These are some still drawings I have done over the years from ideas and designs around the forums and elsewhere. I thought I would throw them all together in one file for others to gawk at.

This is not an exhaustive list of possible still types and designs. For example, there are no plate stills in here.

There is nothing new here, except maybe the offset VM near the end, and the condenser for the Offset CM (Manu) still.

These drawings are schematic drawings about the basic principle, not full engineering drawings, (though they may have some details on them). Most of the basic designs are well established and tested, but some variations may need fine tuning, and some have not been tested at all (as far as I know), like the the offset VM, and the condenser for the Offset CM (Manu) still.

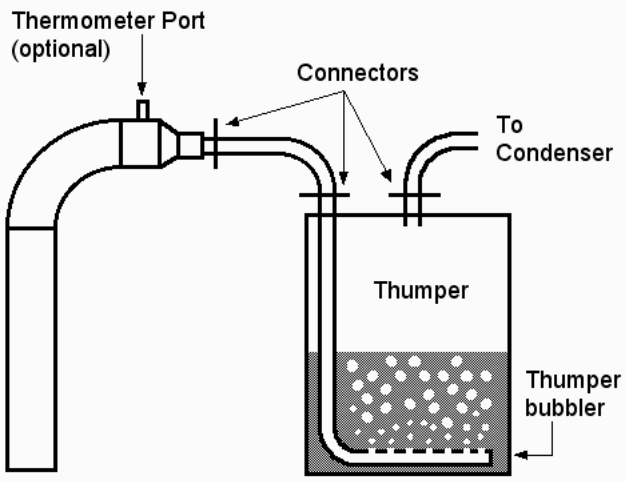
I don't have time to make any serious notes on them. But I think the drawings are pretty self explanatory.

Also, the document formatting is not perfect, but I just ain't got the time to make it otherwise.

Hook
Dec 2010

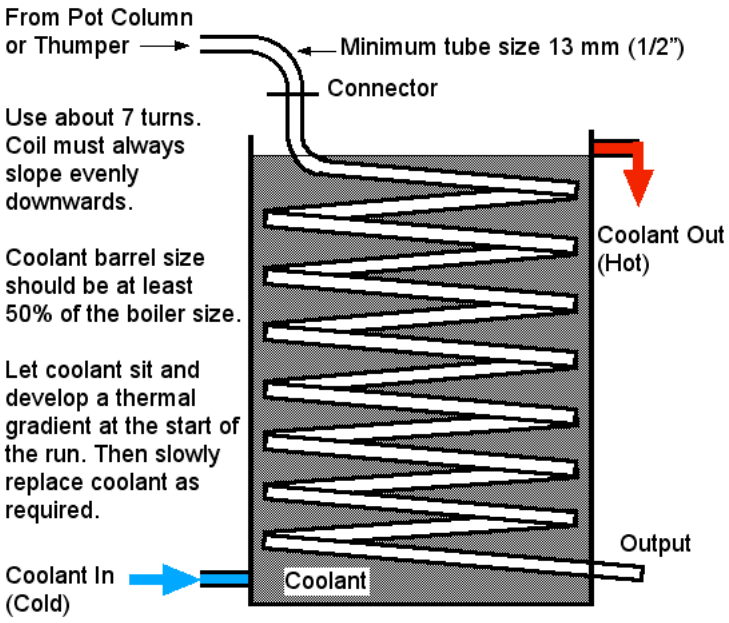
••••••

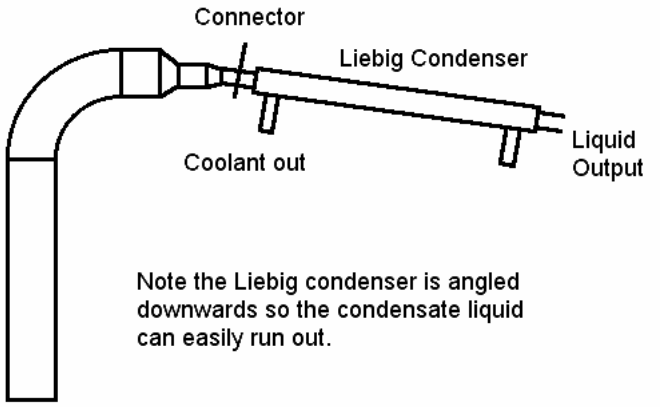
Pot still with thumper



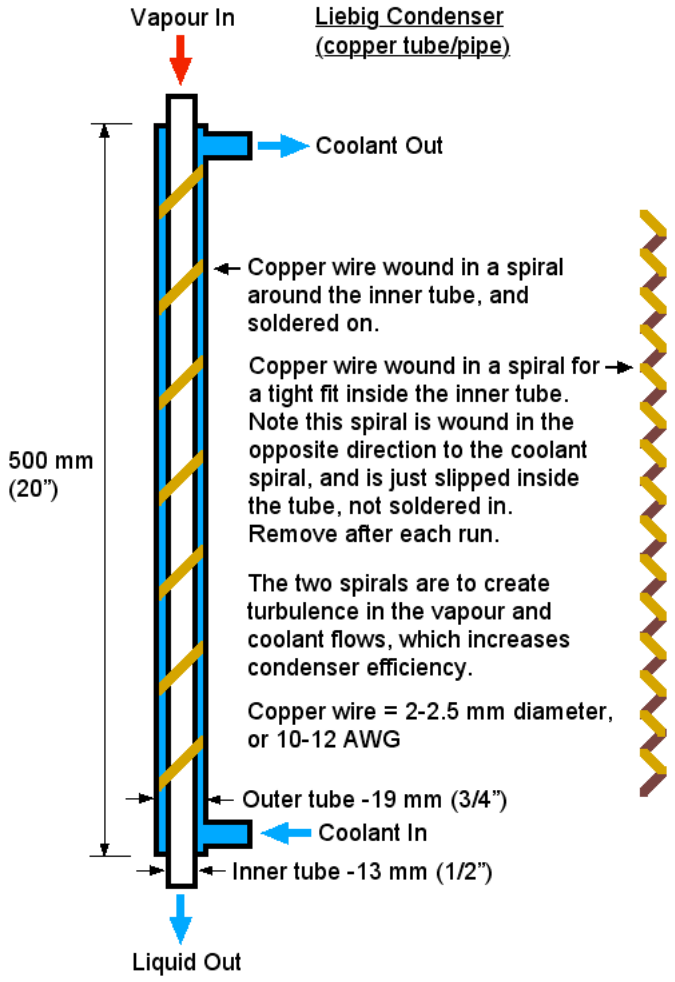
It is very important that the holes in the thumper bubbler are never blocked. If stilling a wash containing grain, fruit or molasses then the holes in the bubbler must be big enough to let any solids through if the wash boils over ('pukes') into the thumper.

Coil in a barrel condenser
(worm condenser)

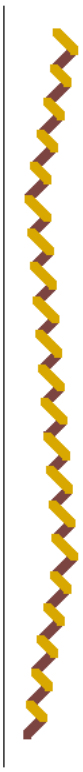


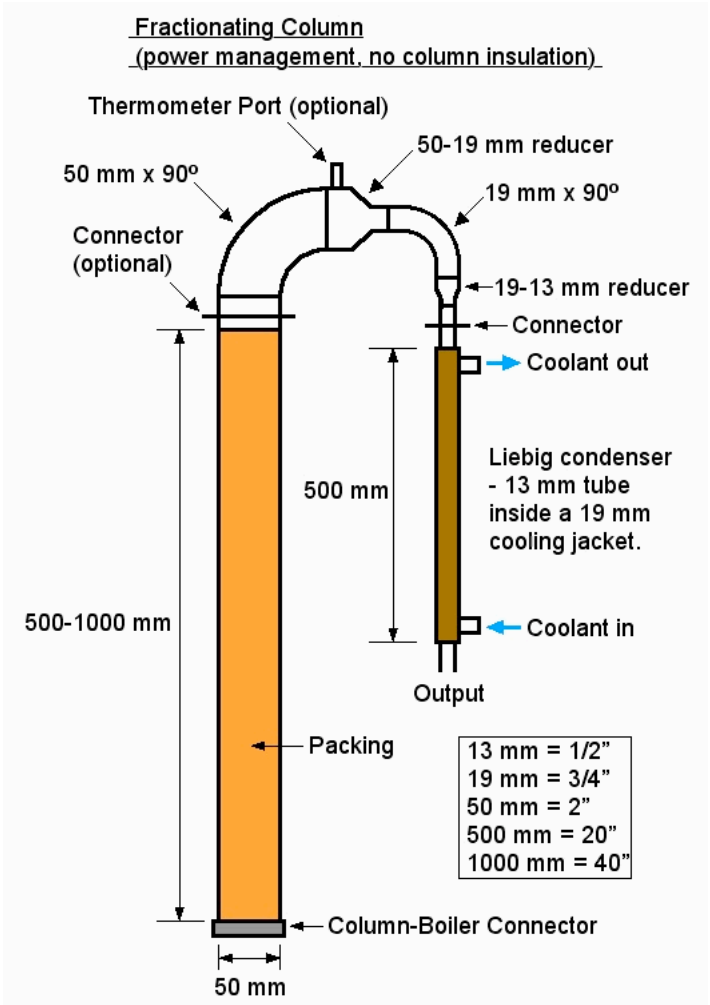


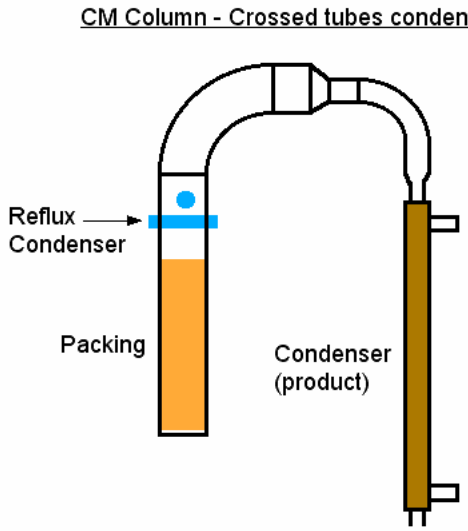
Note the Liebig condenser is angled downwards so the condensate liquid can easily run out.



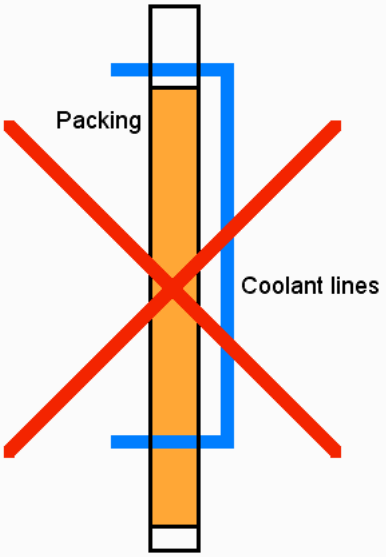
Form the inner spiral into a slight ‘s’ shape overall. This will keep it in place inside the condenser




Fractionating Column
(power management, no column insulation)
Thermometer Port (optional)
50-19 mm reducer
50 mm x 90º
19 mm x 90º
Connector
(optional)
19-13 mm reducer
Connector
Coolant out
Liebig condenser
- 13 mm tube
inside a 19 mm
cooling jacket.
500 mm
500-1000 mm
Coolant in
Output
Packing
13 mm = 1/2”
19 mm = 3/4”
50 mm = 2”
500 mm = 20”
1000 mm = 40”
Column-Boiler Connector
50 mm


CM Column - Crossed tubes condenser
Reflux
Condenser
Packing
Condenser
(product)

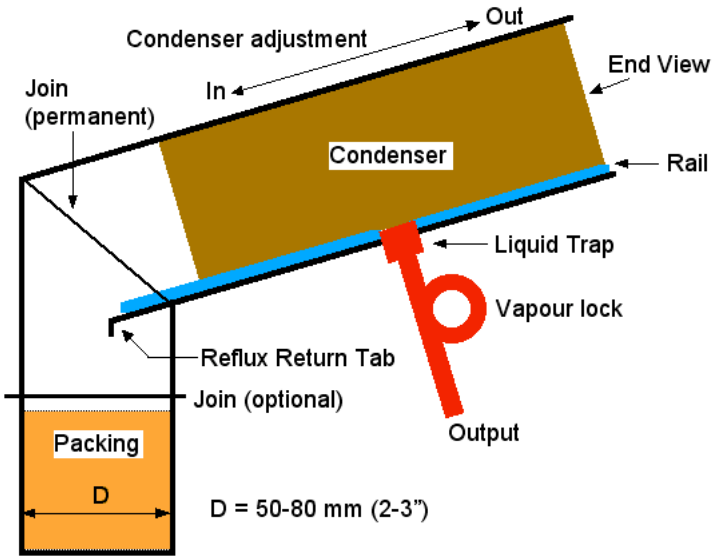
Avoid any column design with coolant ('reflux') lines running through the packing, typically lower down in the column, like this:

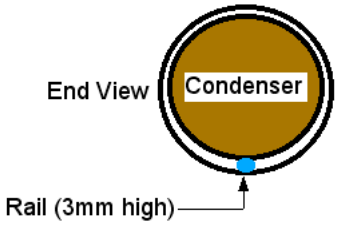


All forced reflux condensing must take place above the packing.

