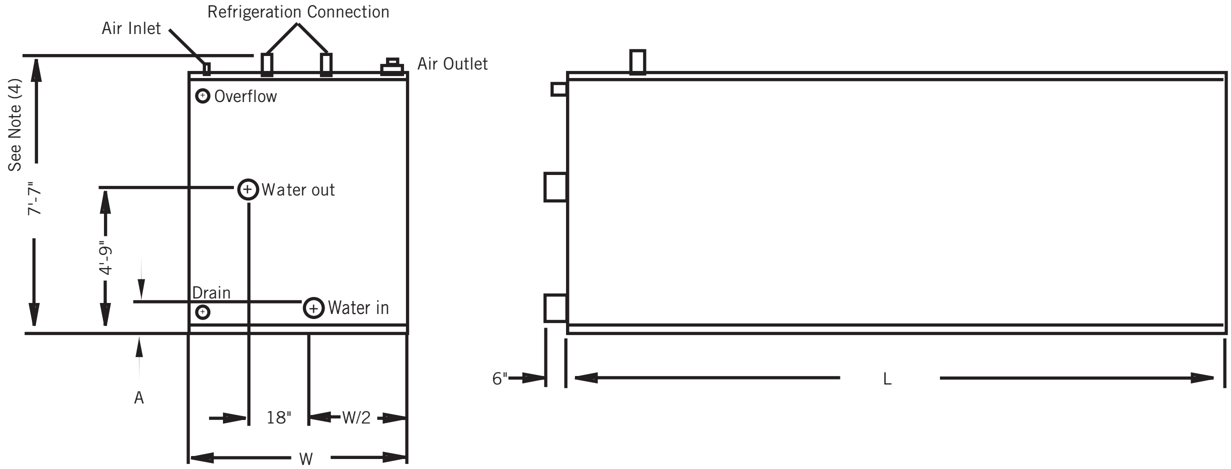
TSU (E, F & G) Engineering Data

NOMINAL 5' WIDE UNITS: MODELS TSU-125E TO TSU-235E AND TSU-145F TO TSU-270F

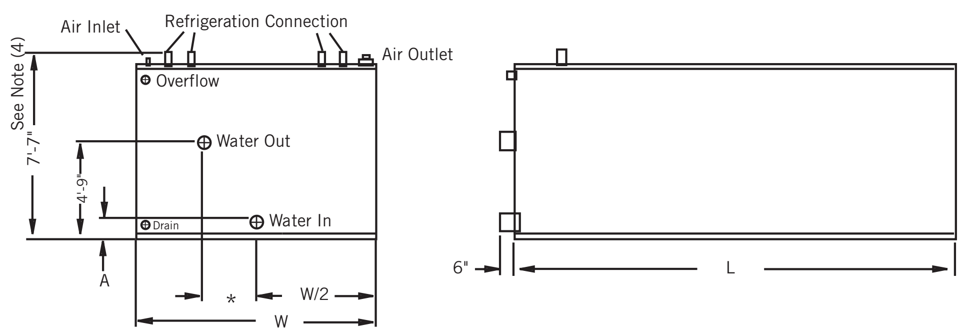


Model Number	LBS of Ice[2]		Approx. Shipping Weight (lbs)	Approx. Operating Weight (lbs)	Air Pump (HP)	Water Volume (gal)	Pull Down Volume (gal)	Coil Volume (ft³)	R-717 Charge (lbs)[5]	Water Conn. In/Out	W	L	A
	Gravity Flooded	Pump Recirculated											
E Series													
TSU-125E	9,330	10,808	5,500	23,500	3	2,080	270	9	245	3”	5’-3 1/8”	10’-1”	4.5”
TSU-155E	11,410	12,250	6,230	28,000	3	2,520	320	10	275	3”	5’-3 1/8”	12’-1”	4.5”
TSU-180E	13,580	14,580	7,070	32,600	3	2,960	380	12	325	3”	5’-3 1/8”	14’-1”	4.5”
TSU-210E	15,660	16,740	8,090	37,400	3	3,400	440	13	355	4”	5’-3 1/8”	16’-0”	5”
TSU-235E	17,830	18,910	8,830	41,900	3	3,840	490	15	410	4”	5’-3 1/8”	18’-0”	5”
F Series													
TSU-145F	10,660	11,500	5,730	23,700	3	2,070	40	10	275	3”	5’-3 1/8”	10’-1”	4.5”
TSU-175F	13,080	14,080	6,500	28,100	3	2,510	45	12	325	3”	5’-3 1/8”	12’-1”	4.5”
TSU-205F	15,490	16,580	7,370	32,800	3	2,950	55	13	355	3”	5’-3 1/8”	14’-1”	4.5”
TSU-240F	17,910	18,990	8,370	37,600	3	3,390	65	15	410	4”	5’-3 1/8”	16’-0”	5”
TSU-270F	20,330	21,490	9,140	42,100	3	3,820	70	17	460	4”	5’-3 1/8”	18’-0”	5”

