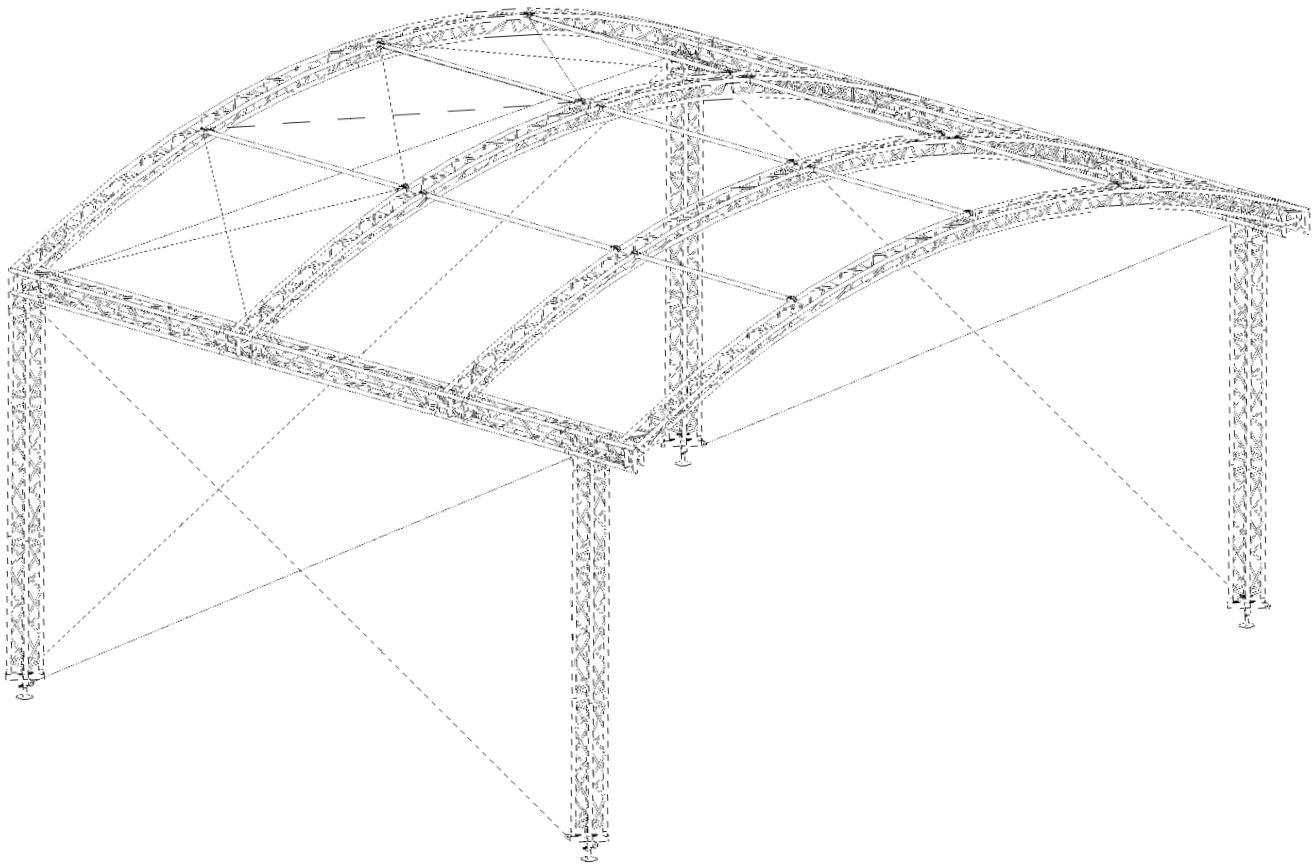
Manual + Static Calculations
Eurotruss Arc Roof 10 series



Version: 12/10/2012

Eurotruss B.V.
P.O. Box 7511
8903 JM Leeuwarden
The Netherlands
+31582158888
info@eurotruss.com
www.eurotruss.com

Index

Introduction.

Eurotruss produces a wide range of Mobile Roof Systems with a wide variety in sizes. Starting with the Arc Roof 10 series with a usable surface of 6x4m through the Pitch Roof 20 up to 24x21m.

Eurotruss strives for uniformity in its roofs. We use standard truss and only use special pieces or lengths when there is no other way. This means that except for a few special pieces all the truss in a roof can be used for other purposes. If desired we can adapt our standard roofs to your specific needs or wishes. Eurotruss can also make the standard roofs so that it can be built as a number of other roofs.

All but the smallest Eurotruss roofs are based on Towers with Sleeve blocks. Our smaller roofs have sleeve blocks built from square tubing. The larger roofs have sleeve blocks created from corner blocks bolted together with Wheelplates.

About this manual.

This manual reflects the present state and views regarding this construction. Although great effort was made to ensure the accuracy of this manual, Eurotruss cannot accept liability in the case of an error. Eurotruss reserves the right to update or alter this manual or the products described in it without prior notice.
Upon request an updated manual can be sent to the user or it can be downloaded from the download section on **www.eurotruss.com** .

Keep this manual with the construction so that people can get familiar with the building procedure, have reference material and guidelines.

This manual describes the building procedure for the entire Arc Roof 10 series roofs. Parts mentioned are used in the largest roof in this series (10x8m). Please refer to the drawings for your roof.

In general:

- Many hazardous situations can be prevented by common sense and careful planning.
- Always be aware of danger.
- Use personal safety equipment like lifelines, helmets, safety shoes.
- Never work when under the influence of drugs, medication or alcohol.
- Use skilled and trained personnel.
- Do not use damaged parts.
- When things don't fit, find out why instead of forcing it to fit.
- Do not rush things.
- Only use appropriate tools.

CAUTION:
Always keep in mind that not only you can cause a dangerous situation, everybody can.

General notes.

Damaged material.

Do not use damaged truss, truss with holes in the main tubes or truss that has been heated to over 100°C. The strength of this truss cannot be accurately predicted. This may lead to failure of (part of) the structure.
Do not use truss with deformed holes for truss pins. The hole must be round and taper from big on the outside to small on the inside of the truss.
Do not use Spigots with deformed holes. The hole must be round and taper from big on the outside to small on the inside of the truss.
Do not use bent truss pins. Do not use truss pins that have been used so often that the "mushroom" on the head prevents the pin from going through the bus of spigot.
Do not use truss pins that have been heated to over 100°C as the strength of these pins can no longer be predicted.
Do not grind off the "mushrooms" that form on truss pins during use.

Personal safety.

When assembling truss, always wear safety goggles and appropriate (safety) clothing.
When climbing into truss structures always use a safety line.
Always consult local regulation en legislation.

