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Typical installation of Drain-All condensate traps

By

**Control Devices, LLC
Drain-All Product Brand**

**Drain-All Technical Service
+1-314-781-7859
TechService@Drain-All.com**

Explanation of Nomenclature

Schematics are used in this presentation to give an idea of how the Drain-All condensate traps will be installed. There are **three basic Balance Line (BL)** connecting arrangements shown on the following slides:


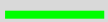
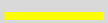



BL1 = to the vessel

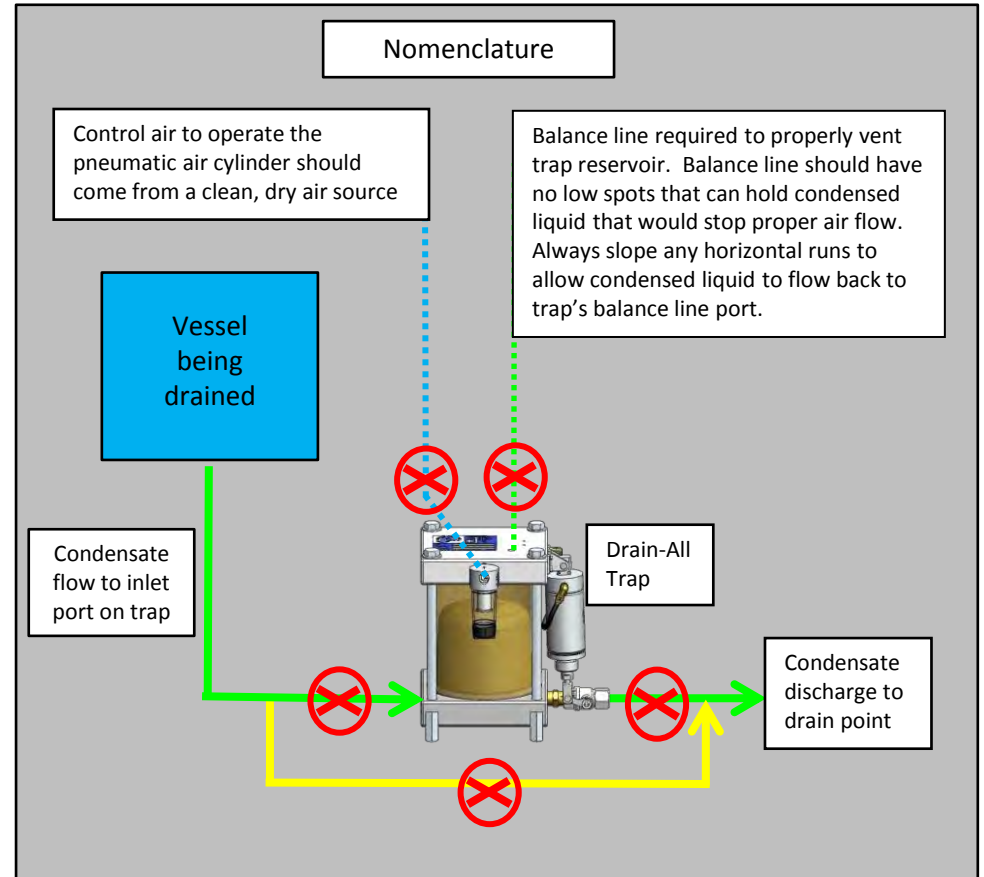
BL2 = to the drain line from the vessel

BL3 = to atmosphere

This presentation will recommend piping solutions for each type of Drain-All installation.

The following symbols and definitions are used in this report:

-  = Isolation Valve
-  = Condensate Line
-  = Bypass Line
-  = Clean, Dry Control Air Line
-  = Balance Line
-  = Dimension or Reference Line

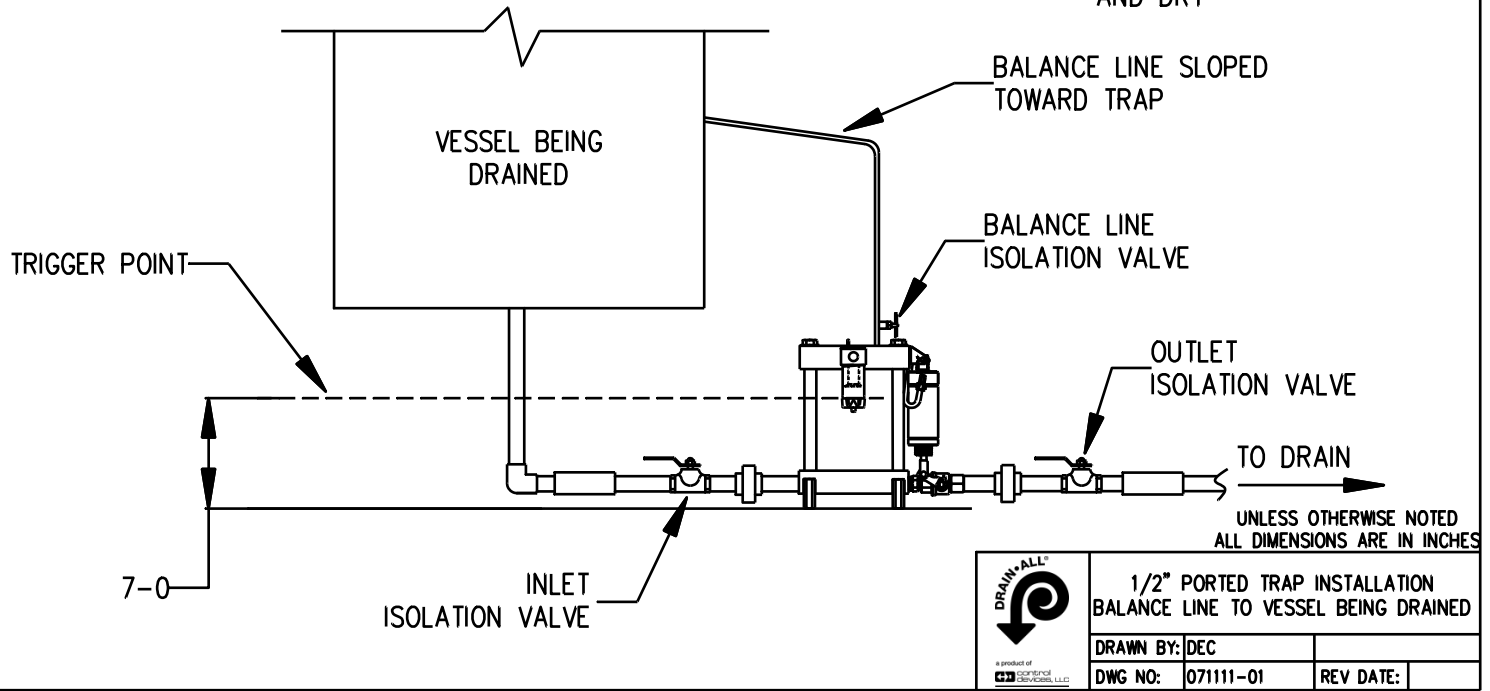
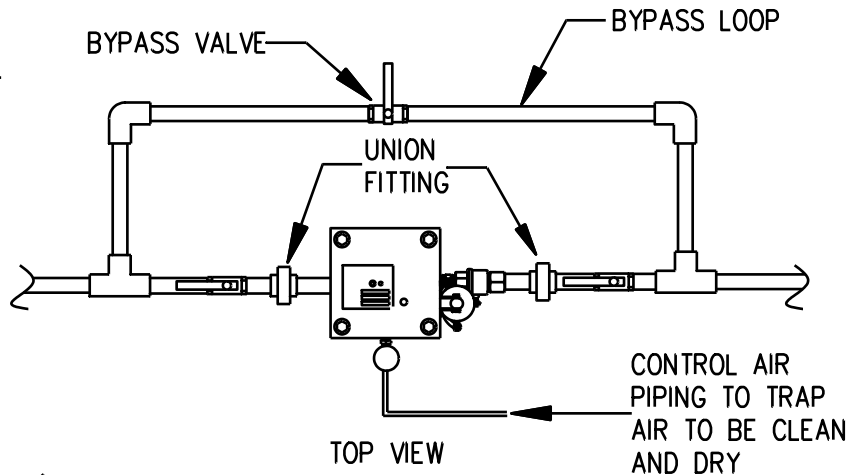


BL1

USE THIS PIPING LAYOUT DRAWING IN THE CASE WHERE THE BOTTOM OF THE VESSEL BEING DRAINED IS ABOVE THE TRIGGER POINT OF THE TRAP BUT NOT HIGH ENOUGH TO CONNECT THE BALANCE LINE TO THE VERTICAL SECTION OF THE DRAIN LINE.

CONNECT THE BALANCE LINE TO THE VESSEL BEING DRAINED SUCH THAT THE PRESSURE OF THE LIQUID ENTERING THE TRAP IS THE SAME AS THE PRESSURE ON THE BALANCE LINE.

THE BALANCE LINE MUST BE SLOPED FROM THE CONNECTION POINT ON THE VERTICAL DRAIN LINE DOWNWARD TOWARD THE TRAP.

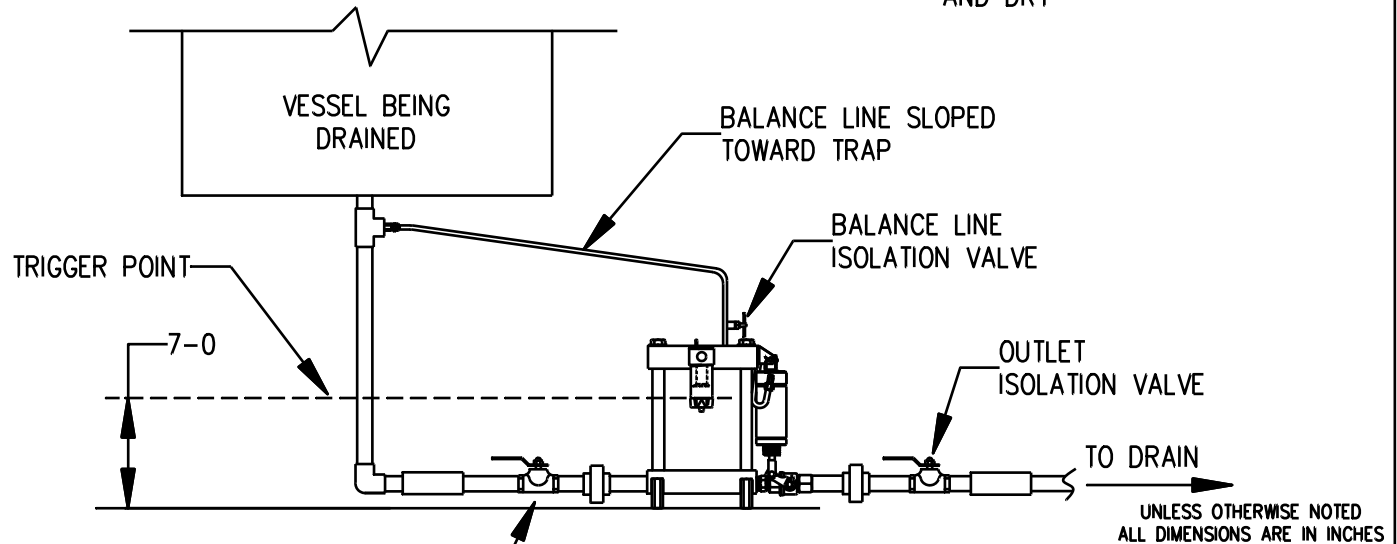
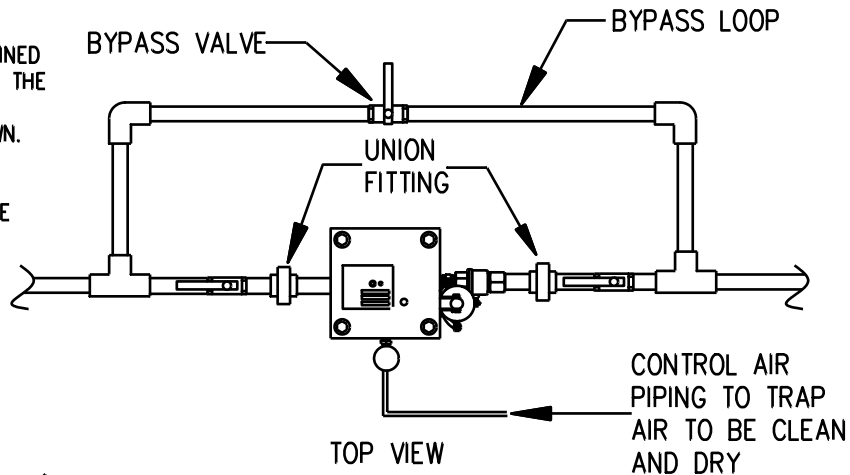


Balance Line 1 = Balance line connected to vessel being drained

BL2

USE THIS PIPING LAYOUT DRAWING IN THE CASE WHERE THE BOTTOM OF THE VESSEL BEING DRAINED IS ABOVE THE TOP OF THE TRAP ENOUGH THAT THE BALANCE LINE CAN BE CONNECTED TO THE VERTICAL SECTION OF THE DRAIN LINE AS SHOWN.

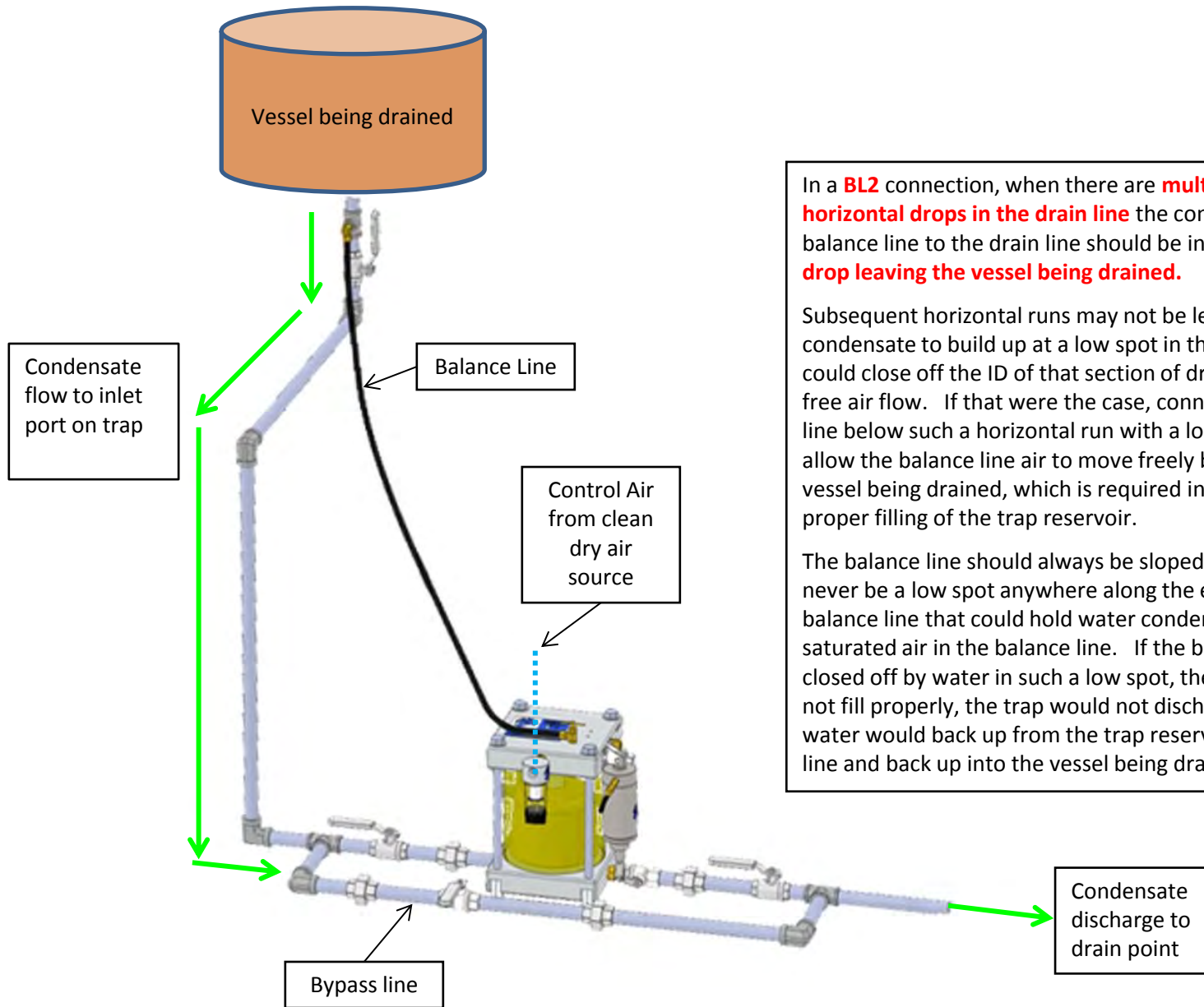
THE BALANCE LINE MUST BE SLOPED FROM THE CONNECTION POINT ON THE VERTICAL DRAIN LINE DOWNWARD TOWARD THE TRAP.



1/2" PORTED TRAP INSTALLATION BALANCE LINE TO DRAIN LINE		
DRAWN BY:	DEC	
DWG NO:	071111-02	REV DATE:

Balance Line 2 = Balance Line connect to drain line coming from vessel being drained

BL2



In a **BL2** connection, when there are **multiple vertical and horizontal drops in the drain line** the connection of the balance line to the drain line should be in the **first vertical drop leaving the vessel being drained**.

Subsequent horizontal runs may not be level and could allow condensate to build up at a low spot in those runs and that could close off the ID of that section of drain line and prevent free air flow. If that were the case, connecting the balance line below such a horizontal run with a low spot would not allow the balance line air to move freely back up into the vessel being drained, which is required in order to allow proper filling of the trap reservoir.

