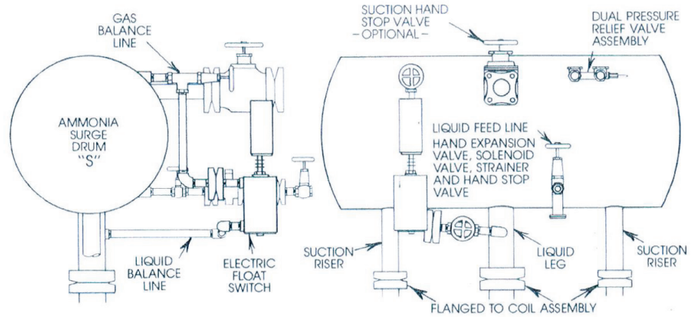
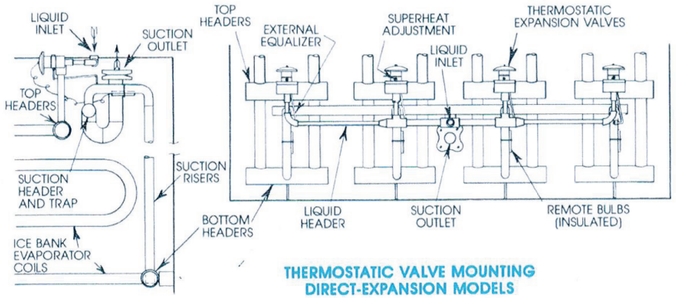
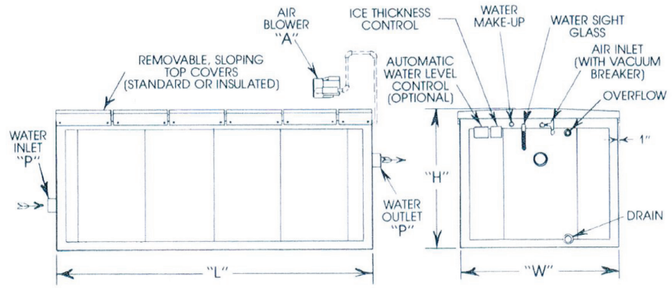


SURGE DRUM AND CONTROLS – FULL-FLOODED AMMONIA MODELS



THERMOSTATIC VALVE MOUNTING
DIRECT-EXPANSION MODELS



ICE BUILDER SIDE AND END ELEVATION

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Ice Builders (Latent Heat Storage Units) for the HVAC, Dairy, and Food Processing industries

Ice Builders

Latent Heat Storage Units
Ice Builders

- Featuring air agitation for use with all popular refrigerants
- Stored refrigeration for product cooling, air conditioning and industrial cooling
- Storage

Direct Expansion Models

5,000 lbs. ice storage (60 ton hours of cooling storage) to 100,000 lbs. ice storage (1,200 ton hours of cooling storage)

Full Flooded Models

10,000 lbs. ice storage (120 ton hours of cooling storage) to 105,000 lbs. ice storage (1,260 ton hours of cooling storage)

This view shows a very even pattern of turbulence due to the placement of the air orifices in the air piping system. The air-agitation is used only when melting ice. Even disbursement of the air is important to prevent dead spots and unwanted ice buildup from occurring.

Air Agitated Latent Heat Storage Units or Ice Builders store refrigeration in the form of ice.

The latent heat storage resulting from the change in state from water to ice is the key to the success of these units. Large quantities of refrigeration can be stored in a relatively small space. The ice can be produced during periods of low demand for refrigeration or electrical energy. It can be used later in the form of 32° F to 34° F (0° C to 1.1°C) cooling water. This concept is ideal for leveling out refrigeration loads that are not constant throughout the cooling period, and for high refrigeration loads of a relatively short duration. Since the refrigeration compressors and related equipment are not required to be sized to meet peak load requirements, energy consumption is reduced to accommodate manual or automated loading.

Additional energy savings can be realized by building ice to store refrigeration during times when electrical demand for other uses is low, thus holding down demand charge rates.

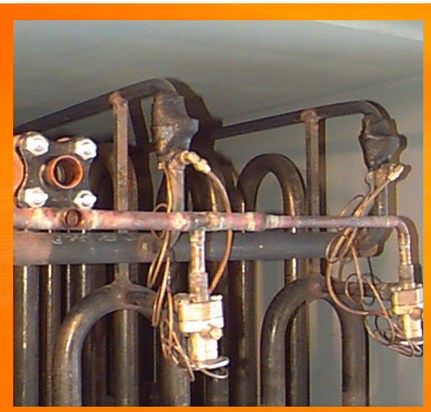
Another advantage of these thermal energy storage systems occurs when working from a reserve, the system capacity is not lost should a compressor breakdown. Ice Builders can have a split evaporator with two compressors separately connected. In this way, if one fails, there is another to give at least 50% capacity (more by running it longer), until the failure has been remedied.

