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TUNNEL WIDTH	-
TUNNEL NUMBER	-
TOTAL TUNNEL LENGTH	-
INSIDE COLUMN DISTANCE	-
OUTSIDE COLUMN DISTANCE	-
SIDE WALL LENGTH	-
HEIGHT UNDER THE GUTTER	-
MAXIMUM HEIGHT	-
TOTAL GREENHOUSE AREA	-
TOTAL PRODUCTION AREA	-
TECHNICAL ROOM AREA	-
TECHNICAL ZONE SECTIONS NUMBER	-
TECHNICAL ZONE SECTION LENGTH	-
CULTIVATED PRODUCT	-



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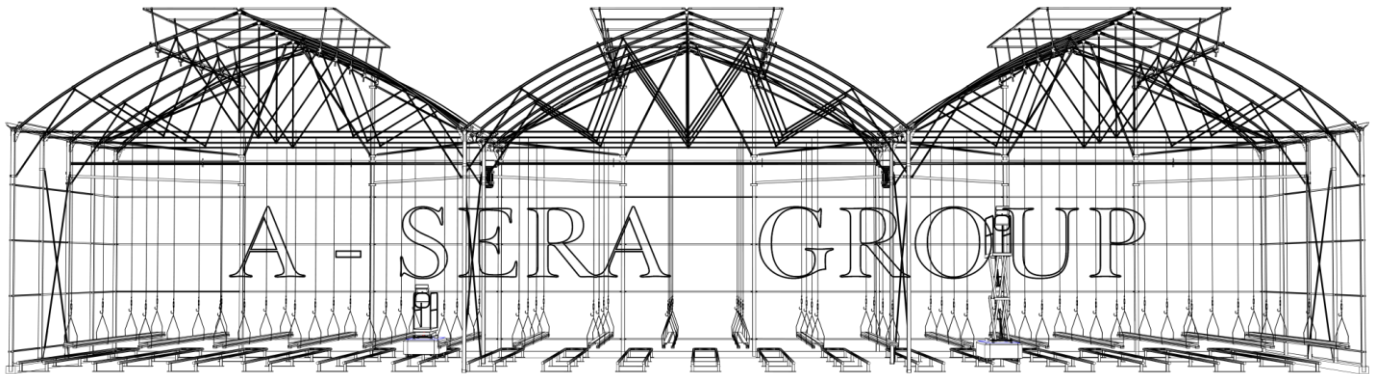
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1 TERRITORY PLANNING

The layout is maintained by special equipment along the length and width of territory.



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SLOPE EXAMPLE

"-%0.8 SLOPE - MIDDLE



"-%0.8 SLOPE - MIDDLE



It is very important to create the right slope in the area for the drainage system to work properly.

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1.1 DRILLING OF ANCHOR HOLES

According to the proposal, the team of installers will prepare anchor holes with special 70X70X3 mm 1.2 m height metal profiles mounted in them. The columns of the structure will be mounted on these profiles. Work will be carried out in parallel with the planning and will be given at the same time.

The holes must be 120 cm deep and 50 cm in diameter. Concrete used for anchor holes should correspond M300 norms.



2 STEEL-CONSTRUCTION TECHNICAL SPECIFICATION

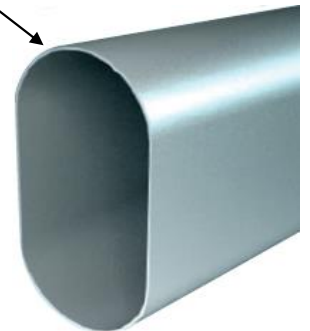
Tunnel width	9,6 m
The distance between the columns	5 m
Ventilation type	Butterfly (two-sided)
Height under the gutter	5 m
Maximum height	7,5 m
Anchors and columns galvanized thickness - 500-600 gr/m ²	470 mikron
Other metal profiles and connections galvanized thickness - 275 gr/m ²	275 mikron

All metal detailes used in the installation of greenhouses should be galvanized 275 gr/m²
At installation welding joints are not applied strictly.

2.1 STEEL-CONSTRUCTION

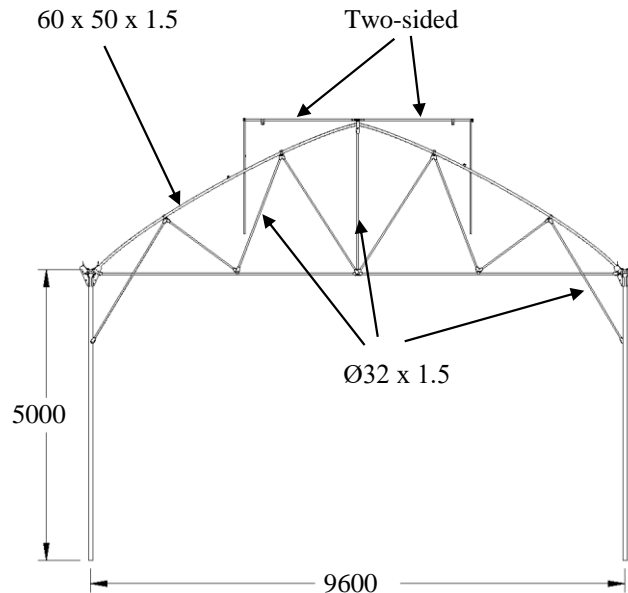
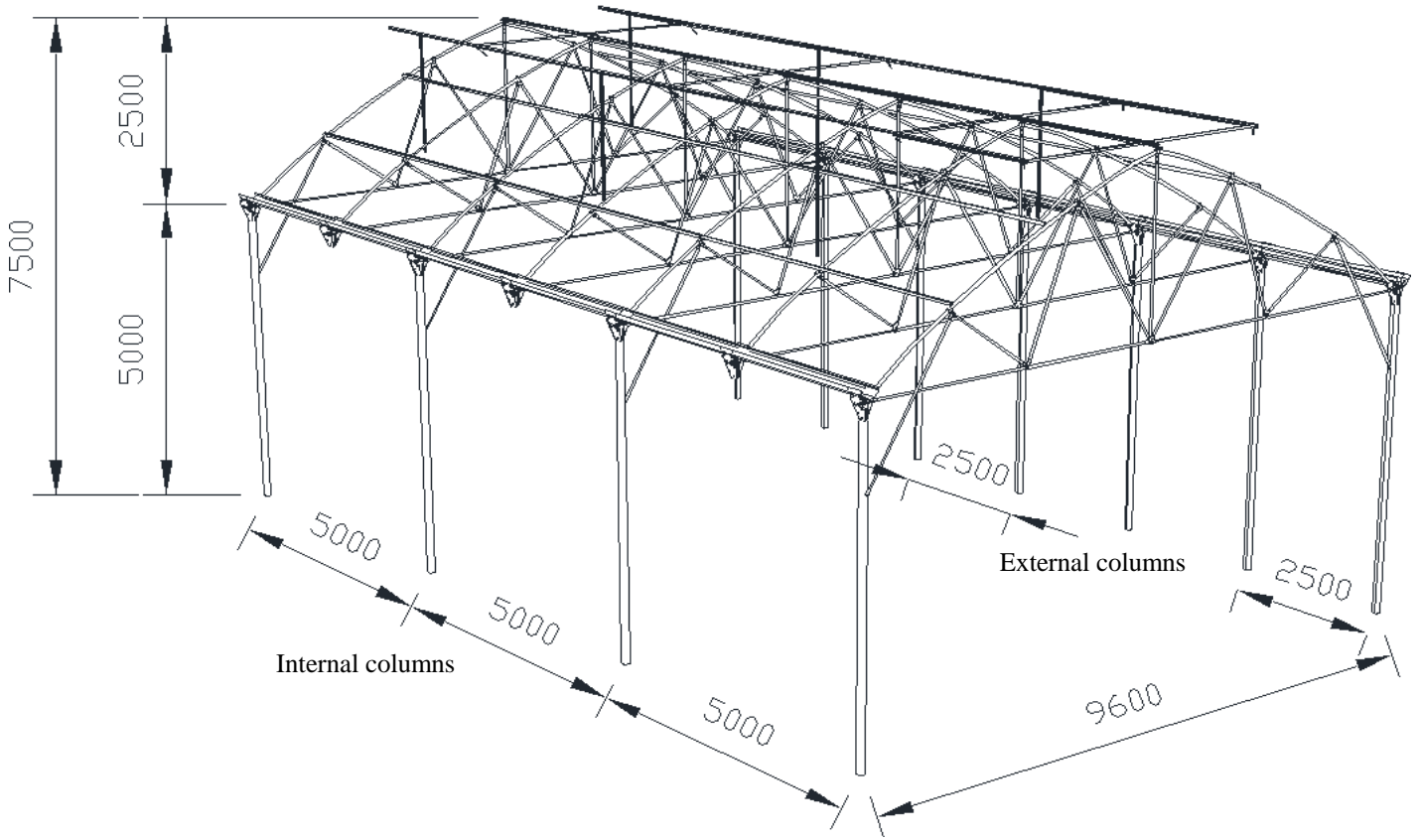
Oval top clip pipe - oval profile
Internal Farm Pipes
Farm bottom pipe
Medium columns - Profile
Side columns - Profile
Front middle columns - Profile
Wind support profiles - Profile

