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"THE SHEFFIELD DEHUMIDIFICATION DEMONSTRATION PROJECT"

A PAPER PRESENTED AT THE 1988 COMBATING
CONDENSATION SYMPOSIUM

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CONDENSATION

Condensation dampness is a widespread complaint occurring in owner occupied, private rented and Local Authority housing stocks.

The effects of condensation can be so serious as to cause large areas of mould growth on walls and ceilings and rotting of clothing, carpeting and the building fabric itself.

A combination of factors cause condensation problems these include:- insufficient heating, poor ventilation and excessive moisture production within the home.

PREVIOUS WORK

The traditional cures for condensation are increasing ventilation and heating. Both of these measures lead to higher energy usage. Conventional dehumidifiers (ie. non advanced) have previously been used in domestic environments but tenants in Sheffield's Local Authority housing have largely rejected them due to high running costs, noise levels, ice build up and poor effectiveness particularly at low ambient temperatures.

Other remedies for condensation such as the upgrading of heating systems and the improvement of the thermal insulation to increase internal wall temperatures are effective, but the high cost involved means that it would be many years before funds were available for such work to be undertaken for all dwellings which require it.

The symptoms of condensation dampness may easily be removed by cleaning and redecorating but the mould and dampness soon return as the cause still remains hence this cannot be considered as a real cure.

As some of the housing stock of Sheffield City Council is seriously affected by condensation, the work being conducted by Sheffield City Polytechnic on the design of an advanced dehumidifier was noted with interest. During 1982/83 the Sheffield City Council funded work to produce four prototypes which were then tested in the laboratory and council dwellings during the winter period of 1983/84. The design/development and the small scale field trials were stages I and II of the Sheffield City Council's fight against condensation. Stage III is a large scale field trial over a longer period to demonstrate and confirm the effectiveness and efficiency in a spread of different conditions and situations. This stage III is the subject of this energy demonstration project.

PROJECT AIMS

The aims of the project are to demonstrate the effectiveness and the energy efficiency of the application of advanced dehumidification techniques to the alleviation and cure of problems associated with condensation dampness. This will be achieved by using advanced dehumidifiers to control moisture levels within the dwellings. Consequently the need for high ventilation rates and wasteful space heating, which are the traditional energy intensive cures, will be reduced. The economy and effectiveness will be demonstrated by the installation and monitoring of a large number of advanced dehumidifiers (approximately 100) in council dwellings over two winter periods.

SITE IDENTIFICATION

Initially the Housing Services of the Sheffield City Council suggested the Foxhill Estate in the City could be a suitable site. The Foxhill tenants association were then consulted and a series of meetings held in order to explain the ideas and aims behind the project. In the interest of the project these meetings were essential to confirm that dampness problems were due to condensation and discover whether support for the project would exist or not. Obviously tenant support was seen to be an important element of the project.

An added bonus is that part of the site which is not involved with the project is undergoing major refurbishment including substantial thermal upgrading. The refurbishment is partly due to these dwellings suffering from condensation dampness. Although not part of the project, note will be taken of the success of the work in curing condensation. As the refurbishment includes double glazing and draughtproofing, effectively sealing the home moisture levels and condensation may actually be increased.

SITE DESCRIPTION

The Foxhill Estate is built at Birley Edge, a high east facing hillside to the north of the City of Sheffield. The estate was completed in 1963.

The estate is a medium/low rise scheme comprising of 439 dwellings with 304 in the form of flats and maisonettes which are arranged in 3 or 4 storey split level blocks. The remaining 135 are two storey houses arranged in terraces and a small number of small bungalows for elderly people. The site is particularly suitable due to the diverse types of dwelling present in one area which combine ease of monitoring and a good comparison of different dwelling types.

IDENTIFICATION OF INDIVIDUAL DWELLINGS

After the site of the project had been identified, questionnaires were distributed to the individual households to obtain the names and addresses of the tenants who were willing to take part in the project. Other information was also requested on the questionnaire, this included, to what extent condensation was suffered, whether they were willing to have a dehumidifier and/or monitoring equipment in their home or not, numbers and ages of people living in the dwelling, the number of people in during the day time and also the methods of heating used in the dwellings.

A copy of the questionnaire is included in Annex I.

SURVEY AND INSTALLATION

Prior to installation two engineers familiar with the causes of condensation, its problems and dehumidification techniques visited each dwelling. The visit was to survey the dwelling for possible instrumentation and to determine the best position for the dehumidifier to be sited. The first choice site being the kitchen and the second being the hallway or any site presenting itself on inspection as being suitable. The dehumidifiers were installed shortly afterwards.

INSTRUMENTATION

Two different types of instruments were used these being electronic data loggers and thermohygrographs.

The electronic data loggers are very flexible in that they can measure up to 4 separate temperatures and the Relative Humidity as well as having an events channel which records the opening and closing of an electrical contact, however the last facility uses substantial amounts of memory.

The thermohygrographs are chart recorders which give a continuous trace of temperature and Relative Humidity.

There were 10 data loggers and 14 thermohygrographs used for monitoring.

MONITORING

Monitoring consisted of both quantitative and qualitative assessment.

The quantitative monitoring phase began by identifying the quantities to be measured as Relative Humidity, dry bulb temperature, electricity usage and water collected. Outside conditions for the period were obtained from the local weather station.

The thermohygrographs were located in various positions within each dwelling the majority being positioned in bedrooms as, except for bathrooms, these were the rooms most affected by condensation. Bathrooms were not monitored because the nature of their use would not give a meaningful general trend. Other thermohygrographs were positioned in dining rooms and on stairs landing.

