Do's and Do Not's of Biomass Plant Room Design

Rural Energy
INSTALLING BIOMASS SINCE 2002

Do’s and Do Not’s of Plant Room Design

You will learn about:

- Boiler sizing
- Fuel quality standards and fuel stores
- Ventilating wood chip stores and Health & Safety needs
- Boiler safety – in event of power failure during full firing operation
- Hydraulic systems
- Buffer vessels
- Flue design and flue height

CPD CERTIFIED
Construction CPD Certification Service
Collective Mark

Do’s and Do Not’s of Plant Room Design

1. Boiler sizing
2. Boiler layout in the plant room
3. Boiler hydraulic circuit
4. Buffer tanks
5. Fuel selection/quality
6. Fuel store design
7. Flue design
8. Questions

Boiler - Sizing

- What is load profile: winter and summer?
- Will the boiler be base load or peak load?

Sizing information:

- Heat loss calculations
- Existing installed heating capacity
- Weekly/monthly fuel usage figures
- Rules of thumb
- Annual fuel usage figures

Boiler - Sizing

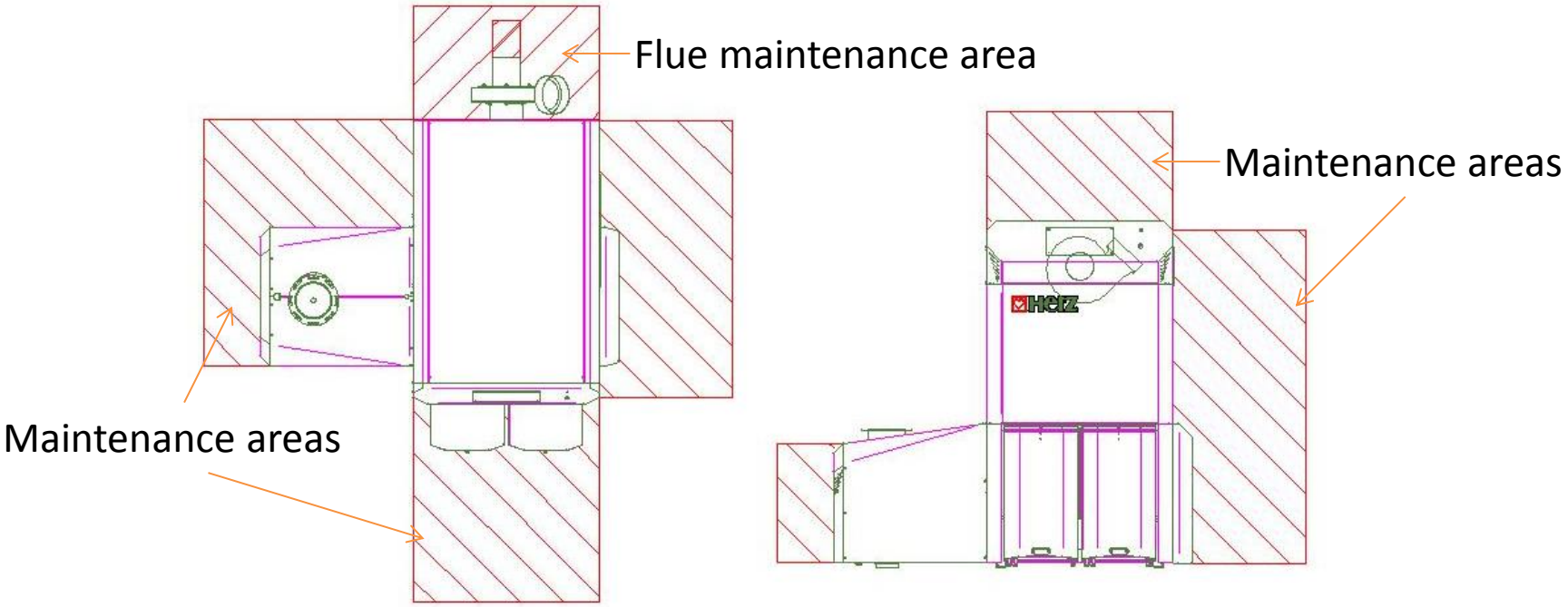
DO

- Use best method available to size the boiler
- Match boiler output to heat load profile

