Installation & Operation Manual

for K-Line Feed Lines and sprinkler / pod lines

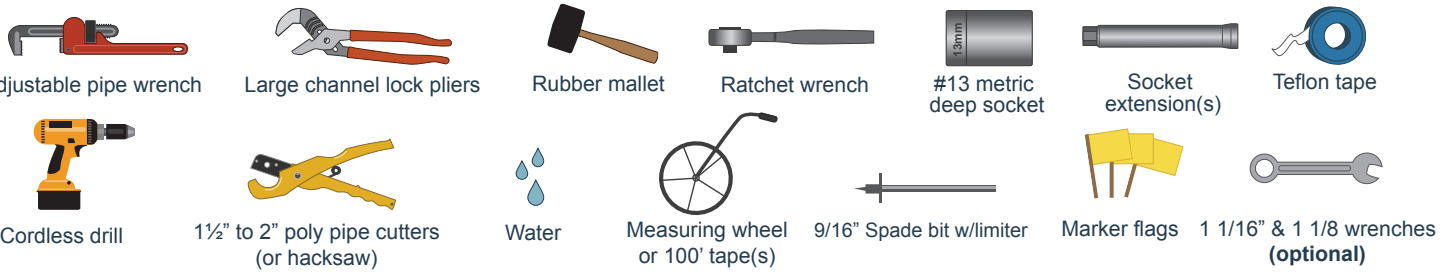
Prior to following these instructions, the underground portion of your K-Line system should be complete; including water source, pump, risers (hydrants) and power supply.

Instructions for the installation of the above ground portion of the K-Line Irrigation system:

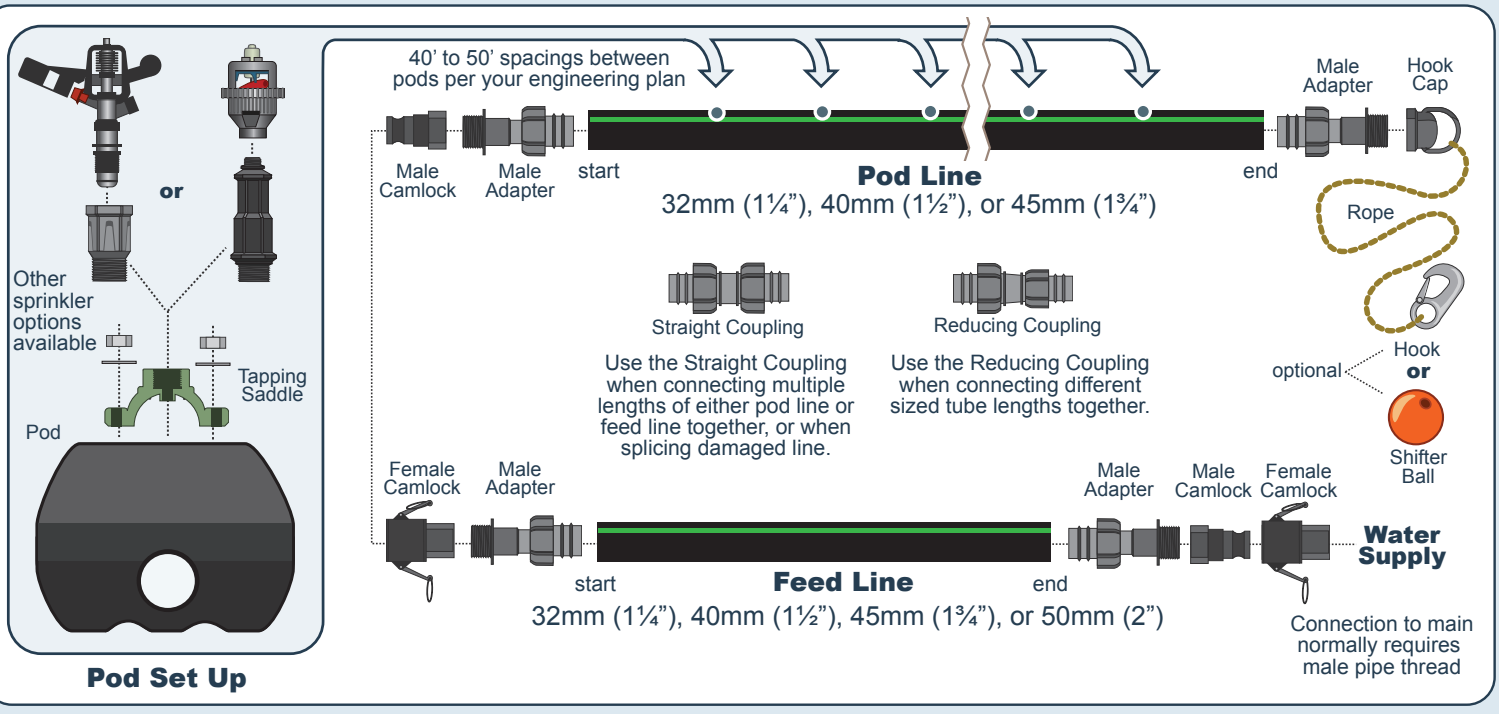
STEP 1: View the K-Line Installation DVD

Please review the K-Line Installation DVD to become familiar with the K-Line System.

STEP 2: Tools Required for Installation



STEP 3: K-Line System Overview



STEP 4: Review Your Engineering Plan

The Engineering Plan will often be an aerial/satellite photograph or government drawing. Become familiar with the Plan and identify variations from one part of the system to another. Take note of:

- **the number of K-Lines and Feed Lines used**
- **the size(s) of the tubing on each K-Line**
- **the number of pods on each K-Line**
- **the types of sprinklers and nozzle sizes used**
- **the size of the tapping saddles**
- **the spaces between sprinkler/pods**
- **the length of K-Lines and Feed Lines**
- **the location of each K-Line**

STEP 5: Identify System Components

Identify and become familiar with the K-Line Irrigation components – a list of options and K-Line components with pictures can be found on Pages 12-15. Consider the location(s) where you will be constructing the K-Lines. It saves time to collect and group together materials for specific areas of the installation prior to layout and construction of the K-Lines.

Hint: K-Line Male Adapters and quick-connect cam fittings can be pre-assembled in a work shop more easily and efficiently than in the field. If **Hook Caps** and Male Adapters are pre-assembled, they should be **hand tight** only, because the hook cap will be removed later for flushing.

STEP 6: Lay Out Marker flags

Location, Location, Location - Building each K-Line in the area that it will irrigate is often inefficient (much more time is spent moving materials, tools, and personnel with this method). It is much more efficient to build several K-Lines in one (or a couple of) layout area(s) with easy access to several areas that the K-Lines will irrigate. The layout area should be long enough for the longest K-Line to be constructed in that part of the system, has easy access, in mowed or short pasture, and is free of obstructions and livestock interference.

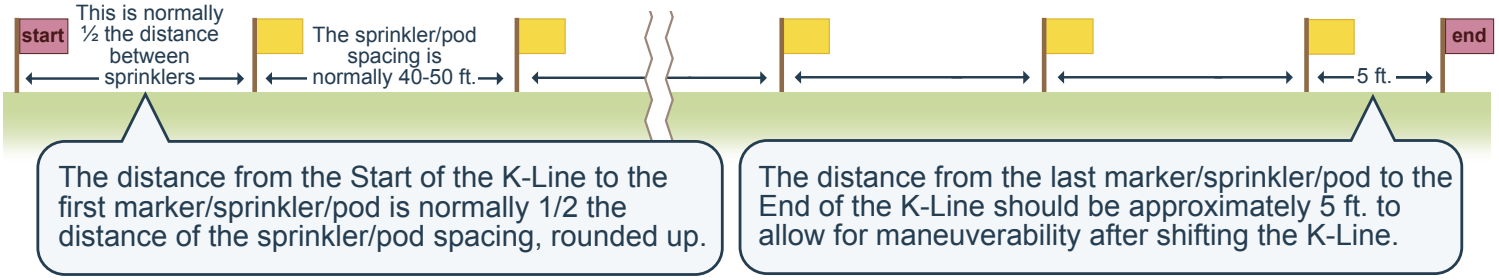
In installations where there are multiple fences, waterways or other obstacles, it is important to plan ahead on how you will get the K-Lines and Feed Lines from the layout area(s) to their initial placements. In many situations it is best to have multiple layout locations.

Placing pod and tubing Markers

After consulting the Engineering Plan:

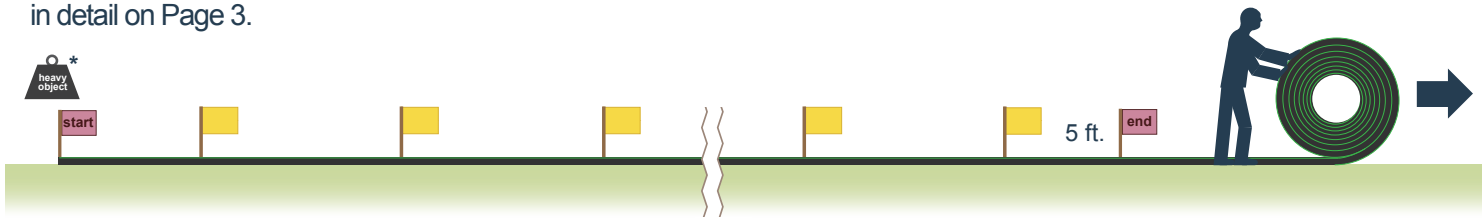
- Use a measuring wheel or measuring tapes to place markers according to sprinkler/pod spacing for the K-Line(s) to be constructed; and
- Use different markers to mark the “start,” and “end” of the K-Line.

NOTE: When K-Lines have the same length and sprinkler/pod spacing, multiple K-Lines can be assembled side by side to save time. Completed K-Lines can then be moved to their areas of service.



STEP 7: Tubing and Pod Placement

A **Single tube Installations:** Some K-Lines may require only one, or a portion of one roll of tubing. See the illustration below. Sliding on pods, connecting two lengths of tubing together, and attaching fittings at the start and end of the K-Line are covered in detail on Page 3.



DO NOT ALLOW IT TO TWIST!
Caution, when rolling out the line by hand, be sure to use the process indicated in the picture. This will eliminate line twist. The green line(s) on the tubing should be in the up position the entire length of the line.