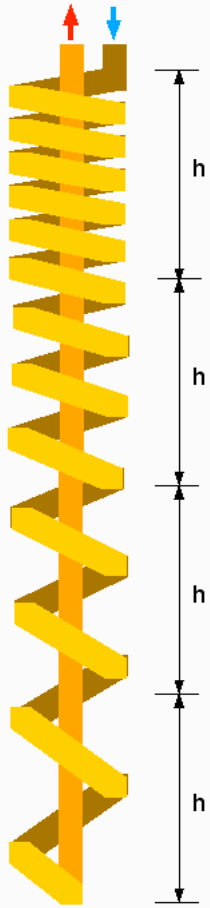
Offset CM (Manu Still)

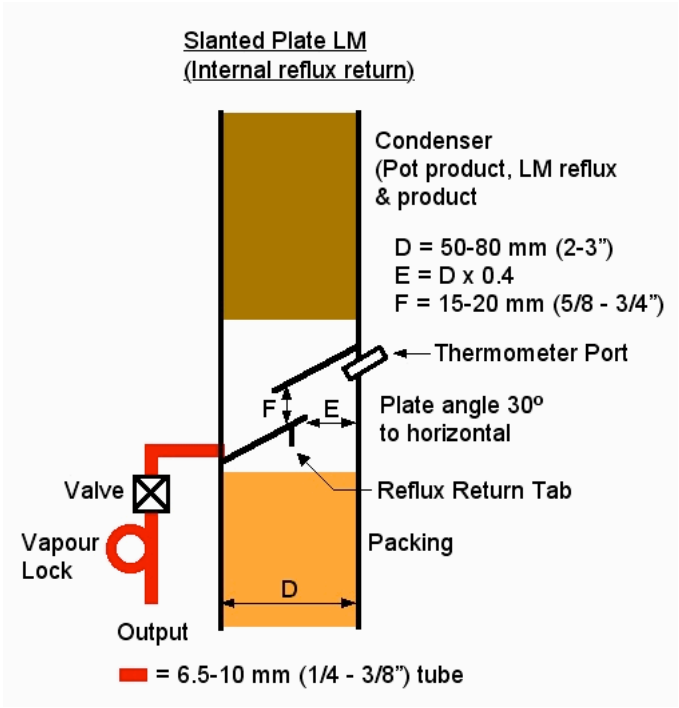
Adjust condenser position to vary reflux ratio.
In increases reflux ratio. Out decreases reflux ratio.

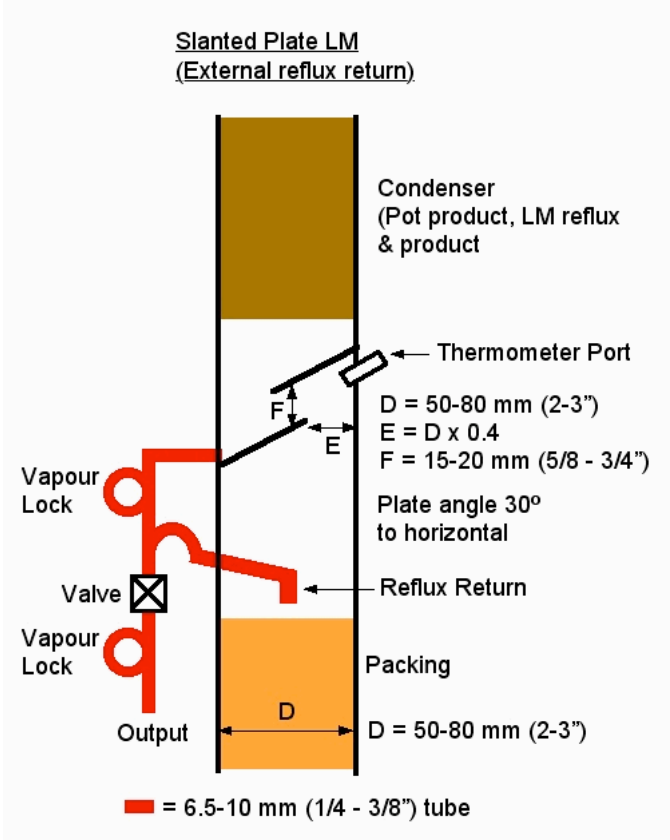


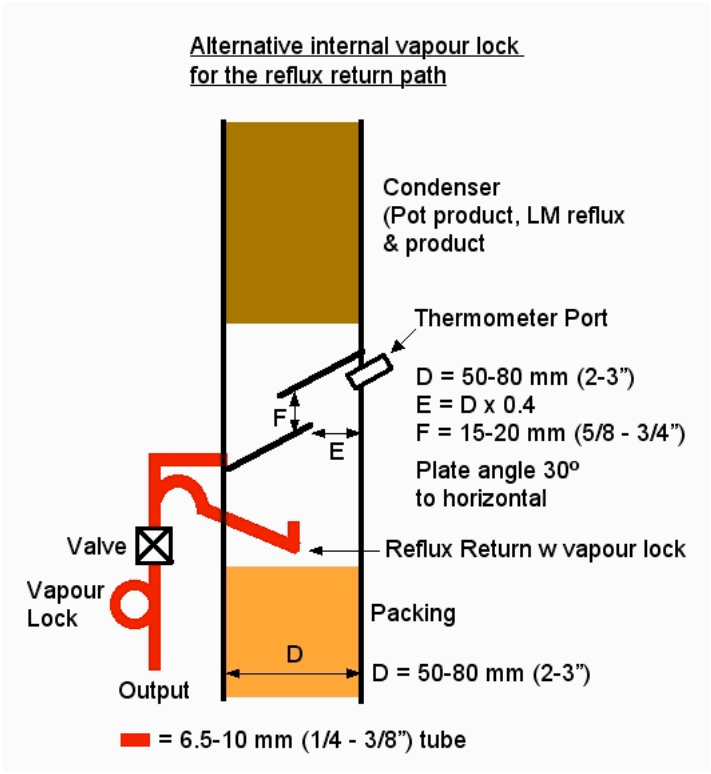


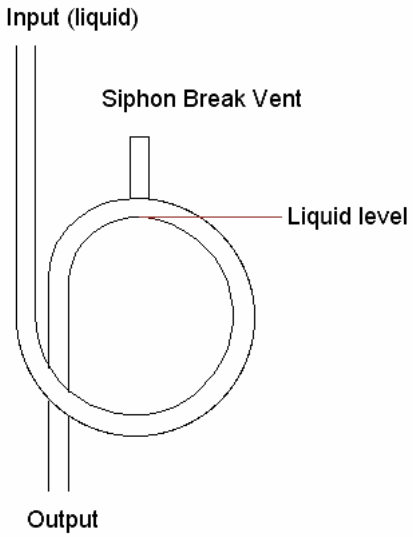
Condenser for Manu Offset CM Still

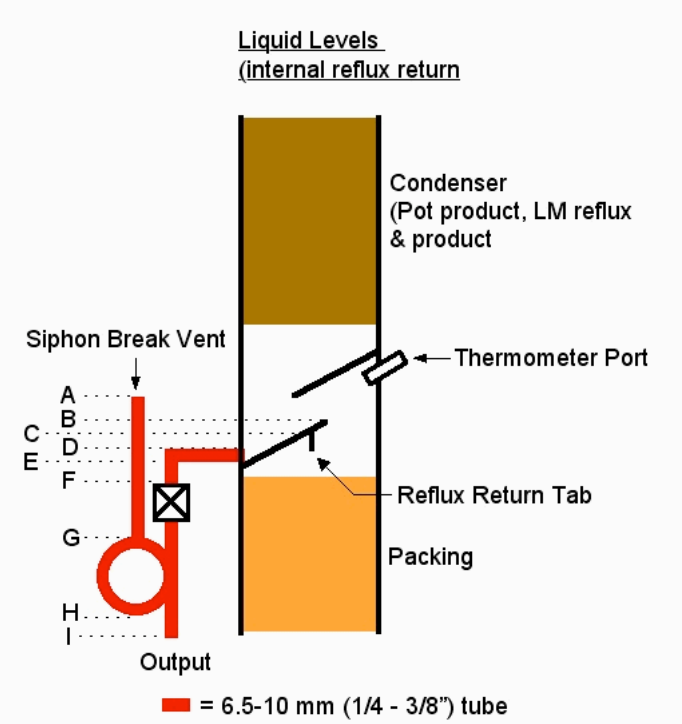



Slanted Plate LM
(Internal reflux return)
Condenser
(Pot product, LM reflux
& product
D = 50-80 mm (2-3")
E = D x 0.4
F = 15-20 mm (5/8 - 3/4")
Thermometer Port
F
E
Plate angle 30º
to horizontal
Valve
Reflux Return Tab
Vapour
Lock
Packing
D
Output
= 6.5-10 mm (1/4 - 3/8") tube

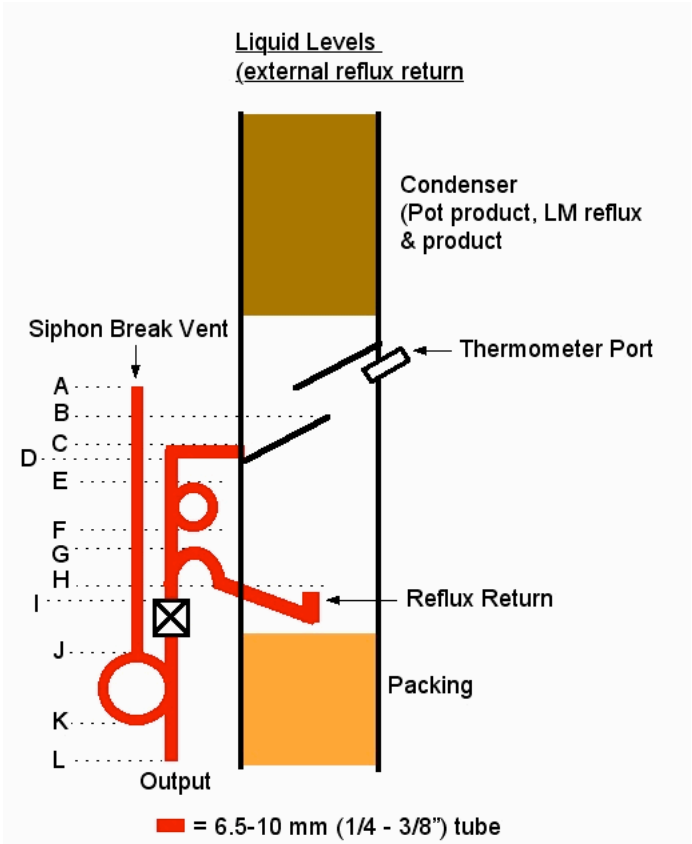

Slanted Plate LM
(External reflux return)
Condenser
(Pot product, LM reflux
& product
Thermometer Port
F
E
D = 50-80 mm (2-3")
E = D x 0.4
F = 15-20 mm (5/8 - 3/4")
Plate angle 30º
to horizontal
Vapour
Lock
Valve
Reflux Return
Vapour
Lock
Packing
D
Output
D = 50-80 mm (2-3")
= 6.5-10 mm (1/4 - 3/8") tube


Alternative internal vapour lock
for the reflux return path
Condenser
(Pot product, LM reflux
& product
Thermometer Port
D = 50-80 mm (2-3")
E = D x 0.4
F = 15-20 mm (5/8 - 3/4")
Plate angle 30º
to horizontal
F
E
Valve
Reflux Return w vapour lock
Vapour
Lock
Packing
D
D = 50-80 mm (2-3")
Output
= 6.5-10 mm (1/4 - 3/8") tube


Input (liquid)
Siphon Break Vent
Liquid level
Output

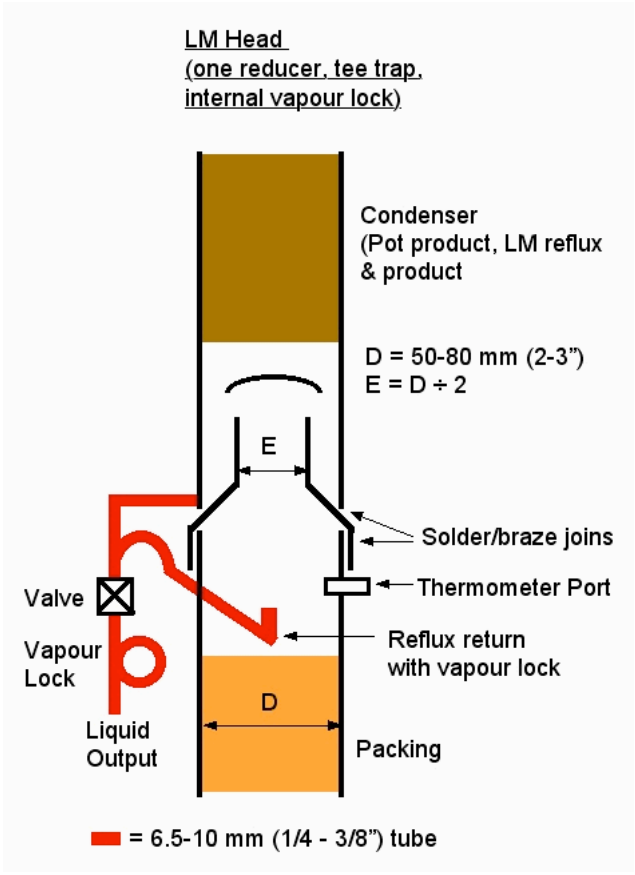


Note the vertical relationships between different components of the liquid management system, A - I.

