

IOWA DEPARTMENT OF AGRICULTURE & LAND STEWARDSHIP'S
REGULATION OF ANHYDROUS AMMONIA TANK'S EXCESS FLOW VALVES

ISU has issued a press release "Voluntary Guidelines for Plumbing Two NH₃ Tanks on One Running Gear" that has prompted concern for Ag Dealers as well as some of you inspectors. The guidelines were developed by a collaborative effort with state, academia and industry to give Ag Suppliers some examples of ways to plumb their double-tank nurse tanks to make them safer and be more compliant with the Iowa Code. The word voluntary could be misleading to some at first because in this case it simply means the firm can "volunteer" or "choose" which of the examples shown in the guideline package they may want to use in plumbing their double nurse tanks. Or they may design their own system as long as it is functional and meets the requirements listed below. **It does not give them the option of whether or not they change their plumbing to become compliant.** The guidelines are not part of Iowa's Anhydrous Ammonia regulations. This document is enclosed and may be referenced at: www.agribiz.org.

The Iowa Department of Agriculture and Land Stewardship's (IDALS) basic regulatory responsibility relating to anhydrous ammonia (NH₃) is set out in Iowa Code sec. 200.14 which states that said equipment "... shall be installed and maintained in a safe operating condition and in conformity with rules adopted by the secretary." IDALS' administrative rules will soon adopt the 2014 ANSI/CGA G-2.1 Requirements for the Storage and Handling of Anhydrous Ammonia and those standards set IDALS' responsibility to inspect NH₃ tanks and specifically excess flow valves installed on NH₃ tanks as follows:

5.5.4 Excess flow valves shall be designed to close automatically at the rated flows of vapor or liquid as specified by the manufacturer. The connections and line, including valves and fittings, and hose, being protected by an excess flow valve, shall have a greater capacity than the rated flow of the excess flow valve, so that valve will likely close in case of failure at any point in the line or fittings.

Note: The underlining above is to show additional wording added to the 1989 ANSI Standard when it was updated to the new ANSI/CGA G-2.1 Standard.

IDALS has and will continue to work with the industry to assure compliance with the above-referenced requirements. However, the responsibility to select appropriate equipment that meets these requirements rests with the owner of the NH₃ tank(s).

Which means simply; **the excess flow valves must work.** This message was again reiterated in Secretary Northey's statement in a letter released to all NH₃ dealers in April, 2012 titled "2012 Anhydrous Ammonia Guidelines. This body of this letter is enclosed and may be referenced on the IDALS website, www.iowaagriculture.gov.

As the corrective measures may entail a relatively substantial cost, some dealers may initially resist the need to change existing plumbing that does not meet the above mentioned ANSI requirements. Please communicate in a professional manner that IDALS's and ANSI's purpose is to improve safety and that IDALS will work with the dealers to develop solutions on a case-by-case basis as long as the end result is equipment that meets the 2014 ANSI/CGA G-2.1 Standards.



April 5, 2012

Iowa Department of Agriculture and Land Stewardship
Anhydrous Ammonia Guidelines 2012

The Iowa Department of Agriculture & Land Stewardship has the following safety recommendations for the upcoming anhydrous ammonia season. These recommendations focus on nurse tanks and double nurse tanks utilized in field applications.

- All excess flow valves should be inspected to assure they are the proper size (flow rate) and that the valves are operating pursuant to design specifications. Note: Withdrawal valves and plumbing on anhydrous ammonia tanks should be the equal to or larger than the outlet connection on the liquid withdrawal valve.
- Double tanks must satisfy the requirements set out in paragraph 1. Special care should be taken to assure that the excess flow valves on each tank have equal flow rates and that the excess flow valves are sized to function as designed given the maximum output of the appurtenances.
- Double tanks plumbed together utilizing a "T" to combine the plumbing resulting in a violation of the criteria established in paragraph 1 should be removed from service until the requisite changes allowing the excess flow valves to function properly have been made.
- All anhydrous ammonia hoses connected to the tool bar should be appropriately sized, including using hoses of the proper length for the specific application equipment being used at any point in time. In addition, precautions should be taken to prevent any hose from dragging or becoming entangled with application equipment.