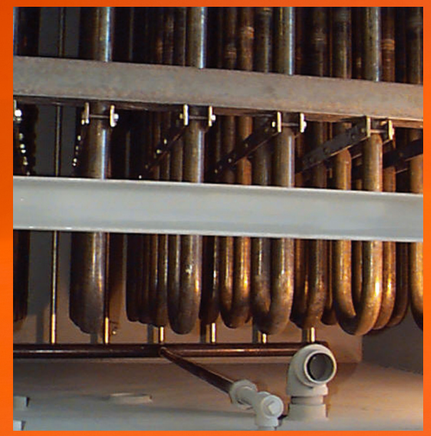
For certain heating, ventilating and air conditioning applications, the units can be used for storing cold and heat. The cold is stored as both latent and sensible heat while the heat is sensible heat only. This is accomplished by using the ice building coil as a condenser to heat the water in the tank.
Some imitators have cut corners and do not supply air agitation lines between each vertical bank of ice coils. This results in an uneven pattern of agitation over the tank area with dead spots where unwanted ice buildup can occur.

Ice Builder Features:

- The tanks are constructed from .25in (6.35mm) thick steel plate. All seams are double welded and tested. Heavy structural stiffeners limit distortion and stress.
- Double plate bottoms have a 2in (50.8mm) thickness of molded polystyrene insulation sandwiched between them.
- Tank sides and ends have a 3in (76.19mm) thickness of polystyrene insulation between the tank wall and the outer sheathing of stucco embossed Aluminum. The insulation is glued to the tank wall to eliminate condensation problems.
- Standard top covers are formed from a single thickness of stucco embossed Aluminum sheet, while the optional insulated top covers have a 2in (50.8mm) thickness of molded polystyrene completely encased between aluminum sheets. All top covers are sectional, overlapping, self-draining, and are secured to the tank.
- The water return is located on the rear of the tank, and the chilled water outlet on the front. The connections are weld stubs except for the 3in (76.19mm) size that is threaded. A .75in (19.04mm) water makeup, 2in (50.8mm) overflow, and a 3in (76.19mm) drain connection are provided on the front of the Ice Builder. A sight glass is also furnished for easily checking the water level.
- The air inlet has a vacuum breaker to prevent water from getting into the air blower on shut down. Removable air distribution pipes are located between EACH vertical bank of ice coils for even pattern of agitation.
- All the pipes are bent on 7in (177.79mm) centers and are headered on 7.25in (184.14mm). The coils are made from stainless steel.

International Thermal Systems supplies a compact, highly efficient, low-pressure air blower for agitation with each Ice Builder. The air agitation is needed only when ice is being melted. The air blower motor starter should be interlocked with the ice water circulating pump motor starter. The air agitation lines in the Ice Builder are easily removable for maintenance.



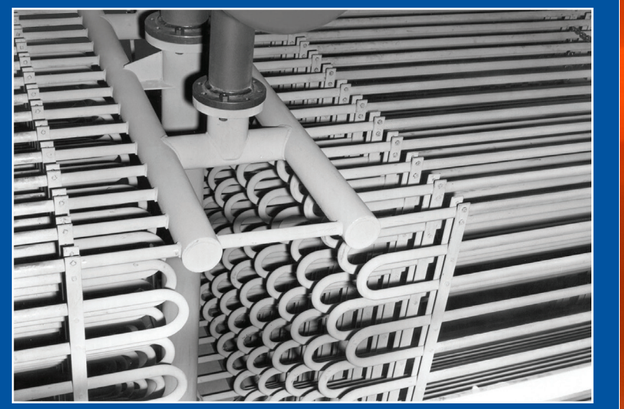


Direct Expansion and Full Flooded Models

SINGLE BANK DIRECT-EXPANSION
This view shows the mounting of the thermostatic expansion valves. The two coil bank headered to one valve design provides an even refrigerant feed. The remote bulbs free drain and are insulated. Suitably sized bottom suction lines bring any oil out with the refrigerant gas. A flanged sweat copper suction connection is mounted as well as a sweat copper liquid connection. The coil assembly is filled with dry nitrogen for shipping.