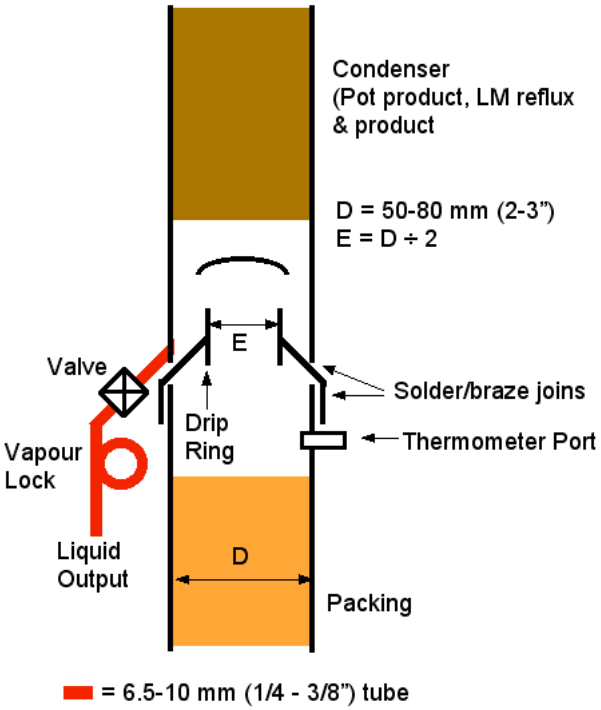


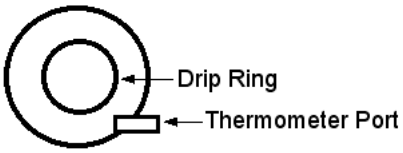
Note the vertical relationships between different components of the liquid management system, A - L.

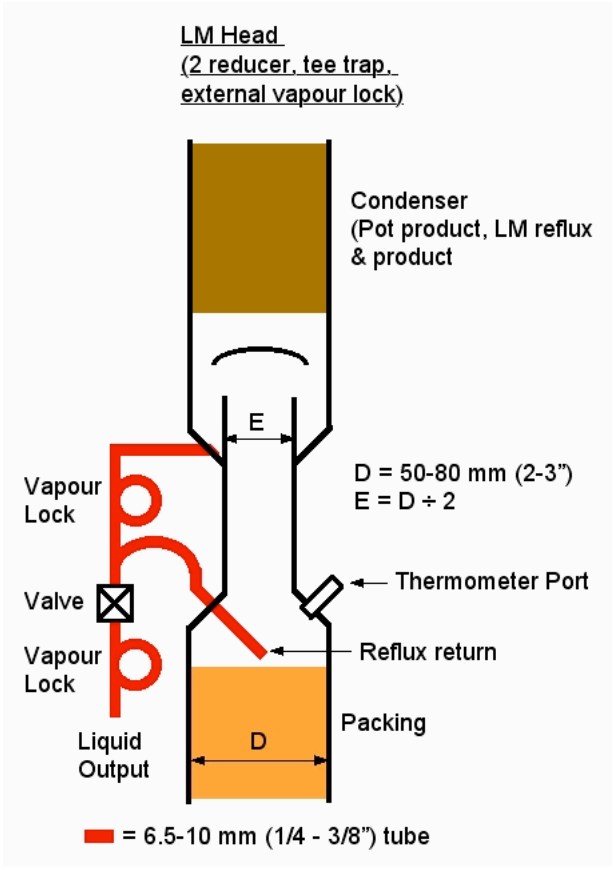
The distance from G to H must be at least 2.5 times the diameter of the tube.


LM Head
(one reducer, tee trap,
internal vapour lock)
Condenser
(Pot product, LM reflux
& product
D = 50-80 mm (2-3")
E = D ÷ 2
E
Solder/braze joins
Thermometer Port
Valve
Vapour
Lock
Reflux return
with vapour lock
D
Liquid
Output
Packing
= 6.5-10 mm (1/4 - 3/8") tube

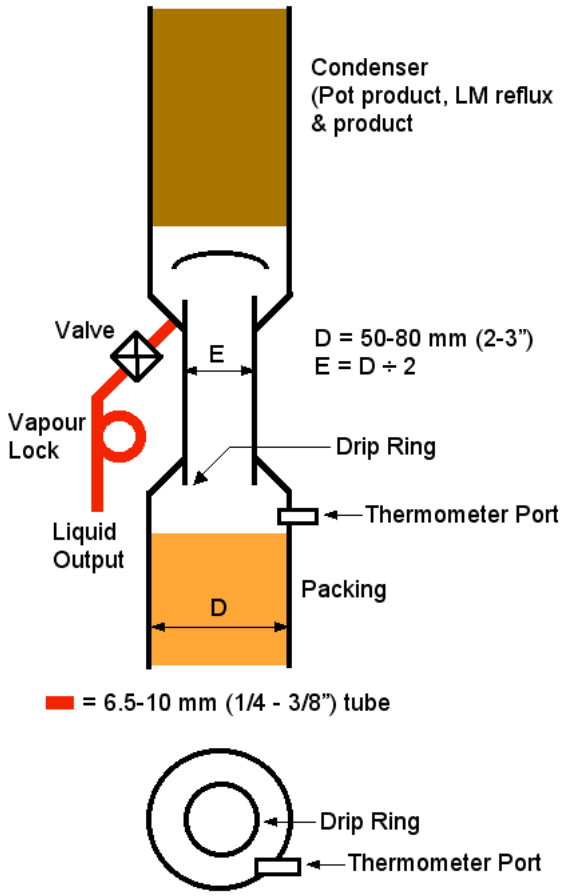
LM Head
(one reducer, tee trap)

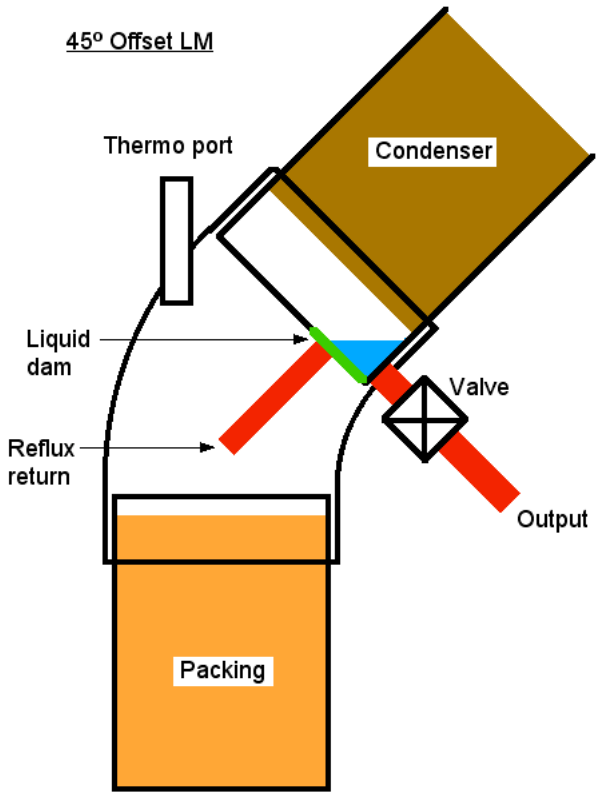


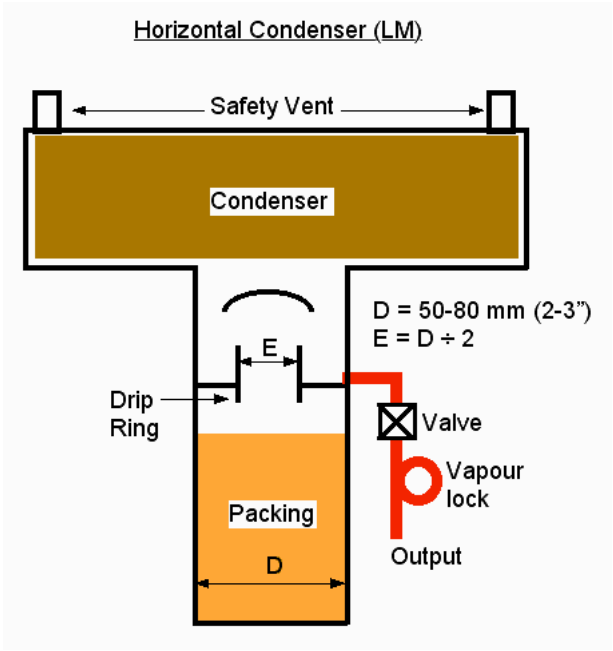



LM Head
(2 reducer, tee trap,
external vapour lock)
Condenser
(Pot product, LM reflux
& product
E
D = 50-80 mm (2-3")
E = D ÷ 2
Vapour
Lock
Valve
Thermometer Port
Vapour
Lock
Reflux return
Packing
Liquid
Output
D
= 6.5-10 mm (1/4 - 3/8") tube

LM Head
(2 reducer, tee trap)

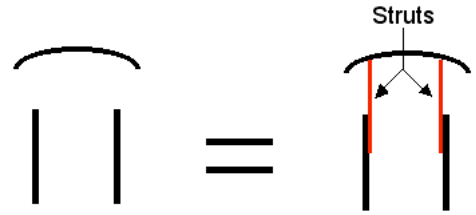



45º Offset LM
Thermo port
Condenser
Liquid dam
Valve
Reflux return
Output
Packing

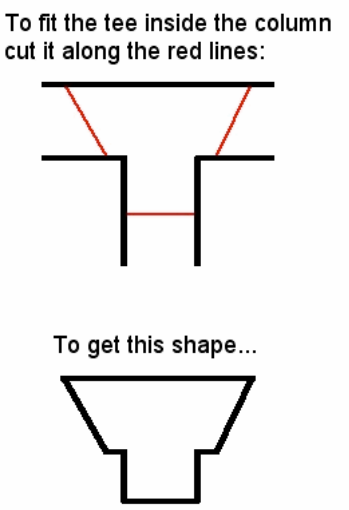

Horizontal Condenser (LM)
Safety Vent
Condenser
D = 50-80 mm (2-3")
E = D ÷ 2
E
Drip Ring
Valve
Vapour lock
Packing
Output
D

Liquid Trap or Tee Trap

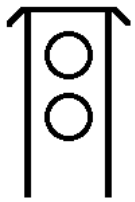
Liquid Trap 1



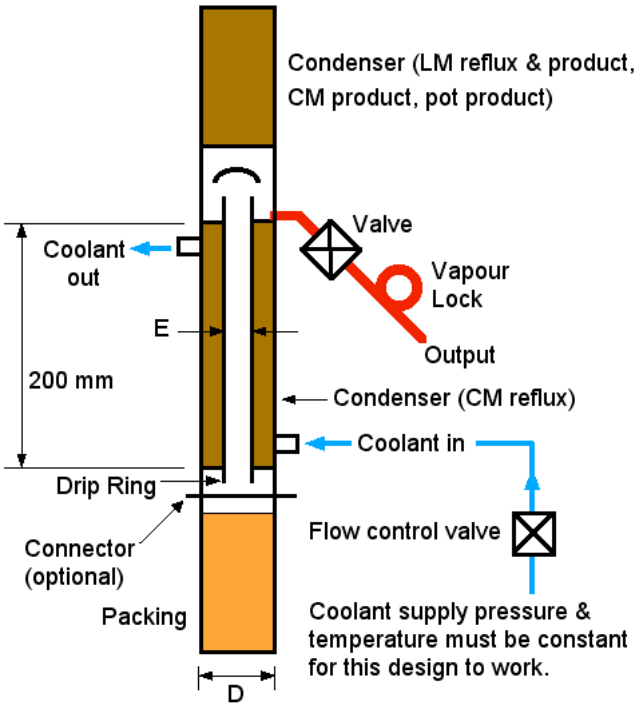
Liquid Trap 2



Liquid Trap 3

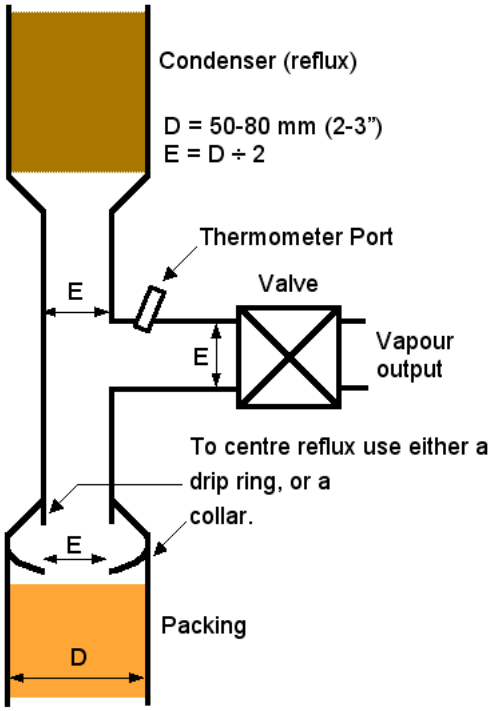


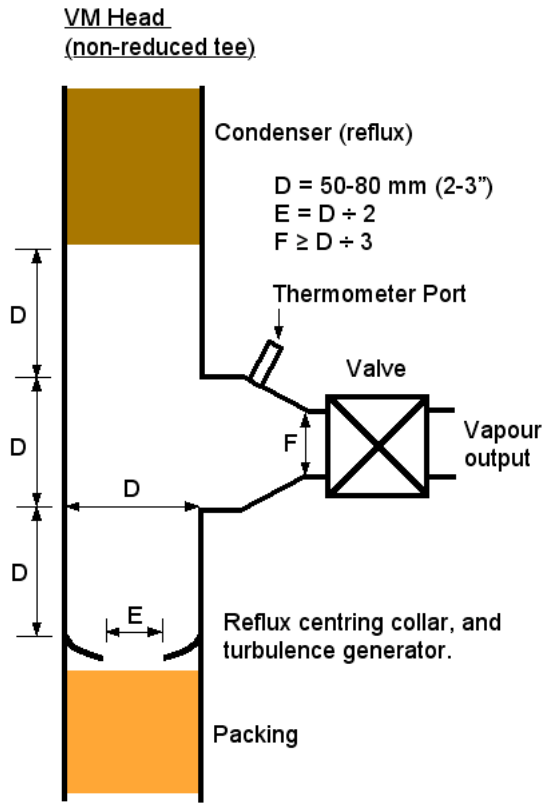
LM-CM Head
(tee trap)



