

## Episode 149

# Can airtightness tests on developer houses be trusted? – with Paul Buckingham of Sustainable Lifestyles

The show notes: [www.houseplanninghelp.com/149](http://www.houseplanninghelp.com/149)

**Intro:** Today's episode isn't about self build, but instead is looking at the bigger picture. Stories like this one about volume house builders just make me even more determined to work through all of the challenges – when the 'professionals' aren't doing their job properly it's important that we don't give up.

I started by asking Paul to tell me a little bit about his background.

**Paul:** Basically I've been doing airtightness testing on and off for about the last four or five years. I've been doing thermography. Before that I did a Masters degree at CAT in Architecture: Advanced Environmental and Energy Studies. And I've just sort of been interested in buildings and how energy efficient they are, or not as the case may be.

So I've been doing just all kinds of things: working with homeowners advising them on how they can improve their houses from a thermal point of view, looking at all kinds of things with thermography so damp issues, all those sorts of things.

I ended up getting into airtightness testing through meeting up with somebody who was doing it at the time. Well I went to visit somebody and it's kind of gone on from there. It's not necessarily what I would choose to do but I've ended up doing it. I suppose in the last 12 months or so I must have tested over 2000 houses.

**Ben:** What?! In 12 months? Is that even possible?

**Paul:** Yes, it's not about quality it's about quantity. So you're going round, some days I've done perhaps 15/16 plots on seven or eight different sites scattered all over the place. So you're literally you're in, you test it, you're out, next one.

Ben: But are there some controls that you have to set up to do a good test? I've been on a few airtightness tests and generally they seem to take a really long time. I don't know whether it's trying to work out where some of these leaks are and how to improve it, but it's not just a quick in and out job.

Paul: If you're doing it properly, yes. When time has permitted I've spent maybe two, even three hours on a plot identifying where the air leakage is, working with the builder to seal up the leaks.

But when you get to that point, if you're failing and you're getting leakage underneath your skirting boards, under baths, under kitchen units, it's all behind the plaster board so the house, it doesn't matter what you do to it at that stage, you're never going to make it an airtight house. All you're doing is effectively bodging to get it through an air test.

And if you're getting air flowing out from under your skirting boards, while you're running your fan you're effectively pulling that down from the roof void behind the walls, behind the dry lining, and into the building itself.

The dry lining should be what they call solid dab, so it should be fully sealed all the way round the tops, around all electrical outlets, and sort of each board should be sealed sort of along the top sides, along the bottom. Invariably it never is. It's never done like that.

I've heard cases where the dry liners have actually been pulled up by their management saying they've been using too much plaster to stick the boards onto the walls. Whereas in actual fact they're not using anywhere near enough. They should be putting what they call a solid dab all the way round which is specified by the builders themselves, specified by NHBC and I think the Building Regulations as well specify this. But it's never done.

Once the boards have been put on the walls you can't see it unless you use thermography. With thermography you get a thermal bridge where the plaster is and you can see where the dots and dabs are. And I've been to a number of houses, not through my employment but sort of working privately, where I've gone around with thermography and you can see that it's not solid dabbled all the way around.

There's one house I went to, it was quite a particularly windy day, and the wind was getting in through the eaves and was effectively blowing down behind the dry lining, you could see streaks of cold

on the walls. And this is standard. This is not one or two houses, it's all of them. It's all of the houses that are going up at the moment. There's thousands of them. Like I say I've tested at least 2000 in the last 12 months or so and out of those I would say none of them were really properly airtight.

Ben: Now this must come back to a few issues. On this podcast we generally deal with very high performance homes, Passivhauses, we're always talking about that so we get into the routine of this. But I thought this podcast would be interesting because it's just focussing us on the bigger issue and why we're going down this route of self build. Just reminding us of what some of the bigger developers get away with.

So let's go into some detail here. Some of the companies, we don't have to name them, but when you go in on these jobs, presumably you're trying to pass these houses. That's what you're always trying to do isn't it?

Paul: Yes. It's all about passing. It's nothing to do with making the building efficient or anything like that. It's just to do with ticking a box. The builders need a pass so they can get their CMLs and they can sell it. Without that pass they can't do it. And it doesn't matter how good or how bad the building is, it will pass eventually. I find this so frustrating.

As an example there's one house that I went to, it's standard practice to cut out all the mastic around the skirting boards after the air test has been done.

And I went into one building, probably eight months ago, something like that, and I tested it one day and it failed. And it was failing because there was no mastic around any of the skirtings anywhere in the house.