DO NOT

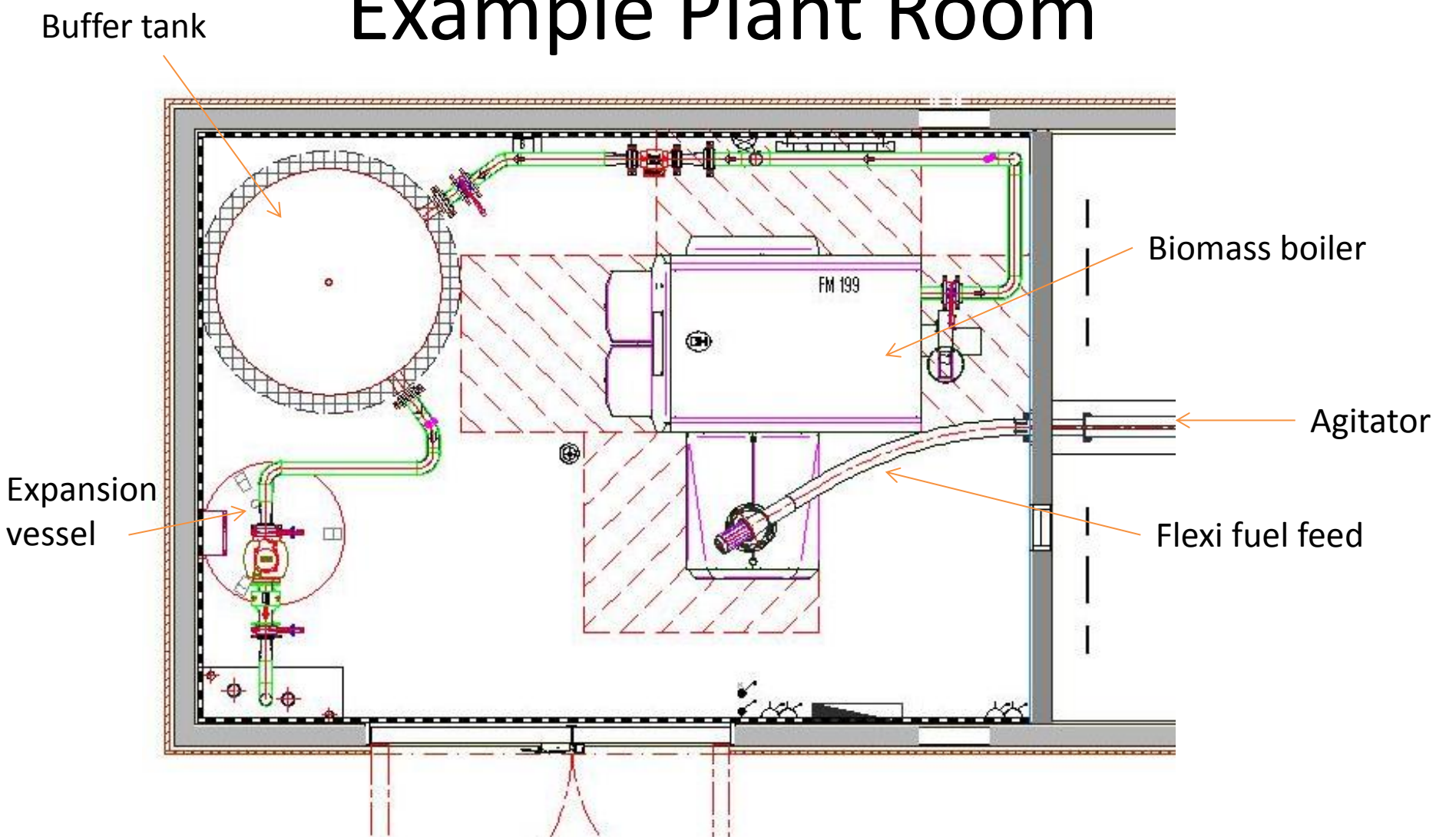
- Use annual fuel usage figures

Boiler - Installation

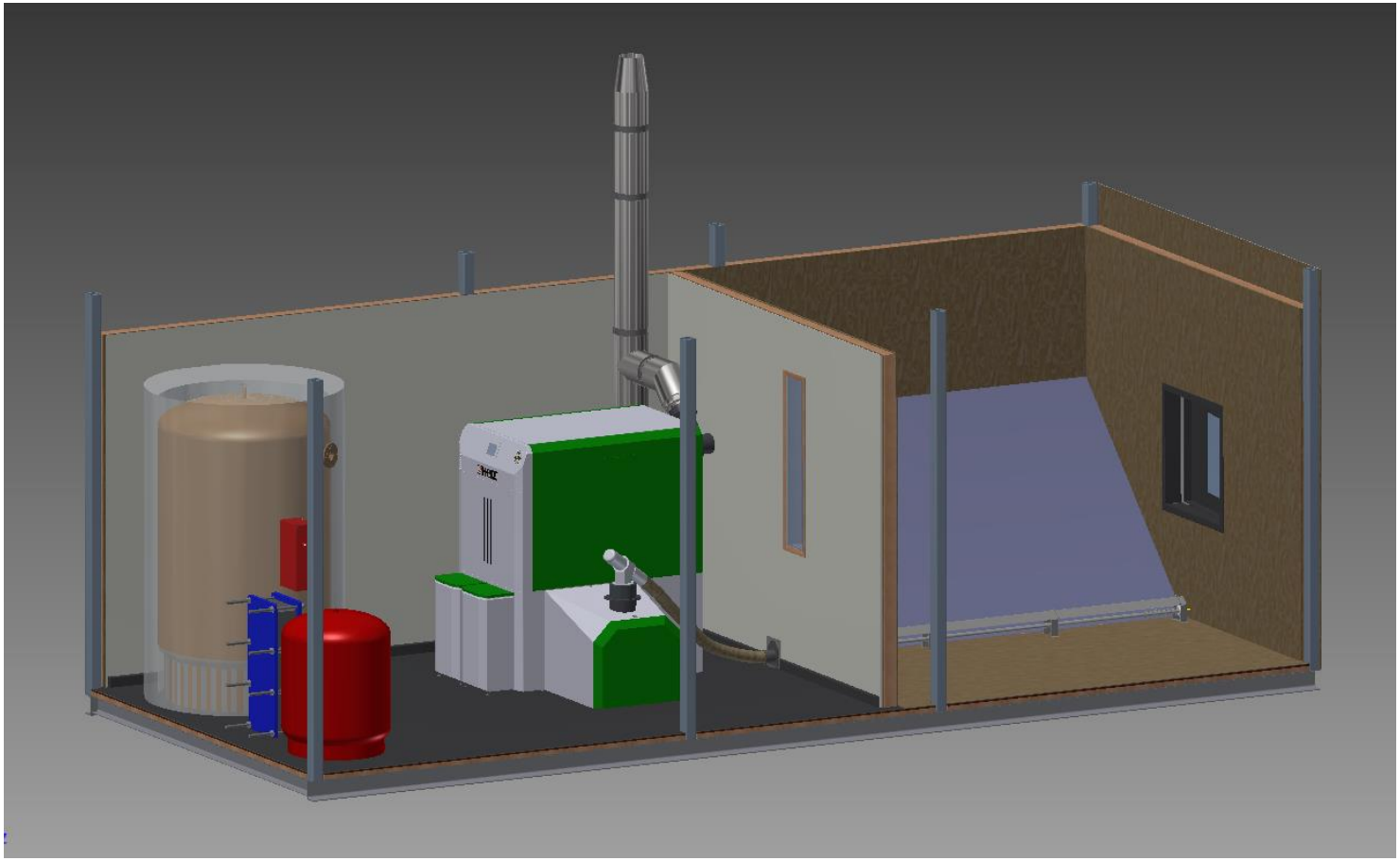


Required maintenance areas needed around a Herz biomass boiler are similar for most models