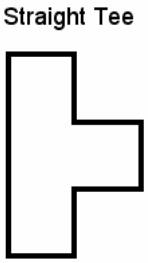
D = 50-80 mm (2-3")
E = D ÷ 2

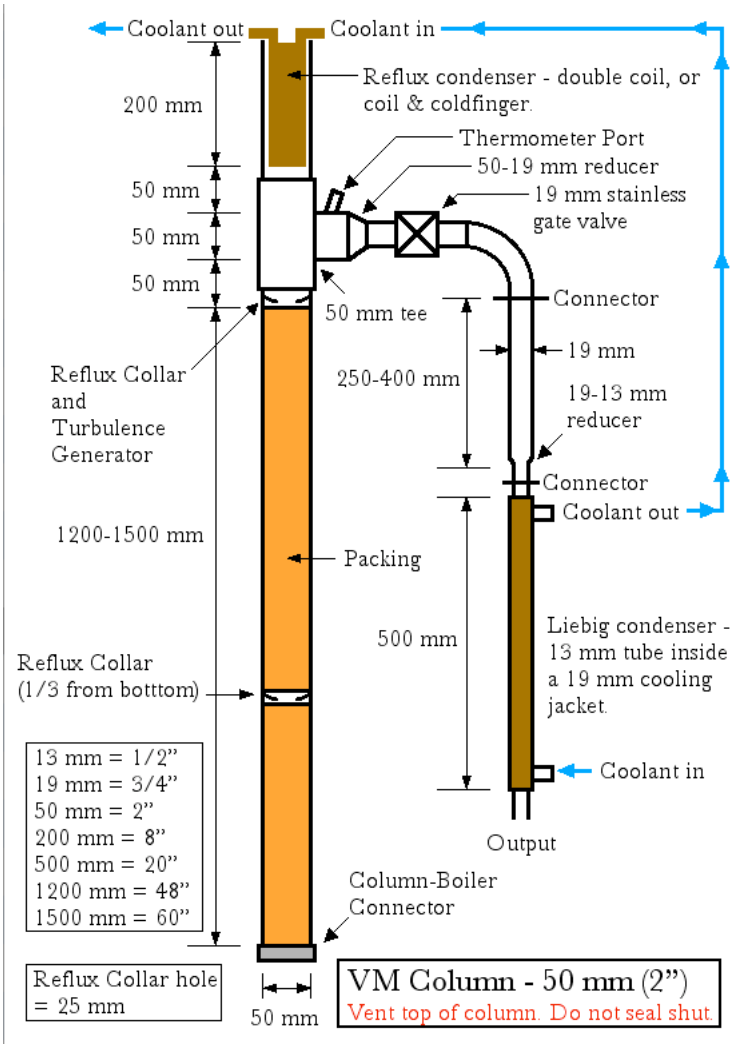
VM Head
(Nixon-McCaw, reduced tee)



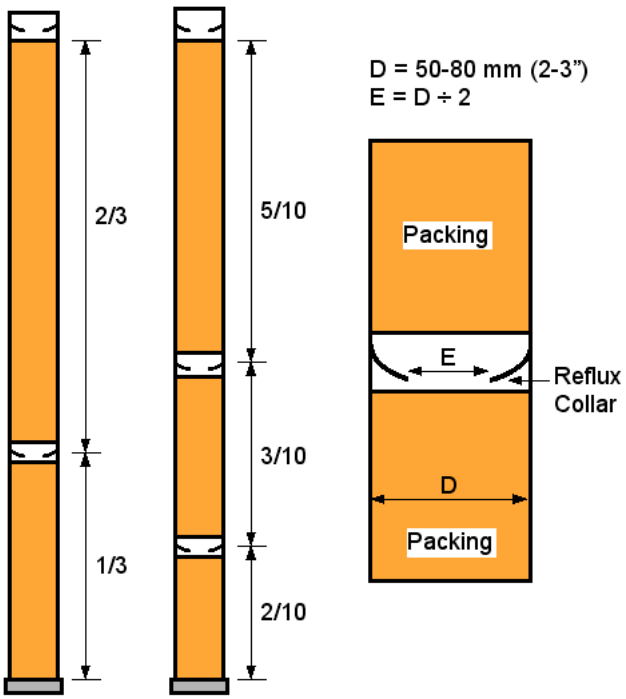


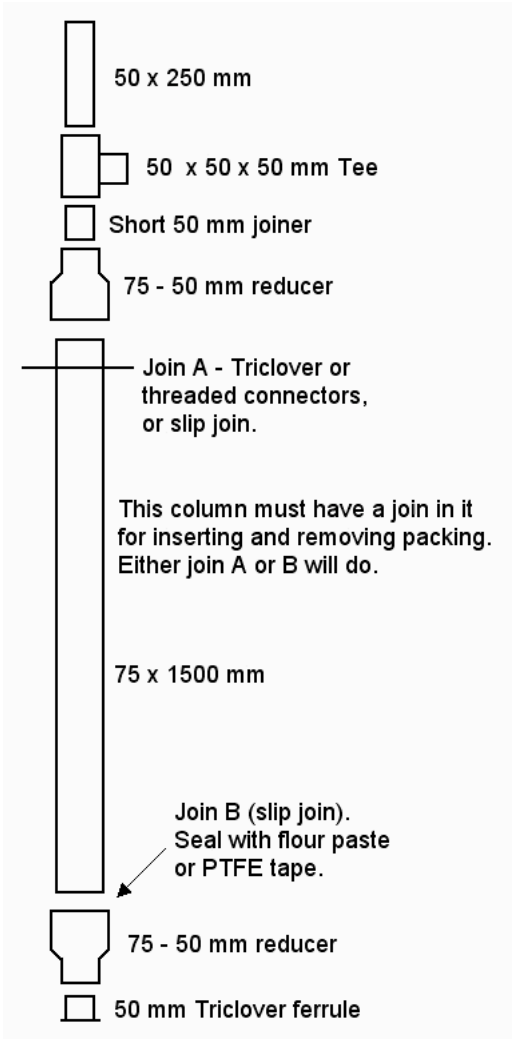
There is a type of tee called a sweep tee, which might be a better choice for this type of VM.

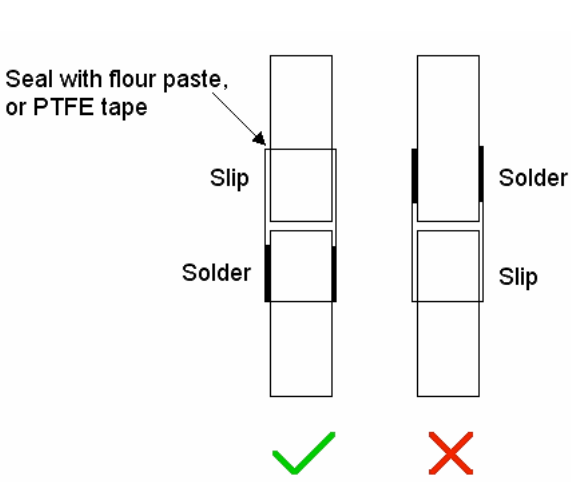


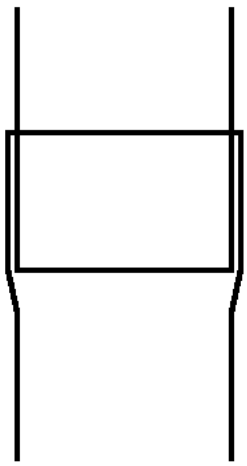

Coolant out
Coolant in
Reflux condenser - double coil, or coil & coldfinger.
200 mm
Thermometer Port
50-19 mm reducer
19 mm stainless gate valve
50 mm
50 mm
50 mm
50 mm tee
Connector
19 mm
250-400 mm
19-13 mm reducer
Reflux Collar and Turbulence Generator
Connector
Coolant out
1200-1500 mm
Packing
500 mm
Liebig condenser - 13 mm tube inside a 19 mm cooling jacket.
Reflux Collar (1/3 from botttom)
Coolant in
13 mm = 1/2"
19 mm = 3/4"
50 mm = 2"
200 mm = 8"
500 mm = 20"
1200 mm = 48"
1500 mm = 60"
Output
Column-Boiler Connector
Reflux Collar hole = 25 mm
50 mm
VM Column - 50 mm (2")
Vent top of column. Do not seal shut.

Reflux collar spacing

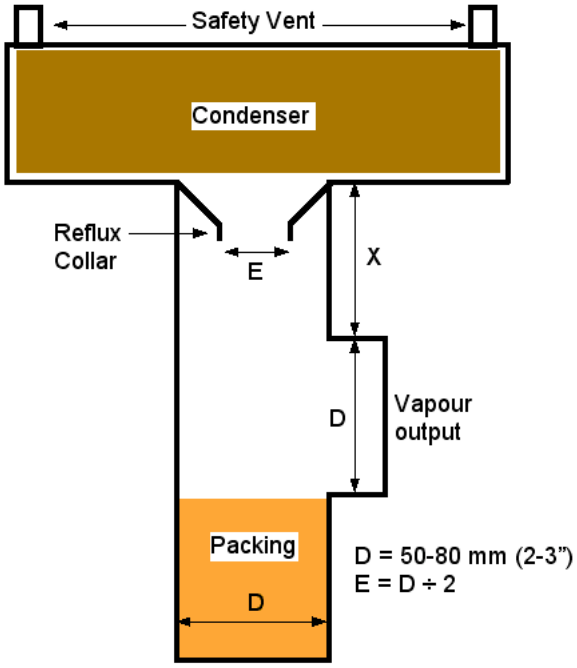



50 x 250 mm
50 x 50 x 50 mm Tee
Short 50 mm joiner
75 - 50 mm reducer
Join A - Triclover or
threaded connectors,
or slip join.
This column must have a join in it
for inserting and removing packing.
Either join A or B will do.
75 x 1500 mm
Join B (slip join).
Seal with flour paste
or PTFE tape.
75 - 50 mm reducer
50 mm Triclover ferrule

