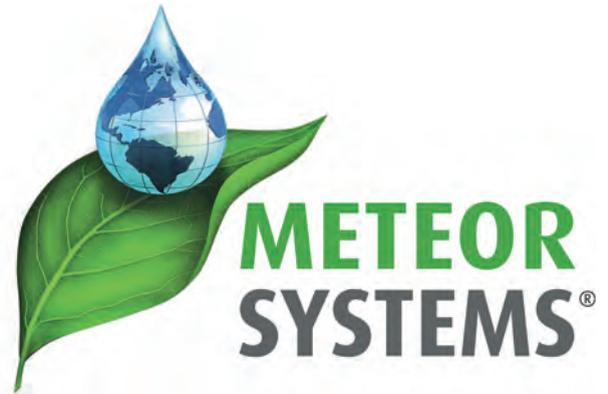




GUTTER GROWING SYSTEM VEGETABLE

Tomato.



Cultivation on TOP of gutter growing systems is eminently suitable for the production of vegetables, like tomatoes, peppers, cucumbers and more. The roots have no chance to grow into the separate drain channels at the sides or inside of the gutter. A fail safe design preventing spreading of diseases or viruses.

Who chooses for growth, chooses for Meteor Systems.

www.meteorsystems.nl





Welcome dear Customer,

Thanks for your interest in the Systems of Meteor Systems.

Meteor Systems is leading in irrigation-, growing- and hoisting systems for the international horticultural growers.

Our goal is meeting the highest standards of quality in the Systems and services, to be able to allow your company achieving the necessary optimum growth and product quality. In close cooperation with experienced growers, constant development and innovation is realized creating the growth of our programme of Systems. Resulting in higher yields and product quality with a reduced consumption of water, fertilisers and energy. A better control of your operational costs.

Of course user's friendliness, environment responsibility, limited physical labour loads and lower labour costs constantly have the same priority in designing your System.

We are speaking from our own experiences, because Meteor Systems consults, designs and supplies Systems all around the world.

Frank Bastiaansen
President

Choose for growth,
choose Meteor Systems



The most growing systems are built from the following components:

- 1) **Growing gutters:** choice of growing gutter is defined by: crop / span / load.
- 2) **Suspension material:** depending on crop.
- 3) **Supports:** depending on crop.
- 4) **Drain care:** depending on the construction of the greenhouse.
- 5) **Options:** different by crop.

1) Growing gutters:

Quality based on sustainability.

The growing gutters of Meteor Systems are made of: quality material, solid or double-sided finished with Granite HDX coating (polyurethane) or polyester coating, depending on the application.

The base material is cut on our slitline in Etten-Leur to right width.

In the greenhouse on site the gutters are rolled at bay length into the desired gutter profile. Connections and therefore leaks will be limited to a minimum.

Depending on the situation at the location we rolled up to 8000 till 12000 meters of gutter per day. To consolidate the steel stocks and transport in own management, we can respond flexible and competitive to the demands of the market in general and yours in particular.



Material choice.

For a right material choice for the growing system there are several issues to address:

Thickness of steel;

The material can be supplied in any desired thickness ranging from 0,5 till 0,8mm.

The thickness depends on which gutter type and span the gutter.

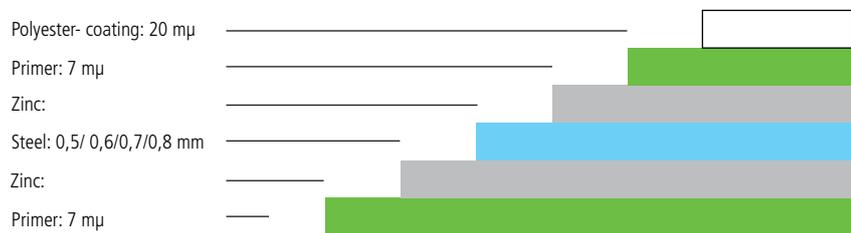
Hardness of the steel;

For large spans and/or extremely heavy load on the growing gutters we can deliver harder steel, so with an identical gutter form and material thickness, this makes a stronger profile.

Coating;

The steel has a number of layers: on both sides zinc and primer and the top layer of polyester or polyurethane coating.

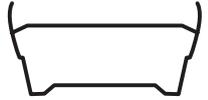
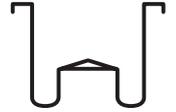
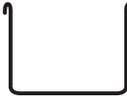
MSPOL:



MSPU:



Wide range of gutters.

Gutter type	Model	Gutter type	Model
GM-01		GM-11	
GM-02		GM-12	
GM-02S		GM-14	
GM-03		GM-15	
GM-04L		GM-16	
GM-04H		GM-17	
GM-05		GM-18	
GM-06		GM-19	
GM-07HD		GM-20	
GM-07XHD		GM-21	
GM-08		GM-22	
GM-10L		GM-23	

2] Suspension materials:

Most suspension systems consists of a combination of bended rod products and steel cables.

Rod products

All rod products are automatically produced in our factory in Duiven, ranging in diameter from 3 to 10 mm. The thickness of the rod is depending on the load and form of the brackets.

Through our own production we can adequately respond to changes, in implementation, but also in delivery times.



Steel cables

In the suspension, steel cables are used, it takes away less light and is easy to install.



Construction

The construction for the steel cables used in the greenhouses is 1x19. This is used because the cables do not run on disks and no side loading occurs. The cables are made on length by talurit and rod terminals.

Normally in the hoisting world a safety factor of 1 till 5 is used. In thugboat a safety factor of 1 till 3. We recommend a safety factor for the greenhouse 1 till 4.

Fracture 1x19	3.0mm	1770N/mm ²	851kg.
Fracture 1x19	4.0mm	1770N/mm ²	1510kg.

3) Supports:

All support material are produced in our factory in Duiven. This varies from support materials welded by one of our welding robots, the rolling of long profiles, or a combination of these.



4) Drain collection:

For the drain collection thermoformed collection trays are used.

5) Options:

The options can exist from all kind of materials.

For each crop the right System.

Each crop and each growing medium needs specific technical performance of the gutter. Growing in containers or buckets there will be other and often less heavy demands made on the gutter than the growth in rock wool & coconut .

From this practical knowledge Meteor Systems has a program lasting "sustainable quality gutters" developed that fits any growing and work environment.

In this brochure, the most common complete growing systems of each crop group are discussed. Beside the growing gutter there are also suspension/support materials, drain collection and various options specific to your crop group.

Fruitculture

Strawberry
Raspberry



Vegetable culture

Tomato
Cucumber
Pepper
Aubergine



Floriculture

Rose
Gerbera
Amaryllis
Anthurium

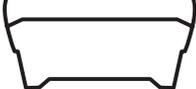


GUTTER GROWING SYSTEM TOMATO

Guttertypes.

For tomato growing we have a lot of gutters available.

The gutter type is depending on growing medium and section length.

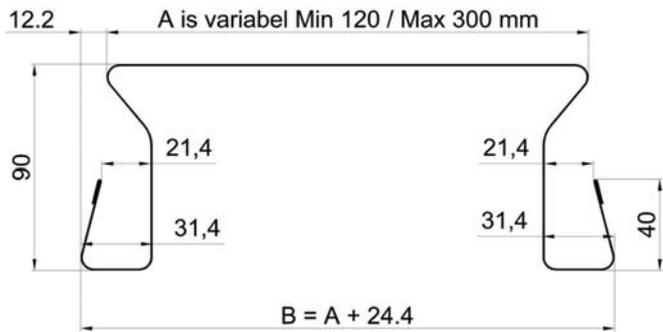
Guttertype	Model	Material thickness	Max. span	Guttertype	Model	Material thickness	Max. span
GM-03		0,6	4,0	GM-14		0,6	5,0
		0,8	5,0			0,8	6,0
GM-05		0,6	4,0	GM-15		0,6	4,0
		0,8	5,0			0,8	5,0
GM-07HD		0,6	5,0	GM-21		0,6	4,5
		0,8	5,5			0,8	5,0
GM-07XHD		0,6	5,0				
		0,8	5,5				

GUTTER GROWING SYSTEM TOMATO

Dimensions gutter types.

