Passivhaus Scottish Equivalent Standard

WG 02b Workshop – Airtightness

Workshop 2 Notes

Built Environment — Smarter Transformation

12th October 2023

Breakout 1	
2.1	**The focus of this workshop will be to discuss what is currently being delivered across the built environment when targeting airtightness levels in new buildings and what could reasonably be achieved by 2025/26** **What levels of air-tightness are currently being achieved across domestic and non-domestic buildings?** Current levels of AT under current regs between 3 and 5, recent PH school in steel had 0.53 little doubt 0.6 can be achieved by 2025. Keep designs simple. Access to data of 4000-5000 homes, average AT is 4.5-5. Some up at 7 but outliers and not acceptable. Easier to achieve in timber kits can't forget about traditional builds. Need for wet plaster to be applied to get AT change of construction details on site. Social housing AT is between 3-5 on average although tighter on PH where there are more of them which have been built. Average across 800 Scottish homes was 4.1, CCG achieve 4.5 with Offsite. Big difference between domestic and non-domestic. NI housing comes in at lower A average was 3.8 could be down to prevalence of wet trades and plastering over masonry as standard. Easier to achieve AT fewer than 1% are above 8. Could be the quality of the AT tests themselves also. If you have a value of 1-3 you need ventilation strategy or decentralised mech extract at the least. Data from large sets of AT can be provided by those in the room. AT – houses 4, flats 3.5, commercial 6.5. Average AT is sitting at 4.2 on average reasonable aim is 3-5. Single modular average is 2.6 with a 0.39 as best ever. MMC methods give better air tightness values and is easier to achieve. 0.6 ach= 15 kwh/m2, 1.0 ach- 16 kwh/m2, 2.0 ach= 20 kwh/m2, 3.0 ach= 25 kwh/m2, 5.0 ach= 35 kwh/m2, 7.0 = 47 kwh/m2
2.2	**Where could reasonable and scalable progress be made over the period 2025/26?** AT starts with designers. Don't have enough clout as the guidance is not stringent enough on the need for simple design and detailing especially on wall builds ups with a clear air tightness line. It should not be removed as a VE exercise. Needs to stop contractors interfering with thermal bridges when they build on site. Simple lines and clear guidance on how details should be provided. For example contractors can't move steel so it punctures AT layer for example. Separate lines for facades. Culture of air tightness on site has changed in the last 10 years, used to be box ticking now contractors much more aware of it through testing. This should be taught as part of apprenticeships. Culture change is key 0.6 requires a complete change on site of how to do the work. Aim for zero then 0.6 becomes achievable.

	Reasonable targets would be houses less than 3, flats 2.5, understanding that below 3 is moving into MVHR.
2.3	**What are the benefits of assigning a specific air-tightness level when setting energy targets for new buildings?** Reducing AT to 0.6 has a massive effect on heat demand, 2.7 kw from circa 47k if you work to current standards. Save huge amounts of energy, comfort levels are good, health of the fabric reduced interstitial condensation. MVHR require maintenance and need to be designed with access in good location. Insurance risk if a scare story gets out someone got sick from not changing filters. Performance gap which already exists between design and build would be reduced if a specific AT target was set. This would reduce the skills gap on site, the benefit of setting a target increase quality on site.
2.4	**Identify any risks and opportunities associated with targeting certain air-tightness levels** What happens when a house just fails the standard? Does it still pass or how would that be dealt with? Remediation is a nightmare. Data on how much faster the units get handed over would be key to understanding cost variations for higher standards. Training and education for the whole sector is key – guidance needs to be delivered for the entire supply chain. Offsite construction means AT is easier to achieve although if you go below 3 you need ventilation should there be different AT levels for non-domestic? Debate around yes or no. Non-domestic buildings have building managers who interact with the tech, houses is down to owner/tenant and needs support to change behaviours. Risks are Scottish weather making air tightness hard to achieve. AT layer being penetrated by occupiers and tenants. Benefit is that it increases focus on good ventilation design. Increased focus on AT leads to on overall focus on quality on site. AT needs good workmanship on site which is already an issue. Risk is not having enough. Risk if there is an increase for MVHR do we have enough ventilation products available to cope with demand. Mould and damp are increased risks where tenants do not understand the difference in the behaviours required for a more airtight home. Risk is cost of lining products increasing. Capital cost increases on overall affordability. Need to avoid duplication between SAP or PHPP, Non domestic is 0.47 ach this is hard to achieve 0.6 AT.
General Comments: Generally setting a target around air tightness was perceived positively in that there is much more of a culture around air tightness on site now. It is not just seen as box ticking. This was noted due to improved construction on and offsite and also in materials and products such as vapour control layers. Risks are going below a 3 requires a ventilation strategy so where would the line start. Achieving 0.6 under PH has a huge effect on heat demand as demonstrated by the calculation in the presentation and if the legislation is setting out to achieve carbon emissions reductions the PH target of 0.6 was highly effective. However, achieving this without the other parts of PH	

