# Domestar V3 (5/8): Assembly instructions

## Video Domestar Frequency 3 5/8 Installation guide

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## DOMESTAR Fréquence 1

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## DOMESTAR Fréquence 2

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# DOMESTAR Fréquence 3 (3/8)

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# DOMESTAR Fréquence 3 (5/8)

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# DOMESTAR Fréquence 3 KRUSCHKE (3/8)

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# DOMESTAR Fréquence 3 KRUSCHKE (5/8)

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# DOMESTAR HEXDOME (5/8)

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Domestar FAQ

Welcome to the assembly instructions for the geodesic dome using DOMESTAR Fréquence 3 connectors. If you have any questions, click on Contact to get in touch with me: I will be delighted to help you.

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**Photo Credits**: most of the photos in this guide were taken by the talented **Simon G**, who I sincerely thank for contributing to this guide!

I don’t yet have a video for building the 3V 5/8 geodesic dome, but you can watch the video for building the 3V 3/8 dome. However, in this old video I put up all the triangles of a floor before putting on the belt of this floor: I do NOT recommend this way of doing things. I recommend putting the belt on as the triangles are assembled.

# Materials required

- The kit of 61 DOMESTAR Frequency 3 5/8 connectors
- 165 wooden uprights (joists) in 3 sizes (see size calculation table below)
- 330 bolts: screws and nuts. I strongly recommend TRCC bolts (round head, square neck): one blow from a hammer and they’ll lock into the wood and won’t turn when you tighten them
- For the finish, about 200 wood screws

# Tools required

- tools for cutting the studs: ideally a radial saw, otherwise a circular saw or jigsaw
- a drill a drill bit the thickness of the screws
- a spanner or ratchet to tighten the bolts, or an impact screwdriver (note: an impact screwdriver is NOT a percussion drill. With an impact screwdriver, you can screw or bolt much more strongly and quickly) or a simple screwdriver
- a hammer to drive in your TRCC bolts.
- depending on the height of your geodesic dome bench or ladder

# Size of your screws and bolts

The bolts must go all the way through the **thickest** side of **the upright** and the connector: if, for example, you buy 35*60mm uprights then the bolts will go all the way through the 60mm. I therefore advise you to choose a bolt length that is around 10 – 20 mm longer than the greatest thickness of your wood.

**If your bolts are less than 10mm longer, assembly will be much more complicated.**
FOR EXAMPLE, if your wood is 40x70mm, you will need to drill through 70mm. So use an 80mm or 90mm bolt.
For thickness, I recommend 8mm bolts (=M8)

**I recommend using bolts rather than screws.** The assembly is much more solid, as the bolts go through. But above all, dome assembly will be easier.

# Choosing the size of your dome

Domestar 3V (=frequency 3) geodesic dome connectors allow you to mount a “frequency 3” 5/8 geodesic dome using only 3 different sizes/lengths of upright. You will need:

- 80 large A-pillars
- 55 medium B-pillars
- 30 small C-pillars

The size of the uprights will determine the size of the dome. Height, radius and diameter are therefore determined by the length of the uprights.

Explanations:

For a geodesic dome with a radius of 3m (6m in diameter) I therefore need to cut:

- 80 A-pillars (large) measuring 1.177m
- 55 B-pillars (medium) measuring 1.151m
- 30 C-pillars (small) measuring 0.986m

**NB:** If you use another geodesic dome calculator, remember that these calculators often give you the measurements from “hole to hole”, i.e. the centre of the connector. However, there is 3 cm between the centre of the connector and the start of the connector leg. That’s why the 2 “hole to hole” columns are 6cm longer. But you must cut to the length of the 3 columns A, B and C.

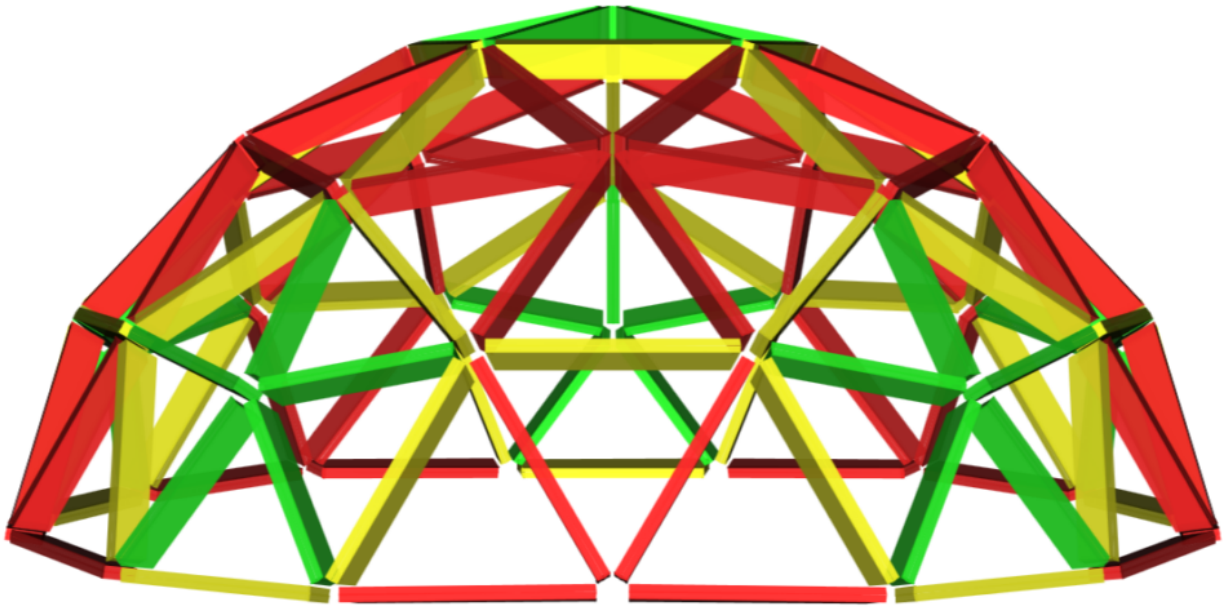
## What does the 5/8 in the 3 5/8 frequency mean?

Frequency 3 geodesic domes come in 2 formats: 3/8 and 5/8 (sometimes also called 4/9 and 5/9 or even 5/12 and 7/12: it’s just a habit! The domes 3/8, 4/9 and 5/12 are all exactly the same).