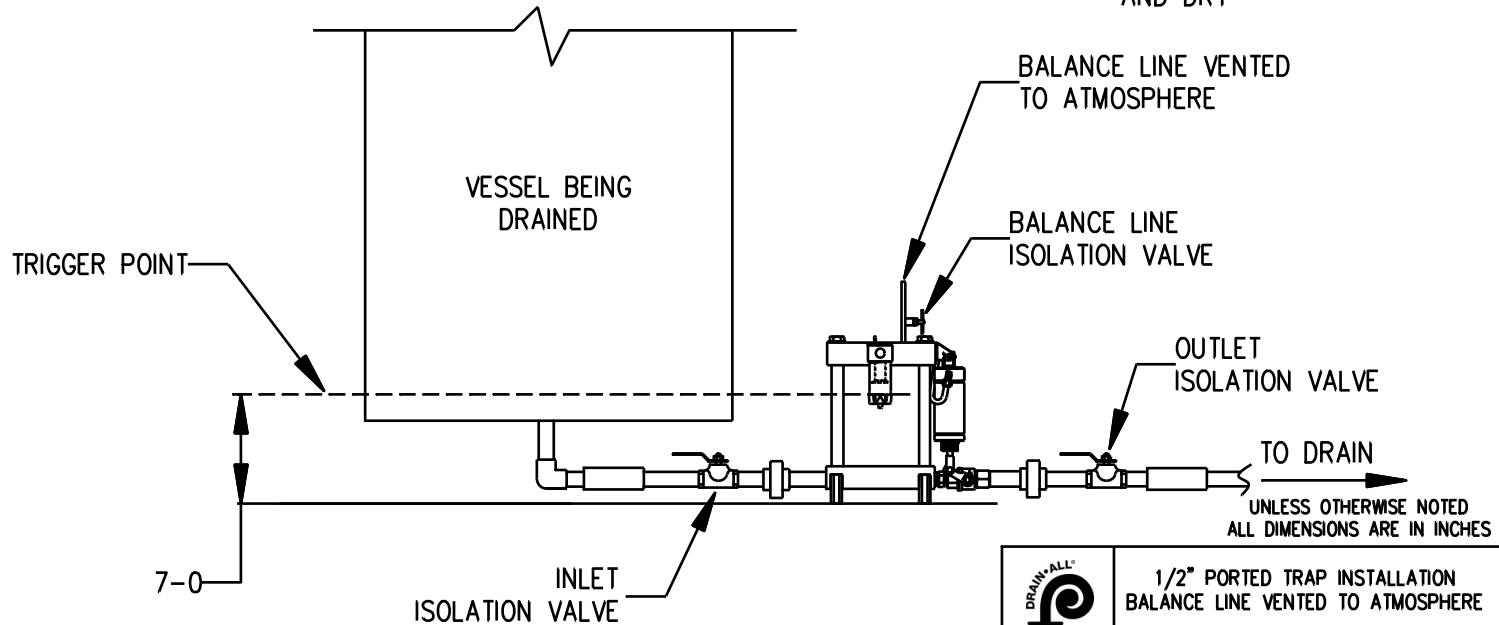
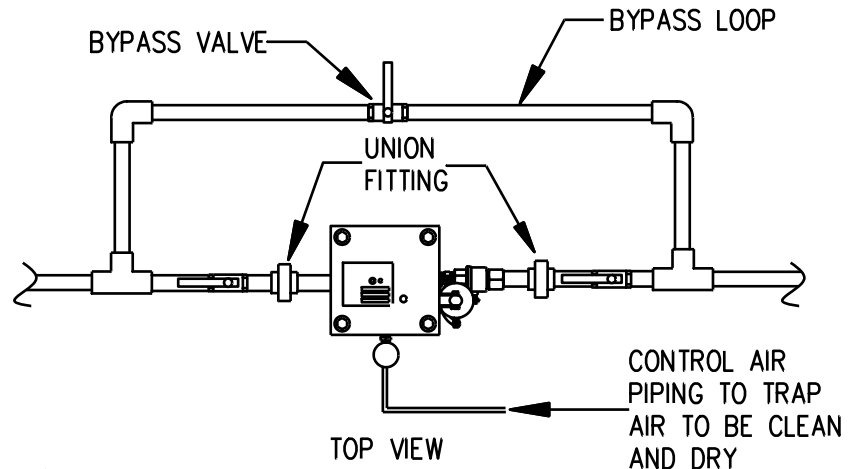
The balance line should always be sloped – there should never be a low spot anywhere along the entire length of the balance line that could hold water condensed from the saturated air in the balance line. If the balance line ID is closed off by water in such a low spot, the trap reservoir will not fill properly, the trap would not discharge properly and water would back up from the trap reservoir into the drain line and back up into the vessel being drained.

BL2 connection with multiple vertical and horizontal drain line runs

BL3

USE THIS PIPING LAYOUT DRAWING IN THE CASE WHERE THE BOTTOM OF THE VESSEL BEING DRAINED IS BELOW THE TRIGGER POINT OF THE TRAP (7 INCHES ABOVE THE FLOOR).

IN THIS CASE, THE BALANCE LINE MUST BE VENTED TO ATMOSPHERE TO PREVENT LIQUID FROM ACCUMULATING INSIDE THE VESSEL BEING DRAINED. SEE THE PRODUCT INSTALLATION GUIDE FOR THE PROCEDURE ON ADJUSTING THE AMOUNT OF VENTING PROPERLY.

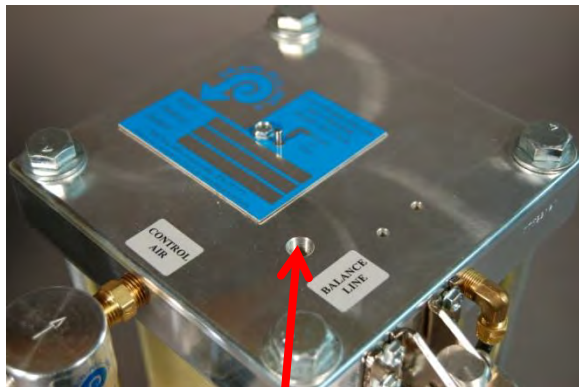


1/2" PORTED TRAP INSTALLATION BALANCE LINE VENTED TO ATMOSPHERE		
DRAWN BY:	DEC	
DWG NO:	071111-03	REV DATE:

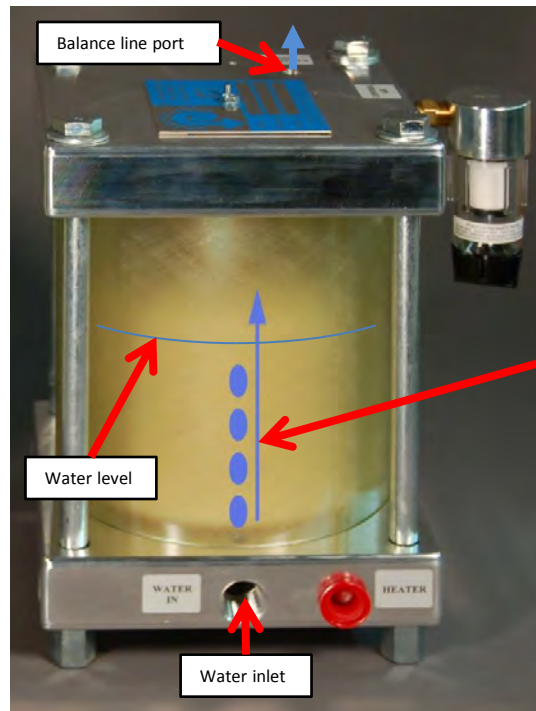
Balance Line 3 = Balance line vented to atmosphere due to low vessel bottom

BL3

When the drain port hole in the bottom of the vessel being drained is lower than the trigger point of the trap it is necessary to “**vent the balance line on the trap to atmosphere**” rather than connect the balance line back into the vessel being drained or to the drain line from that vessel. If the drain port hole in the bottom of the vessel being drained is lower than approximately 8” above the surface on which the trap is sitting, or if there is no accessible location for connecting the balance line at all, the balance line port must be vented to atmosphere. To properly vent the balance line to atmosphere, install a needle valve in the balance line port on the head of the trap and crack it open just slightly until a small flow of air is leaving the needle valve. Through the translucent reservoir sleeve of the trap, and right above the water inlet port to the trap, a small stream of bubbles can be seen going up through the water in the trap. When the balance line needle valve is properly adjusted, a continuous stream of approximately 1/2” diameter bubbles can be seen going up through the water inside the trap. Properly venting of the balance line to atmosphere consumes only a negligible amount of air 0.2 – 0.3 CFM. If no water is in the trap during set up, make sure a small flow of air is going out of the needle valve all of the time. Then, later, when water is in the reservoir, you can adjust the needle valve based on the bubbles and, again, verify that a small amount of air is going out of the needle valve all of the time.



Insert needle valve into balance line port on top of the trap. Open needle valve to achieve a small stream of air flow that should be continuous.



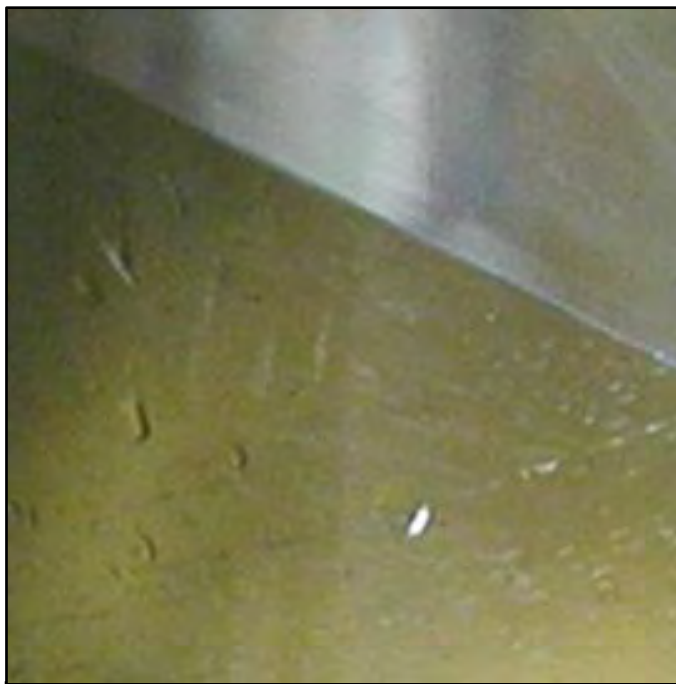
There should be a steady stream of approximately 1/2” diameter bubbles constantly moving upward in the water inside the trap’s reservoir. These bubbles leave the water in the reservoir and go out the needle valve inserted in the balance line port. This venting slightly reduces the pressure in the reservoir and this slight pressure differential allows the pressure in the vessel being drained to push condensed water down through the drain pipe and up into the trap reservoir keeping the vessel being drained dry.

Balance line 3 (BL3) how to adjust air flow when balance line is vented to atmosphere

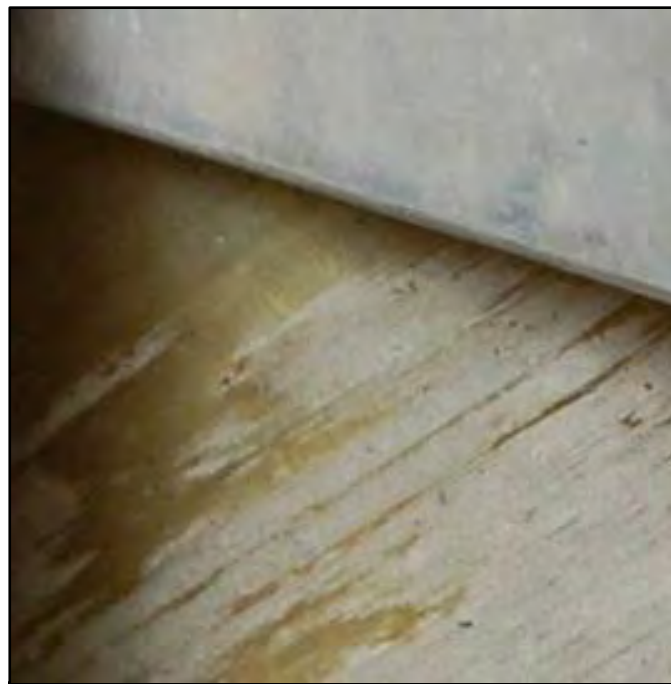
Outdoor Installations and Affect on Reservoir Sleeve

The trap's translucent epoxy fiberglass reservoir sleeve is coated on the outside with a clear lacquer to enhance translucency and allow easy viewing of the liquid in the reservoir during operation. In the photo bottom left, you can see through the sleeve and see the water drops inside the sleeve. In outdoor installations UV exposure can dull this coating and make it difficult to see into the reservoir as shown in the photo below bottom right on a sleeve exposed to UV over a long period of time. UV exposure can eventually make the fibers on the external surface of the sleeve raise up off the surface. While the translucency of the sleeve in this situation is reduced because it is outdoor use of an indoor product exposed to UV and weather, this does not usually affect the structural integrity of the sleeve.

To protect the translucency feature of the sleeve, position the trap to keep it out of direct UV exposure so that sunlight is not on it at any time during the day. This can be achieved by positioning the trap in shade relative to other equipment in the area, beside a wall, or providing a simple enclosure or sun shade to shield the trap from sun/UV, wind and rain.



Sleeve exterior surface in new condition



Sleeve exterior surface in long weathered condition

Outdoor Installation affect on trap reservoir sleeve

Outside or Indoor with Constant Wetting of Trap Exterior

Drain-All regular trap products are designed for use in indoor applications where the exterior of the trap is not kept wet from splash back, hosing down areas or extreme high humidity. When standard indoor traps are used in exterior applications or indoor applications where the product exterior is often kept wet, some external parts can show surface rust. There are Drain-All product options for such installations that include materials that resist external rusting / corrosion when the exterior is kept wet or exposed to corrosive agents. After an application's specifications are provided, an "Application Specific Product Solution" can be recommended to meet even the most demanding application requirements and provide years of service with minimal maintenance. Recommended trap location and piping solutions can also be recommended that prevent the constant wetting of the trap.



Regular trap product above as shipped and as it should remain if the outside of the trap is not frequently kept wet or exposed to corrosive agents. Other trap models are available that have components/materials that resist external corrosion.

Outside or indoor installations with constant wetting of trap

Condensate Discharge Control

Trap discharge of condensate comes out at system pressure. On standard 1/2" ported traps in a 100 PSIG system, 2 pints of water is discharged at 100 PSIG each cycle. Such discharge should be directed into a shielded drain or enclosed piping system to avoid the hazard of blowing water in someone's face or splashing condensate onto the floor causing a slip hazard. Splashing a trap's discharge can also result in corrosion for certain materials on the outside of the trap or surrounding equipment that, when left in direct contact with moisture over time, can corrode and require maintenance parts / labor. Simple discharge control planning can avoid such costs. Drain-All will review applications and make recommendations for discharge control.



Standing water on floors caused by splashing drain lines can cause a slip hazard that can result in personnel injuries.

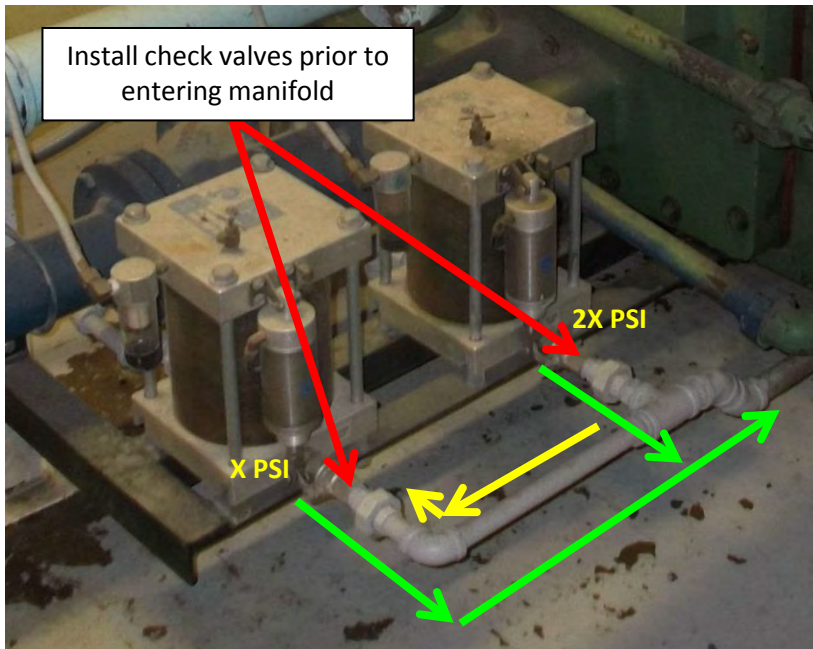


Discharge not being directed to a closed drain can splash onto the trap and other equipment in the area and cause corrosion issues. For exterior applications, such a splashing discharge can result in ice and personnel slip injuries.

Combining Discharge Lines From Multiple Traps

It is permissible to manifold the discharge lines of several traps together. This can reduce some of the installation piping necessary and clean up the overall appearance of the installation. In doing this, consider the following:

- Install check valves on the discharge lines of all traps. In the case where two traps open and discharge simultaneously, the check valves will assure that water is not forced backward (yellow arrows below left) into the lower pressure trap.
- It may be necessary to use larger piping so that the discharge from several traps can be easily accommodated in a single pipe.



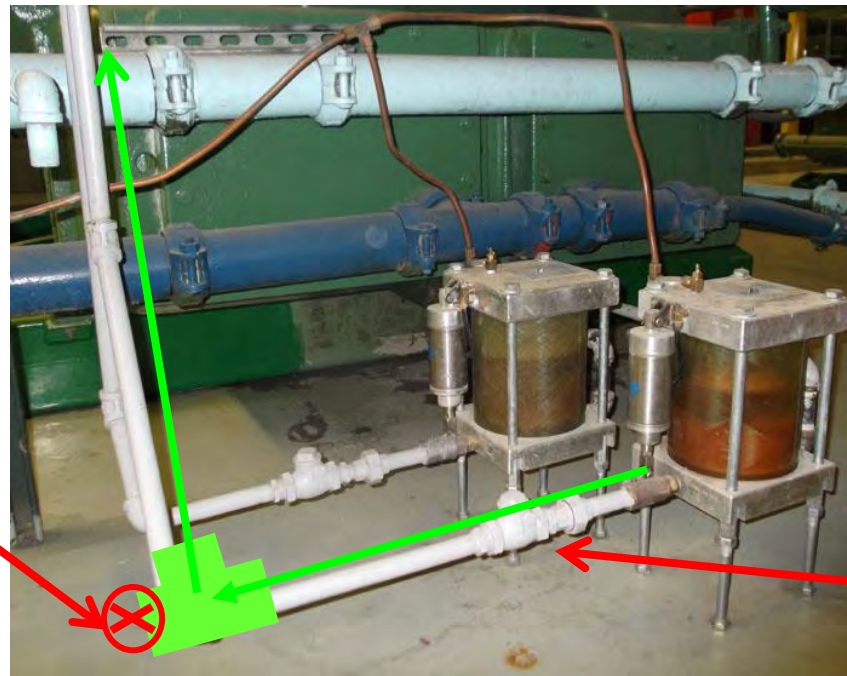
Two drains with discharge piping tied together in a common manifold. Insert check valves as shown. Note that a bypass line is missing in the trap installation shown. Bypass lines should be installed.



