix the ≥ Ø12 mm stainless steel anchor bolts in place (see the chapter on materials).

MAINTENANCE

Maintenance should be carried out on timber awnings once a year. This may only amount to a simple visual check on its condition and nothing more. The following points in particular should be inspected:

- Make sure there is no damage (fungi or insects), especially in those areas with the greatest humidity (post bases, assemblies in which several pieces of timber are in contact, pieces of timber in direct contact with the structure).

✓ *Tip: the components should be able to withstand being tapped by hand with a screwdriver, knife or wood chisel-type object.*

- Bracing in good condition

Make sure the bracing is present and effective.

Make sure the joints are tight (bolts tight, no protruding screw heads).

✓ *Tip: As regards external structures, the presence of areas with very different colours near the joints is a sign that the structure has moved too much and needs retightening.*

STORAGE

Timber humidity levels must not be too high when installed:

- Take the necessary precautions on site to prevent excessive humidity absorption. Timber items should be stored upright. When storing timber for an extended period of time, the protective measures put in place should provide sufficient ventilation to prevent condensation phenomena.
- The timber should not be laid directly on the ground as this can cause soiling and moisture absorption. Similarly, it should not be laid on uneven surfaces as this can cause distortion.

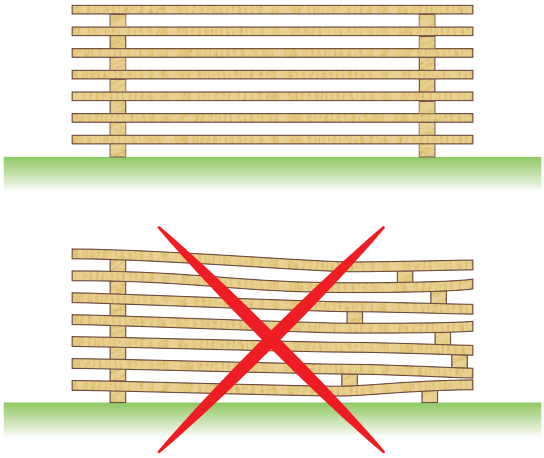


Figure 15: Storing timber components

Glossary

Bracing: building arrangements that provide horizontal awning or corridor stability (cross pieces, brace supporting struts, joints with rotational rigidity, etc.);

ETA (European Technical Assessment): it is awarded in respect of the anchor bolts and attesting to their mechanical performance under seismic load;

Moisture: mass of water in the timber expressed as a proportion of its dry mass.

Post base: bottom part of the post that houses the metallic assembly that ties it to the concrete slab.

Reference

DTU 31.1 : Travaux de bâtiment – Charpente en bois (Building works – Timber framework)

Règles PS 92 : Règles de construction parasismique

Eurocode 5 (EN 1995-1): Design of timber structures

Règles Antilles [Caribbean Regulations] – 1992 revision.

Photos

CAUE [*Conseil d'Architecture, d'Urbanisme et de l'Environnement* – Council for Architecture, Town Planning and the Environment] Guadeloupe.

DEAL [*Direction de l'Environnement, de l'Aménagement et du Logement* – Environment, Planning and Housing Directorate] Martinique and Guadeloupe.

Délégation interministérielle pour la reconstruction des îles de Saint-Barthélemy et Saint-Martin [Interministerial delegation for the reconstruction of the islands of Saint Barthélemy and Saint Martin].

Diagrams

Laurent Stefano

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