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).

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.

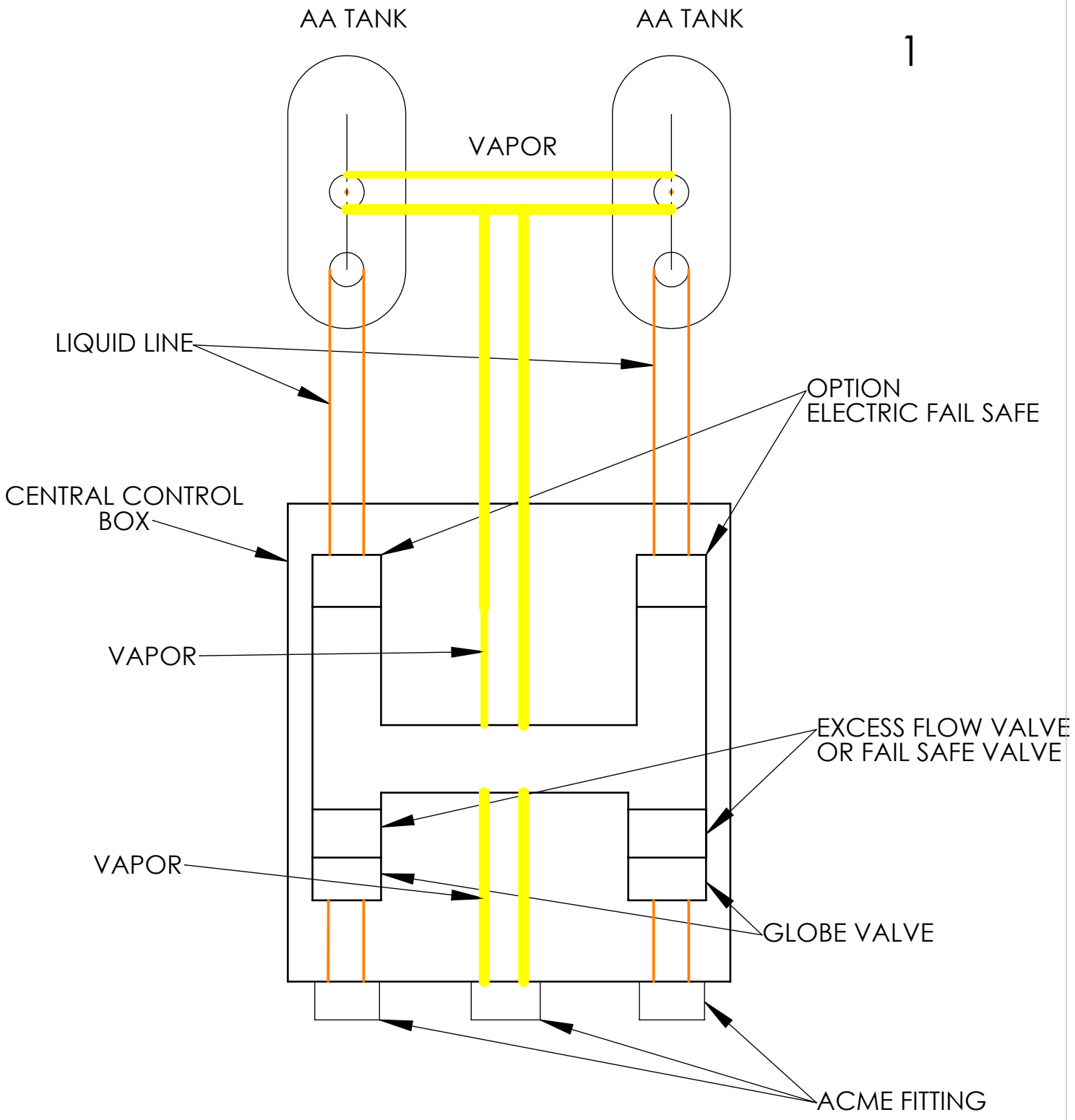
Both of these methods allow for continued use of a quick coupler system without leaving the tractor seat. However, when NH3 tanks are transported or parked at field locations all valves legally must be left shut off for safety precautions. After the tanks are correctly hitched to NH3 tool bars with safety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

