

# Air change rate test results in the Croatian and Hungarian border region.

Joint research project of Pécs (HU) and Osijek (CR) Universities supported by EU IPA scheme

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## I. INTRODUCTION

The aim of this paper is to present a summarized results of natural air change rate (ACH) tests of residential houses and rooms carried out under the management of Building Engineering Department of Pollack Mihály University of Pécs, HU in cooperation with Architecture Faculty of Josip Juraj Strossmayer University, Osijek, CR in 2013.

## II. BLOWER DOOR TESTS PERFORMED

Types of Blower-Door tests:

### A. Air Change Rate (ACH) test

“Type A test”: for testing the building ACH as is during normal use.

### B. Air Tightness test

“Type B test”: testing the air tightness of the building envelope. All purposely made openings of the envelope (e.g. vents, chimneys) had to be closed or tightened.

## III. PRESENTING THE HOUSES TESTED

The use of the buildings is mostly residential, detached houses and apartments apart from a few offices and classrooms in Hungary. In most of the cases the whole homes were tested plus in some cases a selected room too.

The structure of the buildings varies. The detached houses made of traditional brickwork construction while the apartments are in traditional as well as in prefabricated reinforced concrete blocks.

The year of the construction ranging from early 1900 to very recent years. The majority of the old ones are refurbished.

### A. Locations of the Croatian buildings

In Croatia there were ACH tests at total of 58 sites. This includes 47 sites at Osijek and 11 in the outskirts of the city.

### B. Locations of the Hungarian buildings

In Hungary, there were field test both ACH (Type A), and air tightness tests (Type B) at 33 locations of that 19 are in Pécs and 14 in smaller settlements in the Hungarian-Croatian border.

## IV. TEST RESULTS AT A GLANCE

When evaluating the data it is apparent that there is a significant dispersion of data in both countries. There are very high and very low ACH data too.

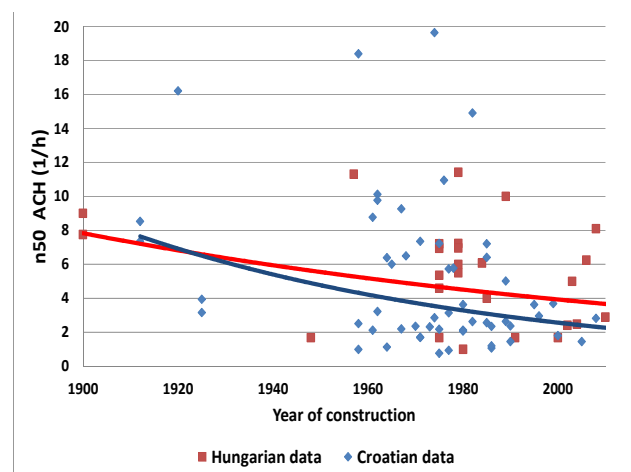


Fig. 1. n50 Blower Door “A-type” ACH test results in Croatia and in Hungary

As a result of the more and stricter energy requirements and introducing better and better windows the ACH number of buildings decreases as a function of construction year. As a consequence there are cases when the natural

ACH is even too low and it is not possible to meet the consistency protection, comfort and health care requirements without intentional ventilation.

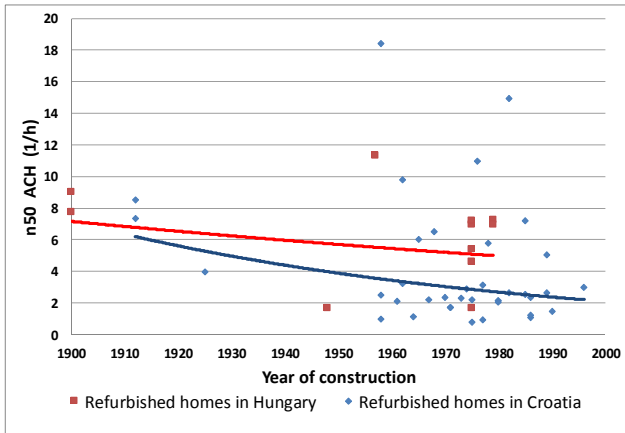


Fig. 2. n50 ACH test results of refurbished houses in Croatia and in Hungary

In Croatia not only the old, but several newer houses are refurbished as a consequence of the Balkan war in early nineties.

