EXCEL INDUSTRIES LIMITED
HUNTON FIBER A/S
THERMAL PERFORMANCE ASSESSMENT OF CONVENTIONAL TIMBER FRAME VERSUS BREATHING WALL CONSTRUCTIONS

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WIMPEY ENVIRONMENTAL LIMITED

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MANAGEMENT SUMMARY

An assessment has been made of the comparative thermal performance of conventional timber frame dwellings (with glass fibre insulation) and breathing wall dwellings (incorporating "WARMCEL" cellulose fibre insulation & Panelite Bitvent 15). Internal and external temperatures, and space heating energy consumptions have been measured for short periods in "matched pairs" of semi-detached houses:-

32 Pittsburg Court, Blaen-y-Maes, Swansea Breathing Wall
31 Pittsburg Court, Blaen-y-Maes, Swansea Timber Frame
7 Fermoy Court, Blaen-y-Maes, Swansea Breathing Wall
5 Fermoy Court, Blaen-y-Maes, Swansea Timber Frame

The dwellings were monitored by Wimpey Environmental Limited on behalf of Excel Industries Limited & Hunton Fiber A/S with the agreement of the owners; Gwalia Housing Association.

In addition to the thermal monitoring, fan pressurization testing was undertaken to determine the dwellings air leakage at 50 Pa. A thermographic examination of all monitored dwellings was also carried out.

The raw results show that the breathing wall dwellings had, on average, an 18% lower specific heat loss rate than did the conventional timber frame dwellings (149 W/K Breathing wall (B/W) and 181 W/K Timber frame (T/F)).

It was apparent that the wind influenced the rate of heat loss and when the results were corrected for wind then the difference in fabric losses increased to 24% (99 W/K (B/W) and 131 W/K (T/F)).

The average calculated fabric heat losses for the monitored dwellings were 106 W/K for the breathing wall dwellings and 114 W/K for the conventional timber frame. While this was considered good agreement with the monitored results it was noted that the breathing wall dwellings were some 6% better than calculated while the conventional timber frame performed about 15% worse than predicted.

A form of the Building Research Domestic Energy Model (BREDEM) was used to estimate the effect of this variation in specific heat loss on annual energy consumptions and costs. This indicated that the breathing wall dwellings will consume some 7.4 GJ per annum (24%) less than the conventional timber frame which is equivalent to a saving in CO_2 emissions of 0.4 tonnes/annum and an annual cost saving of £30.50 pa.

The fan pressurisation results indicated similar air leakage for the two construction types both being significantly lower than the national average with the breathing wall dwellings having a lower air leakage than the conventional timber frame 5.83 ach (B/W) compared to 6.74 ach (T/F) at 50 Pa).

The infra-red thermographic survey indicated a number of areas for further physical examination, but did not identify any major differences in performance between the two construction types.

A comparative costing between the conventional timber frame and breathing wall dwellings (31 and 32 Pittsburg Court) was undertaken by Excel Industries Limited. This indicates a minor cost difference of £20 in favour of the conventional timber frame which would have a simple payback in respect of the energy cost savings of less than eight months.