***Hint:** It helps to put a heavy object on the ends of the K-Line Tubing when rolling it out to keep the tubing in place and prevent it from rolling up behind you. The tubing will relax once rolled out and allowed to sit in the sun.

B **Multiple tube installations:** An Engineering Plan will often call for the use of more than one size of tubing (i.e. 40mm and 32mm, or 45mm and 40mm) in one K-Line, or for more than one tube length of the same size in one K-Line.

For example: an Engineering Plan may call for a 480' K-Line that is 10 pods in length with a 50' spacing between pods, 25' of tubing before the 1st pod, and 5' of tubing after the last pod - for a total tubing length of 480'. This K-Line may be a combination of 45mm and 40mm, all 40mm, or a combination of 40mm and 32mm depending on the nozzle of the sprinkler.

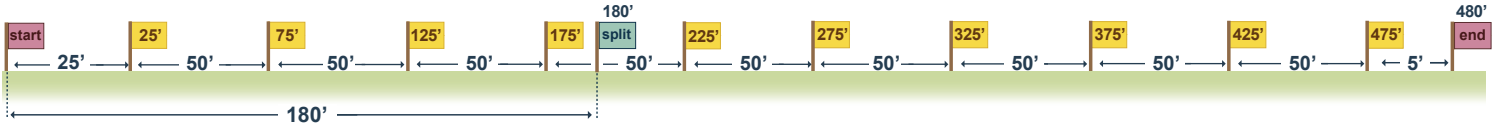
The following procedure should be used when any two lengths of tubing (same, or different sizes) need to be connected together with a Straight or Reducing Coupling. A tow vehicle and Spool-out Reel are invaluable in a K-Line installation involving multiple K-Lines of more than 5 or 6 pods. The steps below use the language for connecting two different sizes of K-Line tubing but are applicable to all Coupling connections.

C Consult your Engineering Plan for the K-Line length and the number of pods / tapping saddle sizes on each length of tubing (if applicable).

Double check that the number of pods matches the number of markers that you placed in **STEP 6**.

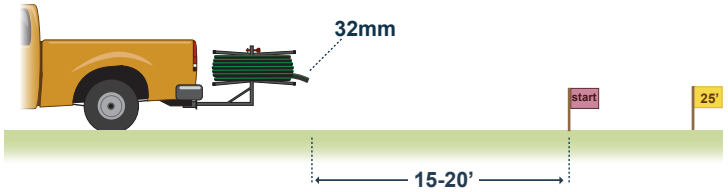
D **Mark the transition point:** Use a flag to mark the point where the two tubes will be joined together. An Engineering Plan will generally specify how many pods on what sized tubing, and how long each length of tubing will be. The marker's distance from the starting point should be equal to the length of the second section of tubing (often the smaller section, both in length and size).

For example: If the plan above calls for 6 pods on 300 ft. of 40mm tubing followed by 4 pods on 180 ft. of 32mm tubing, the marker should be 180' from the Start of the K-Line; as illustrated bellow.

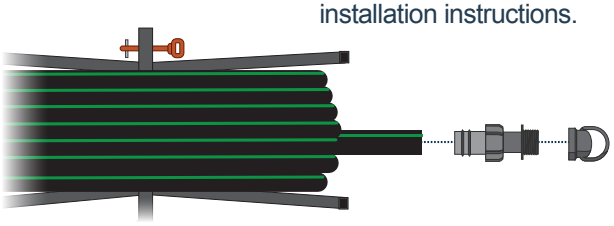


NOTE: When connecting two lengths of tubing, be sure that the connection will not fall within 3' of a pod.

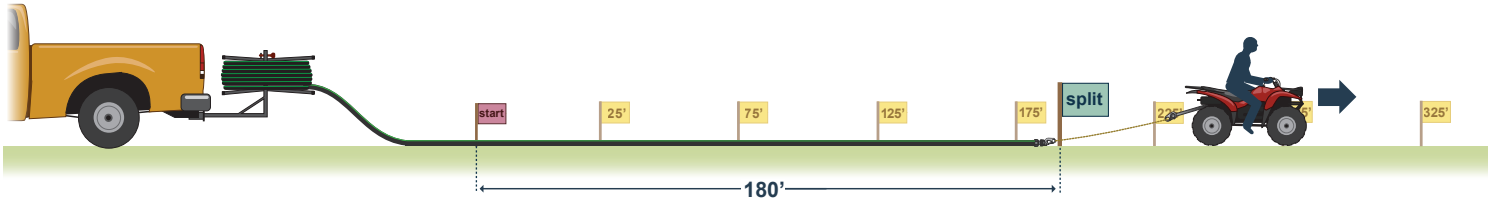
E The Spool-Out Reel, or similar device, should be placed 15 - 20' in front of the Start of the K-Line. This should be loaded with the 2nd section's tubing (32mm in the example).



F Attach a Male Adapter to the tube and hand tighten a Hook Cap to the adapter. See page 6, **STEP 10A** for adapter installation instructions.



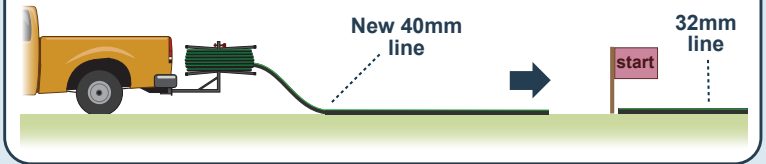
G Using a K-Line Rope attached to a Hook, connect the rope to the tow vehicle and the Hook to the Hook Cap. Begin pulling out the smaller tubing until the Hook Cap at the end of the smaller tubing reaches the flag at the transition marker (180' in the example).



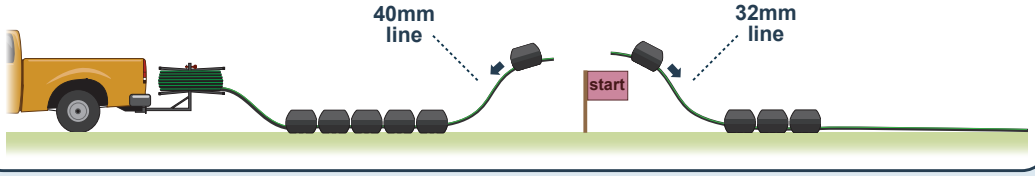
H Cut the tubing at the Start flag using 1½"-2" poly pipe cutters.

NOTE: Take care when cutting the tubing because the tubing will want to roll back on itself.

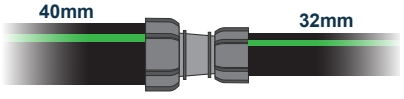
I Remove the rest of the 32mm tubing from the Spool-out Reel. Place the new 40mm tubing on the Spool-out Reel and pull out a length to the Start flag.



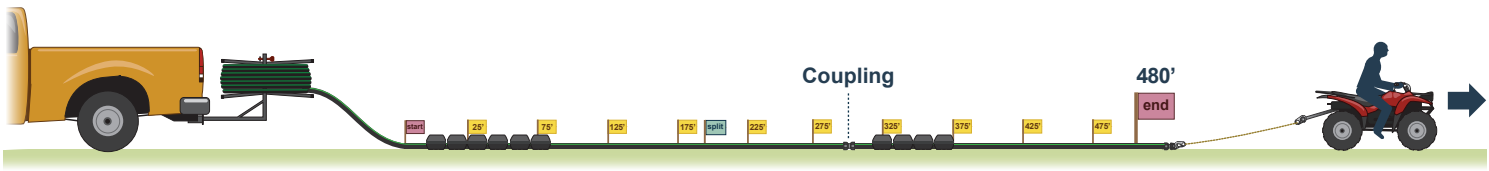
J Slide the correct number of pods onto each of the smaller AND larger size tubing. In our example, slide 4 pods onto the 32mm K-Line tubing AND 6 pods onto the 40mm tubing.



K Join the two lines by installing the Reducing Coupling as depicted on page 6 **STEP 11C**.



L Continue pulling the entire length of tubing with the tow vehicle until the Hook Cap reaches just past the End marker.

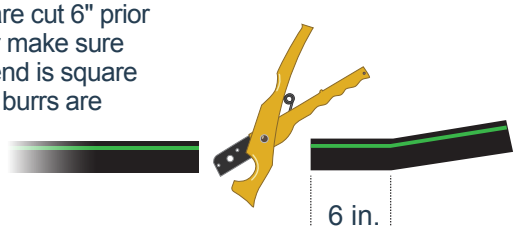


NOTE: Pulling the K-Line tubing during installation may cause the tubing to stretch slightly on a hot day. The tubing will then relax and the Hook Cap end will contract back a foot or so.
If the option is available, it is always advisable to connect two lengths of tubing closer to the beginning of the line rather than near the end. While a properly secured connection is as strong, or stronger, than the tubing itself, it is better to error on the side of caution.

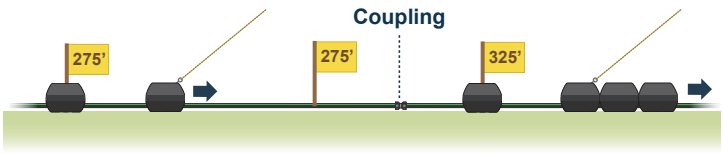
M Cut the tubing at the Start flag using 1½"-2" poly pipe cutters or saw. This will be the beginning of the K-Line and will require the connection of a Male Adapter and Male camlock.
See page 6, **STEP 10A.**

NOTE: Take care when cutting the tubing because the tubing will want to roll back on itself.

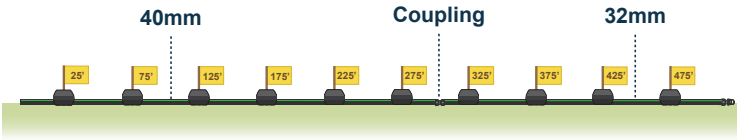
N When you finish unrolling a roll of tubing, there may be a kink in the tubing from when it was wound for shipping. Make a square cut 6" prior to the kink or make sure that the cut end is square and that any burrs are removed.



O Use the Tow Rope and Hook to pull all pods to the markers along both sections of the line. Unhook a pod at each marker.