Discharge from several traps tied together in a single larger discharge pipe. This will better accommodate the flow rate from several traps discharging simultaneously. Note that a bypass line is missing. Bypass lines should be installed.

Discharge From Trap Vertically Upward

If the discharge from a trap travels vertically upward from the trap discharge ball valve to an elevated drain point, as shown by the green arrows below, it is important to remember that the vertical and horizontal portion of the discharge piping will be full of liquid at all times. Depending on the piping arrangement, this can be a significant amount of liquid. Installing a check valve downstream of the trap ball valve will prevent this liquid from back flowing into the trap should system pressure be removed (i.e., during a shutdown) and the test button is pressed opening the ball valve. Also, if the condensate trap is removed or the line is disconnected for any reason, the entire contents of the horizontal and vertical piping will empty out onto the floor. A ball valve installed on a tee fitting as shown below is recommended to allow draining of the vertical piping and to purge any debris build up in such vertical discharge piping arrangements.



Ball valve on tee fitting allows draining of vertical leg out to left

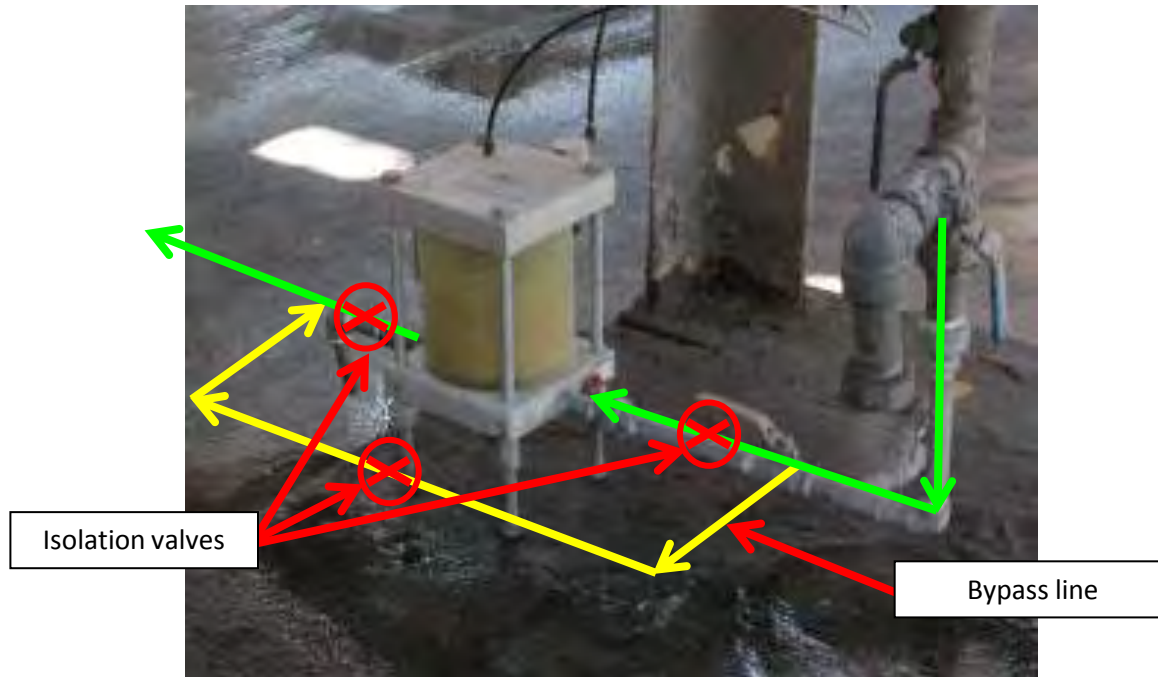
Check valve

Discharge from traps is directed upward. Install check valves to prevent back flow and install a ball valve on a tee fitting to allow draining of vertical discharge piping. Note that a bypass line is missing in the trap installation shown above. Bypass lines should be installed.

Discharge From Trap Vertically Upward

Installation of Bypass Lines

The photo below of an installation does not have a bypass line. Bypass lines are recommended as shown below in every installation so that if there is ever a need to do maintenance on a trap in place, the bypass line can be opened to allow uninterrupted draining of system liquid.



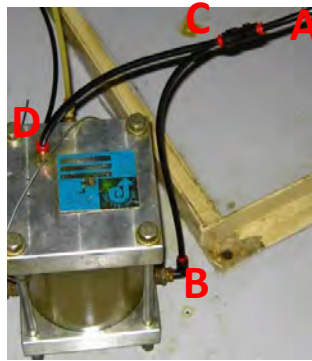
Typical installation of bypass line around the trap (shown in yellow). Isolation ball valves installed at the locations shown in red allow complete isolation of the trap while still allowing uninterrupted draining of system liquid. Note that “stilts” (short threaded rods inserted in the bottom free threads of the trap’s coupling nuts) for the trap are not required, but were used in this specific example to raise trap above a constantly wet floor. Note also that the trap’s discharge is straight down to the floor, which results in a wet floor (slip hazard) and splash back of discharged water all over the trap and surrounding equipment / beams resulting in exterior rusting / corrosion of those surfaces. A proper discharge control piping solution would prevent those issues and minimize / eliminate future maintenance labor / parts costs and avoid slip injuries / loss time accidents.

Use Full Diameter 1/2" Piping for Inlet/Outlet Lines

Using 1/2" piping on the inlet and outlet lines of the trap allows full unrestricted flow of liquid to and from the trap. Do not use smaller diameter piping or tubing which can restrict flow, reduce flow rate capacity, and lead to potential clogs in the lines.



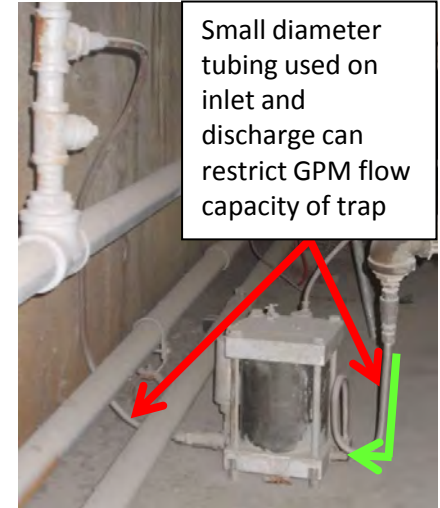
1/2" tubing has smaller inside diameter than full inside diameter 1/2" piping



Drain line A-B above is small diameter tubing. The balance line C-D is teed into the drain line at C. Such small diameter tubing is appropriate for the balance line but not the drain line. Also, the tee fitting should be as shown at left to allow condensate to flow down to the drain inlet while air can enter from the balance line and move back up to vessel. In the configuration above, condensate coming down the drain line to C pours directly into both the drain line to B and balance line to D - not correct.



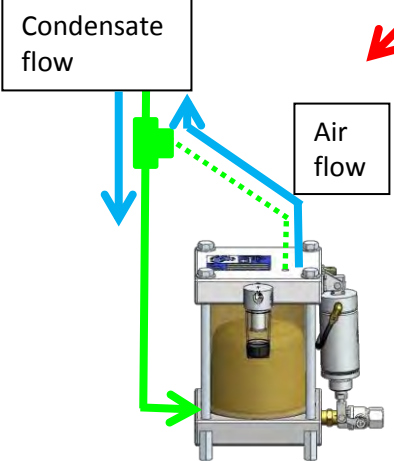
Tubing has smaller inside diameter than full inside diameter of 1/2" pipe. Also, reducing the diameter of the discharge tubing will increase the velocity of the discharge shot of two pints of liquid each cycle. Higher velocity will result in more splash back of discharge.



Small diameter tubing used on inlet and discharge can restrict GPM flow capacity of trap

Recommend "non-looped" piping as shown in Green. If piping loops above the trigger point of the trap, water will back up into source vessel to this level in order to push the liquid over the top of the loop.

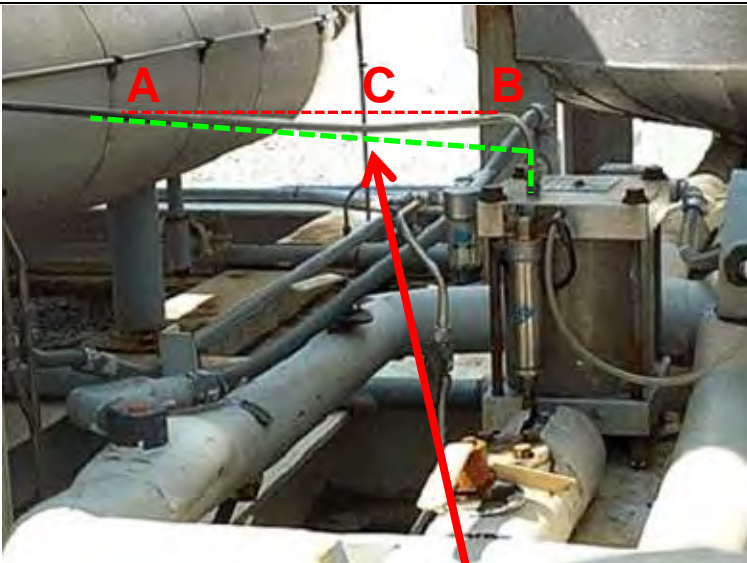
Note that there are no bypass lines on these installations. They should be installed.



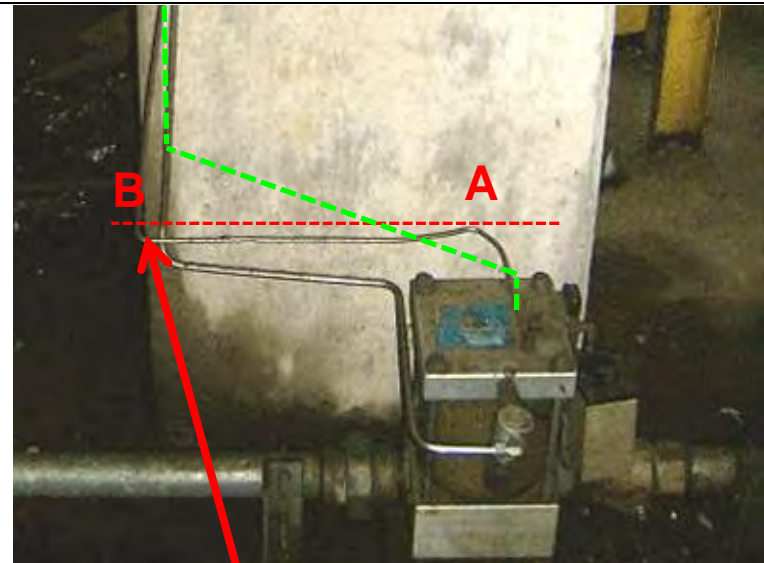
Use Full Diameter 1/2" Piping for Inlet / Outlet Lines

Balance Line Piping

Refer to previous piping diagram slides showing proper balance line piping arrangements depending on basic installation configurations. If none of those fit your application, contact Control Devices' Technical Service (see cover page for contact information) for assistance in selecting the proper piping arrangement for your specific application. Proper Balance Line arrangement is extremely important and any horizontal runs must be sloped downward toward the trap so that there are no dips or places where the piping can hold condensed water from the saturated air in the balance line. This moisture will accumulate and eventually block off the inside diameter of the balance line and prevent proper flow of air through the balance line. That air flow blockage will then prevent liquid from freely entering the trap and the trap will not cycle properly.



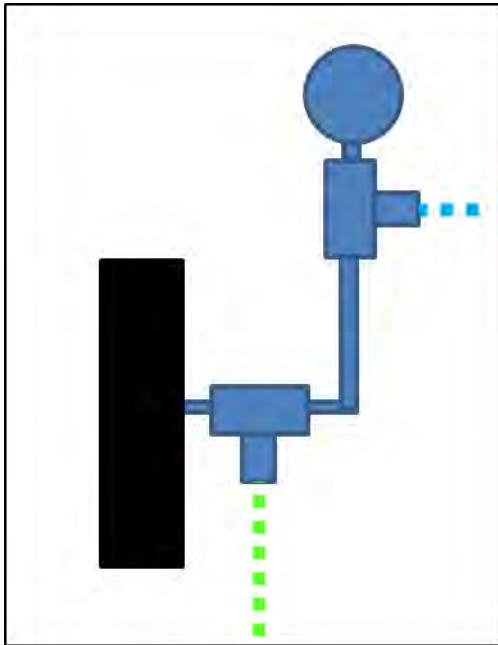
Balance line droops between A-B and forms a low spot at C that will accumulate water under the RED level dotted line and stop air flow. The GREEN line shows proper slope with no droop.



Balance line forms a low spot at B of the horizontal run that slopes downward from A above the trap. That low spot at B will accumulate water in the line under the entire Red dotted line and stop balance line air flow. The GREEN line shows a proper slope of the balance line with no low spot.

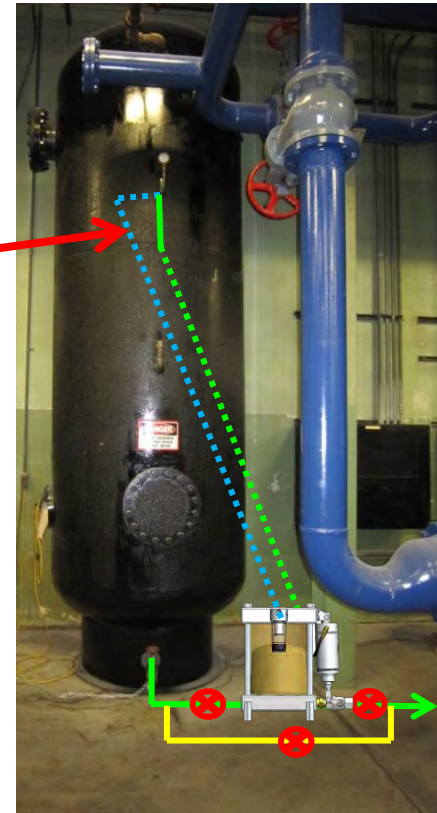
Alternate Balance Line and Control Air Connections for Receiver Tanks Only

This condition should only be used in the cases where a clean, dry control air source is not available. The Drain-All trap requires a clean control air to operate the cylinder and therefore it is equipped with an air filter. If this method is used, the air filter bowl must be checked and drained regularly.



Blue dotted line is the control air. This setup should be only used if there is no clean, dry control air nearby.

Green dotted line is the balance line. This is a typical setup for any reservoir tank.



Alternate Balance Line and Control Air Connections for Receiver Tanks Only



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Appendix I:

Examples of Compressor Installations

Remove existing trap(s) and install Drain-All(s) as shown below.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



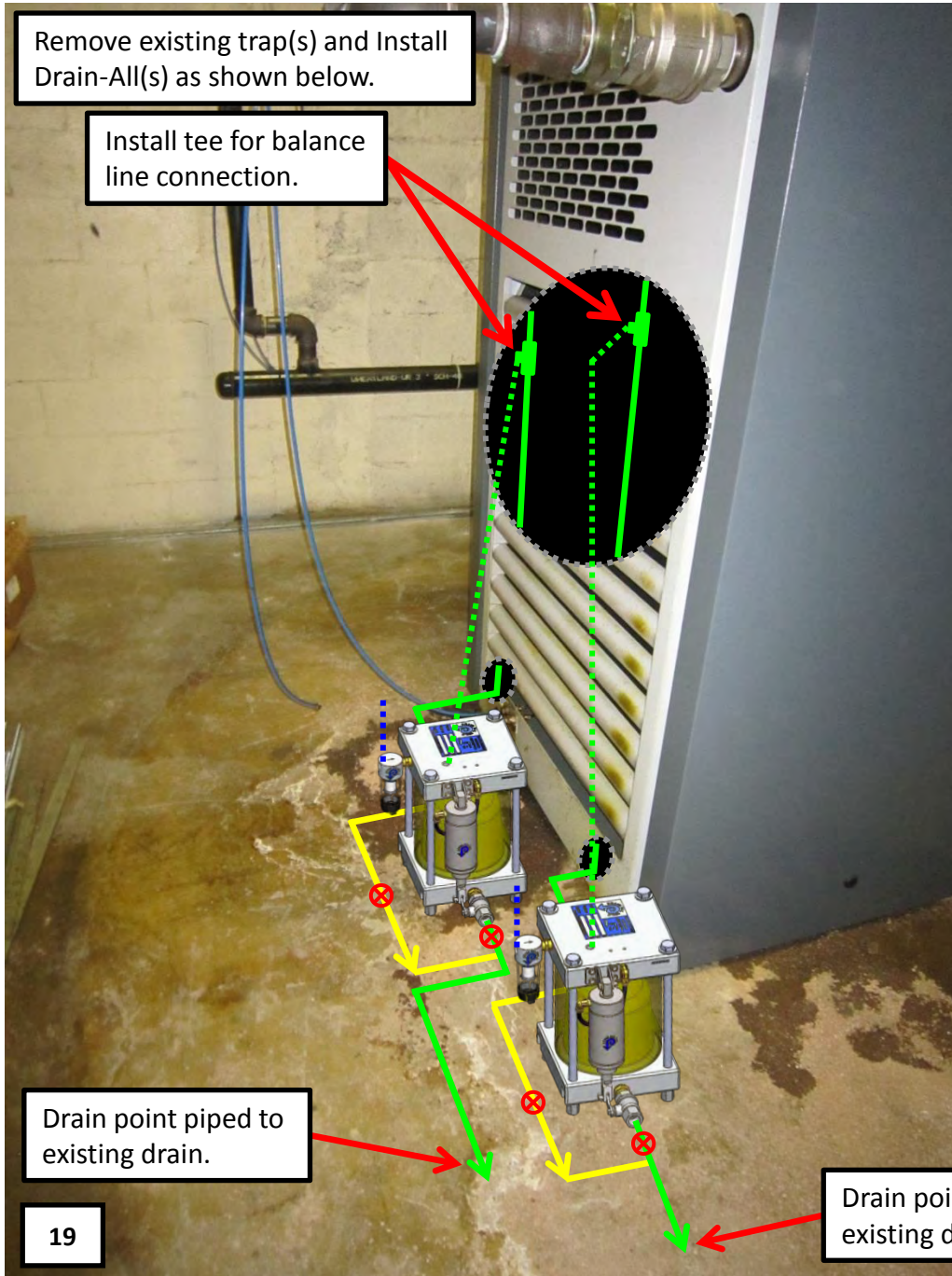
Control air should come from a clean, dry air source as shown in Section 1.

