Today's Date: _____ Design Needed By: _____

BioTherm REQUEST

CULTIVATION ENVIRONMENT DESIGN

CED FORM REQUIREMENTS

In order for BioTherm to provide an accurate project proposal, the following information needs to be filled out before submission.

- FORM 100% COMPLETED
- STRUCTURE INFORMATION
- DRAWINGS
- ITEMS WITH AN * ARE ABSOLUTELY MANDATORY

GENERAL INFORMATION

Company: _____

Name: _____

Phone: _____

Email: _____

Address:

Project name and Location:

BIOTHERM'S 3 DESIGN SYSTEMS

We offer designs for three main system types:

HEATING

Choose a BioTherm heating system.

Fill out this section.

HYDRO SCIENCES

- DGS Dissolved Oxygen System
- Irrigation Tempering
- Subirrigation Floor Systems

Fill out this section.

OPTIMIZED AIR

- Air Conditioning
- Dehumidification
- CO2 Enrichment

Fill out this section.

CROP INFORMATION

Is this for ☐ Greenhouse OR ☐ Indoor Cultivation

Crops Grown: _____

Cultivation Method:

- ☐ Containers (pots, bags, flats)
  - Min. Container Size: _____
- ☐ Nutrient Film Technique
- ☐ Media beds
- ☐ Deep Water Culture

Growing surface:

Benches:

- ☐ Stationary
- ☐ Mobile Trays
- ☐ Rolling
- ☐ Gutters
- ☐ Troughs

– OR –

Floor:

- ☐ Concrete
- ☐ Gravel/Sand
- ☐ Rafts in ponds

Bench surface:

- ☐ Expanded metal
- ☐ Wire mesh
- ☐ Ebb & Flow trays
- ☐ Wood
- ☐ Other _____

* **Current Control System:**

☐ None ☐ Agrowtek ☐ Argus ☐ Hortimax ☐ Link4 ☐ Microgrow ☐ Priva ☐ Wadsworth ☐ Other_____

Air Movement

Circulation fans: ☐ HAF ☐ VAF ☐ Other_____

UTILITIES

* ☐ Natural gas ☐ Liquid propane ☐ Electric ☐ Other (biomass, waste heat, etc). Describe: _____

Electrical service: Voltage:_____ Amperage _____ Phase _____

STRUCTURE INFORMATION

Greenhouse Manufacturer: _____

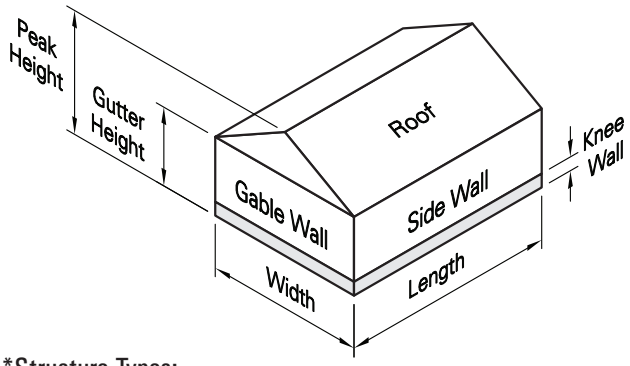
Using the lists and diagrams below, indicate dimensions and glazings/coverings for your project.

Your Project:

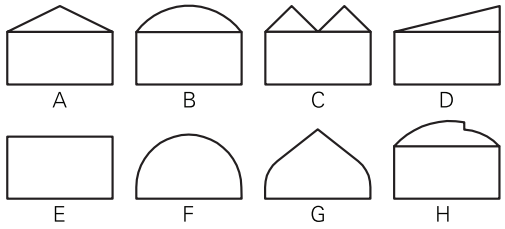
☐ New ☐ Existing

House	1	2	3	4
Number of ranges:				
Bays per range:				
Gutter height (ft):				
Knee wall height (ft):				
Bay width (ft):				
Bay length (ft):				
Peak height (ft):				
Structure type*:				
Glazing/Covering (from list)				
Side wall:				
Gable wall:				
Roof:				
Kneewall:				