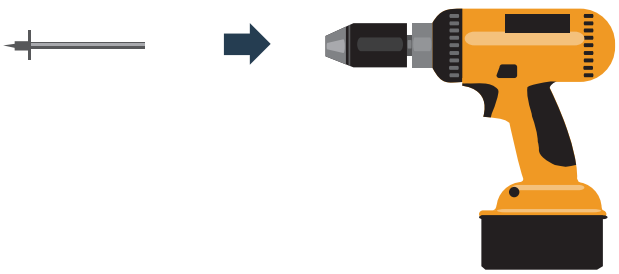
P All markers should now have a pod beside them.



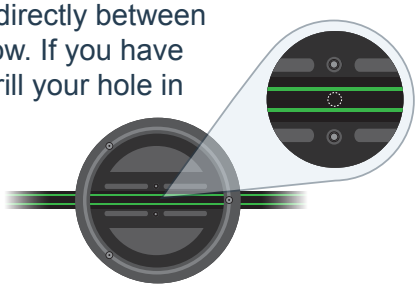
Repeat this process for all K-Lines in your system.

STEP 8: Tapping Saddle Installation

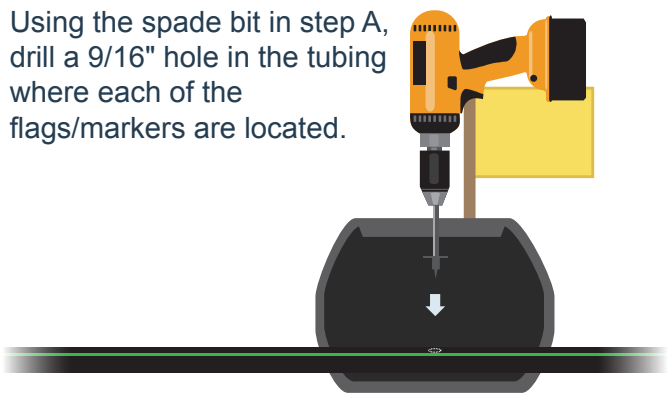
A Install the K-Line 9/16" spade drill bit w/limiter into a cordless drill.



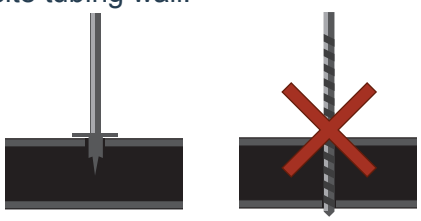
B There may be between 1 and 3 green lines on your tubing. If you have a single green line, drill your hole right in the middle of the line. If you have two green lines drill your hole directly between them as shown below. If you have three green lines, drill your hole in the middle of the center line.



C Using the spade bit in step A, drill a 9/16" hole in the tubing where each of the flags/markers are located.



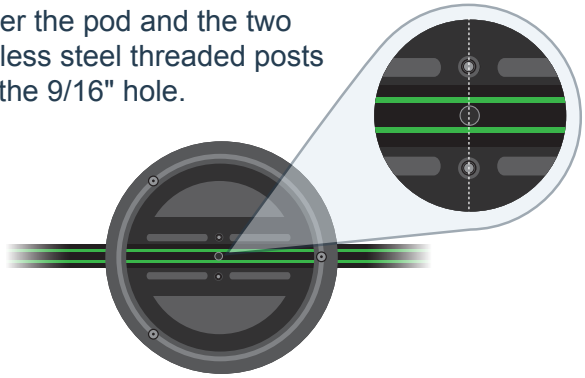
D **Caution: Do not use a 3rd party drill bit.**
The K-Line Bit has a limiter welded onto it to prevent the bit from being inserted too deeply and puncturing the opposite tubing wall.



After drilling, remove the tubing chaff from each hole.

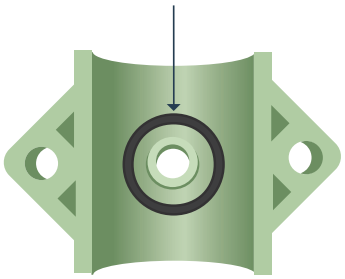
E

Center the pod and the two stainless steel threaded posts with the 9/16" hole.



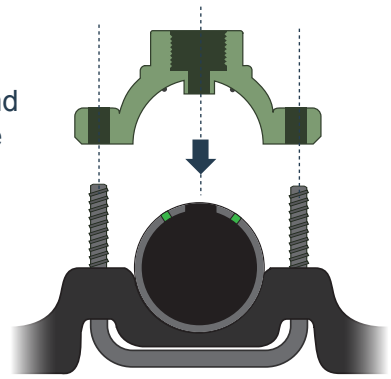
F

Make sure that the rubber O-ring is in the groove on the underside of the K-Line Tapping Saddle.

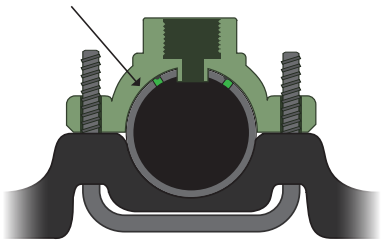


G

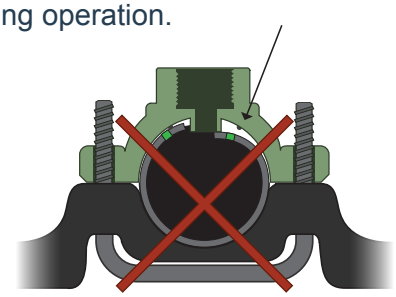
Push the K-Line tapping saddle down over the threaded posts and be certain that the nipple on the underside of the tapping saddle is inserted into the 9/16" hole.



The K-Line tapping saddle should sit snugly over the tubing without a gap.

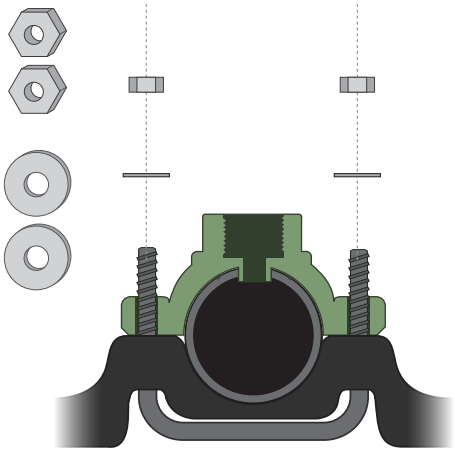


A gap might indicate that you are pinching the tubing on either side of the hole causing water to spray out into the pod during operation.



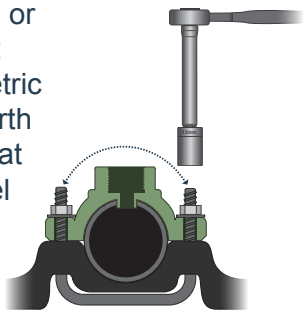
H

Put a stainless steel washer on each threaded post and then hand tighten a #8 metric stainless steel nut onto each post.



I

With a 13mm socket (with 8” or longer extension) and ratchet; alternate tightening the #8 metric nuts by switching back and forth several times to make sure that the Tapping Saddle is set level and square.

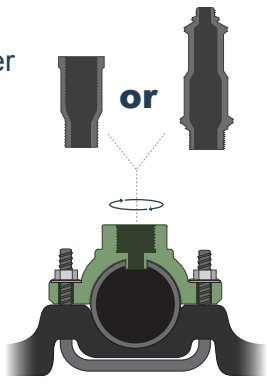


CAUTION: Using a drill to tighten stainless steel materials can cause the stainless steel to heat up and seize, resulting in broken threaded posts or failure to fully tighten the nuts onto the Tapping Saddle.

STEP 9: Sprinkler Installation

A

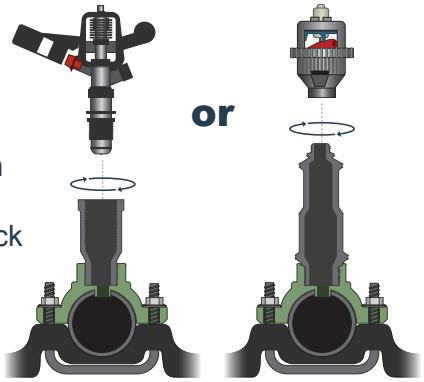
All sprinklers require an adapter.* Hand start the adapter into the K-Line tapping saddle (careful not to cross thread). then finish tightening with an adjustable wrench or channel lock pliers.



* Your Engineering Plan may call for the adapter to be replaced with a Nelson Mini Regulator and Nelson Nipple.

B

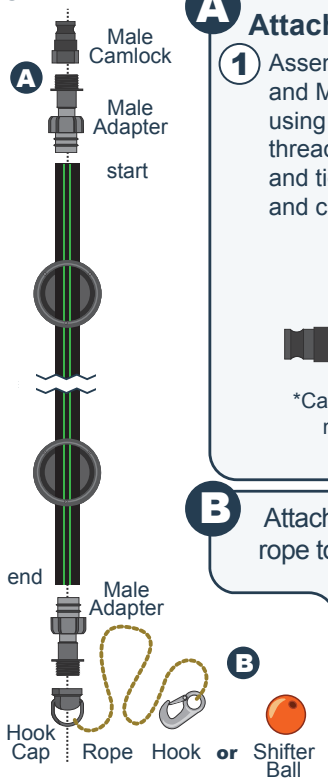
Hand start the sprinkler into or onto the adapter (careful not to cross thread). Finish tightening impact sprinklers with a 13/16” open ended wrench or channel lock pliers. Rotator sprinklers are firmly tightened by hand.



Repeat Steps 8 and 9 for each pod in the K-Line.

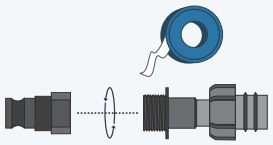
STEP 10: Adding Fittings to the Sprinkler / Pod Line

OVERVIEW



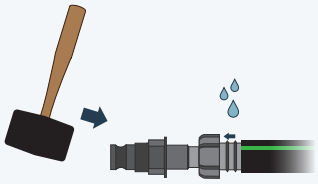
A Attach the Male Adapter and Male Camlock to the Start of the **Pod Line**, as follows:

1. Assemble the Male Adapter and Male Camlock together, using Teflon tape on the threads to seal the connection, and tighten with a pipe wrench and channel locks.*

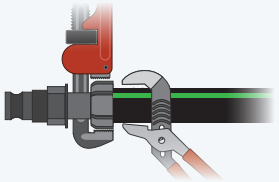


*Camlock and Male Adapter may be preassembled

2. Moisten the barbed end of the Male Adapter with water. Drive the Male Adapter and Male Camlock into the K-Line Tubing with a rubber mallet ensuring that the collar is back against the neck of the Male Adapter.