Helmets must be worn when work is being done above other people to avoid possibly serious injuries due to falling objects.

General directions.

Spigots have a small drilled mark halfway indicating the outside of the spigot. This is the side from which the truss pins enter.

Do not use Eurotruss truss in combination with other brands; even if they claim to be compatible with Eurotruss. Fitting together does not mean that the other truss is compatible. All Eurotruss parts have been designed to our strict demands. This means that

every component is finely related to the other parts of the truss. Using parts from other manufacturers will result in unpredictable behaviour or even failure of the construction
Do not hang heavy loads from braces only from the main tubes of the truss.
When hanging heavy loads, choose the hanging point as close as possible to one of the nodes in the truss. A node in the truss is the point where two braces come together.

While connecting truss together, make sure the truss is aligned before connecting them. The tight tolerances in our truss make it hard to assemble misaligned truss. This also applies to cornerblocks.

Anchor Shackles must be tightened and secured.

When assembling parts, keep in mind that sharp edges or parts may cause injury to bystanders and builders.

Building instructions

Before assembly, check if all required parts are available and in good condition. Check truss for damage, make sure that a sufficient amount of spigots, truss pins and r-clips or locknuts is available.

Set damaged material aside and clearly mark it as unusable. Replace or discard this material as soon as possible or have it shipped to Eurotruss for repairs.

Only build the construction as described on the drawings and part lists provided to you as this is the construction that has been statically calculated. Small deviations may have a large impact on the load bearing capability or strength of the entire construction.

Familiarize yourself with the Eurotruss range of products and accessories.
Read and fully understand this manual, it's procedures and warnings before building this construction.

Eurotruss B.V.
Castorweg 2
8938BE LEEUWARDEN
The Netherlands
www.eurotruss.com

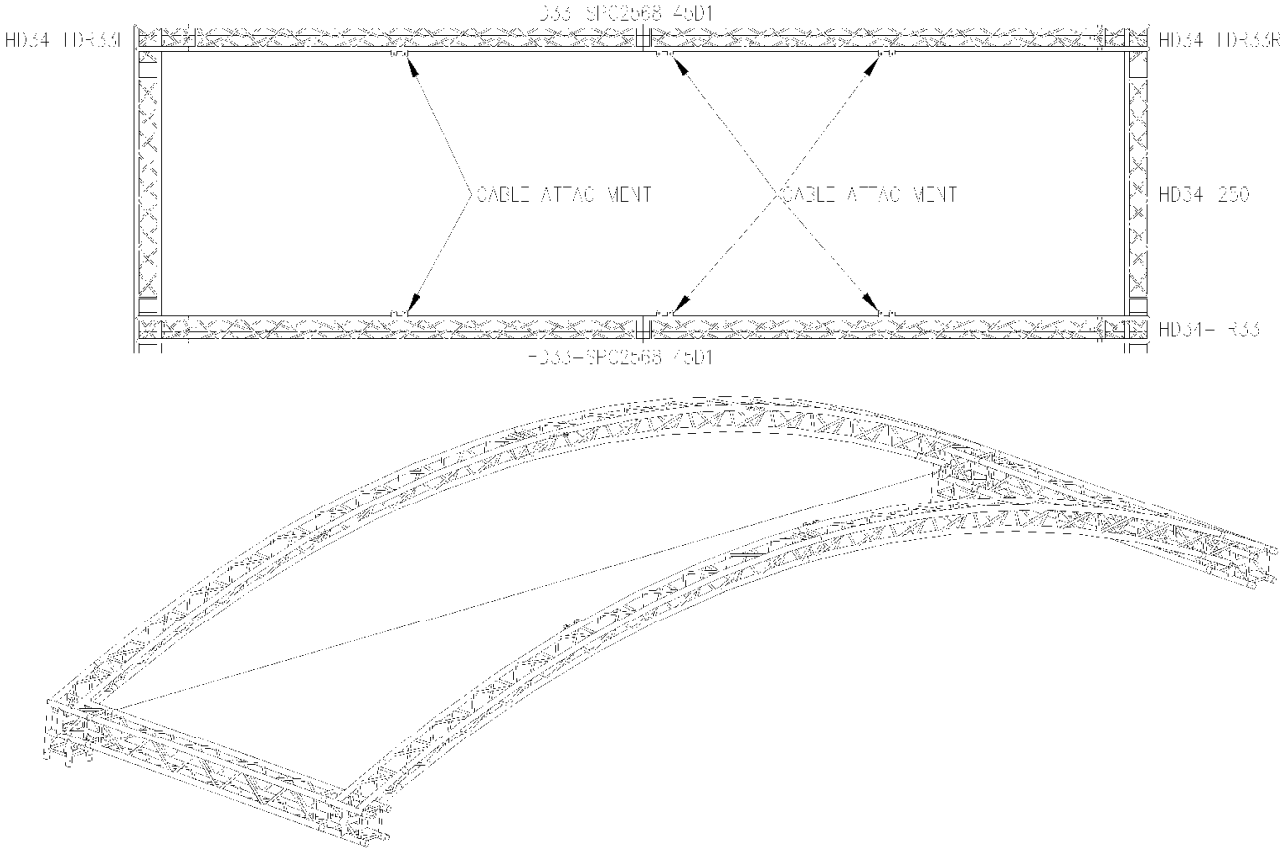
Step 1 Building the rig.

Lay out the parts where you need them. Check if everything is there.

Attention. The images in this chapter show the largest roof in this series. Please check your drawings for the parts required for the smaller roofs.

