

# Accepted Manuscript

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PII: S0360-1323(18)30098-2

DOI: [10.1016/j.buildenv.2018.02.026](https://doi.org/10.1016/j.buildenv.2018.02.026)

Reference: BAE 5310

To appear in: *Building and Environment*

Received Date: 7 October 2017

Revised Date: 19 February 2018

Accepted Date: 20 February 2018

Please cite this article as: Tanyer AM, Tavukcuoglu A, Bekboliev M, Assessing the airtightness performance of container houses in relation to its effect on energy efficiency, *Building and Environment* (2018), doi: 10.1016/j.buildenv.2018.02.026.

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# ASSESSING THE AIRTIGHTNESS PERFORMANCE OF CONTAINER HOUSES IN RELATION TO ITS EFFECT ON ENERGY EFFICIENCY

## ABSTRACT

This study examines the airtightness performance of four types of commonly-used container houses (CHs) and its impact on their energy efficiency. One of the CHs was treated by sealing all junctions inside the container envelope. The airtightness levels of unsealed and sealed CHs were measured by using the fan pressurization method. The interior surfaces of building envelope were scanned by thermal imaging in order to locate the areas suffering from air leakages and thermal failures. The annual energy consumptions of unsealed and sealed CHs for their heating were predicted by energy simulation analyses. The unsealed CHs have poor airtightness features while performing in Energy Rating B category. The junctions of those houses, especially where wall, slab and roof panels come together and the edges of the openings also suffer from air leakages, thermal bridges and condensation. Sealing the interior surfaces of junctions and edges improves the airtightness level considerably while heat loss and condensation problems at the junctions still continue. An 81% improvement in airtightness performance of the CH Type B provided a reduction of 9.3% in annual energy demand which is not enough to step up its Energy Rating category. The results indicate that airtight jointing is needed at junctions while the use of thermal breaks at junction details has vital importance to eliminate thermal failures and to improve energy efficiency performance of CHs. The combined use of Blower Test Method and Infrared Thermography is useful for non-destructive assessment of airtightness features of building envelopes.

**Keywords:** Airtightness; blower door test; container houses; energy efficiency; infrared thermography; in-situ examination

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