60 x 50 x 1,5 mm
Ø 32 x 1,5 mm
Ø 32 x 2 mm
80 x 80 x 2 mm
80 x 80 x 2 mm
80 x 140 x 3 mm
50 x 50 x 3 mm



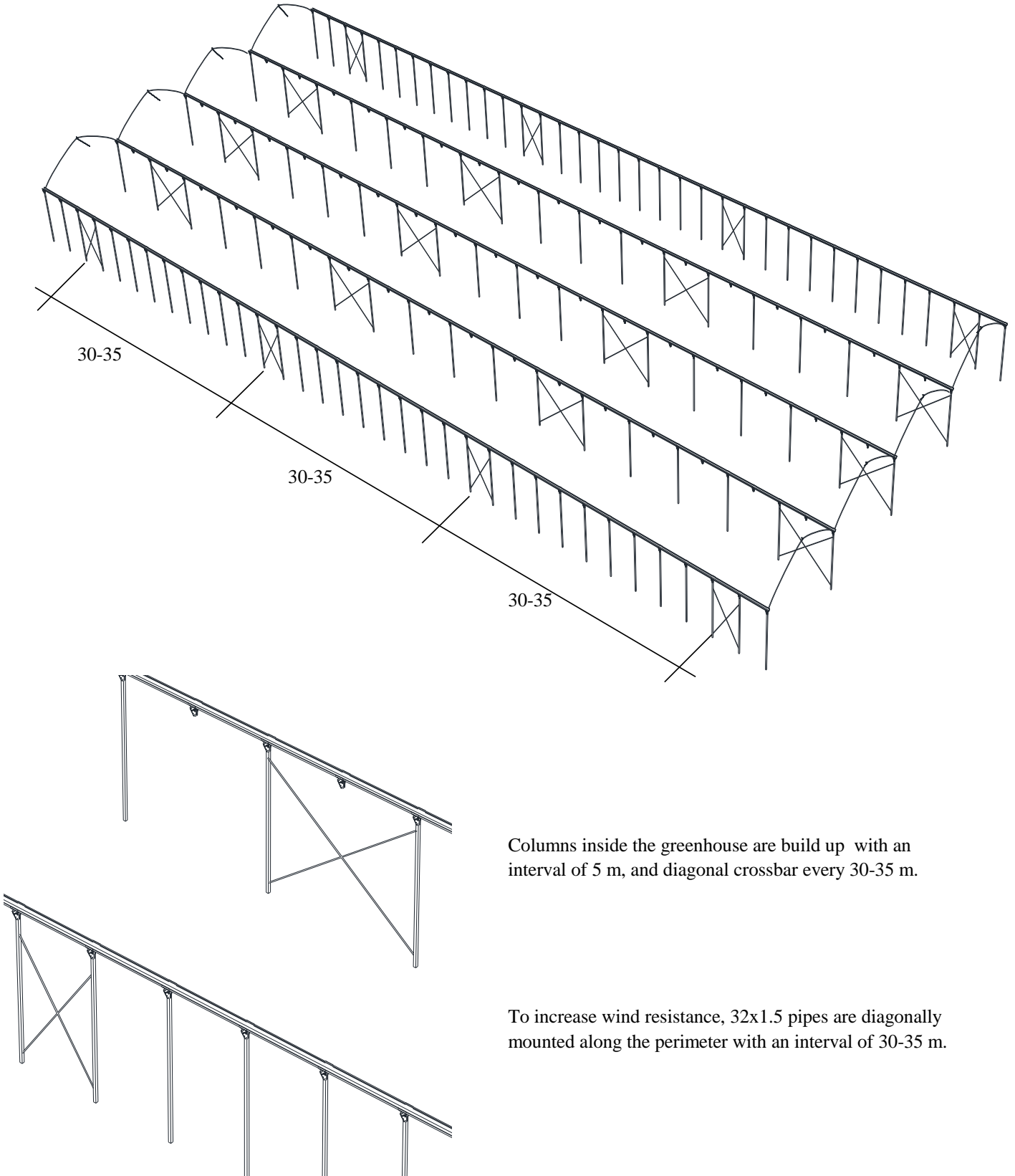
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Columns inside the greenhouse are build up with an interval of 5 m, and diagonal crossbar every 30-35 m.

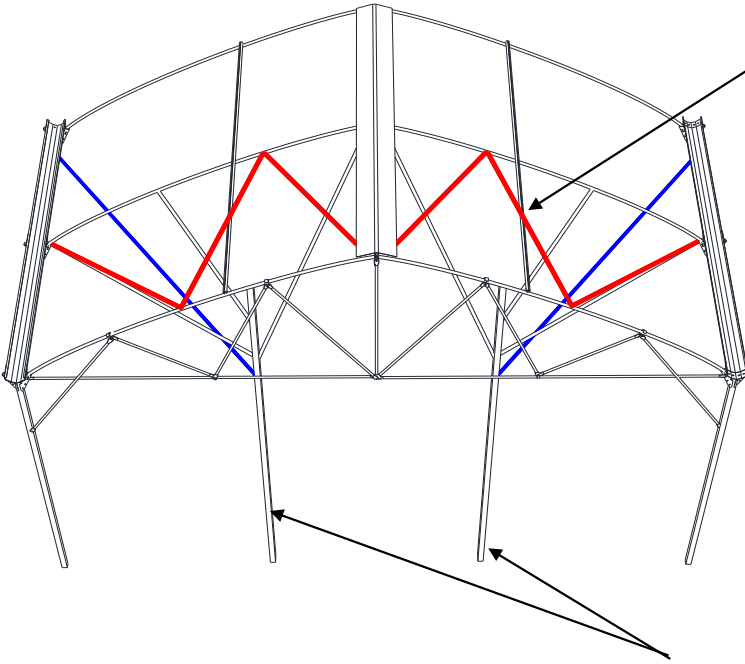
To increase wind resistance, 32x1.5 pipes are diagonally mounted along the perimeter with an interval of 30-35 m.