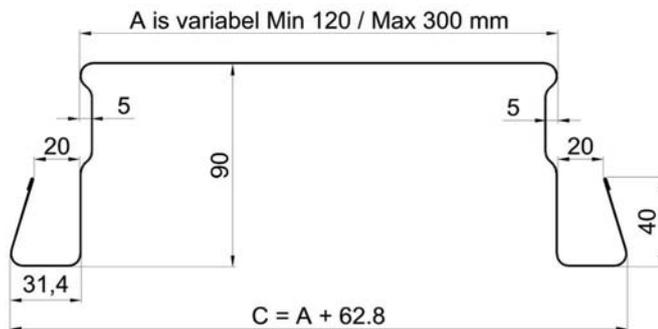
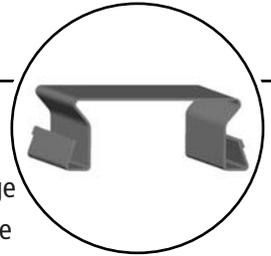
The following models are suitable for the vegetable culture, grown on top of the gutter except the GM-15, the roots get no chance to grow into the drain channels.

The draining through the separated drainage channels of the gutters ensures that there is no risk of spreading diseases and viruses through the drainage water.



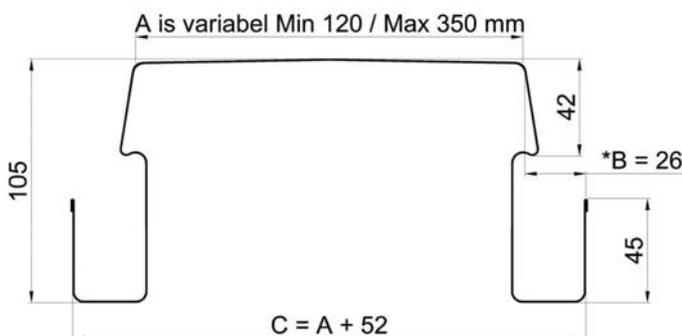
GM-03

Compact because the drainage channels are almost below the contact surface, the drain water is almost not exposed to sunlight. Available in widths varying from 120 till 340 mm.



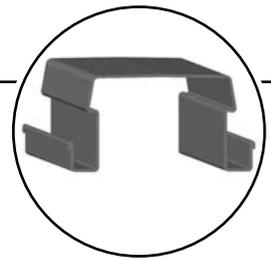
GM-05

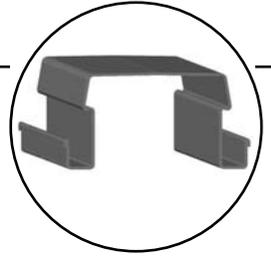
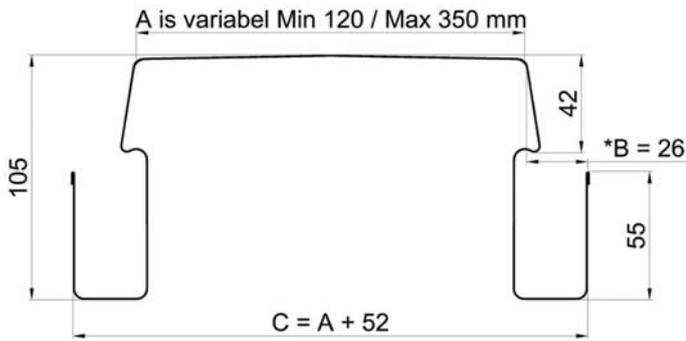
Because of its simple shape this gutter is easy to link to each other. This gutter is mostly used to be shipped in pieces from Etten-Leur.



GM-07

Because of its height and unique shape this gutter is the strongest in his grade. Available in widths varying from 120 till 300 mm.

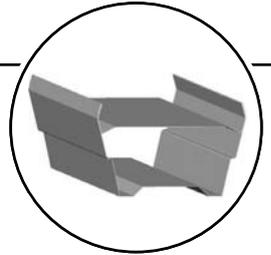
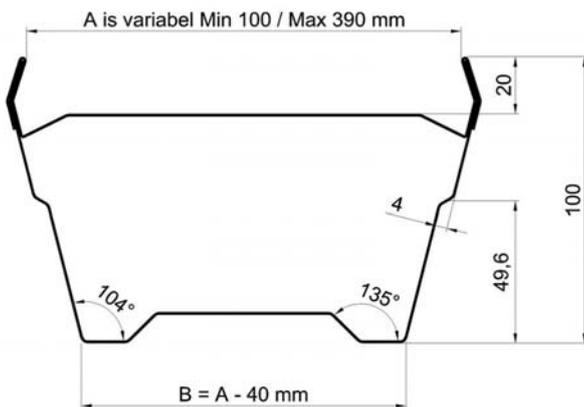




GM-07 XHD

With a drainchannel of 55mm depth this gutter is extremely strong and also with longer bay lengths it's less sensitive for overflow.

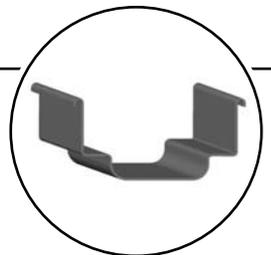
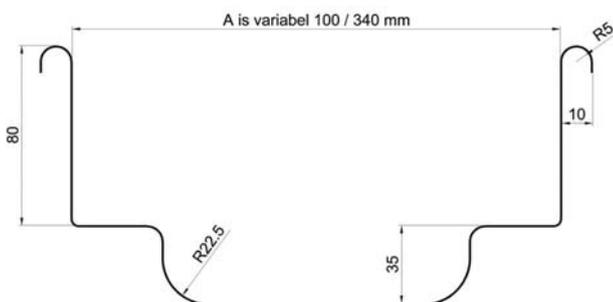
Available in widths varying from 120 till 280 mm.



GM-14

- This gutter has a very large drainchannel.
- Through the box structure there is no dirt raid.
- The recirculating water is collected in the drainchannel and not disposed to sunlight. This prevent alagae growth.
- There is a large span possible, up to 6 meters.
- The rockwool is locked up between outstanding edges of the gutter.
- The gutter provides a completely seperate drainwater discharge.
- There are no sharp edges on the outside, this prevent plant and/or fruit damage.
- The boxgutter is in almost all widths and heights available. The boxgutter is multifunctional and suitable for every culture.

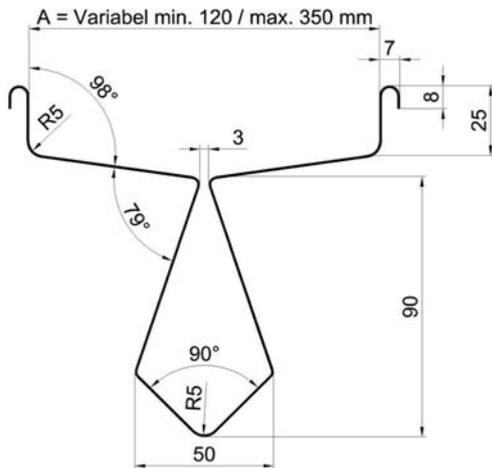
Available in widths varying of 130 till 320 mm.