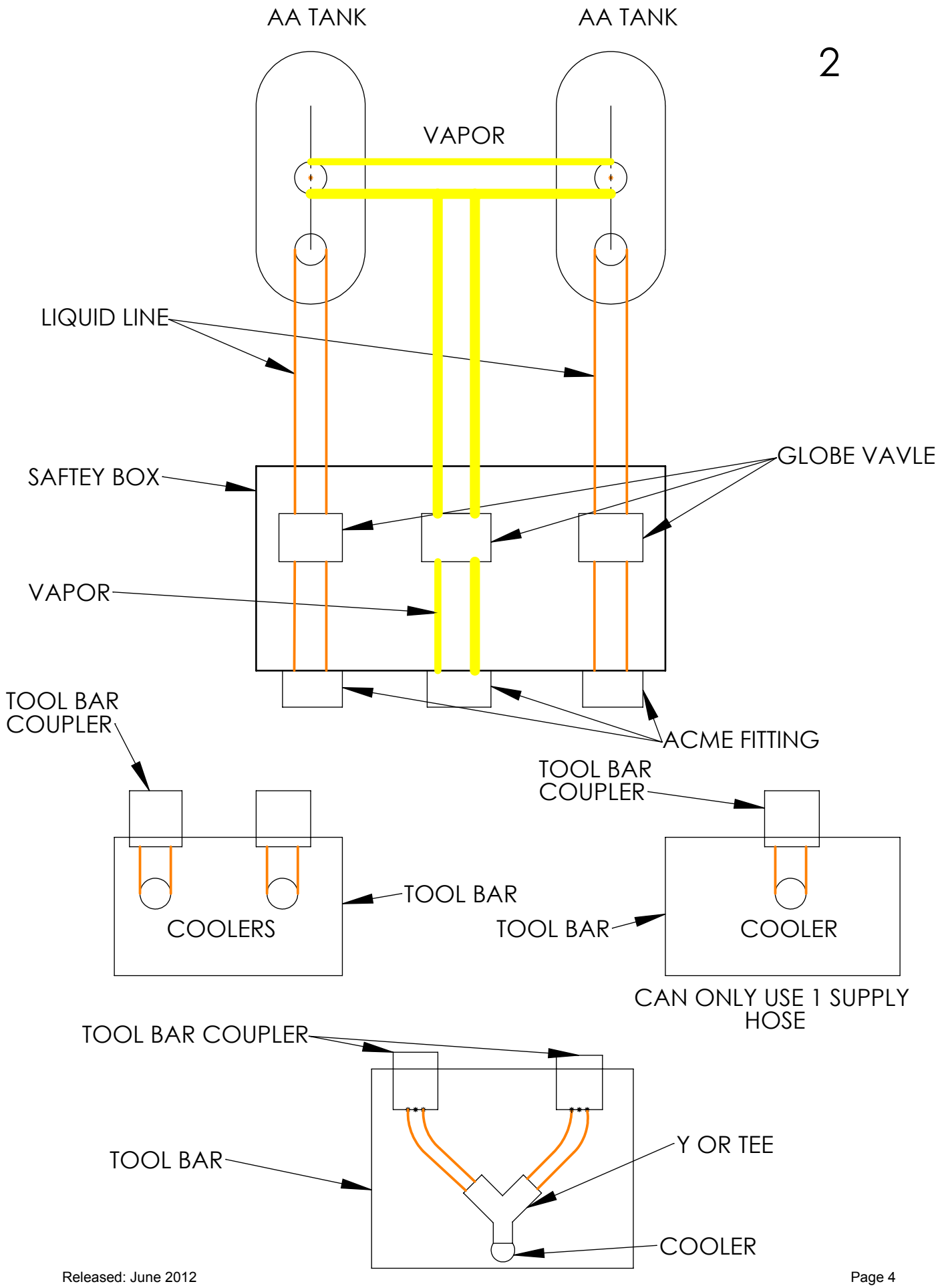
9. Running gears are required by law to be inspected once per year. Remember to inspect both the bolster bolts and welds where the tanks mount onto the running gear. Both cracked bolster bolts and cracked welds have been reported during inspections.