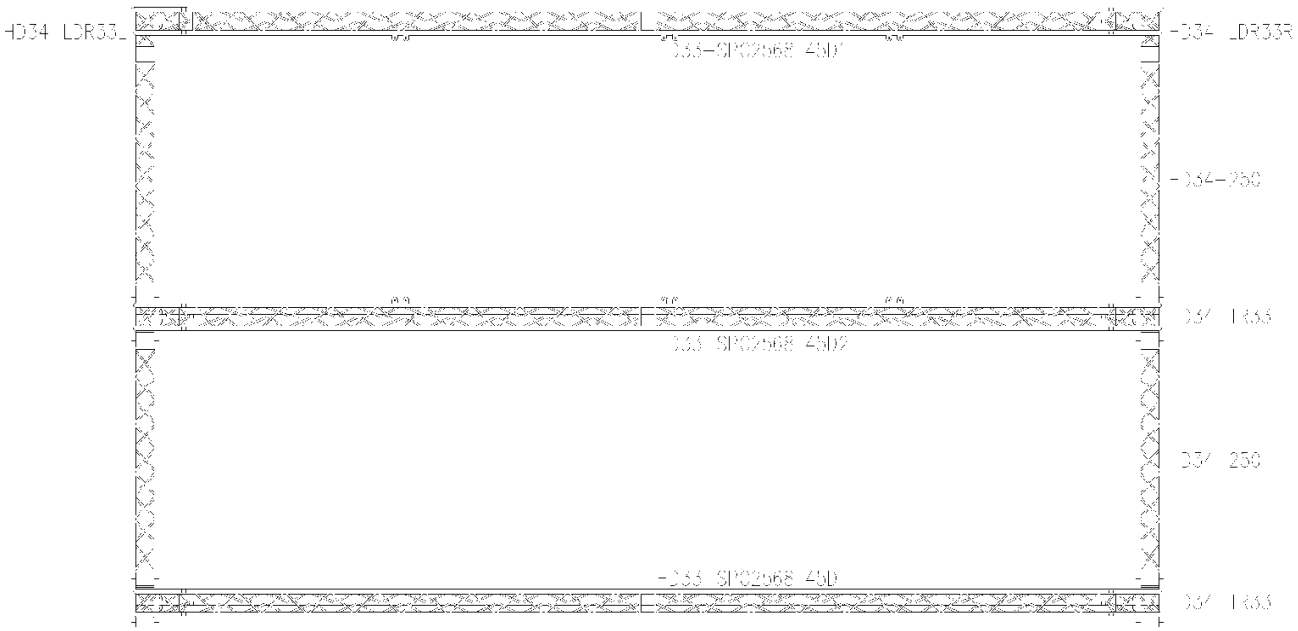
Start by assembling the rear arch. Connect the 2 arc segments together and connect them with the corner pieces HD34-LDR33L and HD34-LDR33R. These corners are constructed so that they have an attachment for the arcs, one for the legs and one pointing to the front.

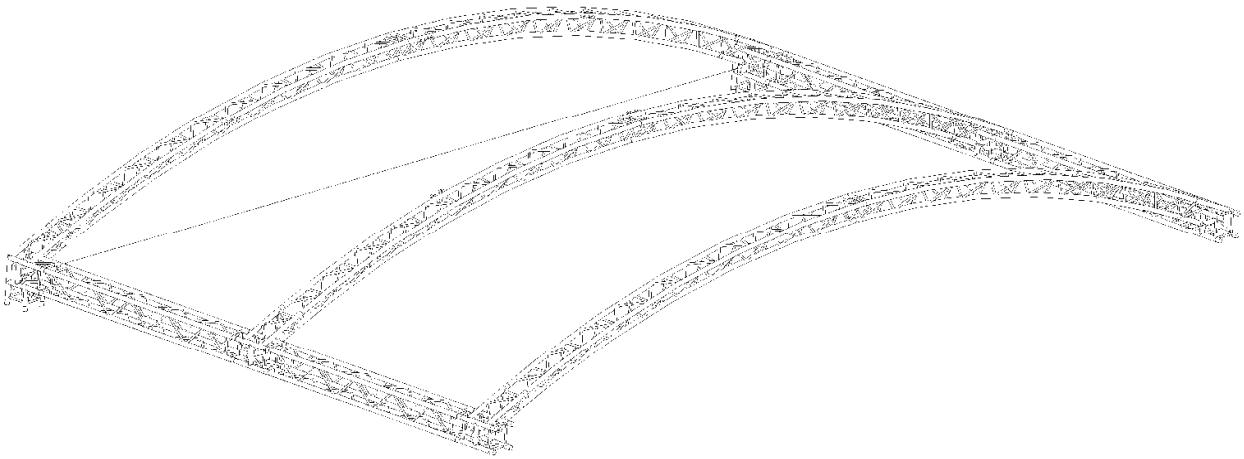
Connect both corners together using a steel cable and put just enough tension on this cable to create a structure that does not flex.
Connect the 250cm trusses pointing to the front.
Build the second arc. Use HD34-TR33 corners for this arc.



Connect the second arc to the already constructed rear arc.
Pay attention to the cable attachment plates on the arcs. They must be directly opposing.

Build the third arc. This one is similar to the previous arches, but has no cable attachment points. Attach the HD34-TR33 corners to the arch and connect the third arch to the existing construction using HD34 250cm trusses.





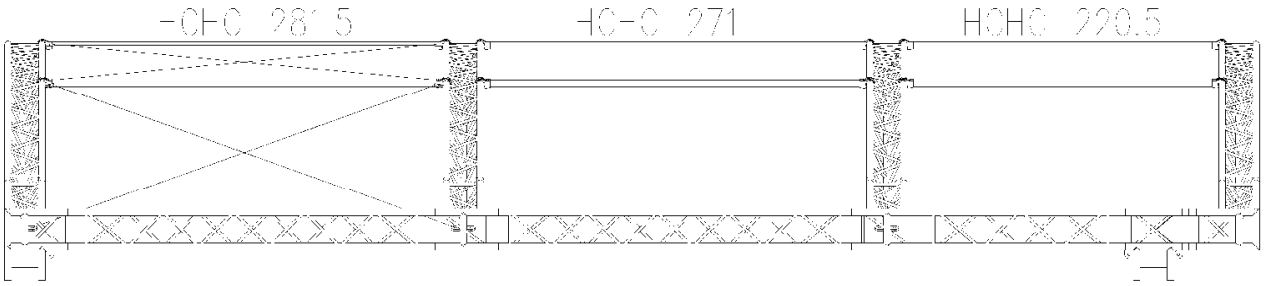
Attach HD34 139,5cm trusses to the third arc and add an HD34-TR (roof t-joint).
Build the front arc. Use HD34-L90R33L and HD34-L90R33R to connect the arc to the rig.

Add the hook on bars as shown and add the span cable crosses in the roof.

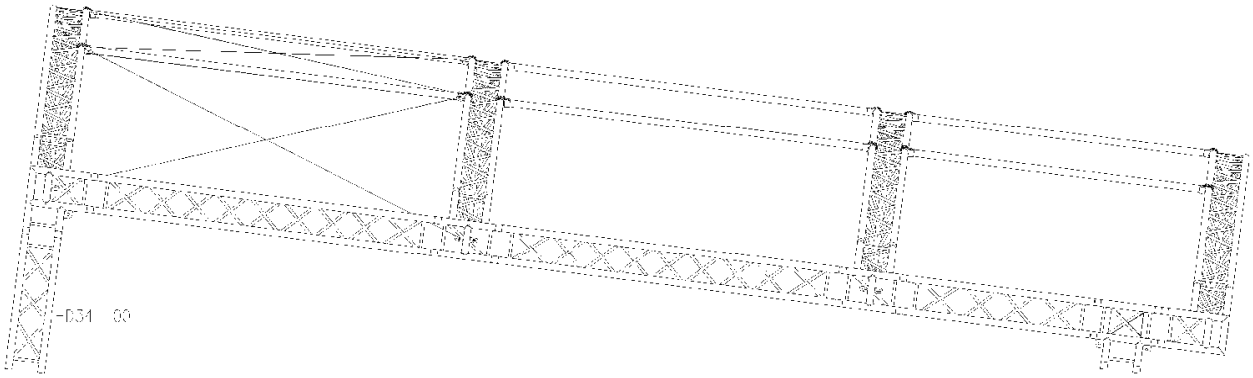
Step 2 Raising the roof.

