

A photograph of a large indoor greenhouse filled with rows of green cannabis plants. The plants are growing in a structured environment with visible metal frames and glass panels. The lighting is bright, and the plants appear healthy and well-maintained.

# Greenhouse Facilities & Systems

## Indoor Production for a Growing

# Cannabis Industry

### U.S. GLOBAL RESOURCES

*74 years of service to a growing world*

Seattle • Florida • Texas

8040 ROLLING ACRES TRAIL BOERNE, TX 78015

Phone: 206-722-3999 • 830-755-4768 Fax: 206-721-1140 • 830-755-4753

Email: [usgr@usgr.com](mailto:usgr@usgr.com) Website: [www.usgr.com](http://www.usgr.com)



# THE QUALITY PLUS SERIES



## Main Features

- Superior ROLL-FORM trusses and ROLL-FORM purlins ensure unmatched structural integrity
- Flush mounted purlin design
- Patented condensate removal system built right into truss and purlin design
- Heavy-duty column to truss connectors manufactured by Conley's meet stringent industry safety standards
- Aluminum end wall extrusion is incorporated to "Flash" roof and end wall coverings
- Components are shipped pre-punched and cut to length; simplifying the installation
- ROLL-FORM components nest one into the other during shipment, substantially reducing freight costs

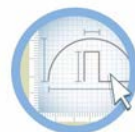
**Maximum Strength**

**Sophisticated design**

**Highly customizable**



Anti-condensate control



Customization



ROLL-FORM



Cantilevered Gutter

## Sizing

Widths: 18', 21', 24', 30', 35'-6", 41'-6", 50'

Under Gutter 8', 10', 12', 14' 16' 18' PLUS

## Loading

This structure is engineered to meet a standard 12 LB live load 85 mph wind or 30 LB ground snow 85 mph wind per the International Building Code (IBC). Alternative loadings are available

## US GLOBAL RESOURCES

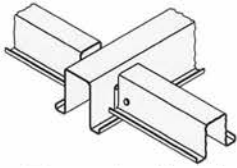
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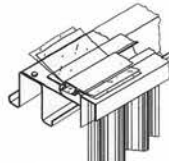
**74 YEARS OF SERVICE TO A GROWING WORLD**

# THE QUALITY PLUS SERIES

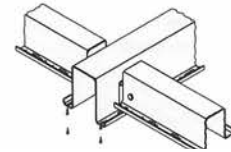
## SPECIFICATIONS



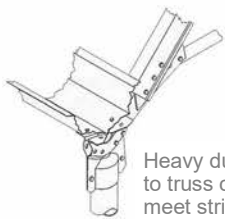
Truss and purlin design offers "I" beam technology for superior strength



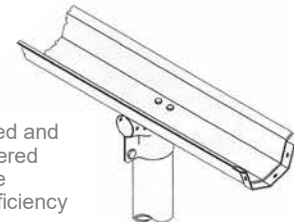
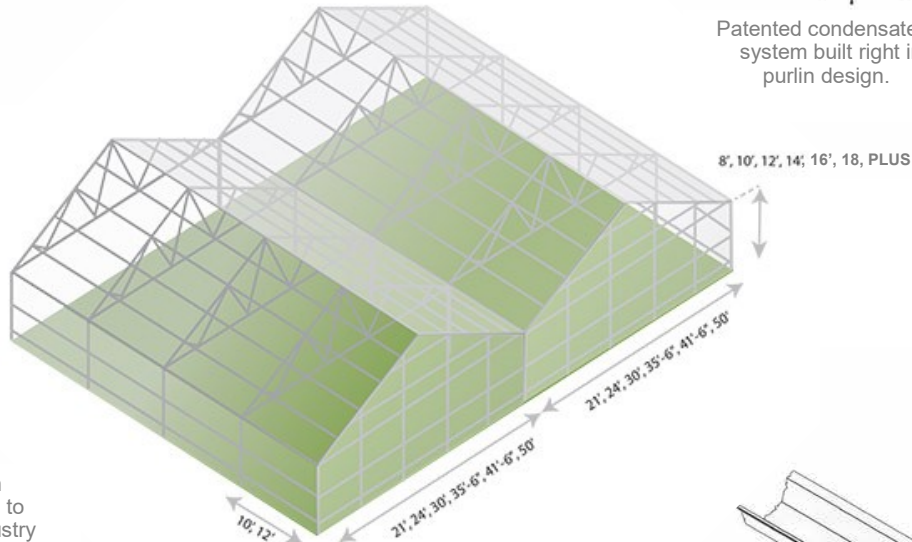
Aluminum end wall extrusion is incorporated to "Flash" roof and end wall coverings.



Patented condensate removal system built right into truss and purlin design.



Heavy duty column to truss connectors to meet stringent industry safety standards.



Lapped and cantilevered gutters increase strength and efficiency

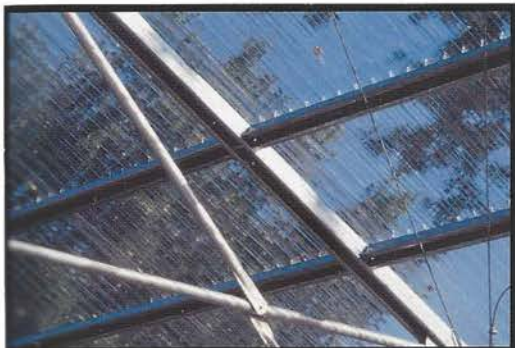
## ACCESSORY EQUIPMENT

- Rack & Pinion roof vents.
- Rock & Pinion side or end wall vents.
- Roll up side or end wall curtains.
- Swing Sliding, sliding or roll-up door assemblies.
- Internal retractable shade system.
- Exhaust fans, circulation fans, and evaporative cooling systems.
- Space heaters, hot water heaters or radiant heat systems.
- Stationary, portable or rolling bench assemblies.



**ROLL-FORM components ensure maximum strength and reliability.**

THIS STRUCTURE IS ENGINEERED TO MEET A STANDARD 12 LB LIVE LOAD AT 85 MPH WIND OR 30 LB GROUND SNOW 3 SECOND GUST PER THE INTERNATIONAL BUILDING CODE (IBC).  
ALTERNATIVE LOADINGS ARE AVAILABLE UPON REQUESTS



Flush mounted purlin design

Toll-free: (888) 334-1440 Seattle: (206) 722-3999 Texas: (830) 755-4768 • Fax: (206) 721-1140 or (830) 755-4753

E-mail: [usgr@usgr.com](mailto:usgr@usgr.com) • Website: [www.usgr.com](http://www.usgr.com)



# THE GOTHIC ARCH SERIES



## Main Features:

- Superior ROLL-FORM Gothic arches and ROLLFORM purlins ensure unmatched structural integrity
- Lapped and cantilevered gutters increase strength
- Patented condensate removal system built right into truss and purlin design
- Heavy-duty column to arch connectors to meet stringent industry safety standards
- Aluminum end wall extrusion is incorporated to “Flash” roof and end wall coverings
- Gothic arch and purlin design offers “I” beam technology for superior strength
- Optional roof, side wall and end wall vents
- Components are shipped pre-punched and cut to length; simplifying the installation
- ROLL-FORM components nest one into the other during shipment, substantially reducing freight costs

A TRADITION AND OF ITSELF, THIS STYLE REPRESENTS ONE OF THE MOST VERSATILE GREENHOUSES ON THE MARKET TODAY. INCORPORATING SUPERIOR STRENGTH ROLL-FORMED ARCHES AND PURLINS, THIS STRUCTURE IS AS STRONG AS IT IS FUNCTIONAL. WITH ITS FLUSH MOUNTED PURLIN DESIGN, THE ARCH SERIES 6500 CAN BE ADAPTED TO POLYETHELENE OR RIGID COVERED ROOFS ALL THE WHILE PROMOTING BUILT IN CONDENSATE CONTROL FEATURES. ENGINEERED FOR MODERATE TO EXTREME WIND AND SNOW ENVIRONMENTS, THIS GREENHOUSE IS ABLE TO MEET ANY LOAD.

## US GLOBAL RESOURCES

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Website: www.usgr.com

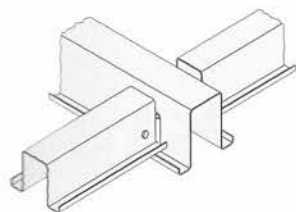
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**74 YEARS OF SERVICE TO A GROWING WORLD**

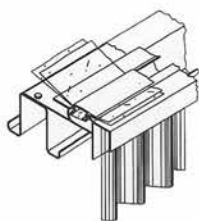


# THE GOTHIC ARCH SERIES

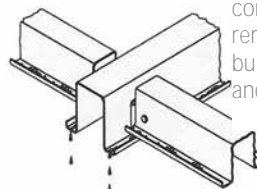
## SPECIFICATIONS



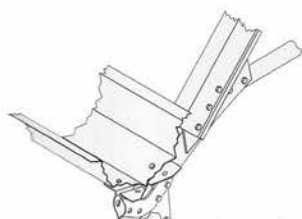
Gothic arch and purlin design offers "I" beam technology for superior strength.



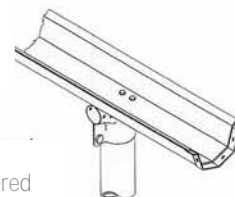
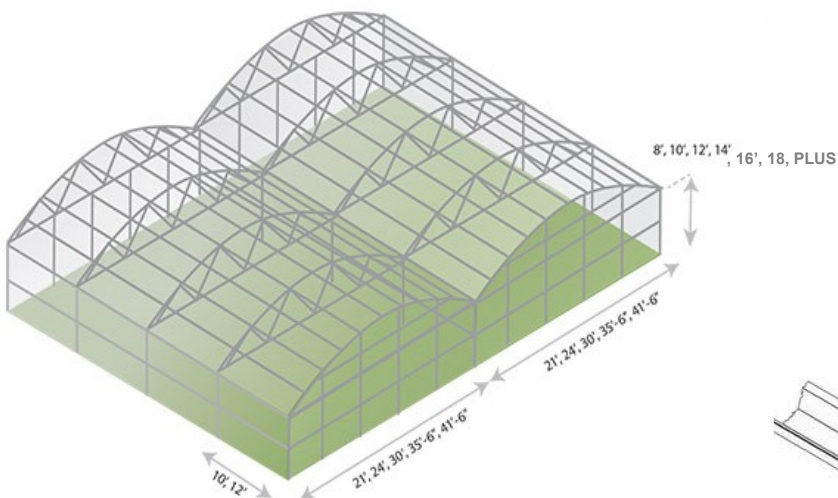
Aluminum end wall extrusion is incorporated to **Flash** roof end and wall coverings.



Patented condensate removal systems built right into arch and purlin.



Heavy duty column to arch connectors are sold by USGR to meet stringent industry safety standards.



Lapped and cantilevered gutters increase strength and efficiency.

## OPTIONS

- **Rack and pinion roof vents**
- **Sidewall and/or end-wall vents to let heat naturally escape greenhouse**
- **Swing doors, single/double sliding doors, roll-up doors**
- **Exhaust fans, circulation fans, high efficiency fog systems and evaporative cooling systems**
- **Internal retractable shade/heat retention system**
- **Rigid covering for sidewalls and endwalls**
- **Space heater units, hot water systems or radiant heat systems**
- **Greenhouse benching systems**
- **Environmental control systems**
- **Aluminum end-wall flashing with hardware**



## Optional roof and sidewall maximizes natural

Type of Roof	Engineered Widths
Gothic Arch	18', 21', 24', 30', 35'-6", 41'-6"
Column Spacing	Gutter Heights
10', 12'	8', 10', 12', 14', 16, 18 PLUS

### Sizing

**Widths: 21', 24', 30', 35'-6", 41'-6", 50'**

**Under Gutter Heights: 8', 10', 12', 14' 16' 18 PLUS**

### Loading

THIS STRUCTURE IS ENGINEERED TO MEET A STANDARD 12 LB LIVE LOAD AT 85 MPH WIND OR 30 LB GROUND SNOW 3 SECOND GUST PER THE INTERNATIONAL BUILDING CODE (IBC). ALTERNATIVE LOADINGS ARE AVAILABLE UPON REQUEST.

