



VOWH DC - Examination in Public Statement Stage 2 Matters and Questions

Matter 12) 3 d) (CP40)

Sustainable Design and Construction.

1.1 Our concern for future development regarding sustainable design and construction is that all energy efficiency in buildings is purely based on design and not on what is actually built.

1.2 Sustainable design is based around SAP (Standard Assessment Process) which assumes that every building is perfect and built to the letter of the current building regulations and design specification. Based on the SAP calculations around the design of the building, an EPC (Energy Performance Certificate) is produced, the majority of new buildings/ dwellings are given an EPC rating of A or B which is deemed as very energy efficient.

1.3 SAP, however in the few buildings that have actually had post occupancy evaluation carried out, has been proven to be up to 100% **inaccurate**.

1.4 Work carried out by Paul Buckingham MSc Arch:AEES of Sustainable Lifestyles has found that:

a) New home owners who have contacted him on a number of occasions making statements like "we sold our old 1950's house, because it was costing too much to heat and always felt cold, and bought a brand new "energy efficient" house, can you explain to us why our energy bills are higher and why the house always feels colder than the old one?"

b) or he had to carry out an air test on a property that the owners had lived in for a year, for some reason the air test had not been carried out before they moved in. As soon as he walked in the owner asked him why his energy bills were much higher than expected and the house always felt cold?

1.5 Sustainable Lifestyles have been surveying and carrying out building compliance testing on new buildings, existing buildings and extensions for a number of years and the standard of energy efficiency **actually** built into these buildings is very poor.

The issues are:

2.0 Building compliance – air permeability.

2.1 When a building is designed it is given a design air tightness target which is the maximum allowed air permeability for the building to meet its SAP rating. This is basically the number of air changes per hour ($\text{m}^3/\text{hr.m}^2$) of the buildings envelope area at 50pa pressure, typical targets are generally between 5 $\text{m}^3/\text{hr.m}^2$ and 7 $\text{m}^3/\text{hr.m}^2$.

2.2 For a passive house design the target is 0.6 $\text{m}^3/\text{hr.m}^2$ considerably less than is acceptable for the majority of dwellings.

2.3 Every new house has to have an air tightness or air permeability test carried out to comply with building regulation *Part L1A Section 3.1 Conservation of fuel and power in new dwellings 1st October 2010*.

2.4 Paul Buckingham has carried out around 1500 air permeability tests over the last 5 years and in excess of 75% of dwellings fail the first test with air leakage paths flowing behind the plasterboard walls from the roof space.

2.5 The only way the building can then achieve a pass is with the use of mastic and expanding foam to internally seal around the skirting boards, all pipework penetrations through the plaster board, under kitchen units and baths/ shower trays, etc, until the pass target is achieved.

2.6) Much of this sealing work is then removed once the building has passed during the final finishing work. Mastic around the skirting boards is of particular concern here because many dwellings only achieve a pass due to this sealing work, when the carpet fitters then move in to fit the carpets this is cut out to allow carpet fitting, effectively removing the air seal, **this is standard practice**.

2.7 Even with all the sealing measures mentioned above, the building is still not air tight and retaining heat.

2.8 The specification for the plaster board wall lining (dry lining) installation is that each board should be fully sealed along all edges (picture frame sealing) and around electrical boxes.

2.9 In the trade dry lining is commonly referred to as 'dot and dab', the plasterboard sheets are effectively stuck to the block work walls with dots of plaster and solid dabs of plaster around the perimeter of the boards to seal them.

2.10 Solid dabbling is virtually never done and so there is a 12mm -15mm open void behind the plaster board which allows unrestricted air to flow behind the boards and into the roof void.

2.11 If a building fails an air test initially it is because of this failure to seal the dry lining.

2.12 Where a building passes first time it is generally because the builder has sealed all the skirting boards and other penetrations prior to the air test being carried out, not because the dry lining has been fully sealed.

2.13 As each room is heated the heat will conduct through the plasterboard and then, through convection, will rise once it gets into the void and flow freely into the roof, at the same time drawing cold air from the roof behind the plasterboard creating cold spots and areas on the internal walls and effectively drawing the heat out of the building.

2.14 Using thermal imaging this can be seen happening internally and as well as the development of significant warm areas around the eaves area of dwellings.