Use a suitable lifting device for the steps in this chapter.
Suitable lifting devices can be a variety of devices. Important is that it is able to lift a load of 500kg safely to a height of at least 1,5m. Examples are forklifts, mobile cranes, hydraulic shop cranes (for example an engine hoist).

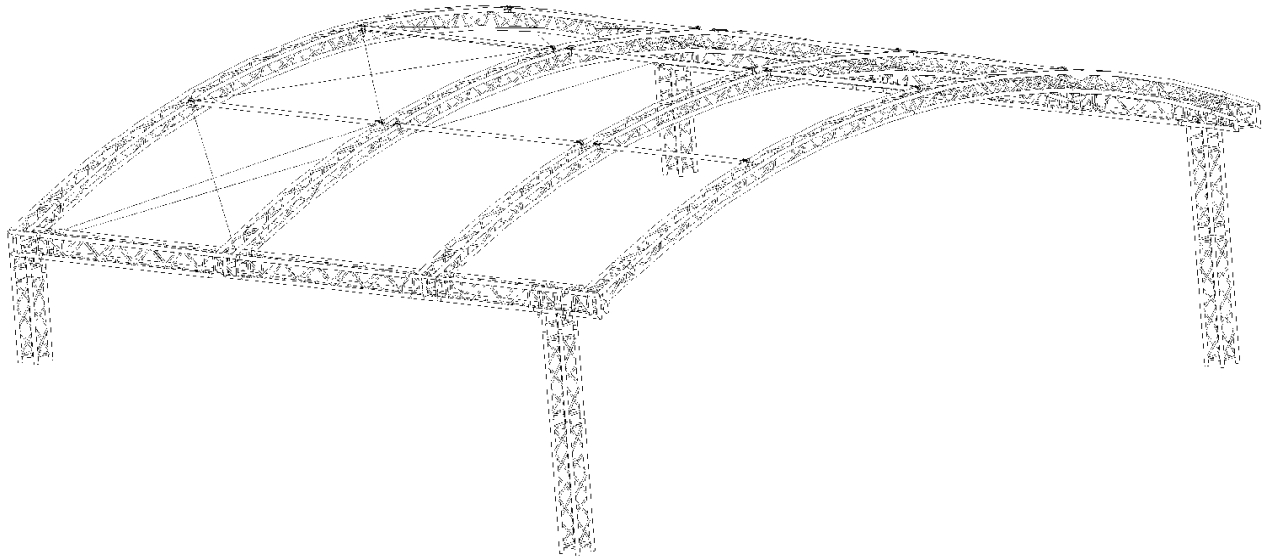
Make sure nobody stand too close to the roof while raising it.



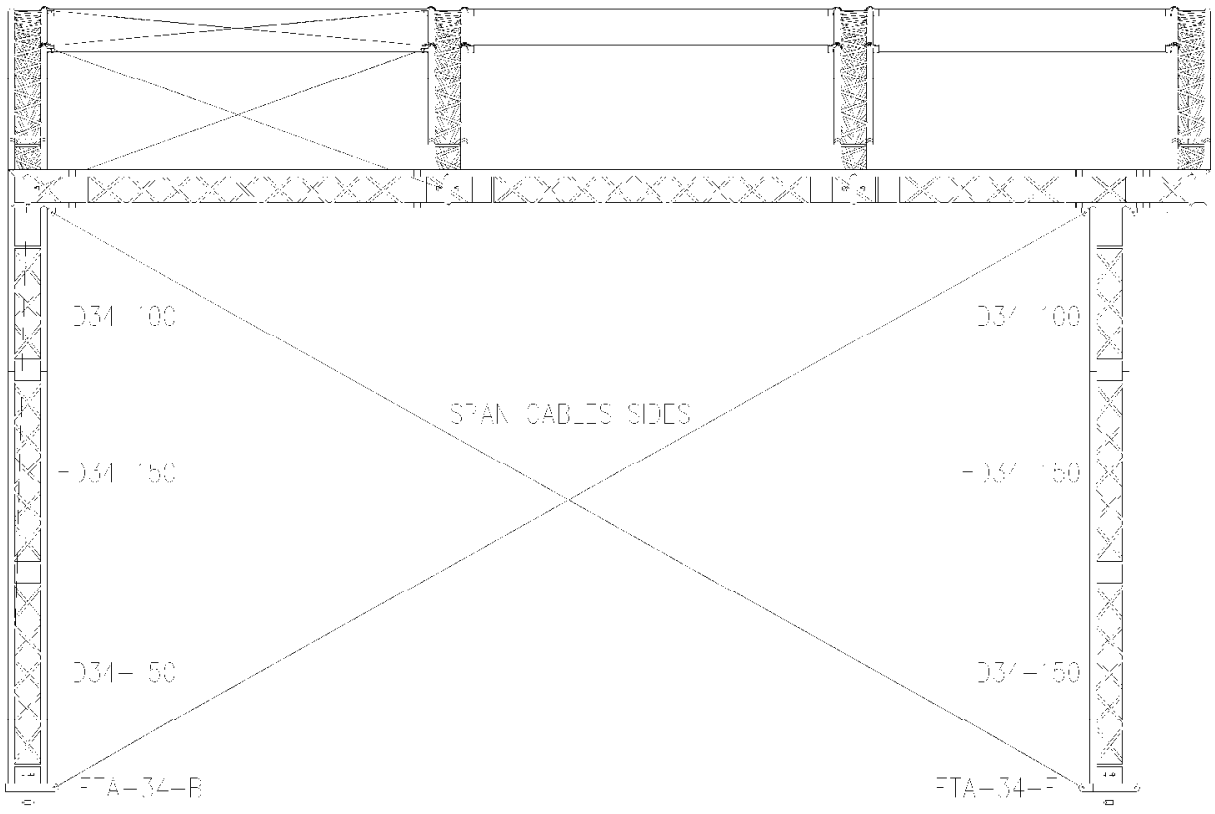
Start by lifting the rear end to a level where the first sections of the legs (HD34 100cm truss) can be connected to the corners.



