



ACME ENGINEERING & MANUFACTURING CORP.

P.O. Box 978 • Muskogee, OK 74402

918/682-7791 Fax: 918/682-0134

www.acmeag.com • www.acmehort.com

acmeag@acmefan.com • acmehort@acmefan.com

Form 610938

August 2016

OWNERS MANUAL • INSTALLATION INSTRUCTIONS

MODEL CSEG6

TOTALLY ENCLOSED SYSTEM

6" Kool-Cel[®] Closed Stainless Steel Top With Extruded Gutter Cooling System

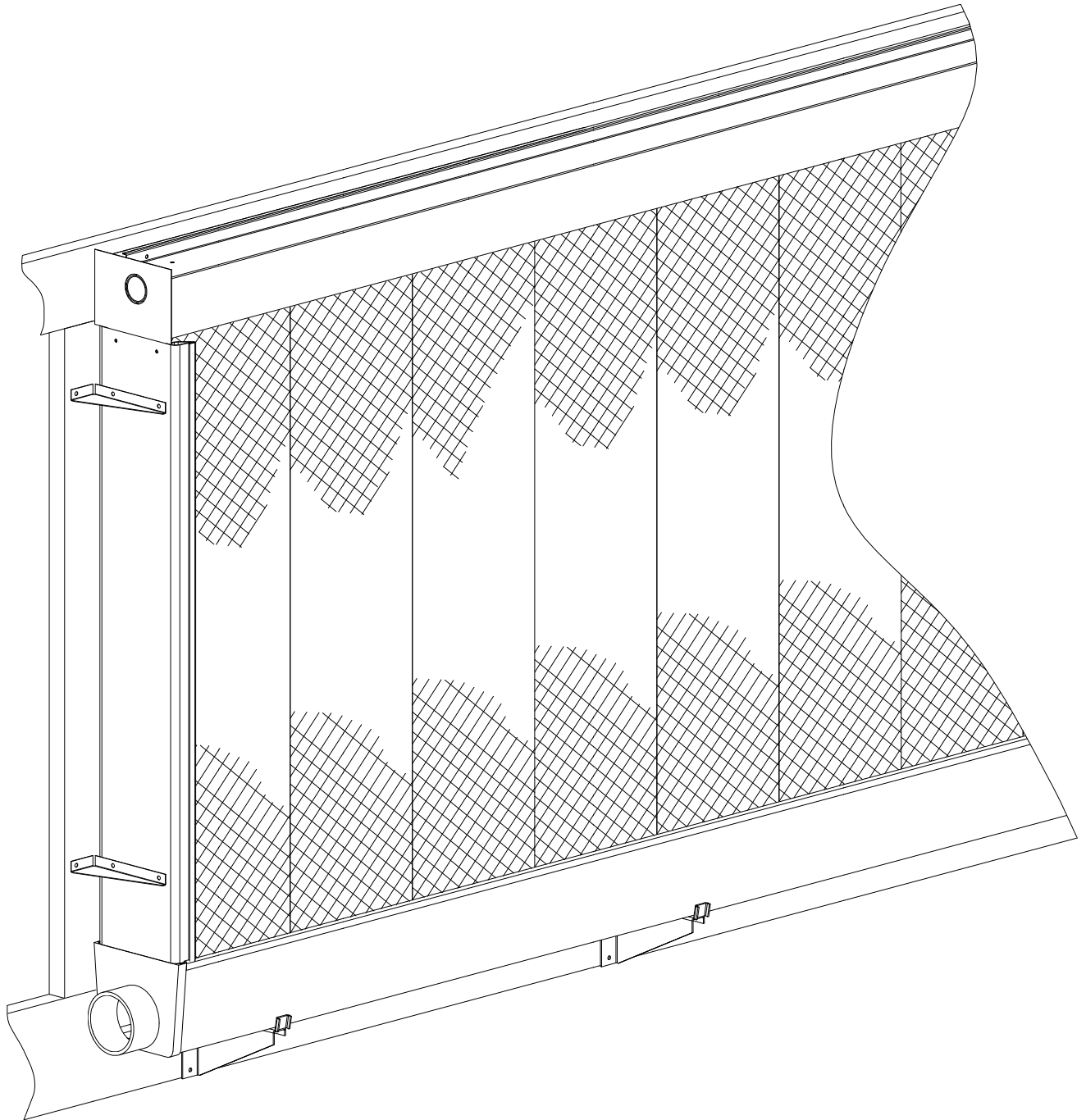


TABLE OF CONTENTS

Section	Page
I. WARNING	2
II. Components	2-3
III. Typical Specifications	3
IV. Building Preparation	4-7
V. System Installation	7-16
V. Tall Pad Supports	16
V. System End Cover Installation	16
V. Bleed-Off Water	17
V. In-Line Tank Assembly	18
V. Plumbing Installation	19
VI. Exploded Drawing of System	20
VII. Extruded Gutter In-Line Tank	21
VIII. Start Up and Testing	22
IX. Maintenance	22-23
X. Pad Care	23-24
Notes	25
Warranty	26

I. **WARNING**

Please read and save these instructions. Read carefully before attempting to assemble, install, operate, or maintain the product described. Protect yourself and others by observing all safety information and procedures. This includes wearing safety glasses when handling chemicals involved in the assembly of these components. Failure to comply with instructions could result in personal injury and/or property damage. Retain instructions for future reference.

II. **Components**

- A. Store all material in a clean dry area prior to installation.
- B. Standard Kool-Cel[®] components provided by Acme:
 - 1. Kool-Cel[®] pads 6" thick x 12" wide x 24", 36", 48", 60" or 72" high.
 - 2. Water Pump 20S or 70S.
 - 3. Distribution and return system. Available in 1-foot increments up to 109 feet in length. Includes distribution pipe, top assembly, pad support assembly, extruded gutter, and support brackets.

4. In-Line transition tank for mounting circulating pump and water valve includes plumbing completer kit.
 5. Float Valve.
- C. Optional Kool-Cel[®] Components provided by Acme upon request:
1. Wrap-Around kit for adapting In-Line tank to mount in the middle of the system.
 2. Plumbing Completer Kit for adapting to user-supplied retention tank.
 3. Tall Pad Supports.
- D. Provided By Owner or Others:
1. Framing material.
 2. Water Supply to float valve.
 3. Drain for bleed-off water.
 4. Flashing material.

III. Typical Specifications:

A. **Description:**

1. The CSEG6 provides the equipment necessary to mount facing either inside or outside of the building wall and operate an evaporative cooling system with 6-inch pad media.

B. **Construction:**

1. The gutter shall be extruded UV resistant PVC capable of being assembled into a watertight reservoir located under the pad media.
2. All metal parts shall be either stainless steel or aluminum where applicable for durability.
3. System shall include heavy duty, stainless steel gutter mounting brackets for use with a wall-mounted gutter.
4. The Kool-Cel[®] system is capable of either floor or wall mounting.
5. Shall be designed for use with 6-inch high-efficiency KOOL-CEL[®] coated or uncoated pads.

C. **PVC Gutter:**

1. The PVC gutter shall have UV inhibitors.
2. The PVC gutter shall serve as storage tank.

D. **Recirculation System:**

1. The submerged pump shall be located in a transition tank.
2. The transition tank shall be placed at either end or in the middle using the wrap around kit.
3. The recirculation system shall include a #24-mesh in-line filter to reduce particles, which could clog the distribution pipe.
4. A bleed-off tube shall allow for continual refreshment of re-circulated water.
5. Fresh water shall be supplied by way of a Rojo or Topaz water valve.
6. KOOL-CEL[®] kit shall include plumbing parts needed to complete the water recirculation system.

E. **Warranty:**

System shall be covered by a 2 year limited warranty.

F. Product:

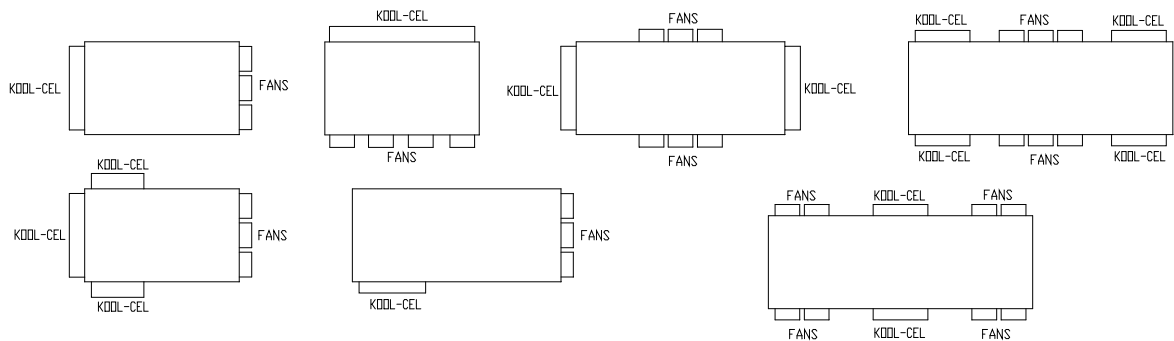
Evaporative cooling system shall be Model CSEG6 as manufactured by Acme Engineering and Manufacturing Corporation of Muskogee, Oklahoma.

G. Because of constantly changing development research, Acme must reserve the right to change specifications without notice.

IV. Building Preparation:

A. Wood used in conjunction with a Kool Cel system should be treated for wet area usage. Any place where aluminum can come in contact must be insulated to prohibit aluminum from contacting the treated wood surface. All hardware should be stainless steel or an approved material for use with treated wood.

B. **Location of Pad System:** Typical Pad/Fan Relative



Locations

The Kool-Cel® pad should be placed away from the fans (opposite) so that the cooled air can flow through the building without turbulence as shown in Figure 1. Pads should be no more than 250 feet from the fans in greenhouse buildings to avoid excessive temperature rise and velocities.

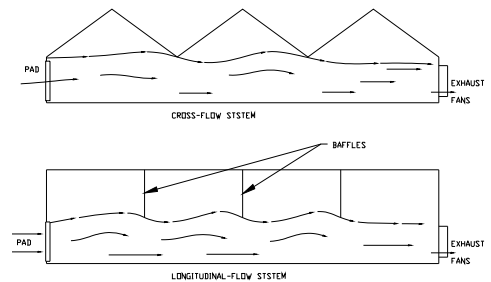


Figure 1

In a **greenhouse**, the top of the pad should be near the top of the crop or have its midpoint centered on the midpoint of the crop. The system is normally placed on the inside of the inlet wall.

In **poultry and livestock** installations, the pad is generally placed on the outside of the building. An eave extending beyond the CSEG6 Kool-Cel® system is recommended.

The pump electrical power should be run to the location of the transition tank. The water supply for makeup water should be positioned at the side of the transition tank.

A drain for the bleed-off water should be located at the location of the bleed-off tube. The bleed-off water should be 1% to 2% of the circulating water. Bleed-off is mandatory for system longevity.

C. Framed Opening and Sizes

Note: The sidewall structural members should be left intact. This document defines the structure needed for the correct mounting of the Kool Cel system and does NOT include any structure needed for the support of the greenhouse or livestock buildings. In modifying an existing structure, no supporting members should be changed without consulting a qualified engineer.