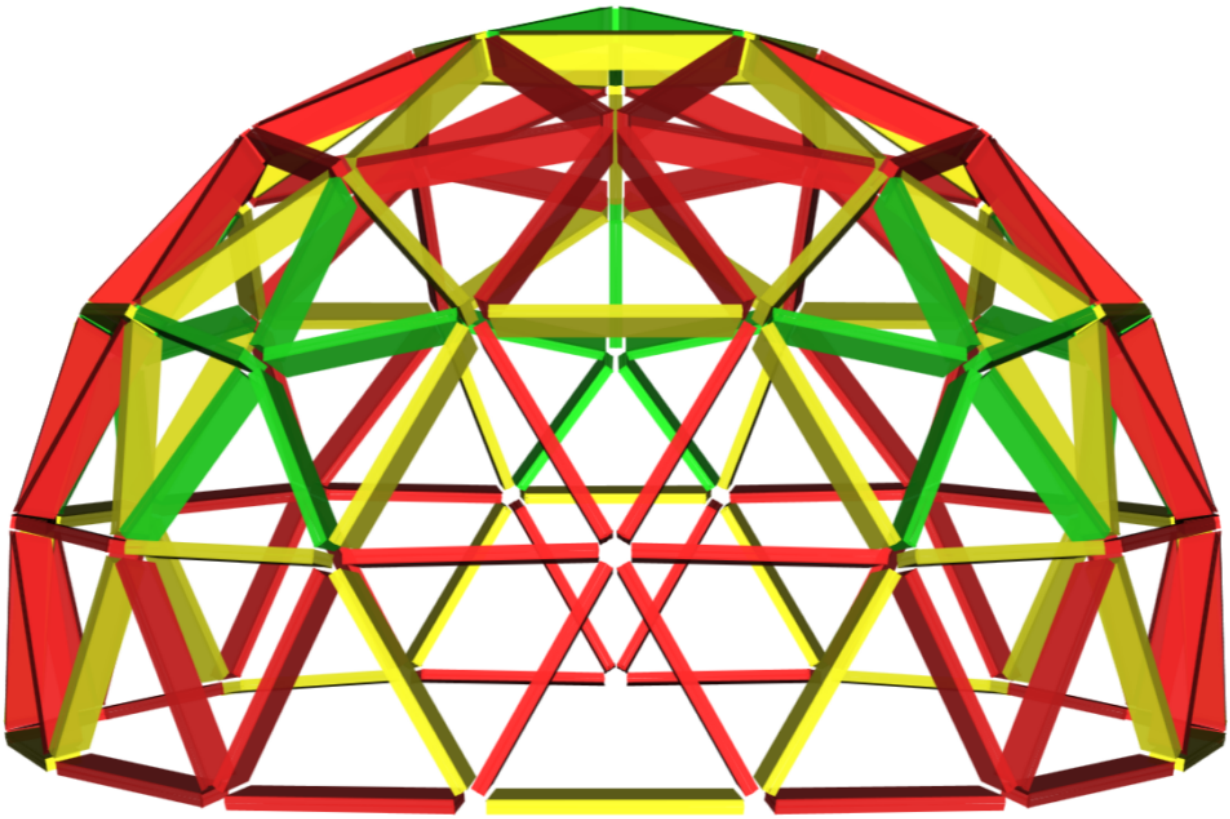
This is the division of the sphere:

- 3/8: a little less than half the sphere
- 5/8: a little more than half the sphere. These domes are one level higher than the 3/8 domes: they are therefore taller.

Here is an example of a 3V 3/8 dome:



And the 3V 5/8 dome:



## Which wood should be used for the uprights of a geodesic dome?

I recommend using construction or decking timber that offers good strength at a fair price.
The MINIMUM length and width of the uprights should be 30mm to ensure the stability of the structure.
Decking joists are very attractive, with dimensions of around 62x38mm or 70x45mm. The joists are also often treated to class 3 or class 4, giving this wood very good resistance to rain.
Construction rafters / half-rafters (on the websites of major building retailers, type in “construction timber”) are often even cheaper and thicker with dimensions of 75×50, but their treatment and rain resistance is often inferior (generally class 2 – this is yellow-coloured wood)

**TIP**: choose your own wood from the big building stores. Check

that the wood is not twisted or warped. Twisted joists will make assembling your geodesic dome much more difficult!

**TIP**: If you plan to treat the wood, I advise you to do so after cutting the wood but before assembling it: it will be easier to paint/spray the wood flat than once the geodesic dome has been assembled.

**TIP**: buy a few extra large uprights: they will be needed to support the high levels of the dome during construction.

**ATTENTION**: if you choose uprights with widths greater than 38mm you may need to bevel some of the uprights: do a test on a 6-point connector with your uprights to see if the ends are not touching. If they do, then bevel them a little.

# My experience of fitting the domestar V3

A frequency 3 dome is more difficult to assemble than my domestar V1 and domestar V2: there are many more parts to assemble and more uprights are levered and therefore require supports during assembly. Here are my recommendations:

- Leave the triangles that do not yet have a support for as short a time as possible without a belt: as soon as you have assembled 2 triangles connect them with the belt and continue to add the belt when you add triangles
- 1st floor: absolutely provide a support as long as the belt has not been fitted
- 2nd floor and above to be done by 2 people. Provide supports
- From the 2nd floor onwards, the connectors start to bend under the strain of assembly. But don’t worry: once everything is assembled, the connectors will return to “normal”
- Be sure to mark the letters on the uprights (A, B and

C): it’s very easy to get the wrong upright. Take the time to check. Getting the wrong jamb is really the worst mistake you can make: after that, nothing fits properly. So take the time to check regularly!
- Don’t try to wedge the dome before you’ve finished it: all the connectors will move and shift during assembly to ‘automatically’ adjust.

# Preparing to build the geodesic dome

During this preparation phase we will:

- Cut out the uprights
- Drill all the uprights
- Insert all the screws

## Prepare the location for the geodesic dome

Once you have determined the diameter of the geodesic dome using the table above, make sure that you have enough space for your dome and that this space is flat enough.