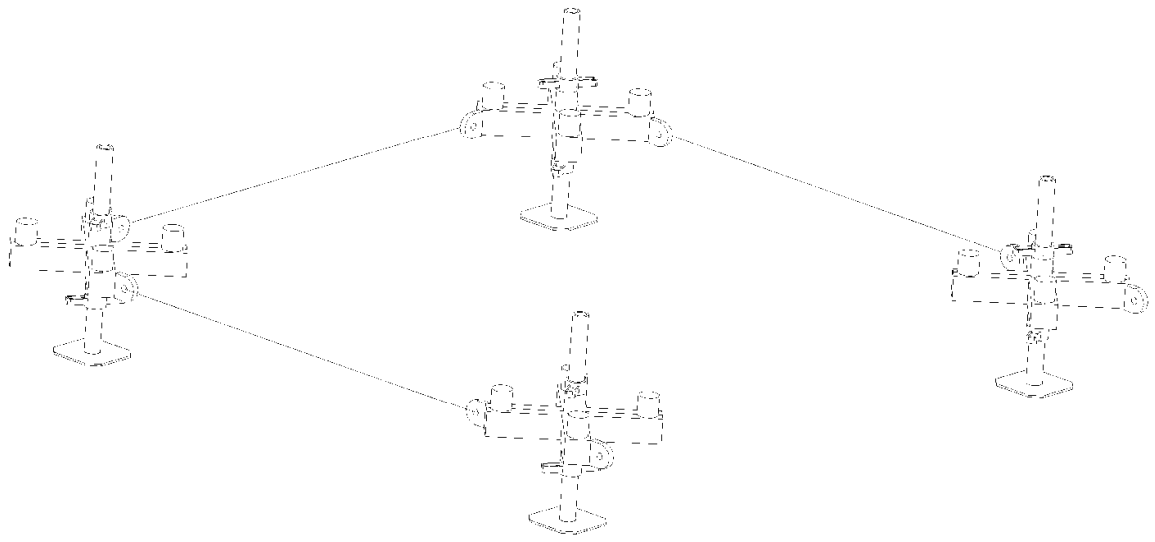
Lower the rear end and raise the front end of the roof. Put in the first section of the legs and raise the front end again to insert the second section of the legs.



Alternating between front and back slowly raise the rig by raising 1 side and putting in another section of the legs until the rig is fully raised. The legs are built (from top to bottom) from an HD34 100cm truss, 2 HD34 150cm trusses and an FD34 / HD34 small base roof.



The FD34/HD34 small bases are in 2 variants. The front legs are fitted with 2 cable attachment plates inline. They are fitted so that the plates are on the outside of the roof. The rear legs have 2 cable attachments in a 90° corner. These are fitted so that 1 plate points to the front, and 1 plate is in the rear plane.



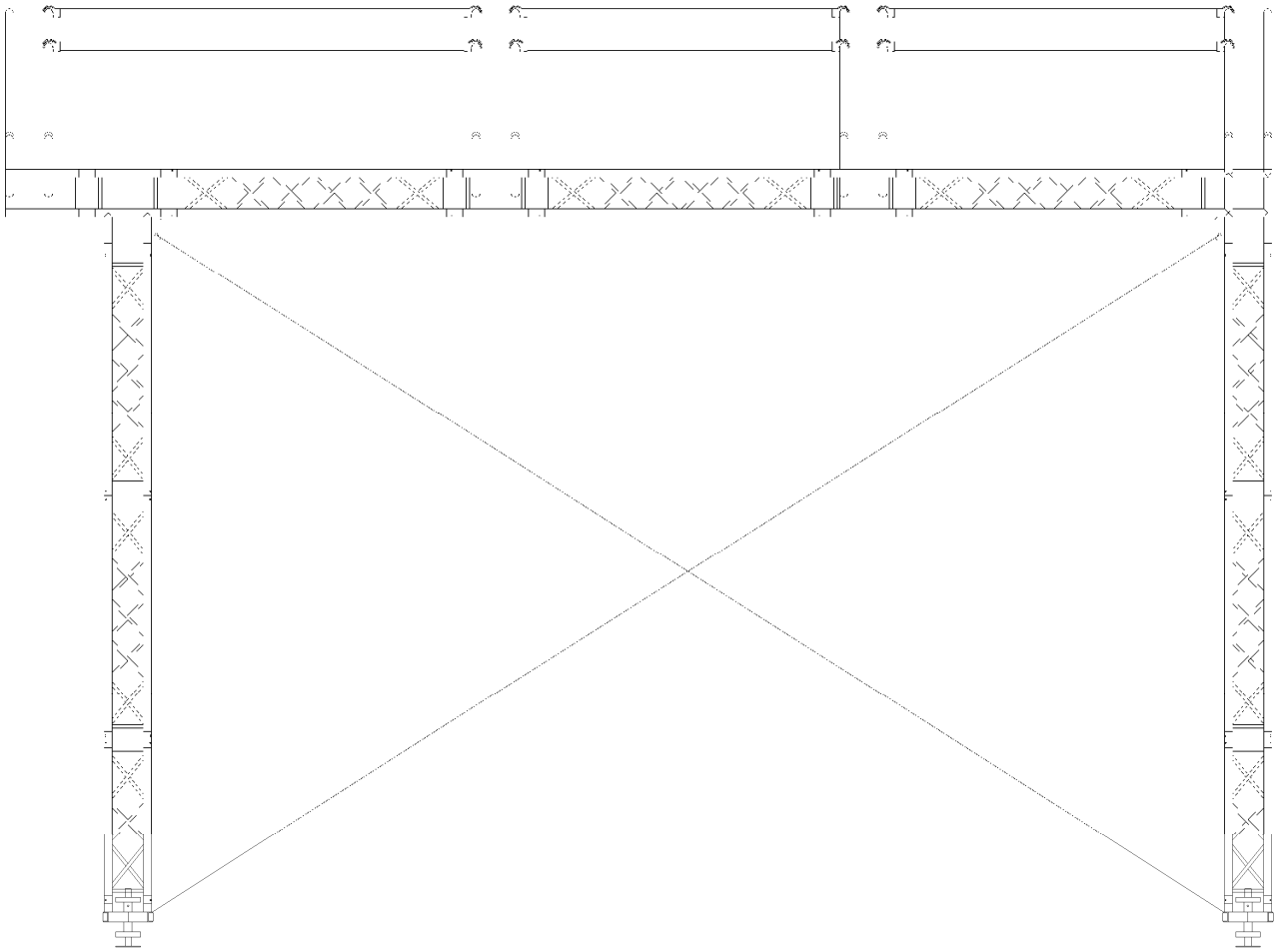
If the surface on which the roof is constructed has sufficient load bearing capacity, the bases can be placed directly on the surface. The use of rubber underneath the spindles is required.
If the surface on which the roof is constructed does not have sufficient load bearing capacity, use wood panels underneath the spindles to distribute weight. Use panels of at least 25mm thick and at least 50cm square. Use rubber between spindles and wood panels and rubber between wood panels and the surface to obtain maximum friction and reduce ballast.

