GROUNDTHERM
CORRUGATED PPR PIPES
FOR GREENHOUSE HEATING

UV
PROTECTION

Greenhouse gardening has known a constantly increasing growth during the last years. A few of the numerous benefits that it offers over conventional gardening are the possibility to grow plants without using toxic pesticides and saving resources such as water. Today, when the issue of climate change is becoming crucial, greenhouses offer a solution for a more **environmentally friendly** way of cultivation. **Heating of the greenhouses** is one of the most important factors to **achieve successful plant growing.** Certain plants require warm temperature all year long so it is necessary to **eliminate any heat loss** and **ensure stability in temperature.**

SOLIN, a Greek company with **over 30 years experience** and a wide range of pipes for heating, sanitation and other uses, offers a **mostly effective heating system for greenhouses.**

SOLiN®
The Pipe We Trust.
www.solin.gr

Groundtherm system is produced in black color and with UV stabilizers that enables it to be resistant to sun exposure.

The modern greenhouses' heating system, **Groundtherm, provides the best presuppositions for the normal growth of the plants, by saving energy.** In contrast to the usual heating systems, it can be installed above or below the ground, it activates the growth of plants by **improving the nutrients intake** and **prevents fungus from affecting the plants.**

Due to better performance of Groundtherm in comparison to usual systems, it **can operate at lower inlet temperature** and thus can be easily combined with contemporary energy saving systems such as heat pumps, solar collectors, geothermical systems etc.

The circulation of the hot water through Groundtherm pipe, as an exchanger, is proved very efficient in its use. It is produced from a special PP-R and is very **resistant to corrosion, acidic soil, fertilizers and pesticides.** Its **profile resembles a radiator and has about twice the performance than the standard smooth polypropylene tube** (see diagram 1). Is available in dimension Φ25mm for 1,5 bar nominal pressure, accompanied by a full range of fittings (made of the same material).

SOLIN S.A. provides full technical support to the installer through its engineering department. According to the study, length of the pipe (total and per m^2) and the distances between the pipes of the floor standing net and the other details of the installation are determined.

For the study of the engineering department the following data are requested:

- the area/field where the greenhouse will be built
- the dimensions of the greenhouse
- the cover material (PE film single or double, glass, polycarbonate plates etc.)
- the type of plants that will be cultivated
- the planting rows.

Example of calculation with data:

- Greenhouse 25m x 40m =1000m² (required heat load 200W/m², i.e. 1000m2 x 200W =200.000 W total heat load)
- Water inlet temperature 50°C and return 45°C, so the average temperature is 47,5°C (ΔT= 5°C)
- Requested room temperature of greenhouse 10°C
- Length of the loop from inlet fitting to outlet fitting 40x2=80m

Calculations

1. Heat output per m of pipe:

ΔT between average temperature of water and room temperature of greenhouse 47,5ºC-10ºC= 37,5ºC.
From diagram 1, pipe output 50W/m2.

2. Required pipe:

Required energy W/m2: pipe output W/m =Total length of pipe in m/m 2200W/m2. 50W/m= 4,0m/m2. Length of pipe m/m2 x total surface m2= Total length of pipe m/m2 4m/m2 x 1000m2= 4000m.

3. Average pipe distance:

Total surface/Total length 1000M2:4000M =0,25m.

4. Total water supply per hour:

total required energy/ ΔT coefficient of transformation 200.000W/5ºC x 1.163 =34.394 lt/h.

5. Required water supply in each loop/h:

Total supply x length of loop/h length 34.394 lt/h x 80m/4000m=688 lt/h.

6. Total loss of pressure (diagram 2):

For water supply 688lt/h, diagram 2 gives loss of pressure 50mm WS/m that means that the total loss of pressure per loop is: 50mm Ws/m x 80m= 4000 Ws=4mWs =0,4 bar.

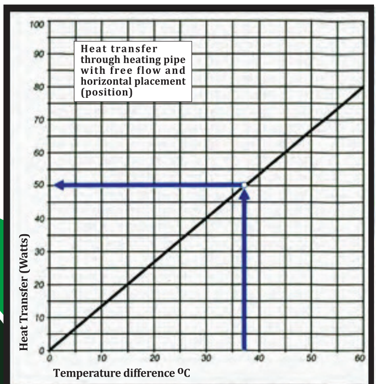

Diagram 1: Heat Transfer (Watts)/ Temperature difference ºC (Average Working temperature – ambient temperature)

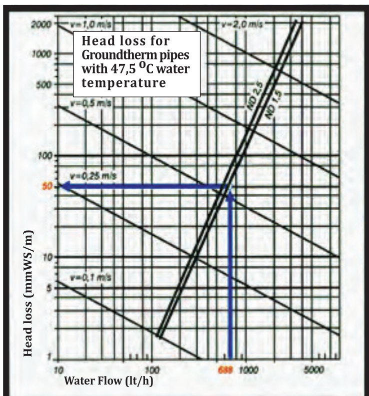

Diagram 2: Water Flow (lt / h) / Head loss (mmWS/m)

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Offices: 12 Souliou Str., N. Chalkidona, 143 43 Athens, Greece
tel.: +30 210 2531990, +30 210 2523636, +30 210 2531585
fax: +30 210 2523049, e-mail: secretary@solin.gr

Factory: A' Industrial Area of Volos, 38500, Volos Greece
tel.: +30 24210 95402, +30 24210 95421, fax:+30 24210 95422