GM-15

This gutter is designed for pots or containers. The wide drainchannel ensures a maximum drainwater discharge capacity. The width of the drainchannel is variable, according as the width of the gutter.

Available in widths varying of 130 till 320 mm.



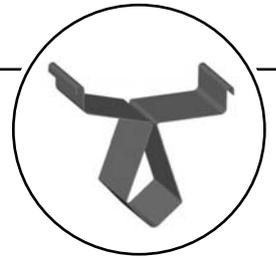
GM-21

Very compact gutter with a minimum of material by its sophisticated shape.

Suitable for growing on rockwool.

Through the deep drainchannels roots get less opportunity to get in contact with drainwater.

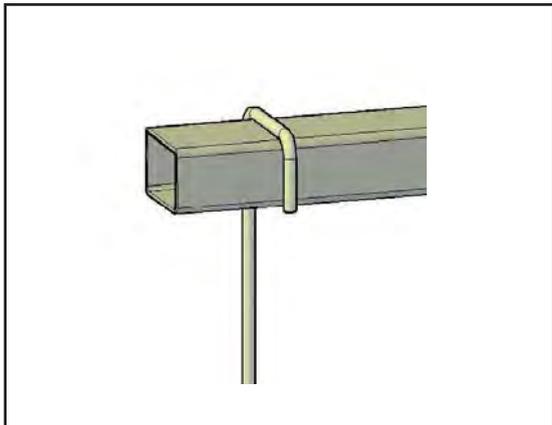
Available in widths varying of 120 till 350 mm.



GUTTER GROWING SYSTEM TOMATO

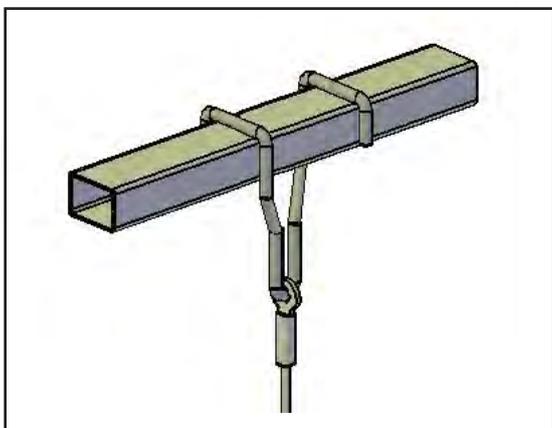
Suspensions.

To fix the growingsystem to the trellis there are several possibilities:



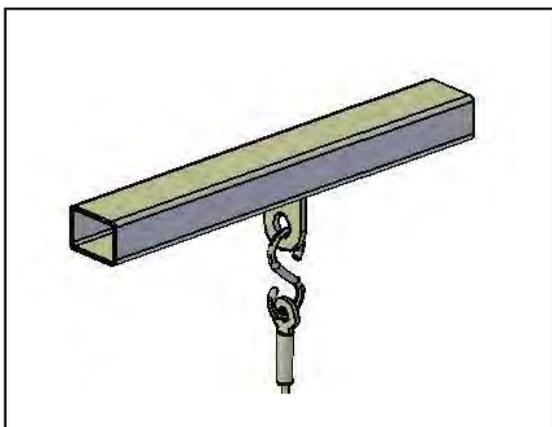
Truss hooks;

One or two truss hooks, which should be alternately mounted on the trellis.



Trellis hook;

This type of suspension is often used in combination with a wire and V-bracket and therefore often used in higher greenhouses.



Truss lip with S-hook;

This kind of suspension is often used in combination with a wire and V-bracket. The advantage is that the lower beam of the trellis remains free for a possible second screen installation.



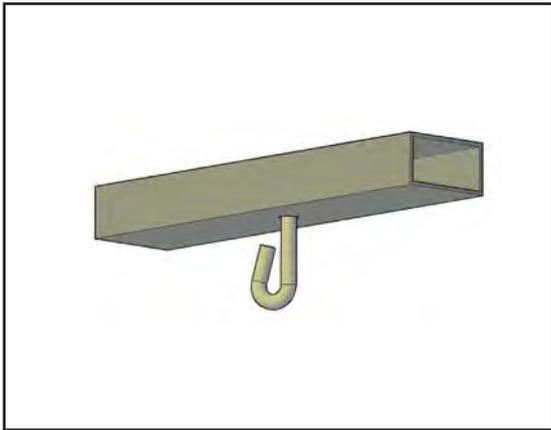
Wire with threaded rod;

Besides the fact that the lower beam of the trellis remains free for a possible second screen, it is also possible to adjust the height through a rolled threaded rod.



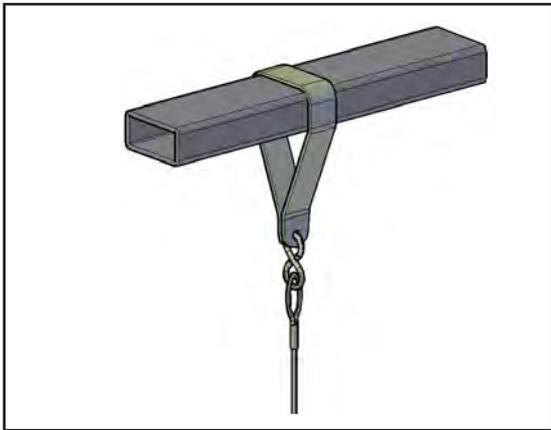
Wire with T-terminal/threaded rod;

This method has the advantage to stay free of the bottom beam of the trellis for the second screen. The wire is foreseen of a threaded rod and there is a possibility to adjust the height.



Strained woggle;

With this possibility of support it is not required to drill the whole bottom beam of the trellis, but only the underside of the beam.

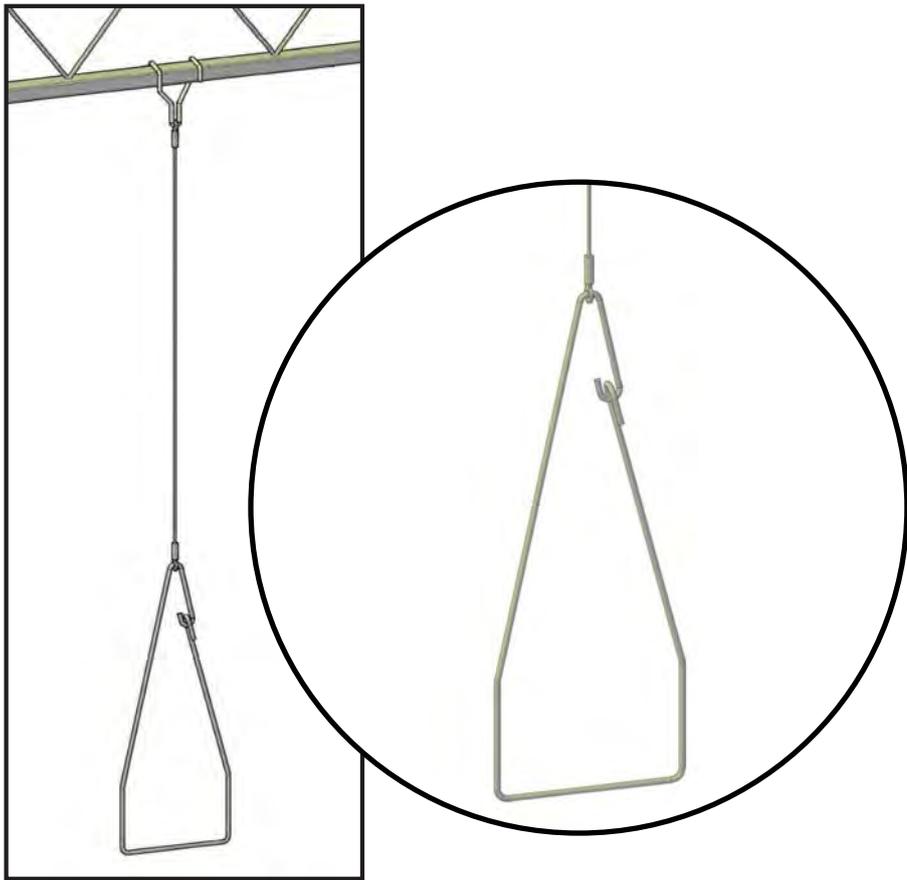


Truss-strip;