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32' th DIAGONAL CONNECTIONS

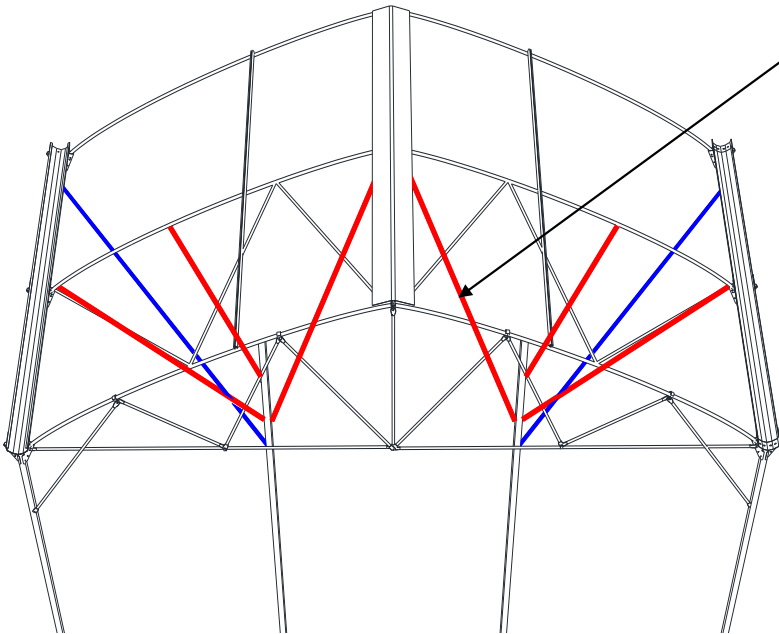
At the beginning and end of the tunnels and through every 30 m along the length of the spans installed 1 set of 6 diagonal pipes (red). Protects the integrity of metal structures in the greenhouse.



As the construction of the greenhouse is in the north-south direction, the strength of the wind coming from this direction is high. Therefore, the head columns are made of galvanized profile 80X140X3 mm

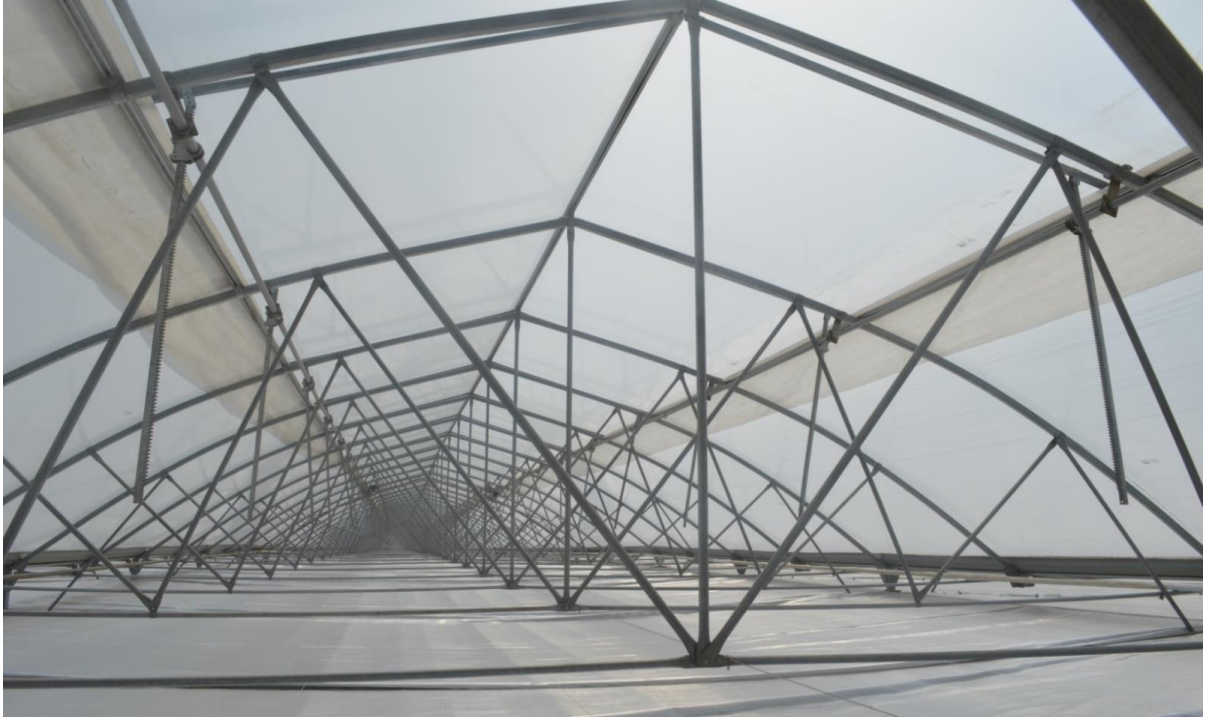
WIND RESISTANCE HEAD CONNECTIONS

At the beginning and at the end of the tunnels are diagonally mounted 6 pieces of (red) pipes 48X2 as shown in the picture. Significantly affects the wind resistance of the greenhouse.

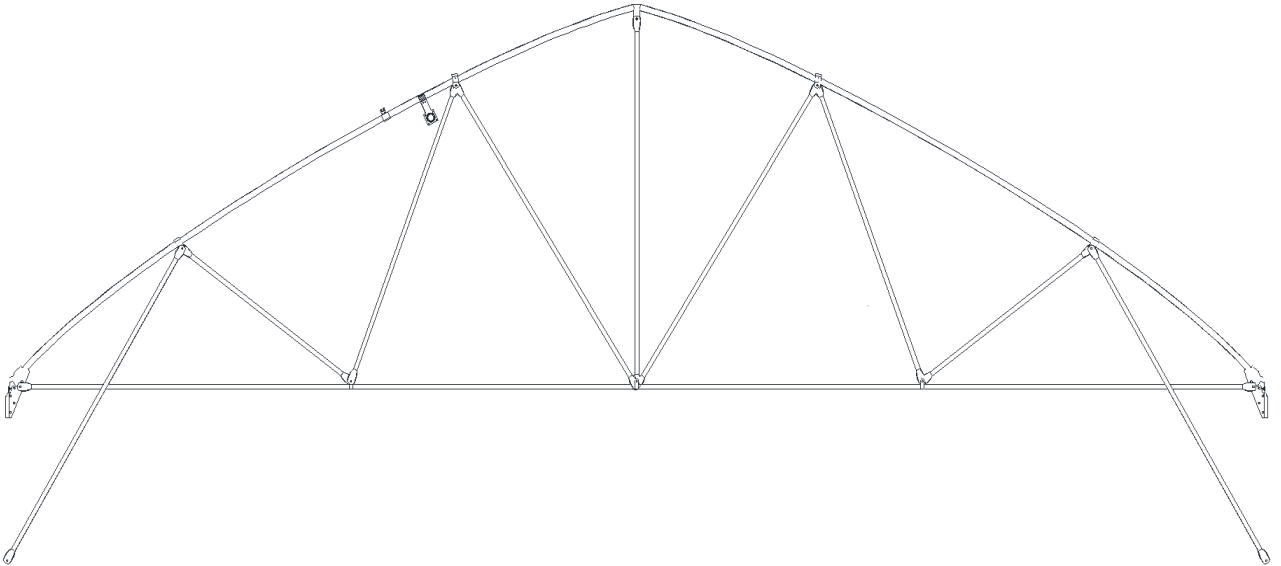


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ROOF FEATURES



In accordance with our standards, farms are mounted every 2.5 meters. Farms are connected to the 9th and 5th pipes from the inside. In this regard, the greenhouses that we mount can withstand wind speeds of up to 110-120 km/h and a load of up to 25 kg/m².



In this project, the farm is connected and strengthened with 32 x 1.5 mm pipes.