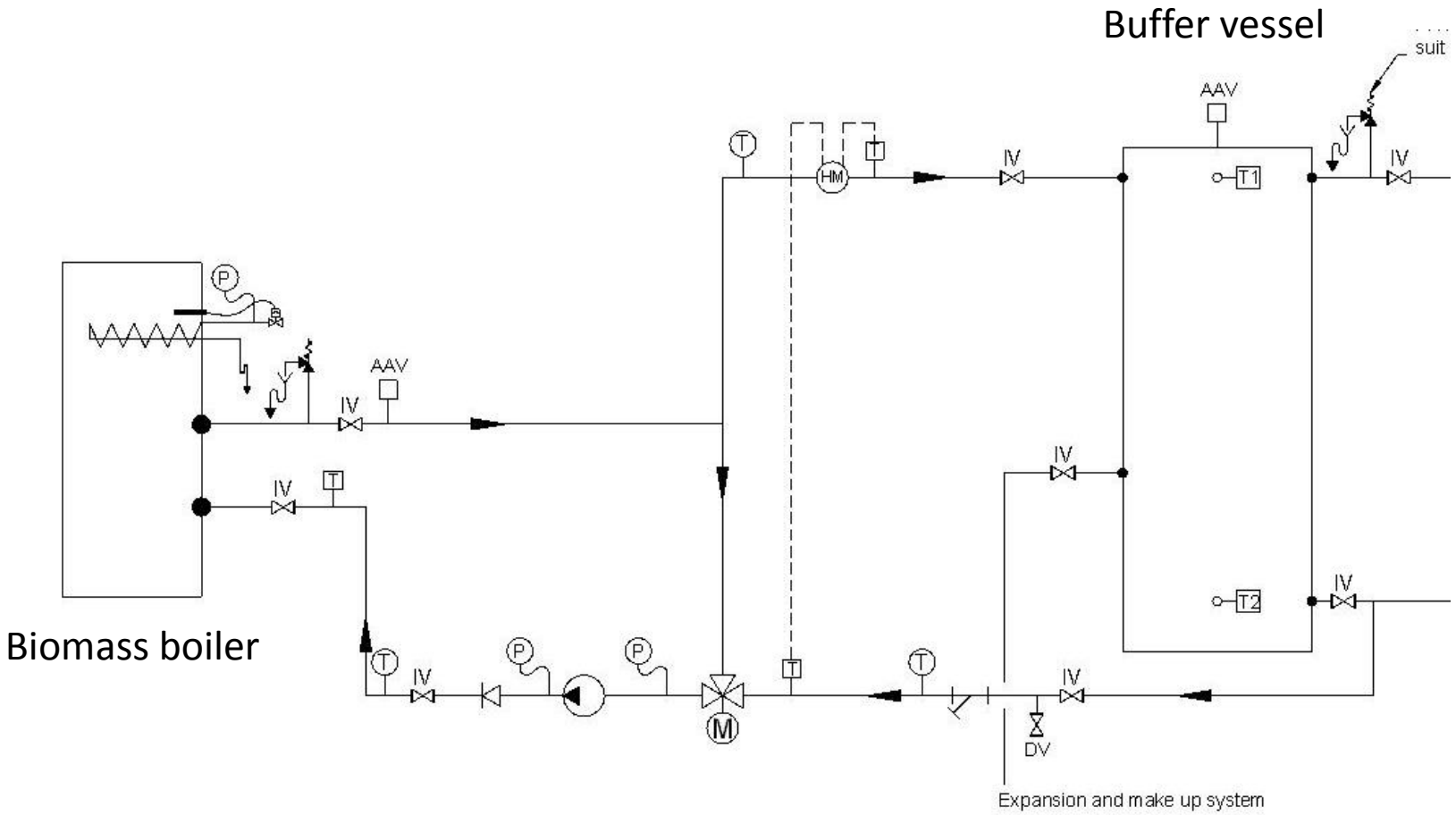
Example Plant Room



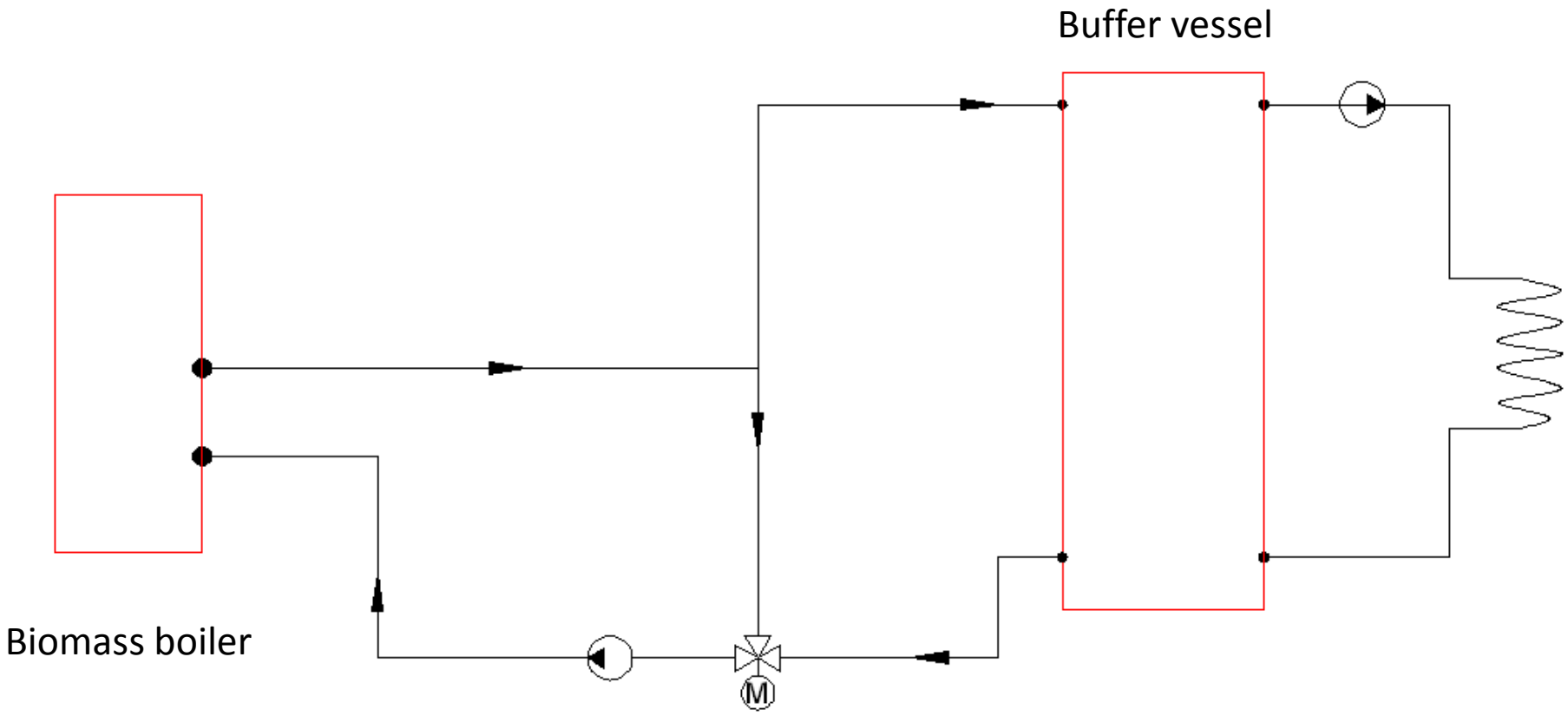
Example Plant Room



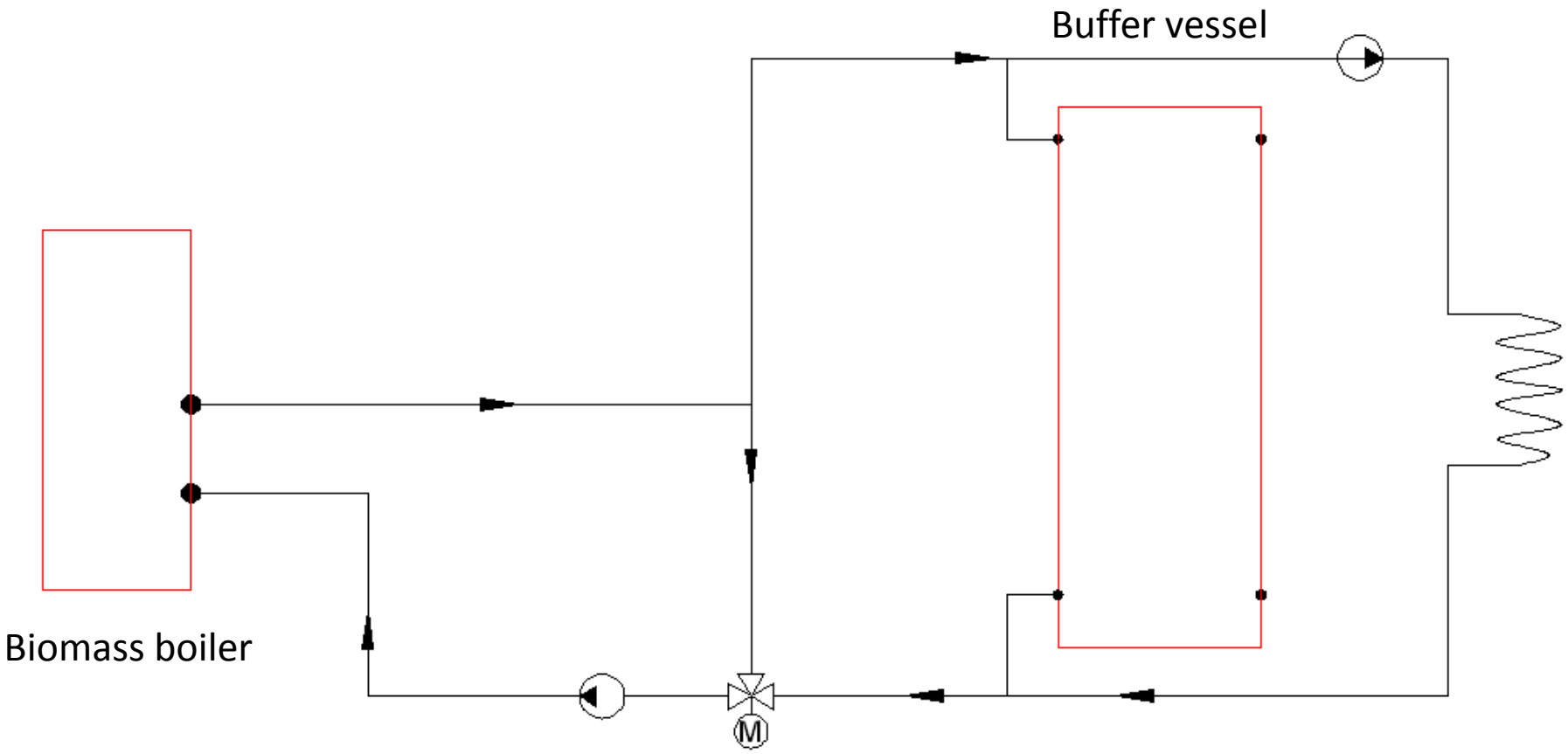
Boiler Primary Circuit



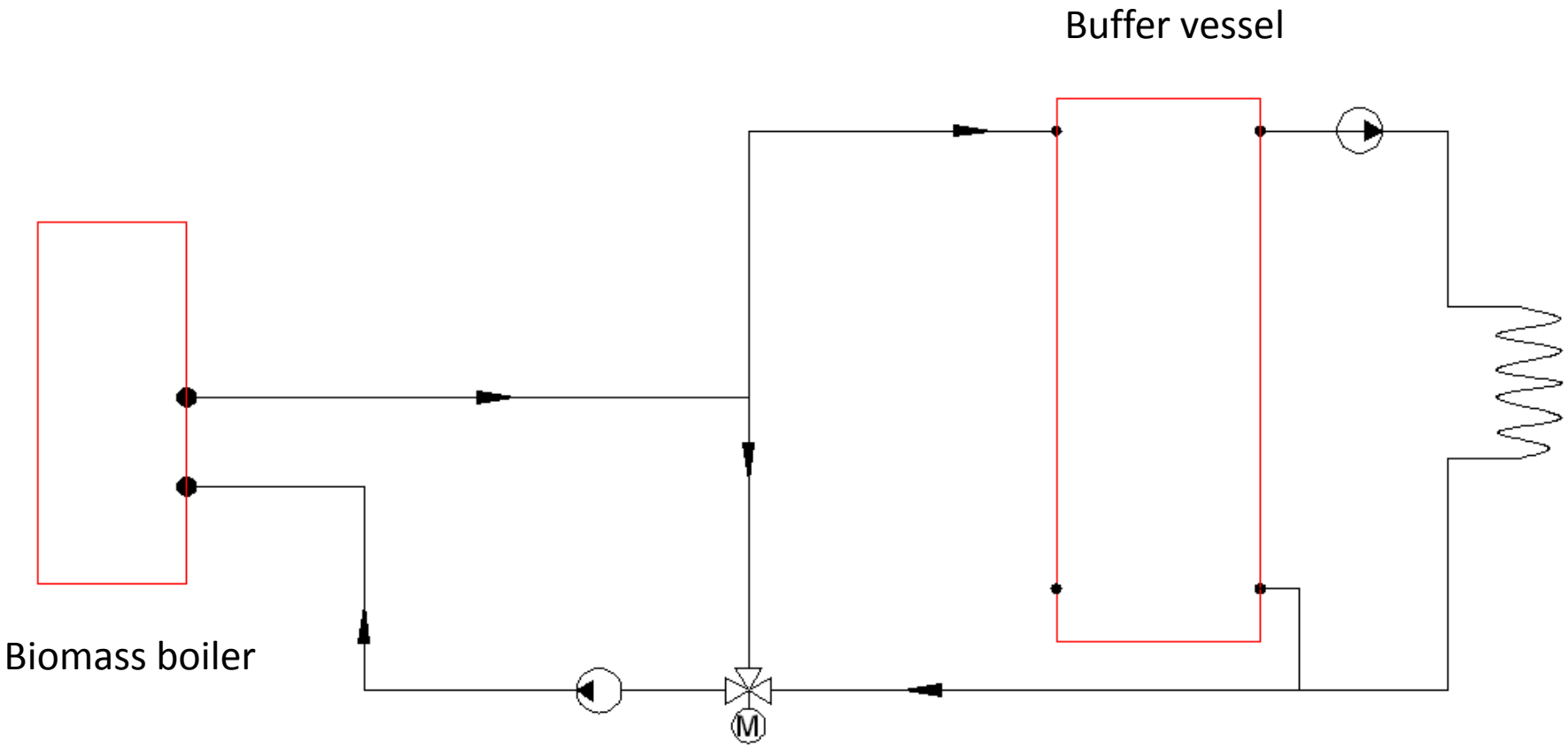
Buffer tank – 4 Port Arrangement



Buffer tank – 2 Port Arrangement

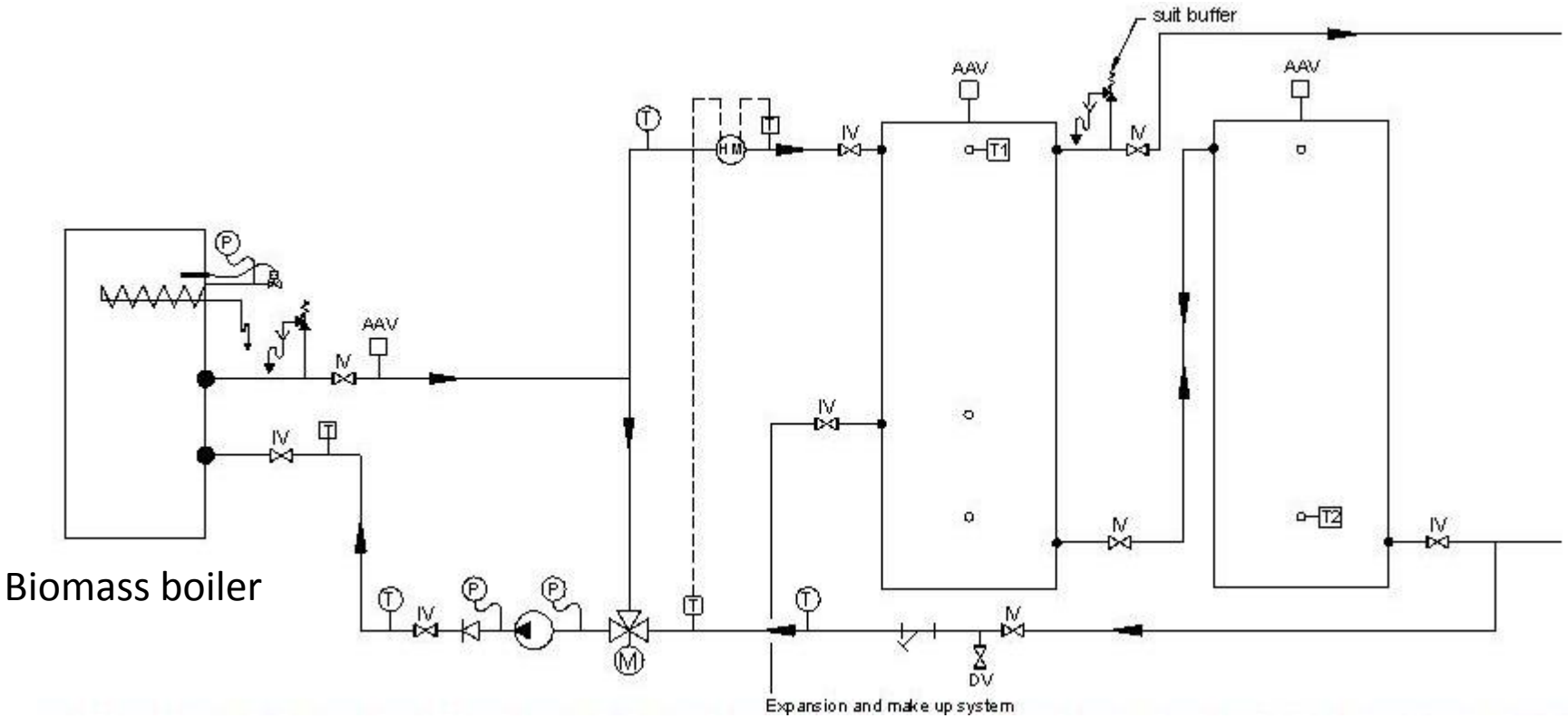


Buffer tank – 3 Port Arrangement



Multi Buffer Tanks

Buffer vessels



Biomass boiler

Plant/Hydraulic Design

DO

- Follow best practice rules and guides for LTHW systems
- Make sure you have a clear route to take the ash bins out of the plant room for emptying
- Think about how the fuel feed system will impact on boiler layout options within the plant room. For smaller (<200kW) wood pellet boilers flexible auger systems or vacuum systems will give more layout options than rigid augers
- Use the biomass boiler to control shunt pump and back end 3 port if possible

DO NOT

- Use a secondary side pump that is NOT speed controlled or at least with an on/off control (to allow boiler to link to buffer tank)
- Use a 4 or 2 port buffer tank design
- Compromise maintenance zones around boiler

Fuel Type

Pellet or chip?

- Cost
- Availability
- Access for delivery vehicle
- Available space (volume) for fuel store
- Fuel store could affect plant room location
- Fuel type can affect fuel delivery type in plant room