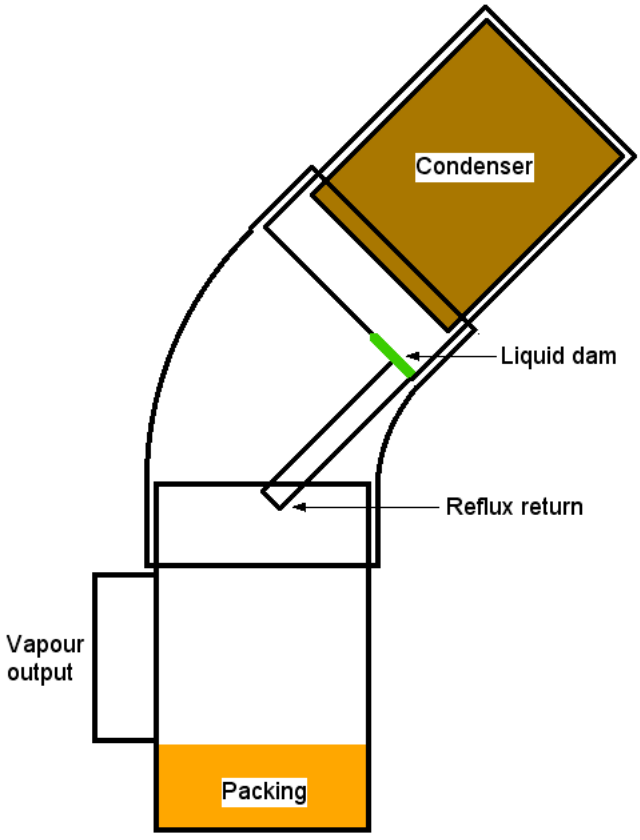

Seal with flour paste,
or PTFE tape
Slip
Solder
Solder
Slip

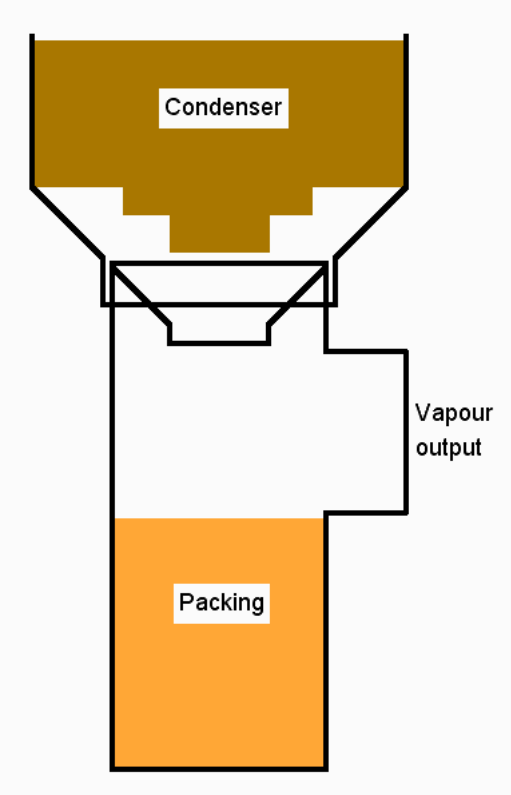


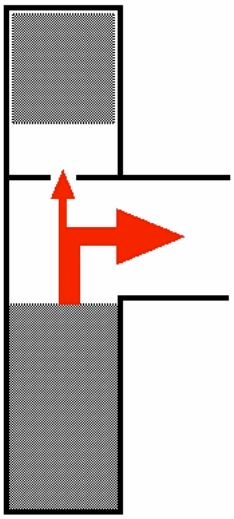
Horizontal Condenser (VM)



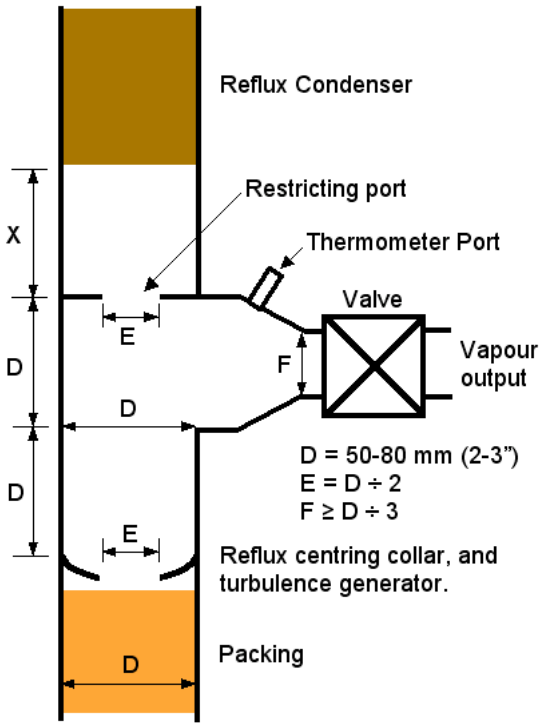
Note the value for X is not determined. But it shouldn't need to be greater than D, and might be less.




Condenser
Vapour
output
Packing

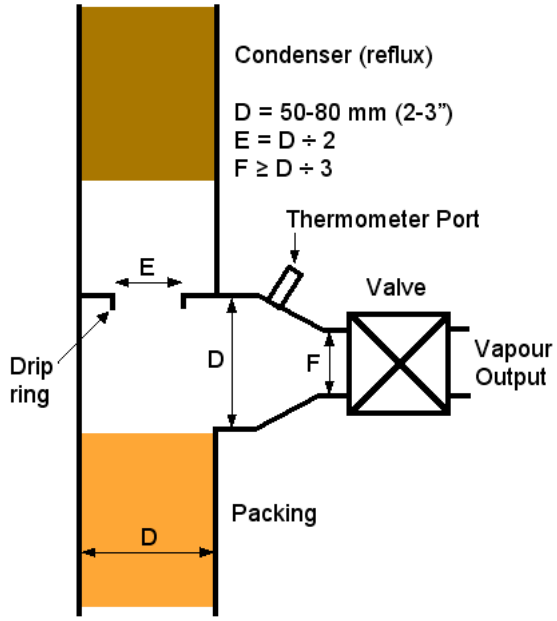


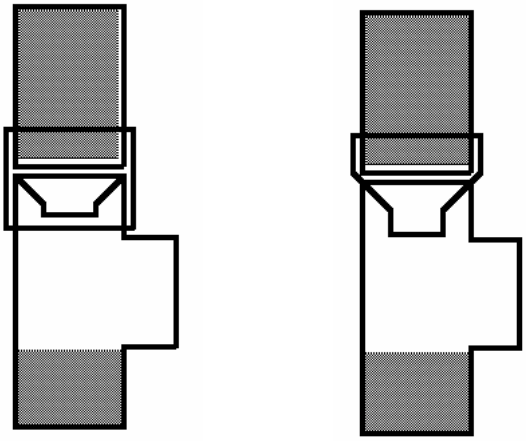
VM Head (restricted)

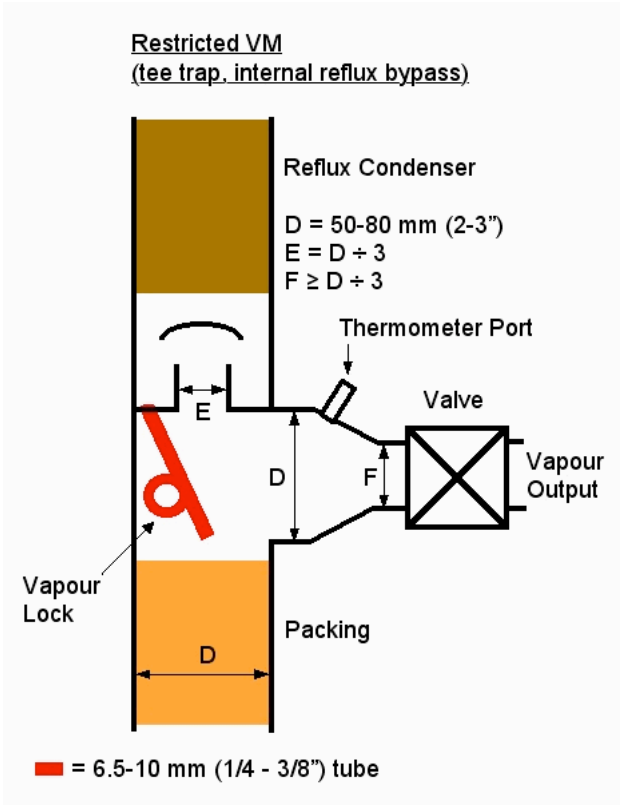


Note the value for X is not determined. But it shouldn't need to be greater than D, and might be less.

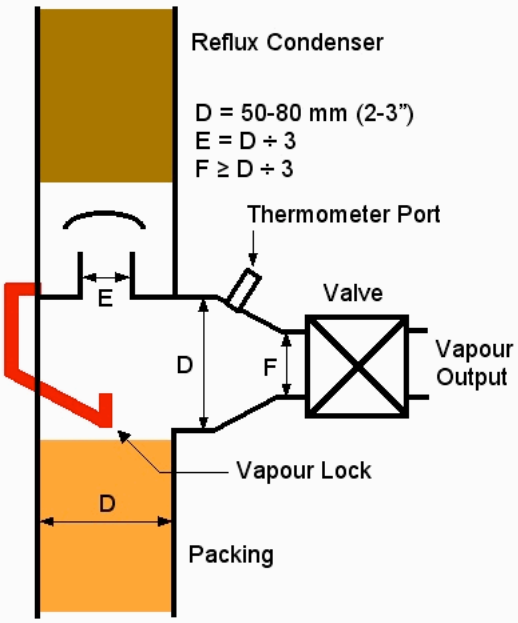
Restricted VM
(internal reflux, drip ring)



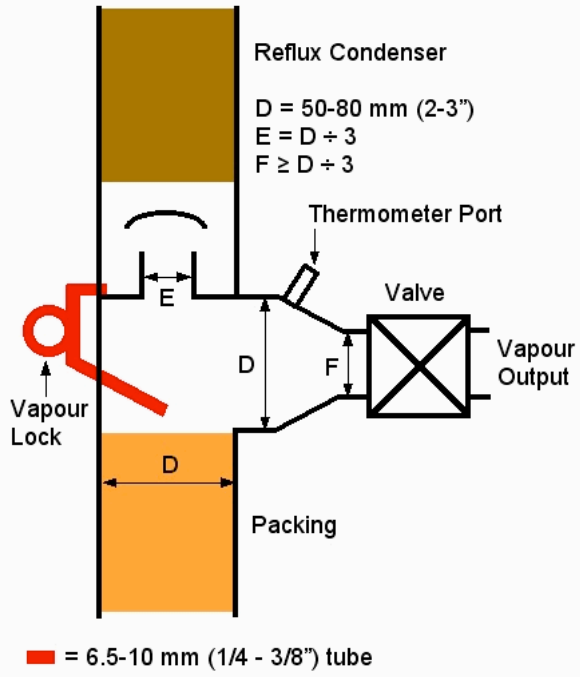


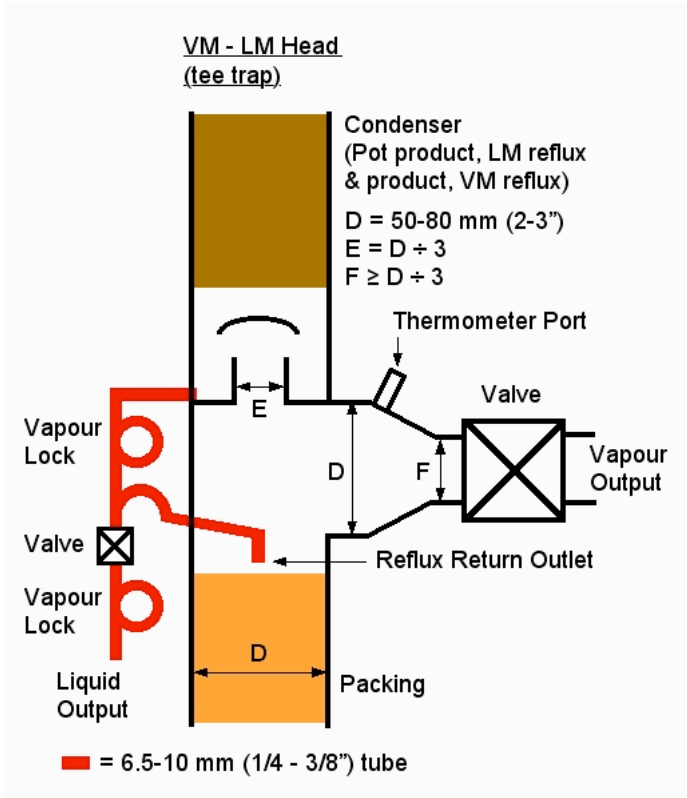

Restricted VM
(tee trap, internal reflux bypass)
Reflux Condenser
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Thermometer Port
Valve
E
D
F
Vapour
Output
Vapour
Lock
Packing
D
= 6.5-10 mm (1/4 - 3/8") tube

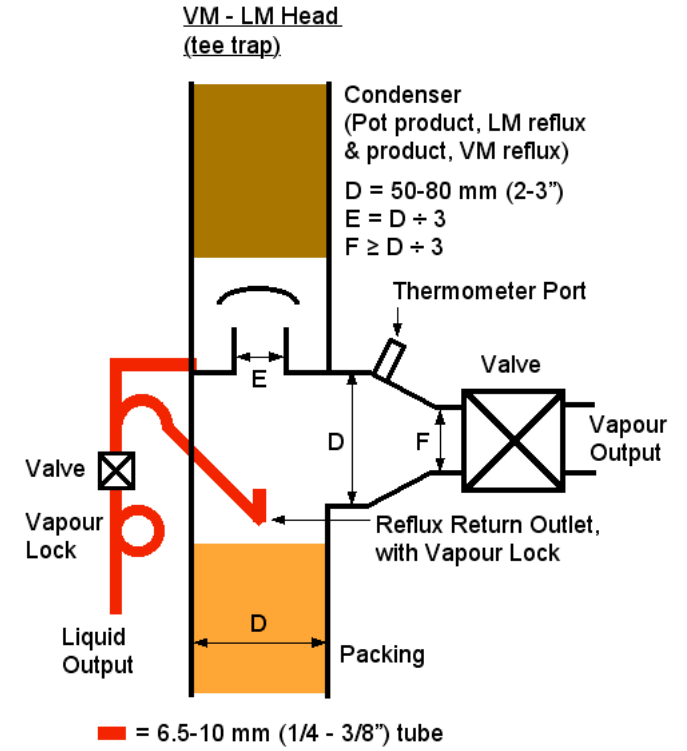
Restricted VM
(tee trap, external reflux bypass,
internal vapour lock)

