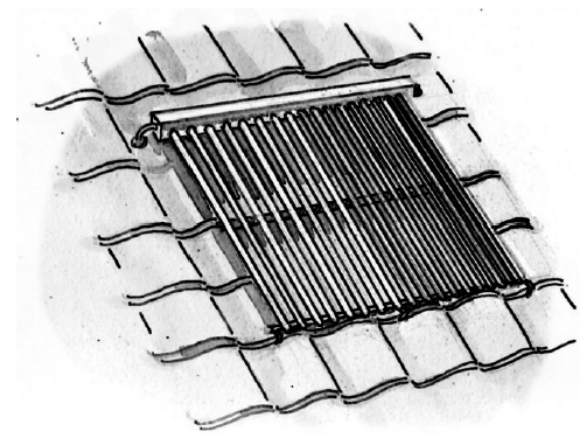


SOLAR PANELS

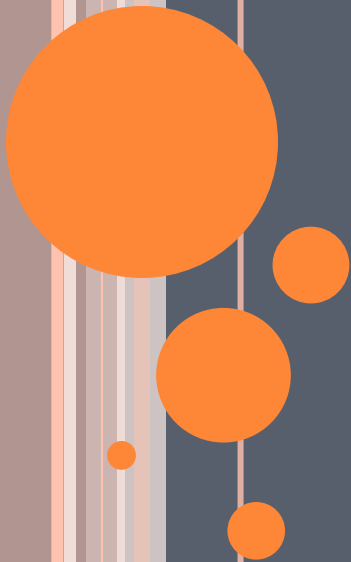
2009 HIGHER LEVEL

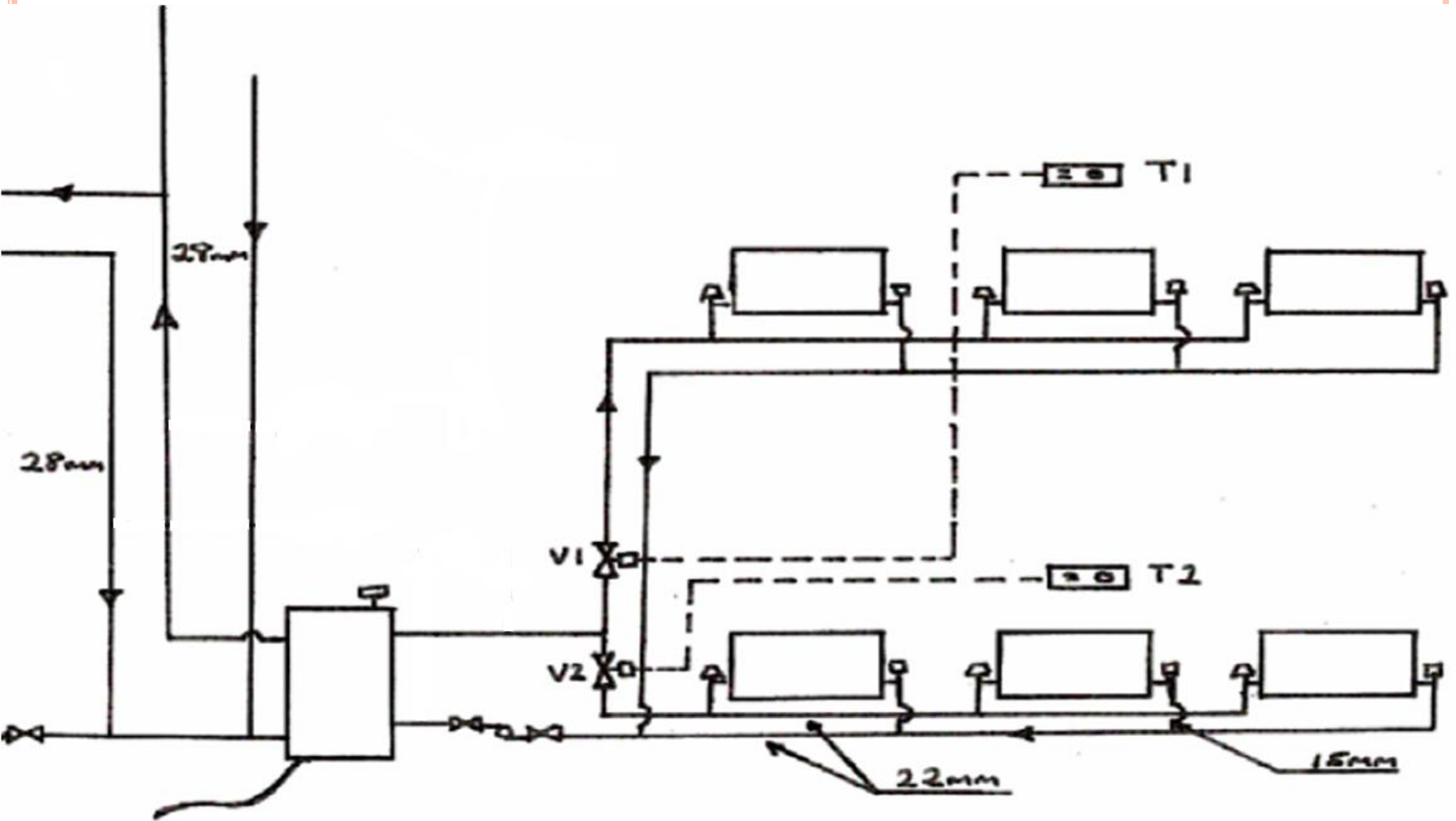
8. (a) An oil-fired boiler is used to heat two independently controlled heating zones, one on each floor, in a two storey dwelling house. Using notes and a *single-line diagram*, show a design layout for the pipe work necessary for each zone. Show **three** radiators on each floor, indicate the control valves and give the typical sizes of the pipework.
- (b) A roof mounted solar collector, as shown in the accompanying sketch, is to be connected to the system at **8(a)** above, to heat domestic hot water only. Show the pipework necessary to connect the solar collector to the above system. Outline **two** advantages of connecting a solar collector to the system.