D. Stringers Wall Mounted or Floor Mounted – The framing and support stringers could be any type of material (metal channels, square tubing, treated wood, etc.). The design should provide a flat surface for mounting support brackets and the lower stringer and for wall mounted systems should be capable of carrying a load of (5 lbs. plus 6.3 lbs. / ft. of pad height) per running foot of system. Any wood used around the Kool Cel® system should be treated wood. The framed opening must be vertical and square for proper installation of the system. The use of a chalk line or laser level during stringer installation will aid in keeping the system square.

Framed opening and structural details for wall mounted systems with wood framing

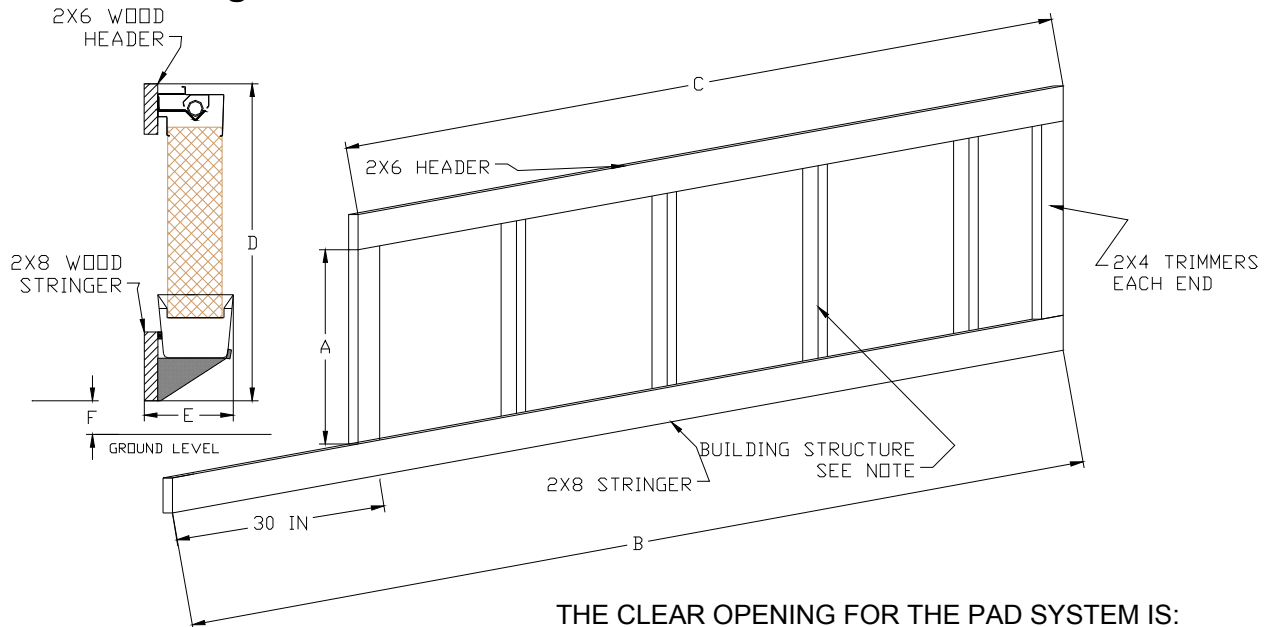


Figure 2
(Framed Opening Layout-Wall Mount
with Wood Structure)

THE CLEAR OPENING FOR THE PAD SYSTEM IS:

- A. (Vertical) = Ordered pad height + 1 1/2 inches.
- B. (Horizontal) = Ordered pad length + 1/2 Inch for each 10 ft of gutter + 34 inches for the In-Line tank and trimmers.
- C. Header length = Pad length plus the width of the two trimmers
- D. Overall system height = Ordered pad height plus 14 1/2 inches.
- E. Width = 9 7/8 inches.
- F. Can be Zero.

A 3/4 by 7/8 inch Foam Gasket Tape is supplied to seal between the wood Stringer and the extruded gutter. This will be positioned in Section V.

The 26 inch of the 30 inches on the end is for the In-Line tank and can be placed on either end. If a center tank adaptor is used the 26 inches may be eliminated.

Framed opening and structural details for wall mounted systems with metal framing

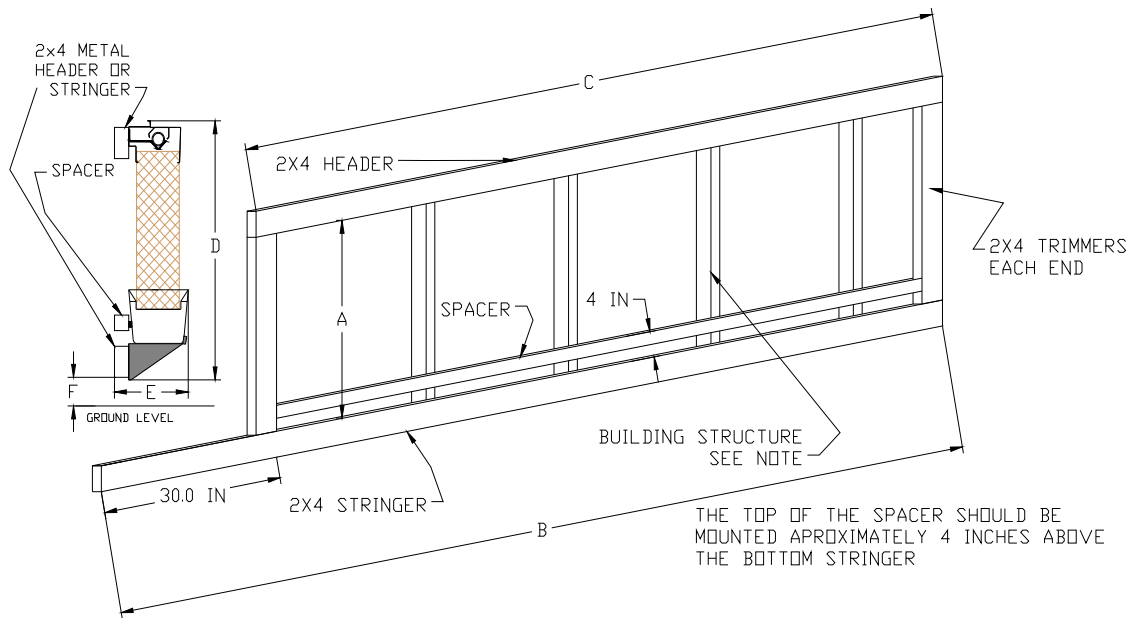


Figure 3
(Framed Opening Layout-Wall Mount with Metal Structure)

THE CLEAR OPENING FOR THE PAD SYSTEM IS:

- A. (Vertical) = Ordered pad height + 6 1/4 inches.
- B. (Horizontal) = Ordered pad length + 1/2 inch for each 10 ft of gutter + 34 inches for the In-Line tank and trimmers.
- C. Header length = Pad length plus the width of the two trimmers.
- D. Overall system height = Ordered pad height plus 14 1/4 inch.
- E. = 10 3/8 inches.
- F. = 1/2 inch Minimum.

The Header and Spacer may be C channel. The Stringer should be sufficient to support the weight specified in Section C above. The surface of the Header, Spacer, and Stringer must be in the same vertical plane.

The Spacer is used to hold the gutter assembly in place against the gutter support bracket. A 3/4 by 7/8 inch Foam Gasket Tape is supplied to seal between the Spacer and the extruded gutter. This will be positioned in Section V. The system should be flashed (supplied by customer) between the Spacer and the Inlet system.

The 26 of the 30 inches on the end is for the In-Line tank and can be placed on either end. If a center tank adaptor is used the 26 inches may be eliminated.

Framed opening and structural details for floor mounted systems

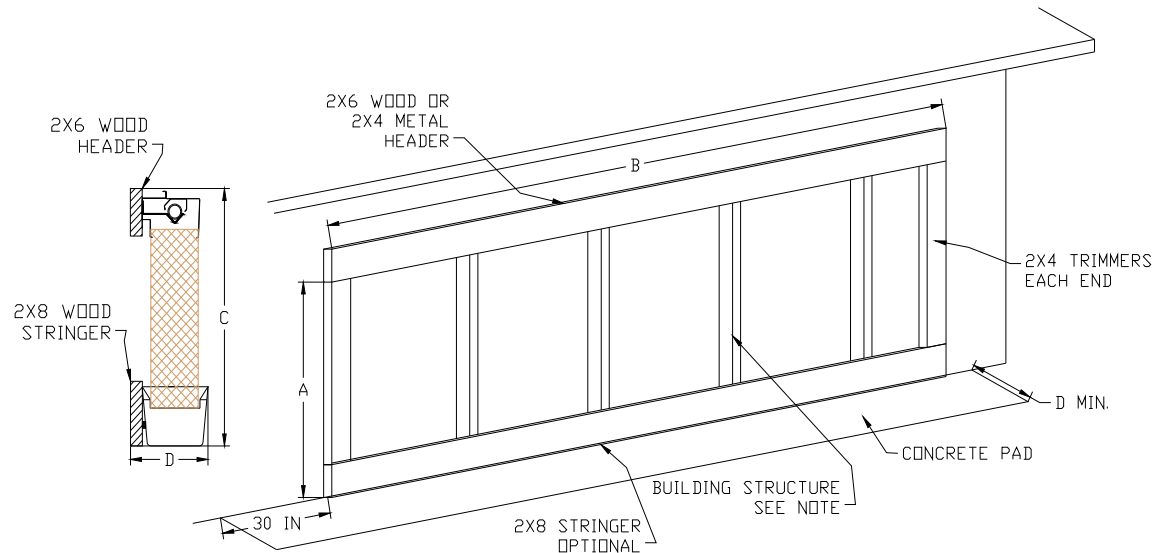


Figure 4
(Framed Opening Layout-Floor Mount
with Wood or Metal Structure)

THE CLEAR OPENING FOR THE PAD SYSTEM IS:

- A. (Vertical) = Ordered pad height + 4 1/2 inches.
- B. (Horizontal) = Ordered pad length plus the width of the individual trimmers.
- C. Overall system height = Ordered pad height + 9 7/8 inch.
- D. = 9 7/8 inch.

The concrete pad should be level and reasonably smooth.

E. **Extruded Gutter In-Line Tank Placement** see page 21

V. System Installation

After installing all framing materials, the Kool-Cel® distribution and return system will go together simply and quickly by following the instructions systematically.

1. **Framing** -If framing is not properly installed as shown in the Installation Instructions, the system will not operate properly. Refer to Section IV B and Figure 2 through 4 and verify the framing has been installed accurately.

2. **Caulking** - Where the installation instructions refer to caulking, use the Butylgrip caulking supplied with the CSEG6 System unless otherwise specified.
3. **Packages** - Place all cartons in the area of installation and open the top of the cartons. **Do not remove the material until needed.** NOTE: The packing slips and Installation and Maintenance Instructions should be retained for future reference.

A. Gutter Bracket Installation

1. Gutter Support Bracket-Wall Mount Wood Stringer

To locate the gutter support bracket position on the bottom stringer for the extruded gutter, refer to chalk line shown in Figure 5. The chalk line should be 3 3/4 Inches from the bottom of the stringer and run its full length. The chalk line will be used to locate the top hole position of the gutter brackets. Hole spacing is shown in Figure 5. The bottom stringer should be designed to hold up the weight as defined in Section IV paragraph C. The top header supports very little of the Kool Cel[®] weight.