# THE QUONSETTER SERIES



## FEATURES

- ROLL-FORM arches, legs and purlins ensure unmatched structural integrity.
- Gothic Arch roof profile is engineered to reduce roof snow build-up and provide maximum headroom.
- Arch and purlin design offers 'I' beam technology and strength.
- 13 gauge rollformed legs are substantially stronger than conventional greenhouse columns.
- Engineered to meet a standard 12 LB live load at 85 mph wind ("B") or a 30 lb ground snow 3 second gust per the International Building Code (IBC).
- Alternative loadings are available upon request.
- Components are shipped pre-punched and cut to length simplifying the installation and require much less labor than traditional greenhouses.

WHETHER STARTING OUT OR IN AN EXPANSION MODE, THE VERSATILITY OF THE QUONSETTER SERIES OFFERS A NATURAL NO NONSENSE SOLUTION FOR OBTAINING MAXIMUM PRODUCTIVITY WHILE REDUCING CAPITAL INVESTMENTS. THE QUONSETTER SERIES IS EQUALLY AT HOME AS A GROWING AREA OR SOPHISTICATED RETAIL CENTER. IT CAN BE COVERED WITH POLYETHELENE, SHADE CLOTH OR RIGID COVERINGS INCLUDING POLYCARBONATES. MORE THAN 60 YEARS OF EXPERIENCE GO INTO EACH QUONSETTER SERIES FABRICATED. EVERY DETAIL HAS BEEN FILED TESTED AND REFINED TO GUARANTEE COMPLETE CUSTOMER SATISFACTION.

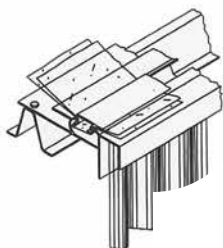
**74 YEARS OF SERVICE TO A GROWING WORLD**



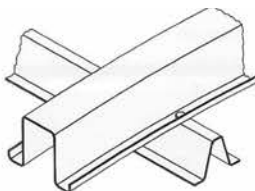
# THE QUONSETTER SERIES

## SPECIFICATIONS

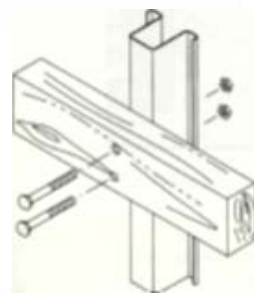
Aluminum end wall combination creates a flashing for end wall and roof coverings.



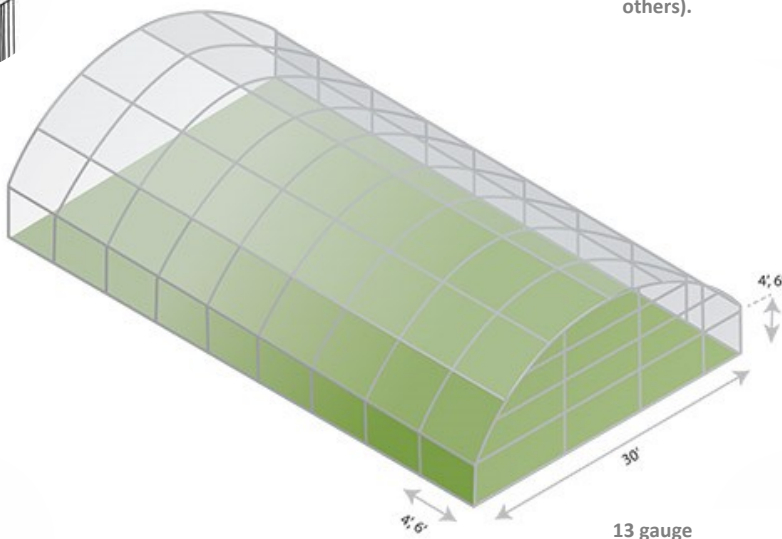
Arch and purlin design offers "I" beam technology for superior strength.



All legs are shipped pre-punched to simplify the installation of side wall framing (wood supplied by others).



Our Tube Lock II is the most efficient means of securing poly coverings.



13 gauge rollformed legs are stronger than conventional greenhouse columns.



## Options

- Covering choices of: polyethylene film, rigid coverings (polycarbonate) or shade cloth.
- Endwall frame kits with uprights and girts
- Arched gable end bar with clips and screws
- 3' x 6'8" Storm Door kit with double pane glass
- Conley's Tube Lock assembly or Wire and Springlock for poly film fastening
- Exhaust fans, circulation fans and evaporative cooling systems
- Space heater units, hot water systems or radiant heat
- Environmental control systems
- Roll-up/drop-down curtain systems (manual or automated drives)



THIS STRUCTURE IS ENGINEERED TO MEET A STANDARD 12 LB LIVE LOAD AT 85 MPH WIND OR 30 LB GROUND SNOW 3 SECOND GUST PER THE INTERNATIONAL BUILDING CODE (IBC) .  
ALTERNATIVE LOADINGS ARE AVAILABLE UPON REQUEST

# WHY BUY A GREENHOUSE AND INDOOR SYSTEMS FROM U.S. GLOBAL RESOURCES?

Good question: One we face daily. Many potential customers often think: "I can get the lowest price buying direct from the greenhouse manufacturer!" Let us look at some facts.

For 74 years, U.S. Global Resources has been providing quality greenhouses and indoor plant production facilities based upon a long history of integrating plant growth technology and all the disciplines of growing plants to produce both quality and quantity for maximum ROI. We often tell our clients we are not really building a greenhouse, we are growing plants, but a steel structure is required for containment.

Greenhouse manufacturer is really a steel fabricator making high strength, ridge framed engineered structures to meet all codes. Others supply low cost temporary structures. There are different qualities in between. All manufacturers specialize in their particular fabrication process, essentially fabricating steel to order. They do not make other components such as pads, fans, coverings, heaters, shade systems, electrical irrigation and many other systems that comprise the greenhouse. All of these components vary dramatically based upon the needs of the plant.

Each component and system in a facility must be engineered and designed to create best plant growing environment by proper selection and engineering of the individual component to meet the needs of the plant. For example, a fan is not just a fan, there are 4 or 5 different qualities; different number of CFM's produced or CFM per watt of electricity, how fan affects air movement, temperature, humidity, and particularly its effect on the particular plant that is being grown and its effect on the plant canopy. This is one example of how each component must be engineered and designed based on plant growth technology in order to have a healthy and growing plant.

As important as the structure is, most important are the tools, knowledge and equipment to produce maximum quality product regardless of whether it is a restaurant, factory or greenhouse or plant growing facility.

With our extensive background in a wide range of crops, including cannabis, we know that the structure is just part of an integrated growing operation. A structure alone will not produce a profitable quality crop.



Plant Growth Technology



Indoor Production



LIGHTS READY TO BE INSTALL

**74 YEARS OF SERVICE TO A GROWING WORLD**



**USGR UNDERSTANDS THE UNIQUENESS OF YOUR PROJECT, WHETHER YOUR INVESTMENT IS SMALL OR LARGE, WE CAN TAILOR IT TO MEET YOUR FINANCIAL REQUIREMENTS AND CROP NEEDS, MAXIMIZING QUALITY, QUANTITY AND RETURN OF INVESTMENT.**

Wherever you build, the location, weather, load requirements, light conditions, and the crop you grow make your project. Because of our extensive and diversified background, USGR understands the uniqueness of your project. Whether your investment is large or small, USGR can tailor it to meet your requirements and those of the crop.

Our 75 years of service and quality product offerings in over 44 countries has resulted in over 1,500 projects completed and operating. Always consider the experience of your supplier in determining your product source.

We do not search out low cost non-compatible equipment and systems to make our structure package less expensive. It is our responsibility to represent you, the client, to provide compatible systems and equipment based on the economy of operation integrating the equipment for maximum environmental efficiency and plant benefit. Further, it is these compatible systems that determine most of the budget. In most situations, the structure rarely is more than 15% **to 20% of our client's total investment, except where you are** building a low-tech rain protection minimal environment control. It is also our responsibility to always be concerned about product life expectancy and of course economy of operation.

Many of our cannabis clients are retrofitting warehouses and buildings to accommodate the growing of cannabis. We understand the parameters of these conversions, but still base all of our engineering and design on the building into a quality growing facility. We believe certain existing operating systems of such buildings must be compatible or changed to benefit the crop.

It is certainly far more complicated than converting walls, roof and ends to a clear covering. Caution must also be used in irrigation, ventilation, heating, humidity control, etc.

Qualify your supplier as to their ability to design and implement the project around your plant growing requirements. We have designed and built projects for horticulture, agriculture, forestry, aquaculture in over 80 countries worldwide with tremendously different environments, from arctic regions to tropical and desert conditions for a wide variety of crops. We design these projects only after a thorough study of plants to be grown and tailor it to your investment. Your investment demands a thorough knowledge by the supplier of the requirement of the facility as well as the plant to be grown.

Structures that are weak or overbuilt, heating systems that under heat or heat unevenly, air moving systems that create turbulence, can not cool properly and give uneven temperatures, coverings that do not transmit proper life and have short lives, pads that deteriorate or improperly designed, motors that are inefficient, and controls that are not integrated can affect your investment very quickly and negate your opportunities for success.

If you have local sources for your greenhouse, an existing building, or are fabricating your own structure, we hope you will consider our firm for your operating systems. We have all the systems and plant growth technology to help you in completing your project.

We hope to earn the privilege of supplying you with your project or systems. But if we are not awarded the project we want your investment to be rewarding and successful. For this reason, we urge you to qualify your supplier in many areas before buying.

***WE MAKE PLANTS GROW BETTER***

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# Cannabis Greenhouse Equipment & Systems



**ROLLING BENCHES**



**STATIONARY BENCHES**

Indoor-Outdoor Bench Available in Many Options



**EBB & FLO BENCHES**



**POLYCARBONATE ROOF COVERING**  
MANY COVERING OPTIONS AVAILABLE



**GROW CART**



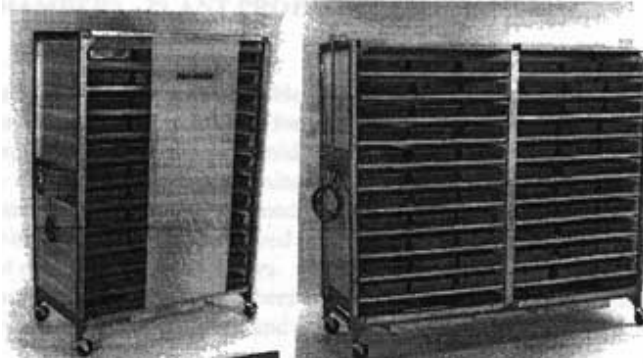
**DRYING RACKS**



**ODOR CONTROL**



**WADSWORTH CONTROLLER**



**GERMINATION CHAMBER**



**HUMIDITY CONTROL**

**WE OFFER ALL TYPES OF MEDIA PROCESSING EQUIPMENT**



**SOIL STERILIZER**



**STEAM GENERATOR**



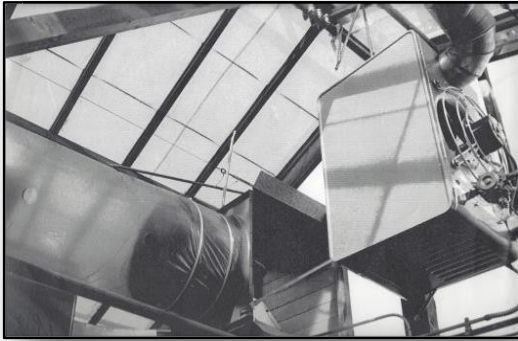
**1/2 YARD CUBIC ELECTRIC  
SOIL STERILIZER**



**1/2—10 YD SOIL MIXER**



# Cannabis Greenhouse Equipment & Systems



Fan-jet for heating, ventilating, air circulating, cooling and humidity control



Fans



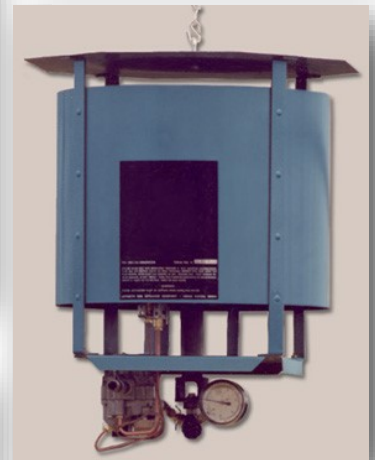
AIR CIRCULATION FAN



UNDER BEANCH HEATING



MODINE UNIT HEATER



CO2 GENERATOR



LIGHT DEPRIVATION



LIGHTING



EVAPORATIVE COOLING



INSECT SCREENS



FERTILIZER INJECTORS



# HSE NXT2

## 1000 WATT FIXTURES

P.L. LIGHT SYSTEMS  
THE LIGHTING KNOWLEDGE COMPANY

### A REVOLUTIONARY FIXTURE

PL Light Systems is proud to introduce the HSE NXT2, the pinnacle of 1000W horticultural fixture design. The HSE NXT2 takes into account not only the most advanced electronic driver, but utilizes a brand new cast aluminum body. The HSE NXT2 is designed for years of maintenance free operation and no detail has been overlooked.