QUESTION 8 (PART A)

An oil-fired boiler is used to heat two independently controlled heating zones, one on each floor, in a two storey dwelling house. Using notes and a *single-line diagram*, show a design layout for the pipe work necessary for each zone. Show **three** radiators on each floor, indicate the control valves and give the typical sizes of the pipework.





Control Valves?



CONTROL VALVES

Note:

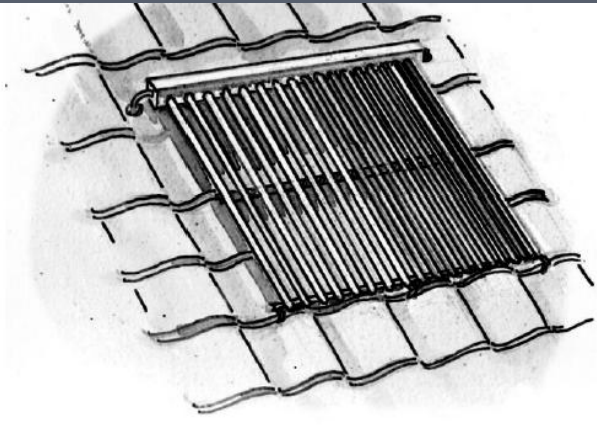
- Control valves at V1 and V2 can be manual or two port valves
- At each radiator a handwheel valve to thermostatic valves on flow, lockshield valves on the return
- 22mm pipe on flow and return, 15mm pipe at upstands
- Room thermostats (T1 and T2) can control the motorised valves in each zone



QUESTION 8 (PART B)

A roof mounted solar collector, as shown in the accompanying sketch, is to be connected to the system at **8(a)** above, to heat domestic hot water only. Show the pipework necessary to connect the solar collector to the above system.

Outline **two** advantages of connecting a solar collector to the system.



SOLAR PANELS

WHAT IS A SOLAR PANEL

- Solar energy begins with the sun.
- Solar panels are used to convert light from the sun into heat energy that can be used to heat our domestic hot water needs
- Light from the sun is a renewable energy resource which provides clean energy, produced by solar panels.