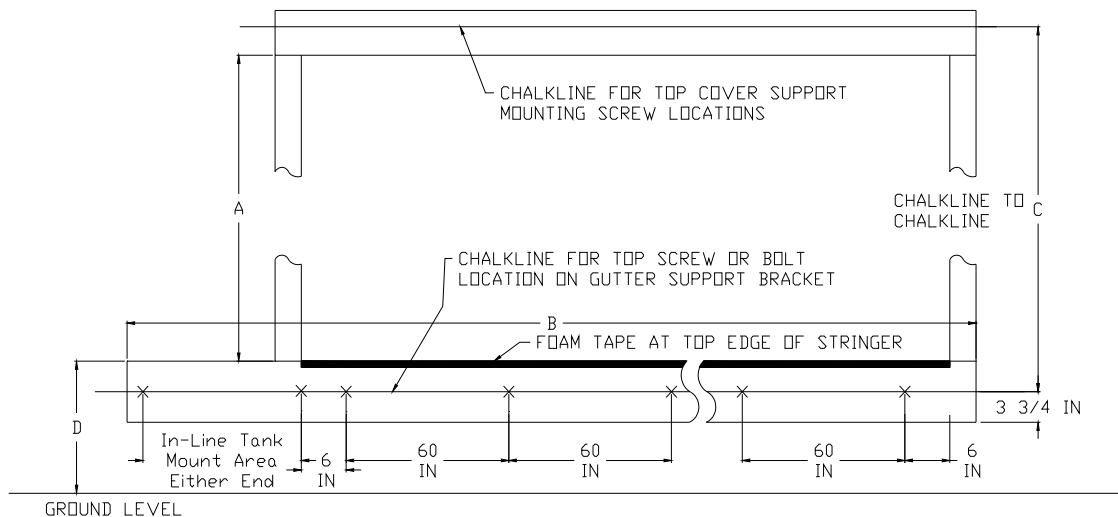


Figure 5
Gutter Mounting Wood Stringer

- A. (Vertical) = Ordered Pad Height + 1 1/2 inches.
- B. (Horizontal) = Ordered pad length + 1/2 inches for each 10 ft of gutter + 34 inches for In-Line tank and trimmers.
- C. = Ordered Pad Height plus 8 3/4 inches.
- D. Minimum dimension is 7 1/2 inches.
(Ground level to top of lower stringer.)

2. Gutter Support Bracket-Wall Mount Metal Stringer

To locate the gutter support bracket position on the bottom stringer for the extruded gutter, refer to chalk line shown in Figure 5. The chalk line should be 3 1/2 Inches from the bottom of the stringer and run its full length. The chalk line will

be used to locate the top hole position of the gutter brackets. Hole spacing is shown in Figure 6. The bottom stringer should be designed to hold up the weight as defined in Section IV paragraph C. The spacer and the top header is designed to support very little of the Kool Cel[®] weight.

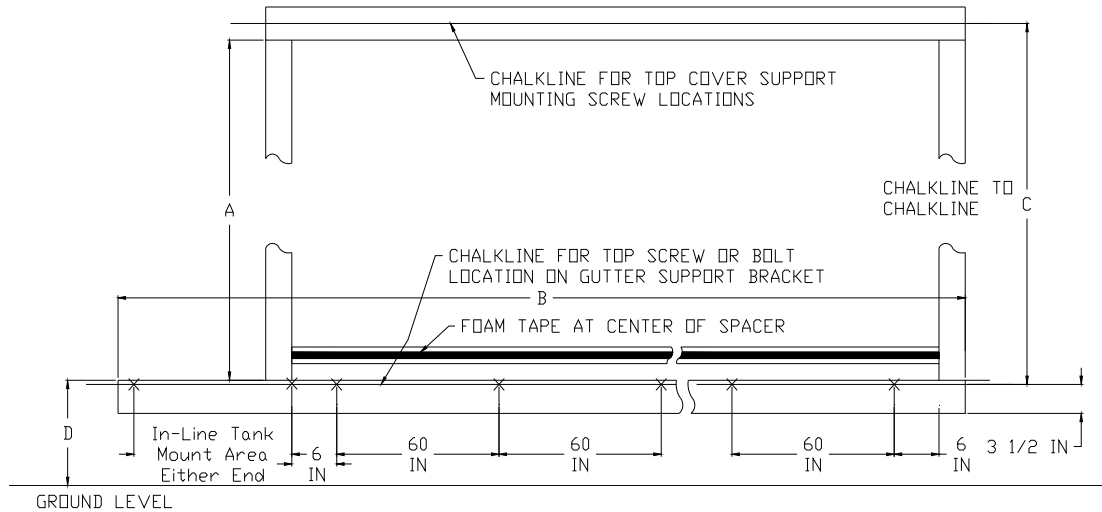


Figure 6
Gutter Mounting Metal Stringer

- A. (Vertical) = Ordered Pad Height + 6 1/4 inches.
- B. (Horizontal) = Ordered pad length + 1/2 inches for each 10 ft of gutter + 34 Inches for In-Line tank and trimmers.
- C. = Ordered Pad Height plus 8 3/4 inch.
- D. Minimum dimension is 7 1/2 inch.
(Ground level to top of lower stringer.)

Locate the gutter support brackets. Install all gutter support brackets as shown in Figure 7, making sure brackets are vertical. Note: The bracket's top hole should be on the chalk line. Lag screws are shown. They are to be used if going into the 2x8 material at a 4x4 post location. If going into the stringer at a location other than the 4x4 post, use the 1/4" x 2 1/2" stainless steel bolts, washers and nuts.

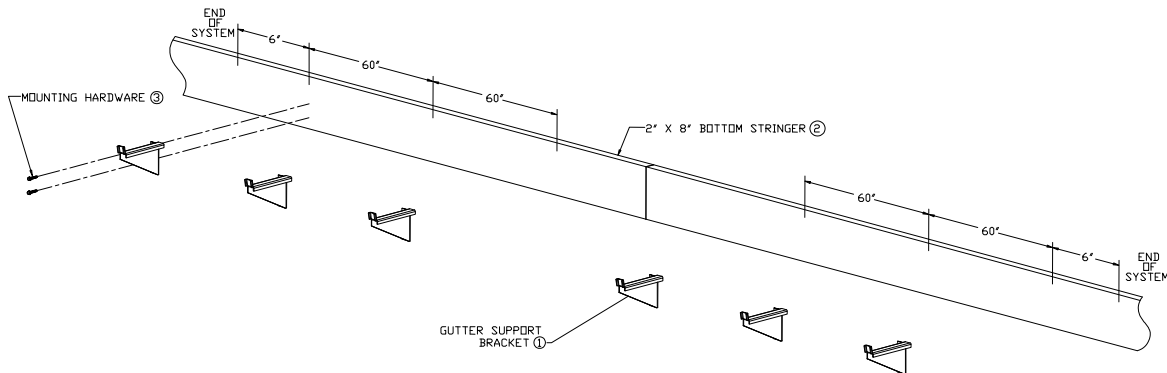


Figure 7
Gutter Mount

3. Gutter Positioning Bracket-Floor Mount

- a. To locate the extruded Kool-Cel[®] floor bracket position on the bottom stringer or wall studs in the absence of stringers for the extruded gutter, refer to placement shown in Figure 8 and 9. The top hole should be 2 inches from the bottom of the stringer or concrete pad. Hole spacing is shown in Figure 8 and Figure 9.

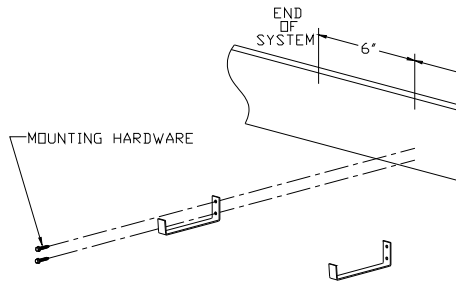


Figure 8

When mounting on a bottom stringer, attach the gutter positioning brackets starting 6 inches from the end of the gutter and space the brackets every 5 to 7 feet. The brackets sit on the concrete slab and are used to position the gutter under the Kool-Cel[®] top.

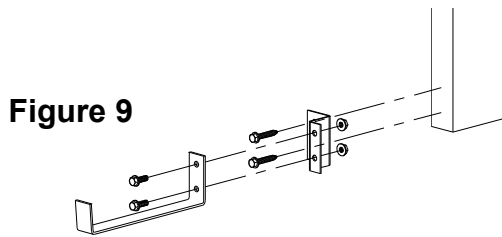


Figure 9

When not using a bottom stringer, mount the gutter-positioning bracket to the spacer supplied with the Floor Mount Kit. These are then attached to the structure every 5 to 7 feet. These assemblies should start at the first opportunity from the end of the gutter. The spacer is designed to allow for a 1 1/2 inch stringer. If the width is different, an additional spacer should be fabricated. The spacer should be attached to the same frame member that the stringer is attached to.

- b. The top chalk line should be run on the top header spaced from the concrete pad. The distance should be the pad height plus 9 3/4 inches. This chalk line is used to mount the Kool-Cel[®] top.

B. Gutter Installation

1. All PVC joints must be cleaned with PVC cleaner prior to any assembly. Follow instructions on PVC cleaner can. This step is required to obtain watertight joints. All PVC material must be clean and dry prior to the application of PVC cement.

2. Gutter sections are designed to be 1/2 inch longer per 10 ft. This will allow for an expansion and contraction of the PVC as compared to the pad media. **This**

extra length should never be trimmed off and where possible spaced to equally extend beyond the pads on each end of the Kool Cel[®] system.

3. Locate the gutter sections and lay them out along the length of the framed opening (see Figure 10 to identify gutter parts).
4. Locate the gutter end caps and gutter connectors as shown in Figure 10.

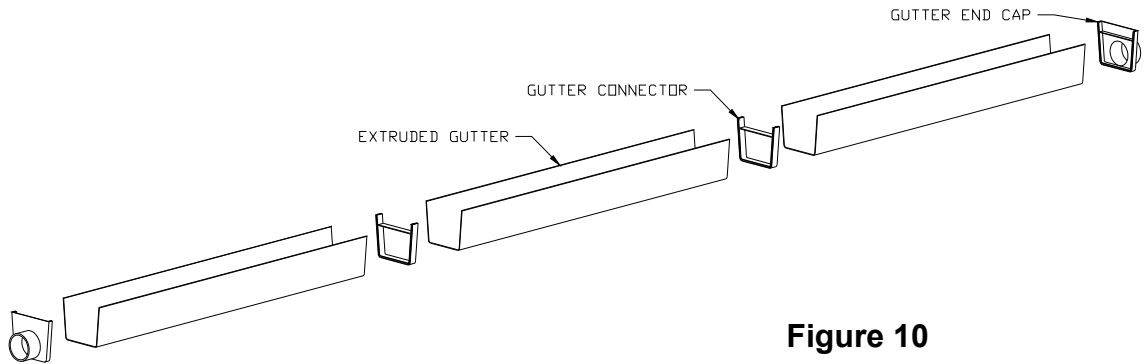


Figure 10

5. Locate the Paste PVC Cement tubes supplied with the system. Cut the tube tip as close to the end as possible to leave a small hole in the end. Apply the Paste PVC Cement to the gutter end cap by completely filling the groove of the end cap as shown in Figure 11. **Wear EYE protection.** Do not allow the PVC cement to form a film prior to coupling the parts together. Once the cement is applied immediately join the parts.