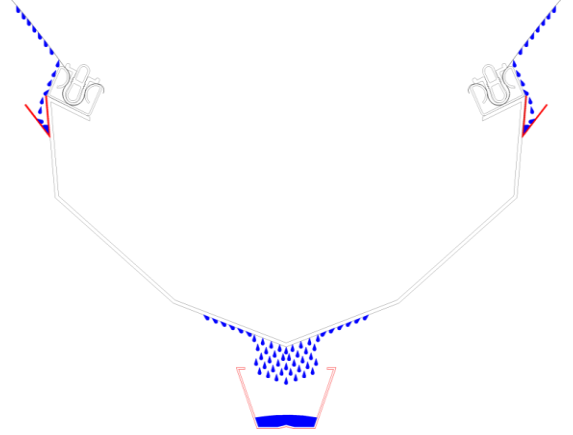
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GUTTERS

Made of galvanized sheet 50 cm width.

On both sides of the rain gutter there are special trays where all the condensate formed on the film on the inside is dripping. Another tray is located under the gutter where all the condensate is dripping which is discharged outside the greenhouse according to a given slope.



The thickness of galvanization of all the above stated metal parts is 275gr/m².

2.2 CONNECTION BOLTS

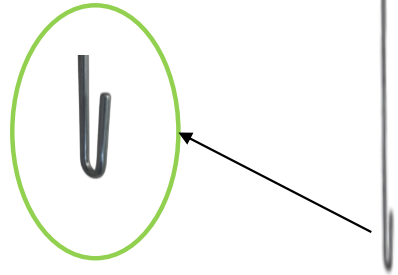
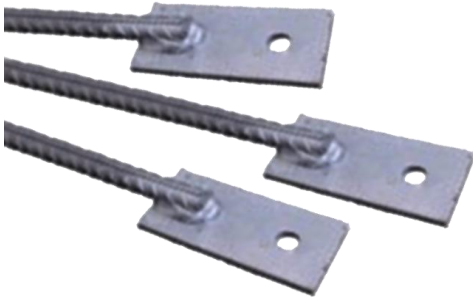
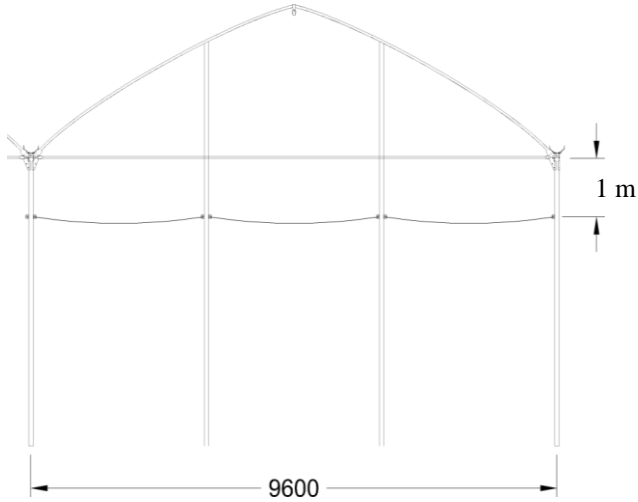
The quality of steel used in the system are 8.8.



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2.3 PLANT SUSPENSION SYSTEM

ø 14 steel armatures are suspended in 6 pieces per span (9.60 m) and connected to columns at a height of 4.5 m from the ground.

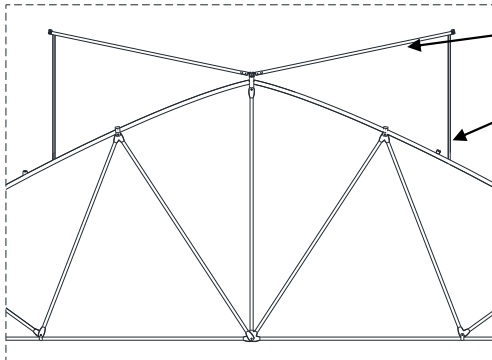


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2.4 VENTILATION SYSTEM (TWO-SIDE)

The upper ventilation system operates on a rack & pinion system.

The window ventilation system connected to motors with gearboxes operates with 34x2.5 pipes that pass through special cells.



Profile 2m

Opening 1,5 m

The motors are equipped with limit switches. The length of the gear racks is 150 cm; every 2.5 m, one gear rack and one gear box are mounted.



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2.4.1 WINDOW VENTILATION SYSTEM



Each wing of the windows leaf with a 1 motor, but if the greenhouse exceeds 120 meters in length, 2 motors are used.



Rack box



Rack gear

Shaft pipes in the ventilation system have a longer service life, as we use special bearings.

3 DOORS

3.1 REMOTE CONTROL DOOR

The doors used at the end of the concrete paths measure 2.7 X 3.2 m.



3.2 PVC ENTRANCE DOOR

The main entrance door to the technical room of the greenhouse will be a PVC door measuring 0.90 X 2 m.



Doors are fully equipped with rails, anchor elements and locks.

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3.3 ALUMINUM SLIDING DOOR



3.4 DESINFECTION ROOM

The disinfection room is a two-door section located in the entrances and exits of the sowing area. The dimensions of the room are 5m x 2.5m width. One of the doors (on the side of the sowing zone) provides non-contact movement, and the other a double-leaf aluminum sliding door.

In order to prevent outsiders from entering the greenhouse, an ID card system is installed inside the disinfection room.



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3.5 ELECTRIC AIR CURTAINS

Electric air curtains create additional protection in places of passage from the technical zone to the sowing zone. They prevent invisible insects from entering the greenhouse. Air curtains are located above the sensor doors at the entrance to the greenhouse's disinfection room.



3.6 GATES FOR LOADING SECTOR

There are 2 types of loading doors for loading grown products,

For loading in the technical room



For loading without entering the technical room



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4 GREENHOUSE COATING SYSTEM

4.1 POLYETHYLENE (Nylon cover)

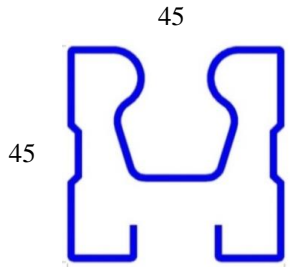
Roof cover: 180 microns thickness for 36 months, with all the additives

Head and sides: 10mm polycarbonate for 10 years

To create maximum stability against the wind;

To increase wind resistance to a maximum level at the top of the roof; Depending on the length of the span, we fix polyethylene with double aluminum clips that divide the total length into 2 parts.

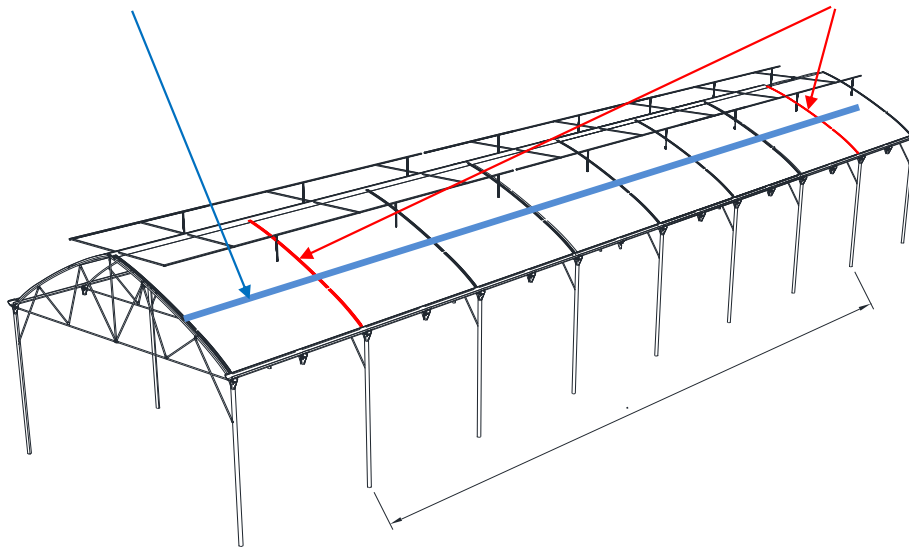
We use a clip profile (marked in blue) along the entire length of the greenhouse to mount the polyethylene with plastic clips.