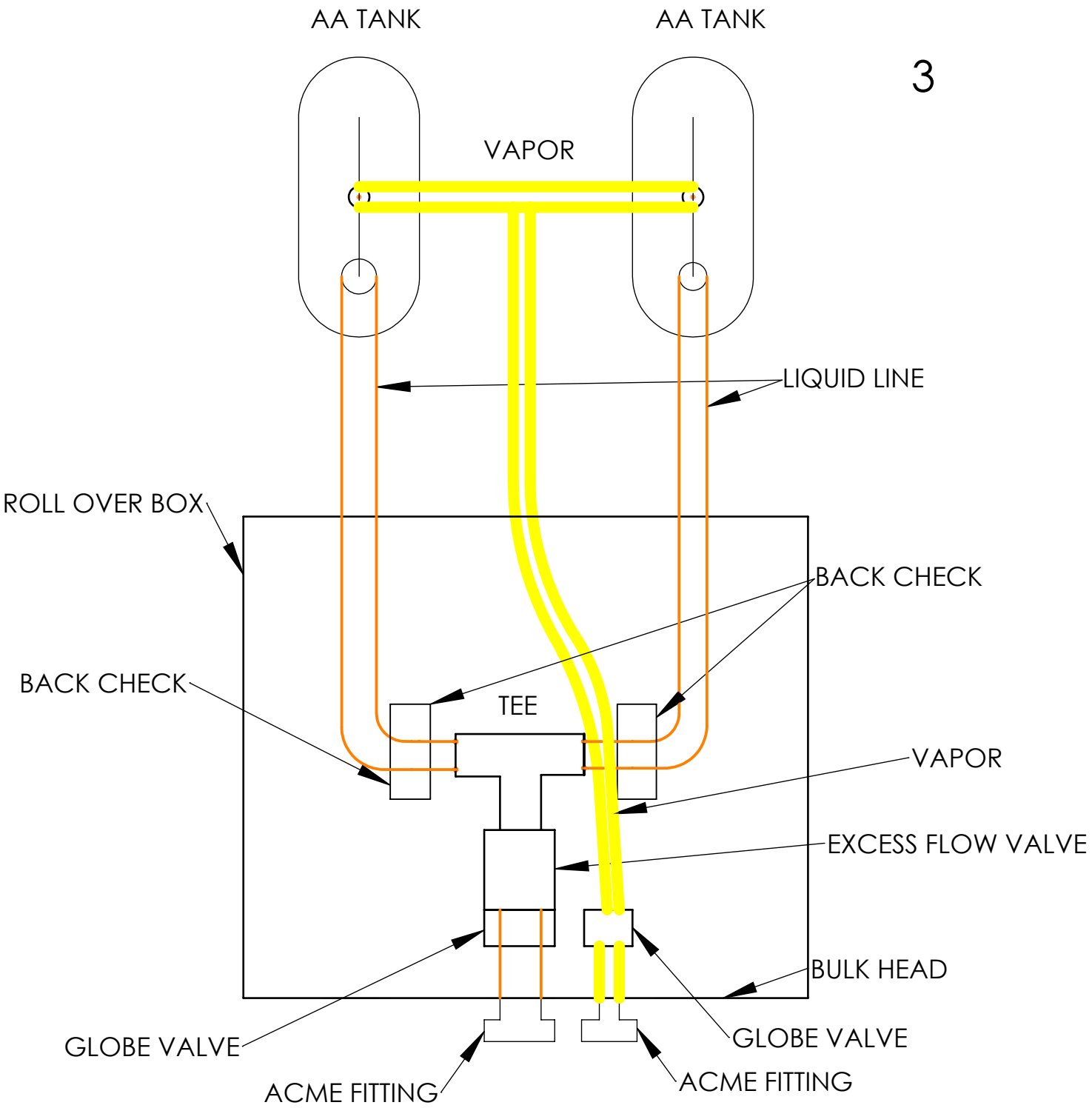
Conclusion:

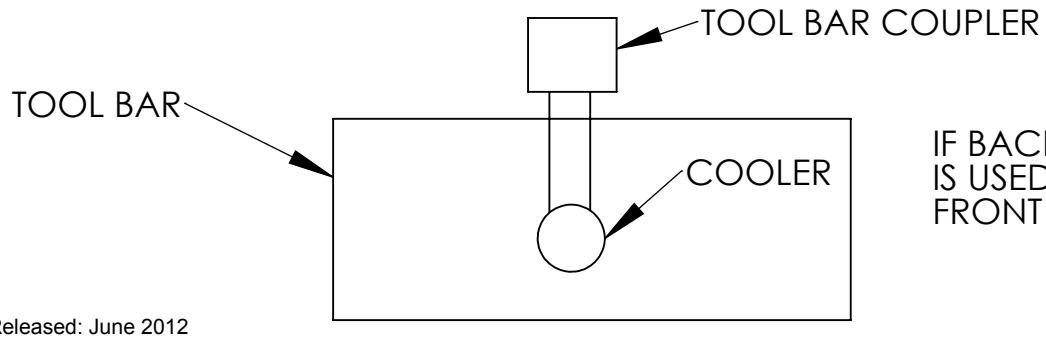
Other guidelines and examples may be added to this list as agriculture and NH3 equipment moves forward. However it is important to narrow the short term scope of guidelines down in order to get them quickly implemented throughout the industry, with a uniform process. This should increase the level of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



