



Proposal/Contract no.: FP6-503186

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**DEMOHOUSE**

Design and Management Options for improving the energy performance of Housing

SPECIFIC TARGETED RESEARCH OR INNOVATION PROJECT

Thematic Priority 6

### **Deliverable 5: Securing of air tightness in building projects**

Due date of deliverable: October 18<sup>th</sup>, 2005

Actual submission date: April 25<sup>st</sup>, 2006

Start date of project: October 18<sup>th</sup>, 2005

Duration: 4 years

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**Executive Summary**

The EU- Demohouse project is a specific targeted research and innovation project supported by the EU – 6<sup>th</sup> Framework programme. It started in October 2004 and is ongoing for 4 years until October 2008. Demohouse is here an acronym for Design and Management Options for Improving the Energy Performance of Housing. ECN from Holland is coordinator and there are realised demonstration projects in 5 countries – Denmark, Austria, Hungary, Spain and Greece, with main focus on housing renovation.

This report is concerned with air tightness in building renovations. Measures for air tightness in various building elements (floor, roof, external wall, installation of windows) are presented as well as connection of construction elements. The method of the Blower Door test is described.

With the Blower Door Test it is possible to measure the air tightness of a building and identify possible sources of air leaks in the construction. A Blower Door Test, which exists as an international standard, is proposed to be carried out as soon as the first phase of the building project is concluded. This allows to get indications of where the leaks are so possible problems can be rectified early. After improvements are made, air tightness should be checked with another Blower Door Test. Finally, another test should be performed when the building is completed. In order to avoid leaks when dealing with installations, i.e. pipes and ducts, it is recommended to be extra careful and assure tightness against water.

To ensure good air tightness the exterior of the building must be wind-tight. This is implemented in connection with insulation and external cladding materials. In this way the cold outside air is prevented from entering the building. Should the structure is not air tight, there is a difference in air pressure and consequently the insulating ability of the insulation material is minimised, resulting in extra heat loss. The internal side of the building must also be air-tight. This is ensured with air tightness of the construction inner layers. In this way the humid indoor air is prevented from penetrating the external construction. The vapour seal must be placed on the warm side of the construction to avoid condensation on the colder side of construction.

Air tightness measures and blower door tests were undertaken in all DEMOHOUSE renovation projects. The Blower Door Test revealed the air leakage of the construction. Smoke detectors were used to identify points in construction of air leakage. Achieving very good air tightness proved to be quite challenging, confirming the fact that testing the construction with several phases of blower door test, as recommended during construction, before and after completion of the building.