What You Need to Know About Manufactured "Glass and Frame" Type Enclosures

A Manufactured Enclosure is NOT Considered Standard Construction

Structures of this nature that use a form of polycarbonate, "glass", Kal-Wal, or some other type of transparent material do not have the same R or U values that are found with standard building construction. Many times their U or R values can be from a 0.2 to a 10—far below standard construction with insulation of R19 to R40 in walls and ceilings.

Some of the newer polycarbonates used in enclosures made today will not condense in colder climates (i.e. Structures Unlimited). Enclosures have the same requirements as standard construction when it comes to dehumidifying and maintaining a healthy environment. They do require the same "design" of dehumidification, heating, and potentially cooling. However, the heating and cooling requirements for these structures will be much greater than your home or commercial buildings. Clients need to be aware that with this type of structure, you should expect higher utility bills and operating expenses due to high heat loss and heat gain of these buildings.

Some enclosure companies are better suited to this environment than others, and each client should review all specifications very carefully as heating and cooling loads can exceed the dehumidification load for equipment sizing. And with some structures, the framework may not be able to support ductwork or ceiling fans.

What are *sensible calculations?*

Sensible calculations, or basically heat loss and heat gain measured in BTU's, is much greater for manufactured enclosures and needs to be taken into consideration when sizing dehumidification, heating, and cooling for these structures. Sensible calculations simply mean that a complete HVAC load calculation for heating and cooling has been done on the building.

This takes walls, ceiling, glass, and other materials into consideration, insulation values, building construction, lighting, and geographic area design conditions to determine temperatures in winter/summer months, and wet bulb and dry bulb temperatures. The end result is you have the heat gain of the structure in BTU's, and the heat loss in BTU's. This is done for all types of construction but is especially recommended for any manufactured enclosures.

Who performs these calculations?

We do not perform these calculations. Generally an engineering company is hired and is

responsible for collecting all of the data regarding your geographic design temperatures, the structure, and entering this information into a dedicated software calculation program. Mechanical/HVAC firms and the enclosure companies may also run these calculations with specific software. When the calculations are completed they provide this data to us to size the primary heat source for heating the space. These calculations also provide the heat gain (in BTU's) so that the correct outdoor condenser/cooling or geothermal loop can be sized. Without these calculations, it is not feasible to provide an accurate heating and cooling peripheral selections.

What if you need more cooling than heating or dehumidification?

This is very common with some types of structures that have very little R or U value. A system can be sized that requires 20 tons of cooling but only 10 tons of dehumidification. You cannot upsize the dehumidifier for obvious reasons, and you install a 10 ton outdoor condenser/fluid cooler on a 20 Ton system. In these circumstances—our engineering department will work with each client to determine the best approach to your project.

What is the best type of structure?

There are many enclosure companies that build for a variety of applications. Do your homework! DXair recommends structures with the highest R or U value and all metal frames MUST have thermal breaks to be the better choice. Structures can also be framed in wood and the interior wood is sealed to prevent moisture damage. We recommend double pane "glass" or use of other "window" materials that deter condensation and corrosion. Single pane glass should NOT be used due to energy inefficiency and condensation problems when dew point temperature is reached.

Metal/aluminum frame structures and windows:

All frames MUST be THERMALLY BROKEN in these types of enclosures.

Simply put, this means that all framework is insulated. Take a can of cold pop outside on a 90° day. What happens? It *sweats* or *condenses* because it has reached what is called "DEW POINT TEMPERATURE" (where warm meets cold on a surface and it condenses). All metal frames should be non-corrosive or protected against high humidity/chlorine environments.

On days where outdoor humidity is low and temperatures are warm, opening doors and windows is recommended. However, opening retractable panels and bringing in outside air does not control the humidity level 100%. You may still experience high levels of humidity and

condensation at certain times of the year. When opening panels on a day when outdoor temperature is 80° with 90% humidity, you are bringing in 90% humidity to an envelope that will be maintained at 50-60% relative humidity (RH).

Having these panels open on a "colder" day may result in the increased need to heat the room. Lastly, during cold months, the retractable windows and panels are not used. Remember: anytime the outside temperature is lower than the inside temperature, dew point is reached, forming condensation on the inside surfaces.

Some structures may not be suitable for indoor pool rooms where high humidity and chlorine exist. Many are built as sunrooms; some are built as greenhouses and not meant for natatorium duty in a high humidity or chlorinated environment. Talk to your enclosure company when choosing a structure with the highest U or R value and materials for your pool room. Chlorine, salt and other chemicals may cause pitting, corrosion, mold, and/or rust within the structure. Even steel structures will deteriorate over time if the humidity levels and pool chemistry are not controlled properly. Ensure that any materials used for the pool enclosure are corrosion proof.

Pool Covers are highly recommended in all residential projects. This cover can save between 50-75% of operating costs for an indoor pool.

Ductwork or air delivery system to maintain the environment:

This is the most critical aspect of the dehumidification system. Careful attention must be given to designing the dehumidification system and air delivery or ductwork system for these types of structures. Properly sized ductwork must provide airflow to all "glass" surface areas of the structure to prevent condensation. **Ceiling fans blowing upward may be helpful to break up stratification and move airflow.**

Ensure that the framework will support ductwork and/or ceiling fans. With enclosures, underground or overhead ducting can be used with generally one high return air. Return air is always high in the room because the moisture from a pool rises to the ceiling area. Stratification occurs at this point and air flow is critical to preventing condensation.

We highly advise against return air being placed at deck level even though many companies (wrongly) advocate this practice. Their reasons are an attempt to deal with pool chemistry but that is a water issue not an air delivery issue. We cover this in more detail in our *Pool Chemistry* bulletin and especially our *Stink or Swim* guideline.

DXAIR INDOOR POOL DESIGN GUIDELINES
GLASS AND FRAME OR MANUFACTURED ENCLOSURES

Checklist of considerations when evaluating manufactured enclosures:

- Contact enclosure company and request Sensible Load Calculations (Heat Gain/Heat Loss in BTU's) of the building.
- If they do not perform these calculations, research and find an engineering firm or HVAC firm or contractor who can provide calculations or contact DXair to see if we have a resource available for you. If it is not feasible to do so, DXair will provide a quote for dehumidification and some heating and/or cooling, but we cannot guarantee the heating/cooling load requirements of the system will be met.
- Understand that these structures will have higher operating costs.
- Determine your utility rates ahead of time; find out what natural gas, propane, electric costs are and review carefully to determine the best approach to designing your system at the least expensive utility rates.
- Determine quality of "glass" for structure—single pane is never recommended; double pane glass or similar should be utilized.
- Determine if framework (if metal) has thermal breaks (they are required).
- Determine if ceiling fans can be hung from the metal framing at top of structure BLOWING UPWARD. This will help move air flow and help to break up any stratification.
- One high return air is required. Stratification occurs at the top of ceilings; therefore the return air is at a higher point of the structure.
- Keep in mind ductwork will be required to move air flow to all glass or other surfaces. Ductwork is designed as a peripheral loop around the outer edge of the structure with diffusers/registers deflecting the air flow at all surfaces.
- Determine where the ductwork system will be installed. A continuous loop of ductwork is required either overhead or underground. If overhead, can the framework support hanging the ductwork and potentially ceiling fans? If underground, did you allow enough deck area to install underground duct?
- If wood framing, wood may need to be sealed with a water/moisture proof sealer (NOT THOMPSONS).

Please contact DXair directly to assist in this type of structure.