2.15 On one site where homes were constantly failing air tests, even where a relatively high target of 7 m³/hr.m² was required, significant time was needed to be spent working with the builders to seal all the internal leakage areas just to achieve a pass.

2.16 When the site agent was advised to try sealing all the roof penetrations through the ceilings, particularly the perimeters where the dry lining void would allow air flow to the roof void, before allowing the dry lining installation, all subsequent dwellings, in the next round of air testing produced air test scores as low as 2.66 m³/hr.m² with no additional internal sealing around the skirting boards or any of the usual areas **proving that the dry lining was the main issue.**

2.17 **In conclusion the majority of air test passes are achieved basically through 'bodging' to achieve a pass and effectively failing to meet current building regulations.**

3.0 Building compliance – Insulation.

3.1 Paul Buckingham has seen many instances on extensions and new build dwellings where the insulation has been very poorly installed and detailed and in some cases has actually fallen out effectively leaving buildings fully un-insulated.

3.2 The main area of concern here is when a building has a warm roof construction where the top floor is effectively a loft conversion or room in roof.

3.3 In these cases the eaves void is often an insulated space and so effectively heated space inside the thermal envelope but due to the drawings and construction, outside the air seal line which would be tested for air tightness.

3.4 These areas are never sealed so external air can flow freely through the eaves ventilation and around the inside of the thermal envelope, bypassing the insulation.

3.5 In one case, the roof had been insulated between the roof rafters from the eaves up to and over the vaulted ceiling. After the building had been occupied the insulation fell out from between the rafters leaving the majority of the top floor flat completely uninsulated, this dwelling was built 2 years ago and has an A rated EPC.

3.6 Recently insulation in a similar construction where there was a 100mm void between the insulation and the plasterboard wall of a loft room. At the top of the insulation there was a gap of at least 100mm between the insulation and the underside of the roofing felt which meant a hand could be easily put through into the eaves void.

3.7 This lack of detailing will allow free air to flow around the insulation leaving the loft room, again, uninsulated.

3.8 When questioned, the site manager said that it had been installed exactly to the drawings and specification!

4.0 The experience of Paul Buckingham and Sustainable Lifestyles through compliance testing, thermography and research can only conclude that there is a serious lack of understanding and training within the construction industry regarding energy efficiency which is fundamental to building sustainably.

4.1 This is apparent from design to the actual build quality and needs addressing if VoWH and the country as a whole is to build sustainable and future proof dwellings.

4.2 In the current climate this is just not happening.

4.3 Many of the dwellings currently under construction are built using 40-50 year old technology with a few 'tweaks', but with current demands, time constraint pressures and government targets, are not fit for purpose when trying to meet future sustainability and energy efficiency needs.

4.4 There are many new technologies available now that can meet all of these demands while still achieving budgetary targets but these are not being taken up by an out of date construction industry.

4.5 On site construction is fully open to corner cutting, lack of training and understanding, drawing interpretation issues, etc, and is not conducive to producing quality, robust and sustainable energy efficient buildings for the future.

4.6 Systems such as Structurally Insulated Panels (SIPS panels) and German style kit houses offer a manufactured and engineered product that eliminates many of the issues detailed above, and offer speed of construction and employment opportunities.

4.7 There are also many other construction systems that could achieve similar results quickly and efficiently, again these are not being taken up.

4.8 If VoWH is serious about actually improving the energy efficiency of new and existing buildings and thereby achieve long term sustainability in future dwellings we are going to have to move away from the outdated construction systems we have been using for many years and start to actually build sustainable housing that works efficiently instead of just ticking boxes to prove efficiency and sustainability as a paper exercise.

4.9 If VoWH take a more hands on approach to building control by, for example, witnessing air tightness testing and taking a heavy hand with the builders to enforce building regulations to the letter then significant improvements could be made to current buildings.

4.10 Making it mandatory for construction workers to attend training courses on understanding air tightness and how to install insulation to achieve maximum results would help to redress the lack of knowledge and understanding within the industry.

4.11 Estate Agents should be encouraged to disclose the air test results in sales particulars. This would mean that new owners could then have their house retested if they felt it was unexpectedly colder than the sales information suggested and as such force the developer to ensure that the standards were being met in reality or take appropriate action to remedy the situation.

4.12 Sustainable Lifestyles would be happy to advise VoWH further on this matter and can develop courses to meet this initiative.

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