Drain point piped to existing drain.

Atlas Copco Z Series Oil Free Compressor

Remove existing trap(s) and Install Drain-All(s) as shown below.

Install tee for balance line connection.



Drain point piped to existing drain.

Drain point piped to existing drain.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



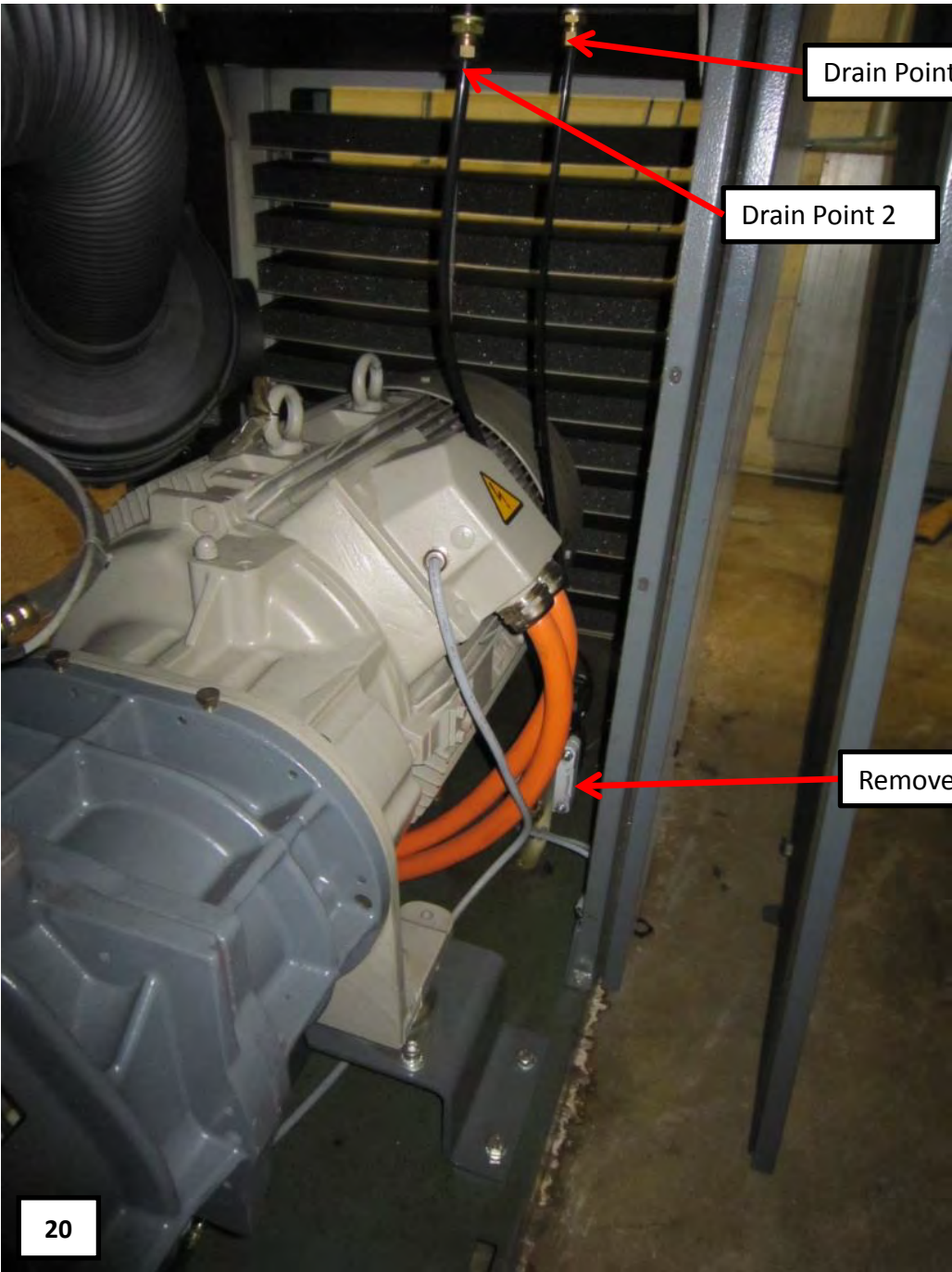
Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.



Drain Point 1

Drain Point 2

Remove Existing Internal Traps

Remove existing trap(s) and install Drain-All(s) as shown below.

Connect balance line to existing port that is at the same pressure as the drain point.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1 or 2, BL1 - BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

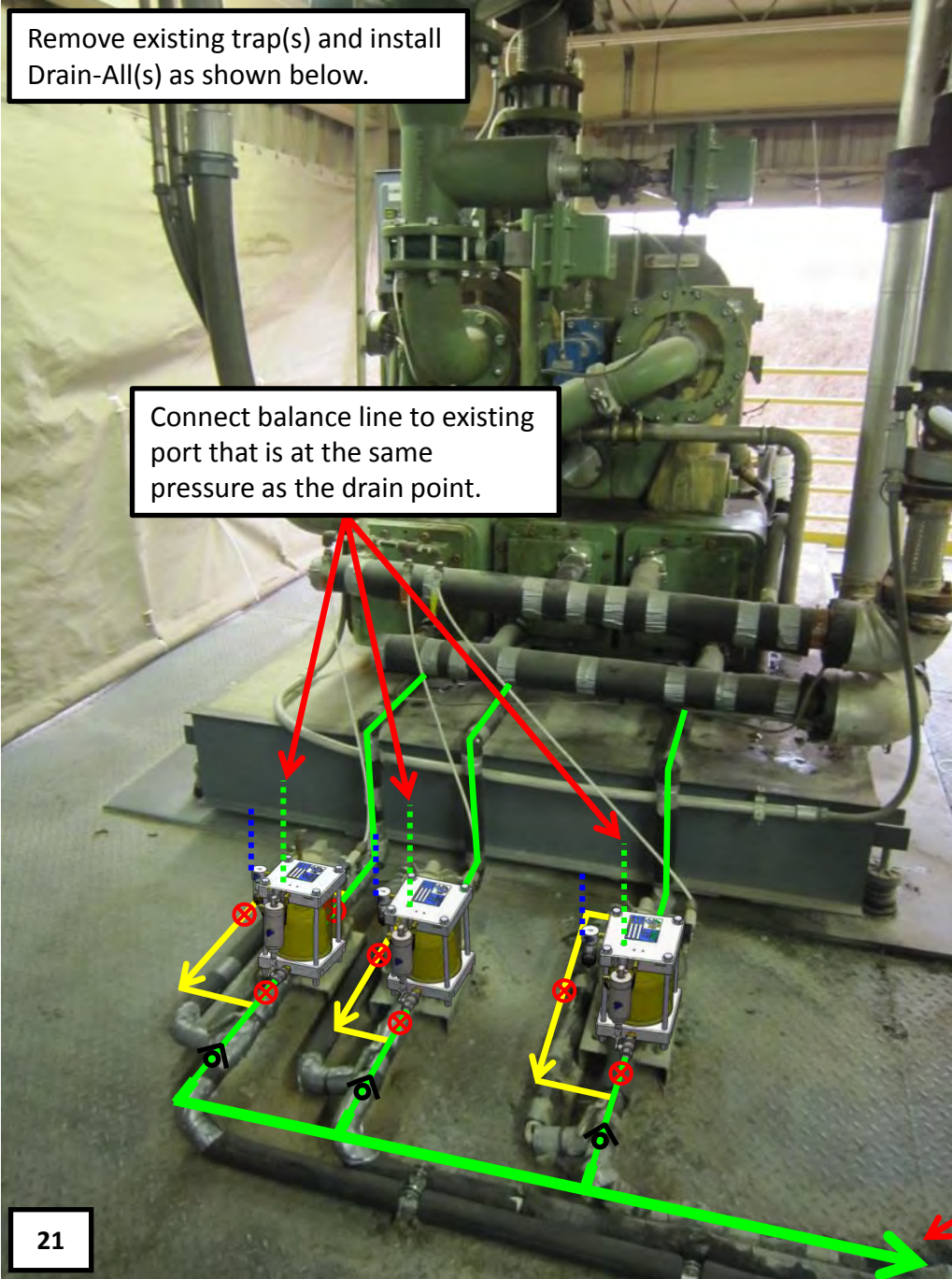


Check Valves shown below. See Section 2 Slide "Combining Discharge Lines from Multiple Traps" for how to tie discharge lines together.

Use 2" diameter pipe when combining drains from multiple traps.

Drain point piped to existing drain.

Elliott Compressor with Manifold Discharge



Install Drain-All(s) as shown below.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2. (Alt connection, BL1)



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Alternate balance line connection points. Ensure that the pressure at these points is equal to the pressure at the drain points. Balance line MUST continuously slope downward

Install tee for balance line connection.

Drain point piped to existing floor drain and inserted deep enough to prevent splash.

Remove existing trap(s) and install Drain-All(s) as shown below.



Check Valves shown below. See Section 2 Slide “Combining Discharge Lines from Multiple Traps” for how to tie discharge lines together.

Install tee for balance line connection.

Use 2" diameter pipe when combining drains from multiple traps.

Drain point piped to existing floor drain and inserted deep enough to prevent splash.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



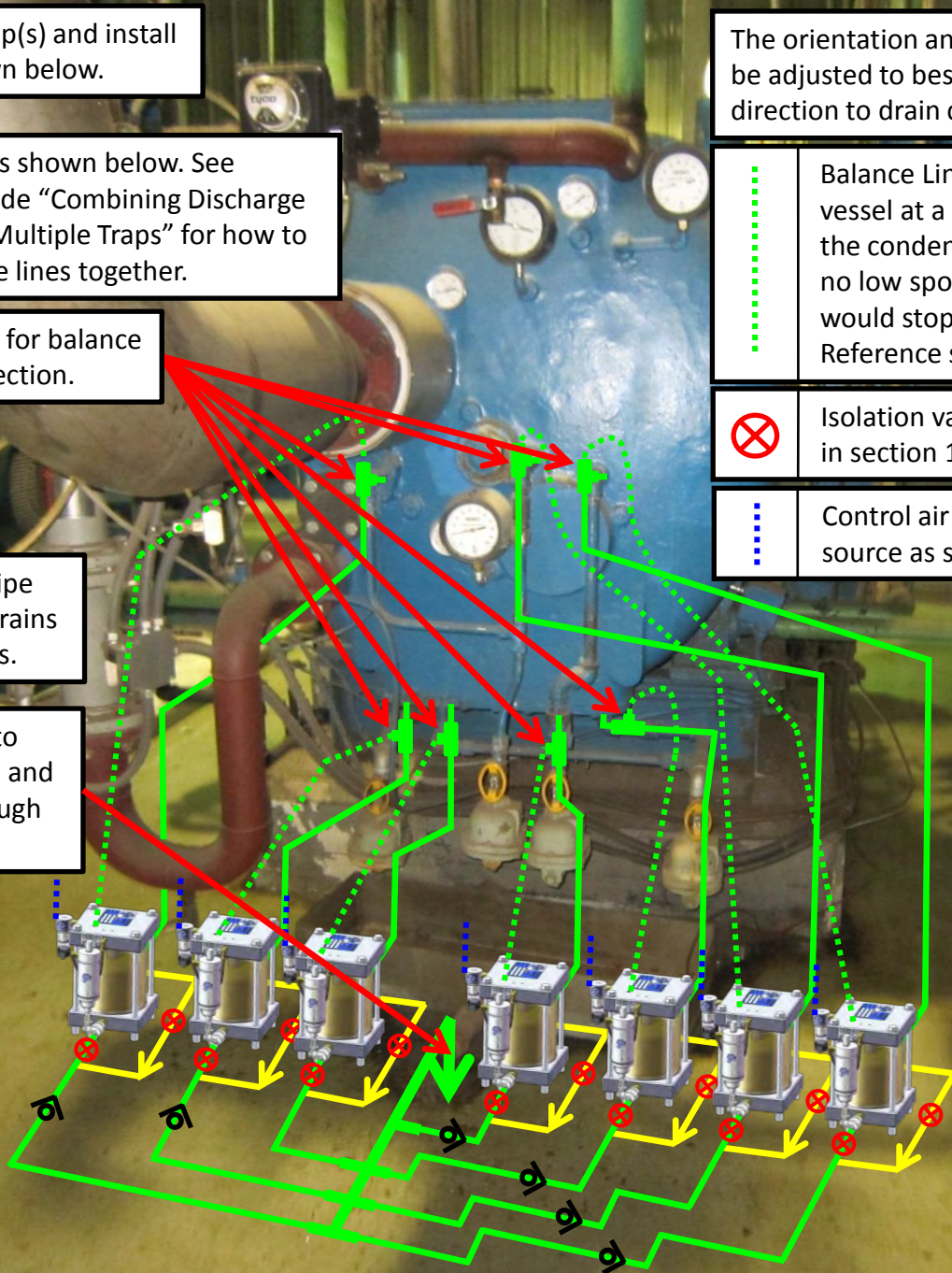
Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.



Remove existing trap(s) and install Drain-All(s) as shown below.

⊗ Isolation valves to be installed on lines as shown in section 1 and 2.

⋮ Control air should come from a clean, dry air source as shown in Section 1.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

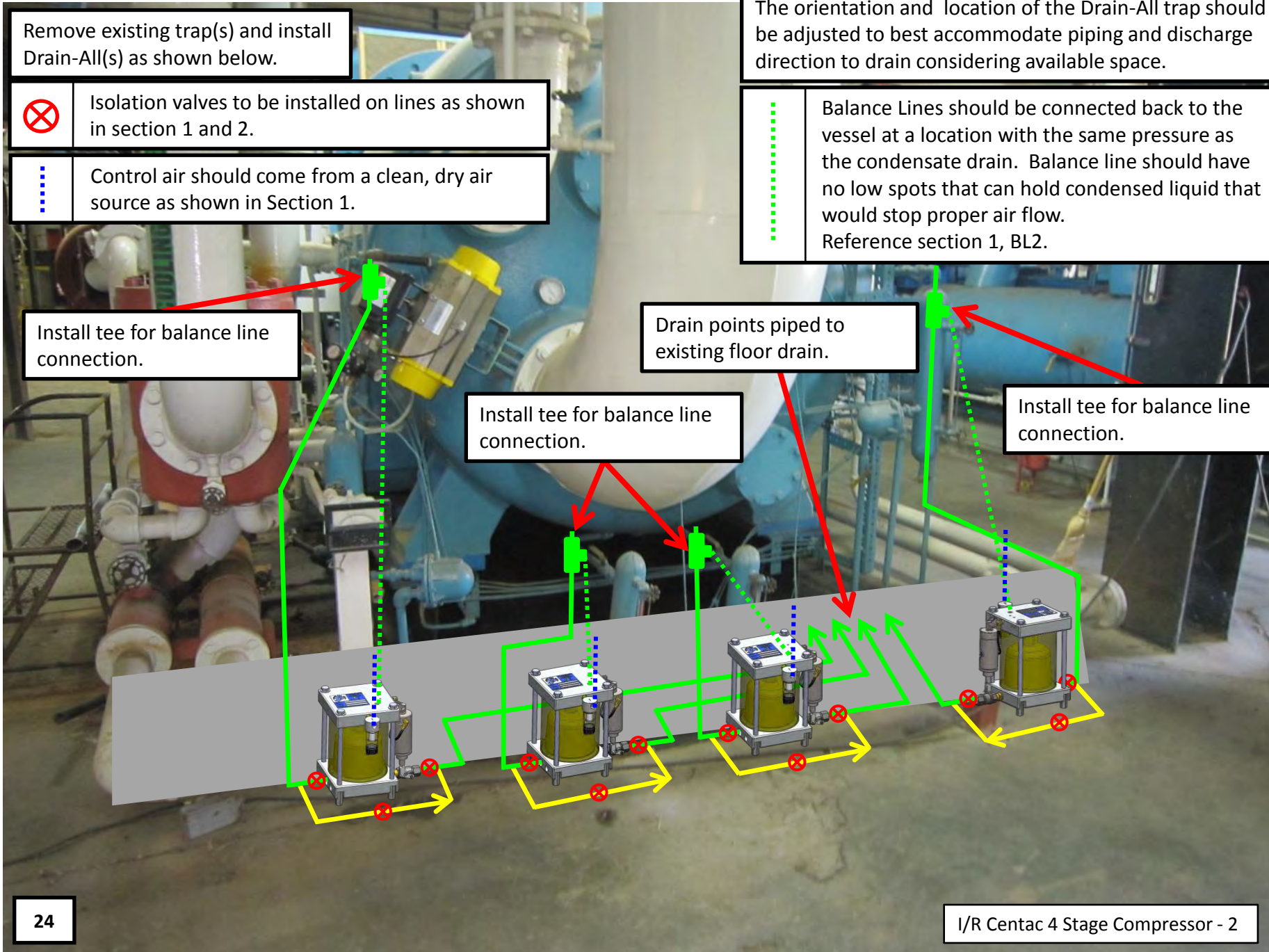
⋮ Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.

Install tee for balance line connection.

Drain points piped to existing floor drain.

Install tee for balance line connection.

Install tee for balance line connection.



