

Air Tightness Retrofit

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Killeshin Hotel , Portlaoise – 1st April 2011

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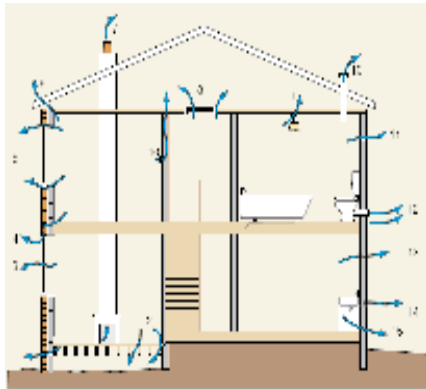
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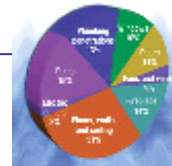
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Typical Air Leakage Paths



1. Under floor ventilator grilles.
2. Gaps in and around suspended timber floors.
3. Leaky windows or doors.
4. Pathways through floor/ceiling voids into cavity walls and then to the outside.
5. Gaps around windows.
6. Gaps at the ceiling-to-wall joint at the eaves.
7. Open chimneys.
8. Gaps around loft hatches.
9. Service penetrations through ceilings.
10. Vents penetrating the ceiling/roof.
11. Bathroom wall vent or extract fan.
12. Gaps around bathroom waste pipes.
13. Kitchen wall vent or extractor fan.
14. Gaps around kitchen waste pipes.
15. Gaps around floor-to-wall joints.
16. In and around electrical fittings in hollow walls.



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Typical Air Leakage Paths

Design Ventilation – Ventilation features intentionally specified and provided in the dwelling (Chimney, flue, fans, vents)

Pressurisation test carried out with all designed ventilation openings sealed up and inoperative.

Structural Infiltration - Uncontrolled entry of fresh air into a dwelling through air leakage paths in the building –

Impact on BER cannot be predicted – Air tightness test required.
(exception for DEAP input is draughtsealing of Windows and Doors)

Ventilation Heatloss in DEAP is the sum of Designed ventilation features and Structural infiltration with an allowance for the Ventilation type and Sheltering.

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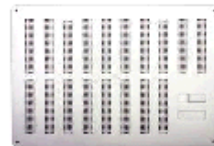
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**Where to start –
DEAP input without test 1/3**

Ventilation grilles (10m³/hr each if non-controllable)

Use Controllable 'Hit & Miss' grilles (not where open fire, boiler)
Not included in DEAP "if controllable vents in a room can be closed
to less than 3500mm² (total)"

~6% improvement in DEAP

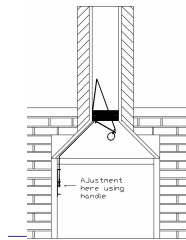


**Where to start –
DEAP input without test 2/3**

Chimney opening –

Turn chimney(>200mmØ, 40m³/hr) into a flue (<200mmØ 20m³/hr)
~3-4% improvement in DEAP (+ stove efficiency~8-9%)

- Chimney Damper
- Closed-in stove



**Where to start –
DEAP input without test 3/3**

Windows & Doors

~3-6% improvement in DEAP

2 factors:

1. Between Wall and Frame
2. Between Window/door opening and Frame

Infiltration under
windowsill



Smoke travelling through to outside



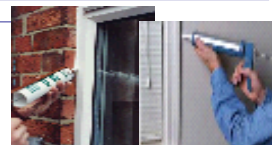
Rubber Seals have gaps



**Where to start –
DEAP input without test 3/3**

Draughtseal Windows & Doors

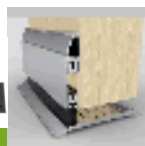
- **Mastic** around frame/wall perimeter
 - Inside and outside
 - Underneath cill



Closing mechanisms replaced/adjusted (if necessary)

- **Weather-stripping** - PVC Foam tape door & window openings

- **Letterbox & door bottom seal**



Other Measures 1/4

Problem:

Gaps around loft hatches.

Solution:

Foam seal

Latches



Other Measures 2/4

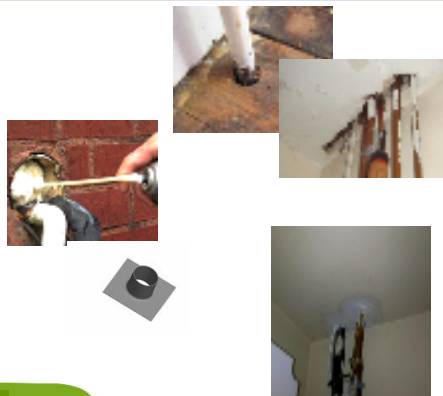
Problem:

- Pipe entries - Gaps around bathroom waste pipes.
- Gaps around kitchen waste pipes.
- Central heating pipes through floor and ceiling

Solution:

- Foam Sealant around service pipe through an external wall
- Preformed Top Hat Pipe Collar
- Mastic or plaster around pipe entries

It may be necessary to remove baths covers, kitchen units, boxing around service pipes, washing machines, etc, to identify leaks and gain access to pipes.



Other Measures 3/4

Problem:

- In and around electrical fittings in ceiling & hollow walls.

Solution:

- Proprietary Mastic around the edges of the wall plate.
- Proprietary Mastic or expanding foam at fuse box. (N.B. to ensure it does not degrade electric wires)
- Proprietary tape around wires behind ceiling rose
- Draughtproofing gaskets that fit behind the cover plates of electrical outlets and lighting fixtures
- Downlighters draught proofing in attic (difficult in intermediate floors)



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Other Measures 4/4

Problem:

- Pathways through floor/ceiling voids into cavity walls and then to the outside.
- Gaps around floor-to-wall joints.
- Gaps in and around suspended timber floors.

Solution:

Mastic or proprietary tape around the perimeter – up to or underneath skirting board

Timber floor – boards are usually caulked - (otherwise plywood sheeting, or repair gaps)

Carpet underlay up to or underneath the skirting



Perimeter sealed with mastic



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Other points

- Full fill cavity wall insulation reduces infiltration through masonry and leakage points
- Wet plastering results in lower infiltration than plaster board
- Fireplace surround can be another source of leakage
- Boiler flue pipes where they pass through the external wall/ceiling should be sealed (Note the heat resistance of the sealing material).
- If some areas are sealed, draughts from other areas may be exacerbated

Conclusions

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- You will generally find a consistent pattern of air infiltration problems
 - A standard operating procedure should be established for different house types/targets based on carrying out at least a few 'test' air permeability tests.
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- In practice 3 - 4ach (structural infiltration) can be achieved with ~€300 of materials and ½ -1 day labour - [Vs. typical 10ach DEAP default]
 - Using an Air permeability test following the above structural infiltration measures an additional 5-7% improvement above default Structural Infiltration can be achieved.
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Local Authority Social Housing
Workshop on upgrading and Building Energy Rating



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