NOTES:

1. All dimensions are in feet and inches. Weights are in pounds.
2. Pounds of ice capacity is based on R-717. For other refrigerants, consult your BAC Representative.
3. Dimensions showing location of connections are approximate and should not be used for prefabrication of connecting piping.
4. Dimension is installed height. Coils are capped for shipping and storage. Add 3 inches for shipping height.
5. Refrigerant charge listed is operating charge for gravity flooded system at 15°F (-9°C). For other feed systems, consult your BAC Representative.
6. ICE CHILLER® Thermal Storage Units should be continuously supported on a flat level surface.

NOMINAL 8’ AND 10’ WIDE UNITS:
MODELS TSU-190E TO TSU-505E AND TSU-220F TO TSU-580F



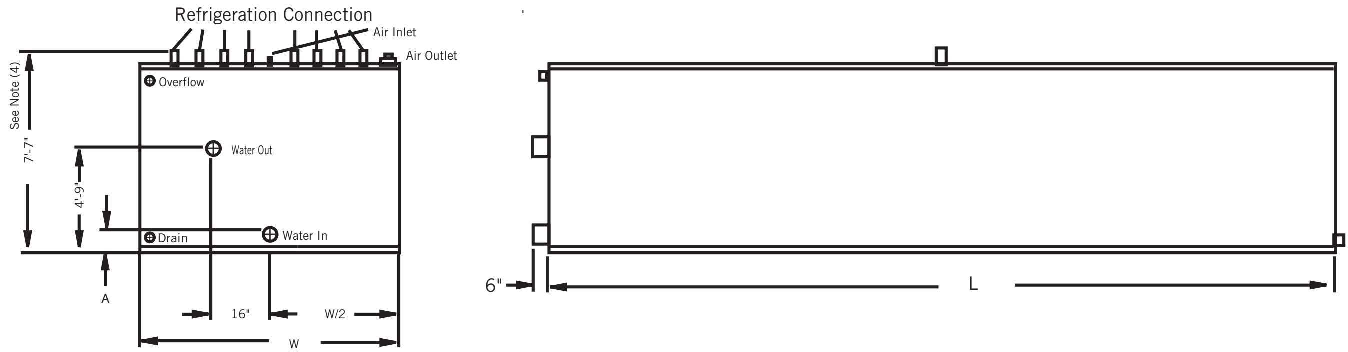
*18" On TSU-190E-365E; TSU-220F-420F
*16" On TSU-290E-505E; TSU-330F-580F

Model Number	LBS of Ice[2]		Approx. Shipping Weight (lbs)	Approx. Operating Weight (lbs)	Air Pump (HP)	Water Volume (gal)	Pull Down Volume (gal)	Coil Volume (ft^3)	R-717 Charge (lbs)[5]	Water Conn. In/Out	W	L	A
	Gravity Flooded	Pump Recirculated											
E Series													
TSU-190E	14,410	15,580	7,670	36,200	3	3,300	420	15	410	4”	7’-10 1/2”	10’-1”	5”
TSU-230E	17,580	18,910	8,740	43,200	3	4,000	510	17	465	4”	7’-10 1/2”	12’-1”	5”
TSU-280E	20,910	22,490	9,700	50,200	3	4,700	600	19	515	4”	7’-10 1/2”	14’-1”	5”
TSU-320E	24,240	25,910	11,120	57,700	3	5,400	700	22	600	4”	7’-10 1/2”	16’-0”	5”
TSU-365E	27,570	29,240	12,100	64,500	3	6,100	800	24	650	6”	7’-10 1/2”	18’-0”	6”
TSU-290E	21,740	23,490	9,950	53,400	3	5,040	640	21	570	6”	9’-9 3/8”	12’-1”	6”
TSU-345E	25,820	27,820	11,200	62,000	3	5,920	760	23	625	6”	9’-9 3/8”	14’-1”	6”
TSU-395E	29,900	32,070	12,900	71,300	3	6,800	860	26	705	6”	9’-9 3/8”	16’-0”	6”
TSU-450E	33,990	36,150	14,050	80,000	3	7,080	980	29	790	6”	9’-9 3/8”	18’-0”	6”
TSU-505E	37,980	40,070	14,700	88,600	3	8,550	1090	32	870	6”	9’-9 3/8”	20’-0”	6”
F Series													
TSU-220F	16,410	17,660	8,040	36,500	3	3,290	60	16	435	4”	7’-10 1/2”	10’-1”	5”
TSU-265F	20,240	21,490	9,150	43,600	3	3,990	70	19	515	4”	7’-10 1/2”	12’-1”	5”
TSU-320F	23,990	25,660	10,180	50,600	3	4,680	90	21	570	4”	7’-10 1/2”	14’-1”	5”
TSU-370F	27,660	29,400	11,700	58,100	3	5,380	100	24	650	4”	7’-10 1/2”	16’-0”	5”
TSU-420F	31,400	33,240	12,730	65,100	3	6,070	110	26	705	6”	7’-10 1/2”	18’-0”	6”
TSU-330F	24,990	26,820	10,460	53,900	3	5,020	95	23	625	6”	9’-9 3/8”	12’-1”	6”
TSU-395F	29,650	31,740	11,780	62,510	3	5,890	110	26	705	6”	9’-9 3/8”	14’-1”	6”
TSU-455F	34,150	36,240	13,430	71,800	3	6,770	130	29	790	6”	9’-9 3/8”	16’-0”	6”
TSU-515F	38,820	40,980	14,650	80,500	3	7,640	140	32	870	6”	9’-9 3/8”	18’-0”	6”
TSU-580F	43,480	45,570	15,370	89,200	3	8,520	160	35	950	6”	9’-9 3/8”	20’-0”	6”