So I told the builder, right you're going to have to mastic all of this, I'll have to come back in tomorrow and we'll get a pass on it. I knew that it was never going to be an airtight house, it was never going to be an energy efficient house, but my job was to go in there and help them to get a pass on it.

So I turned up the next day. They were expecting me first thing in the morning but I didn't actually get there until early afternoon. By the time I got in there they had gone round everywhere and sealed it with mastic, but the carpet fitters had come in before I got there and had cut it all out. So I tested it again, it failed, same as it did the

day before. I think it was the last job of the day. So a builder came in and mastic'd all the skirtings again. I tested it. We passed it. While I was packing my gear away they were cutting it back out again. And this is not a one off. This is standard practice on every single house I've ever been to.

Ben: Why would they cut out the mastic? I can understand if you needed to for carpeting or whatever, but I don't understand why you would cut it out. What's the purpose?

Paul: It's purely because the carpet fitters don't like to fit the carpets when it's in there. But also on a lot of social housing I've been to as well, before they've accepted the house from the builder so they said can you cut this mastic out because it doesn't look very nice.

Ben: What, so is it ruining the paintwork or I can't visualise...

Paul: It's been put on there purely really to get it through an air test. If you weren't air testing it they wouldn't do it.

Ben: To Building Regulations we're talking about? Not even anything special?

Paul: To Building Regulations yes. No. No. So they'll go round, they'll mastic it purely to get it through an air test but it does look a bit messy because they go in there, they literally just throw this stuff on there just to seal the skirtings up so they can get an air test pass on it. And once we've finished they come in and cut it all out again. It happens on pretty much every house I've ever been to.

Ben: When there is no mastic there, what are some of the readings? How much below Building Regulations are they?

Paul: A long way. I mean say your air test target is 5, which is basically five air changes per hour, you might get 8, 8.5 with no mastic in there. You put the mastic in there you might get it down to 4.9, 4.95 so you're just below that 5 and then you cut it all back out again you're back up to an 8 again. So it's almost like you've got four bald tyres on your car, you need an MOT so you go and put four brand new tyres on. You take it down and get it MOT'd. As soon as it's MOT'd you put the old tyres back on again. It's that kind of scenario.

Ben: Have you ever tried to raise this? I'm sure the answer is yes, but how have you tried to do it and what's been the response and in

different places too, because one builder might be different to the next?

Paul: Yes I have. I mean I'm not going there to test it and pass it. I want to go there and try and advise people on how they can make a building properly airtight.

On one site that I went to, I was going there on a fairly regular basis, I think their target was 7. On several of their houses we were getting above 7 and I was spending a lot of time with them showing them where all the leaks were so they could come in and seal these areas up.

And I took the site manager aside and said right, have you got a house that hasn't been boarded yet, hasn't got the dry lining on the walls yet? Let's have a walk round it. So we walked round it and I showed him where all these air paths were, where all the issues were.

And I said to him basically I said just seal everything you can before the walls are boarded, put your ceilings in, seal all around the perimeter of the ceiling and every possible penetration through that ceiling. I said just do that, board it out as normal, but don't do any other sealing. And I said and let's see what happens. I said to him if it fails I'll work with you and get it passed.

So I tested it and we got to something like 3.12, from normally getting about 8, 8.5. Purely by doing some proper sealing before the walls were boarded out. He was absolutely amazed and said I've never had an air test result anywhere near that. And they rolled this out over the rest of the site and I never failed another house.

There was another development, same builder but a different place, and I think I probably tested on about three or four visits, I tested and failed about ten houses. And the first time I went there I explained to them about exactly the same thing, about sealing the ceilings before the walls are boarded and every other penetration through that ceiling. And they kept saying we don't have time to do that, we've never had to do this before.

After I'd been there about three or four times, failed some more houses, they turned round to me and said right, what have we got to do to get these passed because we can't keep failing these houses. I said to them exactly what I told you the first time I came here.

So I worked with them. They arranged a meeting with me and the dry liners. I explained all of these issues to them. Almost immediately once the next lot of houses came round we were getting far better results. We were getting down to between 3 and 4, whereas before we were getting 7 and above. And one of the guys actually said to me one day, you know what, he said since we've been doing what you said these houses feel warmer, because we go home at the end of the day, we turn the heating off, and normally you come in the next day and the house is cold. But since we've been sealing these tops up you come back in the next day and it actually feels warm still. I said you're eliminating this air path, you're eliminating this heat from rising through conduction and convection in the void behind the plaster board. And so they carried on doing the same thing after that and never had any more problems with it.