IMPORTANT: this 3V 5/8 frequency geodesic dome **is NOT flat:** the base is not flat. If you absolutely need a flat base, then it is better to start with a 2V dome. There is a Krushke method for building a flat 3V 5/8 dome, but this kit does not allow it.

## Cutting the uprights

You’re going to cut:

- 80 large A-pillars
- 55 medium B-pillars
- 30 small C-pillars

Start by cutting out the first upright and checking that its length corresponds exactly to what you wanted.
Use this first upright as a template: trace the cutting line on the wood to be cut using this upright. Remember to cut just after the cutting line, not on the cutting line, to allow for the thickness of the blade.

# Bevel some joists if necessary

Depending on the thickness of your joists, it may be necessary to bevel some joists before assembly to prevent them from touching each other on the connector.

More information on bevelling and joist bracing.

# Drill the uprights

Now you need to drill the uprights to accommodate the bolts. Here again, great precision will help you during assembly.

**The bolt hole should be 40mm from the end of the upright.**

IMPORTANT: You must drill through the LONG side of the upright to ensure maximum stability for the dome.

## Make a drilling pattern for greater precision

I strongly recommend that you create a drilling template.

Make your first hole very precisely on one side of the first stud.

Mark the side from which your drill bit entered: as you risk not drilling straight through, only the side where you started drilling is accurate. The exit side is likely to be off. This isn’t serious, but to be accurate you need to base yourself on the entry side.

Now turn the upright over and place a small piece of wood underneath. Screw shims tightly against the jamb around this wooden plate.

Finally, drill the wooden plate through the jamb, entering the drill bit through the EXIT hole.

That’s it, your pattern is ready.

Now finish the holes in the uprights, using your template and trying to drill as straight as possible.

**Mark the side where you put the drill bit in**: this is the side that will be placed against the connectors, as it is the most accurate side.

Insert the bolts into the holes. Pay close attention to the direction of insertion: insert the bolts through the OUTPUT of your drill bit. This way, the end of the bolt is on the same side as the entrance to your drill bit and it’s this side that will be against the connector.
Use the hammer to ensure that the square part of the TRCC bolts penetrates the wood.

**Tip**: if the hammer isn’t enough, you can use a screw and washer and tighten the bolt so that it goes into the wood.

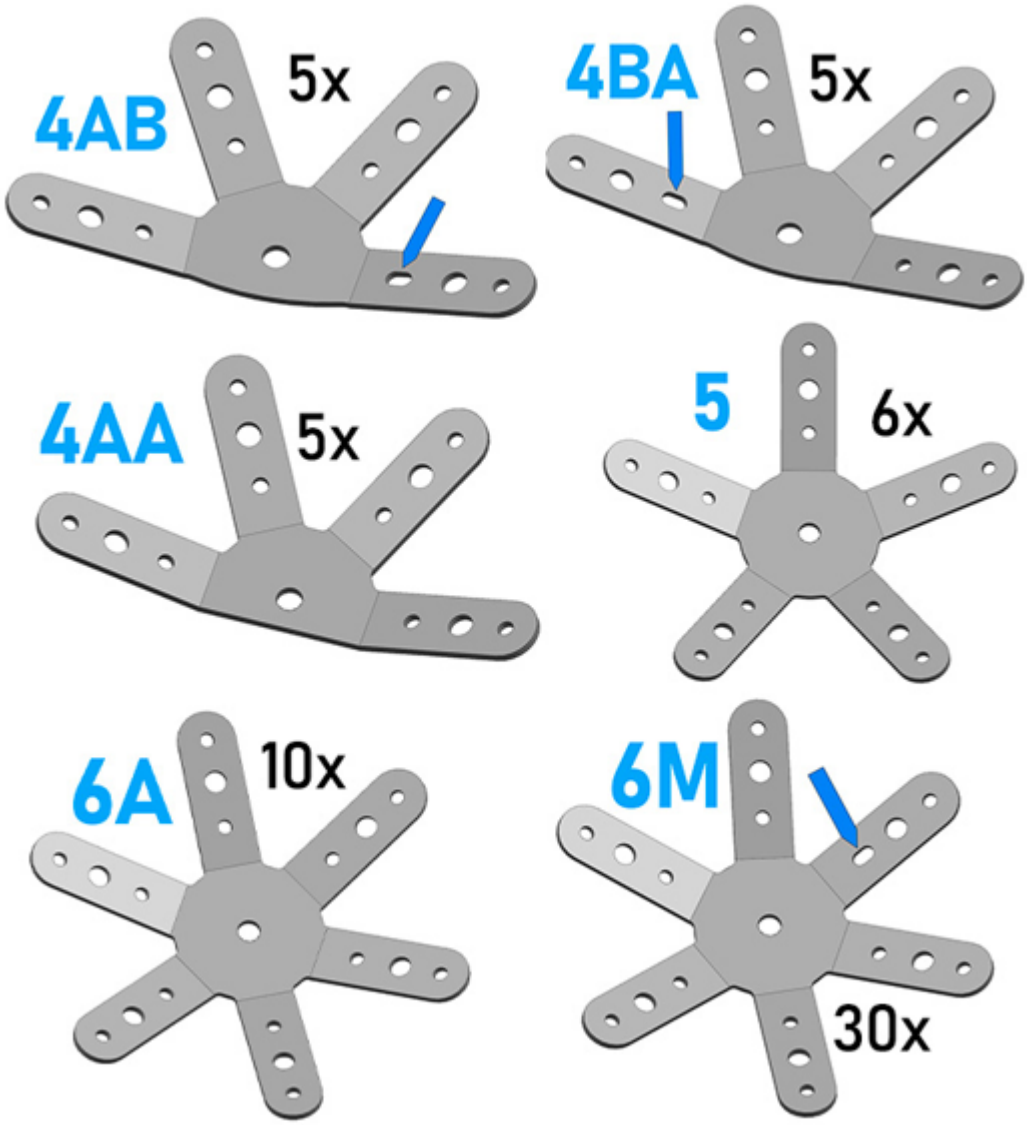
# Presentation of connectors

Your Domestar pack includes 4, 5 and 6-pin connectors.