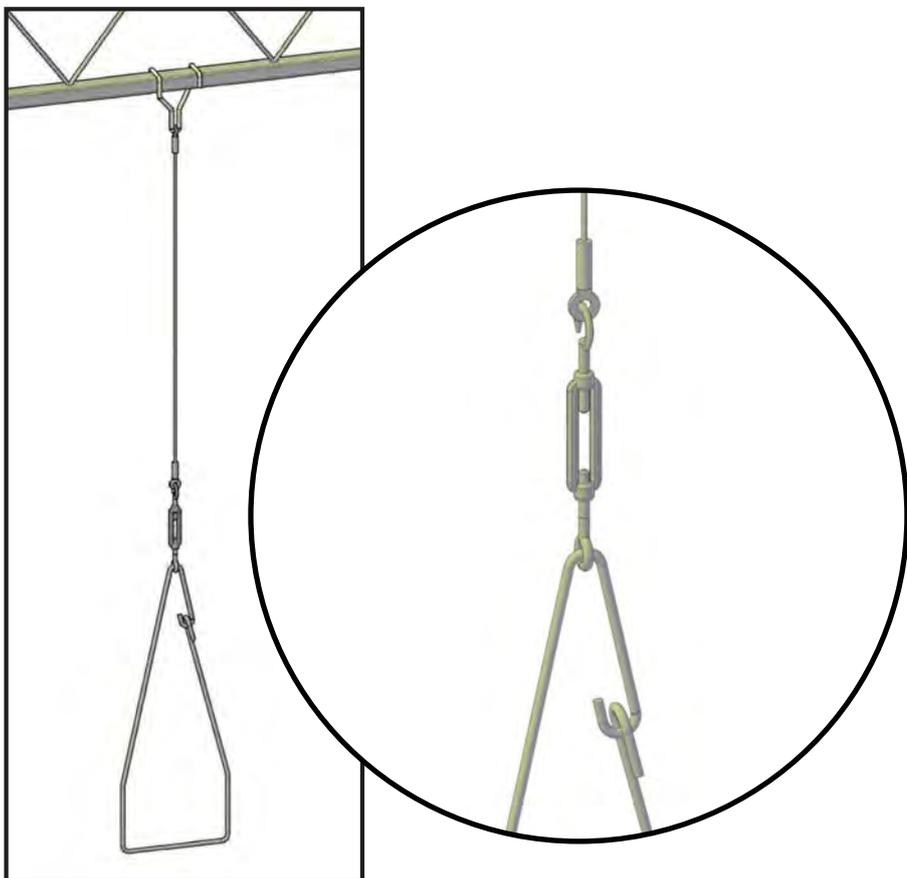
This type of suspension is often used in combination with a wire and the V-bracket and often used at higher greenhouses. The advantage is that the lower beam of the trellis remains free for a possible second screen installation.

For suspending the gutter there are several possibilities:

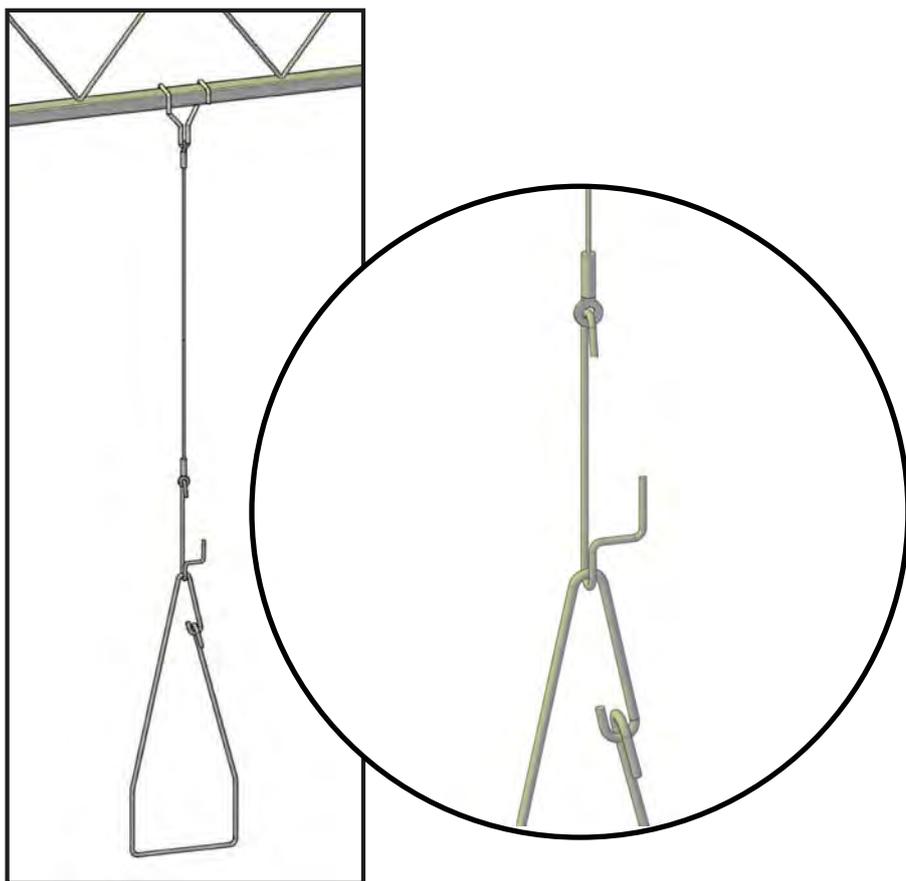
Triangle bracket.