The amount of ballast (see next chapter) is determined by the combination of materials.

While inserting the small bases keep in mind that there are small differences between the bases. Both front legs are fitted with small bases with 1 cable attachment plate that must be pointing to the rear of the roof.
The rear legs have small bases with 2 cable attachment plates. 1 is pointing to the front, the other is pointing to the other rear leg.

Level the roof using the threaded spindles and insert the spancables.

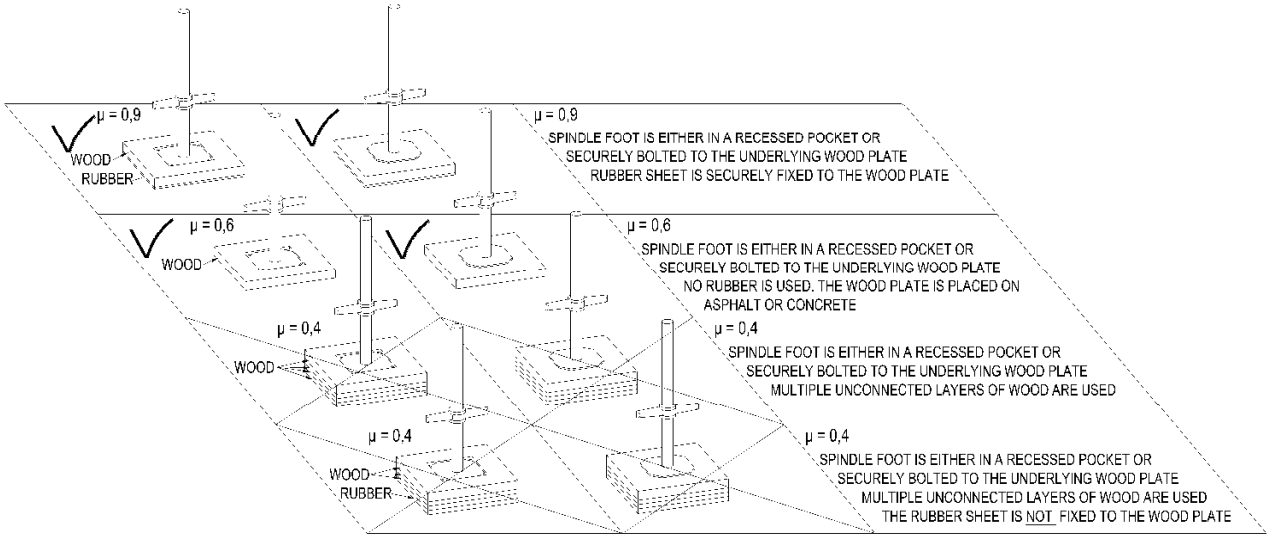
Tighten the spancables enough to take out slack. DO NOT OVERTIGHTEN!



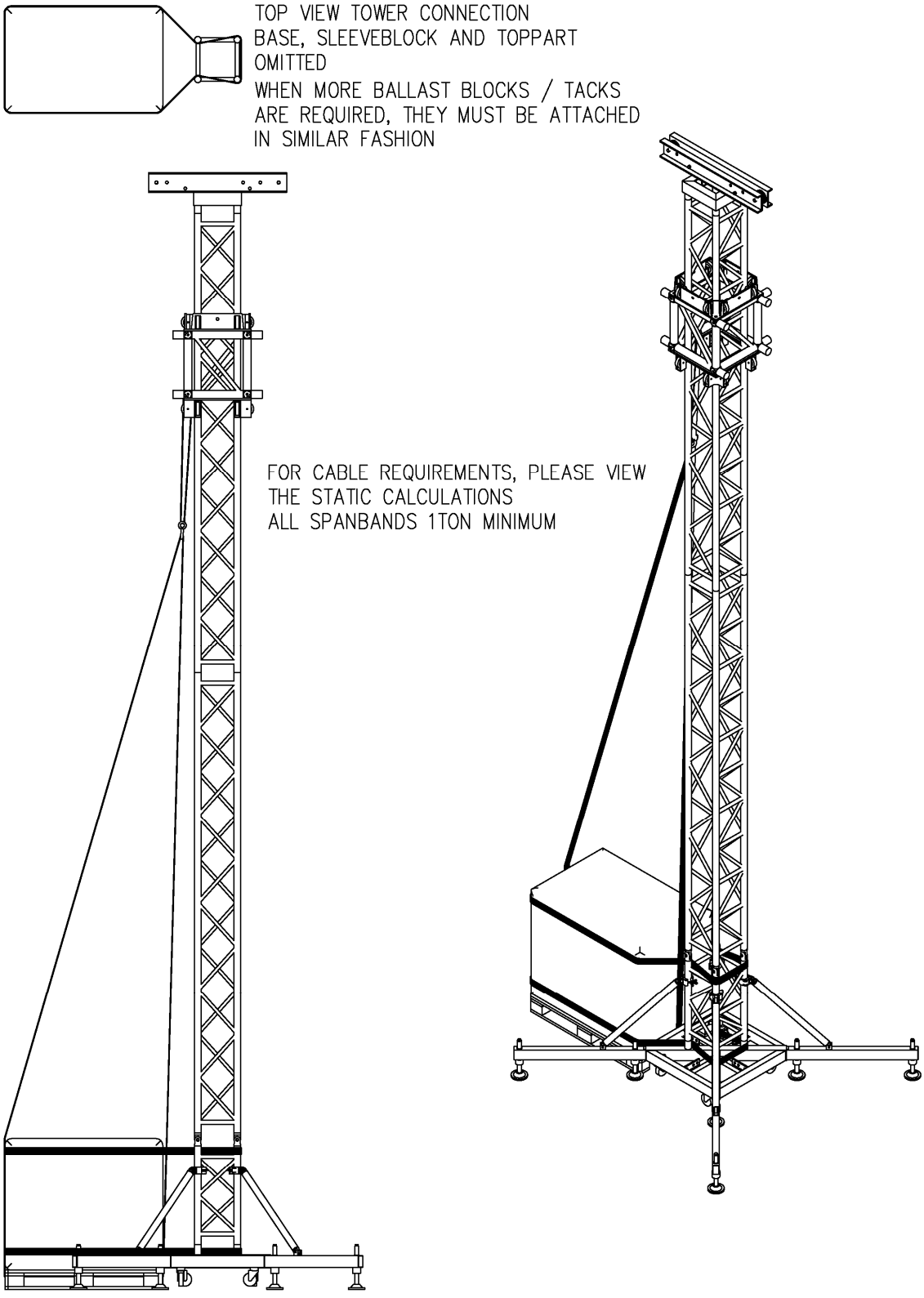
Step 3 Ballasting the roof.