I advise you to start by sorting your connectors:

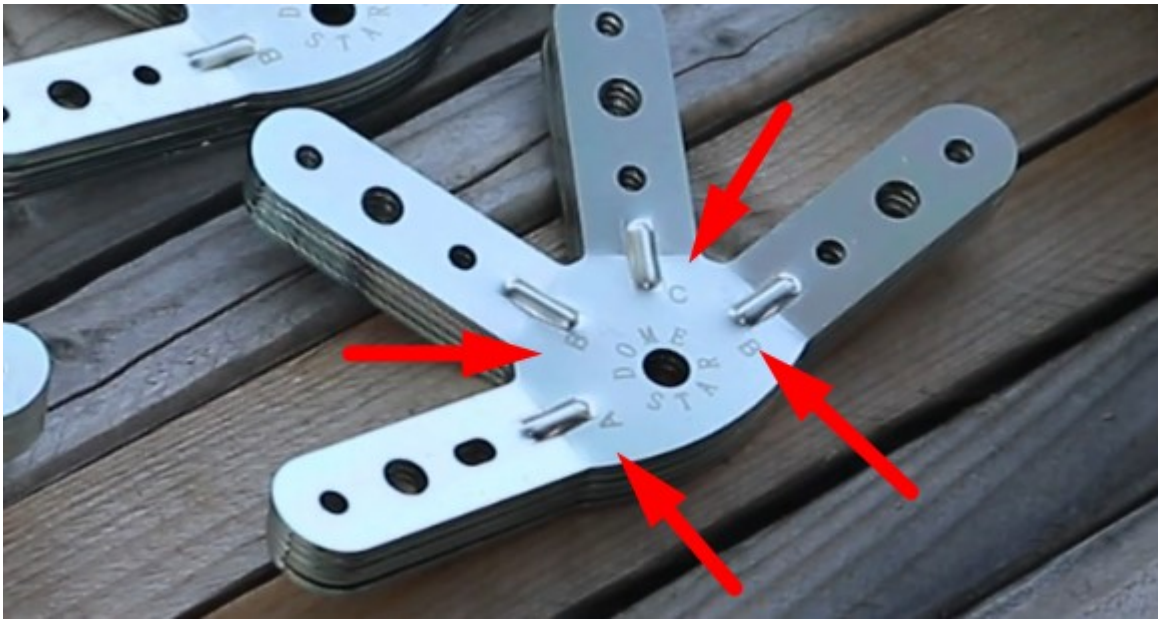
WARNING: there are:

- 3 different types of 4-leg connectors
- 2 different types of 6-leg connectors

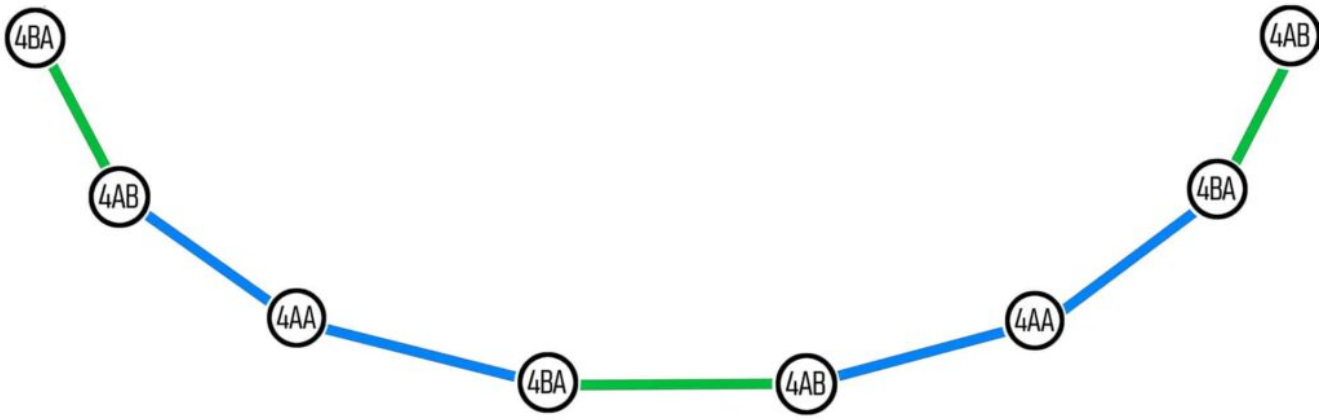



The drawing above shows the distinguishing features that allow you to tell the difference between the connectors.

Each leg also has a letter engraved on it so you know whether you need to fit an A, B or C strut:



# Step 1: the base




The colour of the lines indicates which amount to use:

- blue: large amount A
- green: medium amount B
- red: small amount C

Parts required:

- All 15 4-pin connectors
- 10x A
- 5x B

Assemble 5 B-pillars with 4BA and 4AB:

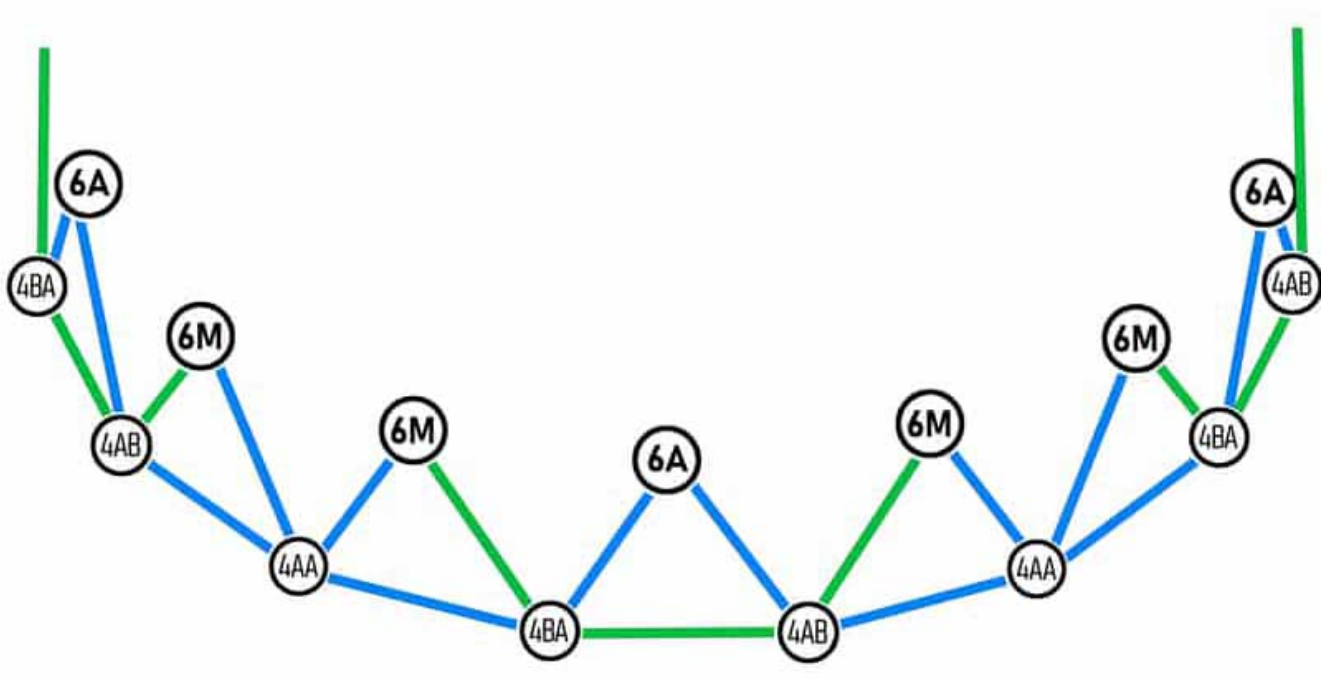
Make sure I only assemble the legs with a B on them.