### SOME OF THE KEY FEATURES AND BENEFITS INCLUDE:

- High efficiency electronic ballast
- Built in heat fins to reduce operating temperature by 6%
- Hinged ballast compartment for easy access
- New breathable membrane allows for cooler operation
- Single part casting with slide lock sockets to make lamping and re-lamping quick and easy
- Compatible with Alpha and Beta reflectors to suit your lighting requirements

74 YEARS OF SERVICE TO A GROWING WORLD



# HSE *NXT2*

## 1000 WATT FIXTURES

Looking for an efficient solution  
in supplemental lighting? Look no  
further then the revolutionary  
HSE NXT2!

### Technical Specifications

Rated main voltage	<b>240V</b> (±10%)	<b>277V</b> (±10%)	<b>347V</b> (±10%)	<b>400V</b> (±10%)
Input current	4.42A	3.85A	3.07A	2.6A
Power factor	>0.98	>0.98	>0.98	>0.98
Input frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Real input power	1060W	1045W	1040W	1032W
Lamp type	High Pressure Sodium 1000 Watt 400 Volt Electronic			

### Dimensions

	<b><u>240V</u></b>	<b><u>277 / 347 / 400V</u></b>
Length	21in / 53cm	21in / 53cm
Width	10.25in / 26cm	10.25in / 26cm
Height	17in / 43cm	12in / 26cm
Weight	6.1kg / 13.4lbs	3.5kg / 7.7lbs

Call 206-722-3999 or 830-755-4768 and ask for a detailed lightplan



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# CROP LIGHTING SYSTEMS

## FOR CANNABIS INDUSTRY

As a 74year old corporation **U.S. GLOBAL RESOURCES** has been deeply involved in supplying worldwide a wide range of seed and plant materials as well as providing products and systems to our horticultural clients for all phases of production from germination to post-harvest handling. Light enhancement and light deprivation on many crops can be the most important focus for successful production and make the difference between profit and loss.

**U.S. GLOBAL** has been an agent for **PL Light** and their parent company in Europe, Schroeder Hortilux for over 35 years. The quality of the products, new innovations and their constant testing of their lights on a wide range of crops has resulted in their worldwide leadership in plant lighting. PL integrates their extensive background in plant growth technology with the supplying of a wide variety of supplemental lighting solutions.

**U.S. GLOBAL** provides **PL Light** with a vast amount of plant growth technology that PL incorporates into their state of the art computer engineering and design which U.S. Global Resources relies on in determining efficiency, light distribution, electrical consumption and with the input of all available details, the result is program and drawings that provide the client with highest degree of technology and best results generally delivered with several options.

### REFLECTORS

U.S. GLOBAL supplies a large range of reflectors. Each reflector has been developed to provide an optimum light distribution for specific crops and business situations. Reflectors are used to ensure that the light penetrates deeper into the crop in the most efficient way possible. Each of the reflectors has its own specific properties and associated applications. It is understood, that all the reflectors have a very high performance.

The reflectors are easily removed from the fixtures for efficient cleaning and changing. In addition, all the reflectors have a standard adapter, which means that they are fitted to the entire range of Hortilux Schröder fixtures. The PL Light Systems fixtures have a standard collar for this purpose. Reflectors that will be developed in the future will also have this adapter so that reflectors will always be easy to change.



ALPHA



BETA



DELTA



ZETA



WIDE



SUPER WIDE



MAXIMA

### P.L. LIGHT SYSTEMS INTRODUCES LIGHTSHINE REFLECTOR CLEANING SERVICE IN NORTH AMERICA

The commercial greenhouse industry has seen significant innovation over the past few years. The greenhouse of today looks remarkably different to those considered to be at the cutting edge of design just a decade ago. The most significant innovations have been in greenhouse technologies—driven by increasing energy and labor costs. Growers have realized the advantages of investing in equipment and automated systems that will reduce their operating costs (including labor, maintenance and energy-related costs) and increase their bottom line.



As such, energy-efficient supplemental lighting systems are a logical investment for most greenhouse operators, but they often do not realize there is also a lot to be gained from 'simple' measures like cleaning and maintaining the lighting fixtures in the greenhouse. Typically, cleaning reflectors is a labor-intensive task done by hand, and does not necessarily deliver the best results. With PL Light's fully-automated Lightshine service, however, reflector cleaning can be a simple and efficient process.

It's simple. All you have to do is contact PL Light Systems to schedule your Lightshine service in the spring/summer months and we will take care of the rest. PL Light will collect the reflectors from your facility, and return them to you cleaned and ready for optimal performance come the fall.

**74 YEARS OF SERVICE TO A GROWING WORLD**



**U.S. GLOBAL RESOURCES** has been involved in plant lighting for vegetative growth and light deprivation since the early 1940's. USGR distributed and programmed flower crops involving all plant technology from propagation to harvest. Medical Marijuana, like chrysanthemum (at one time 800 million cutting industry), with over 200 varieties and different growth habits. But we, like others, could take germinated seed or unrooted cuttings programming propagation using as many as 35 different mum varieties, with different maturity dates and by managing nutrition, irrigation, light enhancement and light deprivation flowering these many different varieties almost to the exact day then immediately replanting and harvesting every 10 weeks realizing 10.5 crops per year. Our history tells us this is essential for medical marijuana where harvest and replanting are essential to maximize turn per year. Also reliably servicing retailers consistency every week of the year.



## **HSE NXT II 1000 WATT FIXTURES**

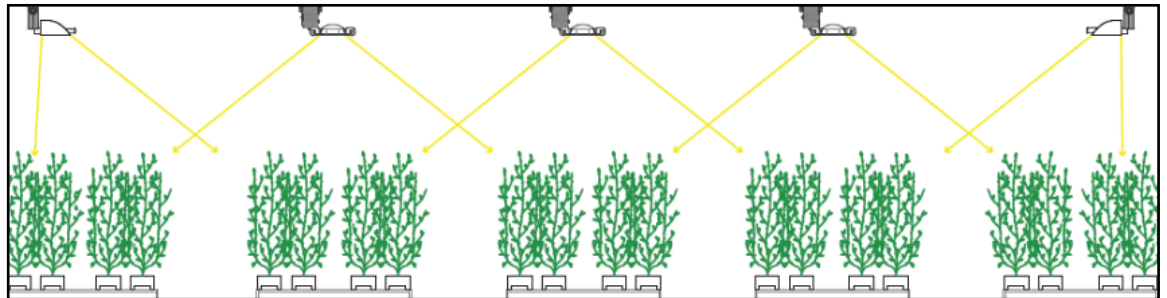
### **A REVOLUTIONARY FIXTURE**

PL Light Systems is proud to introduce the HSE NXT2. the pinnacle of 1000W horticultural fixture design. The HSE NXT2 takes into account not only the most advanced electronic driver, but utilizes a brand new cast aluminum body. The HSE NXT2 is designed for years of maintenance free operation and no detail has been overlooked.

### **SOME OF THE KEY FEATURES AND BENEFITS INCLUDE:**

- High efficiency electronic ballast
- Built in heat fins to reduce operating temperature by 6%
- Hinged ballast compartment for easy access
- New breathable membrane allows for cooler operation
- Single part casting with slide lock sockets to make lamping and re-lamping quick and easy
- Compatible with Alpha and Beta reflectors to suit your lighting requirements.

**SPECIAL LIGHT  
PENETRATE AND  
DIFFUSED  
REFLECTOR  
UTILIZES HEAT**



**Hortilux Schröder** used the latest technology in the development of the HSE NXT II. The electronic driver allows for quiet and efficient operation while the fixture's unique cooling ribs ensure optimum thermoregulation. This makes the HSE NXT II the coolest fixture around.

This is also an extremely durable fixture with a sturdy structure and special membrane that prevents dust from getting into the fixture, and ensures excellent ventilation. This protects the electronics against harmful external influences, which guarantees long-term operating reliability. The HSE NXT II fixture also has a standard reflector collar, which means that the fixture is compatible with the entire PL Light Systems reflector offering.

### **The optimum light distribution for every application**

Every Hortilux Schröder reflector, including the special deep-reflecting lighting fixtures, was developed for optimum light distribution for each application using as few fixtures as possible. Fewer fixtures mean fewer connection points so less shadowing. Hortilux Schröder has developed special wire brackets for quick and easy hanging of the fixtures. An intelligent levelling system with an indicator makes installation even easier. The status of the fixture is easily accessed at all times using the integrated LED indicator. The lamp holder has been designed to ensure that the bulb can be changed easily and without the need for any tools. The EVSA too is easy to access for maintenance purposes.

### **Test specifications**

In North America, the NXT series of fixtures comply with all OSHA certifications, making the fixture compliant in all jurisdictions in Canada and USA. These fixtures are delivered with a CSA and CSA-ul sticker for legal use across North America. NXT fixture certifications meet all the test specifications for professional greenhouse horticulture. The specifications are ENEC, Isolation Class 1 and IP 23. The NXT fixtures were tested in accordance with EN 60598-1, EN 60598-2-1. The fixtures also have the CE marking and the GOST-R certificate and they meet all other relevant requirements including EMC in Europe and other jurisdictions.

# BLACKOUT SYSTEMS



## LIGHT DEPRIVATION FOR CANNABIS PLANTS

U.S. Global Resources has a very long history in plant growth technology. Therefore, throughout our history we have had to provide systems for photosynthesis to provide appropriate lighting systems and blackout period known as photoperiodism. Dr. Gus Poesh at first established photoperiodism in flowering crop production on a commercial basis in the late 30's. During certain periods of growth, 13 to 14 hours of light was necessary for vegetative growth and 13 to 14 hours of darkness to trigger flower set. During 1940's photoperiodism dramatically changed flowering plant industry throughout the world resulting in year around production of plants, particularly chrysanthemums, which dominated the horticultural industry with literally hundreds of millions produced on a regular basis. Our company, as one of the leaders in the industry, distributed cuttings and plants, programmed production from cutting to harvest of these photo period sensitive plants.

During the 1940' & 1950's period black poly was used along with black cloth to manually cover and uncover plants at the appropriate times of the day. In 1962, U.S. Global Resources (Sharp & Son) with Will Weatherford of Weatherford Farms and Voss Engineering, both of Houston, developed, to our knowledge, the first automatic blackout system. It worked on

a grooved cylinder using airplane cable to which black plastic was attached to open and close the blackout system with the motors reduced to less than 30 rpm per minute. The system was operated by time clocks. As simple as it was in those days, it greatly reduced labor and gave greater control to trigger, very accurate vegetative growth and flower set, further resulting in numerous different varieties with different photosynthesis habits that we could accurately flower many varieties timed for a specific holiday to almost to the day. In cannabis production, one of the keys to success is for the crop to be harvested consistently and very accurately on a weekly basis to satisfy markets, increased turns per year and increase ROI and customer satisfaction. It also is very valuable in controlling plant height. We have been doing this with plants since the 1940's with a wide variety of horticultural crops.

U.S. Global Resources engineered, designed and installed these systems throughout the 60's domestically and in Canada which was the principal reason for opening our Canadian company.

The system was eventually replaced by the sophistication of the Dutch and the very creative engineer Mr. George Dean. The knowledge of the requirements of artificial lighting and blackout system for the production of crops continues to this day to be an important part of U.S. Global Resources growth.

Coupled with our light deprivation, light diffusion control system, U.S. Global Resources is the LS Svensson's oldest distributor in North America. We have sold Svensson product internationally as well. The materials used in control system for blackout curtains focuses on several different options.



