Following our appearance at the Culture, Tourism, Europe and External Affairs Committee meeting on 25th October 2018, Page \ Park Architects have been asked to provide details of the types of insulation used on the roof of the Mackintosh Building project and are grateful to the Committee for reminding us that we agreed to provide this information. We apologise for not doing so sooner.

As explained to the committee, at Grenfell, PIR (polyisocyanurate) insulation was used as part of an external cladding of the walls of the existing building as part of a buildup which included aluminium composite cladding panels, insulation and an airgap to provide for ventilation. At the Mackintosh building, PIR insulation was used in selective areas of roof refurbishments or reconstruction, more conventionally employed as part of buildups below slating or as part of an asphalt flat roof system.

There was no insulation of any form added to external walls. In addition, where PIR was used, it was never in an exposed or cavity situation; it was encapsulated top and bottom with lining material in accordance with manufacturers’ recommendations.

PIR insulation was chosen for the select locations as it is a very thermally efficient insulation product, which meant that previously uninsulated roof buildups could be reconstructed incorporating insulation without aesthetic impact on the Category A Listed building.

It is important to note that the specification and detailing of all material was in the context of a fire engineered L1 aspirating detection system and mist suppression system that was to be installed throughout the building.

We unfortunately cannot comment upon the examples that Sandra White MSP referred to in her questions but without exception, the use of insulation in the building complied with all regulatory and legal standards. The drawings and specification submitted to Building Control, and subsequently approved, also contained references to the use and type of insulation.

We set out below the locations at which insulation was used, together with the type of insulation used.

There were various types of roof construction within the project, including the asphalt covered flat roofs to the top-level studios, lead clad flat roofs to the north upper level, and a series of pitched slated roofs at various levels down through the building. The following descriptions outline the types of roof insulation that were either used, or intended for use, in the reconstruction project:

1. **Asphalt Roofing at Flat Roof Areas**
   - In areas with flat roofs, an asphalt roof build-up was laid on timber sarking boards on timber roof joists. This was consistent with the original design of the building. It was intended that the fire risk associated with this historic timber roof build up would have been mitigated by a proposed mist suppression system, which was in the process of being installed.
   - The opportunity was taken during the reconstruction to install insulation as part of the system build-up. The system was made up of three components: an **IKO Permaphalt** polymer modified roofing asphalt two coat system on **IKO Enertherm PIR MG** rigid insulation board on a vapour control layer.
   - **IKO Enertherm PIR MG** is tested and certified under BS EN-13501-1
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- The IKO Permaphalt Design and Specification Guide notes the following in respect of the performance of the asphalt product in a fire: “because of its high mineral content, Permaphalt is virtually incombustible.” Permaphalt fulfils all the external fire resistance required for a roof covering and achieved the highest rating (P60) when tested as described in BS 476: Part 3.”
- The IKO Permaphalt Design and Specification Guide further notes that “The insulation plate has a low to zero smoke emission rate and does not melt or drip. This fire performance is an inherent part of the foam’s cell structure.”

2. Slated Roof Build-up – Condition 1
- Some areas of reconstructed roof comprised slates on roofing felt on timber sarking boards with insulation sandwiched between that and a further layer of sarking boards laid on the timber roof joists. Again, the fire risk inherent to the reinstatement of the timber used in the roof would have been mitigated by the mist suppression system.
- The insulation used in this condition was Xtratherm Thin-R PIR Insulation – pitched roof board (XT/PR). The BBA certificate for the material notes the following in respect of fire performance: “behaviour in relation to fire — the product will not contribute to the development stages of a fire or present a smoke or toxic hazard.”
- Xtratherm Thin-R Insulation is tested and certified under BS 476-3: 2004 and BS/IS EN 13165

3. Slated Roof Build-Up – Condition 2
- This roof condition was made up of five components: slates on roofing felt on timber sarking boards on timber joists on timber roof structure above a ceiling lining. As part of the works, the thermal performance of the roof void was upgraded by the use of insulation roll laid between the roof joists – the specification choice being informed by the space available to insert the insulation without impact on the aesthetics.
- The insulation used in these areas was Superglass Multi-Roll 44, - a mineral wool insulation, tested and certified under BS EN 13501-1

4. Lead Clad Mansard Roof Build-up
- This area of roof comprised four parts: leadwork on felt on timber sarking boards on timber roof joists. As part of the works, the thermal performance of the roof was upgraded by the use of insulation laid between the roof joists and encapsulated by a further layer of sarking boards below. As above, the design allowed for the mist suppression system to be installed to the underside of the roof structure.
- The product used was Ecotherm Eco PIR Insulation. The BBA certificate for the material notes the following in respect of fire performance: "when installed between, under or over rafters the product will be contained between the roof and internal lining board until one is destroyed. Therefore, the insulation will not contribute to the development stages of a fire or present a smoke or toxic hazard.”
- Ecotherm Eco Insulation is tested and certified under BS EN 13501-1.