DOUBLE BANK DIRECT-EXPANSION
This view shows the mounting and headers of the thermostatic expansion valves. These larger Ice Builders have two separate single bank evaporators in one tank. Generally, each evaporator is operated with its' own condensing unit. However, the two evaporators could be connected together and operated as one. Shorter coils and shorter gas travel promote faster, more efficient freezing.

SINGLE BANK FULL-FLOODED
This view shows the mounting of the A.S.M.E. surge drum flanged to the coil assembly for easier shipping. It shows the float switch mounted, as well as the liquid line with hand expansion valve, solenoid valve strainer and shut off valve. It also shows the dual pressure relief valve assembly and the optional large suction shut off valve that is furnished.



DOUBLE BANK FULL-FLOODED
This view shows the two large coil banks connected into and fed by a common liquid leg. It also shows the large A.S.M.E. surge drum, flanged to the double coil assembly for easier shipping. All of the same controls that are furnished for the single bank Ice Builders are furnished for the double bank Ice Builders. Shorter coils and shorter gas travel promote faster, more efficient freezing.

Direct expansion models have every two coils sections headered together and top fed by an externally equalized thermostatic valve. The liquid inlets are located evenly between the coils to prevent over feeding the coil directly in front of the inlet and starving the other coils, as happens when two or more coils are headered together. The suction risers are sized for a practical gas velocity, and they draw from the bottom of the headers. These risers are brought in to the top of a common suction header with a single suction outlet. This is to prevent the possibility of any liquid in the lines affecting the thermostatic expansion valves' remote control bulbs. The expansion valves are headered together for a single liquid inlet. The coils have a deep vacuum drawn on them and then they are tested and filled with dry nitrogen for shipping. All direct expansion models have 8% more pipe coil than required for similar capacity flooded models to compensate for the tapered ice building due to refrigeration superheat. Direct expansion models under 20ft (6096mm) long have a single evaporator and longer units have double evaporator coils back to back in the tank. The result is a more efficient operation because of the shorter gas travel and reduced pressure drop.

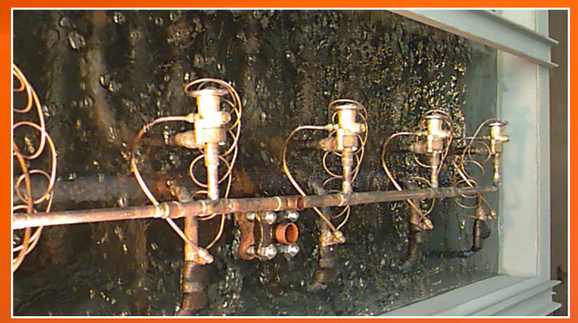
Full-flooded models have the coils headered together with a large liquid leg, built-in oil sump and .75in (19.04mm) oil purge line through the tank wall. The coil top header has two gas returns that are flanged together with the liquid leg to the oversized A.S.M.E. surge drum. The surge drums are sized to hold from 40% to 60% of the capacity of the coil evaporator. They are complete with all controls including a float switch, balance lines, solenoid valve and strainer, expansion valve, dual relief valve assembly and suction and liquid hand valves. Full-flooded models under 30ft (9144mm) long have a single evaporator with the surge drum and controls located at the rear of the tank while longer models have a double coil bank with a common liquid leg and surge drum located at the center of the tank.

Models for recirculated refrigerant or overfeed flooding have the coils headered together and the individual coils have orifices to assure proper distribution for top feeding the evaporator. The liquid and gas return risers are also properly sized for oil return.

Straight through water flow from the rear to the front of the tank results in no loss in pumping head. The entering water is quickly dispersed in the tank and is picked up by the air agitation to mix it completely with the contents of the tank. The air agitation causes it to pass over the all of the ice banks on its' path to the outlet in the front of the tank.

The water capacity of each tank is approximately twice the amount needed to freeze the rated ice capacity. This is a result of more space between the ice banks and between the ice banks and the tank walls, thus nearly eliminating any possibility of ice bridging across the coils and of the tanks bulging because of a freeze-up.

An automatic ice bank control is mounted on all models with the sensors attached to the pipe coils and the relay mounted on the outside of the tank.

An automatic water level control is supplied as an option at additional cost. It constantly maintains the water level in the tank. It has a protected level sensor inside the tank and a relay mounted inside a waterproof enclosure located on the outside of the tank. A .75in (19.04mm) water solenoid valve is furnished for the water supply line.

Straight through water flow from the rear to the front of the tank results in no loss in pumping head. The water capacity of each tank is approximately twice the amount needed to freeze the rated ice capacity. An automatic ice bank control is mounted on all models with the sensors attached to the pipe coils and the relay mounted on the outside of the tank.