Greenhouse Elements:



***Structure Types:**



Glazing/Covering List:

1. Polyethylene Film, Single
2. Polyethylene Film, Double
3. Acrylic Sheet, 8mm
4. Polycarbonate Sheet, 16mm
5. Polycarbonate Sheet, 8mm
6. Polycarbonate Sheet, 6mm
7. Polycarbonate Sheet, Triple Wall
8. Polycarbonate Sheet, Corrugated
9. Fiberglass
10. Glass, Sealed
11. Glass, Lap
12. Concrete, 4"
13. Concrete, 8"
14. Concrete, Block
15. Wood
16. Metal
17. Insulated (R-Value)
18. Other:_____

Shade Curtains/Blackout System:

Please describe any exterior, thermal, or light deprivation curtain systems to be used:

_____

☐ Exterior shade curtain (%):_____ ☐ Interior shade curtain (%):_____

Make and Model of Shade Curtain _____

* SITE SKETCH CHECKLIST

On the following page, please provide a sketch of your facility so we know where to place your equipment and can accurately determine material quantities. For complex sites please provide additional sketches. If indoor cultivation, please provide planset and specs of the building you intend to grow in. Please provide photos to help us understand your needs.

Please sketch your site, including:

- ☐ Structure footprint and dimensions
- ☐ Aisles and walkways (locations and sizes)
- ☐ Bed or bench dimensions
- ☐ Control zones required
- ☐ Boiler/Mechanical room desired
- ☐ Indication of existing and retrofit items
- ☐ North arrow
- ☐ Doors
- ☐ Utility locations
- ☐ Water system (storage and fertigation)

SITE SKETCH

Please use checklist on previous page to guide you.

HEATING SYSTEM REQUIREMENTS

BioTherm's high-tech, efficient heating systems save fuel costs while maintaining optimal temperatures in your growing environment.

Temperature Parameters

* Min. outside temp (°F): _____
* Desired inside temp (°F): _____
* Desired media temp (°F): _____

Air temperature current system will maintain (°F): _____

Heating

Is there an existing heating system? ☐ Boiler ☐ Unit heater

BTUH capacity of existing system: _____

* **Zones**

How many zones should we design? _____

Request for Supplemental Rootzone Heating System? ☒ Yes ☐ No

HEATING SYSTEMS

What heating systems are you interested in?

☐ Under bench

☐ On floor (Roll'N Grow)

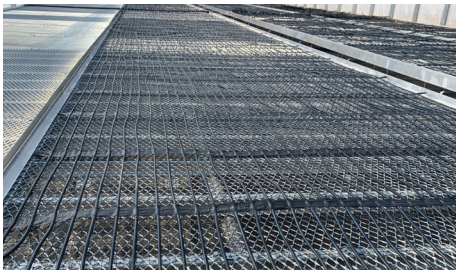
☐ Perimeter heating

☐ In-bench

☐ Bed heat

☐ In-crop

☐ On-bench (Roll'N Grow)



☐ Space heating

☐ Boom supports

☐ In-floor concrete

☐ Cart-rail

☐ Canopy

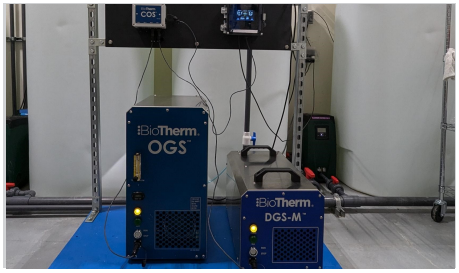
Use the sketch page to guide us.

HYDRO SCIENCE SYSTEM REQUIREMENTS

BioTherm Hydro Sciences has one simple focus: to enhance your irrigation system and boost plant growth using cutting-edge technologies.

What type of hydro science system would you like us to design for you?