A handwritten signature in black ink that reads "Bill Northey". The signature is written in a cursive, flowing style.

Bill Northey
Secretary of Agriculture
Iowa Department of Agriculture and Land
Stewardship

Voluntary Guidelines for Plumbing Two NH3 Tanks on One Running Gear

Introduction:

NH3 safety is an important safety issue facing agriculture. The following new **voluntary** guidelines for plumbing multi-tank anhydrous ammonia systems have been developed by a coalition of state government, academia and industry representatives.

Guidelines:

1. Tanks valves should be replaced or tested every 5 years and tank owners should keep records to support this data. In the near future, uniform testing procedures should be developed that will make it easy for retailers to test NH3 tanks with flow meters to see if excess flow valves are working properly. (Using water)

2. The correct hose length from Central Plumbing Bulkhead should not be so long as to have coils in the hose, and/or should not be dragging on ground. Also, it is incorrect to tie-up the hose to the wagon tongue by safety chains or other devices as the hose may stretch to failure during turns or other operations.

3. Withdrawal valves and plumbing on NH3 tanks should be the same size or larger at the outlet connection on the liquid withdrawal valve. For example:

1.25 inch outlet connection on the liquid withdrawal valve should only use 1.25 or larger NH3 hose and plumbing. (Smaller hose sizes cannot be used as this defeats the purpose and contributes to excess flow valves not working for their intended purpose.)

NOTE: The 1 1/4" MPT X 1 3/4" ACME adapter used at the bulkhead, which actually measures closer to a 1" opening, is acceptable in-line in following the above mentioned guidelines.

4. Excess flow valves should be correctly sized to work with the tool bars they are to be hooked to. Excess flow will depend on toolbar width, speed traveled and rate of application. The NH3 per acre formula is as follows:

Lbs. N per acre x Swath Ft. x MPH x .1212 lbs. of N per hour (at 100 psi tank pressure) divided by 60 for lbs. per minute divided by 4.22 = actual NH3 (or material) gallons per minute.

Example #1: 200 lbs. N per acre x 60 feet swath x 8 MPH x .1212 = 11,635 lbs. N per hour (@ 100 PSI) divided by 60 = 194 lbs. N per minute divided by 4.22 lb N/gal NH3 = 46 gallons of NH3 per minute.

Example #2: 42 Ft. Swath, 180 lbs. N/Acre, 6 MPH= 21.7 GPM NH3

Example #3: 30 Ft. Swath, 150 lbs. N/ACRE, 5 MPH= 10.7 GPM NH3

In either example a 42 or 45 GPM excess flow valve would be appropriate on each NH3 tank valve hooked as doubles. Single tanks would require larger excess flow valve in this example. However, for most double tank applications, industry experts believe 45 GPM excess flow valves are the appropriate size for most situations.

5. Plumbing double tanks together in a tee (T) should be avoided. However if dual tanks are plumbed together they should have additional safety equipment. This can be accomplished with an additional, in-line excess flow valve and/or fail safe shutoff valves (electronic or mechanical).

Voluntary Guidelines for Plumbing Two NH3 Tanks on One Running Gear

Please note; regulatory officials have made it clear that no matter what type of incident occurs it is the tank owner's responsibility to plumb the tanks and hoses in accordance with the Compressed Gas Association ANSI K61.1, section 5.5.4., which states, **"The piping, including valves, fittings and hose, being protected by an excess flow valve shall have a greater capacity than the rated flow of the excess flow valve, so that the valve will likely close in case of failure at any point in the line or fittings."**

6. Dual tanks need separate withdrawal valves and separate hoses running to a Central Plumbing Safety Bulkhead on the front of a wagon with built in roll over protection to handle one of two different methods of plumbing. One method requires two liquid valves in the Central Plumbing Safety Bulkhead with ACME adapters extending in front of the Safety Bulkhead to connect two hoses to the tool bar. A two to one junction going into a single tower (i.e., heat exchanger used with a flow controller on tool bar) or with two towers there would be one hose to each tower; all with breakaway protection.