Fuel Quality Standards

Wood pellets - BS EN 14961-2:2011

Size 6 and 8 mm diameter

Class A1, A2 – virgin wood

B – used wood

Wood chips - BS EN 14961-4:2011

Size P16, P31.5, P45

Class A1, A2, B1 – virgin wood

B2 – used wood

Fuel Selection

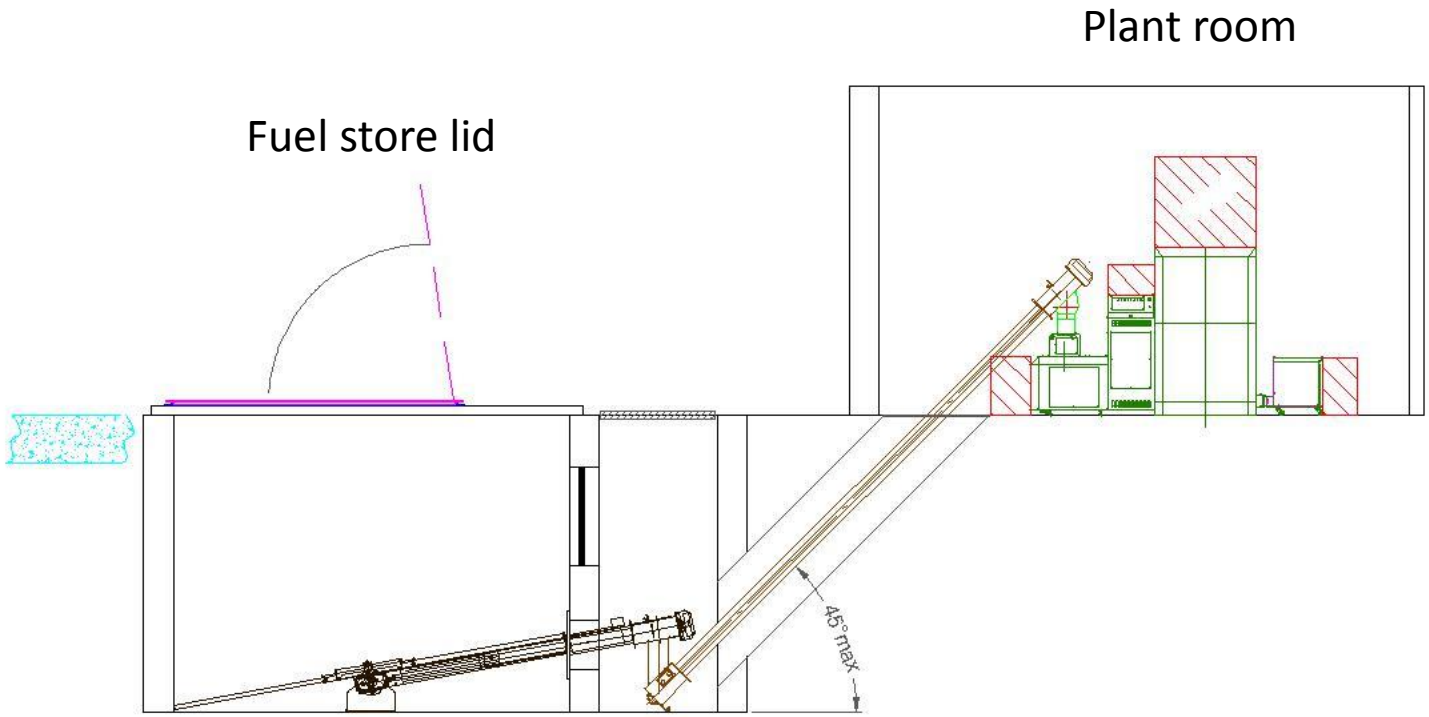
DO

- Only use fuel approved by the boiler manufacturer
- If in doubt, consult the fuel quality standard BS EN 14961

DO NOT

- Use unapproved fuels

Wood Chip Fuel Store



Do’s and Do Not's - Wood Chip Fuel Store

DO

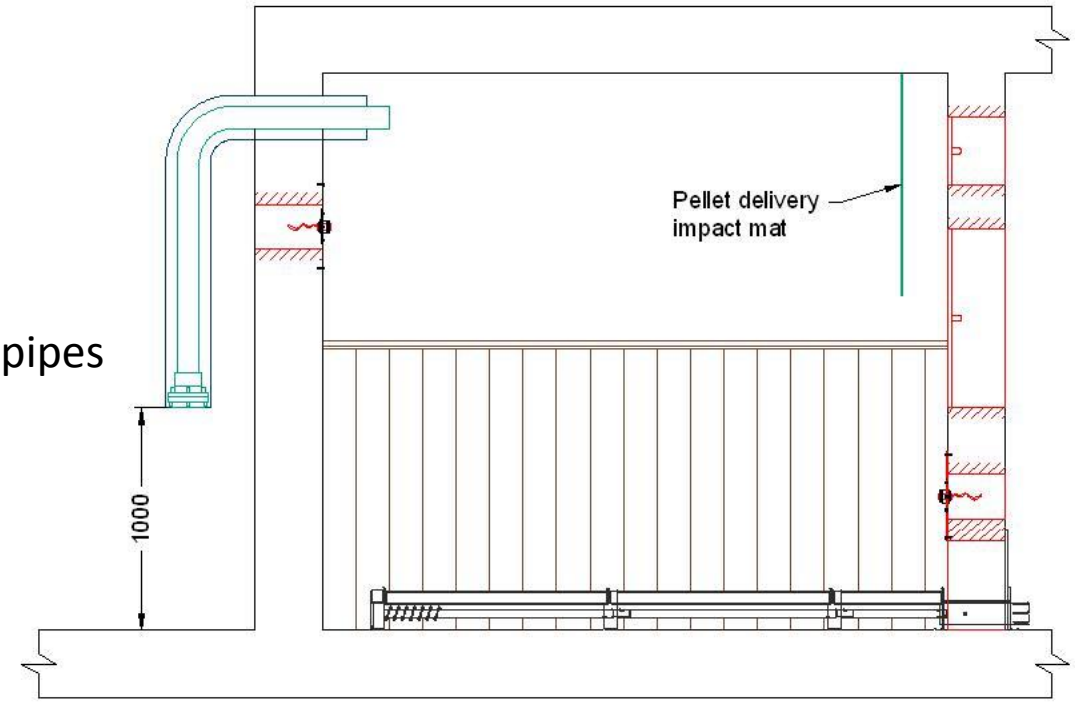
- Choose a fuel store lid design that allows for ventilation (particularly if moisture content is >30%)
- Make sure the fuel store and lid are waterproof
- Empty fuel store if the boiler will be non-operational for any period exceeding 3 months

