



## ARC II Modular construction system – energy and efficiency statement

### Foundations

The building will re-use the existing concrete slab foundation. This ensures no unnecessary energy is expended in breaking-up and reforming new foundations.

### Insulation

It is proposed to use 140mm Steico Flex 038 wood fibre insulation with a further 80mm layer added once first fix electrical and plumbing works are complete. This build-up is continued in the floor zone. Calculated U values – walls / roof – 0.167 W/m<sup>2</sup>.K and floor 0.184 W/m<sup>2</sup>.K.

This material fits snugly in between the timber structural ribs of the building and bends well with the curve. There are no air gaps and therefore it creates a highly efficient building envelope.

The raw materials for Steico Flex come from timber thinnings and sawmill residues which are all locally sourced to the factory where the products are made. Even though the material is manufactured in Poland it is still considered to be carbon negative by the time it reaches the UK. This is due to the amount of CO<sup>2</sup> locked up in the wood fibre material and the relatively small amount of CO<sup>2</sup> produced by transporting the product. In comparison - Fibreglass, mineral wool and foam-based insulants are all very carbon positive (produce CO<sup>2</sup> in their production) and so although saving road miles, the CO<sup>2</sup> footprint would be larger using these insulants manufactured in the UK.

The building is also constructed with a very high degree of airtightness, which ensures heat is maintained that would otherwise be lost through air movement.

### Windows

Triple glazed argon filled units, trickle vented, built into insulated, structural, projecting kerbs. Fakro FTP-V P5. U-Value of units is 0.97 W/m<sup>2</sup>.K. These minimise heat loss and minimise the building's energy consumption.

### Glazed ends

Triple glazed argon-filled units, unvented, glass thickness 6/6/6mm, 10mm air gaps, U-Value of units is 0.97 W/ m<sup>2</sup>.K. These minimise heat loss and minimise the building's energy consumption. It is proposed that the eastern end will be shaded with a parasol type shade during the summer months, although this glazing is also recessed back from the end of the building.

### Brise soleil

It is proposed to use timber brise soleil shading to the large south-facing picture windows to mitigate solar heat gain.

Similar to the images on following page.



#### **Rainwater harvesting**

Rainwater will be harvested for use in the wash basin and external wash down area and this will be significant resource given the need for water cleaning of the artefacts.

#### **Heating & ventilation**

Under-floor infra-red emitting film element beneath the floor covering provides a heat source to the building. This is a low-energy, fast-reacting system.

Pending advice from a specialist, it is proposed to use a mechanical ventilation system with heat recovery – this uses the heat recovered from extracted air.

There will also be natural ventilation via the vents in the fully-openable windows.

#### **Sedum green roof**

The exterior thermal mass provided by the planted roof substrate significantly protects the roof from rapid changes in temperature especially from solar gain, and removes risk of membrane penetration.

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