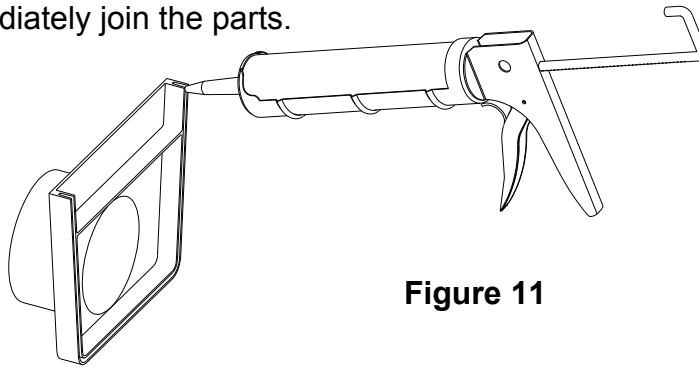


Figure 11

6. After filling the groove in the end cap with Paste PVC Cement, place a section of gutter into the groove of the end cap. Make sure the gutter section is in the end cap as far as possible (see Figure 12) and hold to allow for initial set up of the cement (approximately 1 to 2 minutes).

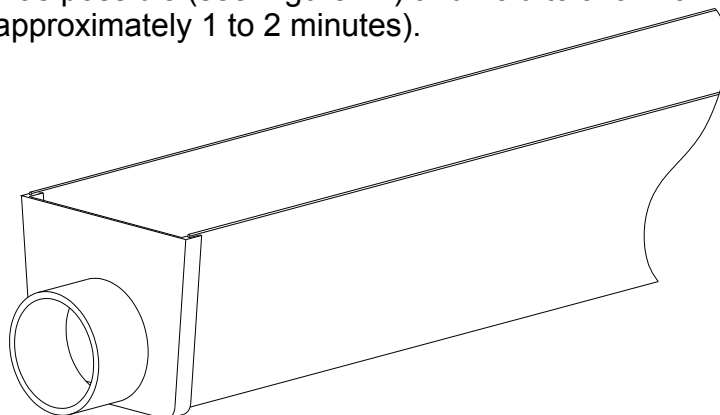


Figure 12

7. Using the Paste PVC Cement, apply the cement to one of the gutter connectors by completely filling the groove of the gutter connector. Place a section of gutter into the groove of the gutter connector. Make sure the gutter section is in the gutter connector as far as possible (see Figure 13) and hold to allow for initial set up of the cement (approximately 1 to 2 minutes)
8. Repeat step 6 until all gutter connectors are installed. Do not connect the gutter sections until step 9.

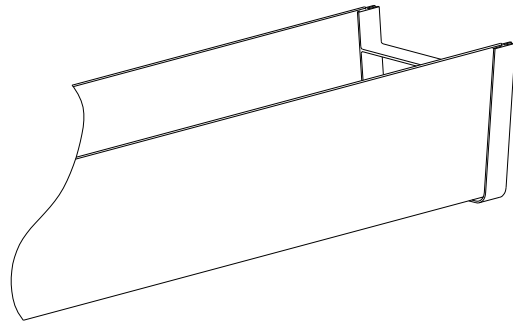


Figure 13

9. Care should be taken when working with the sections with the end caps and gutter connectors installed. The joints will be fragile until their full cure time. Place the first gutter section with end cap and gutter connector into the gutter brackets as shown in Figure 14. Apply the Paste PVC Cement to the gutter connector on the end of the gutter section. Place the next section of gutter into the gutter brackets and into the groove of the gutter connector. Make sure the gutter section is in the gutter connector as far as possible (see Figure 13) and hold to allow for initial set up of the cement.

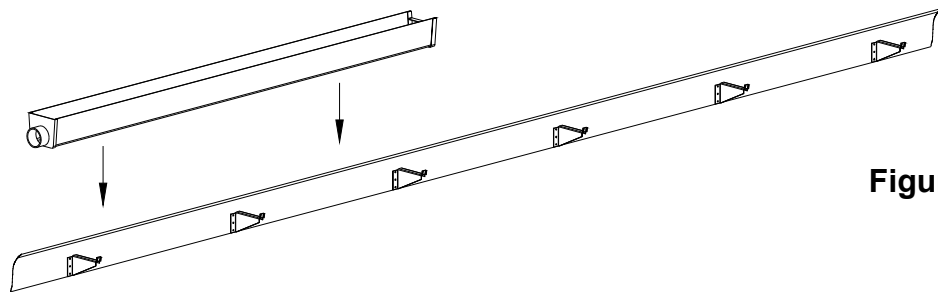


Figure 14

10. Repeat the process of connecting the gutter sections until all gutter sections have been installed. See Figure 15.

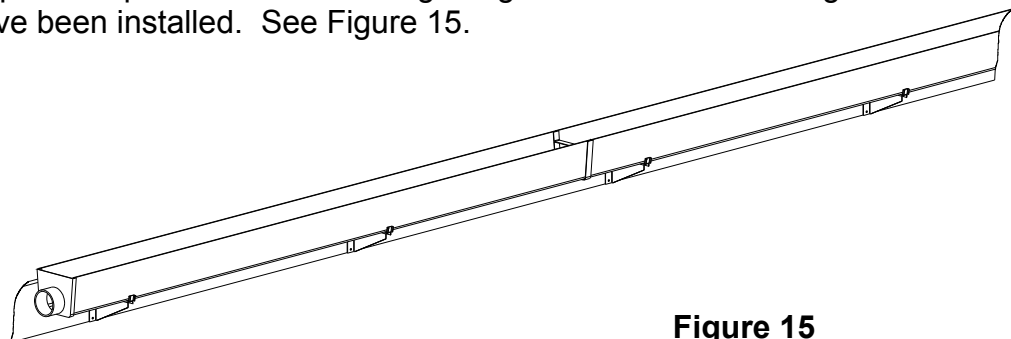


Figure 15

11. Space the gutter so that the excess gutter is equally spaced on each side of the pad area.
12. Locate the pad supports install them on the gutter assembly as shown in Figure 16.

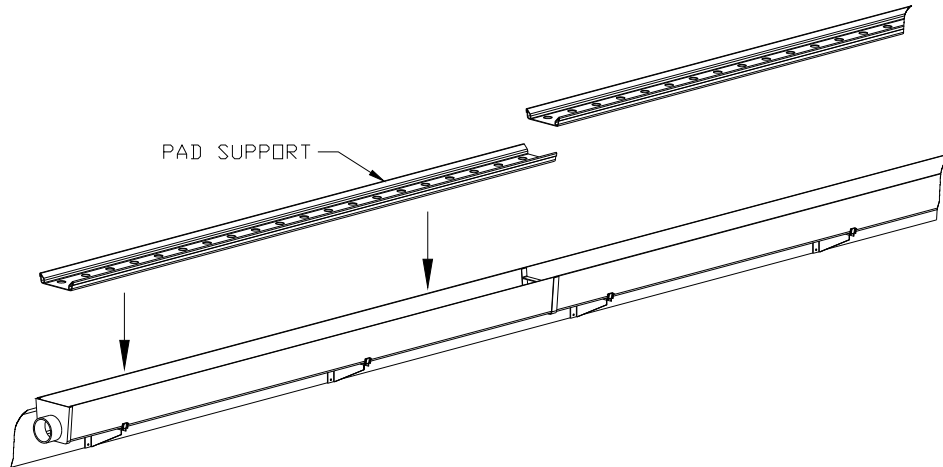


Figure 16

13. Allow the Paste PVC Cement to cure for 2 hours before adding the pads or end caps. If installing the system in temperatures below 40 degrees Fahrenheit, curing time will be much longer.
14. Install the 4-inch rubber pipe cap and clamp on the assembled gutter. The cap should seal the gutter end opposite the tank.

C. System Top Installation

1. Beginning at the pump end of the system, locate the position of the end of the system (see figure 15) and install the top cover support sections and the pipe hangers to the top stringer by lining up the top holes of the Top Cover Support sections with the chalk line (refer to Figure 5 and Figure 6) on the top stringer.

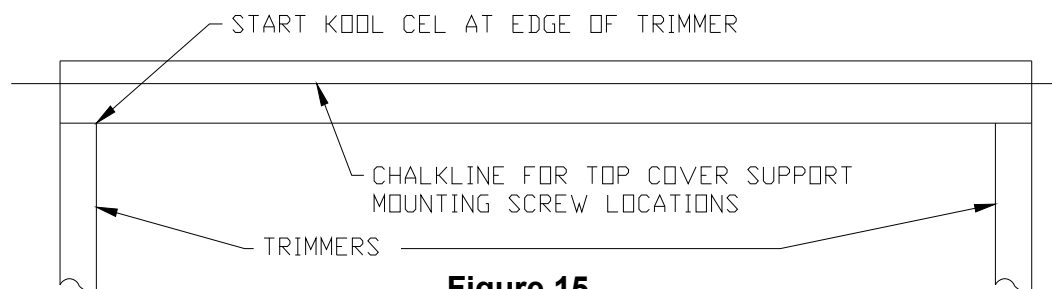
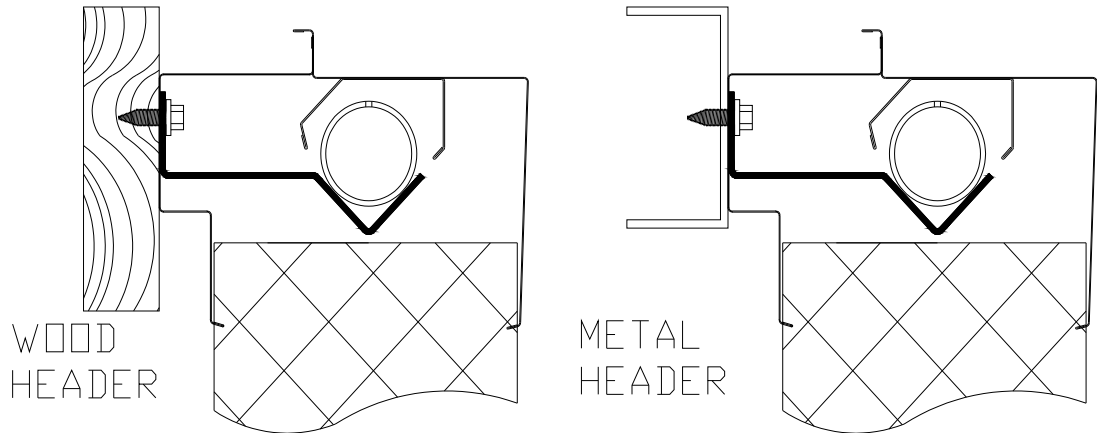


Figure 15

- Attach the hangers and the top cover support sections to the stringers with $\frac{1}{4}$ " x $1\frac{1}{2}$ " hex head screws as shown in Figure 16.