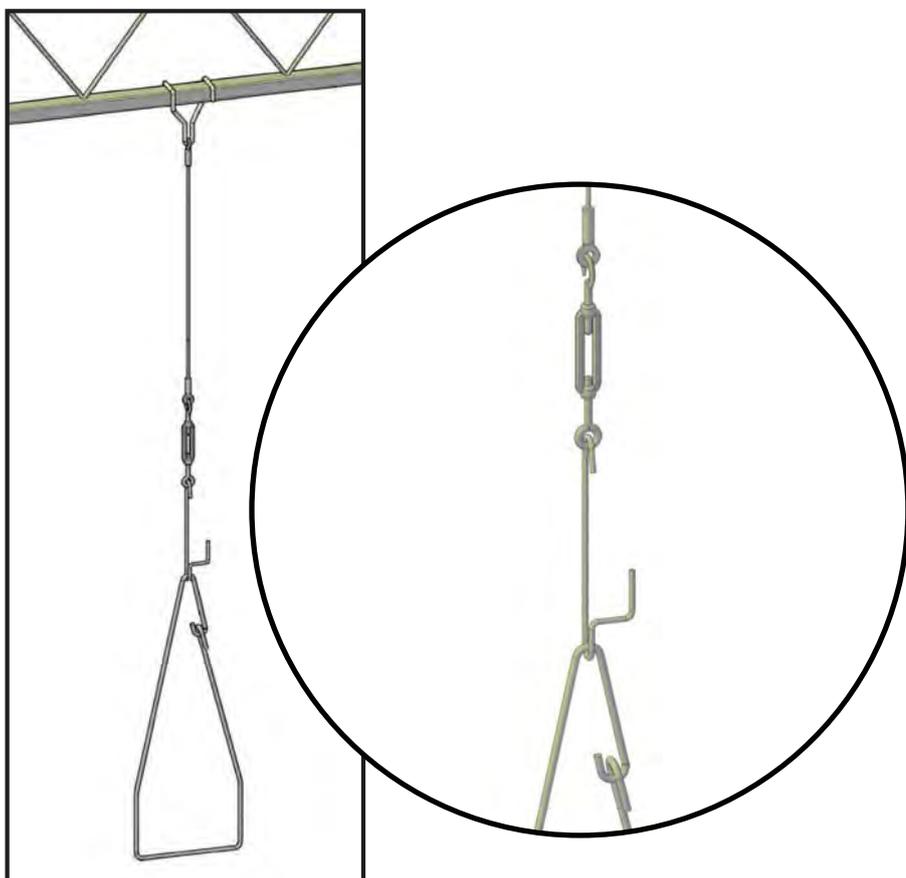
Triangle bracket with turnbuckle.



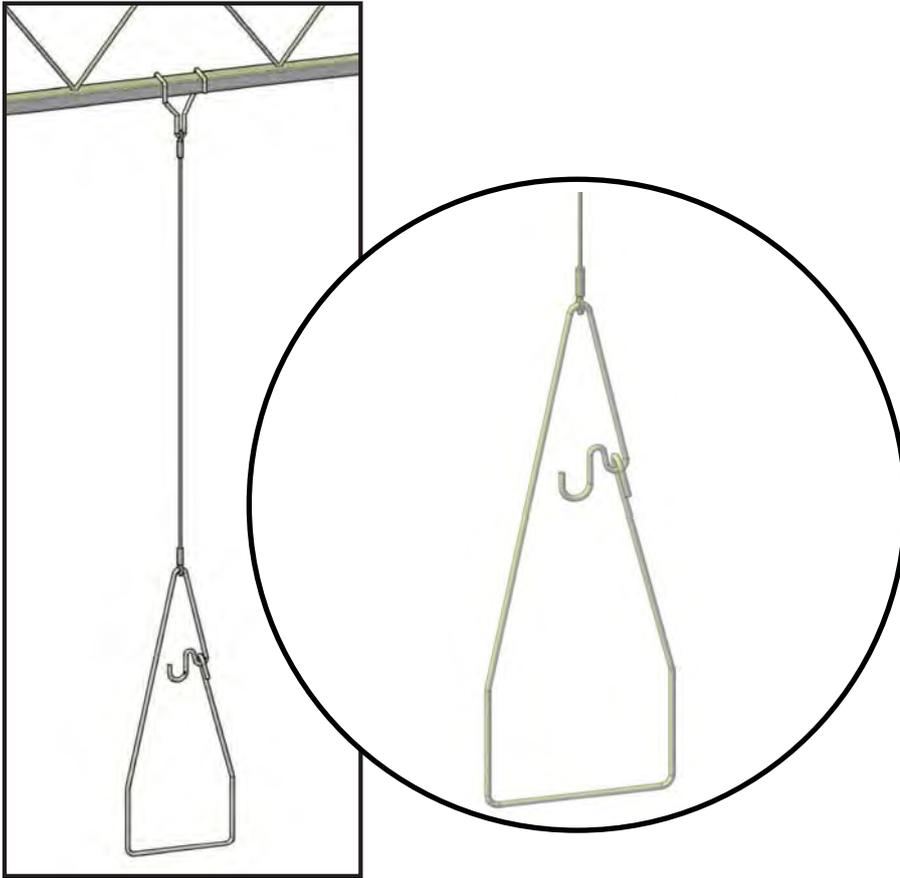
Triangle bracket with grow pipe hook.



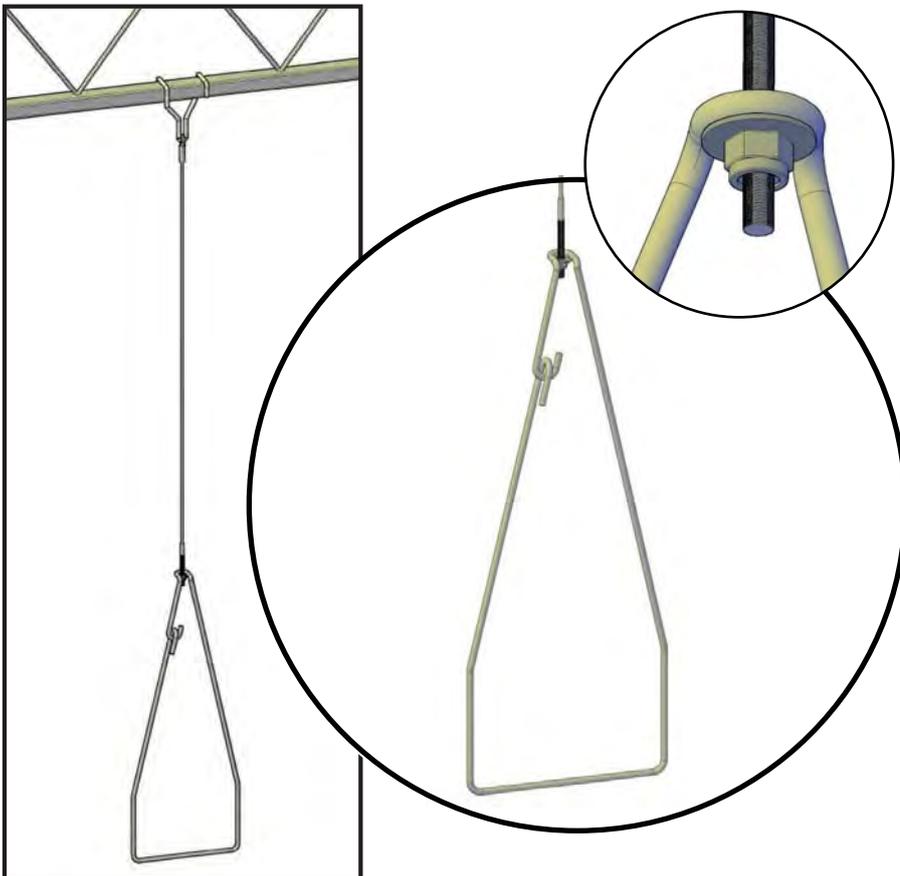
Triangle bracket with turnbuckle and grow pipe hook



Triangle bracket with intergral grow pipe suspension.



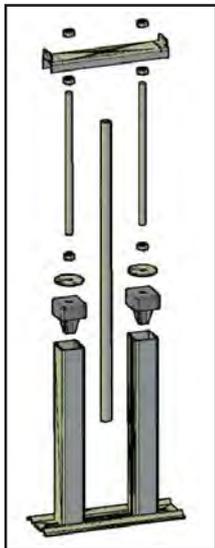
Triangle bracket 3D.