NOTE: See notes on previous page.

TSU (E, F & G) Engineering Data

NOMINAL 10' WIDE UNITS (CONTINUED): MODELS TSU-590E TO TSU-1080E AND TSU-675F TO TSU-1230F

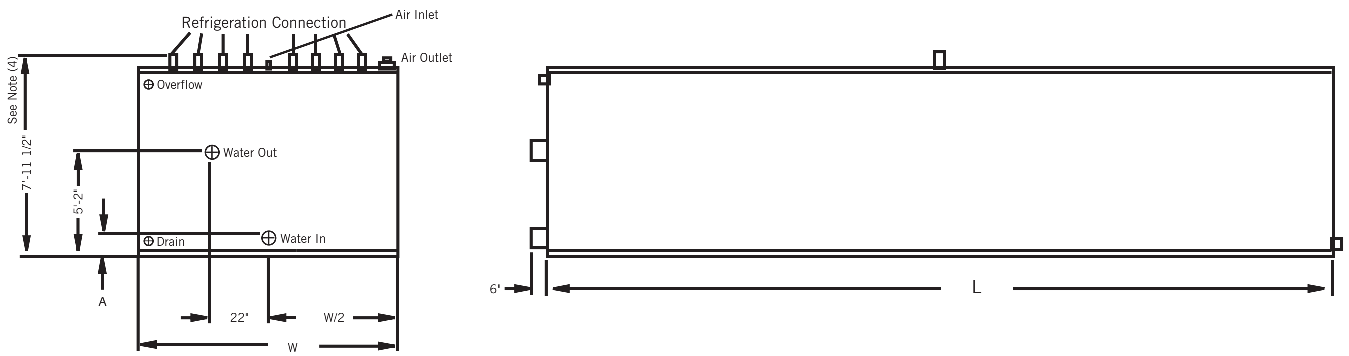


Model Number	LBS of Ice[2]		Approx. Shipping Weight (lbs)	Approx. Operating Weight (lbs)	Air Pump (HP)	Water Volume (gal)	Pull Down Volume (gal)	Coil Volume (ft³)	R-717 Charge (lbs)[5]	Water Conn. In/Out	W	L	A
	Gravity Flooded	Pump Recirculated											
E Series													
TSU-590E	44,650	48,150	18,200	106,900	3	10,240	1,320	42	1,140	6"	9'-9 3/8"	23'-11"	6"
TSU-700E	52,560	56,560	20,820	124,500	3	12,030	1,540	47	1,275	6"	9'-9 3/8"	27'-11"	6"
TSU-810E	60,730	64,890	24,300	144,400	5	13,790	1,760	53	1,440	8"	9'-9 3/8"	31'-10"	7"
TSU-910E	68,890	73,220	26,600	160,200	5	15,540	1,990	58	1,575	8"	9'-9 3/8"	35'-10"	7"
TSU-1080E	80,630	85,130	30,060	186,200	5	18,180	2,330	67	1,820	8"	9'-9 3/8"	41'-9"	7"
F Series													
TSU-675F	51,150	54,980	19,240	107,900	3	10,200	190	46	1,250	6"	9'-9 3/8"	23'-11"	6"
TSU-800F	60,140	64,220	21,960	125,600	3	11,980	230	52	1,410	6"	9'-9 3/8"	27'-11"	6"
TSU-920F	69,470	73,800	25,380	143,700	5	13,700	260	59	1,600	8"	9'-9 3/8"	31'-10"	7"
TSU-1040F	78,891	83,300	27,820	161,300	5	15,480	290	65	1,765	8"	9'-9 3/8"	35'-10"	7"
TSU-1230F	92,460	96,130	31,460	187,500	5	18,100	340	74	2,010	8"	9'-9 3/8"	41'-9"	7"

NOTES:

1. All dimensions are in feet and inches. Weights are in pounds.
2. Pounds of ice capacity is based on R-717. For other refrigerants, consult your BAC Representative.
3. Dimensions showing location of connections are approximate and should not be used for prefabrication of connecting piping.
4. Dimension is installed height. Coils are capped for shipping and storage. Add 3 inches for shipping height.
5. Refrigerant charge listed is operating charge for gravity flooded system at 15°F (-9°C). For other feed systems, consult your BAC Representative.
6. ICE CHILLER® Thermal Storage Units should be continuously supported on a flat level surface.