And this is what I try and explain to people every time I go to a site. Some turn round and say we've never had to do that before, we've sealed the skirtings we shouldn't have to do anything else. They're not interested. Others are like well I've never even thought of that and they take it on board, and again they're getting the same thing, they're getting much better results than they had before.

But there seems to be a total lack of understanding about what airtightness is about, how to make a building airtight. There's no training involved, it's literally just make this house airtight. The easiest thing to do is to find out where the leaks are and seal those leaks up, once the house has been built but you've just got this void behind the plasterboard that is just with free air flowing through it. So unless you eliminate that you're never going to be able to retain the heat from the house as you're supposed to.

Ben: From that example, it sounded like you had people that would take on board your advice and those that wouldn't. But are we actually facing something tougher? It's the management, you can design these buildings, as we talked about earlier, Passivhaus gets down to very low air leakage in a building and you've introduced ventilation. So we know there are better ways of doing it, but is that really where the issue is, at the very top with people that you might not ever meet?

Paul: I don't know. A lot of it as well is down to speed because these houses they're literally throwing them up. They're on such tight schedules that they don't have time to spend.

Ben: Why? Why are they on tight schedules?

Paul: Because they're just desperate to get these houses built and sold to meet all their targets. They might on a big development, I don't know, 500 or 600 houses or more, they might say right we've got to have eight houses out per month. So they're literally throwing these houses up to finish eight houses each month. And the guys that are working on these buildings that they turn around and say we don't have time to do anything, we're literally just throwing these things up, I wouldn't buy one if I was going to buy a new house. And when the guys that are building them turn round and say I wouldn't buy one, then there's something seriously wrong somewhere.

But I think also the design of these houses, you're designing in a void within the build up of the wall construction and that void I've seen with thermography, when you get a strong wind blowing, can blow behind this plasterboard and that is effectively sucking all your heat out.

So the design of them I think is wrong. If it's down to me I would ban dry lining completely and go back to the old solid plaster system because you're sealing the walls up, you're eliminating that void. If you're doing a SAP calculation for your u-values, putting in a void and dry lining gives you a high u-value rating. But if your heat is going upwards instead of through the building then you're kind of falsifying that u-value reading by not constructing it properly. But eliminating that void by going for a solid wet plaster system you're going to make a far better, more energy efficient house.

And if you want to increase your u-value on your wall, make the cavity a little bit bigger and put a little bit more insulation in there or something like that. But it's almost like a sticking plaster approach. It's quick, it's cheap and it's easy to do dry lining but it's not effective, it's not energy efficient and it's horrible!

Ben: So does this leave you in a difficult position? Is it not very rewarding working in an area where you're constantly feeling that you're chasing to improve and to make these better?

Paul: I find it very, very frustrating. Like I say I kind of landed in air testing, it wasn't something I wanted to do.

Ben: So do you have a construction background for years and years or is it only in this last five years?

Paul: No, I'm an electrician by trade but I've never really worked as an electrician. I've worked as a multi-skilled maintenance engineer for

years. I worked in a car factory as a maintenance electrician. And then I was a boiler engineer for about ten years working on ships, oil rigs, hospitals, factories, all kinds of things repairing a very specialised type of boiler.

I came out of that and did a little bit of building work for a while, building maintenance and repairs. So I got a good understanding of how buildings go together but it's I suppose as time has rolled on I've been looking at buildings, got into energy efficiency, and realised that we're not really building efficient houses.

I did a Masters degree at CAT which really gave me a much deeper understanding of what you're trying to do when you're building a building.

I bought myself a thermal imaging camera and I've been going round sort of working with community groups, advising people on how they can improve their houses by finding where the cold areas are, where there's missing insulation and devising solutions to remedy these things and improve the buildings.

I couldn't make enough money out of doing that to make a living so I was literally hand to mouth. So I needed to get a more stable income and when I put my CV out there all that came back was air testing because it was on my CV. There's lots of other things on my CV but this little line said air testing and all I got was agents phoning me up saying oh I've got a job as an air tester.

So I took a job with one company, I worked with them for about seven months or so and they trained me up part 1 thermography because I'd been using my camera without any qualifications but kind of really gaining an understanding. So using the camera, finding issues then poking around to find out what I was actually seeing and what I thought I was seeing. So I had a very good understanding of how it worked.

And then I was offered another job which was about a 25% pay rise so I went to a different company, and that was just purely air testing and I right from the start I was so frustrated because it was all about make sure, keep the customer happy, they're paying your wages at the end of the day and they need a pass on these houses so they can sell them on. So my job was there to test them and help them get a pass.