GUTTER GROWING SYSTEM TOMATO

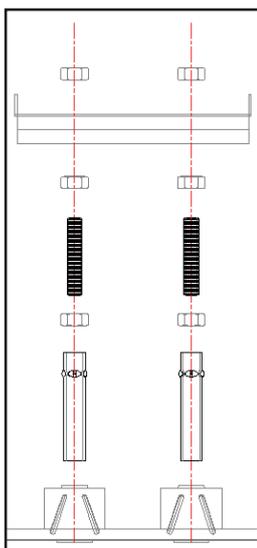
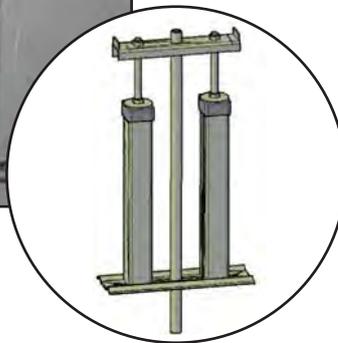
Suspension.

To support of the gutters there are various types of support available:



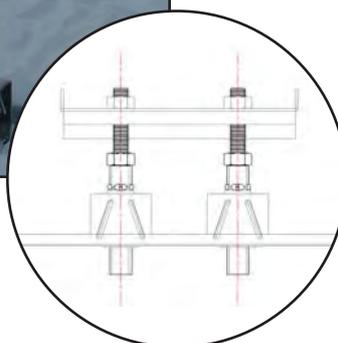
Type 1: Click support.

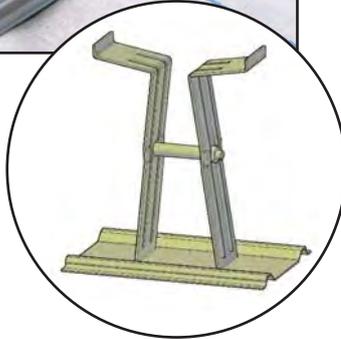
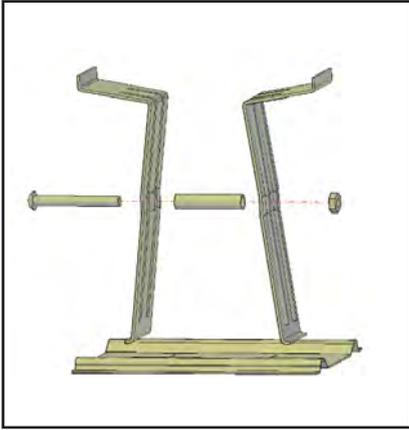
Consisting of: a solid profile with square legs, two plastic caps with a 12 mm hole, two threaded rods M-12 and a crossbeam. This support is adjustable in height, dimensions depends of the gutter type.



Type 2: Bridge support.

Consisting of: a solid profile with two U profiles, two tubes, which has to be put into ground to fix the support, two threaded rods M-12 and a crossbeam. This support is adjustable in height, dimensions depends of the gutter type.



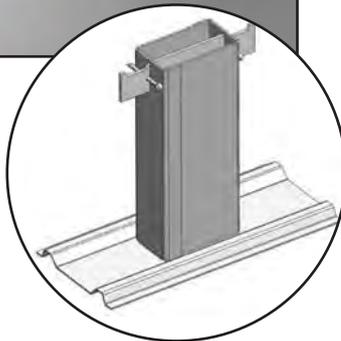


Type 3: Clipsupport

Consisting of: a solid profile from galvanized bandsteel. Both profiles are kept apart through a metal spacer in combination with a bolt and nut.

This support is usually used in combination with the GM-21.

This support is not adjustable in height, dimensions depends of the gutter type.



Type 4: H-support

Consisting of: a strong square profile which is clicked on the lower profile, in this profile there is a recess made for the strip where the gutter has to lay on.

This gutter is usually used in combination with the GM-03/05/07.

This support is not adjustable in height, dimensions depends of the gutter type.

Type 5: Welded support

Consisting of: steel profile with welded tubes and strip, two threaded rods M-12 and a crossbeam.

This support is adjustable in height, dimensions depends of the gutter type.

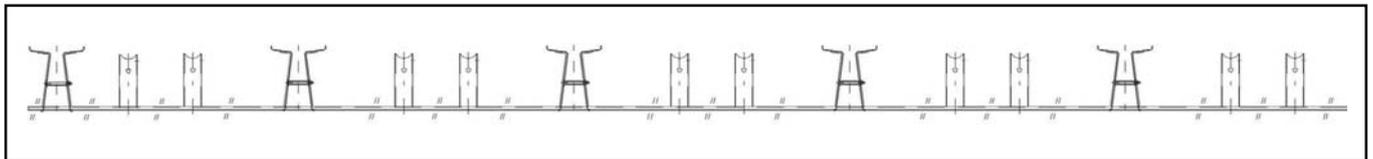
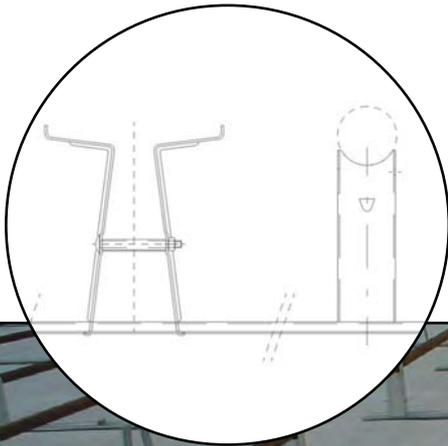


The mentioned supports (except welded support) can also be integrated into a long beam system.

The long beam system

The long beam system is designed in close cooperation with growers with the aim: To create an exact dimension between the heating pipes and the gutter. The system is applicable for every culture and gutter type.

The system provides savings in construction costs because there will be less installation weight for the greenhouse structure. The crop gets more light because there was no hanging support present. The system can be hoisted manually for change of groundcloth or foil.



The system consists of:

- roll-formed ground profile with a special shape. The profile is stronger and can be produced in any desired length;
- in height adjustable guttersupport that may be mounted at any distance;
- the pipe-railsupport that at any center distance is provided.

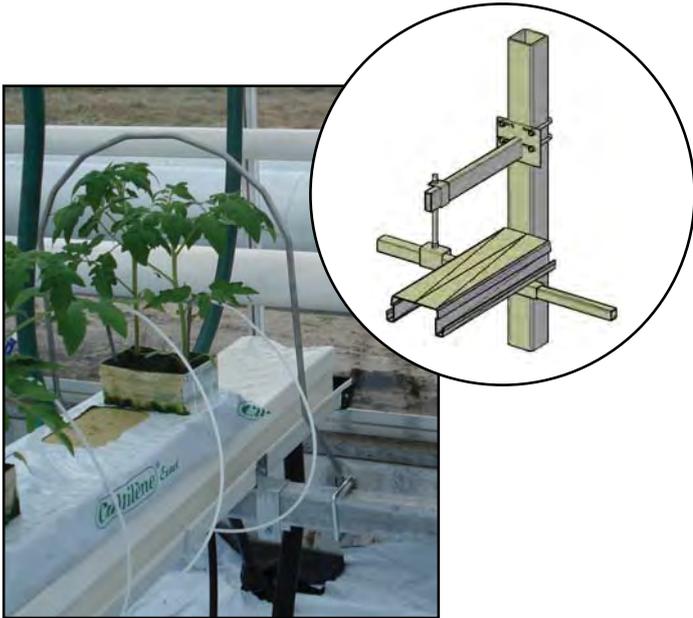
GUTTER GROWING SYSTEM TOMATO

Gable situation.