Continue by assembling 2 large A-pillars with a 4AA connector between them. Repeat 5 times:

Finally, assemble the base to the floor, alternating our two types of uprights.
The one with the two connectors and then the double one with the 4A in the middle.

Once your base is assembled, you can roughly check the lengths of a few diagonals to make sure you haven’t made an oval. There’s no need to be centimetre accurate here, but if you have a 1 metre difference in your diagonals you’ll struggle later! Everything adjusts itself during assembly, but with varying degrees of effort!

# Step 2: First level




In this stage, we will first assemble the floor:

- 5 AA triangles
- 5 triangles AB (A on the left)
- 5 triangles BA (B left)


A
DOME
STAR


Once these 15 triangles are assembled, mount your first triangle on the base, paying attention to the letters. I advise you to add a temporary support to this triangle:

I recommend placing all the ready triangles on the ground in the right place:

Follow the plan above with the second triangle:

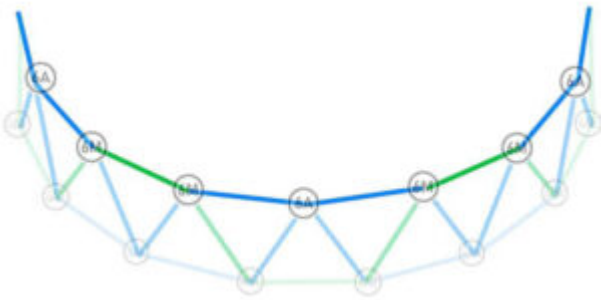
Before going any further, add the first upright of the belt

(an A or B upright depending on the indication on your connector):

Continue to progress by adding triangles and belt:

Until you complete the first level and the first belt:

So in this stage we've also built up the belt:



## Stage: Second level and second belt

We’ll proceed in the same way as above: prepare all the triangles on the ground, place the triangles on the ground in the dome in front of their final position and assemble triangle by triangle, adding the 2nd belt between 2 triangles as soon as they are assembled.

You will need 5 CC triangles:

- 10x C (Small),
- 5x C5

And for 5 triangles BA and 5 triangles AB:

- 10A
- 10B
- 10x 6M

Be careful to fit 5 BA triangles with B on the left and 5 AB triangles with A on the left.

Take 10 small C-pillars and 5 5-pin connectors. Screw these connectors to 2 uprights.

Parts required:

- 5x A (Large),
- 5x B (Medium)
- 5x 6M

Be careful, this is the first moment when it’s quite easy to make a mistake if you’re not careful.