Electricity



Water
Heating



WHAT FIXTURES ARE REQUIRED



Evacuated Tube
Solar Panel



Water Pump



Insulated
Pipework



Twin Coil Hot
Water Cylinder

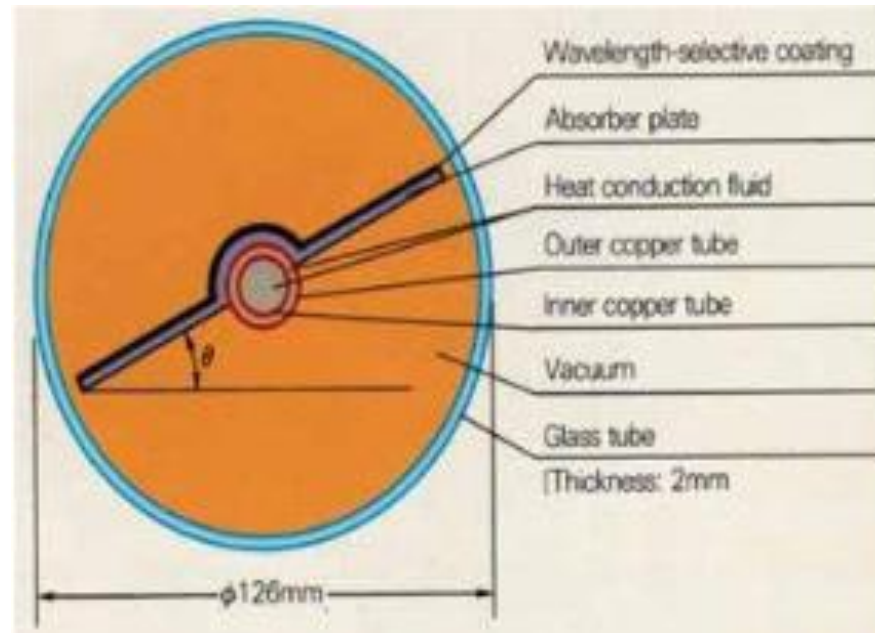


ANATOMY OF EVACUATED TUBE SOLAR PANEL



1. Anatomy of Evacuated Tube

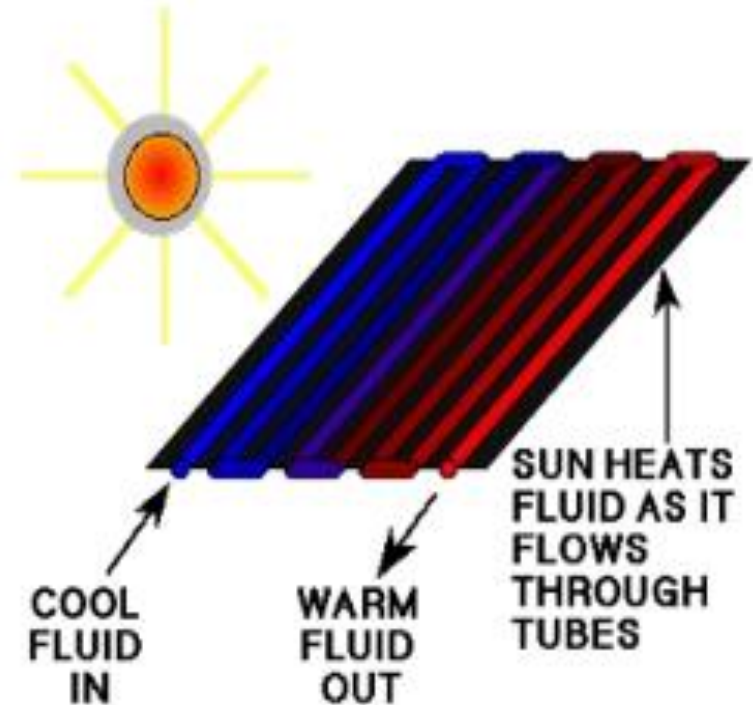
- Outer tube contains inner tube in a vacuum
- Inner tube carries liquid
 - Has coated fins to improve energy absorption
 - Fins increase the absorber surface and the heat – transfer rate



