4CBLB00 Solar Heat System

Self-Study Assignment
Group 16

SSA No.	Description
7	Material/Shopping List
SSA Owner	
Pranav Joshi	

Introduction

After discussions from the last meeting, it was decided that the material/shopping list needed to be finalized

Goal

- The pipe to pipe connection and U-bend connection needs to be finalized
- Sourcing PIR
- Making a final concrete Material/Shopping List

Summary

- The pipe to pipe connection and u-bend connection will be made by friction fitting a small piece of garden hose over the straight Aluminium tube sections
- The PIR was sourced from Praxis Store Scraps. This will be declared appropriately in the material list once the exact dimensions of the PIR have been found, for now the rate has been carried forward from the previous material list
- The final material list is found in table 1

Recommendations

- The neccesary materials need to be bought for the building sessions, the building schedule
- When building, group members should be careful, measure twice and cut once.
- Finally, group members should also be precautionary when handling the aluminum tubes since, it may have sharp edges that can sustain cuts and other injuries.

1 Elaboration

1.1 Finalizing Pipe to Pipe Connection and U-bends

Upon discussions with Protozone staff, it was concluded that bending the Aluminium pipes to achieve the required bend radius is not possible due to a lack of appropriate tools to do so.

Following this, the PVC connection option, ie; making the u-bends with PVC pieces (which are manufactured with 90-degree bends, such as this one [1]) and connecting them to straight sections of the Aluminium tube. This option was deemed inappropriate due to dimensioning problems. The pre-bent PVC pieces come in significantly large diameters (30 to 40 mm) compared to the aluminium tubes (12 mm). Hence, this option was discarded.

Finally a friction fit garden hose connection was looked into. Utilizing the scrap garden hose (with an inner diameter just larger than 12 mm) in Protozone, they can slide over the aluminium tubes (of outer diameter 12 mm). To confirm this friction fit, the scrap garden hose pieces were test-fitted on similar copper tubes (outer diameter 12 mm, emulating the geometry of the Aluminum pipes that will be used).

The friction fit was nearly perfect. To prevent any leakage, zip-ties will be used to clamp the garden hose onto the aluminium tubes. Unfortunately, no pictures were taken of this connection, however the building plan should include enough visual cues to make this connection during building hours.

In conclusion, the garden-hose-friction-fit connection can be used to make the U-bends and any other pipe to pipe connections. The scrap garden hose found in Protozone (around 1.5 meters) is sufficient to meet the needs of the system (only 0.5 m of garden hose is required, SSA 6).

1.2 Sourcing PIR

To source PIR, Dovydas and I visited Kanneldijk to look for scraps. The Praxis scraps had 13 columns of 100x100x1600 (Roughly, shown in fig. 1) PIR. The dimensions weren't accurately measured since there were none handy. However, the PIR found was deemed to be sufficiently abundant to construct the system, connecting the PIR columns to eachother is a challenge and needs to be solved for. A few options are:

- Gluing the PIR columns to eachother
- Taping the PIR columns to eachother

These options violate the C2C requirements further, however, these options may be the most reliable method of connecting the PIR columns. In the final report it can be argued that when manufacturing a real-life system, the insulation can be manufactured in one piece, or in mechanically fastened pieces, hence enhancing the C2C factor of the system.

The sourced PIR columns are currently being stored with Dovydas due to lack of storage space in Protozone. During building hours, the PIR will be transported to protozone.

Figure 1: Sourced PIR

1.3 Material/Shopping List

After all the aforementioned developments, the following material/shopping list has been made. It is deemed best to divide/delegate this shopping list during the next meeting, so that the group can decide as a collective.

Material	**Where to buy**	**Cost per piece**	**Total costs**
1200x600x40 mm PIR plate	`https://tinyurl.com/pirpraxis`	€11.49	€11.49
Tension straps	`https://tinyurl.com/tensionstraps`	€3.79	€15.16
Hose connection piece (12 mm to 12 mm)	`https://tinyurl.com/hornbachhoseconnector`	€6.49	€12.98
Legs	Lasercut by Protozone	€0	€0
Black sand (25 kg)	`https://tinyurl.com/buyblacksand`	€7.49 per 25 kg	€7.49
Aluminium Tubes (12 mm diameter (outer) and 1 mm thick)	`https://tinyurl.com/hornbachaluminiumtube`	€2.5 per meter	€12.5 (for 5 m)
Garden Hose	`https://tinyurl.com/buygardenhose`	€1.38 per meter	€0.70035 (for 0.5075 m, which is the length of 7 u-bends)
Zip-ties	`https://tinyurl.com/buygardenhose`	€1 per 100 pieces	€0.14 (for 14 zip-ties)
Total (approx.)			**€60.4675**

Table 1: Estimated materials and costs for the project

1.4 Conclusion

In conclusion, the pipe to pipe connection and U-bend problem has been resolved, a garden-hose-friction-fit will be used to solve both issues. Furthermore, the neccesary amounts of PIR have been sourced. Finally, the material/shopping list has been finalized completely, now it is ready for execution (purchasing).

Overleaf Link to this SSA

https://www.overleaf.com/read/djzcvfzxshnb#7f20c0

References

[1] *Buy PVC Bend*. URL: https://www.praxis.nl/sanitair-installatie/waterafvoer/afvoerbuizen-hulpstukken/hulpstukken-afvoerbuizen/hulpstukken-afvoerbuizen-pvc/50mm-bocht-dw-1xlm-90/2026310. (accessed: 30.09.2025).