- Caulk the seams between the top cover support sections as shown in Figure 17.

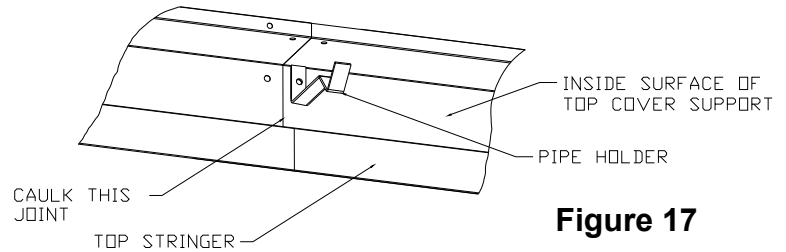


Figure 17

- Center the top cover connectors over each seam and attach with #10 x $\frac{1}{2}$ " screws.

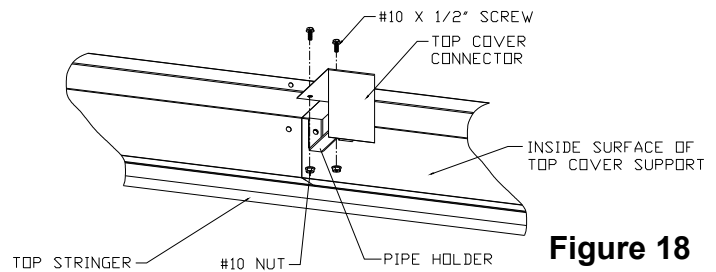


Figure 18

- Place a 10' section of $1\frac{1}{2}$ " pipe **WITH THE METERED HOLES UP** into the pipe hangers at the pump end of the Kool-Cel[®] system. Enough pipe should extend beyond the top cover support as shown in Figure 23 to later attach a PVC pipe connector for plumbing installation.

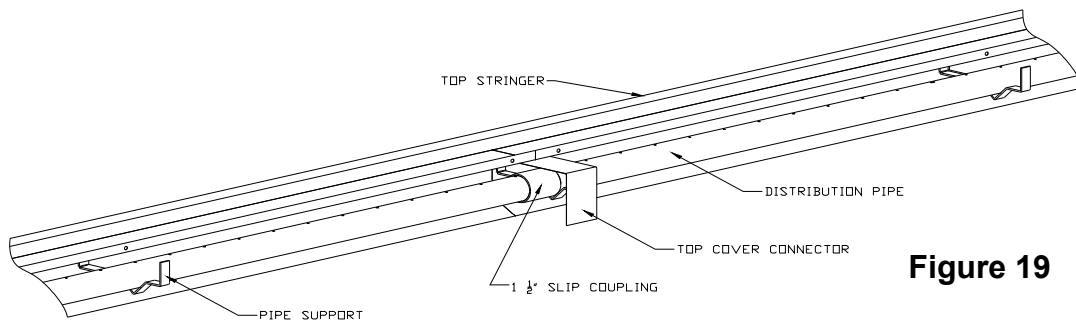


Figure 19

6. Install a 1 ½” slip joint coupling to the end on the pipe opposite the pump and assemble another 10’ section of pipe. **DO NOT USE PVC CEMENT ON THESE JOINTS.** The coupling and pipe should be pushed tightly together **BUT NOT CEMENTED. MAKE SURE THE METERED HOLES ARE AT THE TOP SO THE WATER WILL SPRAY DIRECTLY UPWARD FOR PROPER WATER DISTRIBUTION.**
7. Install the remaining pipe using the 1 ½” coupling (no cement), always making certain that the metered holes point directly upward. Again, the pipe should extend beyond the opposite end to later attach a 1 ½” tee for installation of the bleed-off and clean-out assembly.

D. Top/Pipe Cover and Pad Installation

Note: Install the pads before installing the top cover. (Installing pads with the top cover in place could result in pad damage and “springing” of the top cover which could result in improper channeling of the water).

1. Locate the Top Covers and the Pipe Covers. If not already assembled together, then assemble per Figure 20.

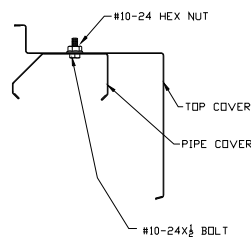


Figure 20

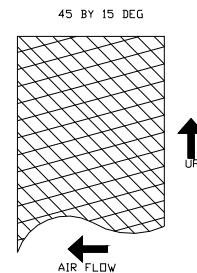
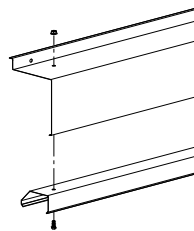


Figure 21

2. Place the bottom of the pad firmly on the drip collector and under the pipe. If the flute angles are not symmetrical then follow the arrows on the pad edge.
3. Beginning at the pump end of the Kool-Cel[®] system, install the end section of the top cover assembly with #10-24 x ½” bolts and Tinnerman Clips provided.
4. Continue installing top/pipe cover sections until complete. Top cover connectors should match the joints of the top/pipe cover sections to prohibit leaks between the joints.

- NOTE: Pad width is not always 12 inches. The last pad should not be installed at the end and may need to be trimmed to fit easily into the available space. Place at least two pads into the end of the system leaving room for the last pad as shown in Figure 22. To install the last pad, measure the opening for the last pad and trim to fit the opening. DO NOT force the last pad into a space that is smaller than the pad.

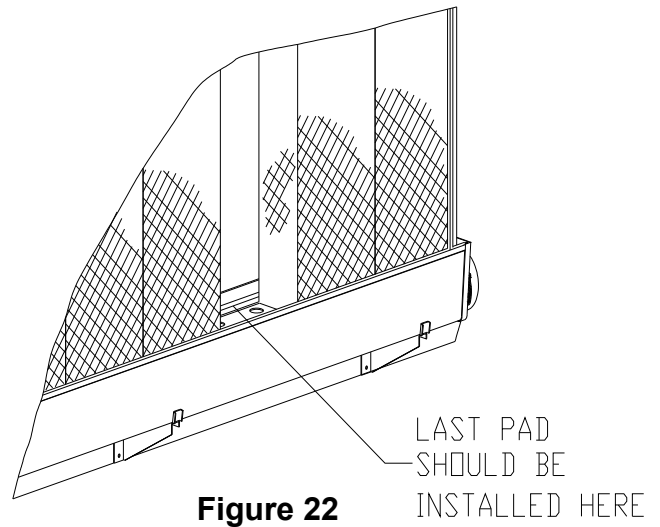


Figure 22

E. System End Cover Installation

- Install a 2"x 4" trimmer in the wall mounted between the top header and bottom stringer with the inside of the 2"x 4" at the end of the Kool-Cel® system as shown in Figure 23. The system end covers fit over the end pad and attach to the 2"x 4" filler using the ¼ by 1 ½ inch stainless steel Slotted Hex Head Screws.
- Caulk the area around the pipe on the system end cover as shown in Figure 23 to eliminate any water leakage.

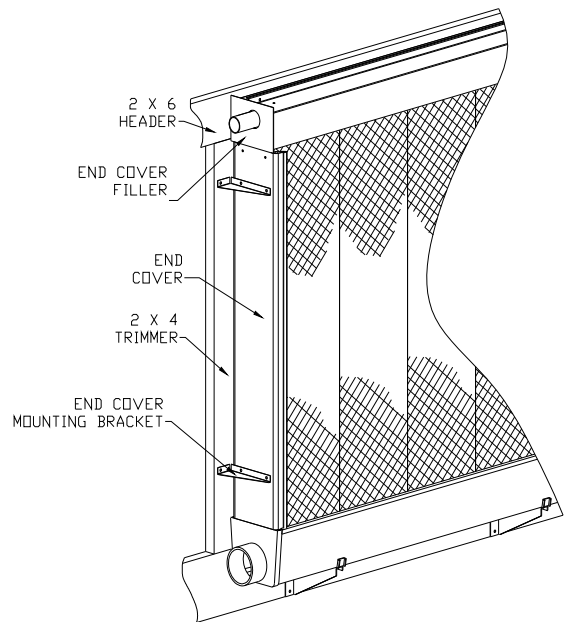


Figure 23

F. Bleed-Off Assembly Installation

Locate the bleed-off end opposite the supply line (or drain). Locate the parts outlined in Table 1 and install in as shown (Figure 24). Cement the pipe and fittings but **DO NOT** cement the threads of the female adapter or the male threads of the plugs. Allow at least one-hour drying time for the cement.

ITEM	DESCRIPTION	QTY
1	1-1/2" Tee	1
2	2'4" Piece of 1-1/2" Pipe	1
3, 6	1-1/2" Female Adapter	2
4	1-1/2" Plug	1
5	Short piece of 1-1/2" Pipe	1
6	See Above	
7	1-1/2" plug set with bleed-off tube fitting	1
8	Bleed-off Tube	1