Remove existing trap(s) and install Drain-All(s) as shown below.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

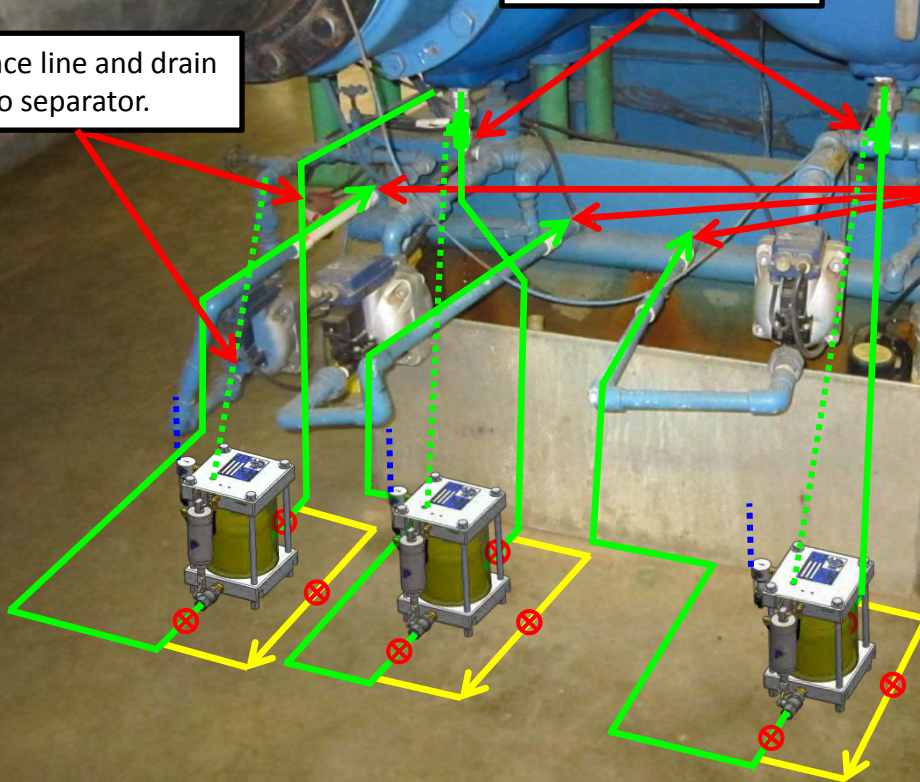


Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.

Install tee for balance line connection.

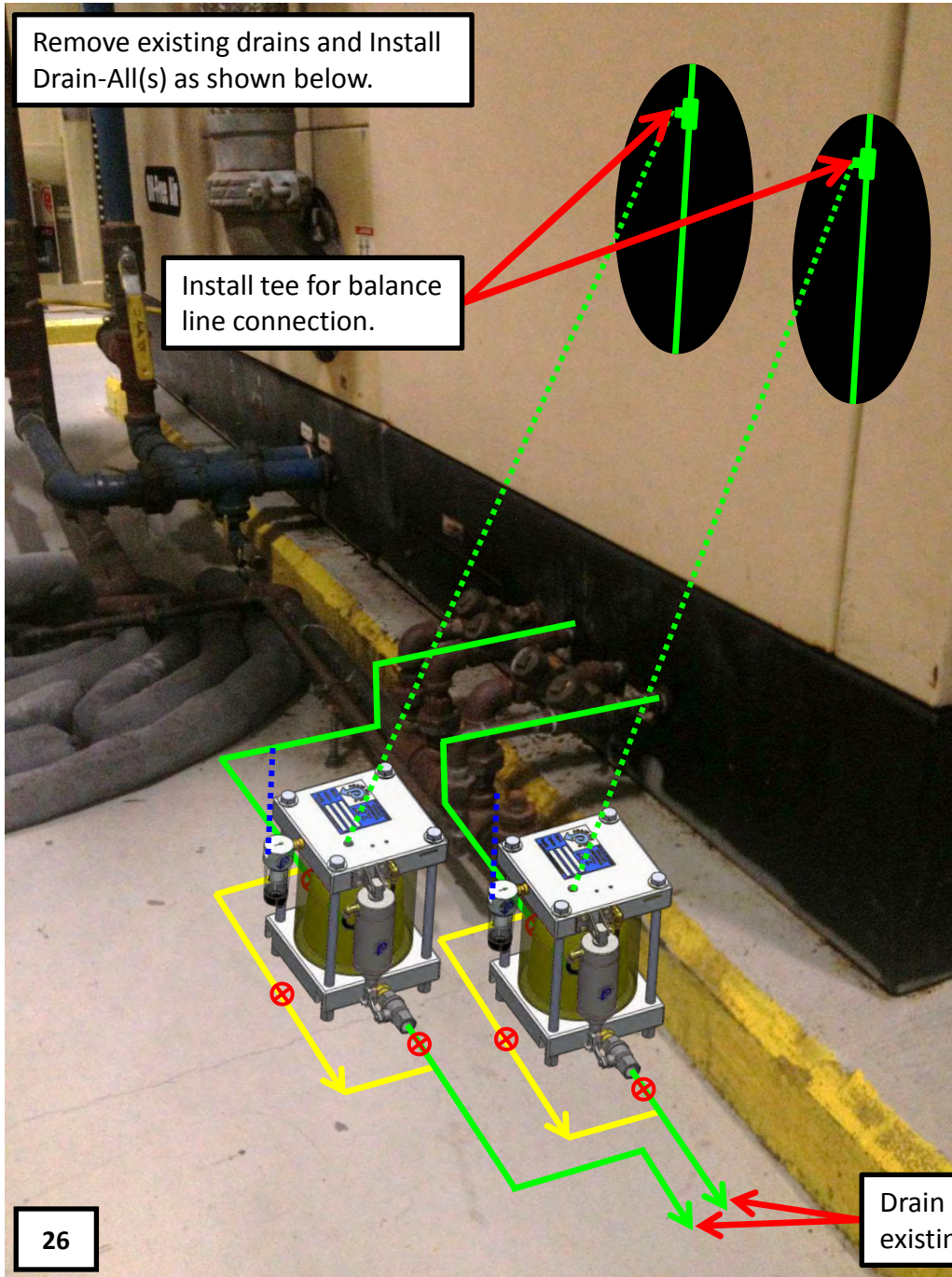
Balance line and drain line to separator.

Drain point piped to diffuser.



Remove existing drains and Install Drain-All(s) as shown below.

Install tee for balance line connection.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

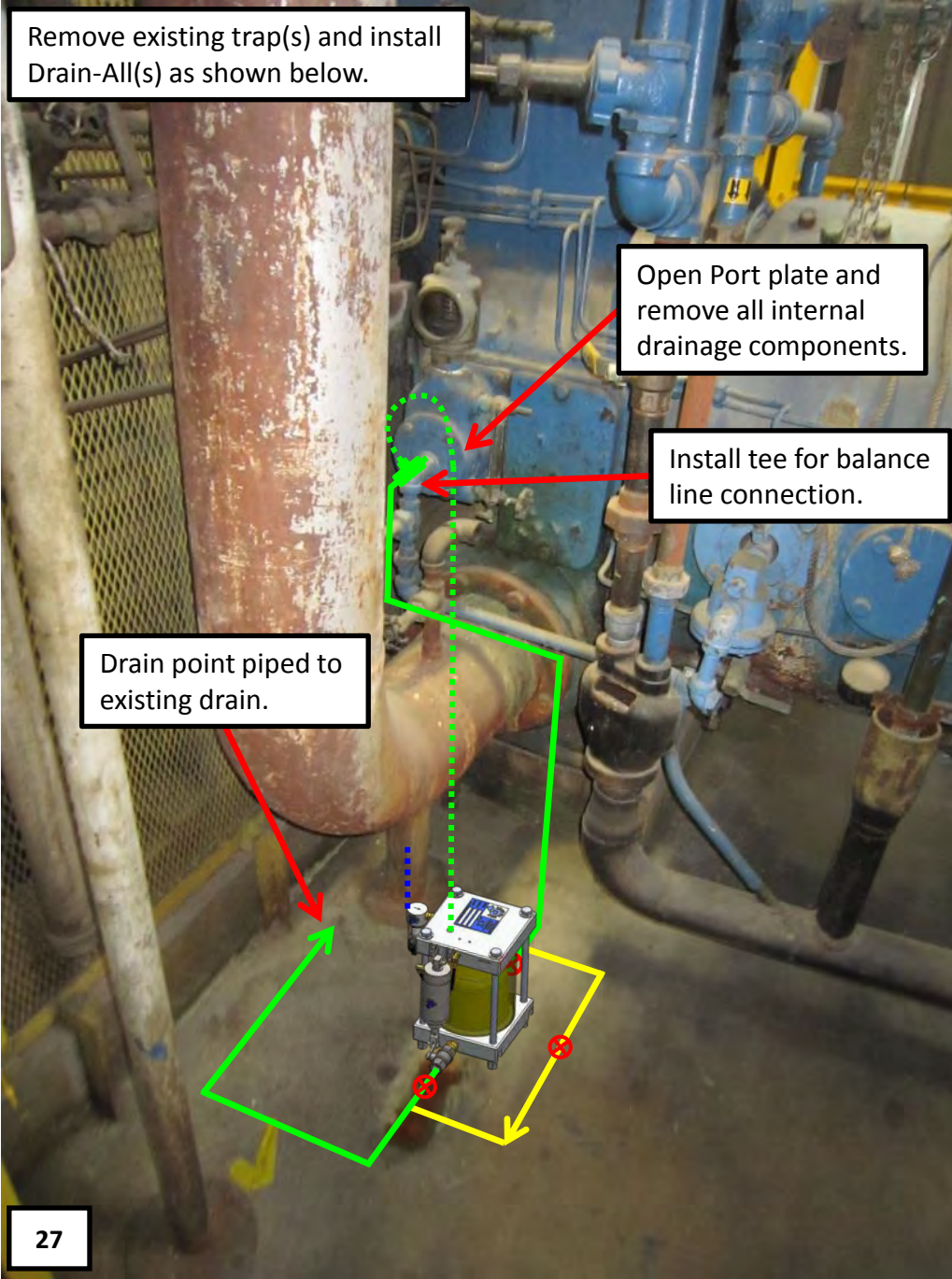
Drain point piped to existing drain.

Remove existing trap(s) and install Drain-All(s) as shown below.

Open Port plate and remove all internal drainage components.

Install tee for balance line connection.

Drain point piped to existing drain.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Remove existing trap(s) and install Drain-All(s) as shown below at all drain points.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL1.

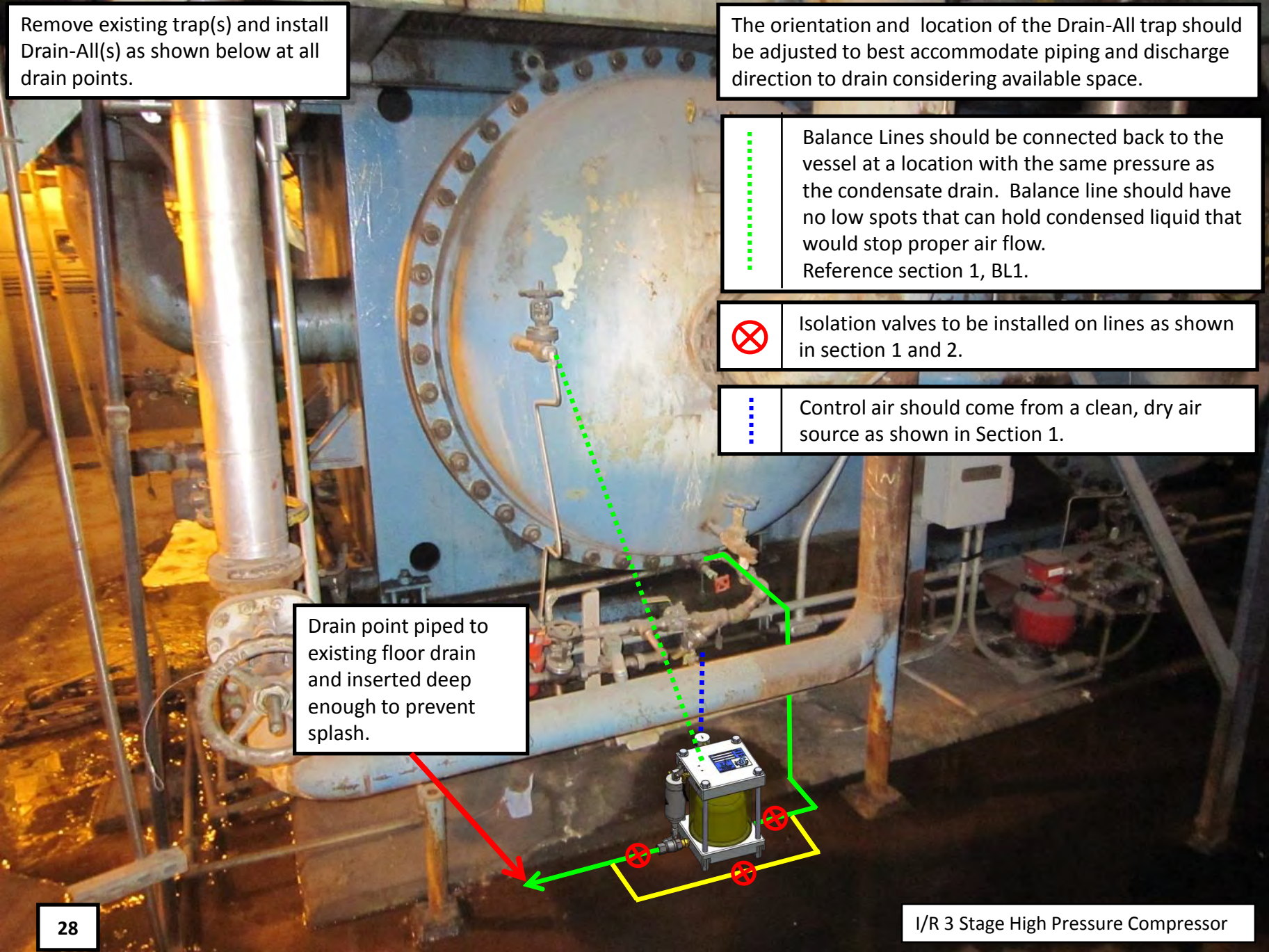


Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Drain point piped to existing floor drain and inserted deep enough to prevent splash.



Install Drain-All(s) as shown below.

Connect drain line to outlet pipe.

Install tee for balance line connection.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Drain point piped to existing drain.

Heater and heat tracing on the pipes is required if freeze conditions exist. Insulate trap to prevent freezing.

Remove existing trap(s) and install Drain-All(s) as shown below.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



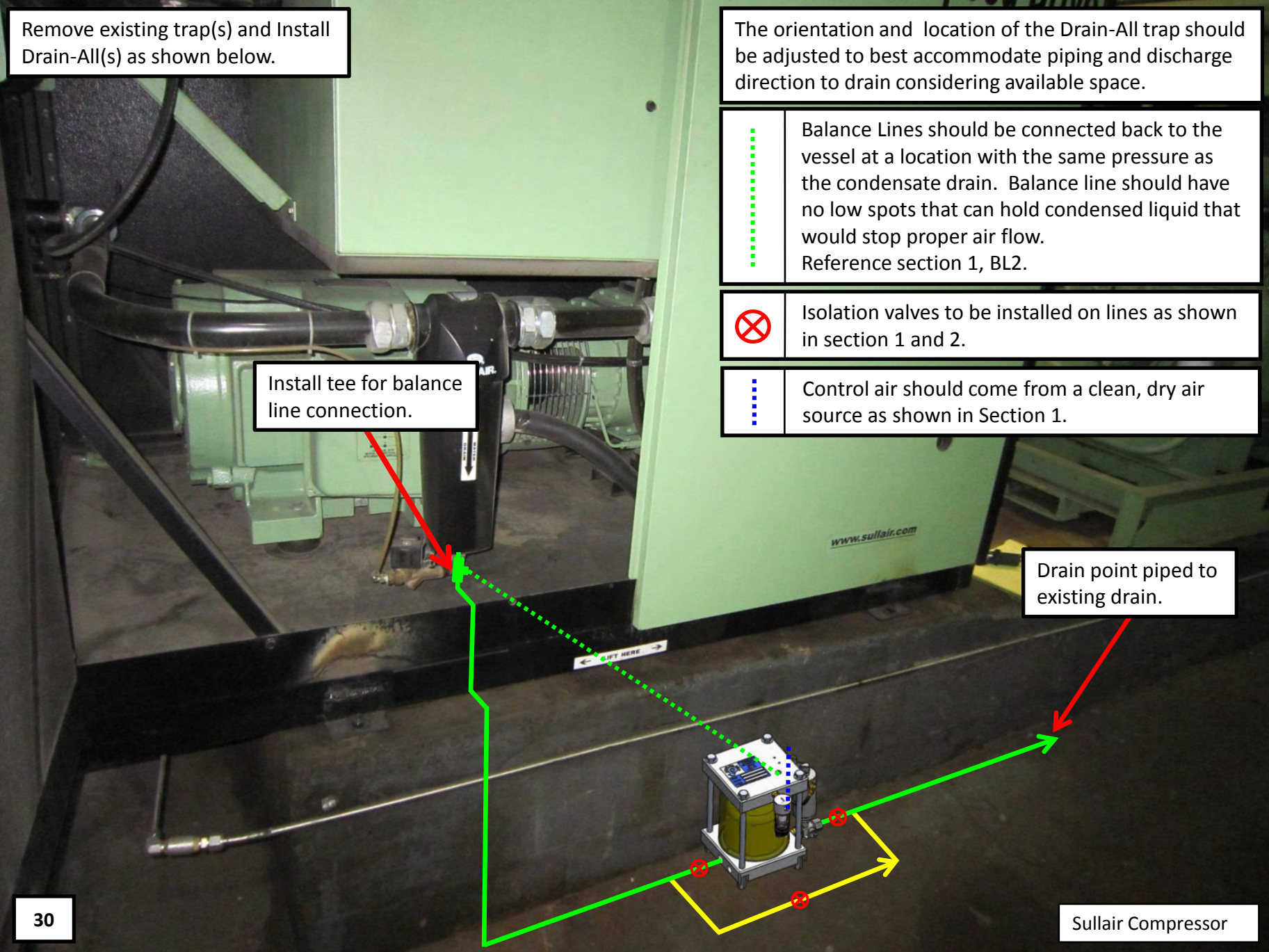
Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Install tee for balance line connection.