The second method would be 2 tank hoses being teed into a single excess flow valve on the safety bulkhead and a single hose of the same size going forward to the toolbar. In order for this to be acceptable, each tank hose should have a one way valve installed immediately before the tee. This will protect the entire system from both tanks feeding a ruptured hose. Also note, the single excess flow valve(s) should be sized the same GPM or less GPM than the valves which are inside the nurse tanks. Finally, each nurse tank valve should have the same excess flow GPM rating.

7. An automated quick coupler system is acceptable to plumb two separate hoses, one from each NH3 tank, into the central safety bulkhead into a two inch tee or Y which should be plumbed with plumbing suited to hook up a two inch hose on the tool bar, and with safety breakaway connection. A one way safety valve should be installed on both feeder supply lines immediately before the tee or Y to prevent both tanks feeding a ruptured tank hose.

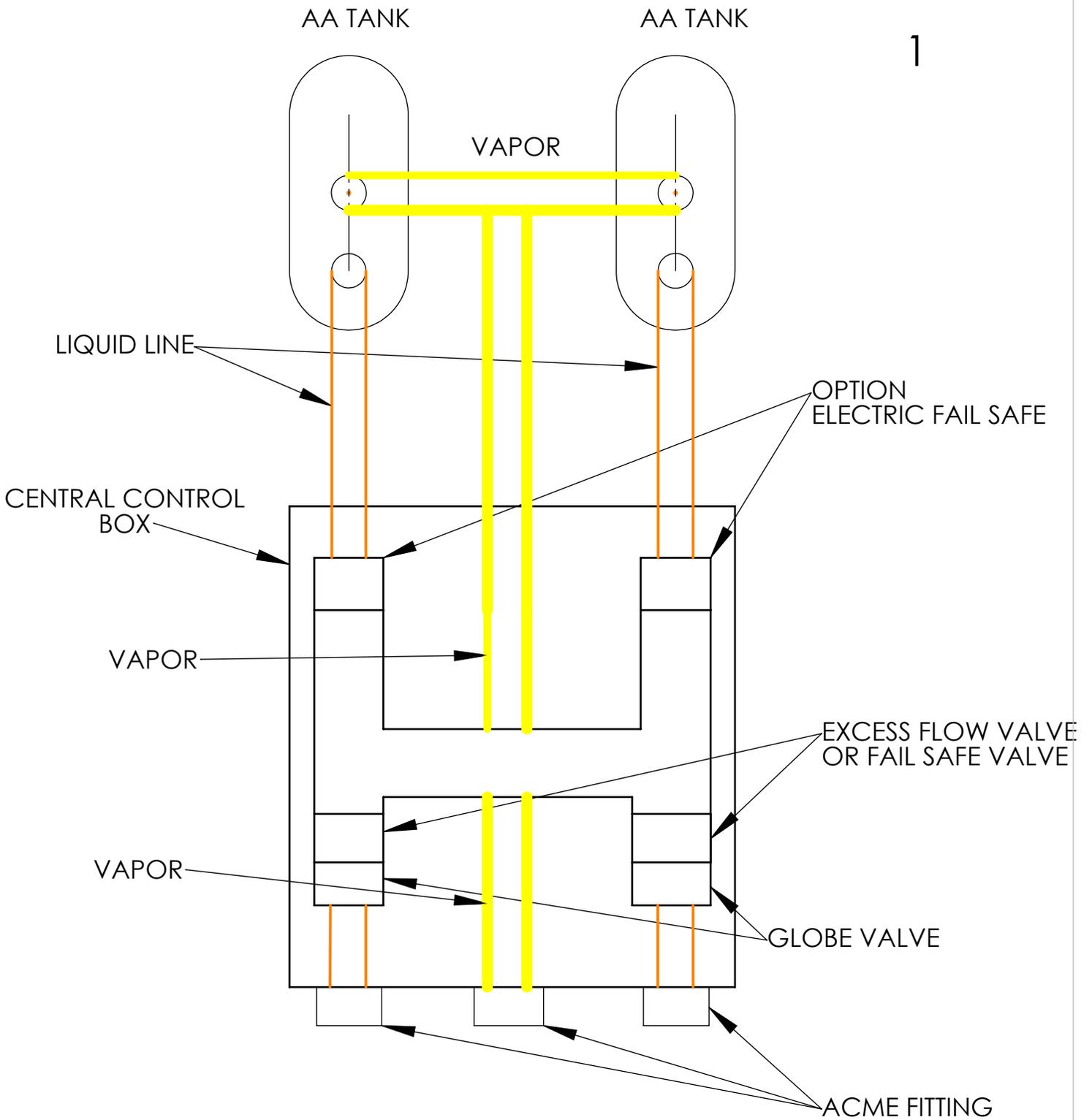
Both of these methods allow for continued use of a quick coupler system without leaving the tractor seat. However, when NH3 tanks are transported or parked at field locations all valves legally must be left shut off for safety precautions. After the tanks are correctly hitched to NH3 tool bars with safety chains attached to the tool bar, the tank valves can then be opened.