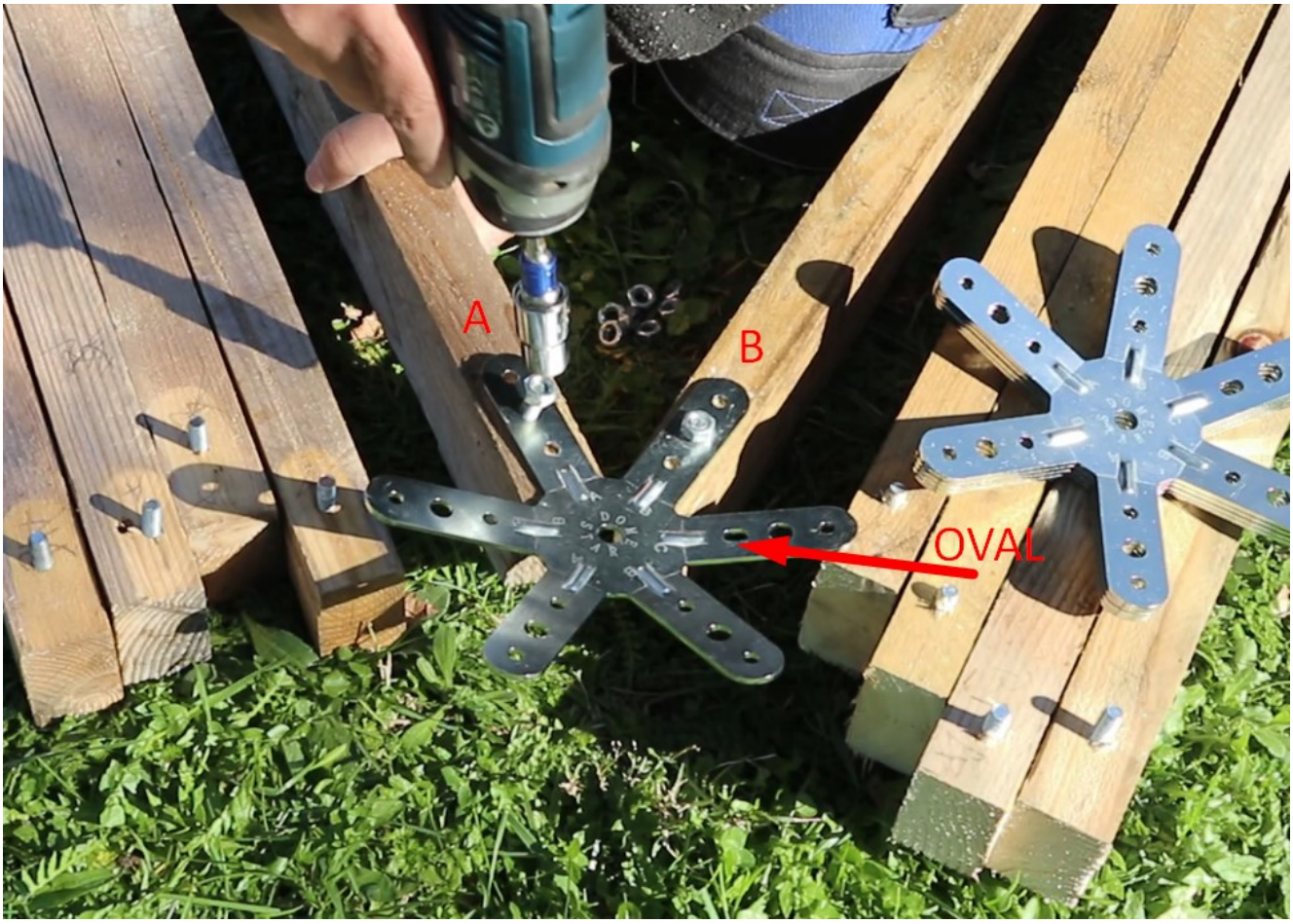

For the first 5 triangles, put the B-pillars to your right and the A-pillars to your left.

Assemble 5 triangles.

Parts required (= same as above):

- 5x A (Large),
- 5x B (Medium)
- 5x 6M

This is the opposite of step 2B: you now have the A’s on your right and the B’s on your left.




Assemble 5 triangles.

## Step: placing the triangles

Fix your first triangle with 2x C between 2 6M connectors and support it temporarily. Be VERY careful to respect the lettering on the connector legs.

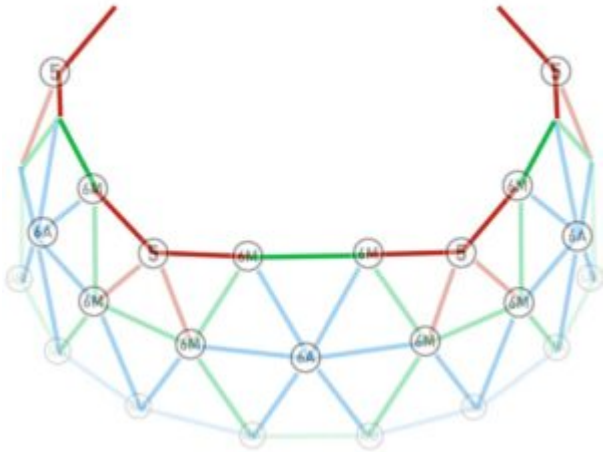
IMPORTANT: I advise you to add a support on these triangles as long as the belt is not installed. Use temporary uprights to support these triangles.

Now fit the triangle next to the one you've just fitted: a BA or AB triangle (look carefully at the letters on the connectors):

Here too, it's important to support these triangles until the belt is fitted using other temporary uprights.

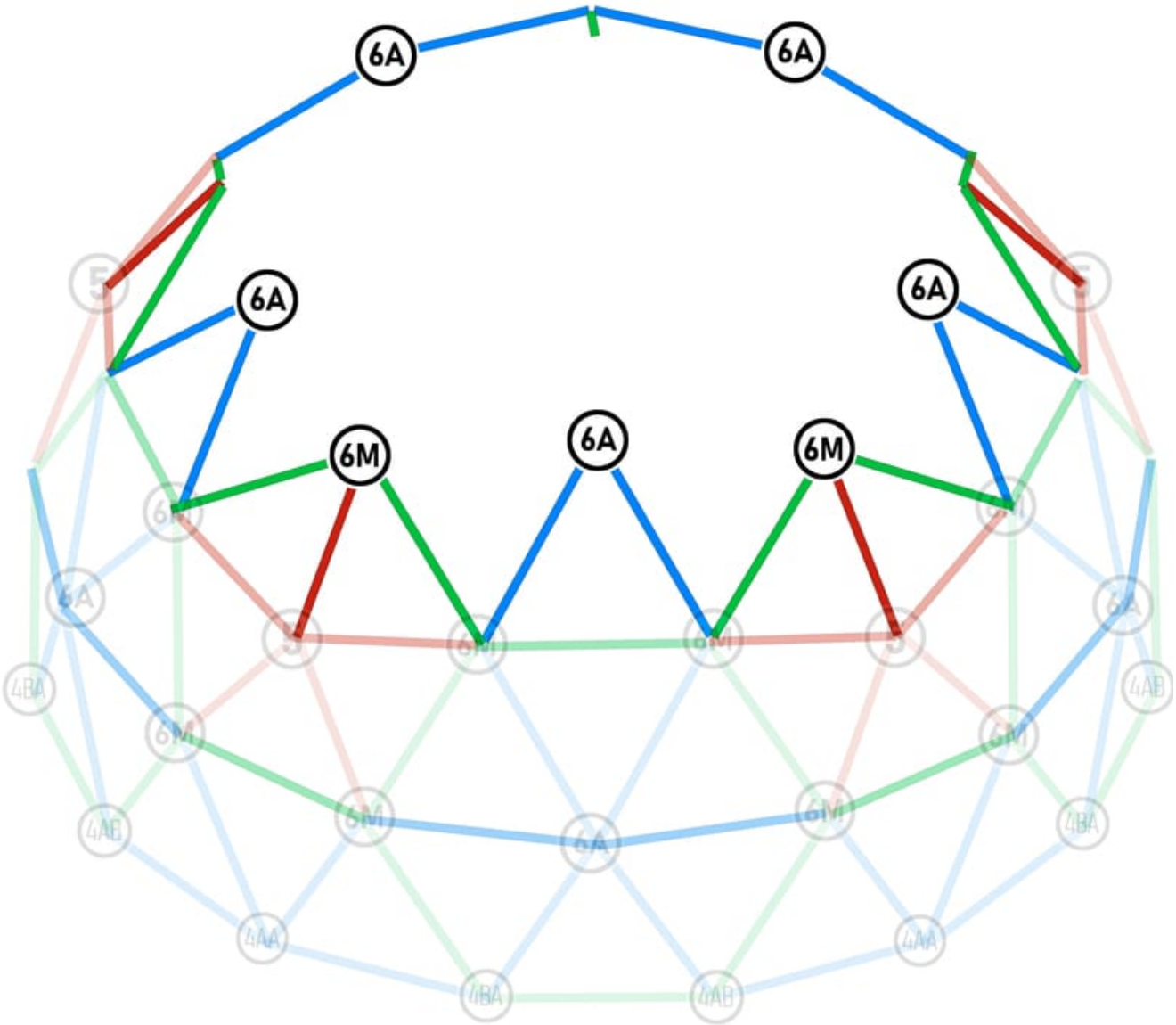
Immediately fit the 2nd belt between 2 triangles without waiting until all the triangles have been fitted: C-pillars on