Drain point piped to existing drain.





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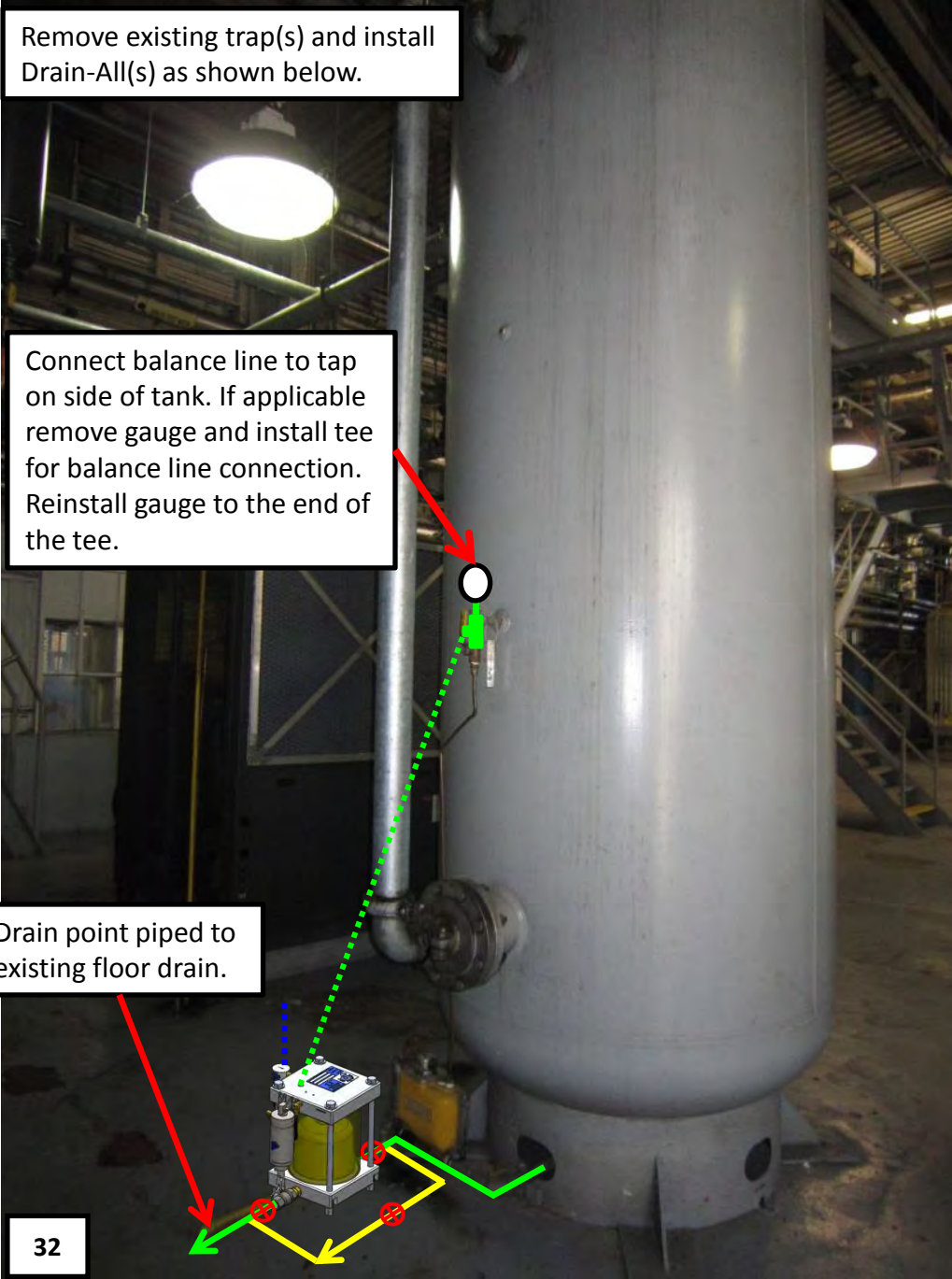
Appendix II:

Examples of Receiver Tank Installations

Remove existing trap(s) and install Drain-All(s) as shown below.

Connect balance line to tap on side of tank. If applicable remove gauge and install tee for balance line connection. Reinstall gauge to the end of the tee.

Drain point piped to existing floor drain.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL1.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Install Drain-All(s) as shown below.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL1.



Isolation valves to be installed on lines as shown in section 1 and 2.



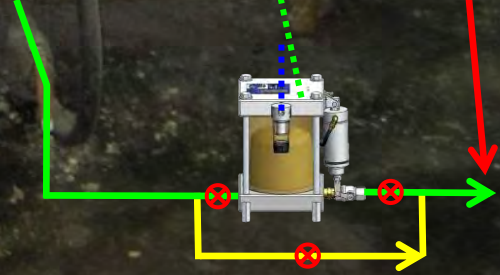
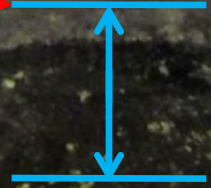
Control air should come from a clean, dry air source as shown in Section 1.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

Connect balance line to tap on the side of the tank.

Drain point piped to existing floor drain.

Clearance should be 7 inches to ensure condensate does not accumulate in tank. If less than 7 inches vent to atmosphere, REF BL3.



Horizontal Receiver Tank

Remove existing trap(s) and install Drain-All(s) as shown below.

Balance line vented to atmosphere. Ensure that ½" diameter bubbles are constantly moving upward inside reservoir.

Drain point piped to existing floor drain.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL3.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Heaters and heat tracing on the pipes is required due to environmental conditions. Insulate trap to prevent freezing.



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Appendix III:
Examples of Filter/Separator Installations

Remove existing trap(s) and install Drain-All(s) as shown below.

Install tee for balance line connection.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



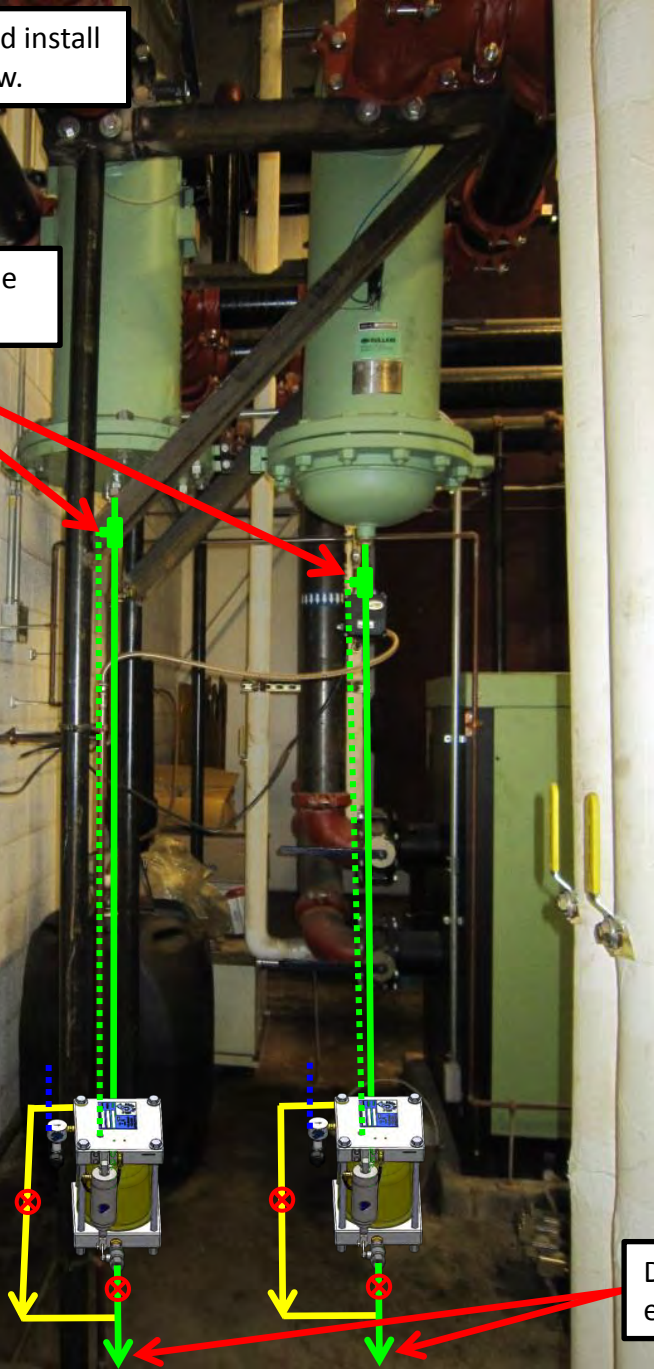
Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.



Drain point piped to existing floor drain.

Install Drain-All(s) as shown below.

Install tee for balance line connection.

Install tee for balance line connection.

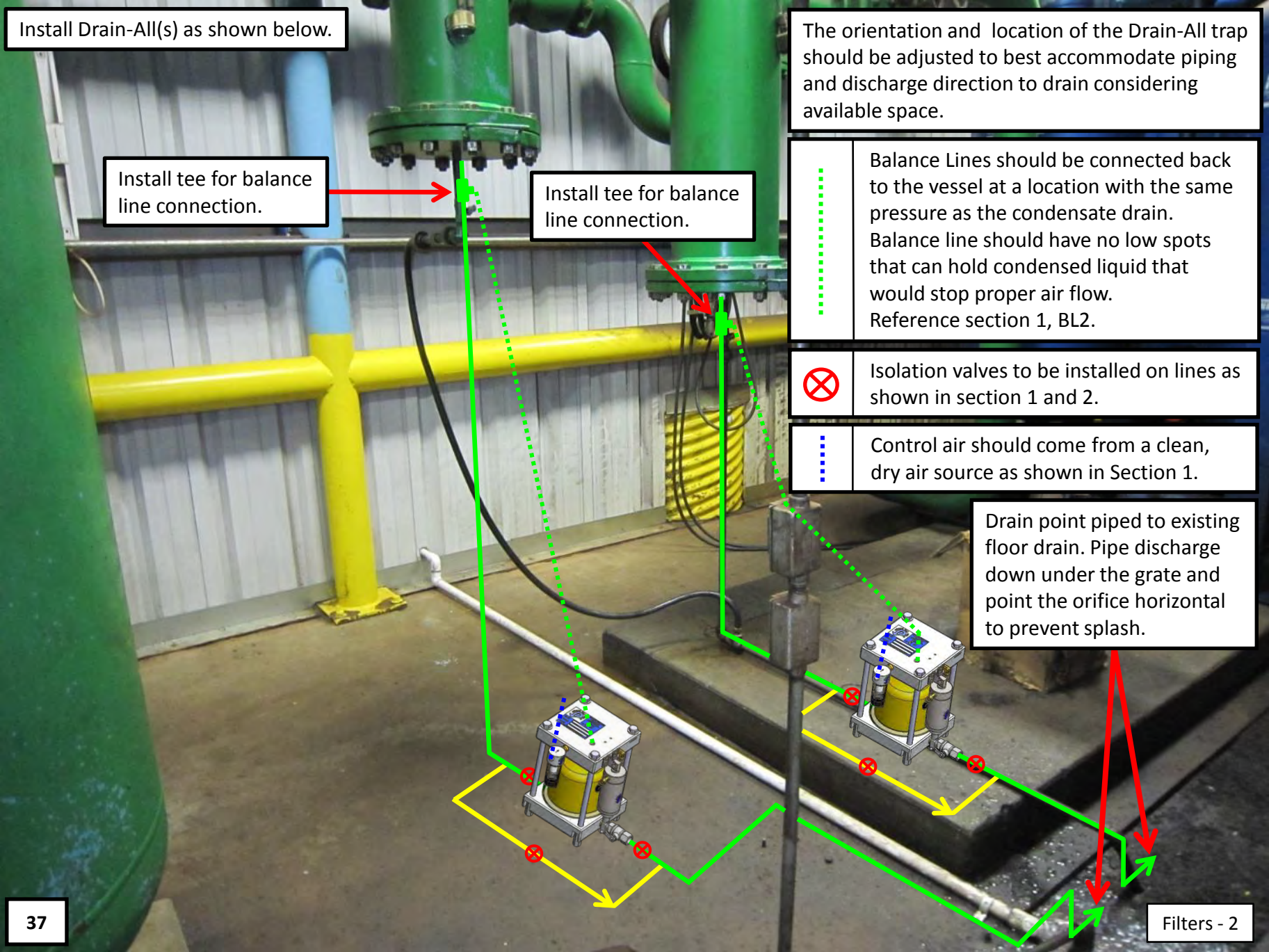
The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.

Isolation valves to be installed on lines as shown in section 1 and 2.

Control air should come from a clean, dry air source as shown in Section 1.

Drain point piped to existing floor drain. Pipe discharge down under the grate and point the orifice horizontal to prevent splash.



Remove existing trap(s) and install Drain-All(s) as shown below.

Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.

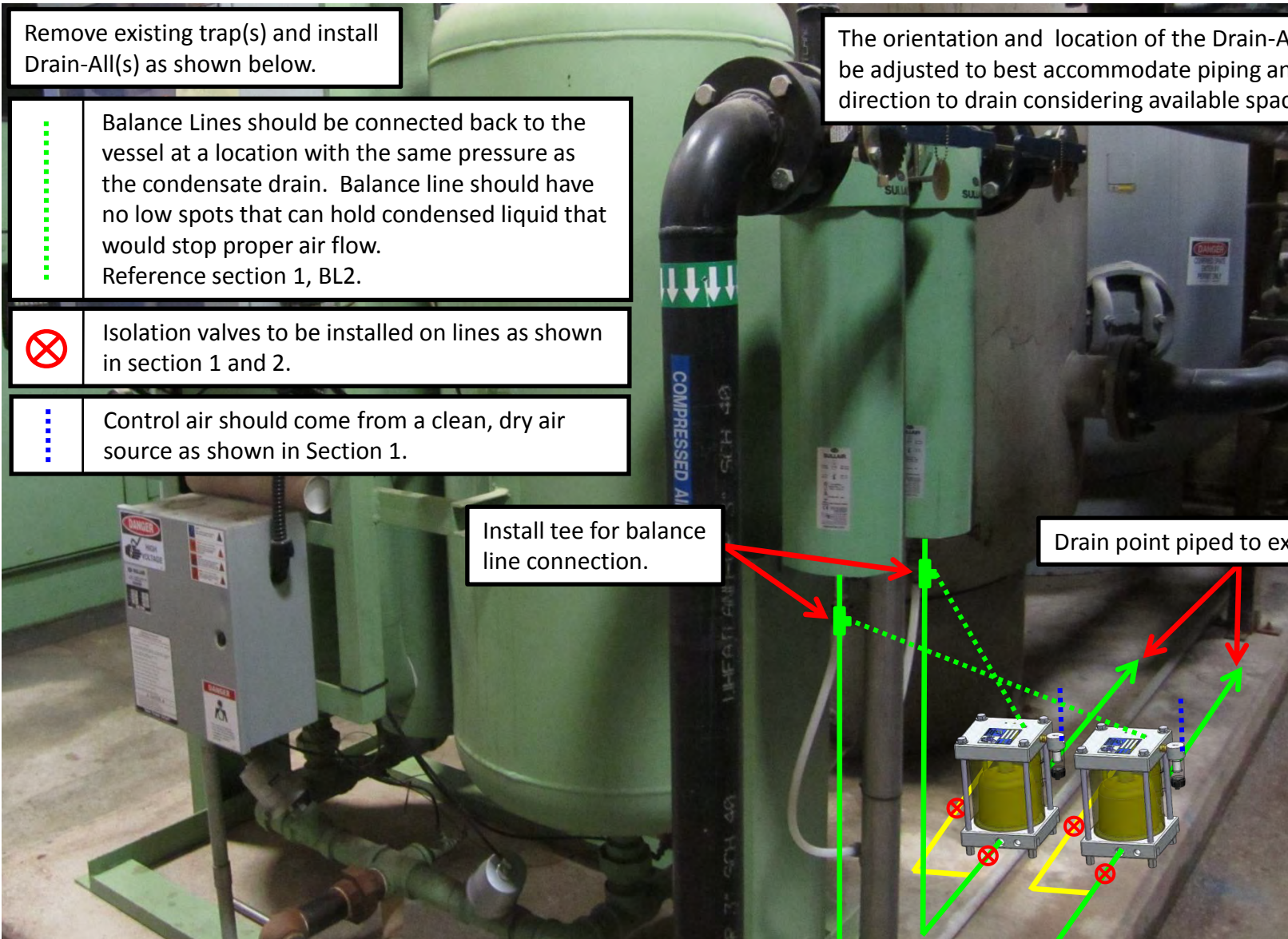


Control air should come from a clean, dry air source as shown in Section 1.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

Install tee for balance line connection.

Drain point piped to existing drain.



Remove existing trap(s) and install Drain-All(s) as shown below.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL3.



Isolation valves to be installed on lines as shown in section 1 and 2.

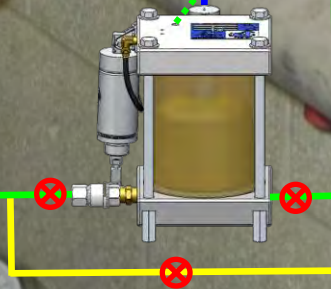


Control air should come from a clean, dry air source as shown in Section 1.

Actual Drain-All location to be determined on site, recommended to be on floor below drain point.

Install tee for balance line connection.

Drain point piped to existing floor drain.