Ballast is needed to keep the legs from shifting and to keep the roof from being lifted by high wind speeds. The required amount of ballast differs from leg to leg. It also depends on the materials used to support the roof.

Ballast requirements	**μ=0,4**	**μ=0,6**	**μ=0,9**
AR10 6x4m (FD34/FD33)			
Front legs	2590 kg	1980 kg	1570 kg
Rear legs	1960 kg	1440 kg	1100 kg
Side wing tower	290 kg	190 kg	120 kg
AR10 8x4m (FD34/FD33)			
Front legs	3010 kg	2320 kg	1850 kg
Rear legs	2430 kg	1790 kg	1370 kg
Side wing tower	300 kg	200 kg	130 kg
AR10 8x6m (FD34/FD33)			
Front legs	2790 kg	2110 kg	1660 kg
Rear legs	2210 kg	1570 kg	1150 kg
Side wing tower	300 kg	200 kg	130 kg
AR10 10x8m (HD34/HD33)			
Front legs	3600 kg	2750 kg	2150 kg
Rear legs	2400 kg	1700 kg	1200 kg
Side wing tower	275 kg	170 kg	110 kg



Ballast must be attached to the towers in such a way that both vertical and horizontal loads are transferred to the ballast. Below is an example of such an arrangement. This shows a groundsupport tower. The principle can of course also be used in a fixed roof such as this.



Step 4. Roofcover installation

The roof cover itself consists of one single sheet. The edges are fitted with holes to allow for easy attachment to the roof structure. The front and back of the roof cover are fitted with a flap that folds around the upper main tubes of the arcs. Rubber bands are used to fix front and back to the arcs.
The sides are also fixed to the roof using rubber bands.
The photo's below illustrate how the roof cover is fixed to the roof structure.

The side walls, are suspended from the side rigs using rubber bands and s-hooks.

Userloads.

Below is an abstract from the static calculation regarding userloads.

The static calculations show that the roof can be used safely, provided that:

- Wind speeds are less than 20m/s or 8bft.
- The soil has enough load bearing capacity.
- The construction is properly ballasted
- The construction is properly ballasted
- The load has been secured properly.

The main grid of the roof can be loaded as follows.

Rear arc;	10kg/m equally distributed
All other arcs;	20kg/m equally distributed
Sidewings;	1 ton pointload centered

Alternatively the side rigs may be loaded with pointloads of 500kg. These must be located within 35cm from the towers.

Sidewings;	1 ton pointload centered

Parts identification / Glossary

Truss types used in Eurotruss Roof constructions.

FD32 Truss. Ladder truss with outside dimension of 290mm. Mainly used as support grid for light fixtures etc.

FD33 Truss. Triangular truss with outside dimension of 290mm. Mainly used as Roof cover Support

FD34 Truss. Square truss with outside dimension of 290mm. Used as general construction element for the smaller roofs. Can be used horizontally in the rig and vertically in towers.

FD43 Truss. Triangular truss with outside dimension of 400mm. Mainly used as Roof cover Support

FD44 Truss. Square truss with outside dimension of 400mm. Used as general construction element for medium sized roofs. Can be used horizontally in the rig and vertically in towers.

TD35 Truss. Square truss with outside dimension of 350mm. Optimized for use in the towers of the larger roofs. Straight braces are used as ladder.

TD44 Truss. Square truss with outside dimension of 400mm. Optimized for use in the towers of the larger roofs. Straight braces are used as ladder.

ST Truss Square truss with outside dimension of 510mm. Optimized for use in medium to large spans in rigs. Straight braces used in top and bottom plane.

TT Truss Rectangular truss with height of 1010mm and width of 580mm. Largest truss in Eurotruss range. Optimized for use in large spans.

XT Truss Rectangular truss with height of 810mm and width of 580mm. Optimized for use in large spans.

Truss parts are identified as in the following example:
FD34-125 Truss type – Length in centimetres.

Standard Eurotruss Accessories used in roofs.

BOB Bolt On Bus. Used to connect truss to parts that have no Bus attached.

DC Doughty Clamp. Easily de/attachable clamp used to connect truss of fixtures to the main tubes of a piece of Truss

FDDC-xxx A combination of a Bolt On Bus and a Doughty Clamp. Is used to connect Truss (at odd angles) to other truss. Xxx denotes the effective length of the part in centimetres.

Scon-xx Screwable connector. Basically half a spigot with internal screw thread. Can be fitted to other parts that have no bus or spigot attached. Xx denotes the effective length of the part in mm.

DCDC Swivel Coupler. Two doughty clamps bolted together allowing them to rotate.

Eurotruss corners.

Eurotruss corners are described by their appearance. Some of the corners can be scribed by one or more letters, others need a number usually to describe a corner or designate a specific variety.

FD34-T T corner
FD34-T04 Specific T corner with other that standard dimensions
FD34-X X corner
FD34-L60 60° corner

In addition to these codes the letters D and U can be added to a corner indicating an extra connection Down or Up or Up and Down.

FD34-TD T corner with Down

Eurotruss connection system

All Eurotruss Truss types are connected in a similar fashion. Every piece of truss has specially shaped parts welded to the end of the main tubes. These busses are shaped to receive the connector or spigot. This is a solid aluminium part used to connect pieces of truss together.
To establish a solid connection between the bus and the connector a conical steel pin is hammered in. Both Bus and Spigot have a conical hole to allow the conical pin.

The truss pins has a retaining device. Depending on the type of pins used this is either a spring clip (or r-clip) or a self locking nut (Nyloc). The type of retaining mechanism depends on the expected use. If the user wants to keep (part of) the spigots permanently mounted, the locking nut is a logical choice. A number of clients have spigots permanently mounted on one side of the truss.
Connection system

Bus	Specially shaped parts welded to the end of the main tubes.
Spigot	Aluminium connector part
Truss pin	Conical pin used to connect Bus and Spigot together.