Profile with clips (blue)



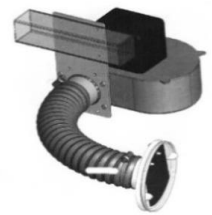
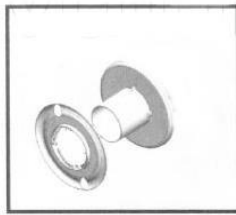
Double clips (red)



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Samples of polyethylene covering



AIR-INFLATED DOUBLE LAYER POLYETHYLENE SYSTEM

According to the location of greenhouse and customer direction top cover polyethylene (nylon) can be double layer.

Mounted with special plastic clips polyethylene cover withstand wind speed up to 100 - 120 km / h.

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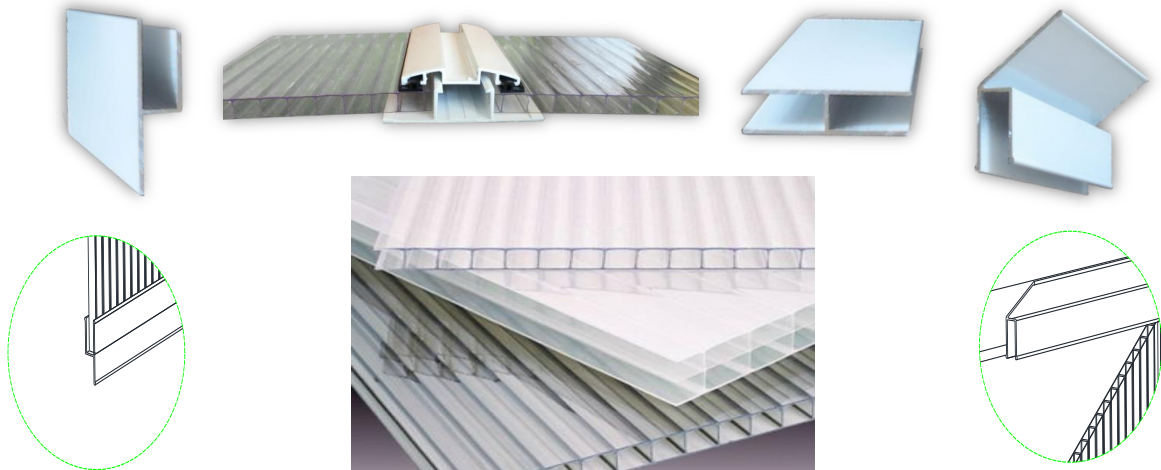
4.2 POLYETHYLENE COVER CLIPS (Plastic Clips)

The main problem with plastic clips was the lack of stability against strong wind gusts, leading to ruptured polyethylene covering . Based on many years of research and development, we have made a completely new model, 8-10 mm plastic clips, which eliminates this problem even with very strong gusts of wind.

4.3 POLYCARBON COVERING

8-10 mm, UV-protected polycarbonate covering with a warranty of up to 10 years.

Installation of polycarbones held by special aluminum profiles.

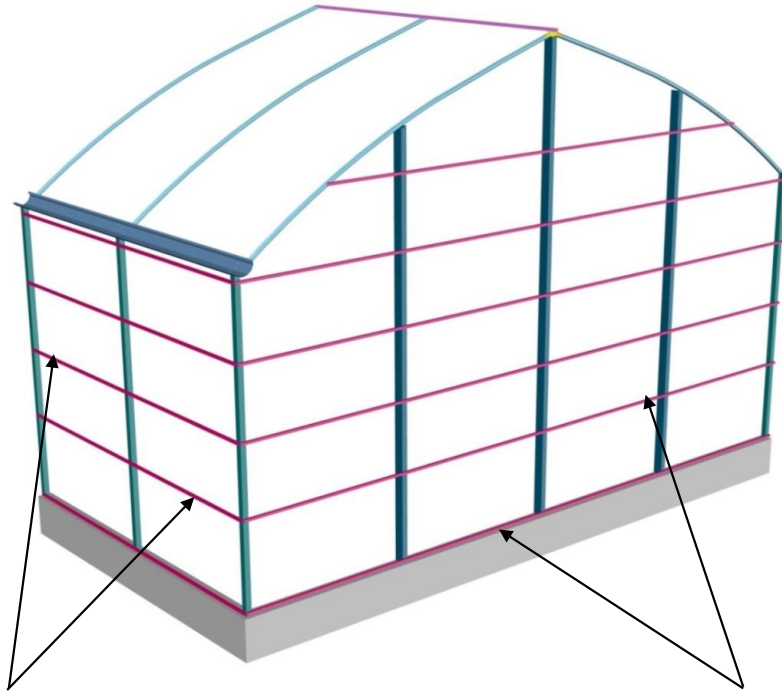


FIXING DETAIL DOWNSIDE

FIXING DETAIL UPPERSIDE

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During polycarbon installation, the side walls of the greenhouse are surrounded by 4 rows of C profiles with dimensions of 35X35 mm.

The head walls are surrounded by 6 rows of C profiles 35X35 mm.



To provide maximum protection against external factors, such as rain and wind, polycarbonate sheets are interconnected with special aluminum profiles.

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4.4 INSECT NET

Insect nets are used in order to prevent the penetration of harmful insects into the greenhouse, the opening parts of the roof (in the windows) use insect nets. A mesh with a density of 40-50 mesh and a 3-year warranty is applied.