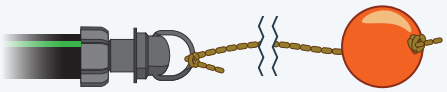


3. Hand tighten the collar of the Male Adapter onto the tubing, then finish by using a combination of pipe wrenches and channel locks to securely tighten the collar. This causes the barbs to bite into the interior and exterior of the K-Line tubing for a strong connection.



B

Attach the rope to the Shifter Ball (or Hook) and Hook Cap. Use a sturdy knot or double knot to attach the rope to the Shifter Ball (or Hook), and then attach the rope to the Hook Cap with a sturdy knot or double knot.

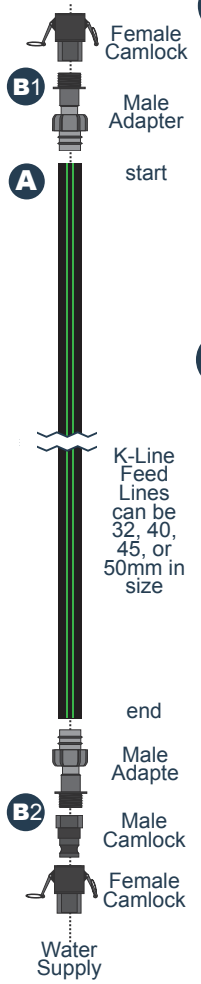


See K-Line Shifter on the back page for fast shifting and reduced mounting and dismounting of the tow vehicle.

SAFETY PRECAUTION !!! When shifting K-Lines, always attach your tow rope to the drawbar of the tow vehicle. Do not attach to the storage racks or hold onto the rope.

STEP 11: Construct the K-Line Feed Lines

OVERVIEW

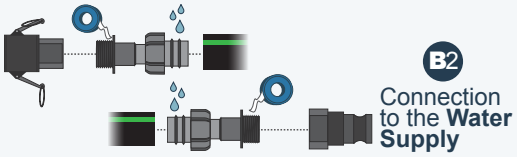


A

Roll out the correct Feed Line size and length per your Engineering Plan. This is often one size larger than your Pod Line. The Feed Line should be at least long enough to reach from the riser in the center of the field to the edge of the field.

B

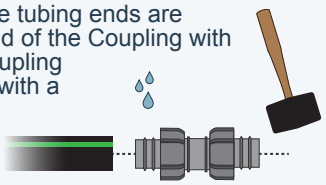
Attach one Female Camlock and one Male Camlock to two Male Adapters using Teflon tape on the threads, tighten securely. Connect one set to EACH END of the **Feed Line** as depicted below following the directions described above in **Step 10A**.*



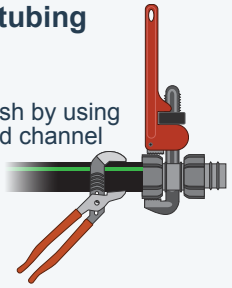
*Camlocks and Male Adapters may be preassembled

C In case of damage, or when an engineering plan requires it, 2 lengths of tubing can be joined with a Straight or Reducing Coupling as follows:

1. First, be sure that the tubing ends are square. Moisten the end of the Coupling with water and drive the Coupling into the K-Line Tubing with a rubber mallet.

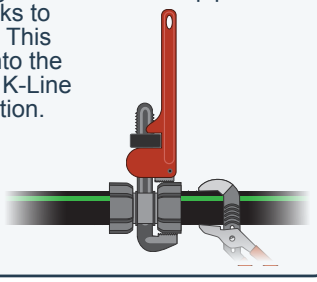


2. Hand tighten the collar of the Coupling onto the tubing, then finish by using a combination of pipe wrenches and channel locks to securely tighten the collar. This causes the barbs to bite into the interior and exterior of the K-Line tubing for a strong connection.



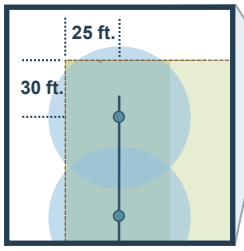
3. Wet and insert the unattached end of the straight or reducing coupling into the other section of tubing and place your foot (and weight) on the tubing to hold the tubing in place. On the already connected Straight or Reducing Coupling/tubing side, place the channel locks directly behind the attached collar. Use a rubber mallet to strike the channel locks to drive the coupling securely into the unattached tubing.

4. Hand tighten the collar of the Coupling onto the tubing, then finish by using a combination of pipe wrenches and channel locks to securely tighten the collar. This causes the barbs to bite into the interior and exterior of the K-Line tubing for a strong connection.



STEP 12: Move the K-Line Pod Lines into Position

Once the K-Lines (and Feed Lines) have been constructed, they need to be moved to the individual paddocks or areas that they are to irrigate. Use a tow rope and hook to move each K-Line and the matching Feed Line to the designated field.



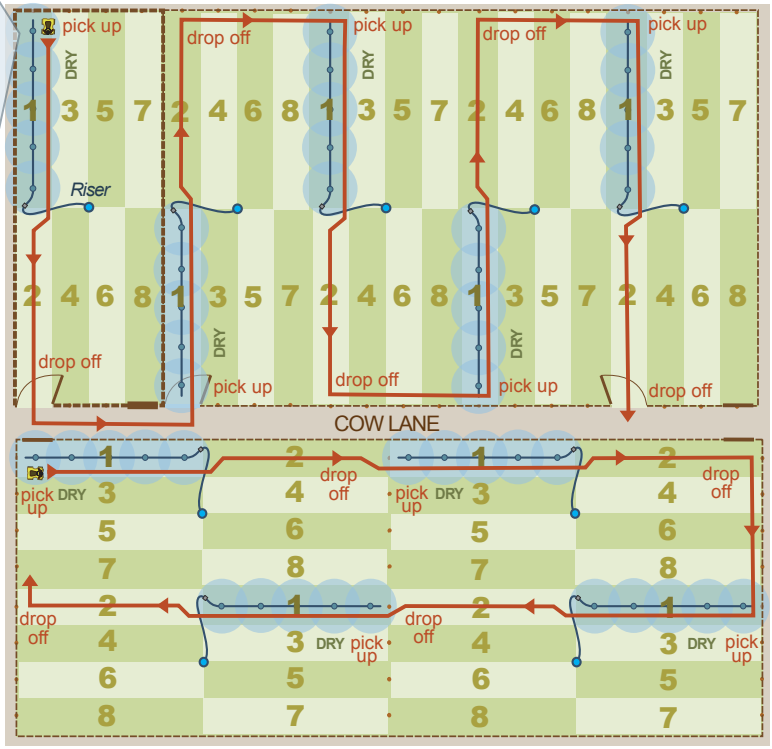
If you built each K-Line in the area that it will irrigate, see **"K-Line Shifting"** on page 8 and 9 and the explanation of a **"False Cast"** on page 10 for helpful hints on how to reposition the K-Line.

If you need to move your K-Line to another field, follow these guidelines:

- Make use of lanes and fields with connecting gates.
- Plan ahead: use combinations of sharp turns while still in motion, false casts, and extremely gradual sweeping movements. The **"Resetting the System from Set 8 to Set 1," STEPS 4 – 7** on page 9, as well as **"K-Line Shifting"** on page 8, and the explanation of a **"False Cast"** on page 10 can be helpful.
- Avoid slow, medium 50 foot arc turns - it will increase the likelihood of overturning pods and twisting the tubing.
- If pods overturn, manually flip them back upright so that the green stripe(s) face up for the entire length of the K-Line.
- Sometimes it is necessary to manually straighten the line to reduce the severity of an arc.
- At fences, it is sometimes easier to unhook the K-Line, move the vehicle to the other side of the fence, then reconnect and tow the K-Line under the fence.

Place each K-Line approximately 25' (or half of the Set distance) from the fence or edge of the area to be irrigated. The end pod should be approximately 30' from the end of the area to be irrigated (as illustrated above).

Isolated Field **Open Grazing or Hay Field** *(Side by Side)*



Open Grazing or Hay Field *(End to End)*

Initial K-Line Placement and Shifting Steps

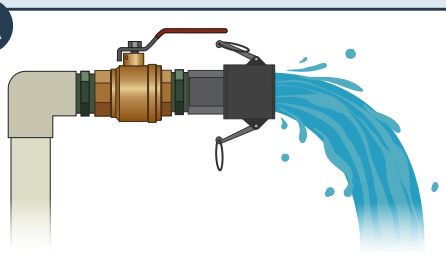
The diagram to the upper right illustrates the initial placement and the process of moving K-Lines through a normal farm operation. You now have your risers (hydrants) positioned to efficiently irrigate the field. How you initially position your K-Lines will also help you avoid excess travel back and forth across the field saving both time and money. The diagram shows the layout of three individual fields, a small "isolated" fenced in field with one line of K-Lines, an "Open Grazing or Hay Field" with 4 K-Lines above the cow lane, and another "Open Grazing or Hay Field" with four K-Lines below the cow lane.

The most efficient movement process is to position the various K-Lines in the way that allows the operator to reach the next K-Line quickly after dropping the K-Line that has just been moved. After initially placing the first K-Line in the field so that its end is up field, place the next K-Line beside it so that its end is downfield as shown above the cow lane in the diagram. Continue alternating the ends of the K-Lines across the field as shown. Then when the operator moves the first K-Line to the opposite end of the field after the first watering set, it is only a short distance to the end of the second K-Line and so forth across the field. The red line on the diagram shows the path the operator would take in shifting the various sprinkler K-Lines during a normal shift process. Often, a K-Line can be moved this way in an average time of 4-5 minutes per K-Line.

The diagram below the cow lane shows the advantage of placing the K-Lines in a large open field area that is aligned end to end. The end of the second K-Line is usually sitting in line with the operator as soon as the first K-Line is dropped. This shifting process is very fast and efficient.