DO NOT

- Enter the fuel store without adhering to requirements of safe working practices
- Think that all wood chip fuel stores must be underground
- Design a fuel store without checking that the design is compatible with the fuel delivery vehicle

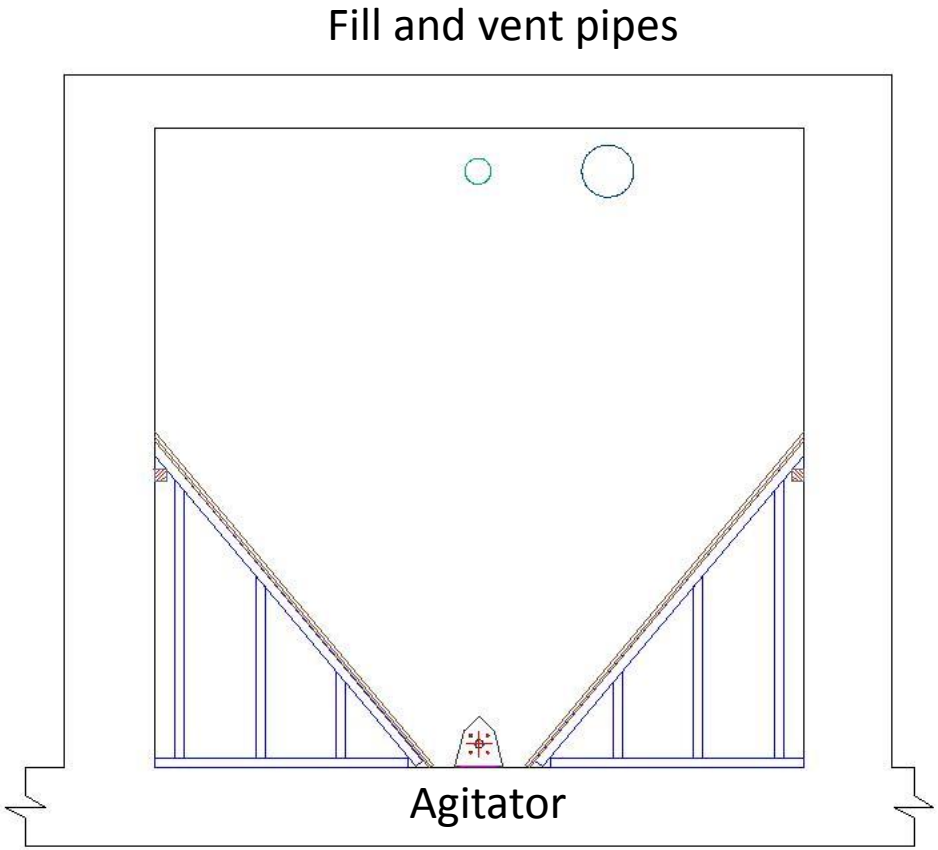
Wood Pellet Fuel Store

Fill and vent pipes



Agitator

Wood Pellet Fuel Store – Cross Section



Do's and Do Not's - Wood Pellet Fuel Store

DO

- Reduce the dust created by pellet damage (low delivery pressure, long radius bends, pellet mats)
- Make sure the vent pipe can not become blocked by pellets during filling
- Include the appropriate HSE warning notices on all access doors
- Empty fuel store once a year and remove any dust accumulation

DO NOT

- Put any electrical fittings in the fuel store
- Allow any water or moisture ingress into the fuel store
- Enter the fuel store without adhering to H&S guidance

Flue Design

- Flues should be designed using BS EN 13384-1:2002+A2:2008 Chimneys. Thermal and fluid dynamic calculation methods for Chimneys serving one appliance

- Flue should be designed to provide the required natural draught for the boiler at:
  - Full output
  - Minimum output
  - With the appliance switched off and the flue at operating temperature

Flue - Termination Height

- BS EN 13384-1:2002+A2:2008 will give an “uncorrected” flue height

- Final (corrected) height is determined from:
  - For boilers up to 45kW → Part J Building Regulations
  - For boilers above 45kW → LAQM (Technical Guidance document 09)
    - Usually requires submission of a chimney height application form to the local authority
    - LAQM requires 2 metre flue height above roof level (3 metre for < 1MW)

Flue - Other Considerations

- Individual bend sections should not exceed than 45^{o}
- Flue should never fall
- Avoid long horizontal runs
- Fit a draught stabiliser
- Fit explosion relief
- Include provision for draught measurement
- Fit inspection and cleaning access points
- Fit condensate drain in bottom of riser
- Termination point – should be tapered cone. Never fit mesh guard

Flue

DO

- Ensure each biomass boiler has its own flue
- Refer design to a specialist flue company
- Contact local planning if you are not sure of requirements regarding air quality management policy
- Fit a draught stabiliser
- Fit explosion relief
- Fit inspection and cleaning access points
- Fit condensate drain in bottom of riser

DO NOT

- Fit any restriction (eg. mesh) over end of flue
- Assume local authority consent

Questions

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