NOMINAL 12’ WIDE UNITS:
MODELS TSU-840F TO TSU-1520F AND TSU-940G TO TSU-1710G



Model Number	LBS of Ice[2]		Approx. Shipping Weight (lbs)	Approx. Operating Weight (lbs)	Air Pump (HP)	Water Volume (gal)	Pull Down Volume (gal)	Coil Volume (ft³)	R-717 Charge (lbs)[5]	Water Conn. In/Out	W	L	A
	Gravity Flooded	Pump Recirculated											
F Series													
TSU-840F	62,980	68,310	24,120	146,500	5	14,240	1,800	55	1,490	8”	11’-9”	23’-11”	7”
TSU-990F	74,470	80,470	26,900	170,000	5	16,650	2,100	63	1,710	8”	11’-9”	27’-11”	7”
TSU-1140F	85,880	92,960	31,460	200,600	5	19,080	2,320	71	1,925	8”	11’-9”	31’-10”	7”
TSU-1290F	97,380	105,210	34,340	218,800	5	21,500	2,710	78	2,115	8”	11’-9”	35’-10”	7”
TSU-1520F	114,540	123,280	38,660	254,400	5	25,150	2,900	90	2,440	8”	11’-9”	41’-9”	7”
G Series													
TSU-940G	70,890	75,970	25,440	147,700	5	13,960	280	61	1,655	8”	11’-9”	23’-11”	7”
TSU-1110G	83,880	89,630	28,340	171,400	5	16,350	330	70	1,900	8”	11’-9”	27’-11”	7”
TSU-1280G	96,880	102,380	33,220	196,900	5	18,730	380	79	2,145	8”	11’-9”	31’-10”	7”
TSU-1450G	109,540	114,790	36,260	220,600	5	21,110	420	87	2,360	8”	11’-9”	35’-10”	7”
TSU-1710G	129,120	132,700	40,820	256,400	5	24,690	490	100	2,710	8”	11’-9”	41’-9”	7”

NOTES:

1. All dimensions are in feet and inches. Weights are in pounds.
2. Pounds of Ice Capacity is based on R-717. For other refrigerants, consult your BAC Representative.
3. Dimensions showing location of connections are approximate and should not be used for prefabrication of connecting piping.
4. Dimension is installed height. Coils are capped for shipping and storage. Add 3 inches for shipping height.
5. Refrigerant charge listed is operating charge for gravity flooded system at 15°F (-9°C). For other feed systems, consult your BAC Representative.
6. ICE CHILLER® Thermal Storage Units should be continuously supported on a flat level surface.

Engineering Considerations – Refrigeration

Suitable For: Industrial Refrigeration, Process Cooling, and Batch Cooling

For industrial applications, stored cooling using ICE CHILLER® Thermal Storage Units provides many opportunities for savings: smaller compressors and likewise smaller system components and electrical equipment; shifting or leveling of energy usage peaks; and efficient use of equipment. Also, since ice storage systems are sized to operate primarily at full capacity, compressor wear from capacity adjustment is minimized, providing maintenance savings over the life of the compressor. Stored cooling from ICE CHILLER Thermal Storage Units supplies consistently low temperature water, making it appropriate for daily and/or infrequent cooling loads in many industrial processes such as:

- Bakeries
- Dairies
- Breweries, Wineries, Distilleries
- Chemical/Plastics Manufacturers
- Laboratories
- Food Product Cooling
- Bottling Process
- Vegetable/Fruit Cooling

PRINCIPLE OF OPERATION

The basic ice storage system includes an ICE CHILLER Thermal Storage Unit, a refrigeration system, and ice water pump as shown in **Figure 10**.

When no cooling load exists, the refrigeration system operates to build ice on the outside surface of the coil. This refrigeration effect is provided by feeding refrigerant directly into the coil. To increase the heat transfer during the ice build cycle the water is agitated by air bubbles from a low pressure air distribution system beneath the coil. When the ice has reached design thickness, BAC's exclusive ICE-LOGIC™ Ice Thickness Controller sends a signal to turn off the refrigeration system.

When chilled water is required for cooling, the ice water pump is started, and the meltout cycle begins. Warm water returning from the load circulates through the ICE CHILLER Thermal Storage Unit and is cooled by direct contact with the melting ice. During this cycle, the tank water is agitated to provide more uniform ice melting and a constant supply water temperature of 34°F (1˚C) to 36°F (2˚C).