The thermohygrographs were inspected weekly and their charts changed. On each visit the tenants were informally asked about the effect and general opinion of the dehumidifier together with any problems encountered.

The use of the data loggers was very similar to the thermohygrographs in that weekly visits were made. To obtain the data a portable computer was used to download the data from the logger onto a cassette tape. The data was subsequently reloaded into a desktop computer and transferred onto floppy disc for storage. One advantage of the data logger is that if the tenant is not at home the data is held in the logger and can then be collected at the next opportunity. This arrangement is acceptable in the short term, three to four weeks but delays longer than this cause problems in downloading the data.

The electricity consumption was measured by kWh meters and readings taken weekly. The water extracted by the unit was measured and recorded by the tenants on a daily basis.

The qualitative monitoring is important as the acceptance by tenants of the dehumidifier is essential. The qualitative monitoring does not only consider the effects, performance, conditions and mould growth but also includes the tenant's opinions of the dehumidifier.

The monitoring began with the initial questionnaire (Annex I) which was sent out when suitable test locations were being sought as these also questioned the extent to which condensation affected the dwelling.

An additional photographic record seemed appropriate for a comparison of conditions at a later date. The photographs were taken of different rooms and dwellings where condensation was present. The photographs show mould growth to various extents and traces of condensation which has run down the walls. The pictures taken after the dehumidifier was installed were to show that whether mould growth has been cured. In many situations this was the case as the tenant had cleaned and/or redecorated the affected area after the dehumidifier had been installed. The mould growth has not returned.

Some of the dwellings being monitored are due for refurbishment in October 1988. Some tenants gave this as a reason for not cleaning or decorating, indicating it was a waste of time or money. This was an unexpected reaction as it meant that they were prepared to tolerate the mould for up to 2 years rather than remedy the condition. Their experience in the past is that mould soon regrows after cleaning, in the absence of dehumidification.

A major part of qualitative assessment was by way of a questionnaire which each tenant was asked to complete after the winter monitoring period had finished. The questionnaire (Annex I), asked for the opinions of the tenant relating to the performance, effects and any general comments they wished to make.

CONCLUSIONS

The qualitative results show that the use of the advanced dehumidifier to ease the problems of condensation dampness is a practical and effective option. This is underlined by the high tenant support throughout the first winter period.

The questionnaires show clearly that many of the tenants thought the machine was very effective. In the early stages of the project many tenants expressed their surprise at the amounts of water extracted and the difference in conditions in their homes regarding the occurrence of condensation.

The demonstration of the effectiveness of advanced dehumidification techniques was one of the aims of the project. Considering the qualitative information only this seems to have been achieved. The quantitative results are, after processing, expected to confirm this effectiveness.

ANNEX I

1. Questionnaire for identification of locations to be used in the project.
2. Questionnaire of opinion and performance with covering letter.

Please tick the appropriate boxes.

1. Does your house suffer from dampness?

Yes Go to Question 2 No Go to Question 5

2. Where are there obvious signs of dampness?

Yes No

Walls	<input type="checkbox"/>	<input type="checkbox"/>
Floors	<input type="checkbox"/>	<input type="checkbox"/>
Ceilings	<input type="checkbox"/>	<input type="checkbox"/>
Windows	<input type="checkbox"/>	<input type="checkbox"/>
Furniture	<input type="checkbox"/>	<input type="checkbox"/>

3. Would you be willing to have a dehumidifier in your home for a trial period? (All running costs will be met by the Council)

Yes Go to Question 4 No Go to Question 5

4. Would you be able to record the amount of water collected by the dehumidifier on a daily basis? (A container will be supplied)

Yes No

5. Would you be willing to have a small chart recorder which measures temperature and humidity placed in your home?

(You will not have to take any readings as these will be collected by a technician on a weekly basis)

Yes No

6. Which form of energy do you use for cooking?

Gas Electricity Other

7. What is your main source of heating?

Central heating Fires Storage heaters

Gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PERSONAL DETAILS

ALL INFORMATION GIVEN WILL BE TREATED IN THE STRICTEST CONFIDENCE AND IS FOR USE BY THE ENERGY DEMONSTRATION PROJECT ONLY.

Name.....Tel No.....

Address.....

	Total Number	Age-groups		
		Under 5	Over 65	Other
No. of people in household	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
No. of people in household in during week days	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

THANK YOU FOR YOUR TIME.

PLEASE RETURN THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

DEHUMIDIFIER QUESTIONNAIRE

ADDRESS: -----

- 1) What did you expect the dehumidifier to do?

- 2) (a) How much water did the unit collect roughly on an average day?

(b) How well do you think the dehumidifier performed?

- 3) Do you think that the dehumidifier has helped reduce condensation dampness in your home?

- 4) (a) Was there black mould present before the unit was installed?

(b) Did you clean it off?

(c) Did you redecorate (paper/paint) the affected area?

(d) Did the mould come back?

- 5) (a) How often did you have the unit switched on?

(b) What reasons would you give for not running the unit?

- 6) (a) Did you notice any slight heat given out by the unit?

(b) Did the house feel any warmer or drier? If yes please give details.

- 7) If after the end of the trials you were given the option to keep the unit and just pay running costs do you think that you would keep and run the unit?

- 8) Please add any other comments, good or bad, (eg. size, appearance, noise, etc) you feel you would like to make about the unit and its performance.