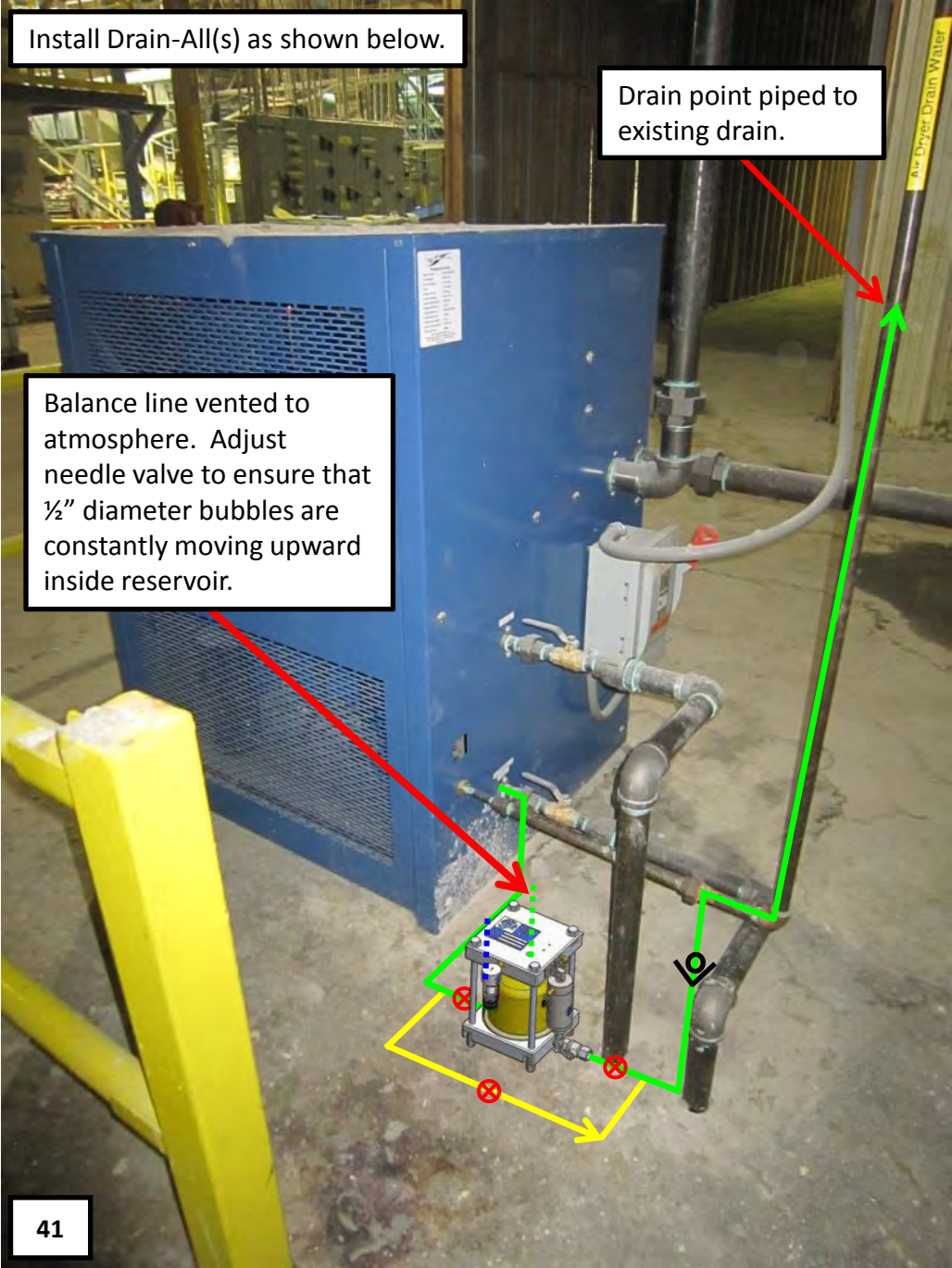




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Appendix IV:
Examples of Dryer Installations



Install Drain-All(s) as shown below.

Drain point piped to existing drain.

Balance line vented to atmosphere. Adjust needle valve to ensure that 1/2" diameter bubbles are constantly moving upward inside reservoir.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL3.

Isolation valves to be installed on lines as shown in section 1 and 2.

Control air should come from a clean, dry air source as shown in Section 1.

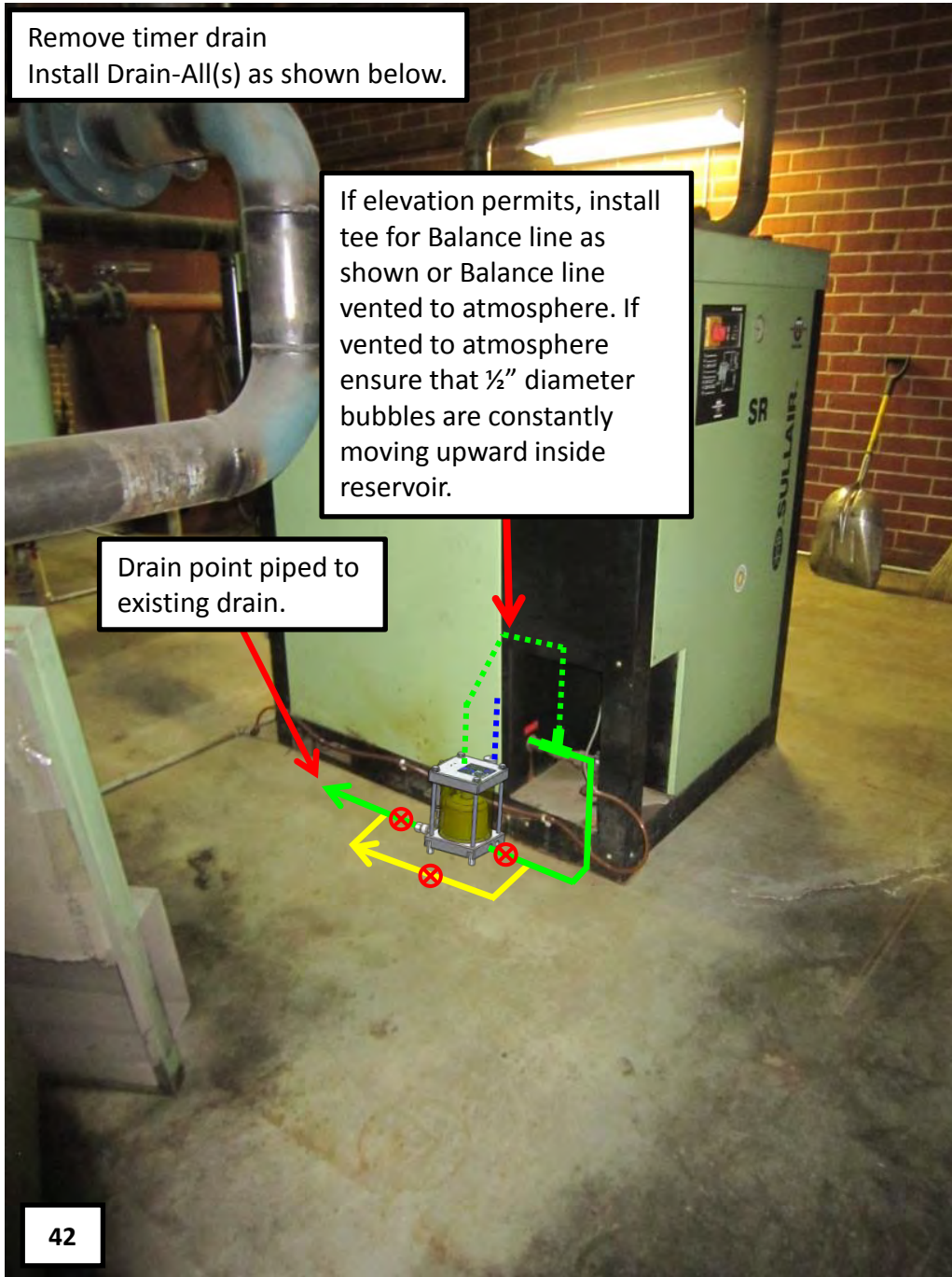
Check Valves shown. See Section 2 Slide "Discharge from Trap Vertically Upward" for more information on installing check valves when piping trap discharge vertically.

Refrigerated Dryer with Up Hill Discharge

Remove timer drain
Install Drain-All(s) as shown below.

If elevation permits, install tee for Balance line as shown or Balance line vented to atmosphere. If vented to atmosphere ensure that ½" diameter bubbles are constantly moving upward inside reservoir.

Drain point piped to existing drain.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2 or BL3.



Isolation valves to be installed on lines as shown in section 1 and 2.





Control air should come from a clean, dry air source as shown in Section 1.


Remove existing trap(s) and install Drain-All(s) as shown below at all drain points.

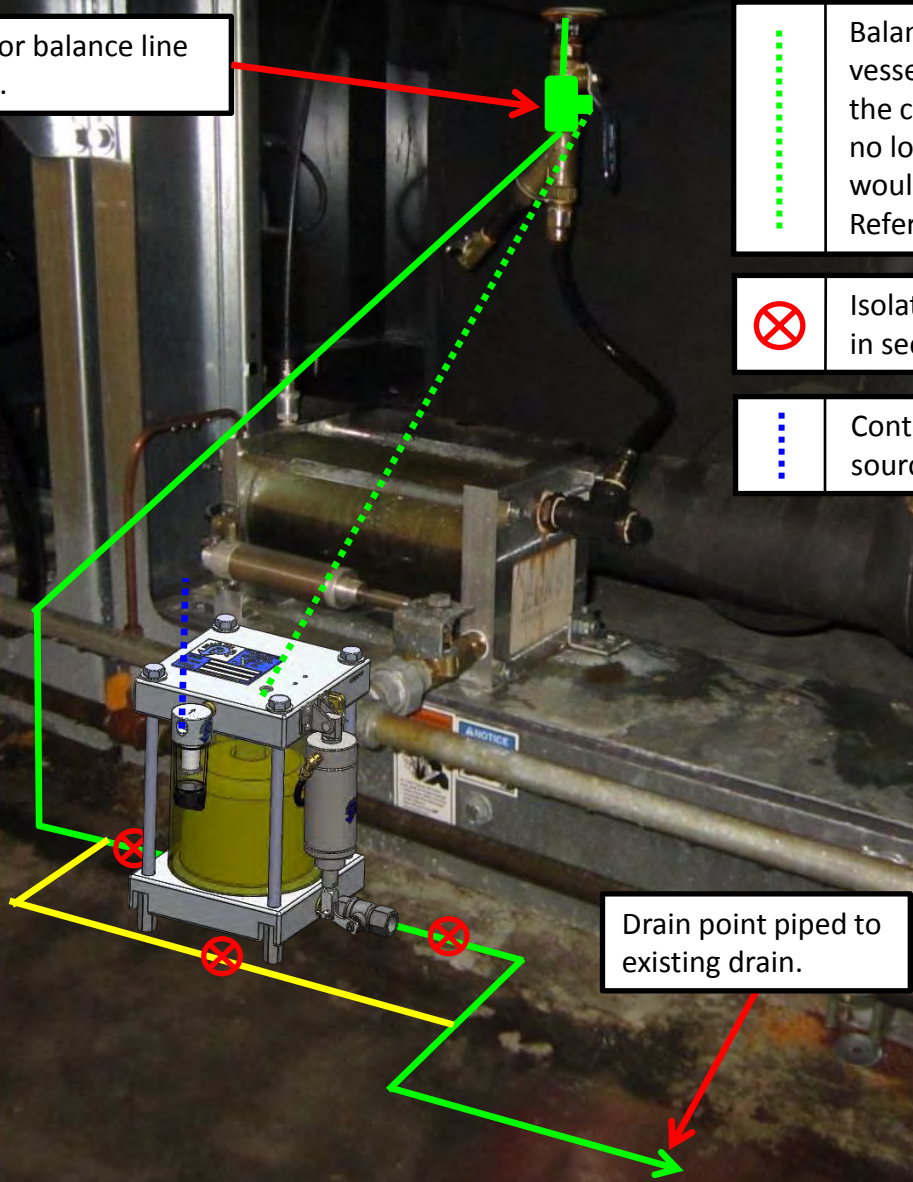
Install tee for balance line connection.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

 Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.

 Isolation valves to be installed on lines as shown in section 1 and 2.

 Control air should come from a clean, dry air source as shown in Section 1.



Drain point piped to existing drain.

Remove existing trap and install Drain-All(s) as shown below.

Install tee for balance line connection.

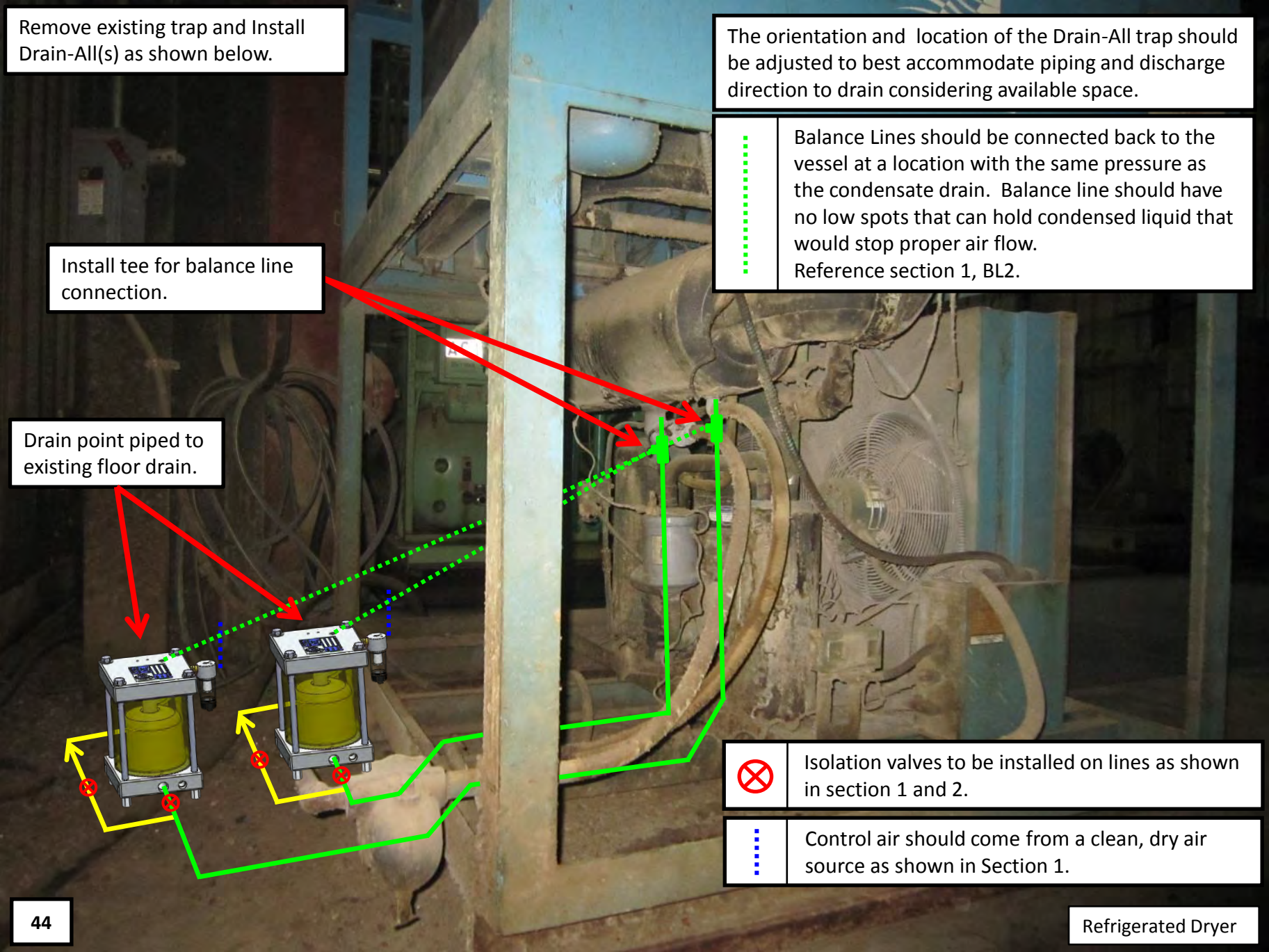
Drain point piped to existing floor drain.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.

Isolation valves to be installed on lines as shown in section 1 and 2.

Control air should come from a clean, dry air source as shown in Section 1.



Install Drain-All(s) as shown below.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

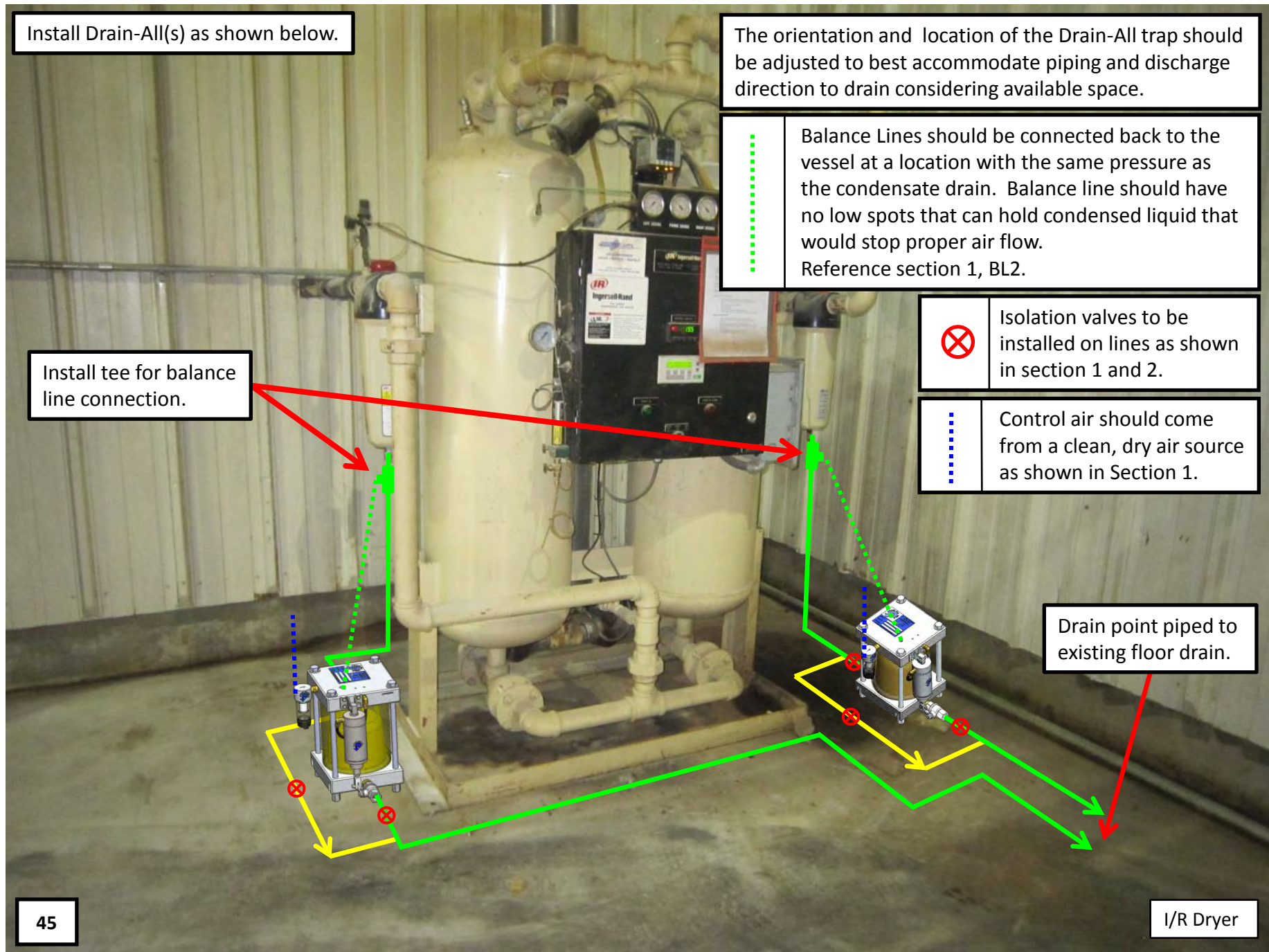
Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow.
Reference section 1, BL2.