TABLE 1

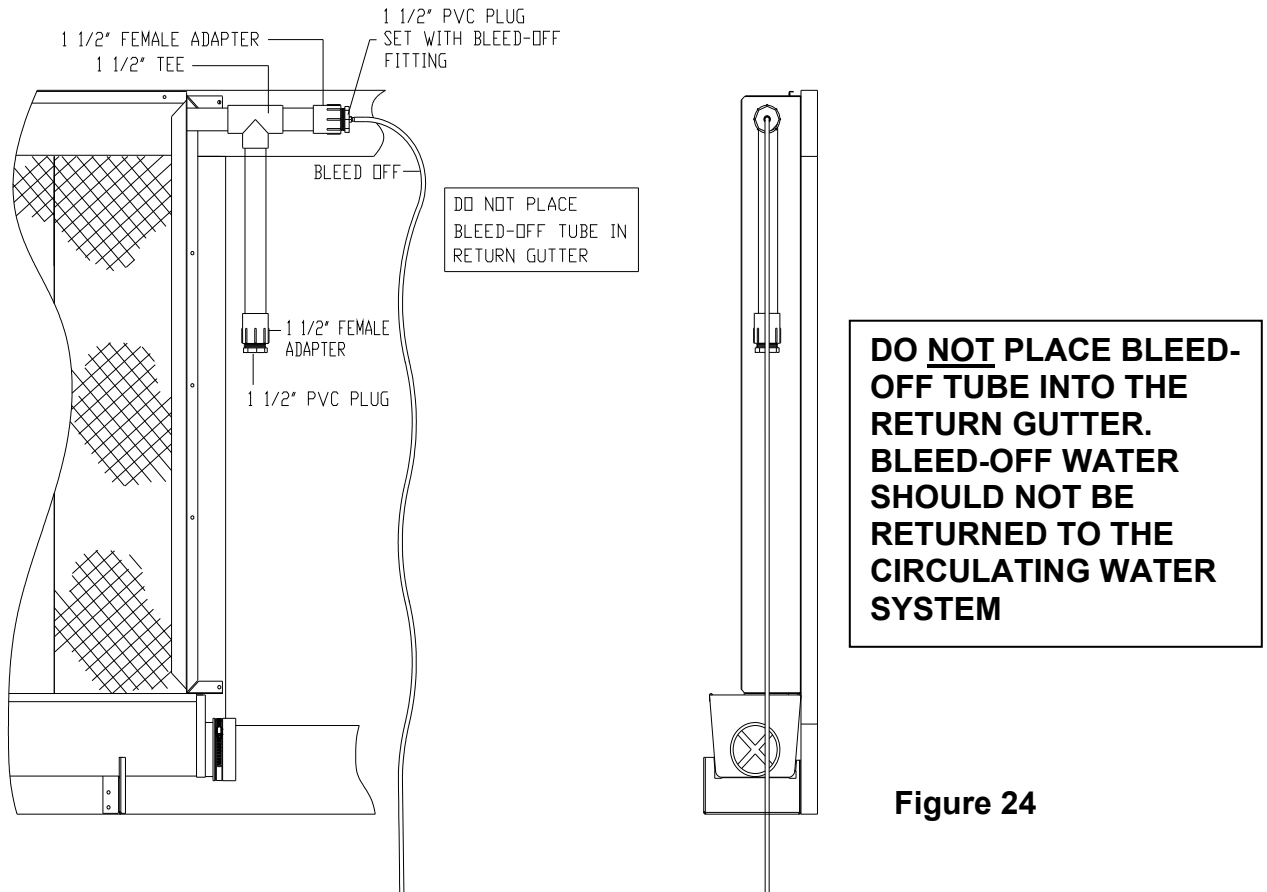


Figure 24

G. In-Line Tank Assembly

1. Please verify the parts in the In-Line tank kit are as shown in Figure 25 and Table 1.

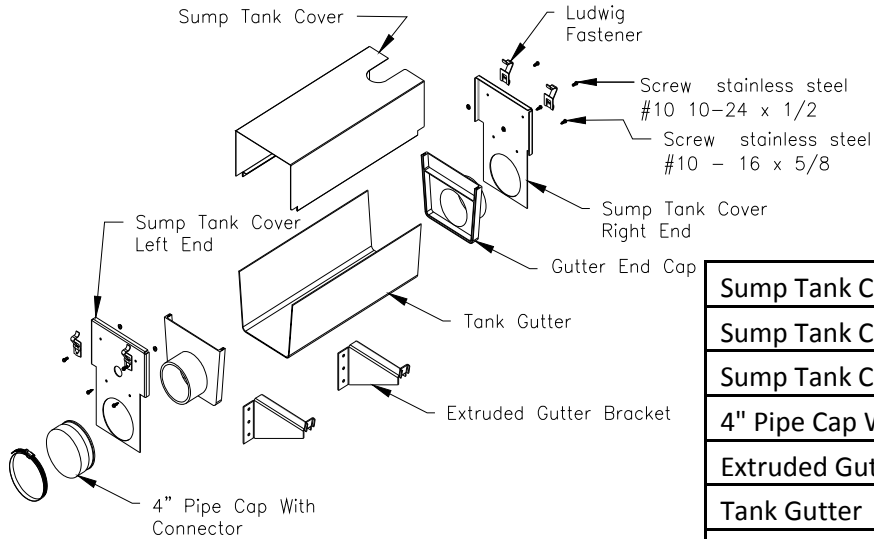


Figure 25

Table 1

Sump Tank Cover	580090
Sump Tank Cover Right End	980091
Sump Tank Cover Left End	980092
4" Pipe Cap With Connector	993491
Extruded Gutter Bracket	670637
Tank Gutter	993493
Gutter End Cap	993426
Ludwig Fastener	941377

2. Clean the PVC joints with PVC cleaner.
3. Apply the Paste PVC Cement to the gutter end cap by completely filling the groove of the end cap as shown in Figure 26. **Wear EYE protection.** Afix the gutter ends to the tank gutter.

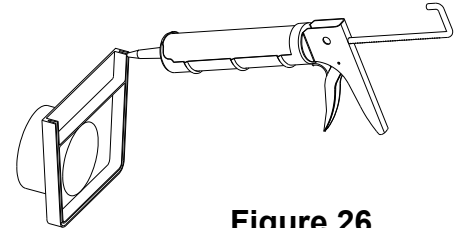
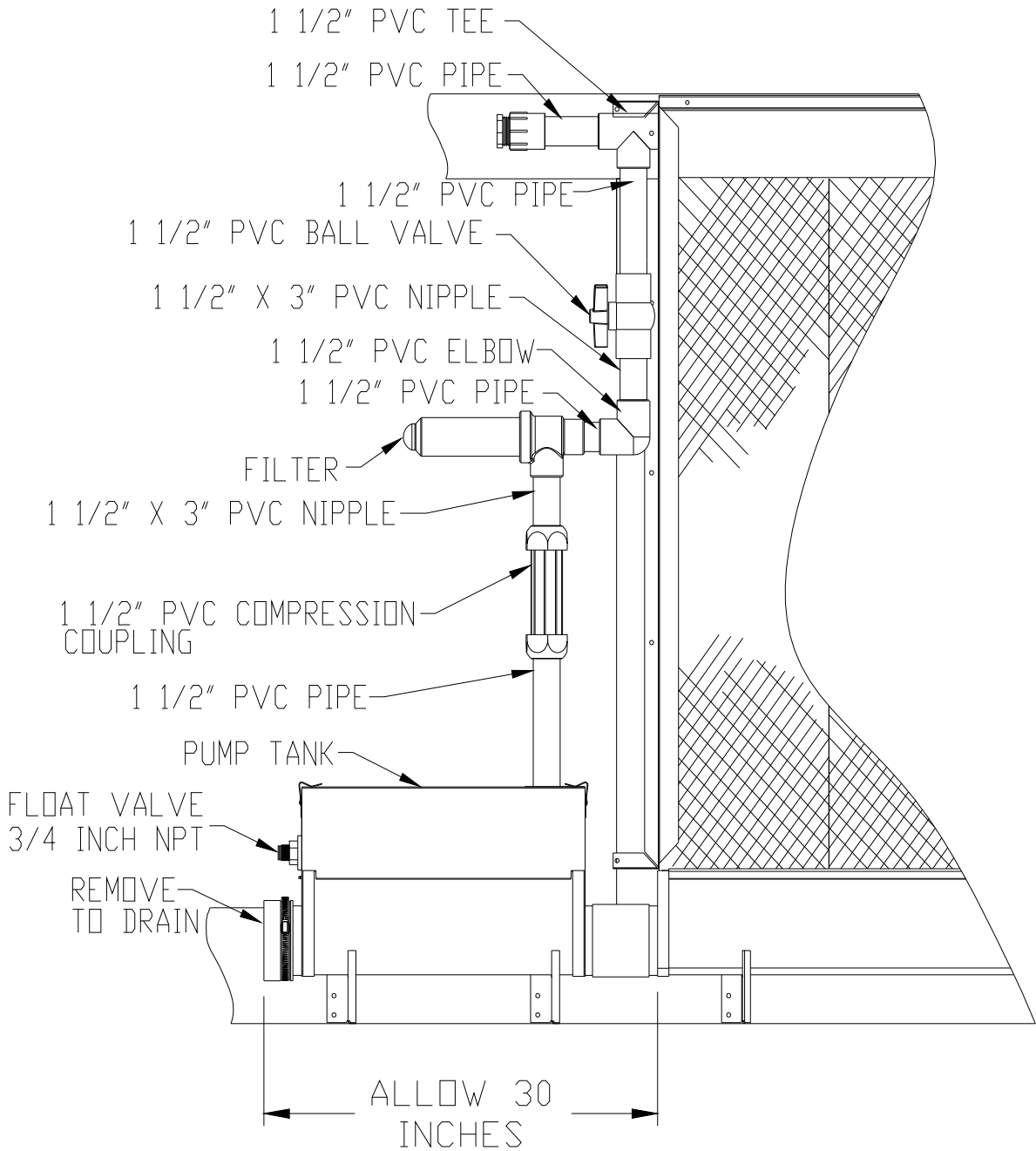


Figure 26

4. Fasten the top cover clips to each of the stainless steel ends using the #10-16 screws and whiz-lock nuts.
5. Fasten each side to the tank assembly using two of the #10-24 stainless steel Screws on each side.
6. Affix the water valve to the end with the small hole.
7. The tank comes with an optional hole cover to minimize dirt from entering in the slot provided for the circulating water pipe. This is not needed in clean areas.

H. Plumbing Installation

The plumbing parts shown in Figure 27 are included with the In-Line tank and the Kool Cel system. Please assemble the water circulation system as shown in Figure 27.



**The Inline Tank Kit and the Kool System Kit
Figure 27**

VI. Exploded View

Bill of Material					
1	By	Top Stringer (by others)	12	580089	CSEG Top Cover Filler
2	Others	Bottom Stringer (by others)	13	As Needed	6" Pad
3	670637	Extruded KC Support	14	512009	Pipe Hanger – 6 In Plastic
4	580094	Extruded KC Floor Bracket	15	512063	10 Ft Pipe Cover 4 In
5	580095	Floor Bracket Spacer	16	511490	PDR 10 Ft Top Cvr 4 In
6	993426	Gutter End Cap	17	512101	Distribution Pipe
7	993423	Extruded Gutter – 120.5 Inch	18	512000	10' Top Cover Support – 6" Pl
8	993425A	Gutter Connector	19	511461	PDR Top Cover Connector
9	993491	4" Pipe Cap With Connector	20	991535	1 1/2" Slip Coupling
10	993424	Pad Support – 119.5 Inch	21	580087	End Cover Mounting Bracket
11	993492	End Cover			