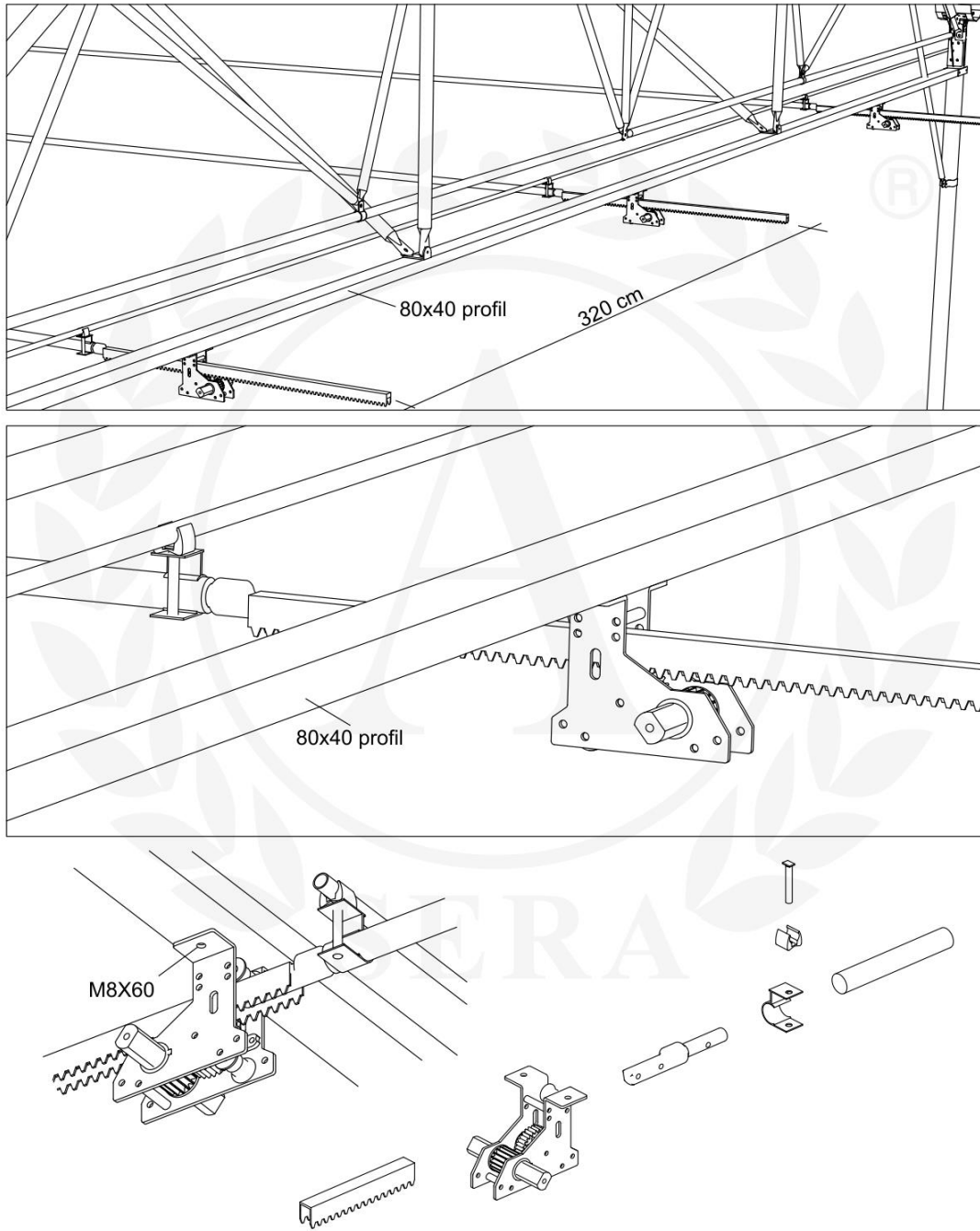


During the opening and closing of the movable part of the roof, sometimes insect nets falling between the teeth of the mechanism, which leads to damage to the mesh itself. To prevent such situations, special grid tensioners are used, thereby increasing the life of the mesh itself.

5 CURTAINS AND MECHANISMS (PUSH PULL)

5.1 CURTAIN MECHANISM

The mechanism works by means of pipes, located at a distance of 320 cm from each other. Installation and adjustment of the system is much simpler than analogues. In addition, it is very easy to repair in case any breakdown.



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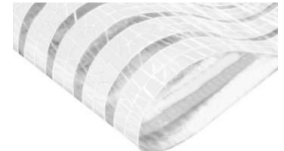
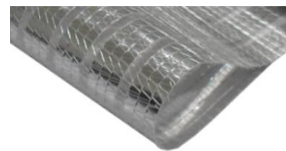
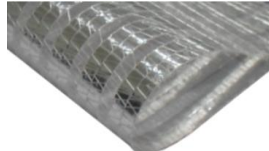
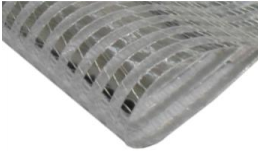
20

5.2 CURTAIN

Fabric: % 55 Shadow creation % 57 Heat protection.

Scope: The system covers the entire surface of the greenhouse.

Side part: The lateral part of the curtains hangs down to 60 cm and prevents sagging by special weight mounting



% 55 Shadow creation
% 57 Energy-saving

% 65 Shadow creation
% 62 Energy-saving

% 75 Shadow creation
% 67 Energy-saving

% 30-35 Shadow creation
% 65-70 Energy-saving



In summer, inside the greenhouse became very hot, in this case the curtain system automatically turns on when a signal comes from the sensors and an artificial shadow is created. And in winter season it automatically turns on to prevent heat loss. In addition, the curtain is closed by the climate control system, so that hot air remains inside.

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6 ELECTRICAL SYSTEM

The main electrical panel will be designed in accordance with EU standards for all engines in the greenhouse, engine protection, contactors, fuse groups, climate control groups.

All electrical cables are mounted inside metal pallets, which are installed above the concrete path throughout the entire greenhouse.

Electrical panels will have additional cells for devices that will be used in the future.



Ventilation motors

Circulation fans

Shading system

CO2 system cables

Greenhouse internal electrical cables

Control panel for drainage tanks

Switches For Heating System

Cables for feeding drainage tanks

Set of switches for Manual And Automatic Usage



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7 AIR CIRCULATION FANS

In each span, fans with a capacity of 7500 m³ / h are suspended every 30-35 m.



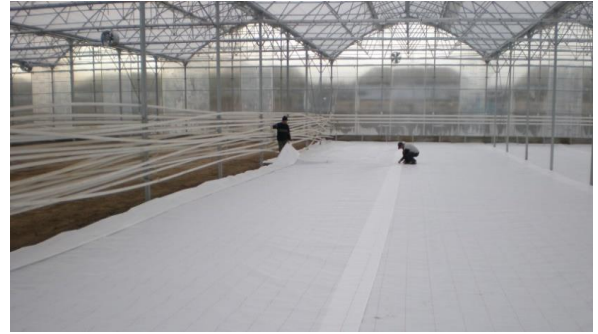
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8 GROUND COVER

Ground cover, laid on the ground in the greenhouse system, prevents the growth of harmful plants that can grow in the soil.

Ground cover is produced from 110 gr / m² plastic with UV additives.



9 PLANT GROWING SYSTEM

9.1 COCOPEATS

Cocopites are used for soilless cultivation.



COCOPEATS (FOR TOMATOS)



COCOPEATS (FOR STRAWBERRIES)

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9.2 SOIL GROWING



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10 TRAYS FOR PLANTS (GUTTER)

For growing crops on hydroponics (cocopeats, mineral wool) in greenhouse complexes, special trays are provided made of a metal sheet coated with special antibacterial paint on both sides. These trays are mounted by special suspension systems to the structure inside the greenhouse. At the end of the trays, devices for draining the drainage water are attached. The drainage system of the trays is connected to the underground drainage water line with a diameter of 100 mm.



DRAINAGE GATE



EQUIPMENT FOR THE PRODUCTION OF TRAYS INTENDED FOR PLANT GROWING



The iron trays used in greenhouses have a width of 60 cm and a white stainless coating.

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11 HEATING SYSTEM

11.1 NATURAL GAS AND DIESEL FIRED BOILER

The heating boilers that we use are origin.BKC / ГОЛЛАНДИЯ

The heating burners that we use are origin.THERMETA / ГОЛЛАНДИЯ

Our system continues to work with diesel fuel automatically when natural gas is cut off.

Distribution of the heating network: each tunnel has 6 rows of ground heating system, sprout heating system and undergutter.

Aluminum insulation of pipes, collectors, chimneys in the boiler room prevents heat loss and gives an aesthetic appearance. This type of insulation is used on request.



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NITROGEN INSTALLATION



COMPRESSOR



MAGNETIC FILTER

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11.2 COAL BOILER

NUMBER AND POWER OF BOILERS, AS WELL AS DETAILED DESIGN AND CALCULATIONS OF THE HEATING SYSTEM WILL BE PROVIDED AFTER SIGNING THE CONTRACT



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11.3 BUFFER TANK AND CO2 SYSTEM

Basically, the supply of Co2 to plants is carried out in sunny weather. To do this, turn on the boiler. During the production of CO2, in order to prevent the ingress of hot water into the heating pipes of the greenhouse heating system, a need arises for a BUFFER TANK. Hot water collected in the tank as a result of CO2 production helps to heat the greenhouse complex without using a boiler at night. An exhaust gas sensor and a gas analyzer are installed in the boiler room. If CO2 is used in the heating system, then CO2 (carbon dioxide) and CO (carbon monoxide) sensors are installed in the boiler room.