For a closed chilled water loop, see **Figure 11**. With this system, warm return water from the load is pumped through a heat exchanger and cooled by the ice water circuit from the ICE CHILLER Thermal Storage Unit.

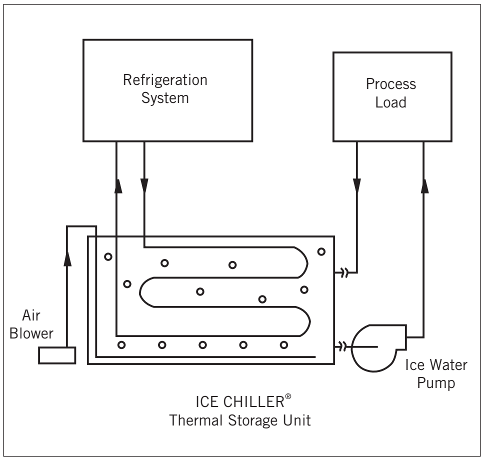


Figure 10

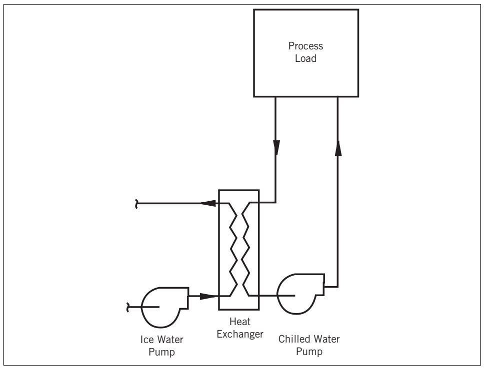


Figure 11

Energy Efficient Design

The ICE CHILLER® Thermal Storage Unit coils are designed for efficient energy use in building ice and constant leaving water temperatures during the meltout cycle.

Compared to traditional ice builders used in the past for industrial refrigeration, the ICE CHILLER Thermal Storage Unit design with its smaller diameter coil circuits and thinner ice (**Figure 12**) results in more evaporator surface per ton-hour of latent storage. Ice builds to a thin 2.0 inches, which results in more than a 16% gain in refrigeration system efficiency by permitting compressor operation at higher suction pressures.

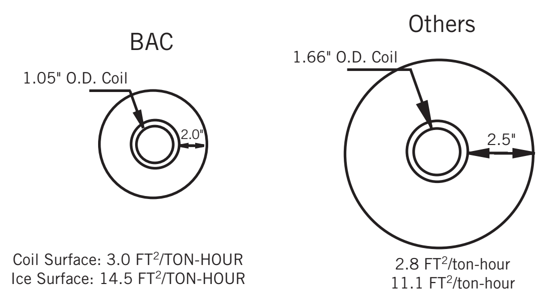


Figure 12

The ICE CHILLER Thermal Storage Unit is specifically designed to provide consistent 34- 36°F supply water temperatures throughout the melt cycle. Two keys to maintaining this consistently low temperature are an extensive ice surface area and direct contact of the water to be cooled with the ice. As shown in **Figure 12**, the unique BAC coil design provides over 30% more ice surface than traditional designs. This provides a greater surface area for the warm return water to come into direct contact, making consistent cold temperatures available throughout the entire melt cycle.

The ICE CHILLER Thermal Storage Unit is designed for efficient operation with either of two liquid refrigerant feed systems: gravity flooded with surge drum or pumped recirculation. With either arrangement, liquid refrigerant is supplied to the coils at a rate several times greater than that required to satisfy the load. This excess flow rate thoroughly wets the entire internal surface of the coil, assuring high heat transfer coefficients throughout to efficiently utilize the entire coil surface for ice building.

Engineering Considerations – Refrigeration

System Design Flexibility

The system design involving an ICE CHILLER® Thermal Storage Unit can range from full storage to partial storage of the cooling load requirements.

- **Full Storage** – With full storage, the ICE CHILLER Thermal Storage Unit generates and stores ice to handle the entire cooling load. The refrigeration system operates to build the ice only during no-load periods when utility rates are usually lowest. This design offers the maximum energy cost savings, but requires the largest ice storage capacity and refrigeration system.
- **Partial Storage** – A partial storage system builds ice during no-load periods as with the full storage system. However, the refrigeration system continues to operate during the cooling load period. The compressor operation supplements the stored cooling capacity of the ICE CHILLER Thermal Storage Unit to satisfy the cooling requirements. Since a portion of the cooling requirement is supplied by the refrigeration system, a partial storage system will require less storage capacity.
- **Parallel Chilled Water Evaporator** – The most common type of partial ice storage is the parallel evaporator system. During the melt cycle, cooling is provided by the refrigeration system to a separate evaporator for direct water chilling. By using a separate evaporator, the refrigeration system gains system efficiency from operation at higher suction pressures.