Svensson offers wide variety of shade thermal:

10075 FB/A+B  
10075 FB/A-B-B  
10075 FB/A+BW  
100.75 FR-AB-BW  
10070 R FR-W  
10070 FR WB-B  
10070 FR-WB-BW  
9950 FR-W  
100 FR

	CODE
A – Aluminum	100 & 90 % of shade blackout level
B – Black	75 – energy saving
BW – Black-White	70 energy savings
FR – Fire Retardant	
FB- Fire Break	
R – Rolling Screen	
W - White	

WE ARE SPECIALIST IN  
ENGINEERING AND DESIGN OF  
INSECT SCREENS  
USGR ALSO OFFERS A WIDE  
VARIETY OF SHADE, THERMAL,  
ENERGY AND SOLAR NETS AND  
SCREENS

Svensson's quality and reliability are second to none in all shade, blackout and insect screen materials.

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## Introducing the product family for light restriction or total blackout

*"The lower temperature beneath Obscura is my competitive advantage"*

### From light restriction to total blackout

For greater productivity and control over day-length sensitive plants, Obscura is the answer. And when used to keep supplemental lighting inside the greenhouse, it increases production.

### The benefits of Obscura

- Total control over day length for the most sensitive plants.
- Effective cooling when a reflective upper surface is chosen.
- High energy saving, especially if one layer is aluminum.
- Light emission control that satisfies neighbors and legislation.
- Increased productivity when used with supplemental lighting.
- More uniformity from supplemental lighting in the growing area.
- Good moisture management.

### OBSCURA



### Double Layer Systems Benefits

#### Twice as versatile

The double layer also allows more options as the top and bottom of the screen can have different surfaces. Aluminum on the top, for example, provides the greatest energy saving at night, whereas white provides better cooling in sunny weather. White is also useful as a bottom layer for intensifying light inside the greenhouse, whereas black is better for absorbing and restricting interior light.

**THE BLACKOUT SYSTEMS ALSO ACTS AS A HEAT RETENTION SYSTEM. DURING NIGHT HOURS, THE SYSTEM REDUCES HEAT LOSS UP TO 30-40 PERCENT.**

### Where and when you can expect to find Obscura

For short-day plants, such as chrysanthemum, Obscura is ideal for delivering flowers in bloom – on time – for important market dates. Obscura is also

Popular where supplemental lighting is needed and night time light emission is a problem. This has now proven to be a good investment, as the intensified lighting increases productivity.

### What else you can expect from a Svensson climate screen

- A long service life – thanks to their resistance to harsh temperatures, Ultraviolet light and the chemicals often used inside greenhouses.
- Small bundle sizes – thanks to our unique knitting techniques. This means that sliding screens from **Svensson** are easy to handle and don't block out as much light when you fold them away.
- Favorable humidity control – this means that condensation is less likely to form on the underside of an indoor screen and less likely to drop on your plants. So fungal diseases are less of a problem.
- A variety of flame retardancy levels – many of these meet the industry's highest fire safety standards.







# INDOOR & OUTDOOR GROWING BENCHES



U.S. Global Resources offers a wide variety of crop growing benches for greenhouse and indoor facilities, including stationary, rolling top, ebb and flo and hydroponic growing. Which style of bench do you require?

Stationary, at a given and length, taking into consideration aisles/walkways or rolling top which are very popular because the grower realizes greater percentage of floor space. When the top rolls, you have moveable aisles. Example in 100 ft. long house 30 ft. wide, you might conceivably have 18 floating top benches but only 2 aisles that open when the tops are moved. Under certain conditions, we have been able to utilize 84% of the greenhouse floor space to crop whereas in stationary benches, you rarely exceed 65%. One consideration is to determine whether the bench will be mounted on a concrete foundation or whether imbedded in soil/concrete.

An issue of major importance is the weight of the crop on the bench that varies from lightweight propagation trays to pots of various sizes to 10 to 15 gallon containers. Also, very heavy hydroponic and ebb and flo trays because of the weight which are extremely heavy per sq ft.



**EBB & FLO BENCHES**

Ebb and flo benches are becoming extremely popular, because they fit both stationary and rolling top styles and contribute to bench stability holding heavy weight material, also used for wick irrigation systems as well as hydroponic growing. Vast majority of ebb and flo trays are imported from Europe. Because of the diversity of application and multiple widths, USGR has been importing these units in great quantities in recent years and also have customers worldwide. Demand is growing dramatically. Another issue is the bench top selection. Most popular bench top is U.S. manufactured expanded metal, followed by welded wire and then the plastic Dura Bench tops. All have their benefits and limitations.



**ROLLING BENCHES**



**EXPANDED METAL**



**STATIONARY BENCHES**



**DURA BENCH**



**DURA ULTRA BENCH**



**PLASTIC BENCHES**

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When using ebb and flo trays, the tray itself is the bench top with extra support for the weight. Widths generally 2 ft., 3 ft., 4 ft., 4.5 ft., 5 ft., 5.5 ft., 6 ft. and in unusual situations, 6.5 ft. Please note that rolling top benches are only available in 5 ft., to 6.5 ft. wide. In certain situations, 4.5 ft. wide might be acceptable, at 4.5 ft. with moveable aisle there is a risk of the bench top tilting. Generally, most are 5 ft. or wider.

Pricing guideline might be noted as follows. 2 ft. bench has 2 side rails, so does a 6 ft. width. The narrower the bench, the more expensive. Same is true of lengths. We note many inquiries ask for benches that are 6, 8, or 10 ft. long and growers do not realize that we produce in benches up to over 100 ft. long. Height varies based **upon customer's requirements**.

We also offer a quick to assemble heavy black plastic bench. It sits firmly on the ground on legs 12, 18, 24, 30 or 36 inches high. Most popular width 24 or 36 inches. They can be viewed at any home improvement center, mass marketer, or particularly store selling plants.

Some prefer to build their own benches using concrete blocks, L angle, wood, treated lumber. In those case we can supply the tops of your choice.

One very important issue in deciding in which bench you require is to remember that welded wire, expanded metal and Dura bench allow for air movement from under the bench up through the plant canopy whereas the ebb and flo tray does not allow for this type of air movement. Therefore, it does not adapt as well when heating under the bench. Therefore, increased air circulation above the crop is essential in order to get the air movement within the plant canopy. **Be sure to increase overhead CFM's. It is particularly a large issue** when you have rolling top benches which cover so much of the ground area and far less air movement under the bench.

### USGR'S BENCH TOP SELECTIONS:

**EBB & FLO** – top are supplied in gray as standard but are available in other colors at an additional charge. Tops are produced in the following widths: 330 – 430 -630 – 8000 – 1000 – 1200 – 1450 -1500 - 1600 – 1800 – 1900 – 2000 – 2200 mm. Lengths of the tops are 1000 – 2400 mm.

**EXPANDED METAL** – continues air flow, long life, drainage, strong, versatile, light weight, low cost

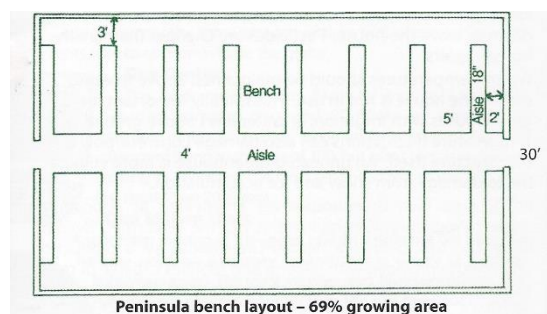
**STATIONARY** – built tough from the ground up with heavy gauge galvanized steel legs. **STANDARD BENCH WIDTHS:** 3', 4', 5', 5'6", 6', 6'6". Many options and specifications on length. Roll form components and one piece aluminum bench top frame.

**ROLLING TOP** – Heavy gauge legs are supplied with a galvanized finish Tapered roll bars require less effort to move the benches **ROLL-FORM** components maximize structural integrity

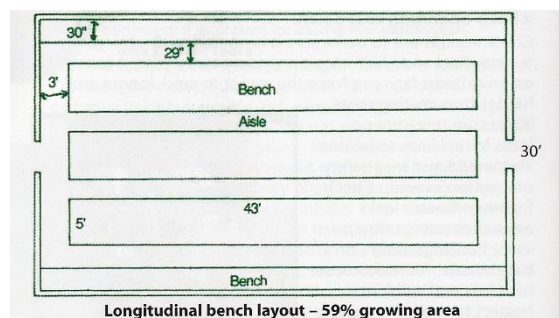
**DURA BENCH** – heavier in weight and encompasses smaller square holes for more surface area. This product is peak load tested at 630 lbs. Durable, smooth surface, smaller hole openings, easy to install, easy to clean.

**DURA ULTRA BENCH** easier to disinfect, longer lasting, rot, splinter, rust, corrosion, deforming & decay proof.

**PLASTIC BENCHES** -heavy black plastic bench, quick to assemble, sits firmly on the ground

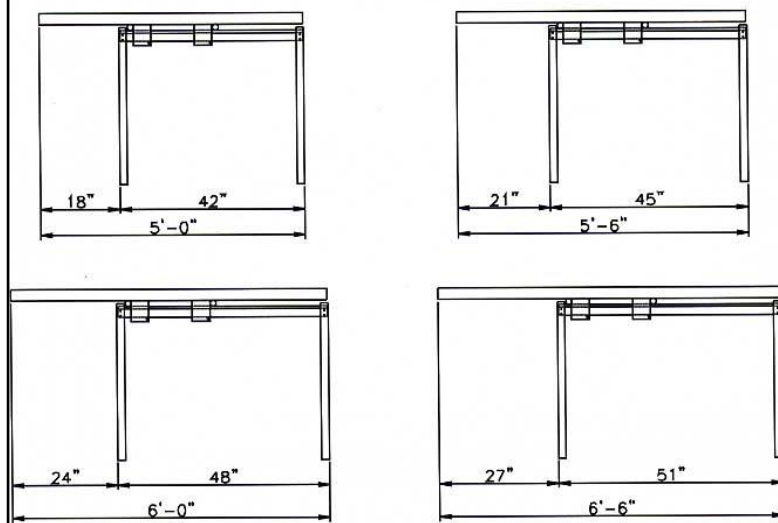


Many Options in lengths and widths



STANDARD WIDTHS FOR ROLLING TOP BENCHES  
UP TO 84% ROOM OR GREENHOUSE PLANT COVERAGE

### STANDARD WIDTHS



AVAILABLE IN 4', 4'- 6", 5', 5'- 6", 6', 6'- 6". ANY LENGTHS AVAILABLE TO 100 PLUS FEET.

# EBB AND FLO BENCHES

Tops are supplied in gray as standard but are available in other colors at an additional charge and shipped directly from the factory in Europe. Minimum order 50 pieces.

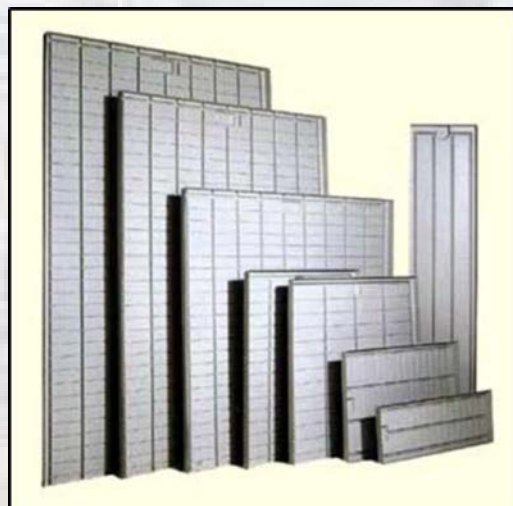
U.V. light filter. For an additional charge we can supply tops with ultra violet light filter on outer surface which is added to polystyrene during the manufacturing process. This provides extra protection for tops and is recommended when they are used in extremely high light areas of the world in greenhouses located more than 1,000 meters (3,500 to 4,000 feet) that are not protected by ultra-light absorbing material such as poly and polycarbonate, when used outdoors.



Some sizes are available in U.S. and Canadian inventory. Material can be ordered from the factory and shipped to warehouses in the U.S. and Canada if not available in the warehouse. Most sizes shipped directly from European factory. Many sizes available.