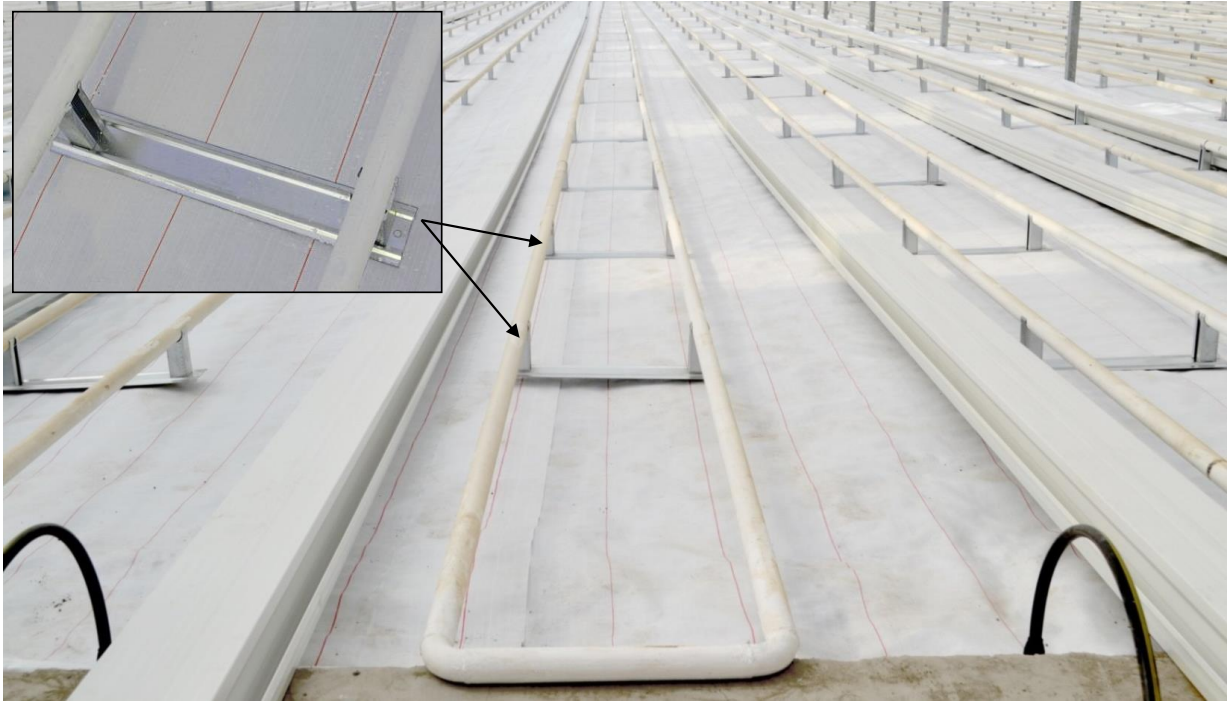


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The heating system works through the information of the sensors according to the set temperature in the climate control system. In order to melt the snow on the top of the greenhouse we install 2 lines of 51mm pipe for gutter heating.

Heating racks 1 pcs for every 2.5 m



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HEATING COLLECTORS



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12 IRRIGATION SYSTEM



EC PH IRRIGATION MACHINES



WATER TANKS



FERTILIZER TANK

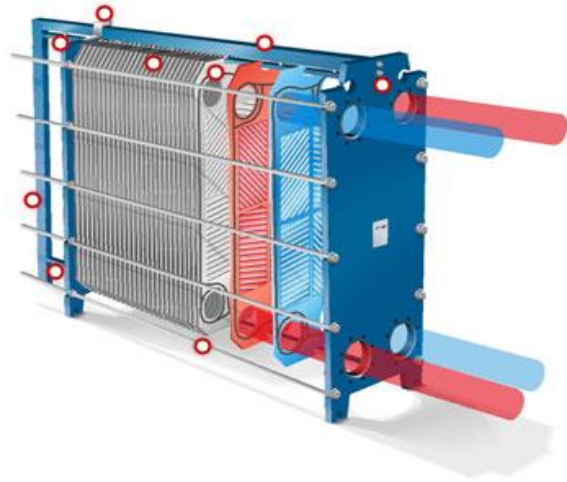
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IRRIGATION WATER HEAT EXCHANGERS

The coldness of irrigation water during cold weather reduces the yield of the plant.

In order to increase productivity, you can use water heaters to heat the water, in accordance with the wishes of the customer.



Spaghetti system is used for drip irrigation system, with the help of which water with fertilizers gets into the root of plants, reducing the consumption of water and fertilizers.



Spagetti irrigation pipes

Tap water

Taps are mounted along the concrete track by each 3 column to use at the moment of need.

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13 DRAINAGE REUSAGE SYSTEM (FERTILIZER WATER)

Drainage water, which is an excess of irrigation water inside the greenhouse, will be collected from various points inside the greenhouse into drainage tanks. Water from the drainage tanks is pumped into a tank with a volume of 212 m³.

The collected fertilized water will be pumped to a second water tank with a volume of 212 m³ with a UV apparatus of 15 m³ / h.

The excess water with fertilizers used in the irrigation system, through this equipment (VITALITE), passes through ultraviolet rays and ozone and is brought into a state of reuse.



14 AUTOMATION AND METEO SYSTEM

Very important for climate control inside the greenhouse is the measurement of temperature, humidity, wind speed outdoors. For this reason, a meteorological station is connected to the climate computer.



Climate Control Computer

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15 FOGGING AND HUMIDIFYING SYSTEM

The climate control system should use a humidification system to naturally lower the temperature inside the greenhouse.



70-90 bar



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16 SUSPENSION FOR PLANT UV ADDITIVE

As the plants grow, the plant is prevented from sagging by wrapping it in UV-wrapped plant wire.



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17 WATER FILTER SYSTEM (REVERSE OSMOSIS)

A water treatment system will be installed based on the EC, PH and other parameters of the water to be used.

Feed pumps will be delivered in working condition with sand filters, inlet and outlet hydrophores.

All metal materials, except the plastic materials in the Reverse Osmosis system, are made of stainless material.

There is no need to install this system if the irrigation quality of the water is appropriate.



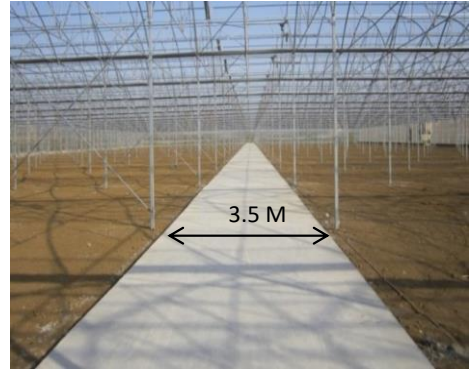
When the Boron content in the water analysis is more than 1 ppm and the water EC is more than 2000 $\mu\text{S} / \text{cm}$ (microsimens), a 25% increase in price should be considered.

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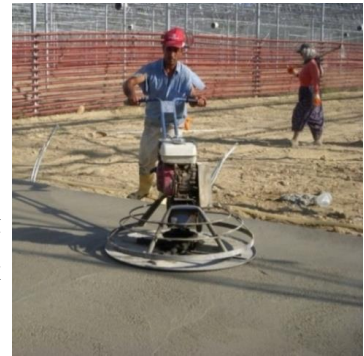
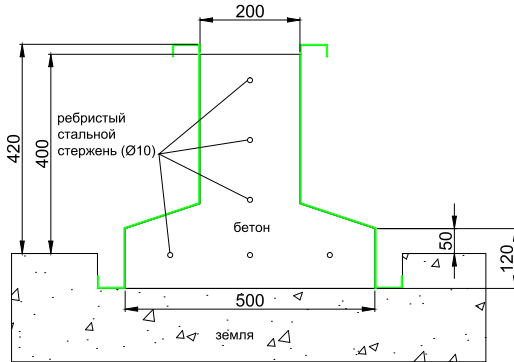
39

18 CONCRETE WORKS

Concrete fence around the perimeter of the greenhouse is 40cmX20cm. For concreting, special formwork of our own metal production is used. The height of service roads is 15 cm. As reinforcement, a steel wire mesh with a size of 10x10 and a mesh of 6 mm is used.