☐ Dissolved Oxygen Infusion



Dissolved oxygen decreases soil-borne disease pressure. Anti-biofouling properties to keep irrigation lines clean.

☐ Irrigation Tempering

Watering with tempered water prevents thermal shock, helps increase rooting and germination rates.

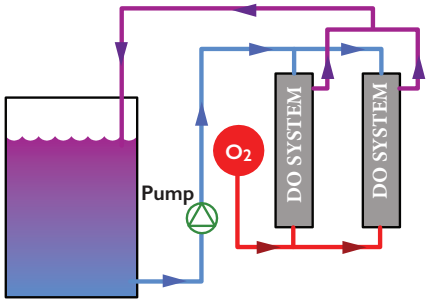
☐ Subirrigation Floor System

Flood and Cascade floor systems save water, energy, fertilizer, and reduce labor costs by up to 95%.

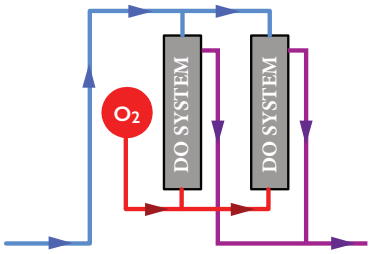
DISSOLVED OXYGEN INFUSION SYSTEMS

DGS™ Dissolved Oxygen System Design Conditions

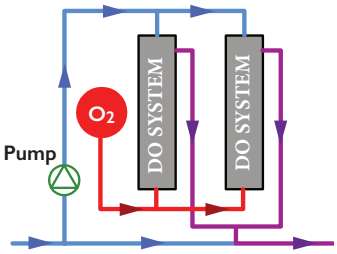
Our DGS™ systems can be installed in different configurations to boost dissolved oxygen levels in your irrigation water. Which type of configuration would you like us to design for you?



Recirculating Tank



Inline



Sidestream

* Grow medium: ☐ Soil ☐ Hydroponic ☐ Aeroponic ☐ Aquaponic ☐ Other: _____

Starting dissolved oxygen level (ppm): _____

* Desired dissolved oxygen level (ppm): _____ (if unsure, we will guide you based on your type of growing)

* Water flow rate (gpm): _____

Does water pressure exceed 40 PSIG? ☐ Yes ☐ No

If yes, max pressure: _____

Irrigation Cycle Time: Start _____

Stop _____

Please provide a simplified sketch outlining the major components (tanks, pumps, fertigation, water source, etc.) and how they are connected. Use the sketch area below.

Irrigation Water Storage

Tank capacity (gal):_____

Is water recirculated? ☐ Yes ☐ No

Are tanks hydraulically connected? ☐ Yes ☐ No

* Fresh-water refill flow rate (gpm): _____

If refill rate is unknown, what is the pipe size? _____

* Do you run out of water after maximum irrigation cycle? _____

IRRIGATION TEMPERING SYSTEMS

Irrigation Tempering Design Conditions

Irrigation temperature plays a key role in plant health. Studies show that plants irrigated with water that is too cold essentially stop growing until the soil temperature stabilizes. The same is true with irrigating with water that is too hot. Our irrigation tempering systems are proven and reliable and help you deliver the optimum temperature irrigation to your crop.

How would you like your irrigation water tempered? ☐ Warm ☐ Cool ☐ Both

* Flow Rate (gpm): _____ * Starting temperature (°F): _____ Any additional details: _____
* Usage (min/hour): _____ * Desired temperature (°F): _____ * Please provide a simple sketch on page 3.

SUBIRRIGATION SYSTEMS

What type of Subirrigation Floor System would you like us to design for you?

☐ Flood Floor (fill and drain) ☐ Cascade Floor (constant "skim" flow)

Please provide a dimensional sketch on page 3.

Flood Floor and Cascade Floor Design Conditions

Flood Floor systems have been a vital tool of top growers for decades. Labor and water savings are only a couple of the many advantages they offer. Cascade floors are based on the same technology, but the water "cascades" across the floor, irrigating all plants on a flat, slightly pitched floor, delivering even more precise irrigation.