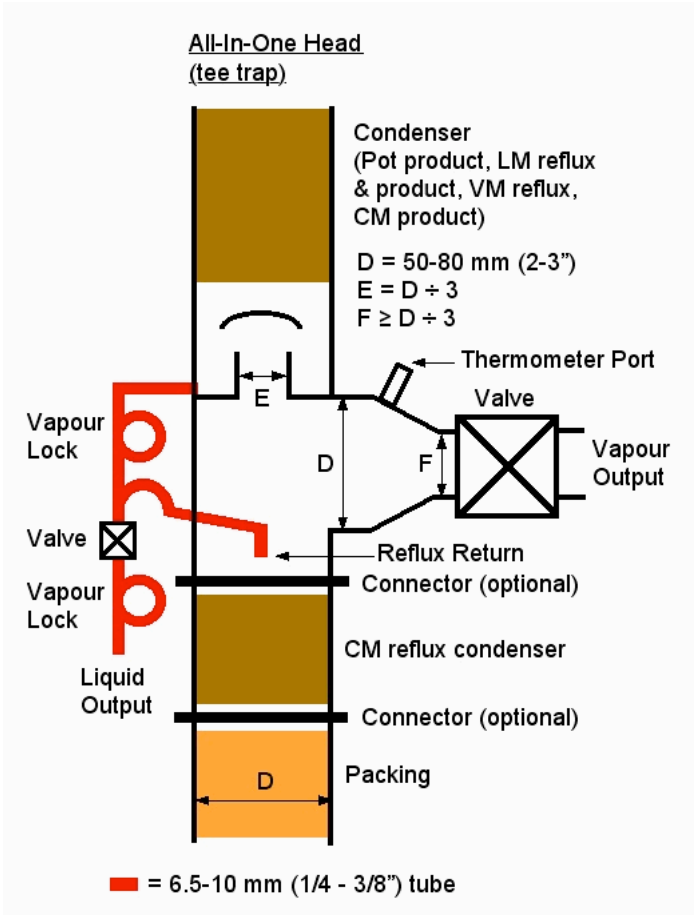


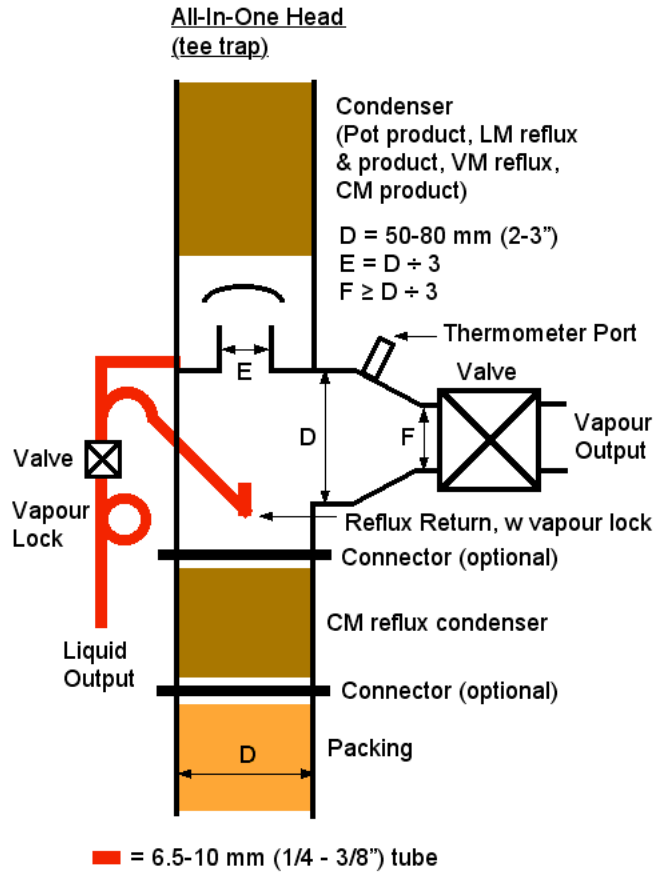
Restricted VM
(tee trap, external reflux bypass,
external vapour lock)

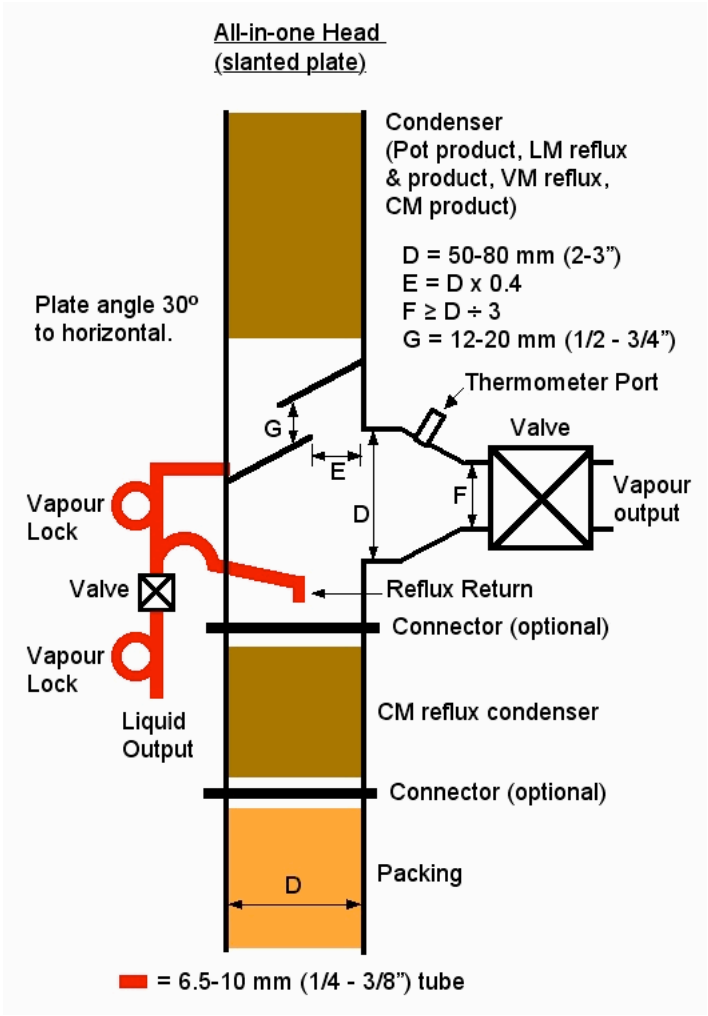


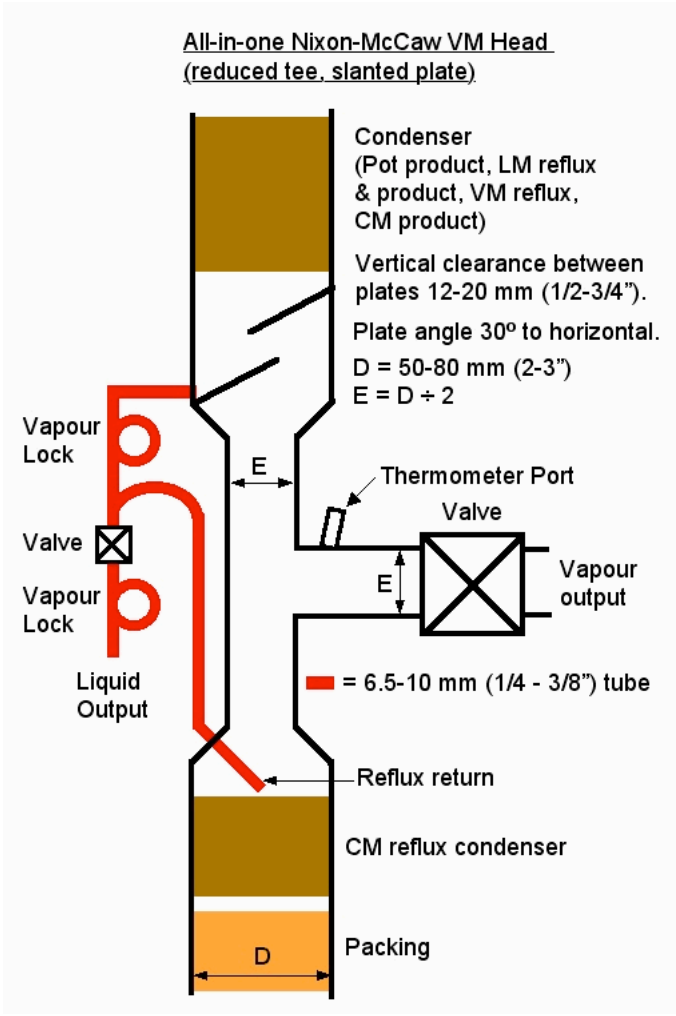

VM - LM Head
(tee trap)
Condenser
(Pot product, LM reflux
& product, VM reflux)
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Thermometer Port
Valve
Vapour
Lock
E
D
F
Vapour
Output
Valve
Reflux Return Outlet
Vapour
Lock
D
Liquid
Output
Packing
= 6.5-10 mm (1/4 - 3/8") tube

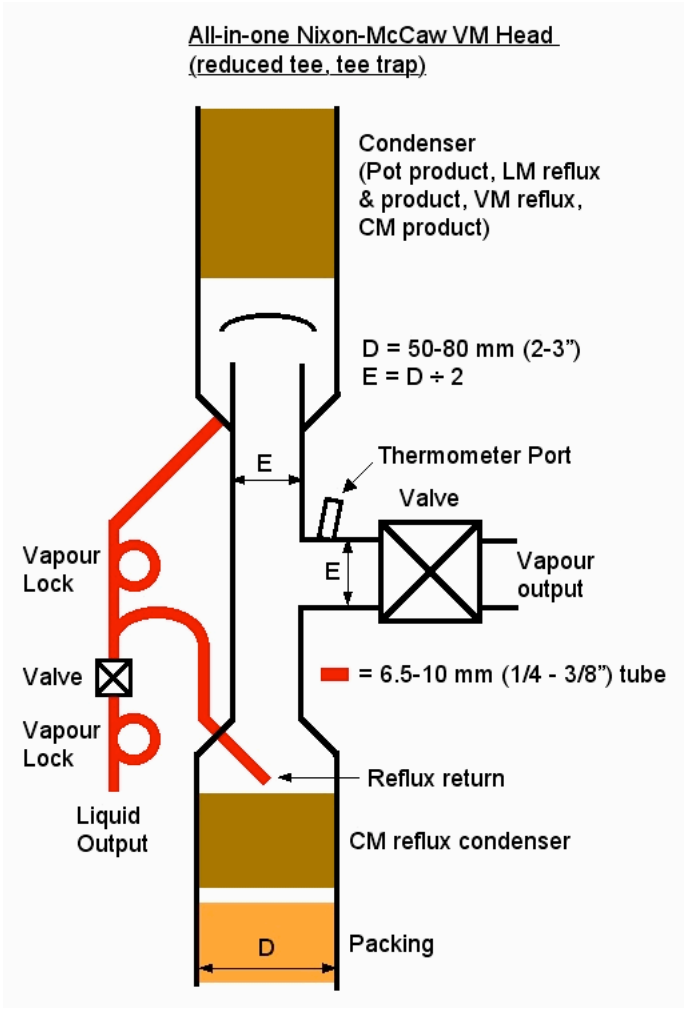

VM - LM Head
(tee trap)
Condenser
(Pot product, LM reflux
& product, VM reflux)
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Thermometer Port
Valve
E
D
F
Vapour
Output
Valve
Vapour
Lock
Reflux Return Outlet,
with Vapour Lock
D
Liquid
Output
Packing
= 6.5-10 mm (1/4 - 3/8") tube


All-In-One Head
(tee trap)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Thermometer Port
Valve
Vapour
Lock
E
D
F
Vapour
Output
Valve
Reflux Return
Vapour
Lock
Connector (optional)
CM reflux condenser
Liquid
Output
Connector (optional)
D
Packing
= 6.5-10 mm (1/4 - 3/8") tube

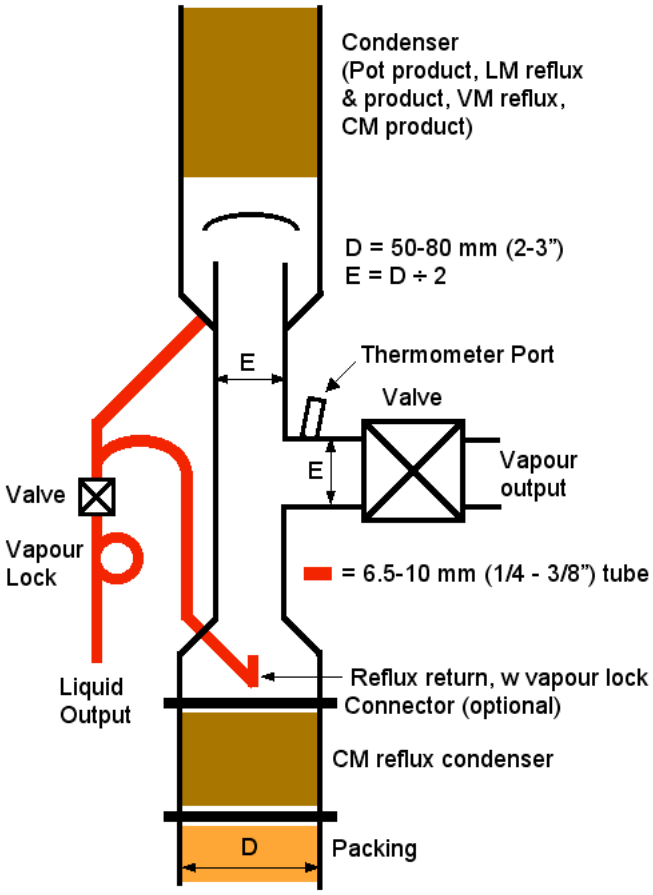

All-In-One Head
(tee trap)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Thermometer Port
Valve
E
D
F
Vapour
Output
Valve
Vapour
Lock
Reflux Return, w vapour lock
Connector (optional)
CM reflux condenser
Liquid
Output
Connector (optional)
D
Packing
= 6.5-10 mm (1/4 - 3/8") tube