either side of the 5-leg connectors and B-pillars elsewhere (between 2x 6M):



Continue to follow the plan until you have both your 2nd level and your 2nd belt:

## STEP 3: Third level




There’s a slight difference at this level: instead of just installing 2-legged triangles, we’re going to install 3-legged triangles. Look at the plan above: at the 6M connectors we’re going to install a C and 2B.

We’ll start by preparing everything on the ground:

For the 3-leg triangles:

- 5x 6M,
- 10B and
- 5C

Screw a C and 2B onto each 6M connector:

For 2-leg triangles:

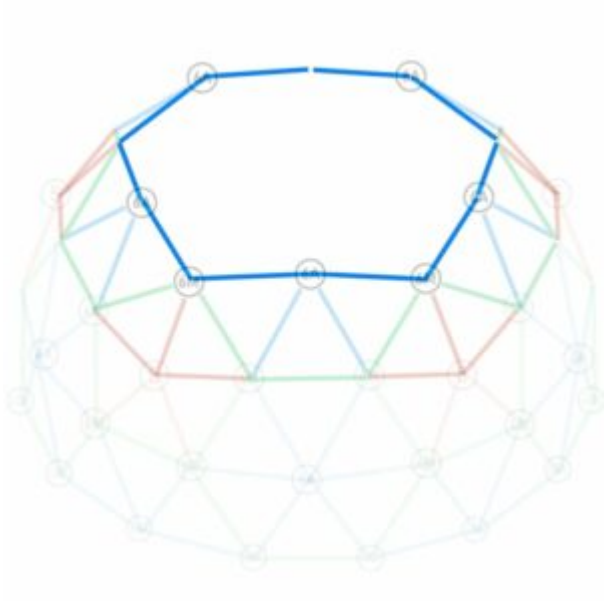
- 5x 6A
- 10x A

Simply screw 2x A onto each 6A connector:

## Screwing onto the dome

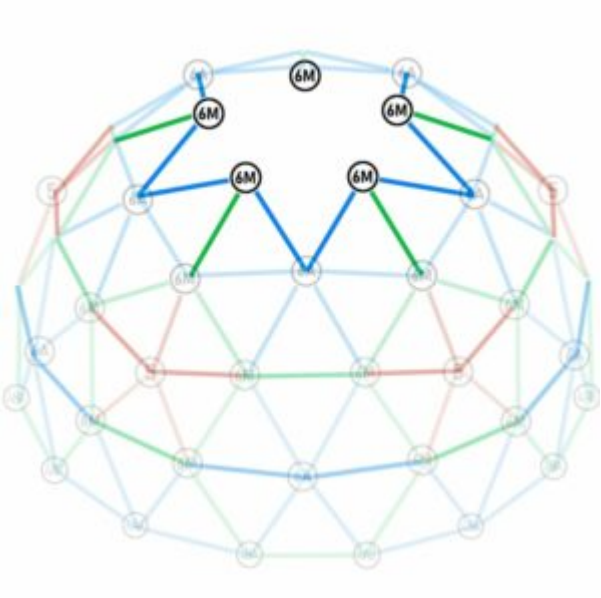
Fit a 3-leg triangle, using the 5-leg connectors as a guide: screw the C onto the 5-leg connector:

And we’ll continue circling the dome, installing the 2-leg and 3-leg triangles in turn and, above all, gradually adding the 3rd belt made up exclusively of A-pillars:



## Stage: 4th level

Now you’ve got the hang of it, everything’s getting easier!




This level only has 3-point triangles, and what’s more, they’re all identical:

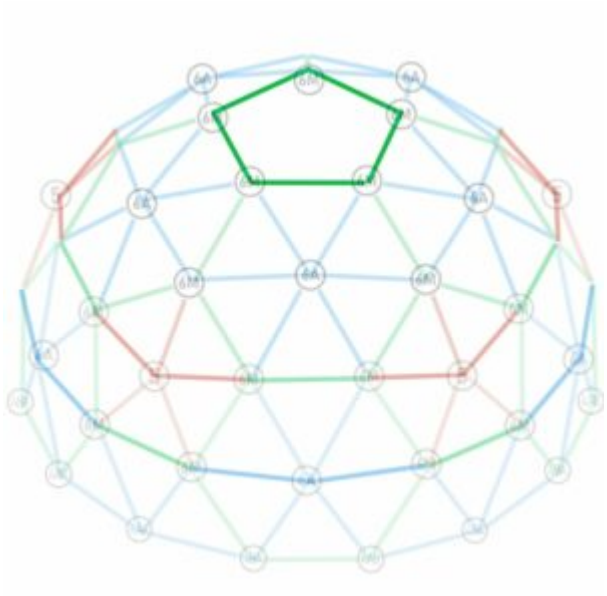
- 5x 6M connectors
- 10x A
- 5x B

Screw a B surrounded by 2x A onto each 6M connector:

Equipped with your 3-leg triangles, be careful: the central leg B must be fitted to a 6M connector, not 6A.

Support these triangles well!