IN MOST CASES 45GPM IS ACCEPTABLE

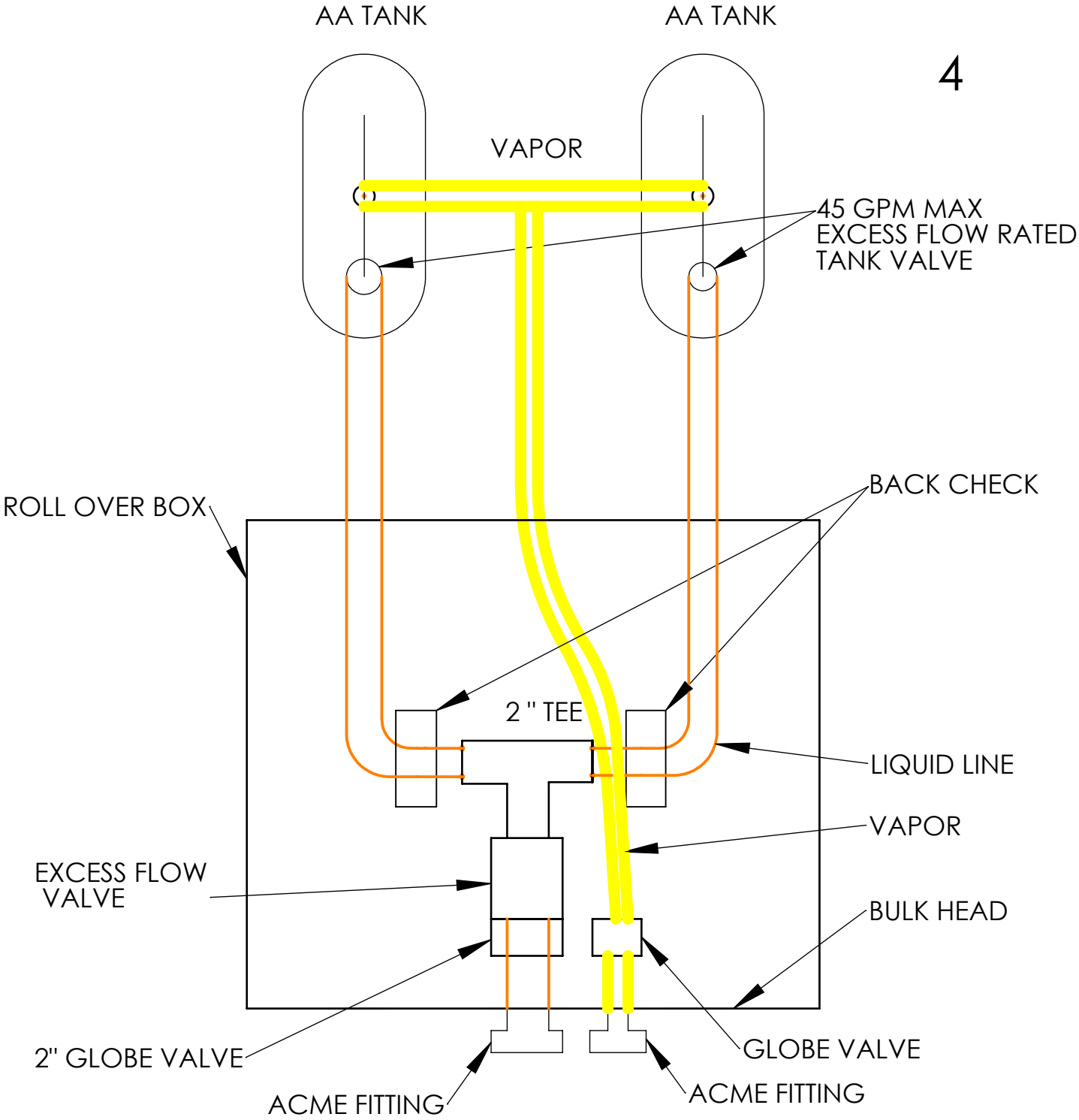

AA TANK
AA TANK
2
VAPOR
LIQUID LINE
SAFTEY BOX
GLOBE VAVLE
VAPOR
TOOL BAR
COUPLER
ACME FITTING
TOOL BAR
COUPLER
COOLERS
TOOL BAR
TOOL BAR
COOLER
CAN ONLY USE 1 SUPPLY
HOSE
TOOL BAR COUPLER
TOOL BAR
Y OR TEE
COOLER

