



BUILDPASS

12 STEPS TO AIRTIGHTNESS

The stakes are changing...

New building standards and regulations mean that in order to efficiently and significantly deliver buildings with the prime levels of airtightness, the UK construction industry needs to adapt.

It's no longer a simple process. Without development in the way the industry works, more and more contractors will come into substantial costs and delays when they realise their build doesn't line up with airtightness standards.

That's why we have rounded up our own 12 step process to support you in your approach and consideration of air leakage in your new or refurbished development.

- 1 What's your target?
- 2 What is your air barrier strategy?
- 3 Design your air barrier drawings
- 4 Define the specifics for airtightness
- 5 Complete an airtightness design review
- 6 Carry out a design workshop
- 7 Employ airtightness champions
- 8 Cross off your air barrier delivery checklist
- 9 Take a site leakage audit
- 10 Time for the preliminary testing!
- 11 Complete your acceptance testing
- 12 Don't forget the post-completion review



Right, that seems a lot, doesn't it?

Let's dig a little deeper into each step and make your airtightness journey as effective and straightforward as possible.



STEP
1 **What's your target?**

There are a few ways that this may be defined; it could be described to you as an air permeability or air change rate, or even both.

Depending on the type of build you are working on will decipher the rate that you need to adhere to. Components such as size, the type of

ventilation in the development and the purpose of the build will all play a role.

The below tables provide an initial insight into the best practice levels of airtightness you should be aiming for when taking into account the above factors and more:

| Ventilation Type | Best Practice Air Permeability Target (m ³ /hr/m ² @ 50 Pa) |
|---|---|
| Trickle ventilators and/or intermittent extract fans | 3.0 – 5.0 |
| Passive stack ventilation systems | 3.0 – 5.0 |
| Continuous mechanical ventilation | 2.0 – 4.0 |
| Full mechanical ventilation with heat recovery (MVHR) systems | 1.0 – 2.0 |

| Building Type | Air Permeability Target (m ³ /hr/m ² @ 50 Pa) | |
|---------------------------------------|---|---------------|
| | Normal Practice | Best Practice |
| Naturally ventilated offices | 7.0 | 3.0 |
| Mixed mode ventilated offices | 5.0 | 2.5 |
| Air conditioned or low-energy offices | 5.0 | 2.0 |
| Factories and warehouses | 6.0 | 2.0 |
| Superstores | 5.0 | 1.0 |
| Schools | 9.0 | 3.0 |
| Schools | 9.0 | 5.0 |
| Museum & archival storage | 1.5 | 1.0 |
| Cold storage | 0.35 | 0.2 |



We always advise to aim for best practice rather than 'normal practice'.

While this has certainly become more difficult as targets have grown in difficulty (particularly as the Passivhaus standard has been seen as more common practice), it will prepare you for any changes in the future and ensure your development maintains the highest, most aspirational levels of airtightness. straightforward as possible.

STEP 2 What is your air barrier strategy?

Essentially, your air barrier strategy is the method you plan to enforce to achieve your airtightness target. The focus should be on your fabric choices within the building.

These systems of materials should be designed in a way that maintains the airflow between a conditioned and unconditioned space. Your air barrier strategy therefore outlines your primary air enclosure boundary that will draw a line between indoor and outdoor air.

Some typical examples of air barrier system strategies include:



Images courtesy of Proctor Group



STEP
3

Design your air barrier drawings

You've got the plans in your head for your air barrier strategy - fantastic! Now you need to get those ideas down onto paper.

You must be able to show the different sections and details of your plan, as well as a clear set of notes pinpointing the materials forming the air barrier in each specific location.

Your drawings should show any key interfaces, penetrations, complicated sealing details and potentially a 3D visualisation. Rest assured, you won't be expected to complete this on your own (unless you are a drawing maestro!). Your project architect or an air leakage specialist will help you put the document together, highlighting any of the potential weakness spots that you can then form a strong solution on.

STEP
4

Define the specifics for airtightness

There are five key points that your project specifications must address with regards to the building airtightness.

- 1 Your air leakage target and the air barrier strategy
- 2 How you will adjust the overall work plan to contribute to the building airtightness target
- 3 Your air barrier drawings, an air leakage design checklist, site air leakage audits and a preliminary set of testing results
- 4 What your airtightness champions will be required to do to help you achieve your air leakage target
- 5 Ongoing responsibilities for the project, with particular focus on the plan of action if the result of the air leakage test isn't high enough



Armed with these core notes...