8. The Central Plumbing Safety Bulkhead should include rollover protection for fittings and valves similar to the protection provided on top of each tank. This protects valves in roll over situations or collisions with other vehicles.

9. Running gears are required by law to be inspected once per year. Remember to inspect both the bolster bolts and welds where the tanks mount onto the running gear. Both cracked bolster bolts and cracked welds have been reported during inspections.

Conclusion:

Other guidelines and examples may be added to this list as agriculture and NH3 equipment moves forward. However it is important to narrow the short term scope of guidelines down in order to get them quickly implemented throughout the industry, with a uniform process. This should increase the level of protection for Iowa agricultural retailers, tank haulers, and NH3 applicators as well as the general public.



IN MOST CASES 45GPM IS ACCEPTABLE

AA TANK

AA TANK

2

VAPOR

LIQUID LINE

SAFETY BOX

VAPOR

GLOBE VALVE

TOOL BAR COUPLER

ACME FITTING

TOOL BAR COUPLER

COOLERS

TOOL BAR

TOOL BAR

COOLER

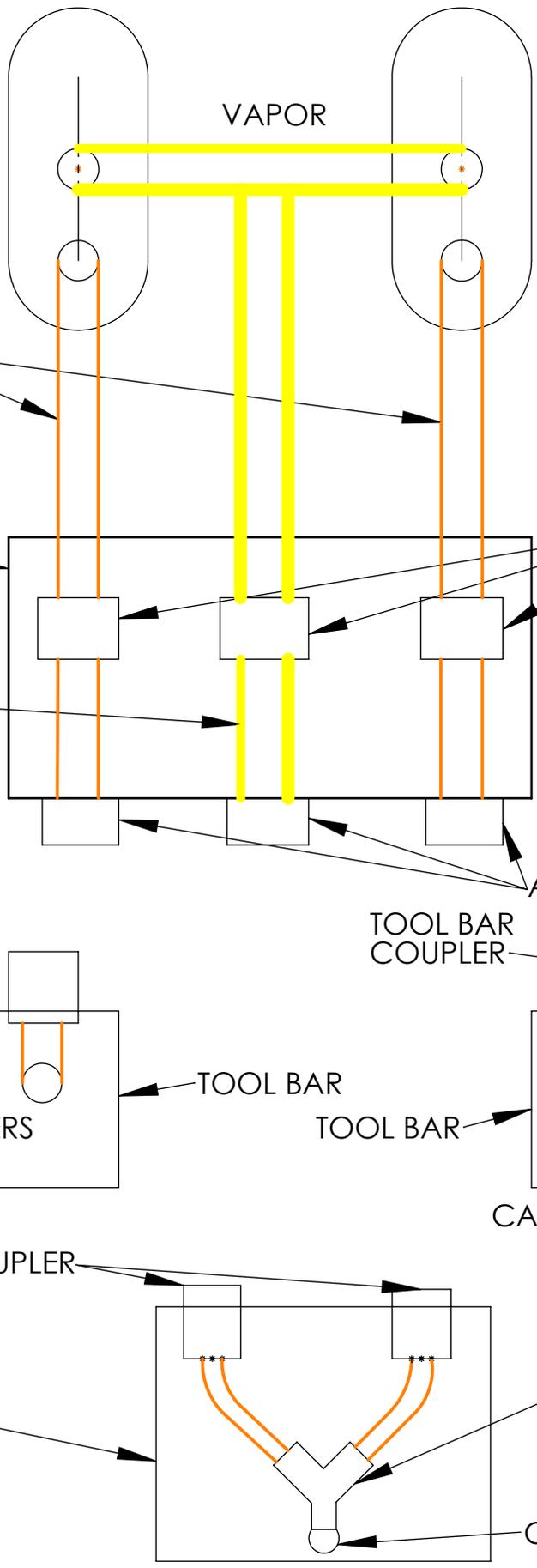
CAN ONLY USE 1 SUPPLY HOSE

TOOL BAR COUPLER

TOOL BAR

Y OR TEE

COOLER



AA TANK

AA TANK

3

VAPOR

LIQUID LINE

ROLL OVER BOX

BACK CHECK

BACK CHECK

TEE

VAPOR