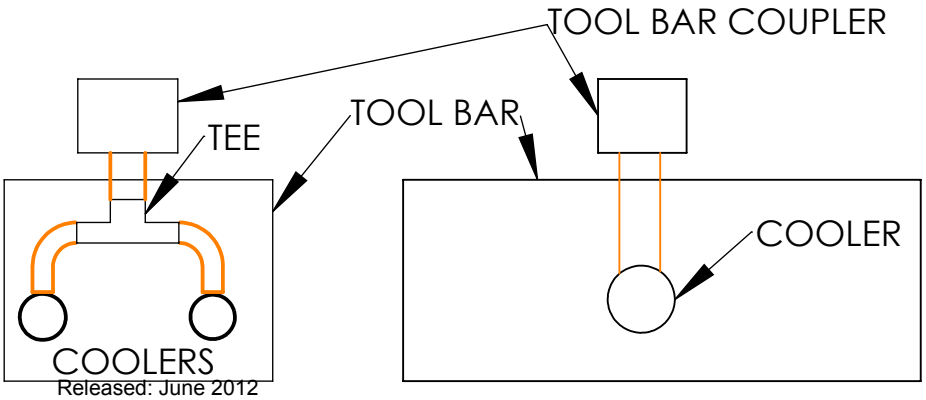




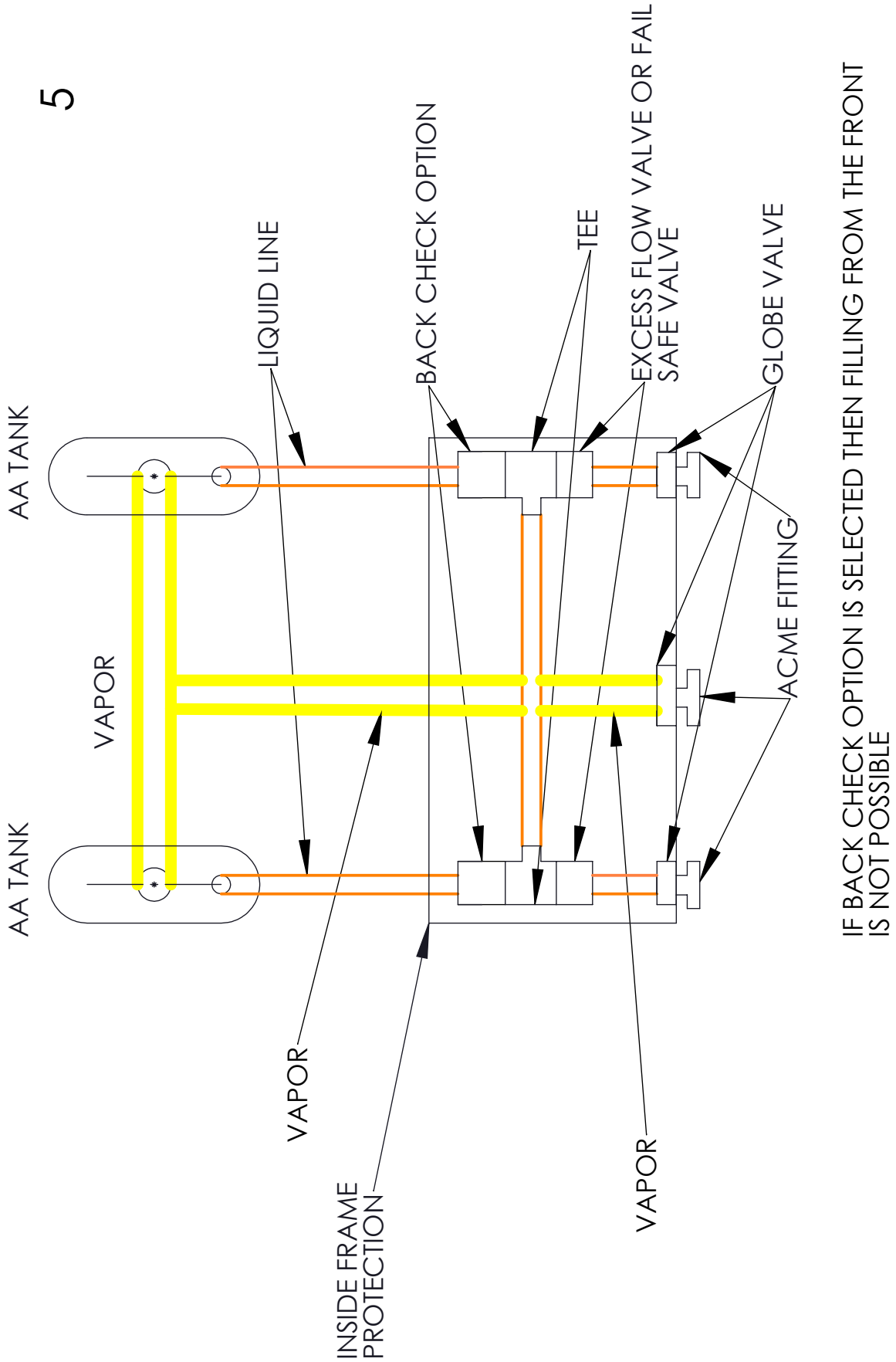
IF BACKCHECK OPTION IS USED FILLING FROM FRONT IS NOT POSSIBLE