  The refrigeration system will operate continuously during full design load. At less than full load the compressor operates only as needed to supplement the ICE CHILLER Thermal Storage Unit. When the load is less than 50% of design, this system can operate in the full storage mode. Systems which often operate at part load can benefit most from a partial system with equipment sizes typically over 50% smaller than required for full storage. For additional information on ICE CHILLER Thermal Storage Units and their system design options consult your BAC Representative.
- **System Load** – The system load is the amount of cooling capacity that must be generated and stored, expressed in ton-hours or Btu. (1 ton-hour = 12,000 Btu = 83.3 pounds of ice). This load is equal to the area under the typical system load profile curve **(Figure 13).**

Thermal Storage Unit Selection

Full Storage

1. From the system load profile (**Figure 13**) establish the required system cooling capacity in ton-hours. This is the ton-hours of storage required.
2. Determine the build time, which is the number of hours with no load that is available for ice building. If less than ten (10) hours, consult your BAC Representative.
3. For a gravity flooded ammonia feed system, continue the selection with the gravity flooded procedure on **pages G30** and **G31**. For a pump recirculated ammonia feed system, continue the selection with the pump recirculated procedure on **pages G31** and **G32**.

Parallel Chilled Water Evaporator Partial Storage

1. From the system load profile (**Figure 13**), establish the required system cooling capacity in ton-hours and the number of hours this cooling is needed.
2. Determine the cooling capacity in tons of the compressor operating with the parallel evaporator (**Figure 14**) during the cooling load hours established in Step 1.
3. Multiply the cooling capacity of the compressor operating with parallel evaporator found in Step 2 times the number of cooling load hours found in Step 1. This gives the capacity in ton-hours that will be handled by direct refrigeration during the cooling period.
4. Subtract the direct cooling ton-hours found in Step 3 from the total system cooling capacity found in Step 1. This is the storage capacity in ton-hours that are required in ice storage.
5. Determine the build time, which is the number of hours with the compressor dedicated to ice building. If less than ten hours, consult your local BAC Representative.
6. For gravity flooded ammonia feed system, continue the selection with the gravity procedure on **pages G30** and **G31**. For a pump recirculated ammonia feed system, continue the selection with the pump recirculated procedure on **pages G31** and **G32**.

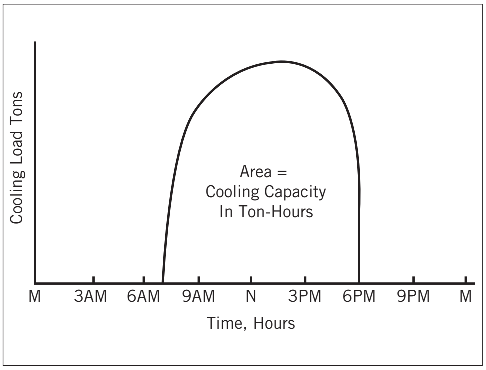


Figure 13

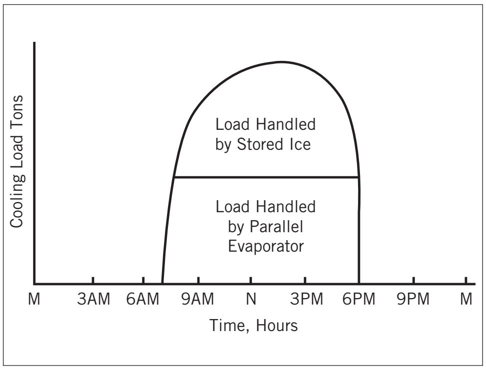


Figure 14

Unit Selection - Ammonia

SELECTION PROCEDURE – GRAVITY FLOODED

1. Enter **Table 2** and read down the base ton-hours column to the capacity which meets or exceeds the ton-hours of storage required. Select either an E, F, or G series unit. (Units are grouped by tank width in **Table 2**. Refer to **pages G22** thru **G25** for unit dimensions.)
2. Read the selected unit from the model number column on the left.
3. Calculate the Storage Factor for the selected unit.

$$\frac{\text{Base Ton-Hours}}{\text{Ton-Hours of Storage Required}} = \text{Storage Factor}$$

4. Using the Storage Factor from Step 3 and the available build time, enter **Table 3** to find the design evaporator temperature.
5. Determine the design compressor capacity in tons.

$$\frac{\text{Ton-Hours of Storage Required}}{\text{Build Time (hrs)}} = \text{Compressor Tons}$$

6. Using the design conditions from Steps 4 and 5, select a compressor. (Note: The evaporator temperature must be adjusted for the system suction line losses to arrive at the compressor saturated suction temperature.)
7. Once the compressor has been selected, use the compressor manufacturer's heat rejection data to size a BAC Evaporative Condenser or Cooling Tower.