The number, shape and size of the drains are made in a way, so that an optimum of watering and draining of the plants is achieved, and even small pots stand constant all over the table. The shape of the drains makes it possible to stack the tops, which means a large reduction in packaging and transport/costs.

Now it is possible to load about 3500 m<sup>2</sup> in a 40" - container. Plastic tops for the ebb/flo tables.



The tops programme for ebb/flo tables of STAL & PLAST is made of a highly developed and carefully tested high-class product with 13 years testing and experience behind it. The tops we produce today are molded on a high technological fully automatic vacuum forming plant, which ensures a great homogeneity of the material and an optimum dispersion of the plastic material. That means a large thickness of material at all corners and edges. All the forming tools are temperature controlled alu-moulds, which ensure an exact homogeneous cooling of the tops this means a total flat level of the material which is important for the efficiency of the ebb/flow system.

The sump of the valve is made in a way, which makes it possible to connect various valves in the same sump. You can also choose sumps at both ends of the table. Plastfilter for the sump can be delivered, so that you can avoid choking up the valve with dirt, soil and leaves. You can also choose a sump with a big drainhole and a stopper, this means a quick drain, when the table has to be cleaned up.

The tops are produced in the following widths: 330 - 430 - 630 - 800 - 1000 - 1200 - 1450 - 1500 - 1600 - 1800 - 1900 - 2000 - 2200 mm. The available lengths of the tops are 1000 - 2400 mm that means: fewer and at the same time less possibility of leaks, less use of glue, easier cleaning and quicker assembling.

The raw materials is high impactproofed, UV stabilized Polystyrene, which is resistant towards chemicals. This ensures a long lifetime even with hard daily wear.

The tops are delivered in gray, but can be delivered in any colour for extra charge. Special wishes can be fulfilled s.a. the width of the tops, the placing of the sumps a.s.o. Please contact us for further information about this subject. Besides, we can recommend you to order our subscription list of all types of tops.

**Special Note:** Ebb and Flo panels available separately to mount on any existing bench or as complete bench system.

Ebb and Flo Tray 6' wide is only size stocked in U.S. warehouses at most times.



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## Available Ebb & Flo Tray Sizes (in width)

Metric Size	US Size	Metric Size	US Size
330 mm	13 inches	1640 mm	64 9/16 inches
435 mm	17 1/8 inches	1660 mm	65 3/8 inches
630 mm	24 13/16 inches	1680 mm	66 1/8 inches
800 mm	31 1/2 inches	1700 mm	66 16/16 inches
1000 mm	39 3/8 inches	1780 mm	70 1/16 inches
1200 mm	47 1/2 inches	1800 mm	70 7/8 inches
1435 mm	56 1/2 inches	1820 mm	71 5/8 inches
1455 mm	57 5/16 inches	1880 mm	74 inches
1475 mm	58 1/16 inches	1900 mm	74 13/16 inches
1500 mm	59 1/16 inches	1920 mm	75 9/16 inches
1520 mm	59 13/16 inches	1980 mm	77 15/16 inches
1540 mm	60 5/8 inches	2000 mm	78 3/4 inches
1560 mm	61 7/16 inches	2020 mm	79 1/2 inches
1600 mm	63 inches	-	-
1620 mm	63 3/4 inches	-	-

Standard length 4' and 8'.  
Minimum order - 6 Ebb and Flo panels  
International sales shipped direct from Europe

Ebb and Flo benches form the world leader European manufacturer drains also The USGR Ebb and Flo benching system replaces traditional expanded metal with watertight, molded plastic trays. The trays are flooded with a water and fertilizer mix, which plants absorb through holes in the pot bottoms. With the Ebb and Flo benching system, you can:

Decrease water and fertilizer consumption by as much as 50%. After a designated amount of time, excess water and fertilizer are drained off and can be reused later.

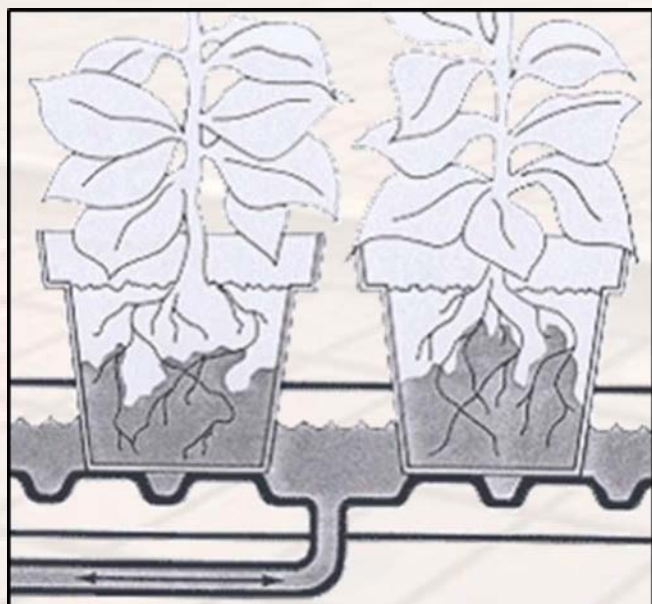
Increase watering efficiency, reduce labor costs. An entire bench of plants can be watered simultaneously.

Improve air circulation and drainage. A grid of shallow troughs allows air circulation and drainage under the pots.

Improve plant health. Plant leaves and greenhouse aisles and walkways stay dry, so overall greenhouse humidity is lowered and the chance of disease is reduced.

USGR's Ebb and Flo benches are designed as a "floating aisle" system, so unproductive aisle space is minimized and growing space is increased by as much as 30% over fixed benches. And they're engineered with the same built-to-last design principles as our benching. Trays will hold up to 1 gal. per square foot.

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Improve watering efficiency and plant health while you cut labor costs.



EBB & FLO benches from the world's leader European Manufacturer drains also.

# COOLING AND VENTILATING



This discussion will focus on cooling and ventilating greenhouses, but has some application for indoor growing. Those indoor growers reading this document will find this document informative as well.

When ventilating controlled environment plants as well as animals, with the removal of solar radiation replacing overly humid air with less humid outdoor air; also at certain times of day the replenishment of carbon dioxide (CO<sub>2</sub>) is vital to plant growth.

Natural ventilation is accomplished by roof vents opening in conjunction with side ventilation as the wind passes over the greenhouse and through the side vents, ventilation takes place to benefit plant growth. Mechanical ventilation is described as using mechanical exhaust fans and end rack and pinion or shutter vents. One of the main problems of greenhouse and indoor ventilation is having the air move through the plant canopy. Where there are pockets of high humidity, area of depleted CO<sub>2</sub>

and different air patterns. Result is disease which in certain crops is extremely hard to eradicate. Our technology tells us best disease and fungus control in a greenhouse is air, preferably fresh air. Except for totally organic production, we find chemicals are almost essential and air is also a great benefit.

In large gutter connected houses with roof and side ventilation and great crop density, disease is even a greater problem, because air does not penetrate deep into the plant canopy. Therefore we believe in dense crop production, the mechanical ventilation is a great benefit. But the detriment is the cost of electricity.

Exhaust fans at one end of greenhouse and shutter or vent at other end of greenhouse, pulling air through that crop, changing the air in that plant canopy and greenhouse in less than 60 seconds is a great benefit to the crop, humidity removal, replacement of CO<sub>2</sub> and lower temperatures. As the air passes through the greenhouse, solar load will increase that temperature. As air travels in a smooth laminar flow in less than one minute it generally will not mix with the warmer air in the upper regions of the house.

Depending on the size of house and cubic ft of air, in many hot regions the upper air must also be removed through a fan and shutter operation or by a roof vent or possibly what we call a fanjet. Please call [206-722-3999](tel:206-722-3999) for more specifications and design.

The reason the fan and vent system can basically cool temperature to outside air, it is also the starting of a system of cooling the greenhouse below the outside temperature. Greenhouses can generally be cooled to slightly above wet bulb. That is done by installing evaporative cooling system with wet pad of quality cellulose on one end, engineered exhaust system on the other. When designing systems, we always think of fans in the form of efficiency based on CFM's per watt of electricity. If you are familiar with the psychometric chart, you can calculate your lowest temperature, at a particular dry bulb temperature and % of humidity.

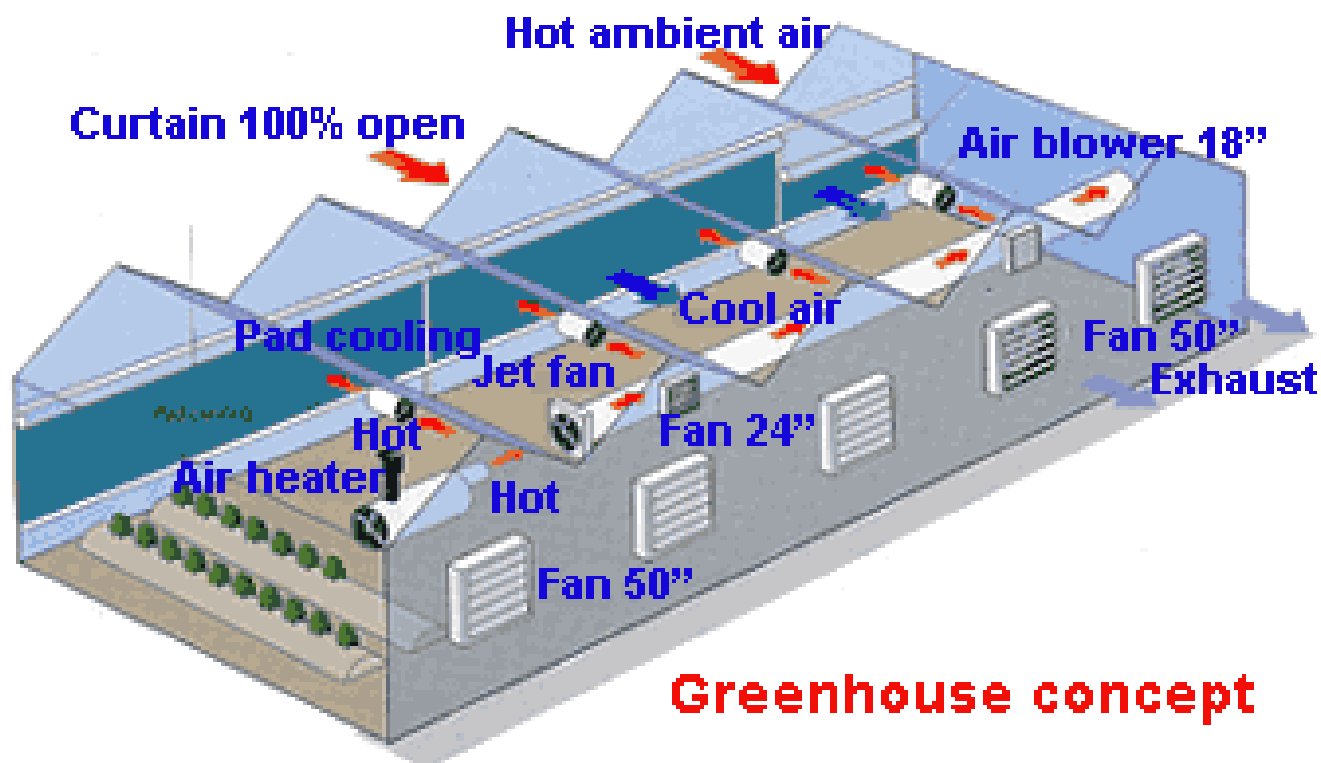
**U.S. GLOBAL RESOURCES** has been designing ventilation and cooling systems for greenhouses, some warehouse crops and even some production facilities to cool people and equipment. We are not recommending it for all indoor cooling. We have been engineering, designing and implementing such cooling systems not only for greenhouses but some indoor plant growing facilities, warehouses and even some building or facilities to cool people, animals and equipment. We also design these systems, for poultry and animal control facilities worldwide.

Clients should know there are many interacting conditions to maximize the efficiency through lowest electrical consumption to best plant canopy environment. In order to get maximum benefit there are definitely many issues and engineering principals required to accomplish maximum cooling.



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## Greenhouse concept

## FAN AND PAD COOLING

Our company has been strongly accepted worldwide because of our ability in providing heating, cooling, ventilation, air circulation in all phases of environmental control in facilities worldwide.