As soon as you’ve mounted 2 triangles, install the 4th and final belt, made entirely of B:

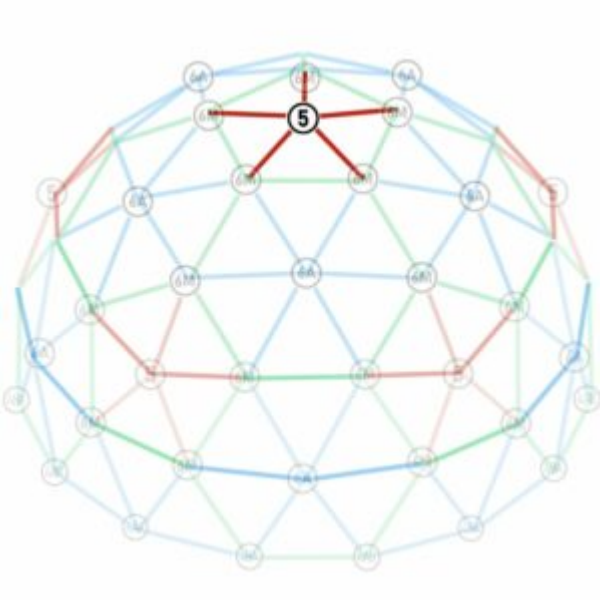


# STEP 8: Last pentagon

Materials required:

- 5x C (small),
- 1x C5

Install the last 5-pin connector on a small upright and install at the very top of the geodesic dome:




Support the upright during assembly until 3 uprights are assembled:

# Finishes

## Wood screws to prevent slipping

Your bolts are held in place by compression and over time they can unscrew and the connectors will start to turn. To prevent this undesirable rotation, I advise you to add at least 3 wood screws per connector, as follows:

# Where can I buy the necessary materials?

If you have any advice to share about buying equipment, drop me a line and I'll post the best tips here!

## Wood

When it comes to wood in France, you can find decent prices without having to negotiate in the big building stores: Castorama, Leroy Merlin, Brico Depot… I find that the professionals are sometimes much more expensive than the building superstores unless you have an account and negotiate for a long time.

## Bolts

For bolts I found the best prices in Europe at **auprotec**(website) with fast delivery and reasonable prices.

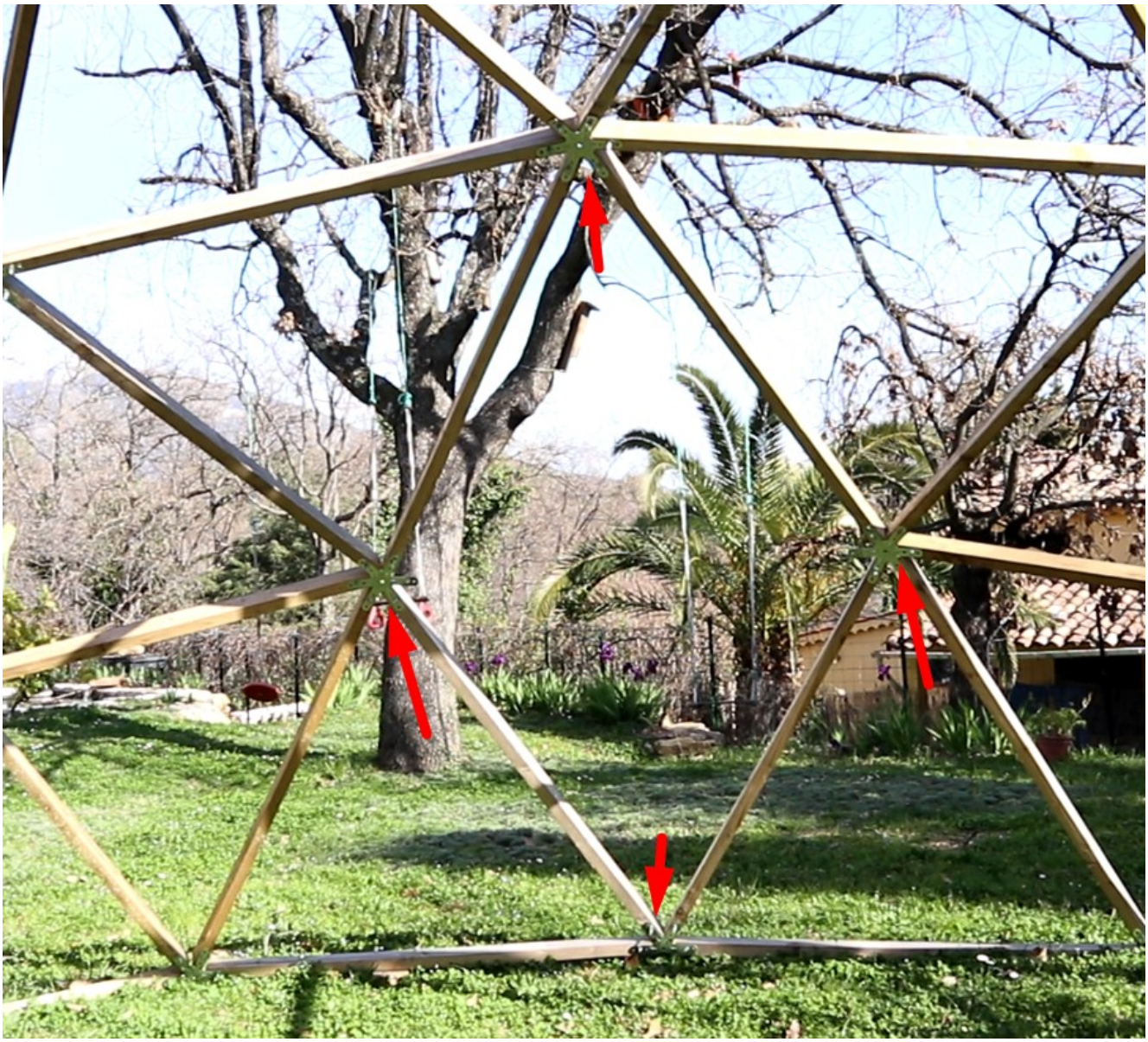
TIP: it is often worth buying 100 bolts rather than 50 because of their policy of reduced prices according to quantity.

Direct link to TRCC bolts

# How do I fit a door into a geodesic dome?

I don’t have any experience of dome doors, but I’m sharing on this page my ideas on how I would go about inserting a door into my domes.

However, it’s easy to remove 1 upright from the first belt to leave an easy passage:



In these cases, I advise you to reinforce the structure by

adding wood screws in each free hole of the 4 connectors around your new opening.

Remove this amount at the end of construction: not during construction.