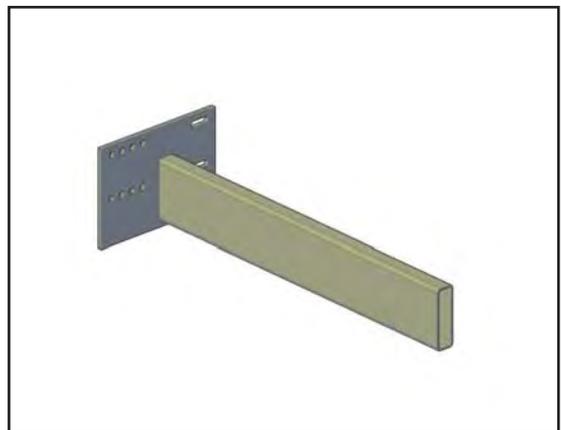
At the gable the gutters get support from a pipe (50x70x3mm) which will be hung on gable consoles fixed to the gable posts by U-brackets.

This pipe is in height adjustable and can also be used for support of manifolds, CO2 lines or a draindischarge. To support this lines we have all kinds of items in our package.

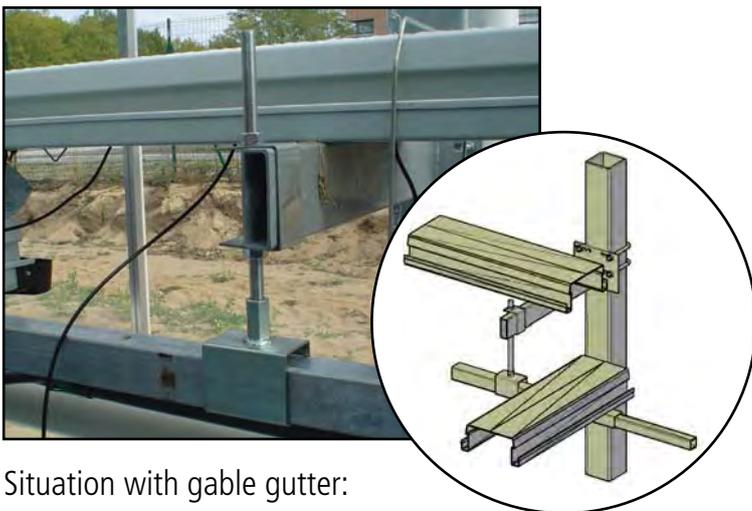
To support this gutter at the gable there are several possibilities:



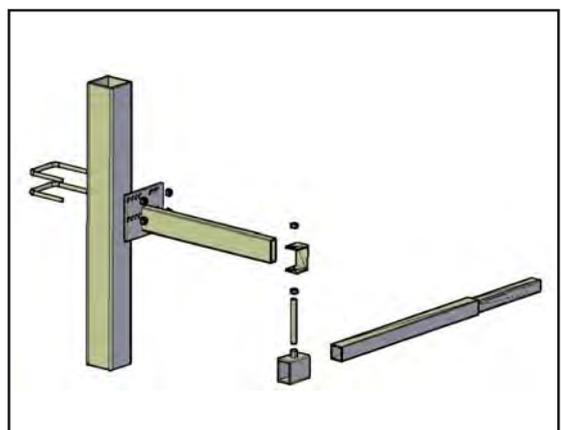
Situation without gable gutter:



Gable console:



Situation with gable gutter:



Assembling the gable situation:

GUTTER GROWING SYSTEM TOMATO

Draincollection.

To collect the drainwater there are two options:

- end collection
- central collection



End collection

Is the gutter no longer than 120 meters, one end collection tray will do. The plastic tray will be placed on the back of the gutter, so the drainhose can not block the culture activities. The tray is easily assembled by self drilling screws.



Central collection

At lengths of more than 100 meters the drainwater must be drained in the middle. A combination of the central drain trays with an end tray is recommended. Also with slope in several directions, we recommend the installation of a central drain tray. The central drain tray can be installed on every place under the gutter, supplied with self drilling screws.



Drainhose

For each drain tray there is a drainhose available. The hose can make a sharp bend without nodding. Thanks to the inside diameter of 38mm the hose fits exactly to the tulle of the trays.

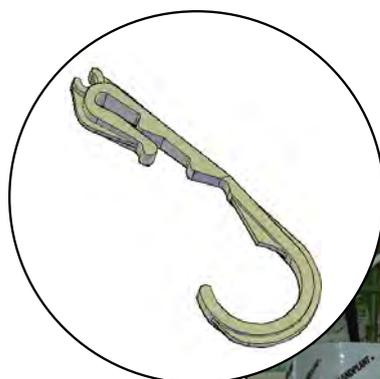
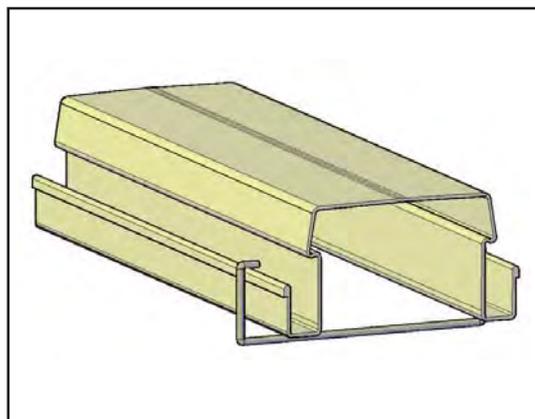
GUTTER GROWING SYSTEM TOMATO

Options.

1. Irrigation brackets (steel).

These brackets has a few additional functions. First the bracket has to support the irrigation tube under the gutter, so the tube will not be directly exposed to sunlight so the temperatur of the water remains low.

The irrigation bracket also offers the possibility to separated a CO2 tube from the irrigation tube. We provide special brackets for the different gutter types, made in galvanized wire 3mm or 4mm. Meteor Systems recommends one bracket for every 0,75 meter.



2. Irrigationhook (plastic).

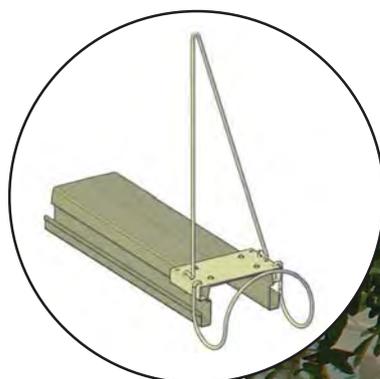
The irrigation clamphooks are used for the irrigation tube hanging next to the gutter. Now the irrigation tube is always visible.

Another major advantage is that during the culture rotation the irrigation tube can be replaced and moved. The hooks are supplied for tubediameters of 16, 20, 25 and 32 mm.



3. Turn around bracket at the walkway.

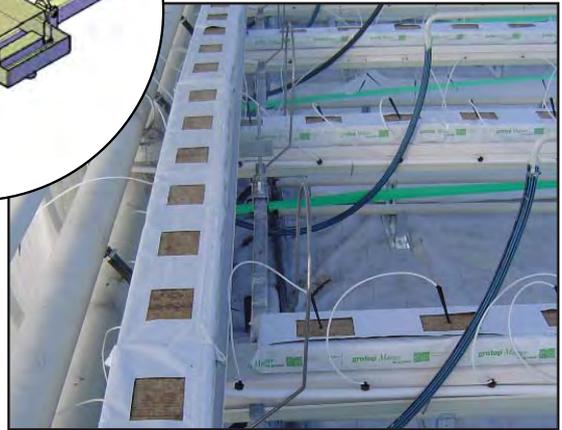
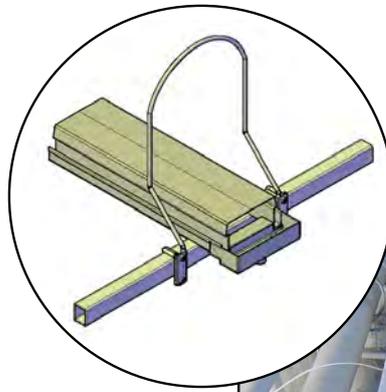
A special bracket that is mainly used in the tomato culture and used to support stems and to guide them at the end of the gutter. The turn around bracket prevents damage to the crop and the area below remains free. This bracket can easily be mounted to the gutter. The bracket is also removable during crop rotation.