EXAMPLE: Gravity Flooded Ammonia

Given: 16,700 lbs ice required storage capacity, 14 hours available build time

To get ton-hours of storage required:

$$\frac{\text{16,700 lbs ice required storage capacity}}{\text{83.3 lbs ice per Ton-Hour}} = \text{201 Ton-Hours}$$

1. Enter the base ton-hours column of **Table 2** and find 211 ton-hours, which is the smallest value that meets or exceeds the 201 ton-hours of storage required.
2. Read to the left to find the selected model number, in this case a TSU-230E.
3. Calculate the Storage Factor.

$$\frac{\text{211 Ton-Hours of Storage Required}}{\text{201 Ton-Hours of Storage Required}} = 1.05$$

4. Using the Storage Factor of 1.05 from Step 3 and the build time of 14 hours, enter **Table 3** to find the design evaporator temperature of 19.9°F.
5. Calculate the design compressor capacity.

$$\frac{\text{201 Ton-Hours of Storage Required}}{\text{14 Hours of Build Time}} = \text{14.4 Tons}$$

6. Based on the design evaporator conditions of 14.4 tons at a 19.9°F evaporator temperature (17.9°F saturated suction temperature, with 2.0°F estimated suction line losses), select an ammonia refrigerant compressor.
7. Select a BAC Evaporative Condenser or Cooling Tower to match the compressor manufacturer's heat rejection requirements.

APPLICATION NOTES:

1. To use the selection procedures, the ton-hours of storage capacity required and the available build time must first be known. For guidance on estimating these values refer to the TSU selection on **page G29** or contact your local BAC Representative.
2. The evaporator temperatures for each build time are "average" values. During the build cycle, the temperature will initially be about 8°F (-13˚C) above the "average" and gradually drop through the cycle to about 4°F (-15˚C) below the "average" when full ice is reached. Throughout the cycle the refrigeration system should be allowed to run fully loaded. Reciprocating and rotary screw compressors are suitable for this duty. If in doubt about the use of a particular compressor, review the application with the compressor manufacturer.
3. The capacities of all BAC ICE CHILLER® Thermal Storage Units are based on latent storage (ice) only. The temperature of the water supplied from the storage tank for most system designs will be 34°(-1˚C) - 36°F (-2˚C) throughout the latent storage discharge (melt) cycle. For specific system design requirements, contact your local BAC Representative.
4. For selections based on other refrigerants, contact your local BAC Representative.
5. These procedures assume that no system cooling load occurs while ice is being formed. For ICE CHILLER Thermal Storage Unit selections involving systems with continuous cooling loads consult your local BAC Representative.

Table 2. Base Storage Capacity (ton-hours) For Gravity Flooded Ammonia Feed[1]

TSUE-Series Units		F-Series Units		F-Series Units	
Model Number	**Base Ton-Hrs**	**Model Number**	**Base Ton-Hrs**	**Model Number**	**Base Ton-Hrs**
TSU-125E	112	**TSU-145F**	128	**TSU-840F**	756
TSU-155E	137	**TSU-175F**	157	**TSU-990F**	894
TSU-180E	163	**TSU-205F**	186	**TSU-1140F**	1,031
TSU-210E	188	**TSU-240F**	215	**TSU-1290F**	1,169
TSU-235E	214	**TSU-270F**	244	**TSU-1520F**	1,375
TSU-190E	173	**TSU-220F**	197	**G-Series Units**	
TSU-230E	211	**TSU-265F**	243		
TSU-280E	251	**TSU-320F**	288		
TSU-320E	291	**TSU-370F**	332	**Model Number**	**Base Ton-Hrs**
TSU-365E	331	**TSU-420F**	377		
TSU-290E	261	**TSU-330F**	300	**TSU-940G**	851
TSU-345E	310	**TSU-395F**	356	**TSU-1110G**	1,007
TSU-395E	359	**TSU-455F**	410	**TSU-1280G**	1,163
TSU-450E	408	**TSU-515F**	466	**TSU-1450G**	1,315
TSU-505E	456	**TSU-580F**	522	**TSU-1710G**	1,550
TSU-590E	536	**TSU-675F**	614		
TSU-700E	631	**TSU-800F**	722		
TSU-810E	729	**TSU-920F**	834		
TSU-910E	827	**TSU-1040F**	947		
TSU-1080E	968	**TSU-1230F**	1,110		

SELECTION PROCEDURE – PUMP RECIRCULATED

1. Enter **Table 4** and read down the base ton-hours column to the capacity which meets or exceeds the ton-hours of storage required. Select either an E, F, or G Series unit. (Units are grouped by tank width in **Table 4**. Refer to **pages G22** thru **G25** for unit dimensions.
2. Read the selected unit from the model number column on the left.
3. Calculate the Storage Factor for the selected unit.

$$\frac{\text{Base Ton-Hours}}{\text{Ton-Hours of Storage Required}} = \text{Storage Factor}$$

4. Using the Storage Factor from Step 3 and the available build time, enter **Table 5** to find the design evaporator temperature.
5. Determine the design compressor capacity in tons.

$$\frac{\text{Ton-Hours of Storage Required}}{\text{Build Time (hrs)}} = \text{Compressor Tons}$$

6. Using the design conditions from Steps 4 and 5, select a compressor. Note: The evaporator temperature must be adjusted for the system suction line losses to arrive at the compressor saturated suction temperature.
7. Once the compressor has been selected, use the compressor manufacturer's heat rejection data to size a BAC Evaporative Condenser or Cooling Tower.