#### V. COMPARING THE TEST RESULTS FOR N50 ACH OF THE TWO COUNTRIES

The initial assumption was that air tightness and ACH values are similar in old buildings when construction technologies and cultural tradition are similar due to common history. That proved to be right.

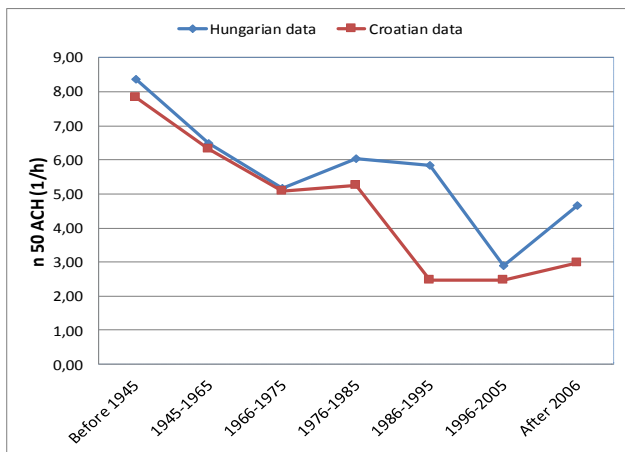


Fig. 3. Comparison of n50 Blower Door “A-type” ACH test result average values in Croatia and in Hungary

In the second part of the 20<sup>th</sup> Century the air tightness and ACH is different. It is less in the Croatian tested houses.

The time periods for averages were set according to significant changes in standards or usual construction technologies.

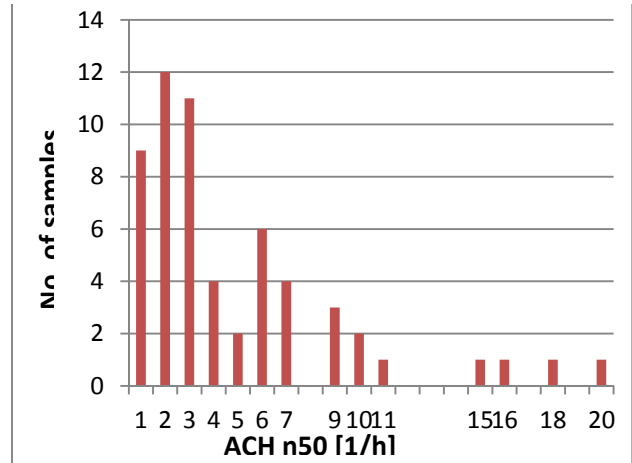


Fig. 4. Distribution of n50 ACH values in Croatia

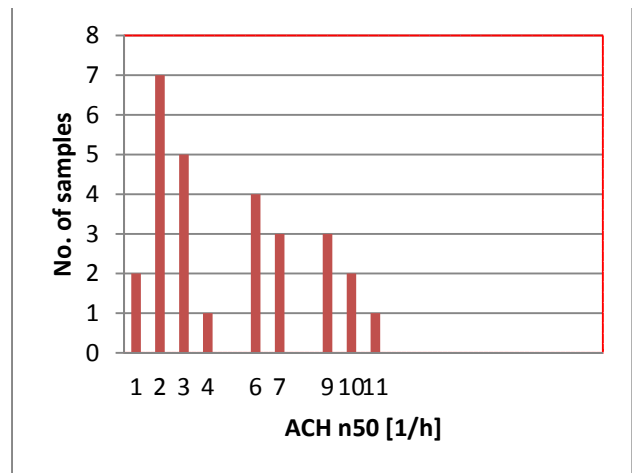


Fig. 5. Distribution of n50 ACH values in Hungary

#### ACKNOWLEDGMENT

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