The Dutch greenhouses with their huge opening vent system in the roof and moderate climate do very well in ventilation and cooling. It does not resolve the issue of plant canopy cooling in high temperatures. It is that dense crop plant canopy that presents the problem.

With the introduction of insect screen and hydroponic growing, even more engineering and design with proper ventilation and cooling is required.

With the introduction of variable frequency drive, we now have even greater control over the ventilation and cooling of crops both indoor and greenhouses at reduced energy costs with lower initial investment.

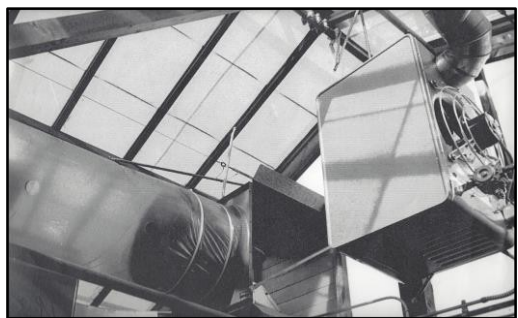
U.S. Global Resources has the ability to resolve the issues of ventilation and cooling whatever the local environment. We have designed systems from the high altitudes of Lhasa Tibet to the deserts of the Middle East, conditions of most humid spot on earth, Madras, India, as well as the cold region of Alaska and Canada, or wherever your project may be developed. We also connect the ventilating and cooling system with heating and air circulation of the facilities as well. As heating is essential, dehumidification of the plant canopy is vital to its growth, so is circulation.



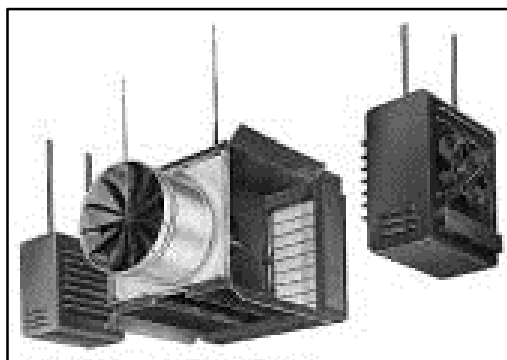
We have been engineering/designing and supplying these special agricultural and horticultural systems since 1956. We take great pride in supplying our customers with exactly what they need.

# FANJET

## FOR AIR CIRCULATION, VENTILATION, DEHUMIDIFICATION, HEATING



**MODEL RC or RCA**



Fanjet is used for air circulation, ventilation, dehumidification and heating. Following is information showing the sequence and operation of the fanjet and heater combination.

**Stage 1:** Nothing operates.

**Stage 2:** Fanjets comes on and re-circulates the air. That gives you even flow of air throughout the greenhouse through a constant recirculation system, giving you 3 CFM of air per sq. ft. That air would help move air through the plant canopy.

**Stage 3:** The fanjet opens the shutter and brings in fresh outside air.

This fresh outside air removes heavier humid air in the greenhouse by operating one of the exhaust fans, thereby ventilating the house and offer on some days dehumidification, because outside air is dryer than inside air.

**Stage 4:** Fanjet shutter shuts down; fanjet shuts down.

**Stage 5:** Second fan comes on, vent opens and now bringing in 4 or 5 CFM through plant canopy for ventilating and moving air through the crop. Of course, it also contributes to cooling the greenhouse. You have maximum ventilation through then rack and pinion.

**Stage 6:** Now pad runs, all exhaust fans are on. Fanjet shuts down, shutters shut down and maximum cooling takes place, thereby lowering temperature to about wet bulb. Everything shuts off in reverse and you are back to set point with only circulation or no activity. Then temperature drops and the first heater comes on, heats greenhouse, heat goes through fanjet and you have even heat throughout the greenhouse. As temp drops more, on comes second heater and maximum heating taking place. This is a very good energy saving system that is economical to operate and is a lot less money and more diversified than if you put in roof vents, which only ventilate the house by convection. Air movement in the plant canopy is not very good with roof vents.

We have a controller that will do all of this automatically. One of things that is also a benefit is if your humidity gets too high regardless of outdoor temperature you can open fanjet, open shutter and turn heater on which will dry incoming air by heating the temperature of the incoming air. Thereby doing a modest humidity control activity. You only would need the heater on for 4 to 5 minutes.

Negative side of fanjet is a poly tubing going down the greenhouse which does lower light intensity of the structure, particularly in your case where you have double layer poly inflated on the roof and tube running down the greenhouse. Tube will lower light transmission by about 12%. Not a problem 8 months of year; in winter cloudy months, it is definitely a factor.

### FAN-JET PERFORMANCE DATA

Fan-Jet Model	HP	RPM	Tube Size	System CFM	Motorized Shutter Model	Heat Accessory	Heating Capacity With Heat Kit BTU/Hr. Output Heater			
							40°	50°	60°	70°
† RC12D4	1/8	1725	12"	1180/780	WAAC1818	NA			NA	
RC18E6	1/4	1160	18"	3120	WAAC2626	HT18	112,000	138,000	163,000	186,000
RC/RCA24F	1/3	735	24"	5420	WAAC3333	HT24	172,000	212,000	250,000	287,000
RC/RCA24F2S	1/3	735/490	24"	5420/2710	WAAC3333	HT24	172,000	212,000	250,000	287,000
RC/RCA30G	1/2	607	30"	8550	WAAC4040	HT30	278,000	342,000	403,000	463,000
RC/RCA30J	1	757	30"	10600	WAAC4040	HT30	345,000	424,000	500,000	574,000
RCP12D4	1/5	1625	12"	1100	WAAC1818	NA			NA	
RCP18B4	1/10	1625	18"	2140	WAAC2626	PHT18	77,000	95,000	112,000	128,000
RCP18F4	1/3	1625	18"	3050	WAAC2626	PHT18	109,000	135,000	159,000	182,000
RCP24G6	1/2	1075	24"	5115	WAAC3333	PHT24	162,000	200,000	236,000	271,000



# AIR CIRCULATION FAN

Acme's precise engineering has matched the proper propeller with a continuous duty motor to form a high air flow and low energy consumption HAF (horizontal air flow) fan. This HAF fan offers the user maintenance-free, long-lasting equipment suited for use in horticulture environments. HAF fans are commonly used for greenhouse, warehouse and industrial air circulation. Outstanding CFM's for watt of electricity and exceptional air flow. Outstanding guard without reducing air flow.

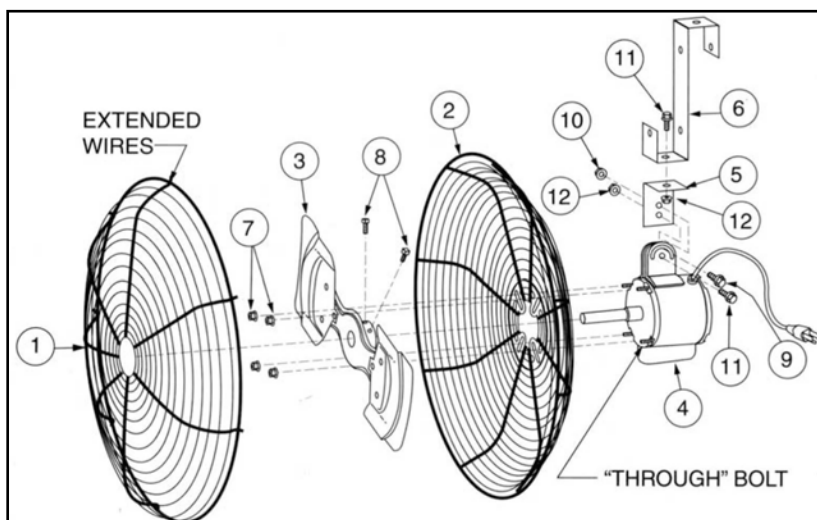
**Propeller** - Aluminum blades held securely in place by a steel spider and hub provide quiet operation. Designed to give the best performance and efficiency as well as quiet operation.

**Moisture Resistant Motor** - From 1/15 HP PSC to 1/2 HP 3 phase, ACME has the right motor for the fan size. All have thermal overload protection and ball bearings. Selected motors can be used with variable speed control for more precise air movement.

**PVC Coated Guards** - Two piece wire easy-access guard has a white PVC coating to resist corrosion.

**Easy Installation** - Two piece standard rotational bracket provides a locking tilt adjustment for proper angle of air flow. "S" bracket provides two different dimensional mountings. Optional brackets are available for alternate mounting styles.

**Factory Wiring** - All single phase motors come factory wired using either a 6 foot 115 volt or 8 foot 230 volt cord with molded plug..



\* Watt reading is corrected to standard air density.

☐ Available with variable speed controller.

\*\*200/230/3 dual voltage or 460/3 single voltage  
Speed (RPM) shown is nominal.

Performance is based on actual speed of test.

Performance ratings include the effect of guards.

FAN SIZE	MODEL	RPM	MOTOR	VOLTAGE	HZ	WATTS*	AIR FLOW	CFM/WATT
12"	☐HAF12A4	1566	1/15	115/1	60	124.5	1,145	9.2
20"	☐HAF20A4	1626	1/15	115/1	60	105.0	3,005	28.6
20"	HAF20F4	1686	1/3	115/230/1	60	402.5	5,105	12.7
36"	HAF36G8	808	1/2	115/230/1	60	680.0	11,280	18.1
36"	HAF36G8	808	1/2	**200/230/46	60	680.0	12,280	18.1

# HEATING SYSTEMS



**THE INDUSTRIES CHOICE  
FOR HEATING PLANTS**



The discussion and presentation of heating systems to grow plants covers a multitude of options and systems depending on many different variables. But all based on convection, conduction or radiation. All have their advantages and disadvantages. Further, in the growing of plants today we are dealing with the greenhouse and indoor heating, which makes the topic even more complex. There is also the issue of whether heat source is hot water, steam, geothermal or radiant. To make situation even more complex, we must deal with the heat loss of the structure, ventilation, circulation, humidity control, crop density and the need to also provide heat to the growing media, as well as growing using hydroponic.

Because of the diverse nature of the project location, from the moderate climate weather belts of the world to the extremes of frigid cold regions of the north, desert regions and often overlook elevations, we have provided enumerable different systems for a wide variety of crops taking into considerations all of these many factors.

For this brief presentation, we are going to address two of the most popular methods used in North America, those being air delivery systems and under the bench convection heating system.

Since the early 1960's U.S. Global Resources and its affiliates have offered the air delivery systems from MODINE MANUFACTURING COMPANY. From time to time for a variety of reasons, we have engineered and supplied competitive units when Modine was not available or by customer's request. However, our preference and that of the vast majority of our customers is for Modine because under a wide variety of conditions, they out perform any other unit we have sold and installed. Because of extended life and quality components, after sale, service is among the lowest of any product we offer.



**Effinity Modine 93**

The gas fired horizontal power vented model PTP still dominates our market, where natural gas or propane heat is available followed by the similar PDP vertical unit. These are 80% efficient units from The new Effinity Modine 93% efficiency unit demand is growing rapidly, due to its exclusive new technology with separated combustion condensing unit. Though it is more expensive the increase in efficiency reduces the payback period very rapidly. The technology features a secondary recuperative heat exchanger fabricated from high quality stainless steel; also its condensing capability helps reduce humidity in the facility. The payback period more than compensate for the price difference.



**HOT DAWG**

The Hot Dawg is an outstanding gas fired unit heater with separated combustion referred to as model HDS with BTUH output units from 24,000 to 100,000 BTUH and ideal for smaller greenhouses and indoor heating systems, including indoor plant growing. Separated combustion models draw combustion air from outside of building to insure that the unit will have plenty of clean fresh air to operate and increase heating efficiency,

Modine Manufacturing has a variety of other heat delivery systems, which include steam and hot water units and for very small units, electrical units can be a solution, but because of cost of electricity are rarely used in greenhouses, except where low BTUH requirements exist.

Oil fired units are also available, but only in demand where natural gas, propane or boilers are not available.

Modine has an outstanding indoor heating solution for commercial, institutional and industrial applications. They are available where clients are growing plants indoors with extremely high BTUH production and high CFM air movement required. In these unusual situations, we have always depended on Modine's outstanding engineering capabilities.