I would like to ☐ Retrofit an existing structure ☐ New construction at new facility ☐ Expansion of existing facility

Recirculating Irrigation System Design Conditions

Floor: Length (ft) _____ Width (ft) _____ Quantity _____ Slope: ☐ "V" ☐ "W"
Max watering time (min): Per floor: _____ Per system: _____
Water depth required (in): _____

Water Storage for Subirrigation

Number of tanks:_____
☐ In Ground: ☐ Above Ground
Tank location: _____

OPTIMIZED AIR SYSTEM REQUIREMENTS

Controlling relative humidity and air temperature is vital to managing Vapor Pressure Deficit (VPD) and controlling pathogens. CO2 Enrichment can increase photosynthetic activity by 30% and reduce supplemental lighting hours.

What type of air system would you like us to design for you?

☐ Air Conditioning

Optimize climate control in your greenhouse with air conditioning solutions for ideal growing conditions.

☐ Dehumidification

Standalone and large-capacity dehumidifiers designed for CEA.

☐ CO2 Enrichment

CO2 systems use boiler exhaust to supplement the levels of CO2 in a greenhouse.

How do you irrigate? _____

AC/DEHU SYSTEMS

AC/Dehumidification Design Conditions

	Zone 1	Zone 2	Zone 3
Crop Type:			
* Target VPD:			
* Day setpoint temperature (%):			
* Day setpoint relative humidity (%):			
* Night setpoint temperature (%):			
* Night setpoint relative humidity (%):			
* Irrigation water input per bay (gal/day):			
Irrigation drain to waste (%):			
Plant count:			
Shade curtain energy savings %			
* Lights per room:			
* Wattage per light:			

*** Dehumidification period:**

☐ Night ☐ Day Both ☐

*** Air Handling Units**

Where do we have space?

_____

Is this going to be an under-bench or overhead polytube application with custom BioTherm AHUs in a corridor?

_____

If no corridor, are you ok with hanging AHUs at the gutter level inside the grow space?

_____

CO2 ENRICHMENT SYSTEMS

CO2 Enrichment Design Conditions

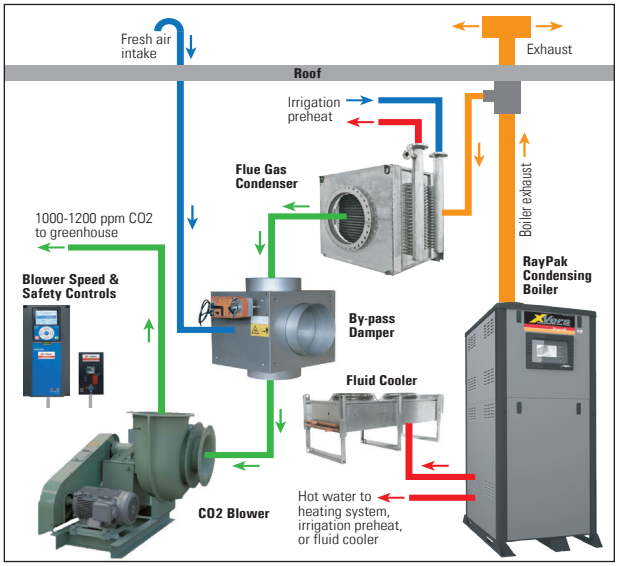
CO2 systems use boiler exhaust to supplement the levels of CO2 in a greenhouse.

CO2 level desired (ppm): _____

Construction: ☐ Existing ☐ New ☐ New w/future expansion

Excess Heat: ☐ Store ☐ Discard (cooling tower)

Zones: ☐ Quantity _____ (Show on sketch, page 3)



AIR MOVEMENT SYSTEMS

Optimized Air Flow Fans

Are you interested in fans?: ☐ Yes ☐ No

Describe existing fans: ☐ HAF ☐ VAF ☐ Other _____

NOTES