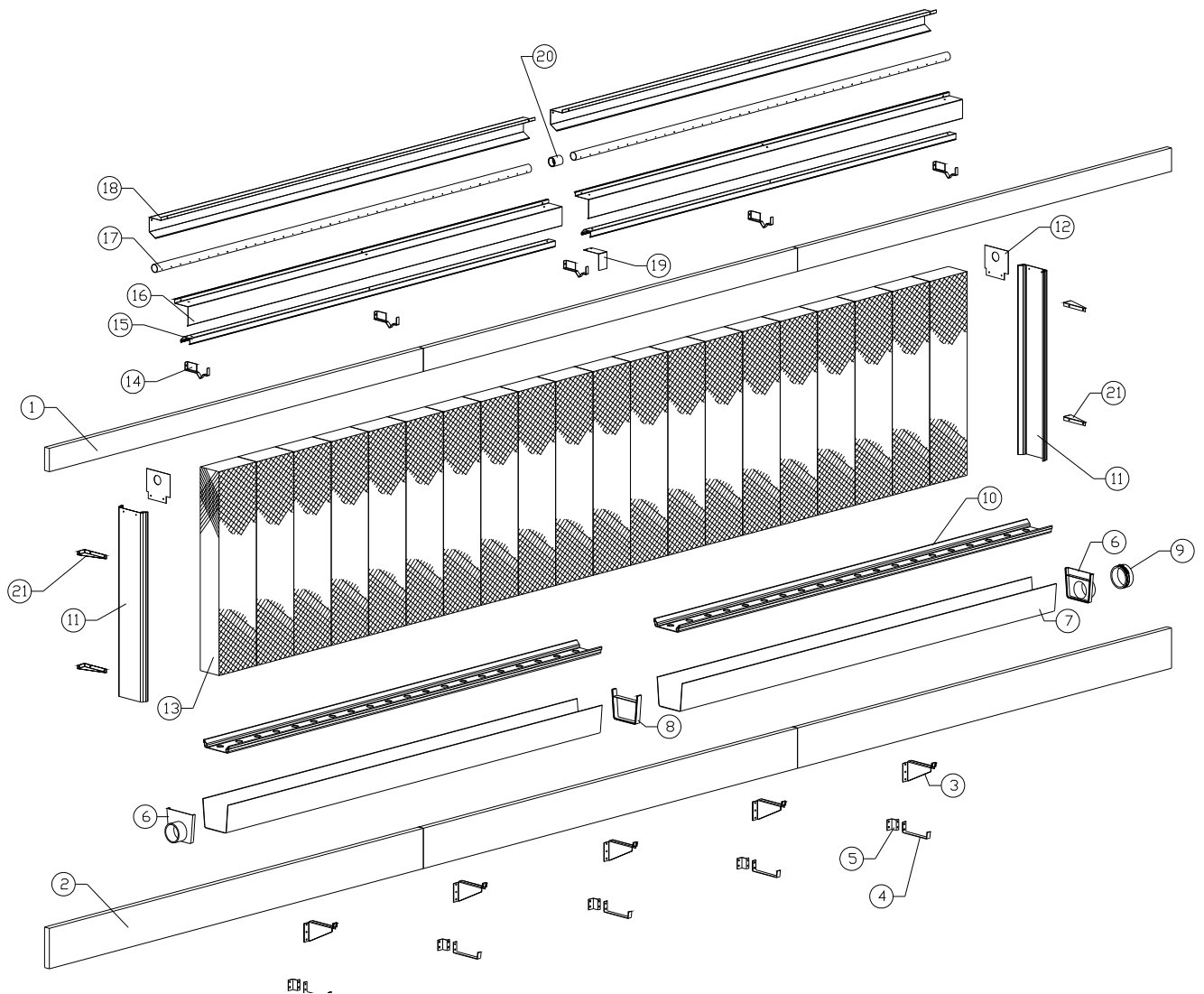


Figure 28

VII. Extruded Gutter In-Line Tank

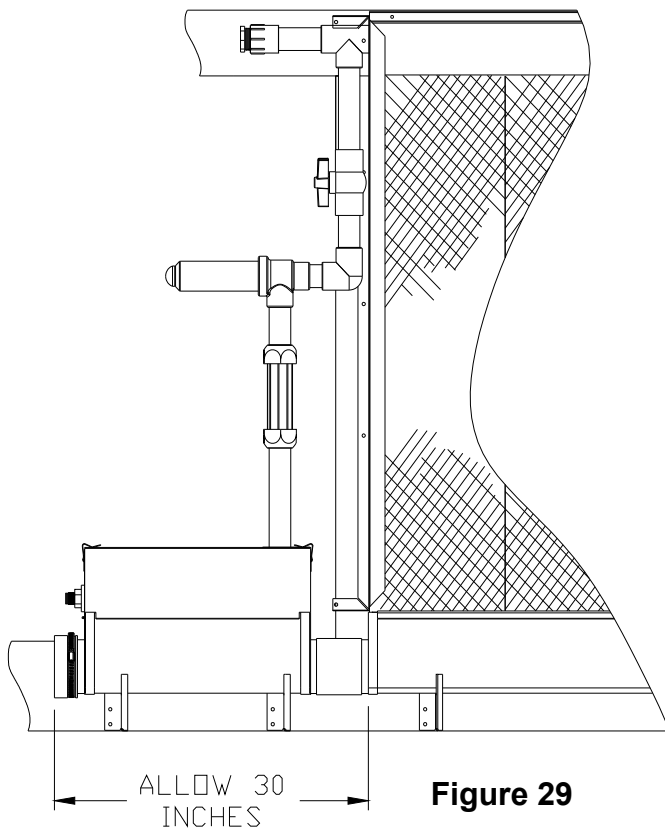


Figure 29

Figure 30 shows the placement in the middle. The Center Mount Kit should be used to support the middle tank. Stainless steel brackets are provided for mounting on the existing stringer and reach out from beneath the gutter to give a support platform for the transition tank. This kit includes the gutter section with a side opening along with the elbow needed to transition the water return into the transition tank. The extra rubber boot is used to close off the unused gutter outlet on the gutter end.

In-Line Tank Assembly Options

The In-Line tank may be mounted at either end or in the middle. When the transition tank is mounted in line with the Kool-Cel[®] gutter, it will require roughly 30 inches of wall space as shown in Figure 29. The float valve is mounted through the hole in the In-Line tank left side. The water valve utilizes a $\frac{3}{4}$ -inch NPT fitting. If a flexible water hose with female hose fittings is used, a hose to pipe thread adaptor should be placed on the water valve input.

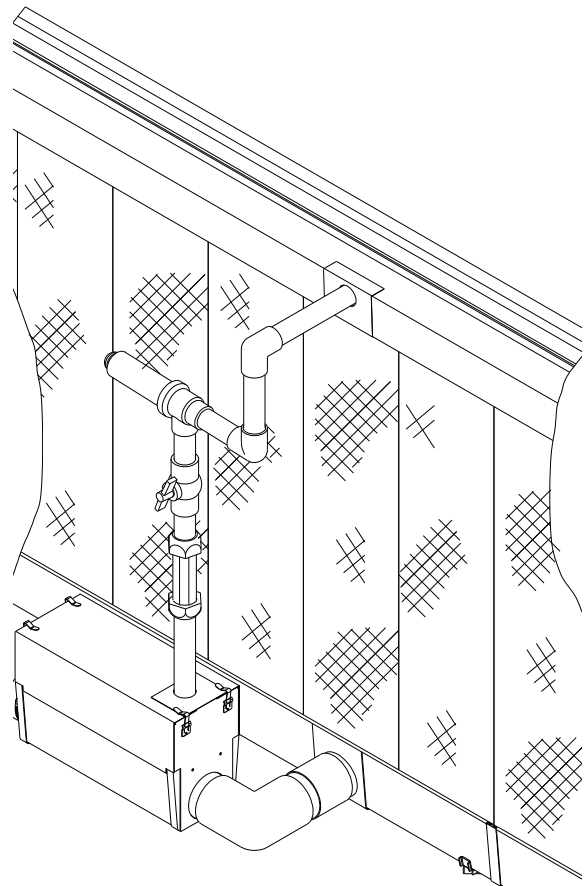


Figure 30

VIII. Start Up and Testing

- A. Test Water – Make up water should be tested for pH level and soluble salts. This pH must be between 6 and 9 and salt concentrates below 40,000 ppm. See “Pad Care” Section X.
- B. Float Valve – Initial adjustment should be such that the float just touches the bottom of the tank before water is applied. Open the water supply line to the pump tank. The initial filling of the gutter should bypass the float shut-off and fill the gutter until the water level in the gutter reaches ½ inch below the bottom of the pad. This will allow for the initial wetting of the dry pads.
- C. Flush the system to clean out all accumulated debris as follows:
 - 1. Open the flow valve.
 - 2. Run power to pump and let the system flush out for approximately 5 minutes.
 - 3. Remove plug from bleed-off end of system.
 - 4. Run pump to remove residue in distribution system.
 - 5. Shut the pump off and replace plugs.
 - 6. Remove screen in filter and clean.
 - 7. Remove rubber caps on gutter and flush out gutter.
- D. Turn on the pump and be sure the water is flowing from all holes in the distribution pipe. Clean out any holes that are not spraying water.
- E. Remove a section of the top cover and adjust the flow valve until water sprays approximately 12 inches in the air. Replace the top cover section and your system is ready for operation.

NOTE: Temperature in a greenhouse that is empty will be considerably higher than a greenhouse with plants as the plants assist cooling by their transpiration.

IX. Maintenance

A regular maintenance schedule should be kept up to keep your Kool-Cel[®] system operating at peak efficiency and to **maximize the life of the system**.

- A. A visual check should be made whenever you're in the area of the pad:
 - 1. Check for dry spots on the pad.
 - 2. Check for algae and scale on pads; See “Pad Care” Section X
- B. During the cooling season, when the pad is in operation:

Weekly

- 1. Clean out strainer to help prevent possible clogging. This may need to be done twice a week.
- 2. Clean out sediment plugs at the ends of system (Remove plugs and drain into a bucket with system pump off; replace plugs.)

3. Drain the sump to remove sediment, usually every two to four weeks. In areas with extremely high salt concentrates, this should be done weekly to lower salt concentrates in the sump. (Shut down the system and remove the 4-inch pipe cap and allow the water in the gutter to drain out.)

Monthly

Inspect the complete system:

1. Check for leaks and repair.
2. Check bleed-off connection to insure bleed off is occurring at all times.
3. Check the strainer in the filter – clean or replace if necessary.
4. Test water for pH level, (make up water and sump water). See “Pad Care” Section X.

Start and End of Cooling Season

1. At the end of the season, drain the pump and piping system to avoid damage caused by rust and impure particles in the water. If the system is outside the building, you must drain and remove the pump to avoid freeze damage.
2. To restart the system in the spring, follow the “Start up and Testing” procedure (VIII).
3. Inspect all parts and pads and replace any damaged or worn parts. See parts list and drawings on appropriate page or exploded drawing on page 20.

X. Pad Care

Kool-Cel[®] pads are very durable and long lasting. To maximize the life of your pads and keep the efficiency of the original installation, review the following items and take necessary action to correct any conditions that may be detrimental to the pad.

- A. **pH of circulating** water (from sump) must be maintained between 6 and 9 (7 is pure water). If these limits are exceeded, the stiffening agents in the pad will leach out and destroy the pad. Water containing acids to a degree that the pH is below 6.0 aromatic hydrocarbons, or wetting and dispersing agents, such as phosphates, can be harmful to the pad.
- B. **Hard water** resulting in Calcium Carbonate deposits on the pad is not harmful, but should be kept within limits. The help of a good water treatment expert is advisable if any hardness problems are encountered.
- C. Sodium Chloride (salt-water) concentrate above 50,000 ppm (approx.) will deposit salt on the pad and reduce airflow. Keep salt concentrates below 50,000 ppm in circulating water and below 40,000 ppm in make-up water.
- D. Algae will grow on any surface that is wet and exposed to sunlight. To help prevent algae build up, follow these tips:
 1. Do not draw make-up water from an open pond. Use well water or chlorinated water from city systems.
 2. Cover the sump to avoid exposure to sunlight and airborne particles, and to keep animals from drinking it.

3. Keep the fans running after the pump is shut off to dry the pads, thus killing the algae spores left on the pads.
 4. Dry out the system every night when the cooling effect is very small.
 5. Isolate the water make-up system from any other system that may carry fertilizers that would enhance algae growth.
 6. If algae persists, use a swimming pool water algaecide non-chlorine, chloride (tablet type) in the sump about $\frac{1}{4}$ the concentrate suggested for pools.
- E. Airborne dust and bugs do not seem to clog the airflow passages of Kool-Cel. When the system is running this clogging washes away.
- F. When Kool-Cel[®] is installed within reach of poultry or livestock, it should be guarded. To guard from poultry a (10x14) mesh guard approximately 8"–12" from the pad and the full length of the system should be provided up to approximately 3' from the birds' feet. The pad should be protected from livestock with a full heavy gage wire screen approximately 2"x2" mesh and placed at least 6" from the pad.
- G. **Bleed-Off** – Since the water is continuously evaporating and being replaced by fresh water, the salts and minerals are left behind in the circulating water. As these impurities become concentrated, they build up in the pads unless steps are taken to prevent this. To reduce the buildup of deposits and scale, a bleed-off of 1 to 2 percent of the circulating water is usually required. This is particularly true in areas that have a high mineral content in the water. The required bleed-off is provided by the bleed-off fitting in the plug.