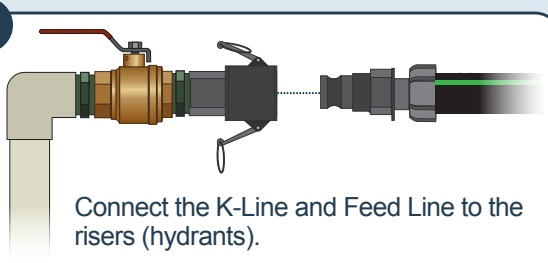
STEP 13: Flushing the Lines

A



The underground mainline and branch lines should be thoroughly flushed after installation, (but before connecting the K-Lines) to remove dirt and plastic chaff. Opening the final riser on the mainline and each of the branch lines for 10-15 minutes should be sufficient.

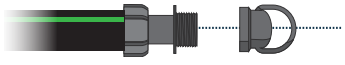
B



Connect the K-Line and Feed Line to the risers (hydrants).

C

Unscrew the hand-tightened Hook Cap from the male adapter at the end of the K-Line and put it near the last pod to prevent misplacing it.

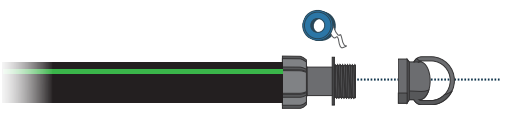


D

Flush each K-Line for several minutes.

E

Turn off the water and reattach the Hook Cap back into place tightly using pipe wrenches, or large pliers, and Teflon tape.



K-Line Shifting

Please also refer to the K-Line Installation DVD to learn how to shift the K-Line System.

Shifting from Set 1 to Set 2

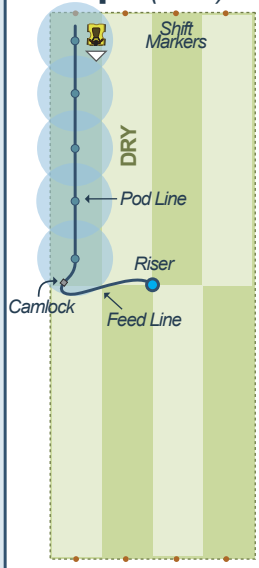
You can shift K-Line Irrigation with an ATV, heavy duty lawn tractor, golf cart, Gator, or similar tow vehicle. Shift Markers placed at the end of the fields are especially beneficial when becoming accustomed to shifting the K-Line, or in irregularly shaped fields - See the hint on page 10. The preferred method of movement is while the sprinklers are in operation. This saves shifting time and the water pressure in the K-Line tubing helps prevent kinking.

The two most important practices to follow when shifting:

1. ALWAYS Shift on the "dry" side. Always begin the shifting procedure on the dry (unirrigated) side of the K-Line. The "dry" (unirrigated) side of a K-Line is the side next to the section(s) of the field that have not been irrigated. This is opposed to the "wet" (irrigated) sections or "Sets" which have been irrigated previously. This will prevent "double loops" in the Feed Line and reduce chances that the tubing will get kinked. Please refer to the illustrations below and note that the "wet" (irrigated) and "dry" (unirrigated) Sets have been labeled.

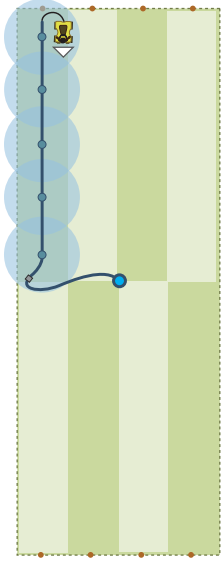
2. When connecting to the K-Line, always face towards mid-field and position the tow vehicle 6 - 8' from, and parallel to, the K-Line.

Step 1 *(Set 1)*



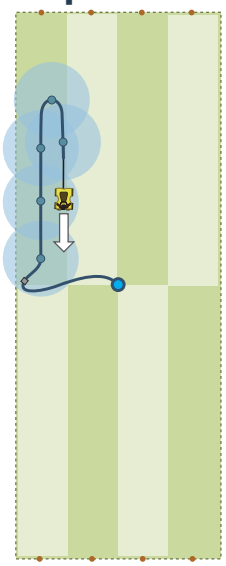
Facing the far end of the field, position your vehicle along side and 6 - 8' away from the sprinkler/pod line.

Step 2



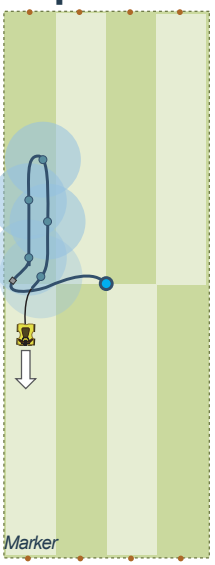
Attach the hook and rope at the end of the sprinkler/pod line to the tow vehicle.

Step 3



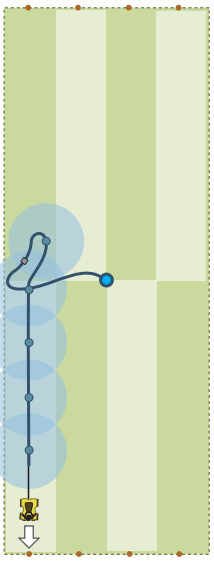
Drive along (parallel to) your sprinkler/pod line, staying within 6 - 8' of the line.

Step 4



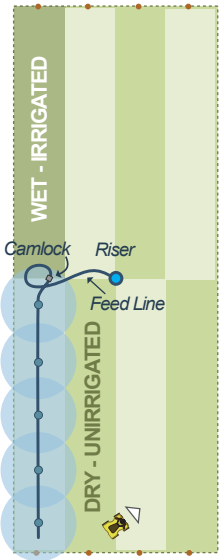
As you approach the midpoint of your field (running over the feed line), line up with your marker at the end of the field.

Step 5



Continue to the end of the field and stop when the first pod is approximately 30' from the end of the field.

Step 6 *(Set 2)*

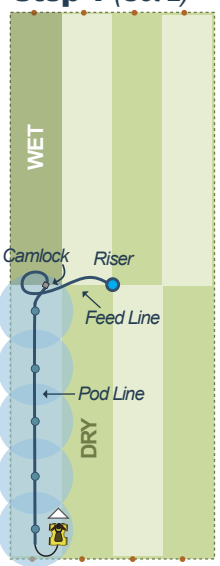


Unhook the sprinkler/pod line from your tow vehicle.

Shifting from Set 2 to Set 3

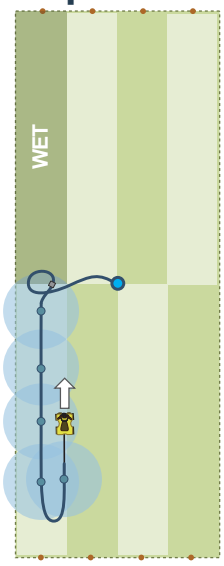
The following steps show how to move the K-Line 50' over to the right for the next set.

Step 1 *(Set 2)*



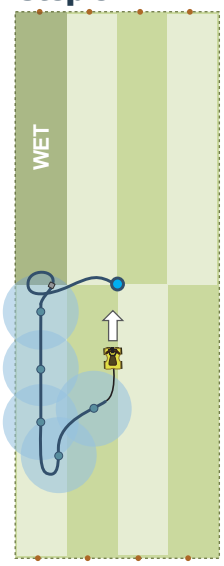
Position your vehicle as described above and hook the sprinkler/pod line to the tow vehicle.

Step 2



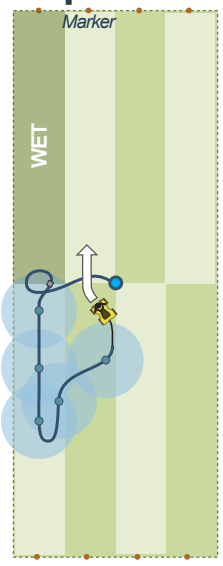
Pull straight forward until you reach the third pod.

Step 3



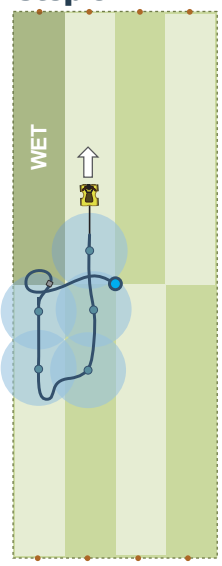
Veer right about 50' and straighten to align the vehicle with the end of the field.

Step 4



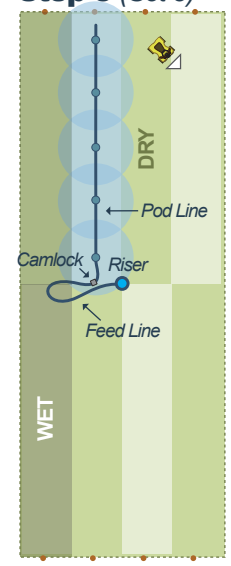
Before reaching the center line, veer back slightly to the left and line up with the marker at the end of the field .

Step 5



Pass over the feed line and continue to the end of the field.

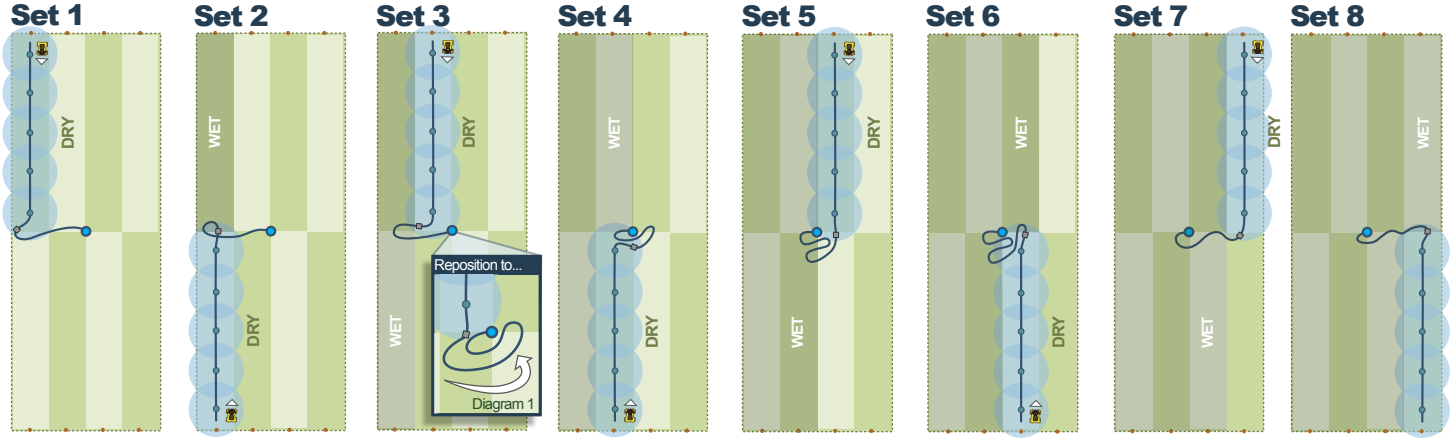
Step 6 *(Set 3)*



Unhook the vehicle from the sprinkler/pod line.