EXCESS FLOW VALVE

BULK HEAD

GLOBE VALVE

GLOBE VALVE

ACME FITTING

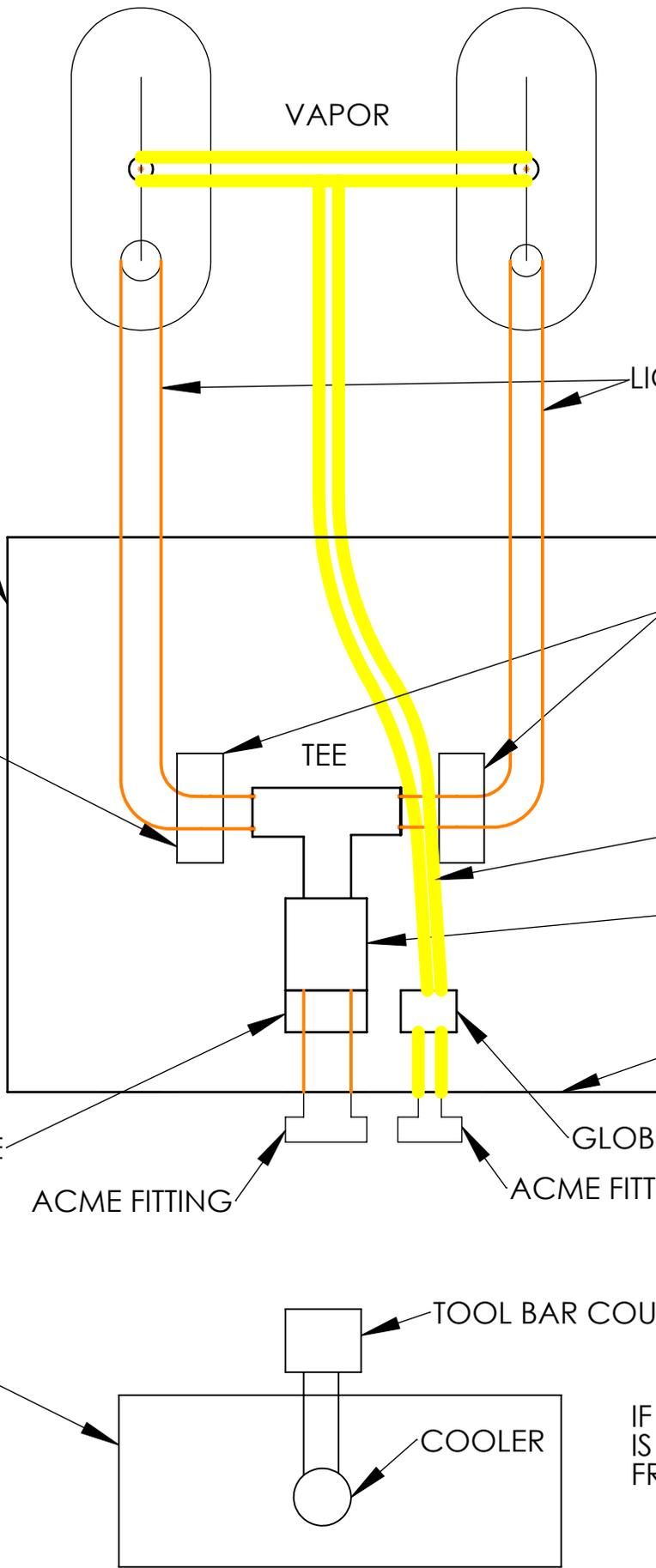
ACME FITTING

TOOL BAR COUPLER

TOOL BAR

COOLER

IF BACKCHECK OPTION IS USED FILLING FROM FRONT IS NOT POSSIBLE



AA TANK

AA TANK

4

VAPOR

45 GPM MAX EXCESS FLOW RATED TANK VALVE

ROLL OVER BOX

BACK CHECK

2" TEE

LIQUID LINE

VAPOR

BULK HEAD

EXCESS FLOW VALVE

2" GLOBE VALVE

GLOBE VALVE

ACME FITTING

ACME FITTING

TOOL BAR COUPLER

AUTOMATED QUICK COUPLER MUST USE 2" HOSE

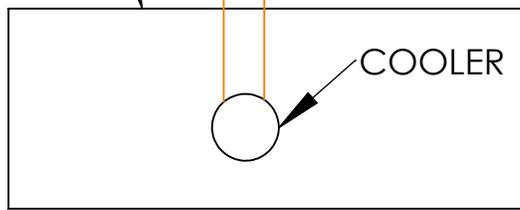
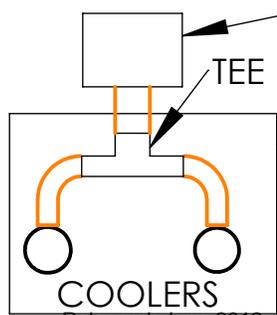
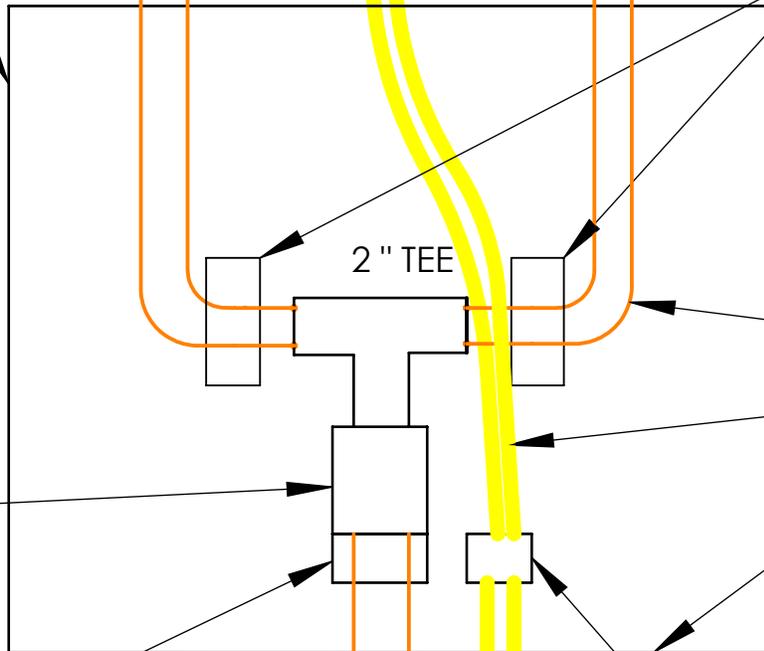
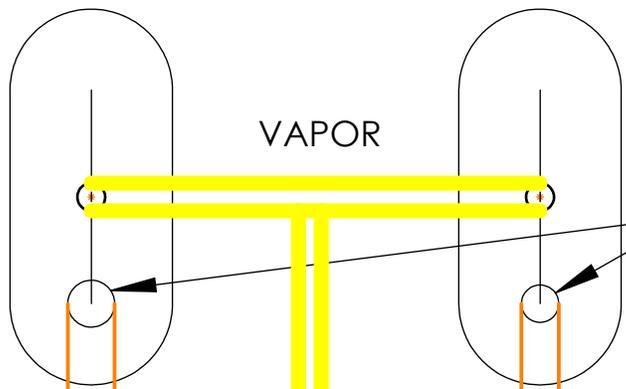
TOOL BAR