**MODINE UNIT HEATER**

**74 YEARS OF SERVICE TO A GROWING WORLD**



# CONVECTION HEATING FOR GREENHOUSE AND INDOOR HEATING SYSTEM



Over 25 years ago, **Mr. Russ Zabel** created **DELTA T SOLUTIONS**, an outstanding company in providing extremely wide range of products for growing plants thereby giving our clients many heating options to choose from. **DELTA T** is a great heating solution company. They are specialists in greenhouse and indoor bench heating systems.



**DELTA-FIN™ SF high-output heating system**



**DELTA-TUBE™ EPDM SD rubber tube bench heating**



Their aluminum **Delta-Fin** pipe heating system has been very beneficial to heating greenhouses with a particular benefit to under the bench heating. The heat so generated passes up through the plant canopy warming not only the vegetative growth but soil and root system as well. It is based upon delivery with water temperature up to 230 degrees. The system can also be placed around the perimeter and at gutter height which supplements under bench heating systems for total greenhouse heating.

**Delta T** also provides EPDM rubber tube heating for propagators, plug producers and general growing of bench crops. These systems are also used for in ground or on ground heating, particularly in the nursery business. **Delta T** hot water heating systems utilize the physics of heat to efficiently heat plants under the most diverse conditions that include hot water boilers, heat exchangers, both in ground and bench top tube heating. There also have been many installations of high density polyethylene in concrete floor heating systems. Their aluminum fin systems out perform any other similar systems.



## Five Heat Components for Better Plant Growth

**HEAT SOURCE:** Delta T can design a heat source specifically for the heat loss of the structure or the output of the radiation. The heat source can use various types of fuels ranging from fuel oil, natural or propane gas, to heat exchangers using steam, waste heat from electric plants or geothermal wells.

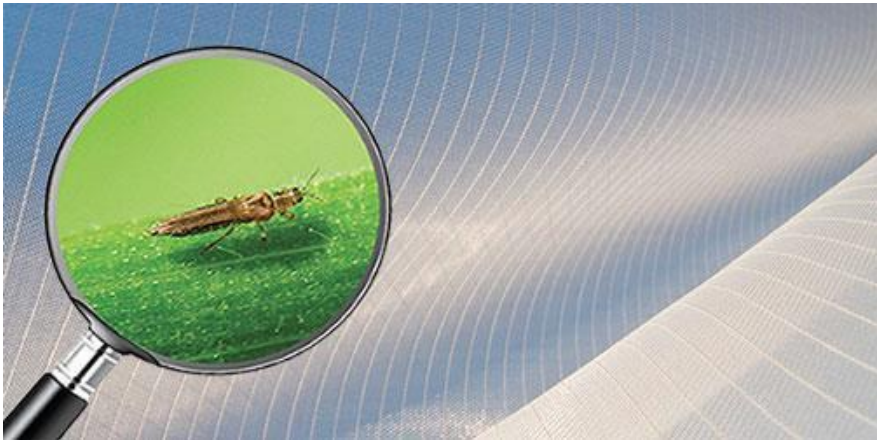
**AIR AND WATER CONTROLS:** Delta T can help with the controls which regulate system water pressure and eliminate air trapped in the system. As simple as it sounds these components are critical parts of the overall system.

**PUMP:** Delta T provides pumps that transport the water through the piping from the heat source to the radiation system. The system controls then monitor the soil/plant temperature and regulate the pumps and heat sources accordingly.

**SYSTEM PIPING:** The system piping carries the water from the heat source to the radiation system. In a low temperature system the piping can be PVC, but in a higher temperature system it must be copper or steel. Delta T Solutions can supply any or all of these to make a complete package.

**RADIATION:** Radiation refers to the material the heat flows through to the crops. Delta T selects radiation materials for each system based on materials that make each particular system the most efficient.

# INSECT SCREENS



Insect screens have become extremely important in the growing of crops in a confined environment, particularly in area where organics are so important and also in the public's demand for insect free crops. We are the oldest Svensson screen distributor in the U.S.

LS Svensson is recognized worldwide as the undisputed leader in shade, light diffusion, thermal control, and blackout and insect screen manufacture. Their constant research and development is exceptional, knowledge of the application of their products on a wide variety

of crops exceeds that of any other company we have ever done business with. We have compared other products, and there is no equal to LS Svensson's professionalism, business integrity and customer acceptance. Their polyester insect screen exemplifies their leadership. We know from experience that their manufactured products also exclude a wider spectrum of insects. We believe their durability and life expectancy is greater than other products.

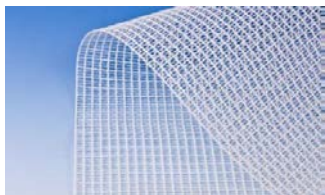
All insect screens reduce air flow. A bee screen protects against bees and other large flying insects. As density grows, smaller insects are excluded down to the tightest, more dense screen for thrip. The more dense the screen, the more reduction in air flow. Therefore, special consideration in designing such screen will affect the growing environment within the controlled environment facility. The reduced air flow will result in higher temperatures, higher humidity, affect CO2 levels and of course, under certain conditions, shade a crop. U.S. Global Resources, under conditions worldwide can engineer and design and modify environmental control systems that alleviate these problems.

It must be remembered that regardless of the insect screen you use, generally the young and juveniles will be able to penetrate. We do recommend some form of insect control within the facility.

Those installing insect screen should be aware that other things that reduce air flow through insect screen are dust, surface tension of rain, low maintenance and objects covering then insect screen all contribute to poor performance. We have also seen in order to clean insect screen, high pressure washers are used, which will damage the screen. Again we highly recommend the LS Svensson product as your best insect protection.

## SPECIAL NOTE:

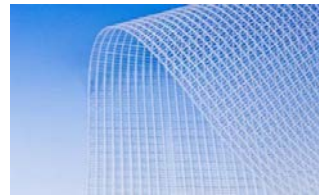
Insect screens are also invaluable to containing beneficial insects.



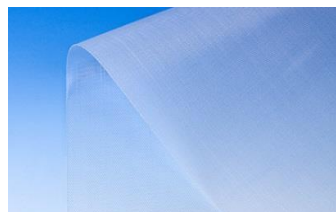
ECONET 2777



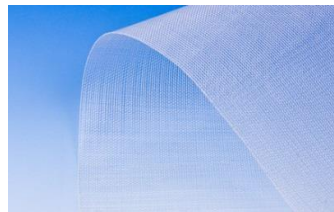
ECONET 3777



ECONET 4045



ECONET 100400



ECONET 100400 FR






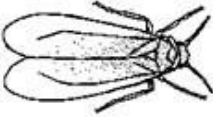

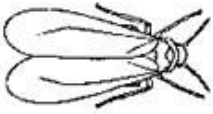

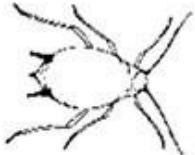

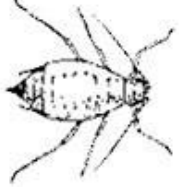

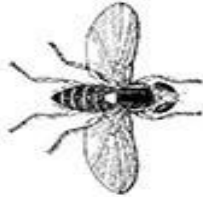




ECONET 1515



ECONET 1535

**74 YEARS OF SERVICE TO A GROWING WORLD**



<b>Insect Common Name</b>	<b>Insect Scientific Name</b>	<b>Insect Critical Dimension <math>\mu\text{m}</math></b>	<b>Screen Recommendations</b>
Western Flower Thrip 	Frankliniella Occidentalis 	192	Econet 1515 *Econet 1535 *some thrip exclusion
Silverleaf Whitefly 	Bemisia Argentifolii 	239	Econet 1515 Econet 1535 Econet 2777 Econet 4045
Greenhouse Whitefly 	Trialeurodes Vaporariorum 	288	Econet 1515 Econet 1535 Econet 4045 Econet 2777
Melon Aphid 	Aphis Gossypii 	340	Econet 1515 Econet 1535 Econet 2777 Econet 4045
Green Peach Aphid 	Myzus Persicae 	434	Econet 1515 Econet 1535 Econet 2777 Econet 4045
Serpentine Leafminer 	Liriomyza Trifolii 	608	Econet 1515 Econet 1535 Econet 2777 Econet 4045
Asian Citrus Psyllid 	Diaphorina Citri 	<0.3 mm <sup>2</sup>	Econet 2777 (0.27 x 0.77 = 0.208 mm <sup>2</sup> ) Econet 4045 (0.4 x 0.45 = 0.203 mm <sup>2</sup> )
Bumblebee 	Bombus 	<1000	Econet 100400

# SOIL MIXING AND HANDLING

For 43 years of our 74 plus years in business U.S. Global Resources has offered our greenhouse, nursery and agricultural clients both manual and automated soil and media handling equipment that speeds up the process of sterilizing, mixing, seeding, transplanting, potting, flat filling which also lowers labor costs and increases accuracy of these processes reducing waste and contributing to more efficient operation. USGR has an extremely long history in plant growth technology such as propagation, germination, media requirements helping our growers select the proper equipment for the crops they are growing. USGR offers 11 different soil mixing and soil handling equipment. We have soil mixing/handling for small growers who only needs 1/2 soil batch mixers to very large growers who require up to 100 cubic yards. Regardless of your mixing requirements, USGR can provide you with soil mixing systems to meet your specific requirements. These mixers are sold worldwide because of their durability and low maintenance.



Potting & Filling Machine Combo



One-half Yard to 10 Yard Soil/Media Mixer



PM1000 INLINE POTTER



EXCEL HOPPER 2,4,6, OR 10 YARD



ALUMINUM CONVEYORS

We strive to supply our customers with the best equipment to fit their specific needs. We have designed and built our entire facility for flexibility to accommodate the custom equipment as well as standard production run machines. From small precision part to the largest complex machine the same care is put into every piece that is sold by U.S. Global Resources.

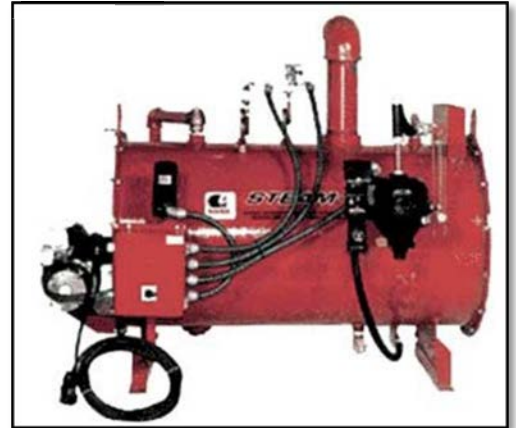
**74 YEARS OF SERVICE TO A GROWING WORLD**



# Soil Sterilizers



Simple to Operate  
Quick, Continuous Steam  
Rugged Design & Portable  
Low Maintenance  
Modular Units Provide Cost Savings  
Proven Dependability  
Many Options Available



## Options

- Portable Non-highway Trailer Option:  
15" Pneumatic Tires, Trailer Hitch, 36 Gallon Fuel Tank, GFCI Electrical Cord and Plug
- Over the Road 2 Wheel Trailer
- Skid Mounted with 36 Gallon Fuel Tank
- Insulation Option:  
1" Fiberglass Based, Protective Stainless Steel Outer Wrap
- Available as a hot Water Boiler

## Available Options

- Steam tarp is available (specify length and width).
- Steam hoses of various types and lengths are available.
- All fittings are available, depending upon application.

All specifications are based on standard operating conditions and may vary +/- 5%. **Prices on request.**

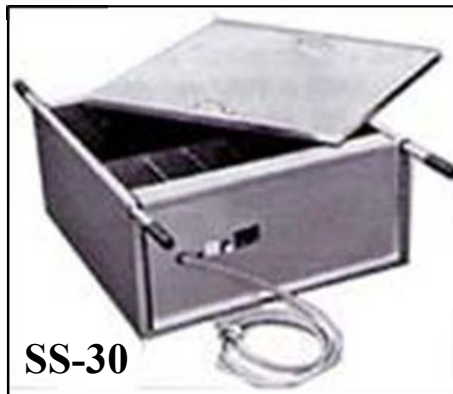


## SG12 STEAM GENERATOR

Fuel is No. 2 diesel  
Vented 8" chimney connection  
120 volt electrical power supply at 20 amps  
Four minute steam at 45 lbs. (55° water to 280° steam temperature)  
20 gallon fuel tank, 2.0 - 2 1/4 gallon per hour usage  
All fittings and hose required for steam delivery are furnished  
Water supply – 45 PSI, 3/4" hose and 3 GPM minimum  
"Clearwave" water conditioning for reduced lime build up  
Gauges for all adjustable controls and steam temperature monitoring  
Start up water diverter (manual) in the system  
One year warranty on all parts (freezing of unit excluded)  
All specifications are based on standard operating conditions and may vary +/- 5%.