Follow the steps above to shift the line to irrigate all the sections of the field.

Example of a Complete Shifting Schedule



This is an example of the Sets and order of shifts to completely irrigate a field. For other field shapes and sizes please consult your K-Line dealer.

Repositioning the Feed Line

You will need to reposition the Feed Line at least once (sometimes more often) as you shift from Set to Set. In this Shifting Schedule, after the 2nd shift, where the K-Line is positioned to irrigate Set 3, the operator must manually take hold of the Feed Line at the point of the loop furthest from the riser. Then, as shown in **Diagram 1**, the operator must pull the Feed Line loop to a point about 15-20' to the right of the riser at mid-field.

The operator may also need to reposition the Feed Line if they see that the first sprinkler/pod (the sprinkler/pod closest to the riser or mid-field) is out of alignment with the other pods.

In this Shifting Schedule, this is most likely to occur after shifting the K-Line to the Set 7 position. In this situation, just pull the Feed Line (near the cam lock connection) to reposition the sprinkler/pod and Feed Line. Once the operator becomes familiar with the shifting procedure, the need to reposition (as in Set 7) will be less often.

K-Line Shifting Hints

To keep the final sprinkler (pod closest to the tow vehicle during shifting) from spraying the operator during shifting, use a clothes pin to prevent sprinkler movement, or a coffee can (or similar) over the sprinkler to redirect the spray. Remove after the K-Line has been shifted.

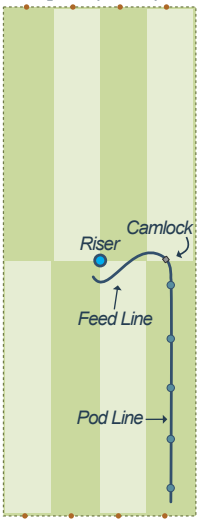
Always position the tow vehicle 6 - 8' from the K-Line to be shifted on the dry (unirrigated) side of the K-Line - SEE page **8-9**. This will prevent "double loops" in the Feed Line and reduce chances that the tubing will get kinked. Mark the ends of the field with large different colored markers or flags to help position your lines properly. See page 10 "Shift Markers" for details.

The first sprinkler/pod may be out of line with the rest of the sprinklers/pods if you have not positioned the last pod (the sprinkler/pod furthest from mid-field) approximately 30' from the edge of the field; OR if the Feed Line needs to be repositioned (as after moving the K-Line to the Set 3 or Set 7 positions – see above, Repositioning the Feed Line, for more details).

Shifting K-Line in hot weather without water running through the tubing increases the chance of kinking. EITHER shift the line while irrigating, OR shift (without water running) in the early morning or early evening when the tubing is cool.

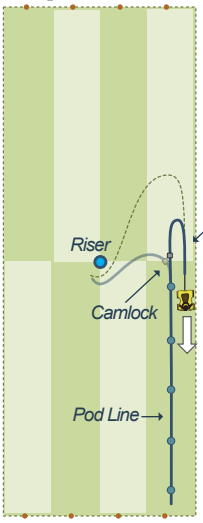
Resetting the System from Set 8 to Set 1

Step 1 *(Set 8)*



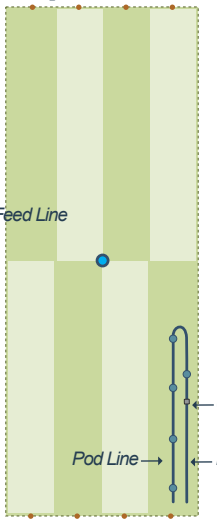
Turn off the water. Disconnect the Feed Line from the riser.

Step 2



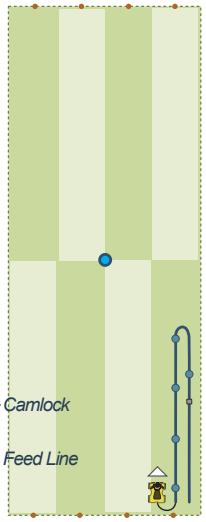
Begin to reposition the Feed Line by making a wide arc away from the sprinkler/pod line, moving to the far side and 6 - 8' from the sprinkler/pod line.

Step 3



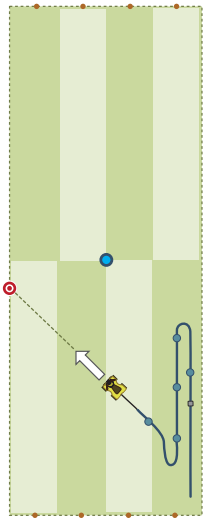
Reposition the Feed Line to run parallel to the pod line (on the far side of the field). The cam fitting that connects to the riser should be near the hook cap.

Step 4



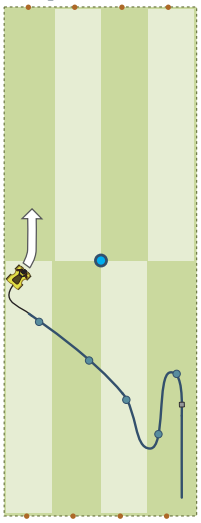
Position your vehicle along side and 6 - 8' from the sprinkler/pod line facing the far end of the field. Hook the sprinkler/pod line to the tow vehicle.

Step 5



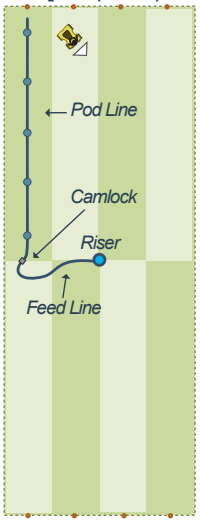
Pull forward to the second pod, then angle left aiming for a point short of the center of the far side of the field.

Step 6



Drive to the edge of the far side of the field. Before passing the center line, turn back and position yourself in the middle of Set 1.

Step 7 *(Set 1)*



Continue to the end of the field. Unhook the sprinkler/pod line from the tow vehicle. Reposition the Feed Line and reconnect the Feed Line to the riser.

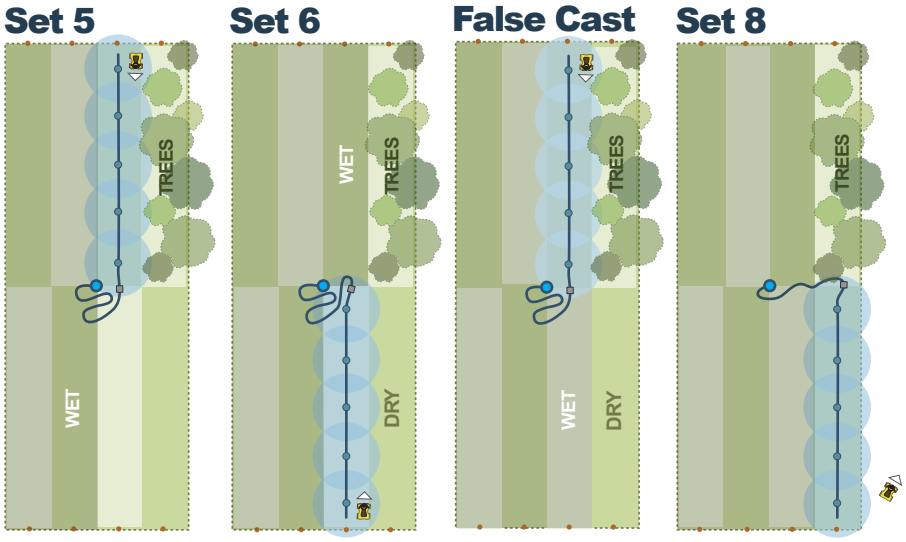
False Casting

K-Line offers versatility unparalleled by other large irrigation systems. In odd or irregularly shaped fields, in a pivot corners, or fields where there is a large continuous obstruction, you may have a "Set" or "Sets" that you do not irrigate. In these situations you perform a K-Line "False Cast."

A "False Cast" is when you move the K-Line into a Set momentarily in order to gain a better position to maneuver into another Set.

As illustrated, we have irrigated Sets 1 through Set 6, however, the area that would normally be our Set 7 is almost completely obstructed by trees and will not be irrigated.

The K-Line must move upfield in order to come back into the last dry downfield position approximately 50' over to the right.



In this situation, we shift the K-Line back upfield into the Set 5 area just as if we were going to irrigate it - this is our "False Cast". IMMEDIATELY reposition the tow vehicle 6 - 8' from the K-Line, facing downfield, and move into the last set.

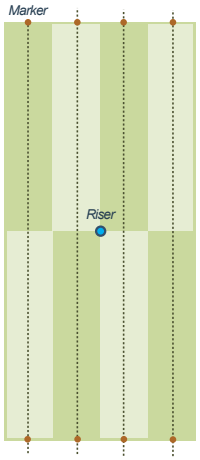
A False Cast almost always requires that the Feed Line and start of the K-Line be repositioned (see "Repositioning the Feed Line" on page 9).

The False Cast maneuver is also useful in the process of repositioning a K-Line to another area of the field (ie, during initial installation when moving the K-Line from the layout area to the initial irrigation position).

Shift Markers

Placement of markers at the end of the field (in the center of each Set width – see the Diagram to the right) gives the operator a target to aim for when shifting the K-Line.

Markers are often brightly colored (fluorescent yellow, orange, or red) streamers that can be attached to a fence; or metal "T" posts driven into the ground, with a 1½" by 6' PVC sleeve slid over top that offers excellent visibility.



K-Line Portable Stock Tank

The K-Line Portable Stock Tank allows the herd immediate and easy access to water – keeping the herd grazing and not walking. Grazing efficiency increases milk production and weight gain.