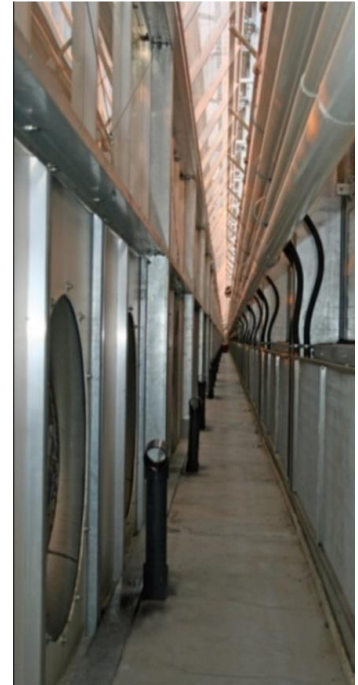
Road concrete with a width of 3.5 m and a thickness of 15 cm. Concrete of the middle road and technical room will be aligned by special equipment "helicopter" type. The concrete to be poured into the anchor pits will have a grade of 300, and the concrete of the technical room will have a grade of 250.



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19 ULTRA CLIMATE SYSTEM



The purpose of this technology is to achieve high productivity: a) in countries with a hot climate by reducing the air temperature inside the greenhouse to 22-24 degrees and continuing producing of vegetables in the summer; b) achieving high productivity in countries with a cold climate. This system does not use windows. The greenhouse is completely closed and air does not penetrate from the outside. Air entering from the outside through the cooling system is fed into the greenhouse through a closed chamber by means of installed units under the gutter. Thanks to the Ultra air conditioning system inside the greenhouse, according to the climate control system, part of the air is discharged through the roof fans and the other part is returned to the closed chamber and integrated into the circulation system. The optimum air temperature in the greenhouse should be 24 degrees during the day, 18 degrees at night. Using this system, you can fully control the temperature regime in the greenhouse.

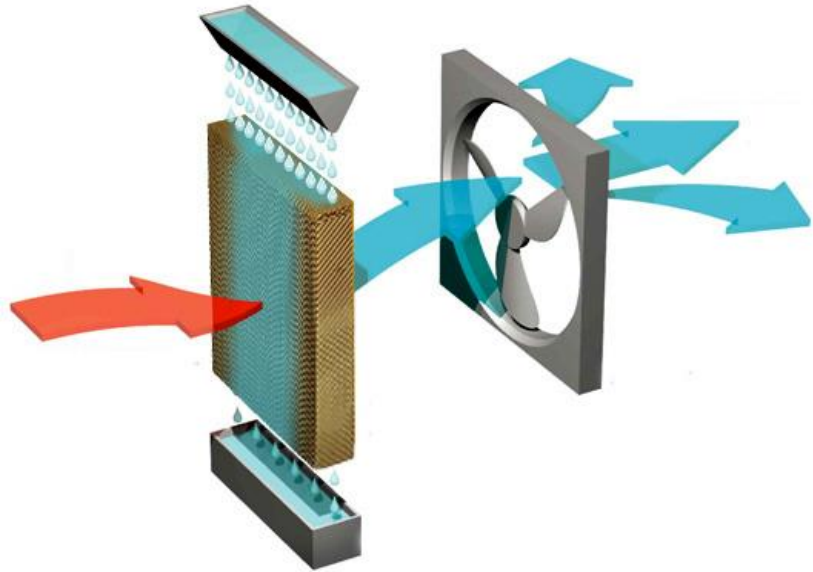


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20 COOLING PAD SYSTEM

The misting and humidification system, among industrial cooling systems, is the most energy-efficient and productive. Air, during operation of this system according to the parameters of cooling and cleaning, is comparable with clean air by almost 100%.



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21 PHOTOCYNTHESES PLANT LIGHTING



Especially in the northern zones, additional light is absolutely necessary for the cultivation of plants as photosynthesis. There are 2 types of lighting systems:

1. Lights equipped with LED lamps.
2. Lights equipped with yellow lamps.

The additionally equipped lighting system plays a major role in increasing productivity and getting 20-30 days ahead of schedule.



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22 CULTIVANT PROCESSING TOOLS

The battery-powered crop care trolleys are specially produced with wheels for greenhouses that can move on concrete roads and on heating pipes .



HARVESTING VEHICLE



ELECTRIC TOW TRUCK



BATTERY-POWERED
TROLLEYS FOR CROP
CARE

23 PULVERIZER MACHINES FOR PLANT CULTIVATION

The battery-powered crop care trolleys are specially produced with wheels for greenhouses that can move on concrete roads and on heating pipes .



Pesticide spraying machine



Plant Protection Tank

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24 COLD AIR STORAGE



25 FORKLIFTS



Electric car lifting capacity 3 tons

Electric hoisting electric forklifts, according to your need, will help save labor and time.

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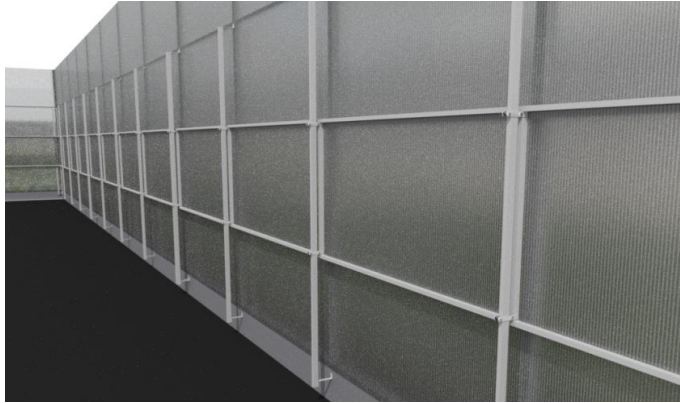
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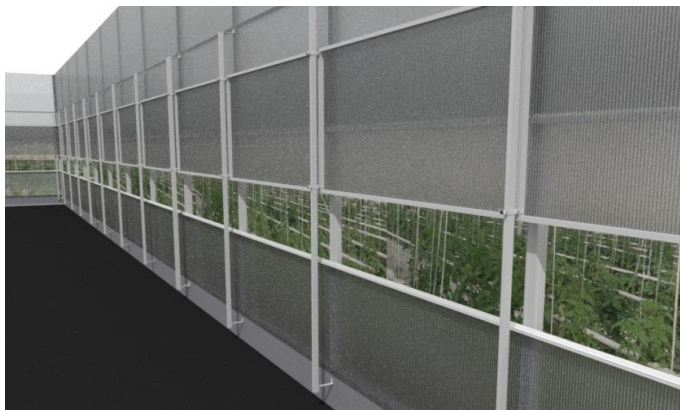


26 SIDE VENTILATION SYSTEM (GUILLOTINE TYPE)

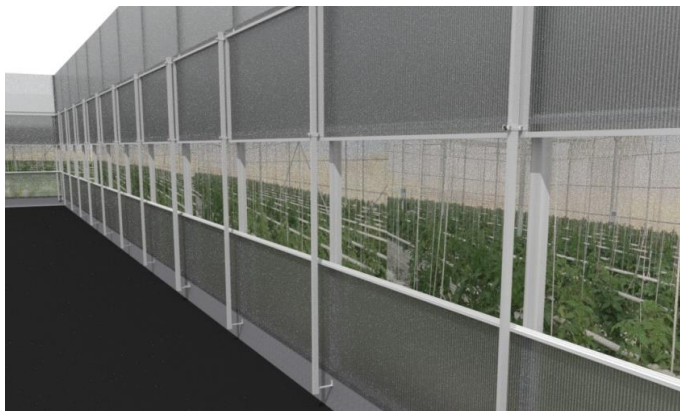
In addition to the upper ventilation system, we recommend using the guillotine type opening system which can be opened and closed vertically on the greenhouse side walls in order to ensure that the inside of the greenhouse penetrate more fresh air.



CLOSED



HALF OPENED



OPENED



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27 SEEDLING AREA

Tables for seedlings, seedlings watering system "BOOM"



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