Indoor climate study, Halifax, N.S. (preliminary report)

Robson, D. R.

Publisher's version / Version de l'éditeur:
https://doi.org/10.4224/20358885
Technical Note (National Research Council of Canada. Division of Building Research); no. TN-373, 1962-05-01

NATIONAL RESEARCH COUNCIL OF CANADA

DIVISION OF BUILDING RESEARCH

No. 373

TECHNICAL NOTE

NOT FOR PUBLICATION FOR INTERNAL USE

PREPARED BY D. R. Robson CHECKED BY DCT APPROVED BY NBH

DATE May 1962

PREPARED FOR Record Purposes

SUBJECT INDOOR CLIMATE STUDY, HALIFAX, N.S. (PRELIMINARY REPORT)

From 1 December, 1960 until 1 December, 1961, the Division of Building Research of the National Research Council conducted an indoor climate study of eleven houses in the Halifax metropolitan area. The houses chosen were of various types and ages: some were built with crawl spaces, some had conventional basements, one was slab-on-grade, and one was a split foyer house. The variety of houses in the study group provided a representative cross-section of house types in this area. In addition combustion efficiencies of furnaces in nine uninstrumented houses were determined.

For this study, it was necessary to keep continuous records of indoor temperatures and humidity, weekly records of burner and fan "on" time, fuel deliveries, analyses of combustion products and calculations of combustion efficiencies. An examination of the house was made also followed by the preparation of floor plans and the subsequent calculation of heat losses.

The relative humidity and temperatures were recorded on a continuous basis by means of a clock-driven drum chart with a hair element for registering changes in relative humidity, and a bimetal element for sensing changes in temperature. The instruments used (hygrothermographs) were calibrated frequently because the hair element cannot be relied upon to react consistently over a wide range of humidity. The recalibration was, therefore, carried out on a regular basis using an electrically aspirated psychrometer.

The fan and burner "on" time readings were made from small electric counters on a weekly basis. These counters were electrically connected across the burner and fan motor leads so that when the burner or fan was in operation, the counters recorded the time of operation. The time was totalized so that subtraction of one week's readings from the following week's readings gave the total time of operation for each week.

The analysis of burner combustion was carried out using a Dwyer Test Kit. This provided a measure of the carbon dioxide, the smoke, and the temperature of the flue gas. The combustion efficiency was calculated from these results. The measurements were made with the burner operation "as found" -- no adjustments were made to the burners.

The highest combustion efficiency calculated was 88 per cent, the lowest 55 per cent and the average 74 per cent.

Fuel consumption was calculated from the fuel delivery dates and the quantities recorded by the home owners. In some instances, with the owner's permission, records were obtained from the oil supplier.

For purposes of comparison, the square feet of floor area heated per 100 gallons of fuel oil per year was calculated for each house from the fuel records and the heated floor area of the house. The living habits of a family have a decided effect on this value, and it serves as a comparison of one house with another. The highest value obtained was 246 square feet per 100 gallons of fuel per year, the lowest 120 square feet, and the average 166 square feet.

An average weekly indoor humidity ratio for the eleven houses was calculated from the humidity records of each house. This is compared in graph form to the outdoor humidity ratio obtained from weather records (Fig. 1). It is interesting to note that the average indoor humidity ratio follows the same general curve as the outdoor humidity ratio.

The average indoor temperature of each house was calculated. The average for the eleven houses is shown in graph form with the average outdoor temperature (Fig. 2).

From this preliminary study it is possible to make some general observations:

1. The indoor relative humidities in houses in the Halifax area in winter are generally maintained at a satisfactory level.

2. In most instances furnace efficiencies can be considered "good" with two exceptions that would be classed as excellent.

3. In some instances the rated capacity of the furnace was substantially in excess of the maximum heat demand of the house.

4. The results from several of the houses demonstrate that increased ventilation by intentional opening of windows in order to limit relative humidity so as to avoid condensation problems can be accomplished without excessive fuel costs in well-constructed houses.

The interest shown by the owners of the houses involved in this study is very much appreciated. Without their co-operation this project would not have been possible.

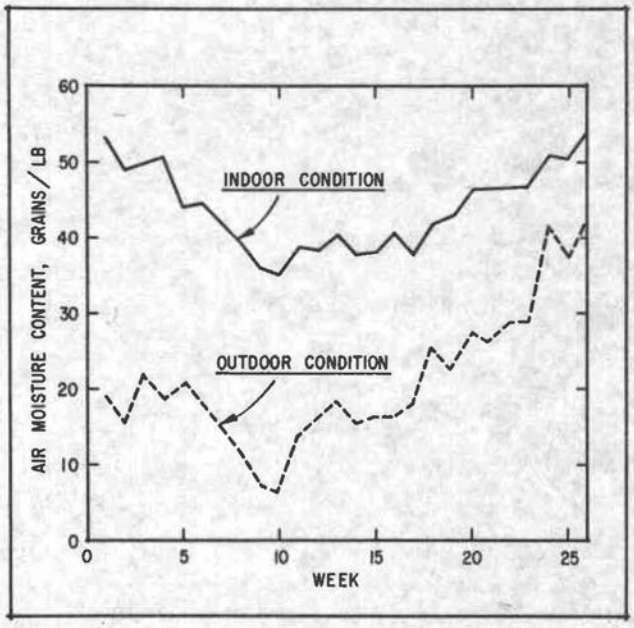

FIGURE 1
AIR MOISTURE CONTENT COMPARISON

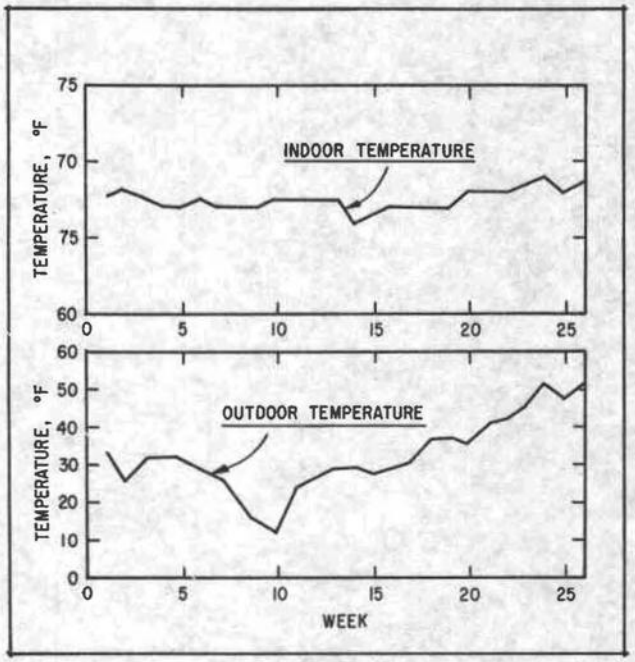

FIGURE 2
AIR TEMPERATURE COMPARISON

BR 2704