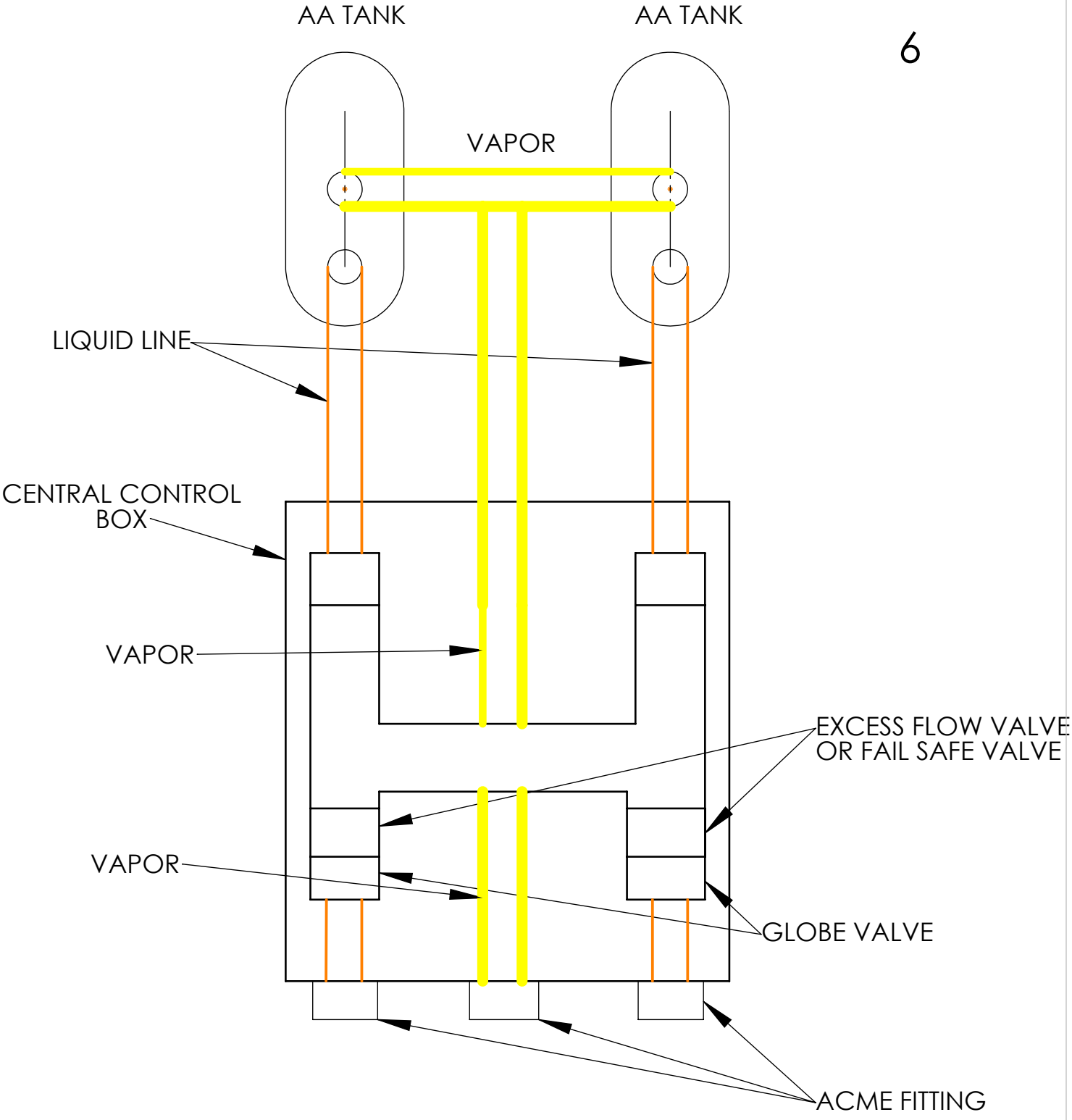
4





AUTOMATED QUICK
COUPLER
MUST USE 2" HOSE


5
AA TANK
AA TANK
VAPOR
LIQUID LINE
BACK CHECK OPTION
TEE
EXCESS FLOW VALVE OR FAIL SAFE VALVE
GLOBE VALVE
ACME FITTING
IF BACK CHECK OPTION IS SELECTED THEN FILLING FROM THE FRONT IS NOT POSSIBLE
VAPOR
INSIDE FRAME PROTECTION
VAPOR



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