8. CONCLUSIONS

- A simple wall built with standard Thermalite Shield blocks and Thin Joint Mortar can be erected almost twice as fast as that built with aggregate blocks and traditional mortar.

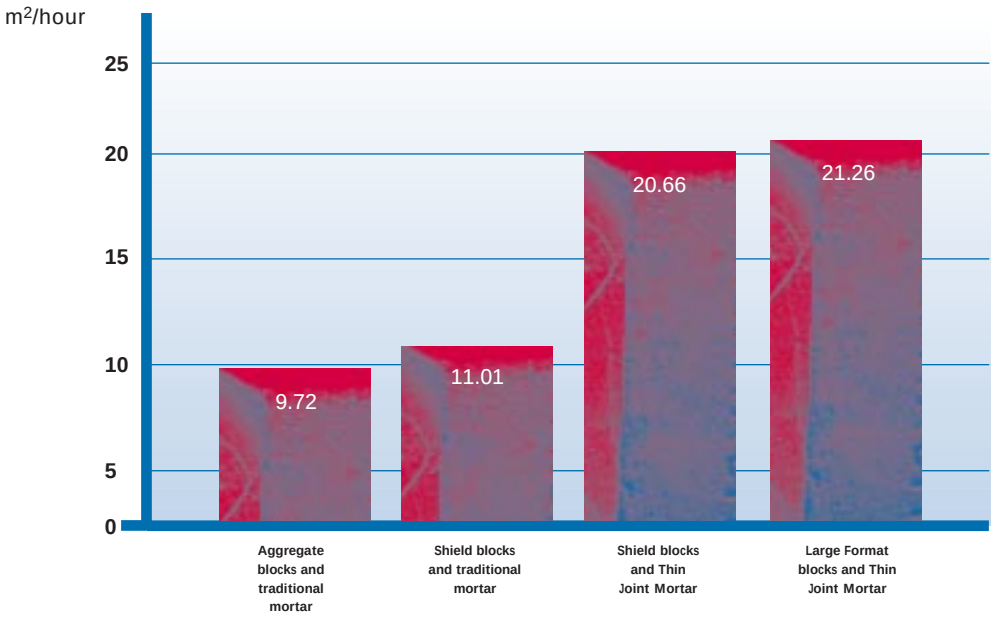
- A simple wall built with standard Thermalite Shield blocks and Thin Joint Mortar can be erected 70% faster than a similar wall built with traditional mortar.

- A simple wall built with Large Format blocks and Thin Joint Mortar can be erected 13.5% faster than a similar wall built with standard size material.

- The erected Thin Joint Mortar panels were set and stable within half an hour of laying. This did not apply to the traditional mortar panels. The use of Thin Joint Mortar can, therefore, be expected to reduce the risk of dislodgement or accidental collapse, allowing a continuation of work irrespective of the number of courses previously laid, in contrast with the restrictions imposed by use of traditional mortar.

- An estimated 12% increase in the rate of laying blocks was achieved by pump application of the mortar replacing the hand scoop. Further gains would be achieved by combining the benefits of the pump and large format blocks, especially where plain uninterrupted panels of walling are required.

Figure 2: Rate of Laying



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July 2001

A report on speed trials for Thin Joint Mortar

A SYNOPSIS OF INDEPENDENT TESTS CONDUCTED BY:

PERCY HOWES
CHARTERED SURVEYORS

CONDUCTED ON BEHALF OF:

THERMALITE

1. INSTRUCTIONS

Percy Howes & Co. Building Surveyors were instructed to observe the construction of walls built with Thermalite Thin Joint Mortar and traditional mortar techniques, obtain data relating to time taken and report observations and conclusions.

Percy Howes & Co. Building Surveyors were instructed to act independently and provide an unbiased and objective report.

2. RATIONALE

A range of wall panels was specified for the speed trial tests and agreed between Percy Howes & Co. and Thermalite. The purpose of the test, to establish a fair comparison, was disclosed to the building contractor.

The tests were conducted to determine the effects of replacing traditional mortar with Thermalite Thin Joint Mortar in typical inner leaf masonry constructions.

Further tests enabled comparisons to be made between different block types and sizes.

2.1 Specification

L-shaped walls were constructed, each of a similar length (4.5m x 1.5m), for stability and to reflect normal building practices. Both ends of the panels were built up to a vertical face, rather than raked.