...you're ready to move onto the next step.

STEP 5 Complete an airtightness design review

At this point, it's likely you'll want to bring in an airtightness specialist. They will carry out a thorough review, assessing all the details that contribute to the air barrier.

This comprehensive review will explore any potential issues and weaknesses, producing a set of recommendations to improve the predicted levels of air leakage before the official assessment.

STEP 6 Carry out a design workshop

Your airtightness specialist should then hold a design review in conjunction with the design team on the development. It is here you can start to discuss not only the most impactful, but cost effective ways to fix problems uncovered in the review.

Ideally, you will leave with a clear action plan that is both achievable and won't cost you the earth to finalise. The end goal is to now hold a verified airtightness design.

STEP 7 Employ airtightness champions

Although not a necessity, there are major benefits of this step; particularly for those hoping to achieve Passivhaus accreditation.

In a nutshell, an airtightness champion is there to keep a close eye and be constantly aware of your development's air barrier plane. It is their responsibility to ensure all work carried out contributes to keeping the air barrier plane tough and fully effective.

This is a fantastic way of guaranteeing everyone on site stays aware of how crucial it is to maintain the airtight barrier across the build. The champion will report any issues back to the design team and project manager, remaining on site throughout the build.



Page 11 of the Passivhaus Airtightness Guide...

...provides a brilliant set of responsibilities for your champion.



STEP
8 **Cross off your air barrier delivery checklist**

Now it's time for some actual action. Your airtightness champion should design a checklist for leakage, taking a close look at the core aspects of the building process to see whether all sealing elements are working correctly.

It's a good idea to take photographs of each area to refer back to in the future and gain a realistic overview of the continual work.

You will want to be sure that every nook and cranny is addressed at this stage in order to make any necessary changes and adjustments.



STEP 9 Take a site leakage audit

These audits may happen several times throughout the project. You'll complete them by physically walking around the site and identifying actual and potential issues that are (or could) influence air leakage.

By carrying these audits out throughout the development, it means adjustments or additional work can be easily slotted in, rather than massively impacting the build once it is already complete. The amount of audits you carry out will depend on the scale of your project, but we recommend - whatever the size - you complete the final audit a week before the acceptance testing.



STEP 10 Time for the preliminary testing!

This is a biggie - but, if you want to pass your air test first time, it is incredibly valuable.

A pre-test is beneficial both to give you confidence for your official test, and also identify any final problems that need to be rectified.

You can - and should - carry out a preliminary test as soon as the build is weatherproof and the primary air barrier is pretty much complete. This is something your airtightness champion can carry out for you.

Think of it like a mock exam - something that will give you adequate time to fix any issues that arise and put yourself in the best possible position when it comes to the "real thing".



STEP 11 Complete your acceptance testing

Duh duh duh... it's the big day!

To complete your acceptance testing, your build needs to be virtually finished; the only temporary sealing in place should be to cut out ventilation systems so that the result is as realistic as possible.

The test can only be completed by a specialist contractor. The level of testing required will differ based on the size and complexity of your building.

LEVEL 1 Airtightness testing for single dwellings or other small non-dwellings up to 4000m³ gross envelope volume. This will often be tested with a single blower door fan.

LEVEL 2 For simple and complex buildings larger than 4000m³ gross envelope volume. This doesn't include larger, complex, high rise (LCHR) buildings, and phased zonal buildings.

LEVEL 3 Mostly for LCHR buildings, phased and zonal handover buildings.



Should you dot all the i's and cross all the t's, you'll pass the test and be handed an Air Leakage Certificate!

This is your golden ticket to prove that you have met all standards and regulations, providing a building with exceptional airtightness levels.

STEP
12

Don't forget the post-completion review

Before you get too excited, remember your post-completion review! It's advantageous to look at what did and didn't work so that you and your entire team are better equipped for projects in the future.



Carry out the review as part of an open discussion.

What can you learn from the entire experience?

TO FIND OUT MORE ABOUT THE PROCESS
OF AIRTIGHTNESS TESTS
GET IN TOUCH WITH THE BUILDPASS TEAM:

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