SS-60



SS-30

## ELECTRIC SOIL STERILIZER

Kill weeds and disease in your soil or growing mix safely, economically, quickly with our electric soil sterilizers. Choose the size you need from 1/2 cubic yard capacity down to one cubic foot.

All units have heavy gauge aluminum tubes to hold the heating element. All stainless steel interiors are available at extra cost. Kills weeds practically 100%, kills all soil-borne insects and, in general, all of the bacteria, fungi and virus organisms that are harmful to commercial crops.

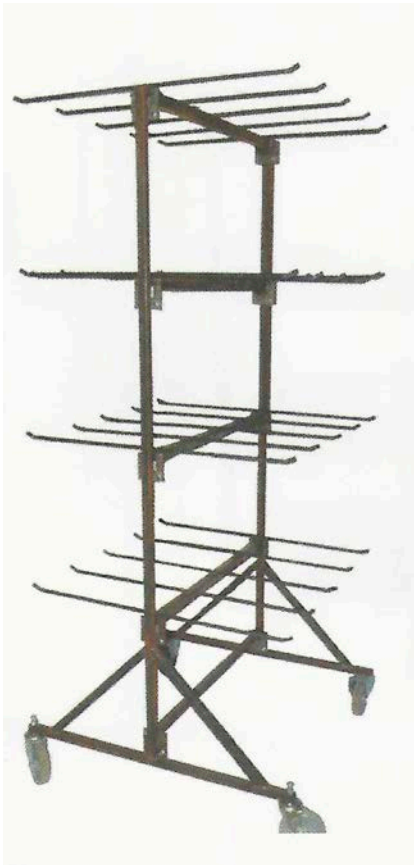
# Integrated Plant Production Systems



## Growing Cart

Clone Rack is specifically designed for propagation flats. Using fluorescent lighting, this 26" wide x 53" long x 64 1/2" height fixture does everything you need while creating an easy to use mobile propagation space. Slide in style shelves and brackets make the fixtures plug and play with virtually no set up time. The quality yellow casters combined with galvanized steel construction will result in a reliable propagation solution for many years to come. The carts, lights, and water trays are sold separately.

**GROW CARTS**



**DRYING RACK**

Our DRYING RACKS is the best special solution for branch drying Cannabis. It's galvanized construction allows for easy sterilization between crops.

Our yellow casters create easy transport from processing areas to drying.

Rungs from hanging can be easy customized to allow more or less space depending on the application.

Our Hook-In Shelves and Slide-In Shelves Carts are the workhorse of our product line. These carts are ideal for moving stock and plant materials around the greenhouse and indoor production.



**HOOK-IN SHELVES**



**SLIDE-IN SHELVES**



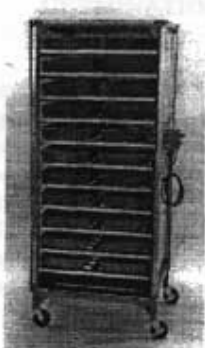
# Integrated Plant Production Systems

- The CULTURE SHIFT™ is leading that innovation being the first of its kind to allow liquid tissue culture cloning on a large scale
- The CULTURE SHIFT™ speeds and increases volume of production by creating movement of the fluid, which improves the nutrient availability for the growing buds
- The CULTURE SHIFT™ is available with different configurations of light mounting to accommodate different lighting systems
- The CULTURE SHIFT™ is flexible with adjustable size shelves to allow different micro propagation vessels or our standard tote
- Multiple units on one control system
- Dimensions - 72" high, 28" wide, 57" long

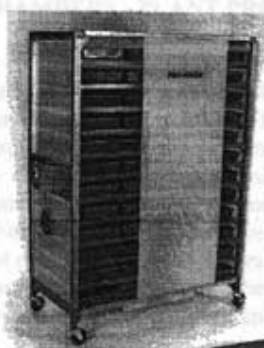


**CULTURE SHIFT**

## GERMINATION CHAMBER



Model PC-22



Model PC-46



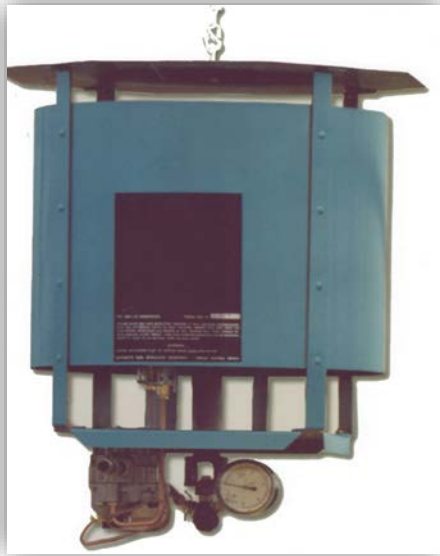
Model PC-70 Dual Zone

PRO-GROW "SPACE SAVER" PROPAGATING CHAMBERS WITH "WATER SAVER" DESIGN  
 MODELS: PC-22, PC-46, PC-70  
 FOR FAST GERMINATION  
 PRO-GROW "SPACE SAVER" PROPAGATING CHAMBERS WITH "WATER SAVER" DESIGN  
 MODELS: PC-22, PC-46, PC-70  
 FOR FAST GERMINATION

### FEATURES:

- Heavy duty welded steel frame.
- Factory paint with stainless stool brackets
- Stainless steel shelves.
- Storage rack for removable door panels.
- Special low heat, low /density electric heaters.
- Heavy duty swivel casters.
- Durable pro-grow thermostats for temperature control.
- Range 40-100 Deg. F
- Pro-grow "WATER SAVER" Special design returns condensed moisture to water pan. ,educing refills. Eliminates need for external water tank. Cleanout drain in tank.

# CO2 GENERATOR



CARBON DIOXIDE IS ONE OF THE ESSENTIAL INGREDIENTS IN GREEN PLANT GROWTH, AND IS A PRIMARY ENVIRONMENTAL FACTOR IN GREENHOUSES. CO2 ENRICHMENT AT 2, 3 OR 4 TIMES NATURAL CONCENTRATION WILL CAUSE PLANTS TO GROW FASTER AND IMPROVE PLANT QUALITY.

MODERN GROWERS ARE BECOMING INCREASINGLY AWARE OF THE VALUE OF CO2. PARTICULARLY NOW THAT MOST GREENHOUSES ARE PURPOSELY SHUTTING OUT CO2 TO CONSERVE ENERGY.

THE CO2 GENERATOR AUTOMATICALLY PROVIDES THE CARBON DIOXIDE TO MEET MAXIMUM GROWING POTENTIALS - AND OPERATES FOR ONLY PENNIES A DAY. THE JOHNSON GENERATOR CAN EASILY BE INSTALLED IN ANY GREENHOUSE. NO EXPENSIVE DUCTWORK IS NECESSARY AND CO2 IS DIFFUSED EVENLY WITHOUT SUPPLEMENTAL FANS.

JOIN WITH MODERN GROWERS EVERYWHERE - USE JOHNSON CO2 GENERATORS - THE LOW COST WAY TO PRODUCE CO2 - THE NUTRIENT OF THE NEW MILLENNIUM.

## Why you get more rapid and efficient growth and better plant quality with Johnson CO2

Plants must absorb carbon dioxide (CO2) in combination with water, soil nutrients and sunlight to produce the sugars vital for growth. A shortage of any of these requirements will retard the growing process. Normally there are approximately 300 parts per millions of CO2 in the atmosphere; when this level is increased to over 1,000 ppm, results are higher production and better plant quality. The Johnson Generator provides up to 1,500 ppm per unit in an average 24' x 200' greenhouse or an equivalent 50,000 cu. ft. volume based on one air change per hour.

Nighttime levels in a greenhouse range from 400 to 500 ppm due to plant respiration. Shortly after sunrise this level will drop to normal atmosphere (300 ppm) due to the plant using the early light to start photosynthesis. After 3 to 4 hours of early morning sunlight the CO2 level can drop to around 100 to 150 ppm, then growth is practically stopped. Supplemental CO2 added during this period can substantially increase your plant and flower production. By adding CO2, during winter months when greenhouse ventilators are closed and when low CO2 concentration becomes a limiting factor in growth, users are obtaining yield and bloom quality which is normally associated with spring and summer.

## CO2 More Important Than Ever

The CO2 Generator is more important than ever because greenhouse growers, trying to conserve energy, are shutting out CO2. Rising fuel costs have forced many growers to use doubled-layered glass, etc., to conserve energy - as a result much less CO2 is entering the greenhouse.

## How to use the CO2 Generator

When there is sunlight and the vents are closed, CO2 should be added continuously to your greenhouse. If the vents are opened because of heat buildup the generator should continue to operate for about 2 hours and then be shut off. Approximately 1 Lb. of CO2 per hour per 1,000 sq. ft. yields 1,000 ppm's of CO2. A 4,000 sq. ft. house requires at least 4 Lbs. of CO2 per hour. If CO2 level drops off from 1,000 ppm's to 500 ppm's on a clear sunny day, you can easily adjust to a higher burning rate to make up for the more rapid absorption of CO2 by plants. Most growers use their Johnson Generator daily in winter from approximately 7:30 a.m. to 4:30 p.m.

## Automatic ...fully adjustable

Completely automatic, the Johnson unit comes complete with a gas pressure gauge. Simply set the gauge to the gas pressure desired for your greenhouse area and the Johnson Generator will automatically provide the correct amount of CO2. Just as you adjust the amount of water and fertilizer to meet the changing needs of your plants, you also set the Johnson Generator to produce the desired amount of CO2 for your greenhouse. The Johnson unit includes a 24V. gas valve. This can be activated by a timer or a combination timer thermostat, which automatically turns the units on in the morning and off in the evening as desired. (Optional).



**74 YEARS OF SERVICE TO A GROWING WORLD**



# PROJECTS & SERVICES IN OVER 80 COUNTRIES



Sawtooth Greenhouse Ornamentales De Cidra



National Reforestation Center Beijing China 1980



Project under construction



**BEFORE** Sometimes to reach a site we have to rebuild a bridge. Himalaya Mountains 2000



**AFTER** now we can get to the site located in the Himalayan Mountains



Roof Top Greenhouse is the rage today. USGR project, University of Utah, Salt Lake City



When hoist is not available we use an elephant. India



We use local help to lower cost



Chia Tai Research Center near Bridge of the River Kwai, Kanchanaburi, Thailand



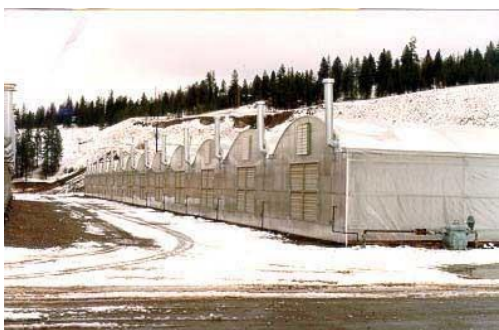
Polycarbonate covered environmentally controlled garden center attached to an office building.



Reforestation/Vegetable Center Lhasa Tibet



Project ready for shipment







**CANNABIS INDUSTRIES LEADING  
SUPPLIER OF FACILITIES, SYSTEMS,  
EQUIPMENT & COMPONENTS**

***74 YEARS OF PLANT GROWTH TECHNOLOGY***

- PROJECT DEVELOPMENT
- ALL ENVIRONMENTAL CONTROL SYSTEMS
- CONSULTING - A DIFFERENT APPROACH TO CONSULTING SERVICES
- INSECT AND DISEASE CONTROL
- LIGHTING SYSTEMS
- CONSTRUCTION OR SUPERVISION
- FERTIGATION TECHNOLOGY
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- WATER MANAGEMENT
- LIGHT DEPRIVATION SYSTEMS

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