The adopted wall types are listed below. (All blocks being nominal 100mm thick.)

- Aggregate blocks and traditional mortar.
- Thermalite Shield blocks and traditional mortar.
- Thermalite Shield blocks and Thin Joint Mortar.
- Thermalite Large Format blocks and Thin Joint Mortar.
- Facing brickwork and traditional mortar.

The Thin Joint Mortar System requires a traditional base course to be laid level, aligned and fully set before commencement. It was decided that a base course for all wall panels would be erected separately. This was undertaken and completed one day prior to the main speed trial tests.

Further speed trials were undertaken with straight 6m length walls, to compare traditional mortar with pump-applied mortar.

2.2 Consistency

The main panels were constructed on a base course, laid directly onto a concrete slab hardstanding in a sheltered location.

All blocks were arranged and stacked around each panel in a consistent manner in accordance with normal building practice.

A cement mixer for traditional mortar was placed approximately 20m from the panels and remained in this location throughout the speed tests.

Thin Joint Mortar was mixed in an appropriate sized bucket with a drill and whisk attachment, adjacent to each wall panel to reflect site practice.

2.3 Personnel

Muratechnic Limited provided site labour and management. A bricklayer/tradesman and labourer erected all the walls. The labourer acted as a blocklayer throughout the tests.

The same individuals undertook each test in order that any ‘human factors’ would be reflected on a similar basis in each trial.

The bricklayer constructed the brickwork panel with minimal assistance from the labourer, which included mixing of two further batches of traditional mortar and pointing during the works.

Percy Howes & Co. Building Surveyors merely observed the proceedings, ensured the agreed specification was implemented, noted observations and recorded the times.

3. TESTING

The speed tests were undertaken and completed over a two-day period.

For all tests, the first batch of mortar was mixed prior to commencement.

A standard 1:6 cement : sand mortar was employed for the traditional tests. The Thin Joint Mortar was supplied dry-mixed in 25kg bags.

Plasticiser was added to the traditional mortar for the brickwork panel, for which it was mixed to a slightly weaker 1:8 ratio.

The tests began with operatives standing with trowel or scoop in hand and were instructed to lay at a pace and rate that they would normally be expected to work.

Cutting of blocks was undertaken during the tests on a patented block cutting bench with an electric saw.

Helical ties were incorporated into the traditional brickwork panel during erection and inserted into the adjacent blockwork leaf every third and sixth course staggered. An aggregate time would be established with block leafs to represent cavity wall construction which could be compared against traditional mortar and Thin Joint Mortar cavity constructions.

Pointing of the brickwork was undertaken during the works by the labourer.

Pointing of the 6m traditional straight run blockwork panel was undertaken and timed separately after the panel was completed in order to represent a fair-face panel should the results be required.

4. COMPARATIVE RESULTS

The timed results for each test were as follows.
(All times have been rounded to the nearest 10 seconds)

4.1 Wall Panel with Corner

A. Aggregate blocks and traditional mortar	32mins : 30secs
B. Shield blocks and traditional mortar	28mins : 50secs
C. Shield blocks and Thin Joint Mortar	16mins : 20secs
D. Large Format blocks and Thin Joint Mortar	14mins : 40secs
E. Traditional brickwork	226mins : 00secs

Taking the time to lay Shield blocks and Thin Joint Mortar as one unit, comparison timings are shown in Figure 1

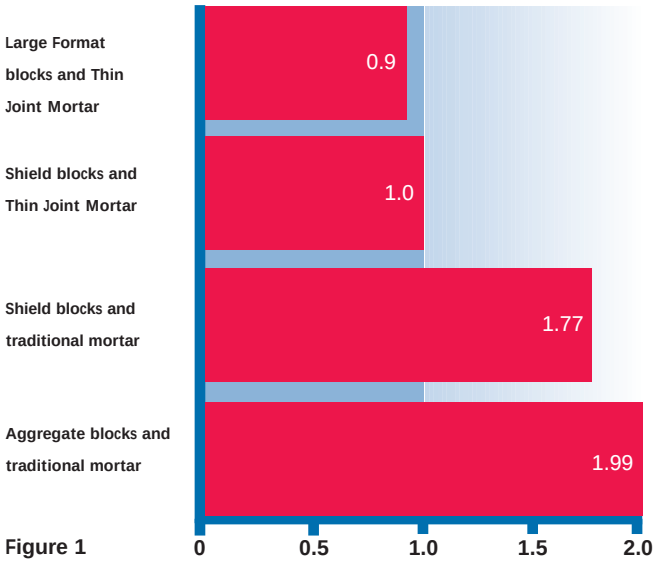

Figure 1

4.2 6.0m Straight Run Panels

Shield blocks and traditional mortar	30mins : 30secs
Shield blocks and Thin Joint Mortar (pump)	14mins : 20secs