All-in-one Head
(slanted plate)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
D = 50-80 mm (2-3")
E = D x 0.4
F ≥ D ÷ 3
G = 12-20 mm (1/2 - 3/4")
Plate angle 30°
to horizontal.
Thermometer Port
Valve
G
E
D
F
Vapour
output
Vapour
Lock
Valve
Reflux Return
Connector (optional)
Vapour
Lock
Liquid
Output
CM reflux condenser
Connector (optional)
Packing
D
= 6.5-10 mm (1/4 - 3/8") tube

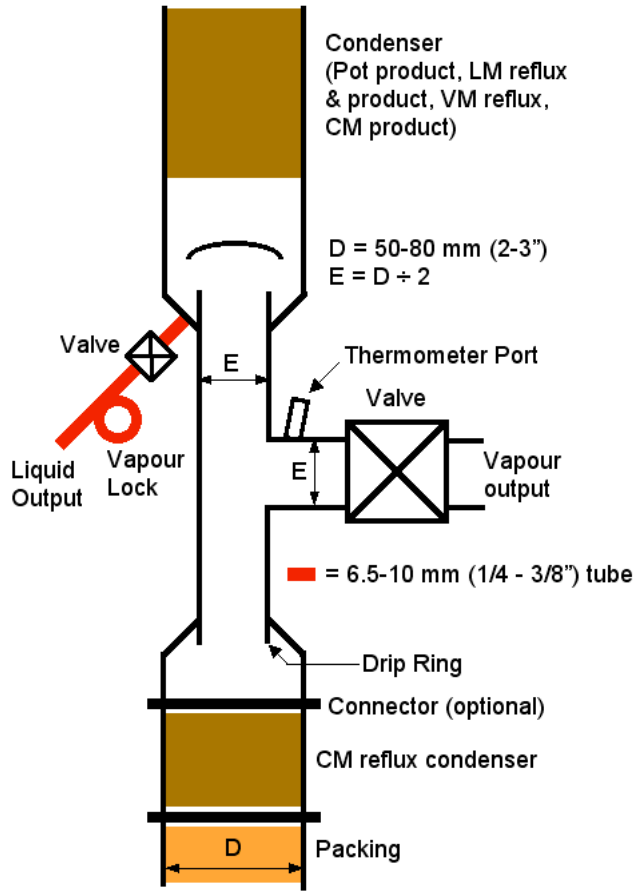

All-in-one Nixon-McCaw VM Head
(reduced tee, slanted plate)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
Vertical clearance between
plates 12-20 mm (1/2-3/4").
Plate angle 30º to horizontal.
D = 50-80 mm (2-3")
E = D ÷ 2
Vapour
Lock
E
Thermometer Port
Valve
Valve
E
Vapour
output
Vapour
Lock
Liquid
Output
= 6.5-10 mm (1/4 - 3/8") tube
Reflux return
CM reflux condenser
Packing
D


All-in-one Nixon-McCaw VM Head
(reduced tee, tee trap)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
D = 50-80 mm (2-3")
E = D ÷ 2
E
Thermometer Port
Valve
E
Vapour
output
Vapour
Lock
Valve
Vapour
Lock
= 6.5-10 mm (1/4 - 3/8") tube
Reflux return
Liquid
Output
CM reflux condenser
D
Packing

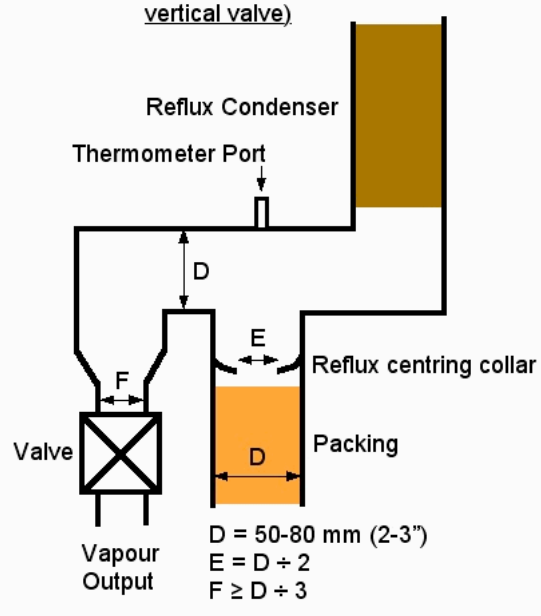
All-in-one Nixon-McCaw VM Head
(reduced tee, tee trap)

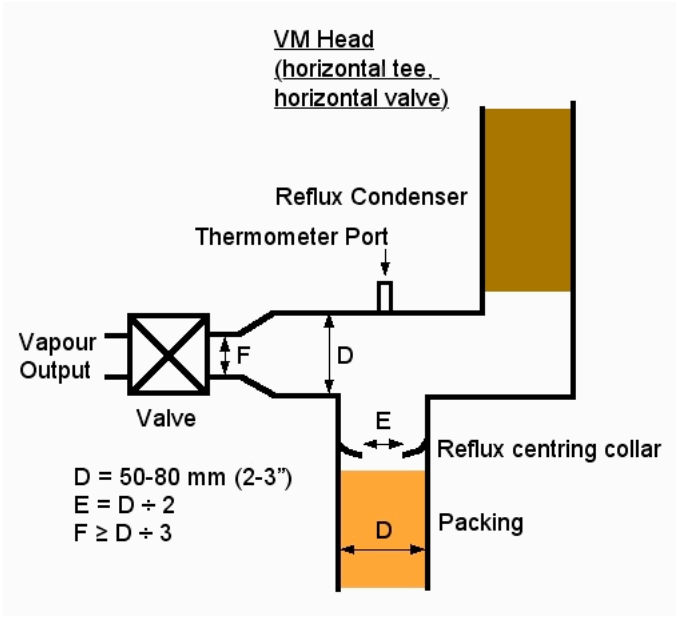


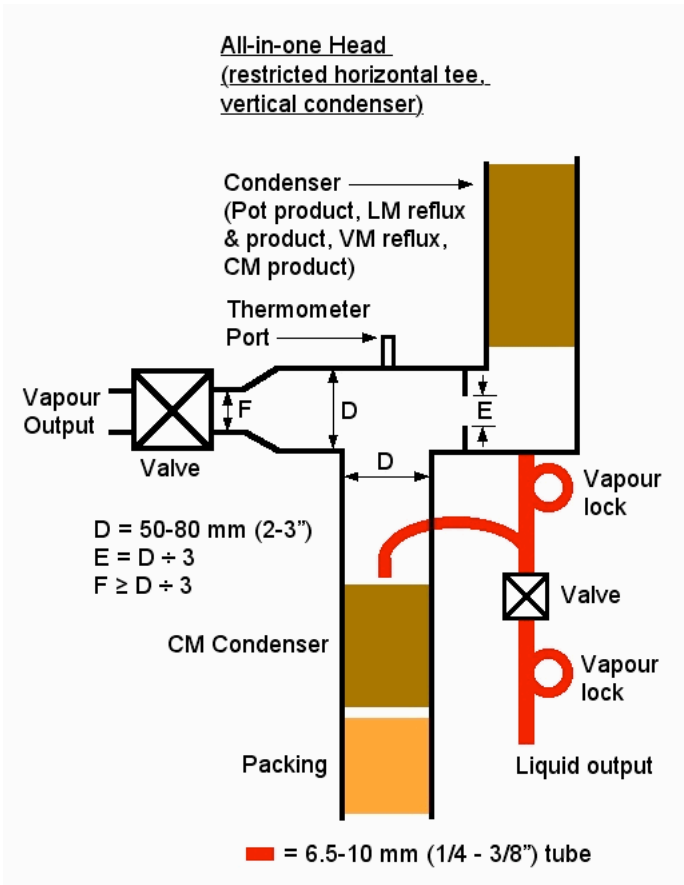
All-in-one Nixon-McCaw VM Head
(reduced tee, tee trap)

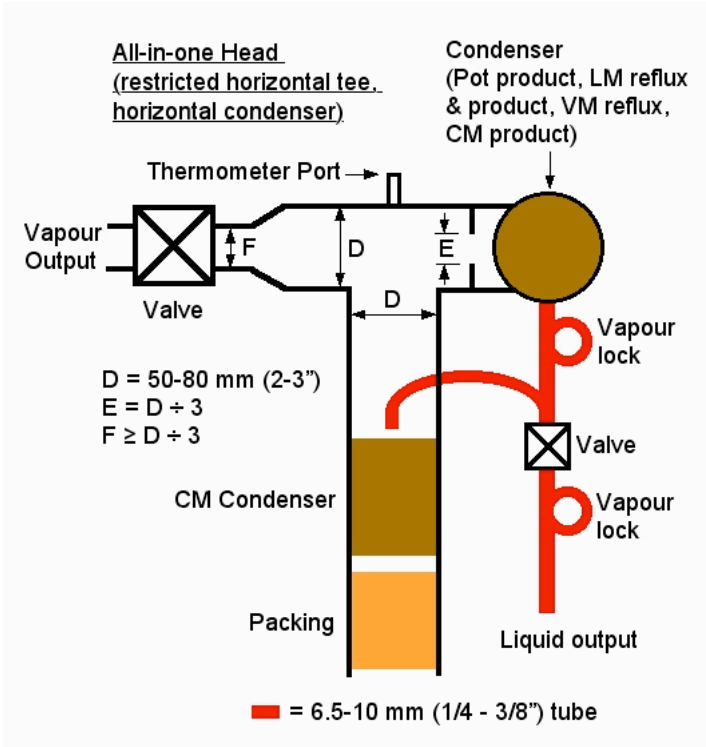


VM Head
(horizontal tee,
vertical valve)

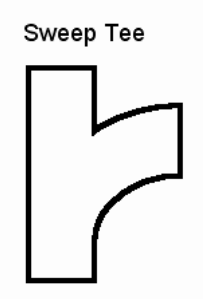



VM Head
(horizontal tee,
horizontal valve)
Reflux Condenser
Thermometer Port
Vapour
Output
F
D
Valve
E
Reflux centring collar
D = 50-80 mm (2-3")
E = D ÷ 2
F ≥ D ÷ 3
D
Packing

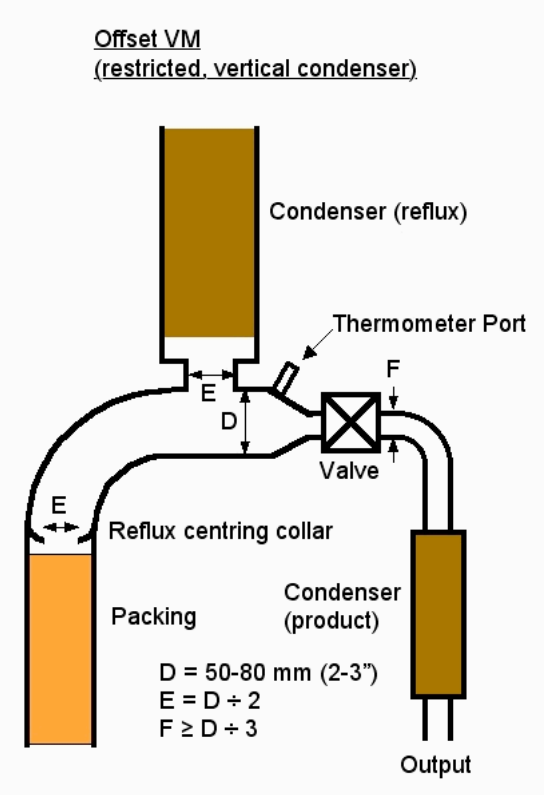

All-in-one Head
(restricted horizontal tee,
vertical condenser)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
Thermometer
Port
Vapour
Output
F
D
E
Valve
D
Vapour
lock
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Valve
CM Condenser
Vapour
lock
Packing
Liquid output
= 6.5-10 mm (1/4 - 3/8") tube