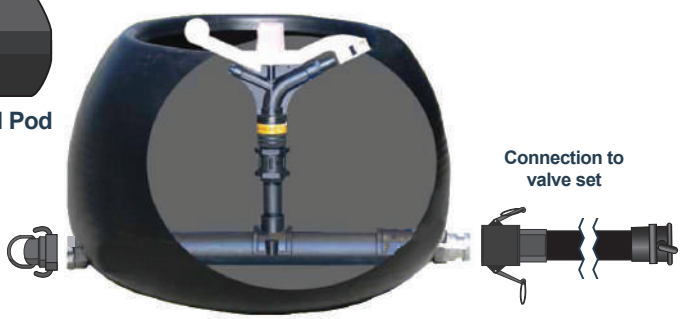
The heavy-duty stainless steel tank is designed to reduce dirt and algae build up and is easily moved with a small tow vehicle to under-used areas of the pasture to encourage grazing, or moved with the herd when following a rotational plan - encouraging better manure dispersal, more quality forage growth and increased consumption of forage.

Rather than one or two permanent waterers and the accompanying concrete pad, mud holes, and soil compaction in ***every*** paddock, ***one*** K-Line Portable Stock Tank can service up to 150 cow/calf pairs in one herd. Stock water supply lines are buried in the same trench as the K-Line Irrigation supply lines with risers/hydrants located along the fence lines. See the back page of this Manual, your K-Line Dealer or www.k-linena.com for further details.

K-Line for VTS and Effluent Disposal

K-Line's low application rate, corrosion resistance and versatility of movement makes K-Line unparalleled in efficient effluent disposal and is the best solution for a Vegetative Treatment System (VTS). With proper solid treatment or separation, the K-Line Standard Pod and Naan 5/32" impact sprinklers have revolutionized effluent disposal.

Standard Pod



K-Line's New Max 80 Pod

K-Line's new Mid Pod and Max Pod systems with Senninger 5023, 7025 and 8025 sprinklers with nozzles from 3/16" up to 5/8", allow distribution of low quality liquids over a large area (up to a 168' diameter/pod - replacing travelling irrigators).

K-Line's all-plastic systems are designed and built to withstand the corrosive effects of effluent. The large nozzles minimize blockages but the low application rates still allow you to match your soil infiltration rate - minimizing leaching or runoff. The large pods, with heavy duty bases, provide the stability needed for the large sprinklers. Lines are easily separated by cam locks and shifted in short lines or individually depending on the system used.

K-Line Trouble Shooting Guide

Symptom	Possible Cause / Solution
Partial or poor distribution from sprinkler	▪ plugged nozzle - remove nozzle, check for obstruction. ▪ obstruction in tubing - remove hook cap and flush line ▪ improper pump pressure - check pump ▪ damaged tubing leaking water - make square cuts to remove the damage, install Straight Coupling as described on page **6**, **STEP 11C** ▪ saddle improperly mounted on tubing - remove and mount according to pages **4 and 5, STEP 8**
Pods rolling over during shifting	▪ towing vehicle is too far from K-Line - keep 6 - 8' from the pod line while shifting
Connectors coming loose	▪ improper tightening of the K-Line connectors - cut off and discard 3" of old scarred tubing when repairing (make sure that you have a square cut), then use pipe wrenches to more firmly tighten the connectors - see page **6, STEP 10A.** If this fails, replace fitting with new fitting with sharp edges.
Water Stream hits the inside of the pod	▪ tapping saddle is improperly tightened down - reposition tapping saddle and tighten down evenly, see pages **4 and 5, STEP 8**
Feed Line loop gets too tight	▪ Feed Line needs to be repositioned - see page **9, "Repositioning the Feed Line"** ▪ Feed Line is too short - add more tubing or narrow the width of the irrigated area
K-Line tubing gets kinked	▪ failure to reposition Feed Line – see page **9, "Repositioning the Feed Line"** - ▪ shifting the K-Line without water running when temperatures are hot - -straighten the kinked K-Line tubing and use a rubber mallet to lightly pound the tubing back into shape

Storing the K-Line During Winter and Harvest

Unhook the Feed Line and K-Line from the riser and shift it to the side of the field. Setting the K-Line on an incline, and the action of shifting the K-Line itself, will remove most of the water from the K-Line. K-Line tubing will also stretch slightly to withstand some freezing. Open all riser and drain valves to drain the system and cover any open risers or tubing ends (cam dust caps and plugs are available) to prevent small animals from nesting inside.

If a significant amount of grass has grown up and entangled the K-Line (i.e., from Fall through to late Spring when you begin irrigating again) then be sure to manually loosen the pods from the grip of the forage before shifting the K-Line.

Post Harvest Irrigation Plan

Following the harvest or grazing of a pasture, only a small portion of the plant's root zone remains active (proportional to the above ground vegetation remaining). Maximum return on your irrigation investment requires a 3 part procedure.

1.Quickly cover the harvested area with enough water to fill the active root zone (4 - 8") by shifting every 8 - 12 hours. This provides the active root zone with enough moisture to begin regrowth. If we do not have water in the top 4" of the root zone, the vegetation will remain dormant until it gets that moisture. Irrigating deeper than the 4 - 8", or applying water more quickly than the soil can absorb will be of little benefit and will result in water and nutrients pooling in low areas, evaporating away or running off into non-target areas.

2. Follow up the "quick shot" with a normal deep watering where we slowly fill the entire soil profile of the now expanded root profile. This maximizes water and nutrient uptake by the plant, maintains moisture in the root zone for a much longer period of time and encourages a stronger, more extensive root system which supports healthier plants capable of quicker more efficient regrowth. The 2nd step may be repeated depending on the rotation schedule.

3. Allow the forage and soil to dry out for several days prior to grazing or harvest. This reduces the possibility of compaction and more importantly allows the pasture to dry down – which makes the pasture more palatable and results in greater daily gains.

Sprinkler Options

NAAN 5022 IMPACT SPRINKLER

order code: **NAAN-5022 -(x)** Nozzle Options: x = **O = Orange 7/64"** **R = Red .118"** **G = Green 1/8"** **BU = Blue 9/64"** **BK = Black 5/32"**

Application rates of 2 - 5 gallons per minute depending on nozzle and pressure.

K-LINE NAAN ADAPTER (connects NAAN 5022 sprinkler to the K-Line Saddle)
order code: **NAAN-ADAPT** 1/2" mnpt (bottom) x 1/2" fnpt (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)
order code: **KLTPS32** 32mm Tapping Saddle
KLTPS40 40mm Tapping Saddle
KLTPS45 45mm Tapping Saddle

NELSON R2000WF WINDFIGHTER

order code: **R2000WF-(x)** Nozzle Options: x = **G = Green 7/64" Nozzle and Green Plate**
T = Tan 15/128" Nozzle & Red Plate
R = Red 1/8" Nozzle & Red Plate
A = Gold 9/64" Nozzle & Gold Plate
B = Brown 5/32" Nozzle and Brown Plate

Application rates of 2 - 5 gallons per minute depending on nozzle and pressure.

K-LINE NELSON ADAPTER (connects Nelson Windfighter Sprinkler to the K-Line Saddle)
order code: **NEL-ADAPT** 1/2" mnpt (bottom) x 1/2" male ACME (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)
order code: **KLTPS32** 32mm Tapping Saddle
KLTPS40 40mm Tapping Saddle
KLTPS45 45mm Tapping Saddle

NELSON R2000WF WINDFIGHTER - Pressure Regulated

order code: **R2000WF-(x)** Nozzle Options: x = **G = Green 7/64" Nozzle and Green Plate**
T = Tan 15/128" Nozzle & Red Plate
R = Red 1/8" Nozzle & Red Plate
A = Gold 9/64" Nozzle & Gold Plate
B = Brown 5/32" Nozzle and Brown Plate

Application rates of 2 - 5 gallons per minute depending on nozzle and pressure.

NELSON MINI REGULATOR
order code: **NEL-REG-(x)** Regulator Options, x = **40 = 40 psi**
45 = 45 psi
50 = 50 psi
1/2" fnpt (bottom) x 1/2" male acme (top)

K-LINE NELSON NIPPLE (connects Nelson Mini-Regulator to the K-Line Saddle)
order code: **NEL-NIPPLE** 1/2" mnpt (bottom) x 1/2" male ACME (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)
order code: **KLTPS32** 32mm Tapping Saddle
KLTPS40 40mm Tapping Saddle
KLTPS45 45mm Tapping Saddle

Sprinkler Options (continued)

WEATHERTEC G50 WEDGE DRIVE

order code: High Uniformity - **G5023V-H-(x)**

Nozzle Options: x = **5 = 5.5 Nozzle**
6 = 6.5 Nozzle
7 = 7.5 Nozzle

Flow Control - **G5023V-F-(x)**

Nozzle Options: x = **O = Orange 7/64”**
W = White 1/8” Nozzle

Application rates of 2.2 - 3.5 gallons per minute depending on nozzle and pressure.

K-LINE NAAN ADAPTER (connects Nelson Windfighter Sprinkler to the K-Line Saddle)

order code: **NAAN-ADAPT** 1/2” mnpt (bottom) x 1/2” fnpt (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)

order code: **KLTPS32** 32mm Tapping Saddle
KLTPS40 40mm Tapping Saddle
KLTPS45 45mm Tapping Saddle

NELSON R33 3/4”

order code: **R33-(x)**

Nozzle Options: x = **9 = Gold 9/64”** **10 = Brown 5/32”**
11 = Gray 11/64” **12 = Green 3/16/”**

Application rates of 3.6 - 8 gallons per minute depending on nozzle and pressure.

K-LINE NELSON R33 ADAPTER (connects Nelson R33 sprinkler to the K-Line Saddle)

order code: **NEL-ADAPTR33** 1/2” mnpt (bottom) x 3/4” male ACME (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)

order code: **KLTPS32** 32mm Tapping Saddle
KLTPS40 40mm Tapping Saddle
KLTPS45 45mm Tapping Saddle

K-LINE POP-UP ASSEMBLY WITH NELSON R2000 9 DEGREE SPRINKLER

order code: **R2000-(x)**

Nozzle Options, x =
GY = Gray 1/16” Nozzle & Green Plate
W = White 9/128” Nozzle & Green Plate
B = Blue 5/64” Nozzle & Green Plate
O = Orange 11/128” Nozzle & Brown Plate
P = Purple 3/32” Nozzle & Brown Plate
Y = Yellow 13/128” Nozzle & Purple Plate
GR = Green 7/64” Nozzle & Purple Plate
T = Tan 15/128” Nozzle & Orange Plate
R = Red 1/8” Nozzle & Orange Plate
B = Brown 5/32” Nozzle and Brown Plate

Application rates of .77 - 2.89 gallons per minute depending on nozzle and pressure.