And I got pulled up as well a lot of times for saying too much to them. For saying you've got to be doing it like this, you've got to be

doing it like that. I suppose maybe I was being a little bit forceful but the frustrations of knowing what these issues are, trying to get the message across, trying to get people to change their ways, was very very difficult. Because I know a lot about these buildings, I can't just go in there, test it, pass it and go home be happy. I was going home at the end of the day thinking I felt like a fraud basically, going round passing these houses.

And eventually I was sacked for writing a report on a few houses that were one of my company's biggest clients. But these houses were so bad that I couldn't not write this report. When I went round doing thermography, had a poke around with them, insulation that had fallen out of the roof, missing insulation, so many holes and areas of air leakage around windows where the air was just blowing in behind the plaster board and you could see it on the walls, on ceilings, everywhere, this flowing air. I had to write this report on it and eventually it got back to my employer. I told them about it anyway and, from what I can make out, the builder told them to get rid of me because they didn't like what I'd said about their buildings!

Ben: So this is you trying to put the best advice on this building and it's just backfired on you?

Paul: Yes, basically. But I think had they not sacked me I would have quit anyway because I got to the point where I just couldn't do it anymore. I just felt like a total fraud.

Ben: So where does this leave you? In terms of what you've learnt about volume build houses, are there any other insights? Do you see it ever changing?

Paul: I don't know. I've had people say it's improving, there's a lot of improvements being made. I haven't seen any improvements.

I was talking to a guy who was a customer care manager for a big builder and he was sacked because he was spending too much money putting people's houses right after they hadn't been built properly. And he said he's been working in the industry for about 15 years and he has never seen it so bad. So this is at the moment. It's always been bad but at the moment it's just terrible. He said he, again if he hadn't been sacked he'd have walked out.

Ben: I've seen a lot of negative press around these volume house builders, yet they continue to sell their products. So why, is my question to you?

Paul: I've absolutely no idea. They're building these houses, I suppose they're putting a lot of, they're selling dreams, they're selling these houses, some excellent marketing and all these kinds of things. And people are buying into that dream, but once they've bought the house they're finding it's not what it was supposed to be.

There's so many people that are frustrated with their brand new houses that I just feel that something needs to be done. That the house builders need to be brought into account and made to do things better. Do them properly.

I would say that the house types that they're building now are no longer fit for purpose with our increasing energy efficiency demands, but the speed they're having to put these houses up to meet their targets, I don't know who sets these targets or anything like this. Government said they want a million houses built by 2020 and we're well behind that schedule from what I gather. So they're kind of increasing the pressures on the builders to deliver these million houses by 2020, but they're not delivering a quality product. If they were cars they wouldn't be fit to go on the road. That's the only way I can describe it.

Ben: If we're forced into a situation, perhaps just geographically where we live that this is the only option, is there anything we can do ourselves to check the houses before we buy or as part of the agreement to buy?

Paul: I would think get a surveyor in that really knows what they're looking for. Most surveyors will come in and do a snagging survey and looking at paintwork and making sure things are structurally sound, all these kinds of things.

But for an energy efficiency point of view, if you went in there with say thermography or even have the air test as an independent thing, it's supposed to be independent now, but the trouble is the builder pays for it so the builders effectively own the compliance companies.

If the air test was done by an independent surveyor who is paid for by the potential purchaser, that might be a step in the right direction. And if the air test fails, it should be a one test, if it fails, if it's down to me I'd say if it fails you've got to pull the house down and start again. But if people started having surveyors doing the air tests, if it fails and the surveyor turns round and says well this has failed an air test, it's got missing insulation, I wouldn't buy it, then

maybe that's got to put more pressure on the builders to actually do it right. I don't know.

Or if legislation is put in there, Building Regulations are tightened up and things have to be done to the letter of Building Regulations, not an interpretation which seems to be how it's done at the moment.

How we can improve things? I really don't know. I've been thinking about this for a long time, pulling my hair out, gone grey and everything else!

Ben: It's alright Paul. Well I wish you luck. It sounds like you don't really want to get back to that air testing, although it also sounds like you enjoy all the energy efficiency and looking at better ways.

Paul: I do, yeah. I know how we can make energy efficient houses, it's just that none of the main builders seem to be doing it. They just seem to be throwing up boxes and selling them. If I could work with these builders and advise them on how they can make them properly energy efficient then yes I think I'd be quite happy with that but at the moment I'm not seeing any of that!

Ben: Paul, thank you very much.

Paul: Thank you.