4. Turn around bracket at the gable.

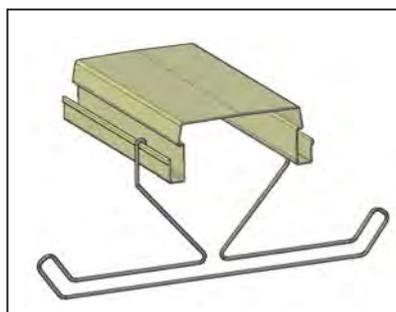
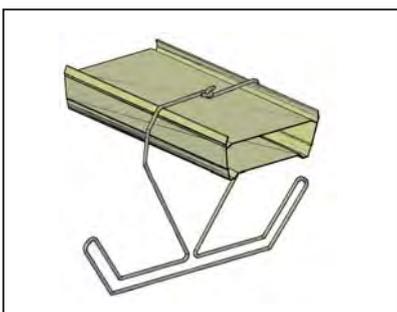
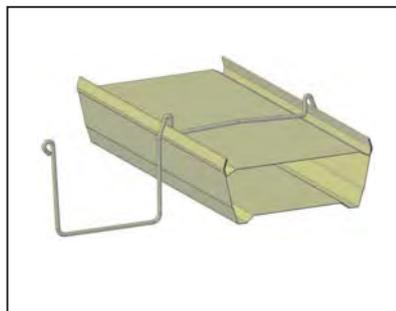
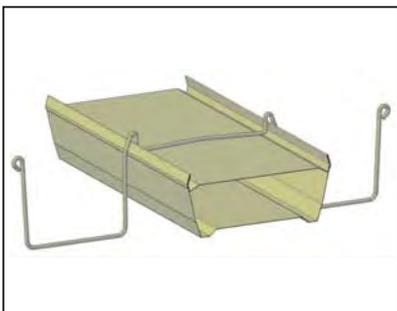
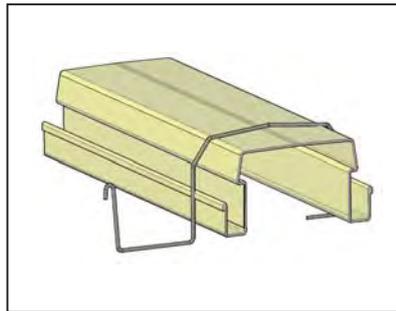
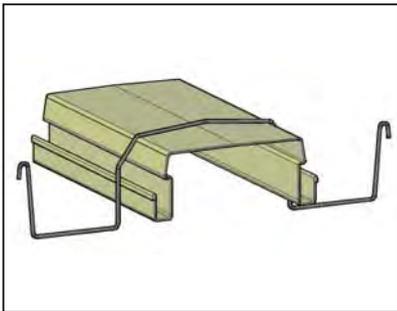
A special bracket that is mainly used in the tomato culture and used to support stems and to guide them at the gable end of the gutter.

The turn around bracket prevents damage to the crop and the area below remains free. This bracket can easily be mounted to gable construction.



5. Stem supports for tomatoes.

This bracket is hung under or over the gutter to support the tomato stems, usually we recommend to use one bracket per meter.

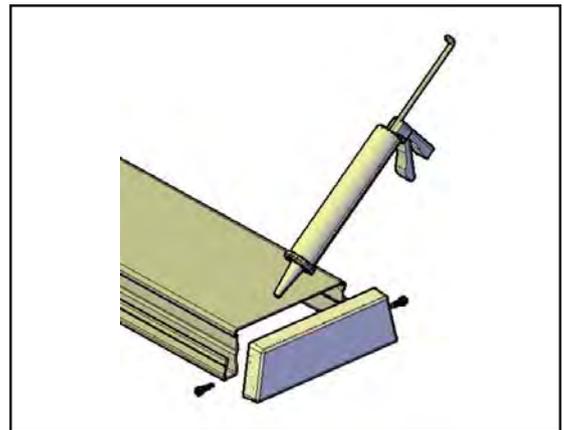


6. Endcaps.

The endcaps are mounted at the end of each gutter:

- protection of the stems at the end;
- to stop the drainwater on the end of the gutter;
- protection for sharp edges of the gutter, so that no injuries can cause during the culture;
- optical effects.

For each type of gutter we deliver a suitable black plastic endcap. The GM-07, GM-03 and GM-05 offers the possibility to close off the drainchannels with a rubber endstop. The stop can easily be mount with putty and form a less costly alternative for the endcaps.

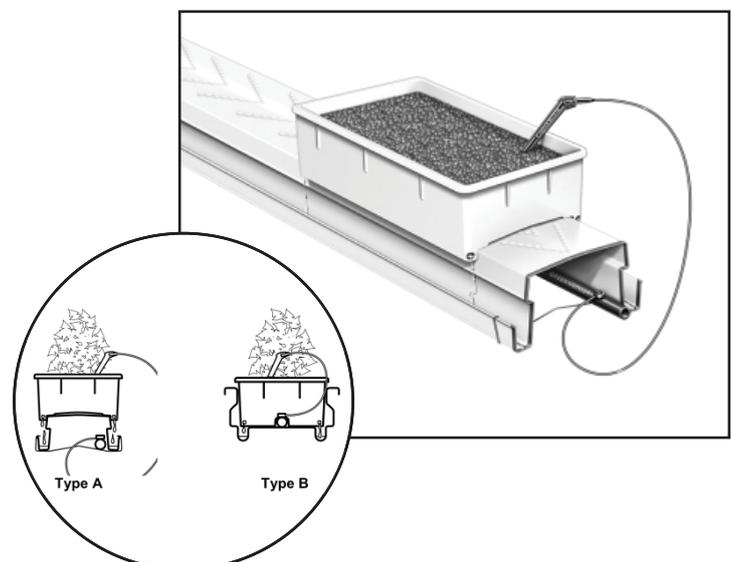


7. Substrate container.

The particular concept for this substrate container makes it suitable for all loose substrate medium, it fits on a 20 cm wide gutter with the drain channels along both sides. This container can also be used on traditional gutters of 25 cm wide and on all plastic gutters.

Features:

- complete drainage through unique construction of the bottom;
- implement in standard colours, black and white. Other colours on request;
- the container has a capacity of 13 litres. Dimensions L x B x H = 415 x 250 x 160 mm;
- there are 2 versions, Type A for the gutter and type B with special openings for irrigation and heating hose.



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Meteor Systems B.V.

Minervum 7081
4817 ZK Breda
The Netherlands

T. +31 76 504 28 42

info@meteorsystems.nl
www.meteorsystems.nl

Meteor Horticultural Systems

419 Seacliff Drive East
Leamington, Ontario
Canada

T. +1 519 324 9900
F. +1 519 324 0920

info@meteorsystems.com
www.meteorsystems.com