like MVHR and using PHPP in the design process would be difficult. AT below 3 requires MVHR and there are risks in design and supply chain for ventilation products. More complex for non-domestic buildings although debate around whether fabric in non-domestic could achieve 0.6 but the ventilation strategy would have to different for each building. The benefits of setting an AT target improves quality on site, attention to details, skills gap and comfort of the occupant as well as reducing heat demand.

NB it was noted that there should be an MVHR session/workshop.

Breakout 2	
3.1	**The focus of this workshop session will be to understand what actions within the design and construction of new buildings result in the target air tightness level being achieved?**
	To identify the key aspects within the design and construction process that result in the design air-tightness level being achieved at completion certificate stage Design is thermal bridging free design and airtightness are interlinked. Need a consistency of approach in design. Construction- testing regime this needs set out in stages. Design - early-stage design input at feasibility stage on AT. Construction- collaboration between architects and trades and labour on site. Needs to be included in the apprenticeship modules. AT strategy needs to first test, second test and completion test. Requires an air tightness champion on site and in design team. Should we have fully exampled elevations or suite of details would be quite hard to deliver on site. Separate lines for ventilation/air tightness/ structural need to separate elements on drawings. Standard details would be good. Design teams need empowerment by the regulations to say no you need to deliver this on site as it is in the targets. Stage 3 / stage 4 VE. Early engagement with all on site and structural engineers around thermal bridging. Having a definition of simple clear lines of design in the standards. Design – need to see the air tightness line on drawings. Simplicity in details, no complex corners, products are there- membranes, boards, tapes etc just need to design the layer in. Construction – quality procedures on site, toolbox talks, interim air tightness tests post fabric pre services, post monitoring testing 5 years etc. AT champion in design team and on site. Could this be written into technical guidance as best practise. Sequencing making sure you are doing correct build ups on site in correct order. For example, signing off penetrations normally done through contractual arrangements. Simplifying façade details, easy to read and understand. Making sure AT is followed up. Designs- improved designs for junctions and connections to ensure AT is considered early in the design process. There needs to be robust detailing which is simple to understand. Construction process will require significant focus on the sequencing of work on site to ensure the air tightness layer is not at risk of becoming punctured by the wrong sequence on site. Closed panel construction offers a de risking of sequencing as the panel is built in the factory first then joined together on site.
3.2	**Being cognisant of the current Compliance Plan workstream, what could an energy standards 'plug-in' include on the key practical actions to manage risk in the delivery of an intended level of infiltration and consistency in the quality of the building envelope?** Self-certification with a compliance manager as a role in the project. We need updated robust details. Photographic evidence for proof of construction phase. Education skills and knowledge on site.

	Section 6 verifier- NHBC, PH designer, contractor, building control and client all involved in the chain of work. Who will sign off evidence this has been designed, built, and tested. There needs to be a strategy for the evidence photos or QR codes. Set the standard and allow the contractors to assume liability for ensuring built properly. Difference between best practise and reality. Should the tech handbooks explicitly state about evidence provisions, air tightness champions and quality assurance. Should a list of insulation and u value build ups be provided. Do we list materials? How should evidence be provided? Photos/ proof of materials/u-values/could this be written into sections 6? Do we have enough AT testers? Other skills are harder- wet trades etc. Quality assurance can be built into existing evidence provisions and checks. Buildings standards surveyors also need trained up on the PH equivalent standards and what they are looking for on-site and in drawings. Required training. SAP versus PHPP debate. Risk assumed to be, do we have enough QA skills to be able to monitor on site. Could there be digital monitoring at the build phase for example Multivista – LABBS and the BS Hub. Build, test, and evidence as the process. There is a QA product in process- for example materials and photographic evidence built into PHPP process.
General Comments: Design guidance could simplify drawings, include an air tightness line and separate lines for different elements. Construction process needs to involve all parts of the supply chain quality procedures on site, toolbox talks and making sure AT tests were carried out at planned stages post fabric and pre services for example not just carried out at the end of the build when remediation would be far more difficult. The energy plug in sets the new standard but expect the contractors to take responsibility for ensuring compliance is managed correctly. Most agreed compliance and quality control is required. There was a reticence from larger house builders around the provision of photographic evidence for example. Too much paperwork. There needs to be a culture change on site and an air tightness champion in the design and site teams. Airtightness champion essential.	