NOTES

TERMS AND CONDITIONS OF SALE

ACCEPTANCE All orders and sales are subject to written approval and acceptance by an executive officer of Acme Engineering & Manufacturing Corporation at Muskogee, Oklahoma, (the "Company") and are not binding on the Company until so approved.

DELIVERY All shipping and delivery dates are estimated only. No delays in delivery will subject the Company to any costs, damages or fees for late delivery. Delivery of the products herein specified shall be made F.O.B. point of shipment, unless otherwise stated. The Company shall not be liable for delay due to causes beyond its reasonable control, such as Acts of God, acts of the purchaser, acts of civil or military authorities, priorities, fires, strikes, floods, epidemics, war, riots, delays in transportation, car shortages, and inability, due to reasons beyond its reasonable control, to obtain necessary labor, material, or manufacturing facilities. In the event of such a delay, the date of delivery shall be extended for a period equal to the time lost by reason of the delay.

TERMS OF PAYMENT If, in the judgment of the Company, the financial condition of the purchaser at any time does not justify continuation of manufacture or shipment on the terms of payment specified, the Company may require full or partial payment in advance.

Pro rata payments shall become due as shipments are made. Each shipment or delivery shall constitute a separate sale, and the default of any shipment or delivery shall constitute a separate sale, and the default of any shipment or delivery shall not vitiate the contract as to other shipments or deliveries.

SALES AND SIMILAR TAXES The Company's prices do not include sales, use, excise, or similar taxes. Consequently, in addition to the price specified herein, the amount of any present or future sales, use, excise, or other similar tax applicable to the sale of the product herein shall be paid by the Purchaser, or in lieu thereof

the Purchaser shall provide the Company with a tax exemption certificate acceptable to the taxing authorities.

CANCELLATION Any contract resulting from the Purchaser's order may be canceled by the Purchaser only by negotiations and upon payments of reasonable cancellation charges which will take into account expenses already incurred and commitments made by the Company.

DESIGN CHANGES The Company reserves the right to make changes in design, improvements and additions in and to its products any time without imposing any liability or obligations to itself to apply or install the same in any product manufactured by it.

TITLE The title and right of possession of the products sold herein shall remain with the Company and such products shall remain personal property until all payments herein (including deferred payments whether evidenced by notes or otherwise) shall have been made in full in cash and the Purchaser agrees to do all acts necessary to perfect and maintain such right and title in the Company.

PRICE ADJUSTMENTS Prices are subject to change upon notice by the Company. Prices on existing orders are subject to surcharges in the event of cost increases of metals and transportation. All complete component accessory material manufactured by others and furnished with the Company's products such as motors, drives, vibration equipment, controls or other completely assembled component structures, are subject to adjustment to the price at time of shipment regardless of the date of original order entry.

SAFETY ACCESSORIES The Company manufactures products designed to serve multiple applications and offers a wide range of safety equipment, including guards and other devices, as may be required to meet

customer specifications. Without exception, the Company recommends that all orders include applicable safety devices. Products ordered without applicable safety devices is clearly the responsibility of the Purchaser. Further, the Purchaser warrants that it has determined and acquired any and all safety devices required for products sold by the Company. Weather covers and guards for motor and V-belt drives, couplings, shafts and bearings, along with inlet and outlet screens, are optional accessories noted in the price list.

GOVERNING LAW The rights, obligations and remedies of Purchaser and the Company, the interpretation of these terms and conditions and the sale of products by the Company shall be governed by Oklahoma law, without regard to any principles of conflict of laws.

ARBITRATION Any dispute arising under or in connection with these terms and conditions or the sale of products shall be settled by binding arbitration administered by the American Arbitration Association under its Commercial Arbitration Rules, and judgment on the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The dispute shall be resolved by one neutral arbitrator who shall have no affiliation with either Purchaser or the Company and shall be selected by the American Arbitration Association office in Dallas, Texas. The arbitration proceedings shall be held in Muskogee, Oklahoma.

APPLICABLE DOCUMENTS The agreement between the Company and the Purchaser relating to the products includes these terms and conditions of sale, any applicable installation and maintenance instructions provided by the Company and any terms appearing on the Company's quotation, sales order acknowledgment and invoice.

WARNING Acme products are designed and manufactured to provide reliable performance but they are not guaranteed to be 100% free of defects. Even reliable products will experience occasional failures and this possibility should be recognized by the Purchaser and all End Users. If these products are used in a life support ventilation system where failure could result in loss or injury, the Purchaser and all End Users should provide adequate back-up ventilation, supplementary natural ventilation or failure alarm system, or acknowledge willingness to accept the risk of such loss or injury.

WARNING DO NOT use in HAZARDOUS ENVIRONMENTS where fan's electrical system could provide ignition to combustible or flammable materials unless unit is specifically built for hazardous environments. Comply with all local and national safety codes including the National Electrical Code (NEC) and National Fire Protection Act (NFPA).

CAUTION Guards must be installed when fan is within reach of personnel or within eight (8) feet (2.5 m) of working level or when deemed advisable for safety.

DISCLAIMER The Company has made a diligent effort to illustrate and describe the products accurately in all Company literature; however such illustrations and descriptions are for the sole purpose of identification and do not express or imply any warranty.

LIMITED WARRANTY

WARRANTY AND DISCLAIMER: The Company extends this limited warranty to the original purchaser and warrants that products supplied by the Company, shall be free from original defects in workmanship and materials for two years from date of shipment (except for the warranty periods noted for products listed below), provided same have been properly handled, stored, installed, serviced, maintained and operated. This warranty shall not apply to products which have been altered or repaired without the Company's express authorization, or altered or repaired in any way so as, in the Company's judgment, to affect its performance or reliability, nor which have been improperly installed or subjected to misuse, negligence, or accident, or incorrectly used in combination with other substances. The Purchaser assumes all risks and liability for results of use of all products.

Evaporative cooling pads are warranted to be free of defects in materials and workmanship for a period of two years from date of shipment provided same have been properly handled, stored, installed, serviced, maintained and operated; and further, not subjected to excessive heat, corrosive agents or chemicals, or mechanical abuse that may cause tearing, crushing or undue deterioration, nor used on a system or in a manner other than that for which it was designed as explained in the product literature.

The following products are warranted to be free of defects in materials and workmanship for the periods shown from date of shipment: Acme's exclusive duplex split pillow block bearings and shaft five years, belts one year, Polyethylene tubing 90 days, AIR40 Heater warranty one year, AIR40 Emitter warranty three years and DDP fan lifetime warranty on its propeller, cone, and housing.

LIMITATION OF REMEDY AND DAMAGES: All claims under this warranty must be made in writing and delivered to P. O. Box 978, Muskogee, Oklahoma, 74402, within 15 days after discovery of the defect and prior to the expiration of two years from the date of shipment by the Company of the product claimed defective, and Purchaser shall be barred from any

remedy if Purchaser fails to make such claim within such period.

Within 30 days after receipt of a timely claim, the Company shall have the option either to inspect the product while in Purchaser's possession or to request Purchaser to return the product to the Company at Purchaser's expense for inspection by the Company. The Company shall replace, or at its option repair, free of charge, any product it determines to be defective, and it shall ship the repaired or replacement product to Purchaser F.O.B. point of shipment; provided, however, if circumstances are such as in the Company's judgment to prohibit repair or replacement to remedy the warranted defects, the Purchaser's sole and exclusive remedy shall be a refund to the Purchaser of any part of the invoice price, paid to the Company, for the defective product or part.

The Company is not responsible for the cost of removal of the defective product or part, damages due to removal, or any expenses incurred in shipping the product or part to or from the Company's plant, or the installation of the repaired or replaced product or part.

The warranties set forth above do not apply to any components, accessories, parts or attachments manufactured by other manufacturers; such being subject to the manufacturer's warranty, if any. To the extent not prohibited by the manufacturer's warranty, the Company shall pass through to Purchaser such manufacturer's warranty.

THE COMPANY'S WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND WAIVED. THIS WARRANTY CONSTITUTES THE COMPANY'S SOLE AND EXCLUSIVE WARRANTY FOR DEFECTIVE GOODS AND PURCHASER'S SOLE AND EXCLUSIVE REMEDY FOR DEFECTIVE PRODUCTS.

No employee, agent, dealer, or other person is authorized to give any warranties on behalf of the Company or to assume for the Company any other liability in connection with any of its products except in writing and signed by an officer of the Company.

REPLACEMENT PARTS If replacement parts are ordered, purchaser warrants that the original components in which these replacement parts will be placed are in satisfactory working condition, and

when said replacement parts are installed, the resultant installation will operate in a safe manner, at speeds and temperatures for which the original product was purchased.

TECHNICAL ADVICE AND RECOMMENDATIONS, DISCLAIMER: Notwithstanding any past practice or dealings or any custom of the trade, sales shall not include the furnishing of technical advice or assistance or system design. Any such assistance shall be at the Company's sole option and may be subject to additional charge.

The Company assumes no obligation or liability on account of any recommendations, opinions or advice as to the choice, installation or use of products. Any such recommendations, opinions or advice are given and shall be accepted at Purchaser's and End User's risk and shall not constitute any warranty or guarantee of such products or their performance.

LIMITATION OF LIABILITY The cumulative liability of the Company to the Purchaser and any other persons for all claims in any way relating to or arising out of the products, including, but not limited to, any cause of action sounding in contract, tort, or strict liability, shall not exceed the total amount of the purchase price paid for those products which are the subject of any such claim. This limitation of liability is intended to apply without regard to whether other provisions of this agreement have been breached or have proven ineffective even if the Company has been advised of the possibility of such claims or demands. In no event shall the Company be liable to the Purchaser or any other person for any loss of profits or any incidental, special, exemplary, or consequential damages for any claims or demands brought by the Purchaser or such other persons.

INDEMNITY The Company's maximum liability to Purchaser and to any end user is as set forth above. The Company makes no warranty to anyone for any products not manufactured by the Company and shall have no liability for any use or installation of any products (whether manufactured by the Company or other manufacturers) not specifically authorized by this sale. Purchaser acknowledges various warnings by the Company regarding the products and its installation and use. If the Company incurs any claims, lawsuits, settlements, or expenses (including attorney fees) for any loss, injury, death or property damage including, but not limited to, claims arising out of the Purchaser's or any end user's installation or use of the products, the Purchaser shall indemnify and hold the Company harmless.



ACME ENGINEERING AND MANUFACTURING CORPORATION
P.O. Box 978
Muskogee, Oklahoma 74402
Telephone 918/682-7791
Fax 918/682-0134
www.acmefan.com