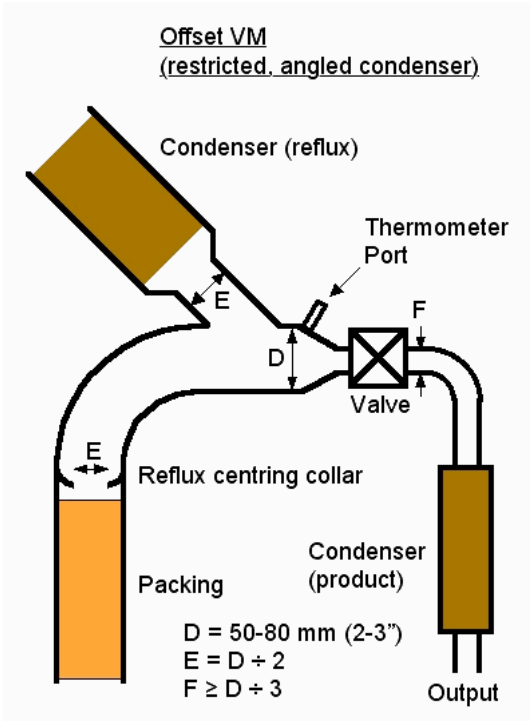

All-in-one Head
(restricted horizontal tee,
horizontal condenser)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
Thermometer Port
Vapour
Output
F
D
E
D
Valve
Vapour
lock
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Valve
CM Condenser
Vapour
lock
Packing
Liquid output
= 6.5-10 mm (1/4 - 3/8") tube

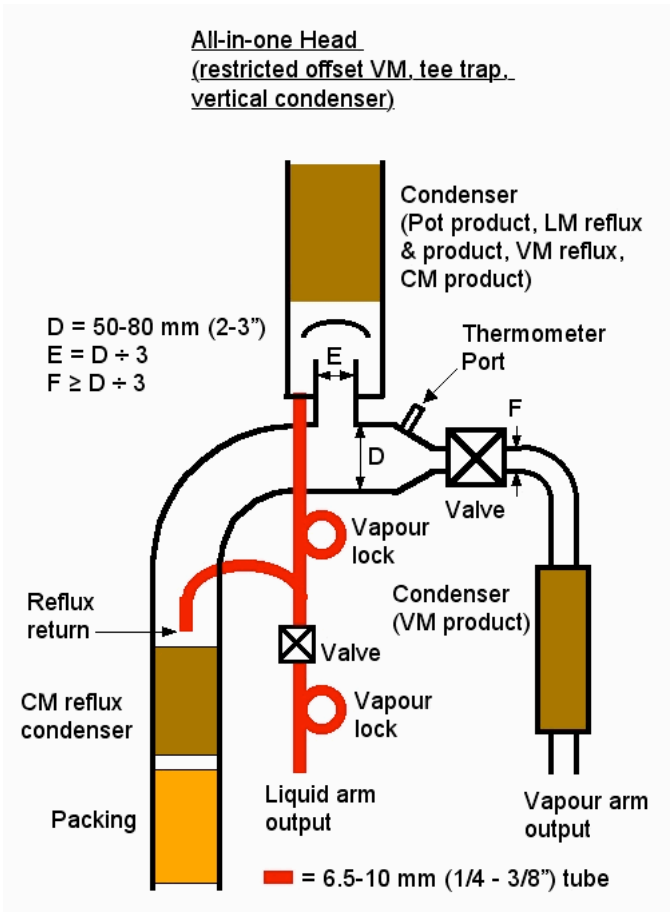
Consider the idea of preferentially directing the vapour flow directly toward the take-off valve in a VM, instead of at the the reflux condenser. If we combine this idea:



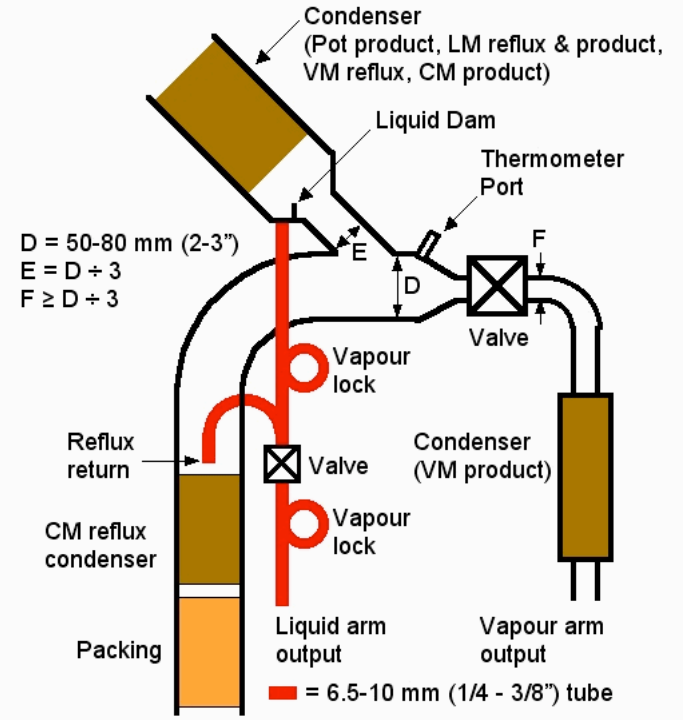
with Manback's vapour flow experiment (results not reported yet), gives us this:



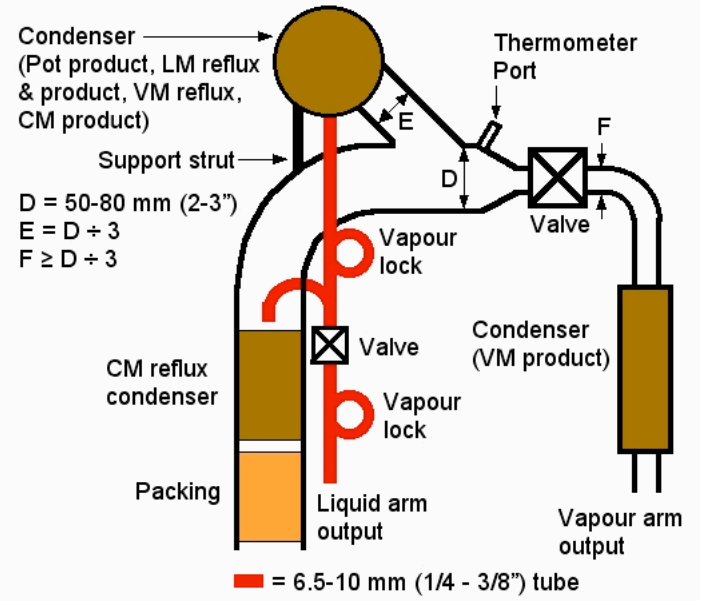

Offset VM
(restricted, angled condenser)
Condenser (reflux)
Thermometer
Port
E
F
D
Valve
E
Reflux centring collar
Condenser
(product)
Packing
D = 50-80 mm (2-3")
E = D ÷ 2
F ≥ D ÷ 3
Output


All-in-one Head
(restricted offset VM, tee trap,
vertical condenser)
Condenser
(Pot product, LM reflux
& product, VM reflux,
CM product)
D = 50-80 mm (2-3")
E = D ÷ 3
F ≥ D ÷ 3
Thermometer
Port
E
F
D
Valve
Vapour
lock
Reflux
return
Condenser
(VM product)
Valve
CM reflux
condenser
Vapour
lock
Packing
Liquid arm
output
Vapour arm
output
= 6.5-10 mm (1/4 - 3/8") tube

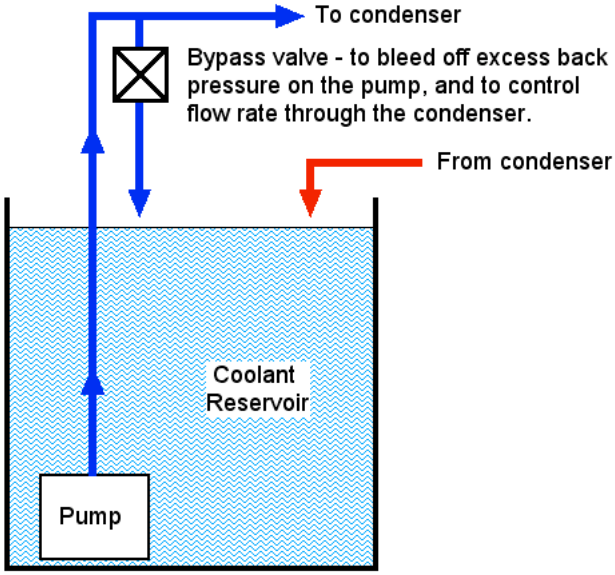
All-in-one Head
(restricted offset VM, liquid dam, angled condenser)

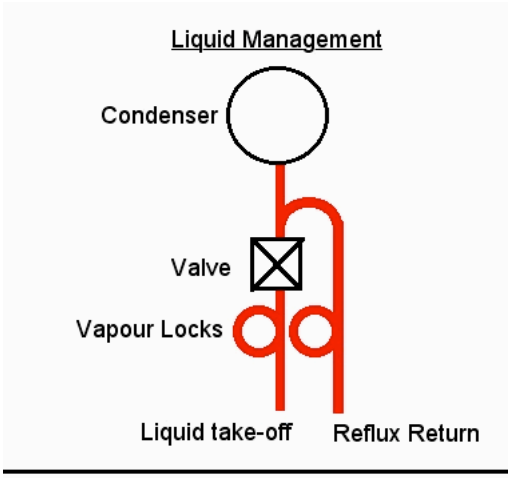


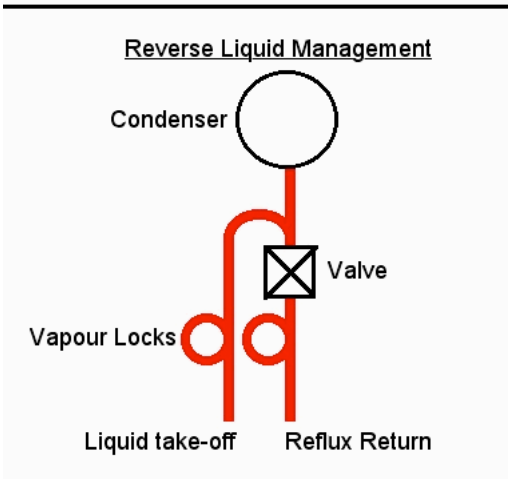
All-in-one Head
(restricted offset VM, angled horizontal condenser)



Recirculating pump & reservoir coolant system





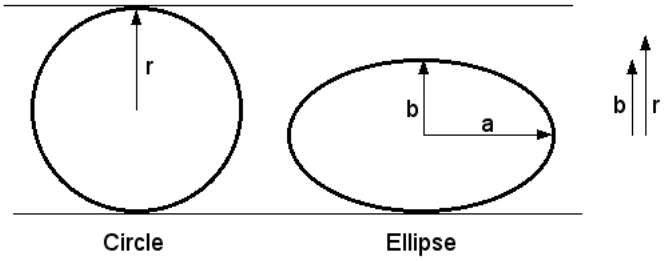


Area of circle = πr^2, where r is the radius.
Area of ellipse = πab, where a is the length of the semi-major axis, and b of the semi-minor axis.

For a given cross sectional area (CSA), an ellipse has a longer perimeter than a circle. This means an ellipse has 1) more heat exchange surface (perimeter) for a given volume of coolant (CSA), and 2) a shorter maximum distance between the coolant and the exchange surface (b < r). Both of which give faster (ie more efficient) heat exchange.

The trade off is that a circular CSA has the lowest internal flow resistance of any cross sectional shape, and altering it to any other shape increases resistance (back pressure), which decreases the maximum coolant flow rate.

However, given that typical coolant flow rates in hobby condenser coils are well below the maximum possible, this is not a practical problem, as long as the degree of flattening is not great.



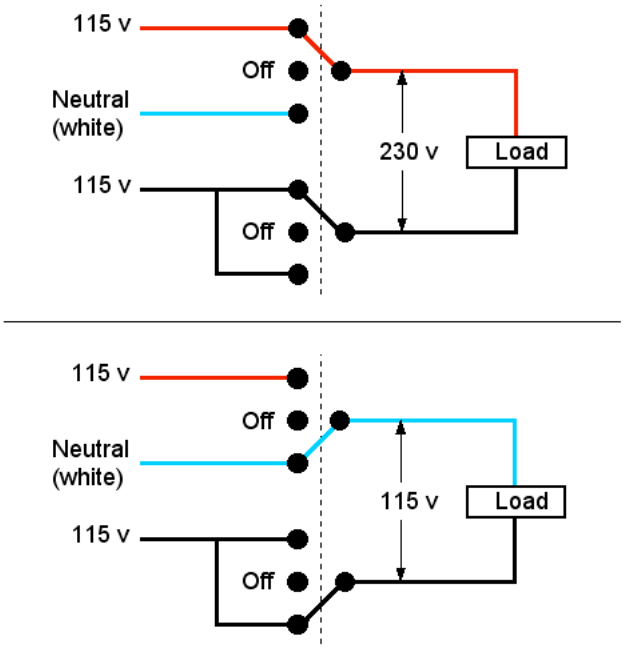
DPDT (centre-off) Switching Schematic

These wiring diagrams are for the household wiring system in the USA, and don't necessarily work in other wiring systems.

Red and black can be swapped in these diagrams. It gives electrically equivalent circuits.

Ground (earth) the boiler, and the switch box (if it is metal)

NOTE: The neutral wire in the USA is white, not blue.



THE END