Isolation valves to be installed on lines as shown in section 1 and 2.

Control air should come from a clean, dry air source as shown in Section 1.

Install tee for balance line connection.

Drain point piped to existing floor drain.

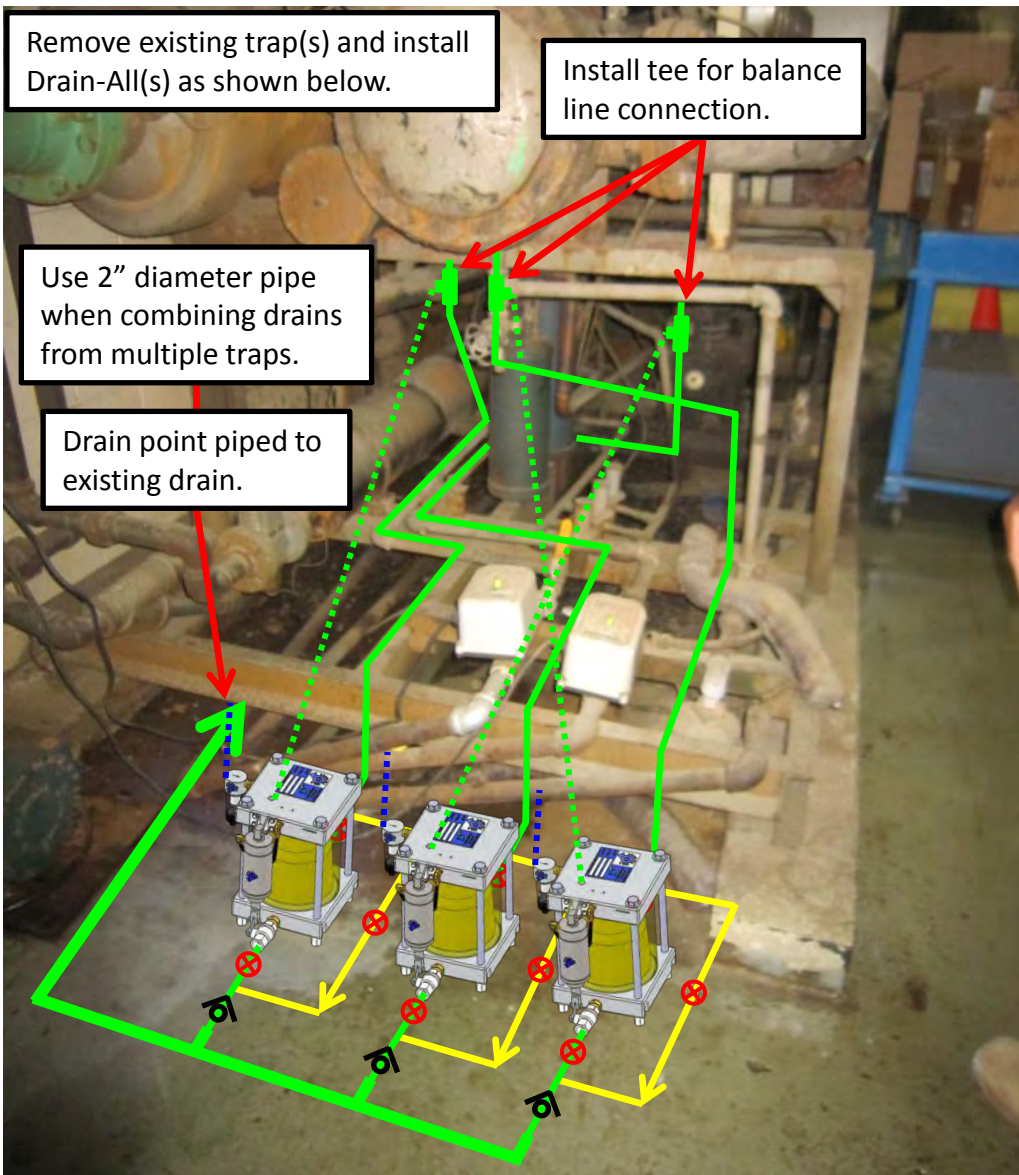


Remove existing trap(s) and install Drain-All(s) as shown below.

Install tee for balance line connection.

Use 2" diameter pipe when combining drains from multiple traps.

Drain point piped to existing drain.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



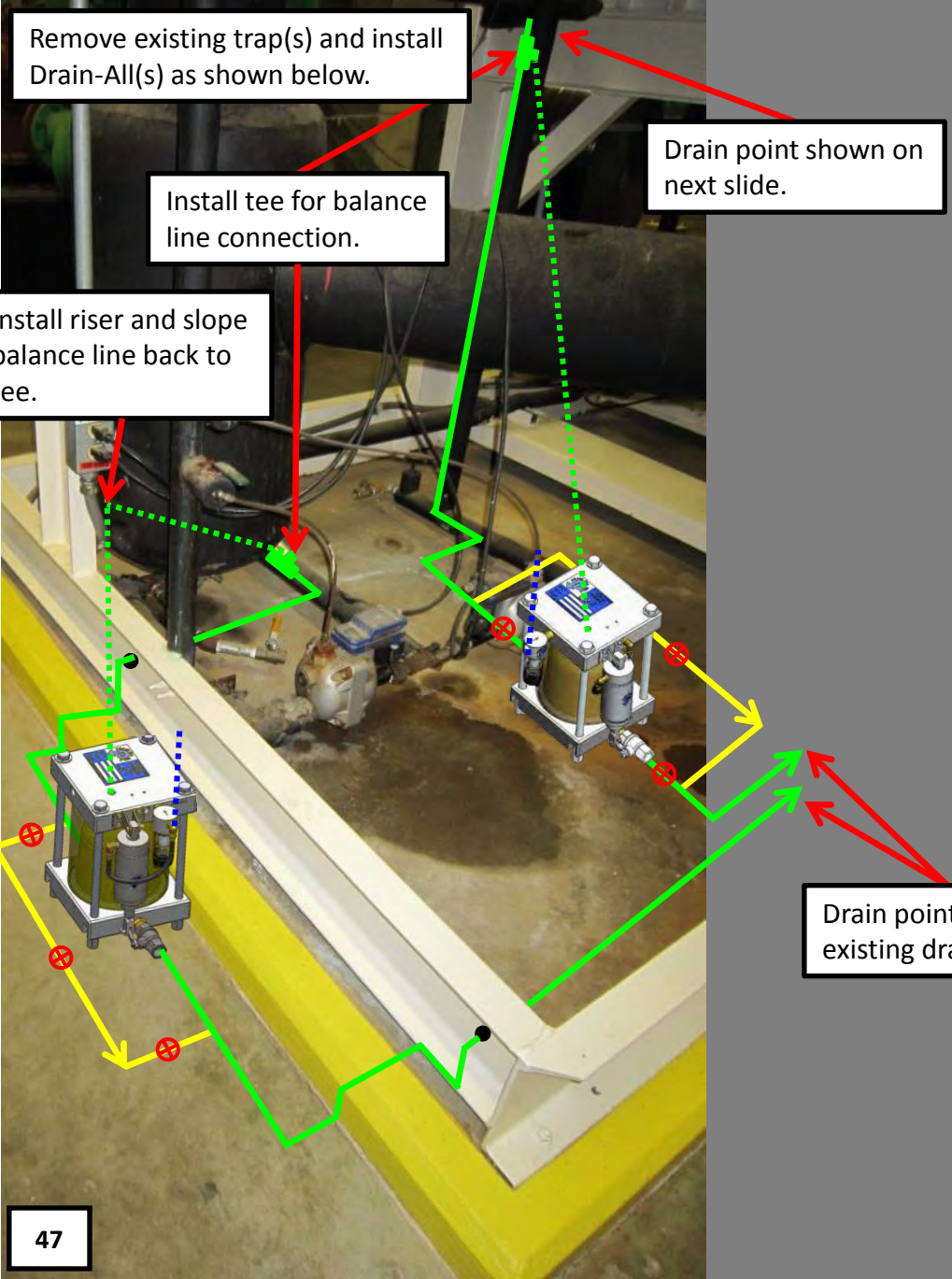
Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.



Check Valves shown below. See Section 2 Slide "Combining Discharge Lines from Multiple Traps" for how to tie discharge lines together.



Remove existing trap(s) and install Drain-All(s) as shown below.

Install tee for balance line connection.

Install riser and slope balance line back to tee.

Drain point shown on next slide.

Drain point piped to existing drain.

The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.

Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.

Isolation valves to be installed on lines as shown in section 1 and 2.

Control air should come from a clean, dry air source as shown in Section 1.



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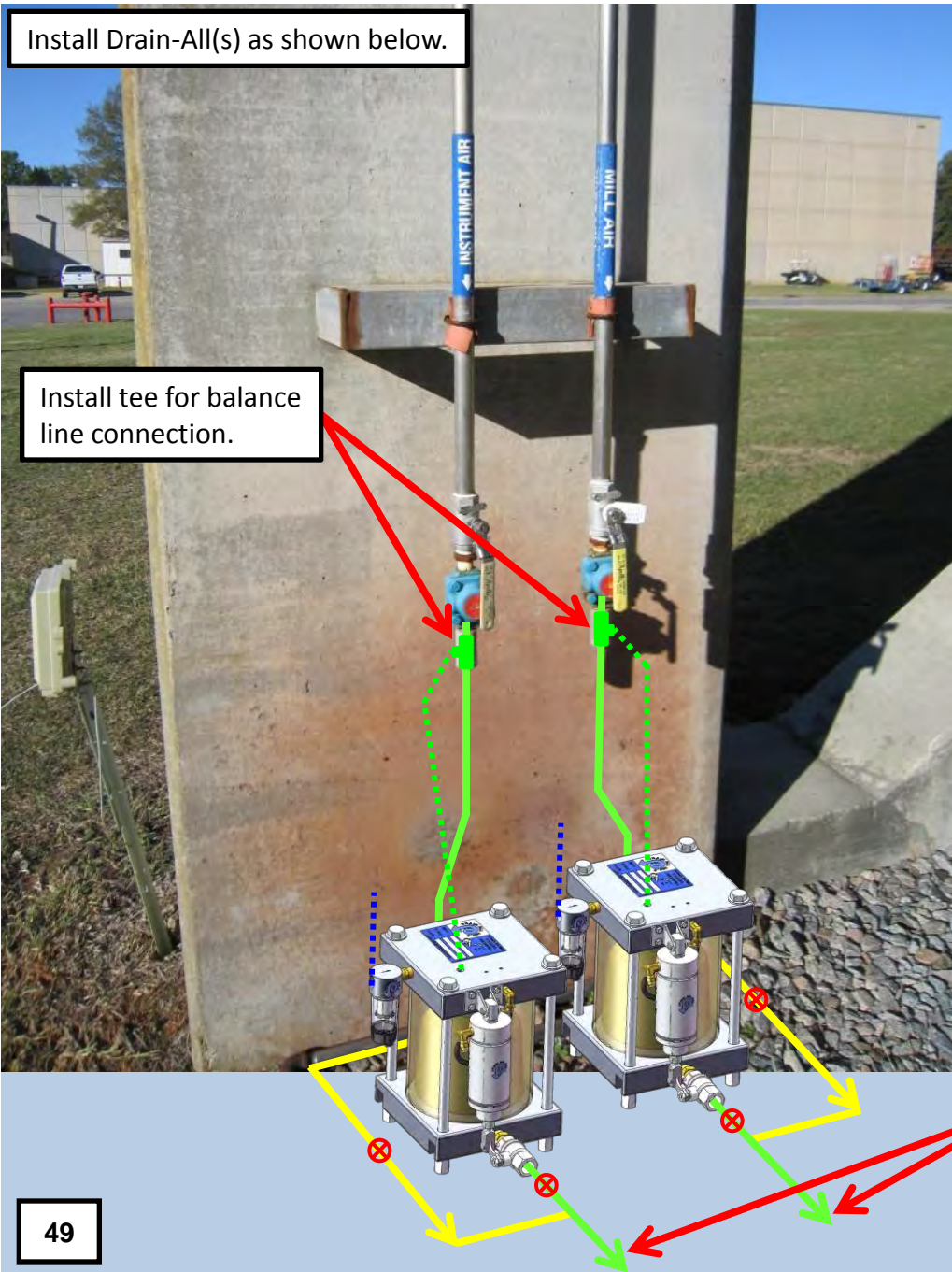


Appendix V:

Examples of Drip Leg Installations

Install Drain-All(s) as shown below.

Install tee for balance line connection.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



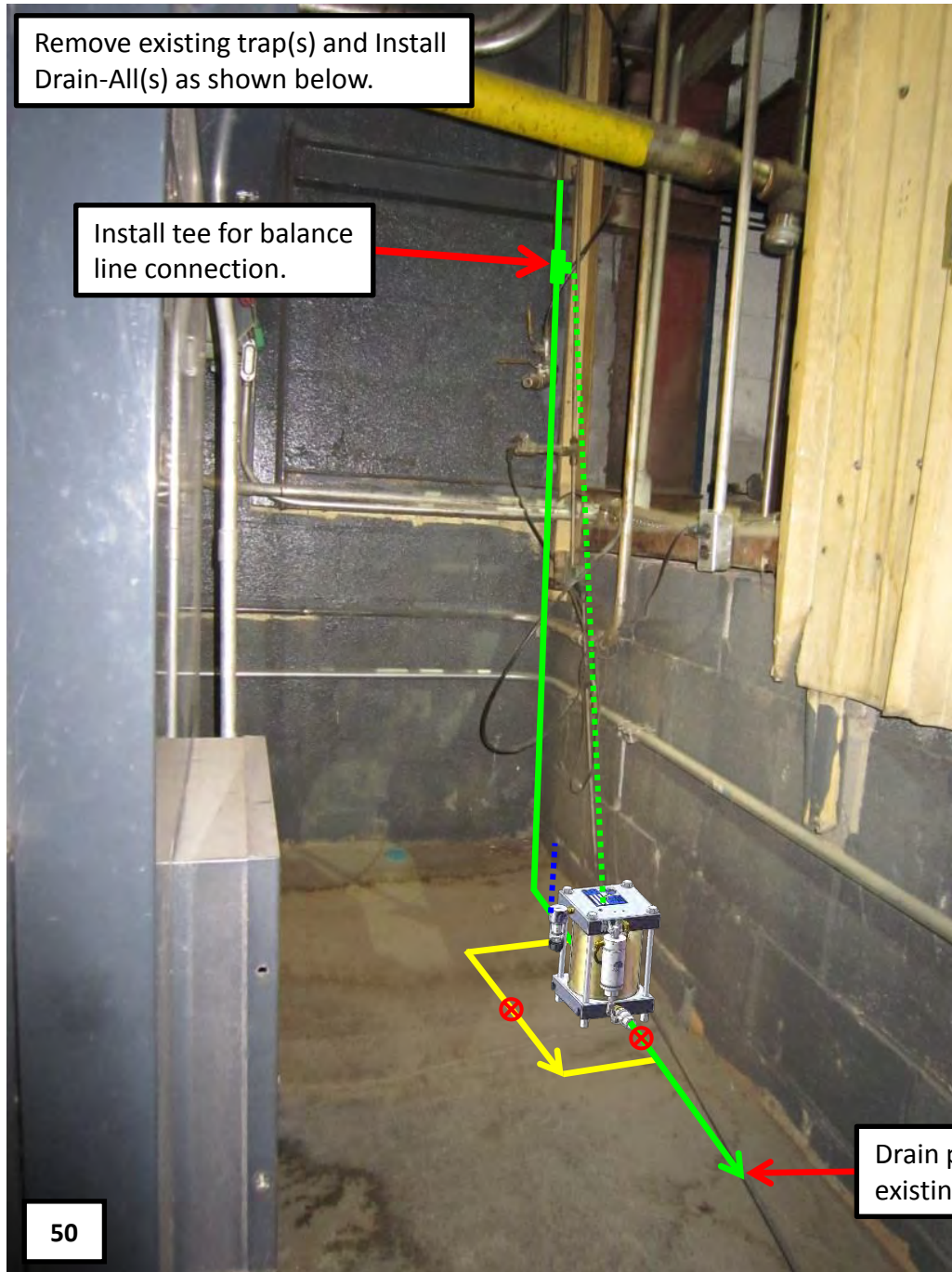
Control air should come from a clean, dry air source as shown in Section 1.

Heaters and heat tracing on the pipes is required due to environmental conditions. Insulate trap to prevent freezing.

Drain point piped to existing drain.

Remove existing trap(s) and Install Drain-All(s) as shown below.

Install tee for balance line connection.



The orientation and location of the Drain-All trap should be adjusted to best accommodate piping and discharge direction to drain considering available space.



Balance Lines should be connected back to the vessel at a location with the same pressure as the condensate drain. Balance line should have no low spots that can hold condensed liquid that would stop proper air flow. Reference section 1, BL2.



Isolation valves to be installed on lines as shown in section 1 and 2.



Control air should come from a clean, dry air source as shown in Section 1.

Drain point piped to existing drain.