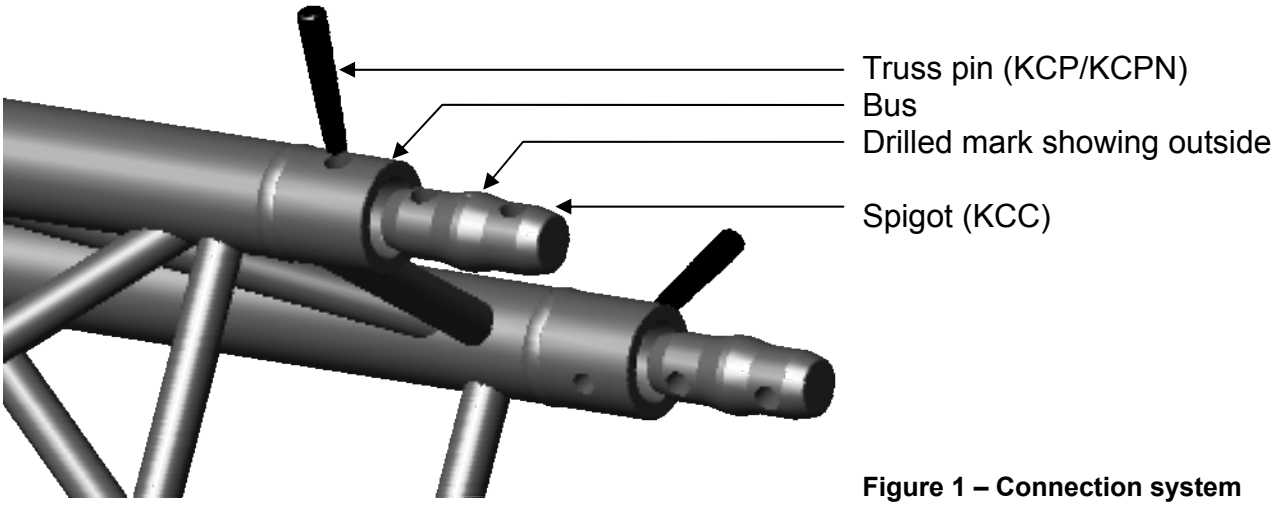


Figure 1 – Connection system

To connect 2 pieces of truss together, spigots are inserted in one truss. Insert the spigot with the drill mark on the outside. Spigots are fastened by truss pins that are hammered through the bus and the spigot. A correctly mounted truss pin is hammered so far in that the r-spring can easily be mounted or in case of a KCPN type truss pin until the entire length of the thread sticks out on the inside of the truss.
When all busses have their spigots mounted, carefully slide the other truss onto the spigot. Slide it on straight and make sure that the busses nearly touch. The holes of bus and spigot must nearly align! Then the truss pins can be mounted on the loose end of the connection.
You may notice that other truss products may be easier to connect. Eurotruss has done this to put tension on the connection. This takes out play in the connection and makes the connection more rigid.

Due to the nature of their use both Spigot and Truss Pins have to be considered consumables. They wear during normal usage and may have to be replaced from time to time.

Eurotruss has 3 different connection systems.
FD25, FD3x, HD3x, FD4x, HD4x, TD35 and TD44 use the FD connection system. The spigot is designated FD-KCC, the pin FD-KCP and the R-clip FD-KCR.
GD and XD use the XD connection system. ST, XT and TT use the ST connection system.
Trusses that use the same connection system can share their connection material. It is 100% compatible. Trusses that use a different connection system cannot share connection material.
Use only Eurotruss connection material in good condition.

Glossary

Tower	Vertical truss structure with the following basic components. Base, short piece of truss just longer than the height of the Sleeveblock, Hinge, Truss making up the length of the Tower, Sleeveblock, Towertop.
Base	Aluminium or Steel structure with adjustable feet. Needed to provide a level basis for the tower to be erected on.
Outrigger	Is used to further stabilize the base by enlarging its footprint. Outriggers are also fitted with adjustable feet.
Baseplate	Aluminium plate with busses welded on. Most basic form of a base allowing no vertical adjustment. Can only be used with small roofs.
Sleeveblock	Aluminium structure with wheels designed to fit around the tower. Used to connect the Rig to the tower. The rig can be lifted by connecting a hoist or motor to the Sleeveblock.
Spancable	Cable with spanner used to stiffen up the construction.
Spigot	Aluminium connection part. Is used together with 2 truss pins to connect the main tube of a truss part to another.
Truss pin	Hardened steel pin used to fixate the spigot in the bus of a piece of truss
R-clip	R-clip or R-spring is used to secure the Truss pin. There are also Truss pins available that use a self locking nut for this purpose. This is especially useful for Truss pins that are left in the construction or (semi) permanent constructions.
Roof endpart	Special piece used to connect the roof gables to the main rig. Connection to main rig via DCDC's.
Hingepart (set)	Part that allows to truss parts to be hinged. Is used in the tower to build the tower horizontally and then erect it. Eurotruss uses hinge parts in FD/TD truss and in the ST/XT truss. There are a number of different versions, each with their own place in the construction.
Towertop	Part that forms the top of the tower. There a two basic forms of the towertop. The manual towertop has two hanging points. One for a manual chain hoist, the other for a safety cable.
Safety cable.	Steel cable used for dead hanging of the rig. Safety cable is used between the Towertop and the Sleeveblock.
Safety chain	Combination of chain with shortened and cable spanner that can be used instead of the safety cable. The safety chain allows more height compensation.
Hingesection	Two square aluminium frames that can be incorporated in de Tower to allow horizontal assembly. Hingesections are available for FD34 and FD44 towers and as such only used in smaller roofs.
Roof cover	All the screens forming the watertight roof.
Side walls	Screens forming the walls of the roof structure. Usually 50% open gaze.
Cornerblock	Rigid square (or rectangular) construction with bolt holes in all directions. Cornerblocks are universal base components from which a variety of corners can be built. The bolt holes can also be used to bolt other attachments to. Standard attachments for cornerblocks are Bolt On Busses (BOB) and hingeparts (Female Bolt On).
Roof top	Part the attaches the roof gables to the Rooftop Support. This may be a custom part or it may be composed of a cornerblock with Hingeparts.

Appendix

Appendix A Consumables and other spare parts

Ordernr.	Art. code	Designation
240906	CS1-CON	CS1 Connection part (spigot)
240907	CS1-TP	CS1 Conical pin
240907	CS1-RS2	CS1 R-Clip

The Beaufort scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (30-45 ft) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	

Contact information.
Eurotruss B.V.
Castorweg 2
8938 BE LEEUWARDEN
The Netherlands
Tel: +31582158888
Fax: +31582158111

WWW.EUROTRUSS.COM
info@eurotruss.nl