K-LINE POP-UP ASSEMBLY

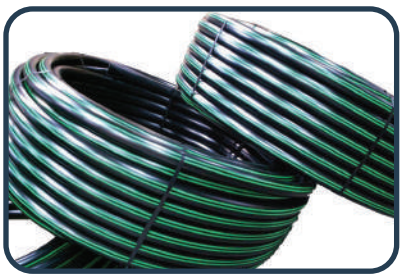
order code: **RXPOP-UP** 1/2” fnpt (bottom) x male acme (top)

K-LINE TAPPING SADDLE (includes nuts and washers for u-bolt in pod)

order code: **KLTPS32** 32mm Tapping Saddle
KLTPS40 40mm Tapping Saddle
KLTPS45 45mm Tapping Saddle

K-Line Components and Fittings

K-Line Custom Engineered Polyethylene Tubing



K-Line tubing is custom engineered to take the stress and abuse associated with pulling and moving across broken, uneven ground.

The polyethylene used in our K-Line tubing is a low-density molecular cross-linked resin that is blended with polyethylene of high tensile strength - resulting in an extremely strong and durable product. A maximized level of UV inhibitors severely limits breakdown from UV light, and the ability to flex allows the tubing to withstand freezing temperatures and being repeatedly run over by small vehicles – all with no apparent breakdown in structure or functionality even after many years of continuous use.

Available in:

Striping	Item Number	Description	Rolls/Pallet
	KL32LD-375	32mm K-Line Linear Low Density Tubing x 375 feet, 95 lbs/roll	4 Rolls
	KL40LD-300	40mm K-Line Linear Low Density Tubing x 300 feet, 81 lbs/roll	4 Rolls
	KL45LD-275	45mm K-Line Linear Low Density Tubing x 275 feet, 85 lbs/roll	4 Rolls
	KL50LD-250	50mm K-Line Linear Low Density Tubing x 250 feet, 94 lbs/roll	4 Rolls

15 pods fit neatly inside 32 & 40mm pallets of coils. 20 pods will fit inside 45 and 50mm pallets of coils.

Pods

KL-POD-1A K-Line Pod w/ Stainless Steel U-Bolt (This pod and U-Bolt are generic to all 32, 40, and 45mm systems) 5 lbs/pod

Bag of 5 or Pallet of 50

Galvanized Hook Caps

RXGHC32 Galvanized Hook Cap 32mm
RXGHC40 Galvanized Hook Cap 40mm
RXGHC45 Galvanized Hook Cap 45mm

Straight Couplings

KLASC32 Straight Coupling (CompxComp) 32mm
KLASC40 Straight Coupling (CompxComp) 40mm
KLASC45 Straight Coupling (CompxComp) 45mm
KLASC50 Straight Coupling (CompxComp) 50mm

All-in-One Plastic Tow Hook

KLPTHC32 All-In-One Plastic Tow Hook 32mm
KLPTHC40 All-In-One Plastic Tow Hook 40mm

Reducing Couplings

KLARC4032 Reducing Coupling (CompxComp) 32x40mm
KLARC4540 Reducing Coupling (CompxComp) 40x45mm
KLARC5040 Reducing Coupling (CompxComp) 40x50mm

Pressure Regulator

KLPRV40-xx Pressure Regulator 1½" mipt x mipt(xx = psi)
xx= 35 psi, 43 psi, 50 psi, 57 psi, or 65 psi
Flow range = 11-35 gallons per minute

Male Adapters

KLAMC32 Male Adapter (MPTxCompression) 32mm
KLAMC40 Male Adapter (MPTxCompression) 40mm
KLAMC45 Male Adapter (MPTxCompression) 45mm
KLAMC50 Male Adapter (MPTxCompression) 50mm

Female Adapters

KLAFC32 Female Adapter (FPTxCompression) 32mm
KLAFC40 Female Adapter (FPTxCompression) 40mm
KLAFC50 Female Adapter (FPTxCompression) 50mm

Male Cam Lock x MPT

KUR-15F	Aluminum 1.5” Cam Lock Male x MPT
KUR-20F	Aluminum 2” Cam Lock Male x MPT
FLO-P15F	Plastic 1.5” Cam Lock Male x MPT
FLO-P20F	Plastic 2” Cam Lock Male x MPT

Female Cam Lock x FPT

KUR-15D	Aluminum 1.5” Cam Lock Female x FPT
KUR-20D	Aluminum 2” Cam Lock Female x FPT
FLO-P15D	Plastic 1.5” Cam Lock Female x FPT
FLO-P20D	Plastic 2” Cam Lock Female x FPT

Male Cam Lock x FPT

KUR-15A	Aluminum 1.5” Cam Lock Male x FPT
KUR-20A	Aluminum 2” Cam Lock Male x FPT
FLO-P15A	Plastic 1.5” Cam Lock Male x FPT
FLO-P20A	Plastic 2” Cam Lock Male x FPT

Female Cam Lock x MPT

KUR-15B	Aluminum 1.5” Cam Lock Female x MPT
KUR-20B	Aluminum 2” Cam Lock Female x MPT
FLO-P15B	Plastic 1.5” Cam Lock Female x MPT
FLO-P20B	Plastic 2” Cam Lock Female x MPT

Pipe Unions

APU32	Pipe Union 32mm
APU40	Pipe Union 40mm
APU50	Pipe Union 50mm
APU4032	Reducing Pipe Union 40mm x 32mm

Brass Ball Valve

BBV-05	Brass valve 0.5”
BBV-15	Brass valve 1.5”
BBV-20	Brass valve 2”

U-Bolt

UBSS32/40 SS U-Bolt for Pods, #8 Metric thread.

Reducing Bushings

KLRB5040 Reducing bush 50/40mm

K-Line Accessories

Shifter Ball

SHIFTR-BALL 6 1/4” diameter bright orange balls for quick shift pick up

Shifter Rope

SHIFTR-ROPE 7.5 feet of 5/8” nylon rope, connects orange balls to hook cap (Ensure you meet minimum tensile strength requirements when using your own rope.)

Spool Out Reel

KL/SPOOL Spool out reel for K-Line tubing (as shown).

KL/SPOOL2 Twin spool out reels positioned vertically side by side to accept both 32 & 40mm K-Line tubing.

Drill Bit with Limiter

KL/BIT Drill bit with limiter to avoid puncturing bottom of tubing

Stock Guard

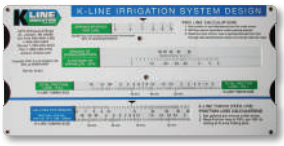
KLSG Generic stock guard with screws for all sprinkler combinations.

Coyote Guard

KLCG/NELSON K-Line coyote guard for Nelson Windfighter sprinkler.

K-Line Flow Calculator

The K-Line Irrigation System Design Slide Rule Calculator ($4.75) allows you to easily and quickly calculate friction loss, precipitation rate, and sprinkler output.



TracMap GPS

TracMap GPS systems, when used in conjunction with K-Line Irrigation, provide the accuracy and ease to move K-Lines in large fields.

K-Line Accessories

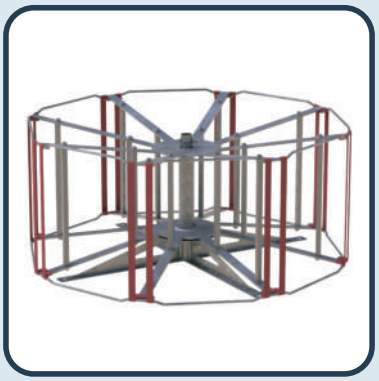
K-Line Pop-Up Sprinkler

K-Lines using the pop-up sprinkler with low angle nozzles are used in orchards and vineyards to promote new plantings, support cover crops, and increase tree vigor and production in established orchards. K-Line is movable from zone to zone and removable during harvest and orchard maintenance.

K-Line Cornering Carousel

Coming soon!

K-Line's new Cornering Carousel allows K-Line to be used in vegetables, vineyards and orchards – anywhere that the typical K-Line shifting pattern cannot be used. The device allows the user to pull the line of pods around a square corner.



K-Line Stock Tank

K-Line's Portable Stock Tank can be pulled behind an ATV or small tow vehicle and is designed to be moved with the cattle as they move through the grazing rotation.

Benefits:

- Heavy duty stainless steel tank with rugged steel tubing framework for maximum durability and longevity.
- Low tank profile and center of gravity minimizes rubbing and potential of cattle tipping the tank.
- Minimal physical labor involved in moving the tank.
- Fields are more efficiently grazed when water is readily available.
- Minimal walking distances to water increases milk production and weight gain.
- A portable tank is rarely placed in the same location - minimizing mud holes.
- Compaction and pugging around the stock tank is minimal – when water is close, cows drink in ones and twos instead of as a mob that causes competition at the tank.
- Manure is more evenly distributed and not concentrated around a permanent tank.

K-Line Kwik Shifter II

The Kwik Shifter II with adjustable hitch is pulled behind the tow vehicle and is designed to catch a heavy-duty, bright colored plastic ball that is attached to the end of the K-Lines. After catching up the ball, the driver shifts the K-Line (at speeds up to 15mph) to the next set (area to be irrigated), pulls the trip rope which releases the ball, and then moves on to shift the next K-Line – all without stopping or dismounting. The time to shift multiple K-Lines can be easily cut in half and mounting/dismounting the tow vehicle is greatly reduced.

K-Line Stock Guard

K-Line's Stainless Steel Stock Guard is available to prevent animals from loosening or breaking the sprinklers. Most stocking situations do not require Stock Guards. If needed, the guard is screwed into pre-molded pockets.

K-Line Spool-Out Reel

K-Line's Spool-Out Reel (Single or Dual Spoolers Available) mounts easily into the receiver of a truck hitch and allows the K-Line tubing to easily be unrolled and layed out for installation.

K-Line 5 Pod 2 Acre Kit

Everything you need for a 2 acre K-Line Irrigation application, be it a small pasture, backyard, athletic field, or park.

This kit can be expanded to a 5+ acre application by combining two kits.

Your K-Line Dealer