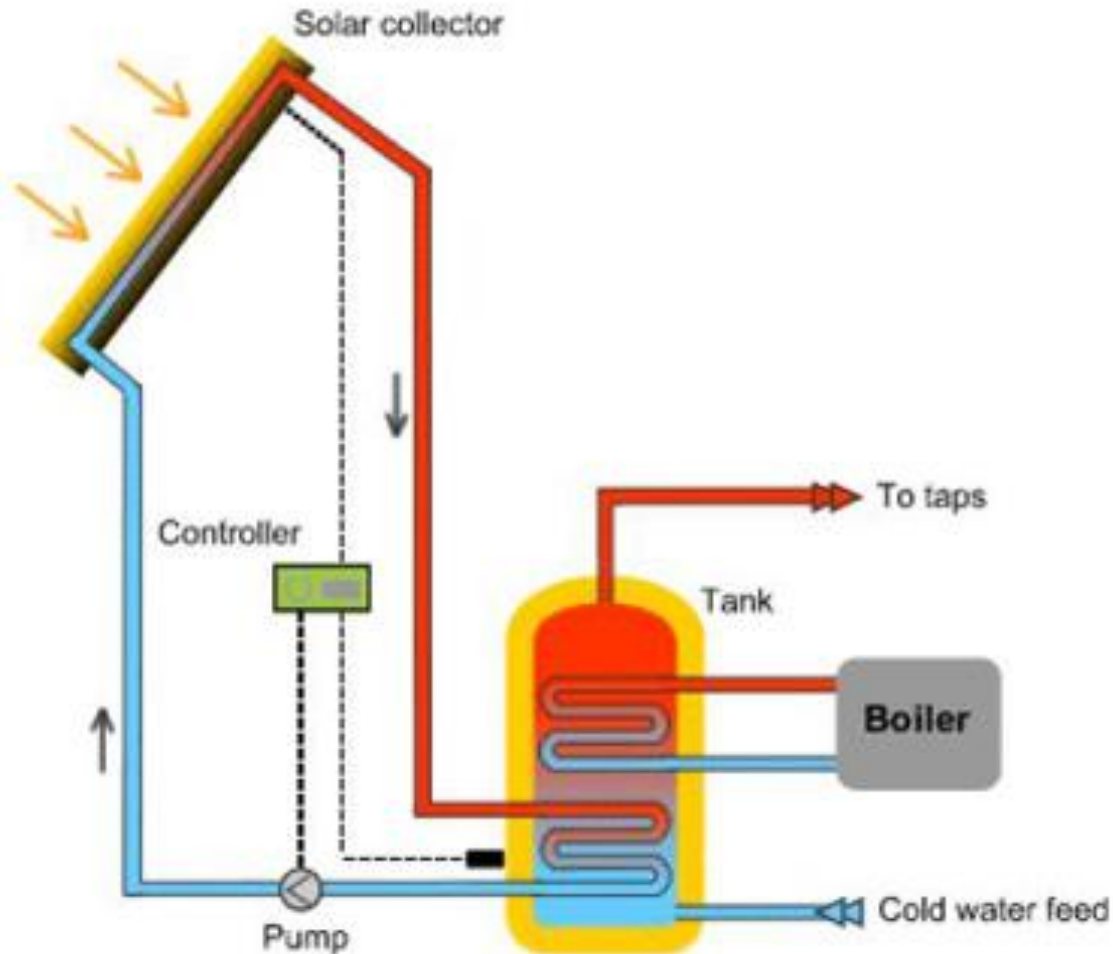
HOW AN EVACUATED TUBE SOLAR PANEL WORKS



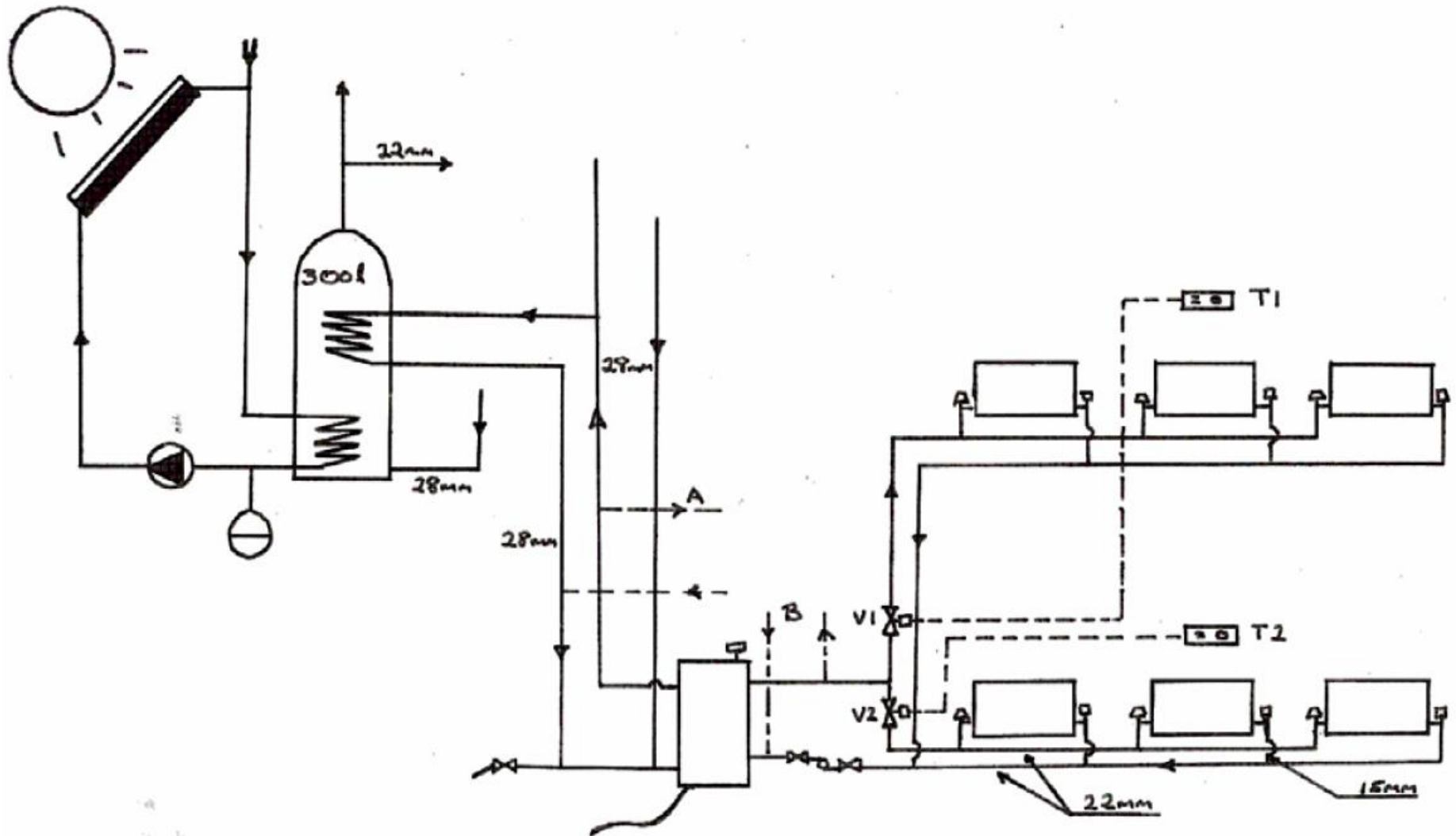
- SSE facing solar panels collect heat
- Absorbed energy heats liquid (non-toxic anti-freeze / water solution)
- Sunlight enters through the outer glass tube and strikes the absorber, where the energy is converted to heat
- Heat is transferred to the liquid flowing through the absorber



HOW IT IS CONNECTED INTO THE INDIRECT HOT WATER SYSTEM



HOW IT IS CONNECTED INTO THE INDIRECT HOT WATER SYSTEM





ADVANTAGES OF ROOF MOUNTED SOLAR COLLECTOR

ADVANTAGES OF ROOF MOUNTED SOLAR COLLECTOR

1. Sources are renewable and sustainable
2. Environmentally friendly
3. Requires no extra space in the house
4. Grant Aided
5. Can be supplemented by boiler
6. Easy to install, maintenance free and long lasting
7. Continuous supply of hot water – up to 60% of domestic requirements
8. Results in substantial savings compared to conventional methods