Table 3. Design Evaporator Temperature (°F) for Gravity Flooded Ammonia Feed[1]

Storage Factor	Build Time (hrs)				
	10	**11**	**12**	**13**	**14**
1.00	14.3	15.7	17.2	18.3	19.4
1.05	15.6	16.8	18.1	19.0	19.9
1.10	16.5	17.7	18.9	19.7	20.5
1.15	17.4	18.5	19.6	20.3	21.1
1.20	18.1	19.1	20.2	20.9	21.7
1.25	18.8	19.7	20.7	21.4	22.1
1.30	19.4	20.3	21.2	21.9	22.6

NOTE:

1. Interpolation between values is permitted, but extrapolation of values is not.

EXAMPLE: Pump Recirculated Ammonia

GIVEN: 700 ton-hours required storage, 11 hours available build time

1. Enter the base ton-hours column of **Table 4** and find 771 ton-hours, which is the smallest value that meets or exceeds the 700 ton-hours of storage required.
2. Read to the left to find the selected model number, in this case a TSU-800F.
3. Calculate the Storage Factor.
4. Using the Storage Factor of 1.10 from Step 3 and the build time of 11 hours, enter **Table 5** to find the design evaporator temperature of 17.7 °F.

$$\frac{\text{771 Base Ton-Hour}}{\text{700 Ton-Hours of Storage Required}} = 1.10$$

5. Calculate the design compressor capacity.

$$\frac{\text{700 Ton-Hours of Storage Required}}{\text{11 Hours Build Time}} = 63.6 \text{ Tons}$$

6. Based on the design evaporator conditions of 63.6 tons at a 17.7 °F evaporator temperature (15.7 °F saturated suction temperature, with 2.0 °F estimated suction line losses), select an ammonia refrigerant compressor.
7. Select a BAC Evaporative Condenser or Cooling Tower to match the compressor manufacturer's heat rejection requirements.

Unit Selection - Ammonia

Table 4. Base Storage Capacity (ton-hours) For Pump Recirculated Ammonia Feed[1]

E Series Units		F-Series Units		F-Series Units	
Model Number	Base Ton-Hours	Model Number	Base Ton-Hours	Model Number	Base Ton-Hours
TSU-125E	121	TSU-145F	138	TSU-840F	820
TSU-155E	147	TSU-175F	169	TSU-990F	966
TSU-180E	175	TSU-205F	199	TSU-1140F	1,116
TSU-210E	201	TSU-240F	228	TSU-1290F	1,263
TSU-235E	227	TSU-270F	258	TSU-1520F	1,480
TSU-190E	187	TSU-220F	212		
TSU-230E	227	TSU-265F	258		
TSU-280E	270	TSU-320F	308		
TSU-320E	311	TSU-370F	353		
TSU-365E	351	TSU-420F	399		
TSU-290E	282	TSU-330F	322		
TSU-345E	334	TSU-395F	381		
TSU-395E	385	TSU-455F	435		
TSU-450E	434	TSU-515F	492		
TSU-505E	481	TSU-580F	547		
TSU-590E	578	TSU-675F	660		
TSU-700E	679	TSU-800F	771		
TSU-810E	779	TSU-920F	886		
TSU-910E	879	TSU-1040F	1,000		
TSU-1080E	1,022	TSU-1230F	1,154		

G-Series Units	
Model Number	Base Ton-Hours
TSU-940G	912
TSU-1110G	1,076
TSU-1280G	1,229
TSU-1450G	1,378
TSU-1710G	1,593

Table 5. Design Evaporator Temperature (˚F) for Pump Recirculated Ammonia Feed[1]

Storage Factor	Build Time (hrs)				
	10	11	12	13	14
1.00	14.3	15.7	17.1	18.1	19.1
1.05	15.5	16.8	18.1	19.0	20.0
1.10	16.5	17.7	19.0	19.9	20.8
1.15	17.4	18.5	19.7	20.5	21.4
1.20	18.3	19.3	20.4	21.2	22.0
1.25	19.0	20.0	21.0	21.7	22.5
1.30	19.7	20.6	21.6	22.3	23.0

NOTE:

1. Interpolation between values is permitted, but extrapolation of values is not.