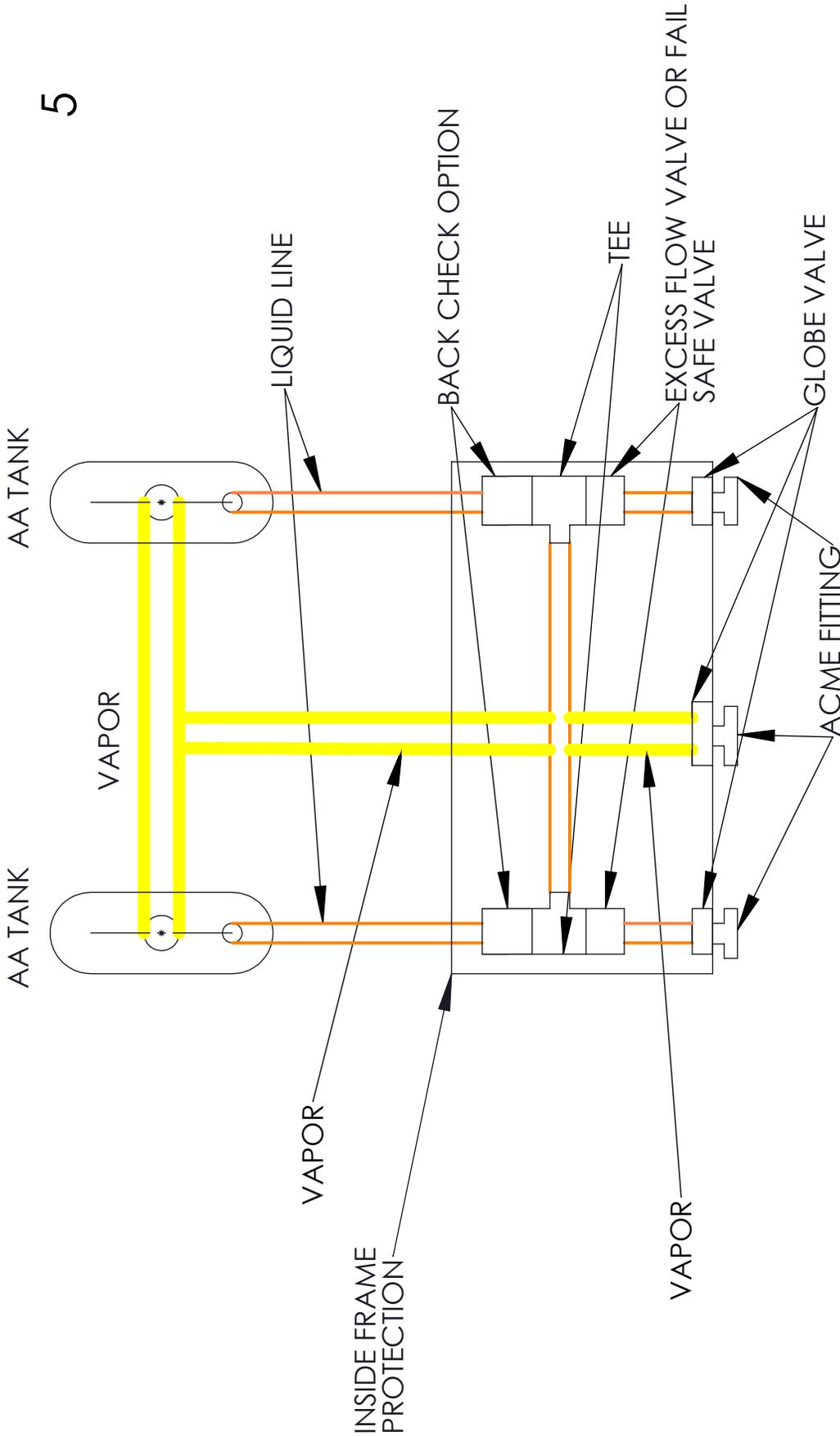
TEE

COOLER

COOLERS

Released: June 2012





IF BACK CHECK OPTION IS SELECTED THEN FILLING FROM THE FRONT IS NOT POSSIBLE

AA TANK

AA TANK

6

VAPOR

LIQUID LINE

CENTRAL CONTROL BOX

VAPOR

EXCESS FLOW VALVE OR FAIL SAFE VALVE

VAPOR

GLOBE VALVE

ACME FITTING

MINIUM RECOMENDATION FOR CROSSOVER PLUMBING IN MOST CASES 45GPM IS ACCEPTABLE