4.3 Pointing

6.0m Shield blocks and traditional mortar	2mins : 00secs

Note: Construction of the base course for all walls is omitted from these results.

5. RATE OF LAYING

The average rates of laying have been calculated as follows.
(Square metres per hour)

5.1 Panel With Corner

A. Aggregate blocks and traditional mortar	9.72 m^2/hr
B. Shield blocks and traditional mortar	11.01 m^2/hr
C. Shield blocks and Thin Joint Mortar	20.66 m^2/hr
D. Large format blocks and Thin Joint Mortar	21.26 m^2/hr
E. Traditional brickwork	1.33 m^2/hr

5.2 6.0m Straight Run Panels

Shield blocks and traditional mortar	10.62 m^2/hr
Shield blocks and Thin Joint Mortar (pump)	21.77 m^2/hr

Note: Construction of the base course for all walls is omitted from these results.

6. INCIDENTAL RESULTS & OBSERVATIONS

6.1 Cleanliness

It was noted that the surrounding areas of the Thin Joint Mortar panels were significantly cleaner. No mortar build up was noted at the base of the panels, unlike the panels where traditional mortar had been utilised. We can, therefore, assume cleaner cavities would be achieved.

6.2 Mixing

The operatives commented upon the ease of mixing of Thin Joint Mortar and it being at the point of use. Much time appears to be wasted in mixing traditional mortar, together with inconsistency in batching. If Thin Joint Mortar is utilised, site movement could be significantly reduced and a consistent mortar used.

6.3 Accuracy

It was apparent that any deviation from level and line could not be easily corrected in subsequent Thin Joint Mortar beds. The accuracy of the base course was thus confirmed as being essential in determining the alignment of thin joint blockwork above.

6.4 Level

Only minimal usage of a spirit level was employed, as the thin joint blockwork can only be adjusted generally one course below that which has been laid. Clearly, the recorded times of the traditional mortar panels would be slightly increased to take account of appropriate use of a spirit level during erection, in accordance with 'normal building practice'.

6.5 Pump Laying

It was clearly evident, with the use of the compressed air pumping system, that the labourer had to slow his progress in applying Thin Joint Mortar so that the bricklayer could catch up with laying blocks. It may therefore be concluded that a considerably faster rate of block laying could be achieved by an experienced team working together.

7. ANALYSIS

By applying the overall rates of laying achieved in the tests to a theoretical scenario for a detached dwelling, with an estimated 60 linear metres of cavity wall, the results of the trials can be better appreciated.

It is calculated that approximately 286m^2 of inner leaf is required (60 linear metres x 5.1 metres height less 20m^2 for openings). Brickwork times have been disregarded as it has been assumed that this would take approximately the same amount of time to erect, irrespective of inner leaf type.

Projected times for the erection of the inner leaf of a cavity wall construction are as follows.

7.1 Aggregate blocks with traditional mortar.

= 286m^2 @ 9.72m^2 per hour
= 29 hrs : 25 mins (over 4 days)

(However, in consideration of note i, below, this would have to be erected in 5 phases, therefore a minimum of 5 days would be required)

7.2 Shield blocks with traditional mortar

= 286m^2 @ 11.01m^2 per hour
= 25 hrs : 59 mins (over 3 days)

7.3 Shield blocks with Thin Joint Mortar

= 286m^2 @ 20.66m^2 per hour
= 13 hrs : 50 mins (nearly 2 days)

7.4 Large Format blocks with Thin Joint Mortar

= 286m^2 @ 21.26m^2 per hour
= 13 hrs : 27 mins (over 1.5 days)

Note:

- **i** Due to the effects of block weight on the mortar bed, aggregate blocks can only be erected in 6 course phases at any one time before curing has to take place.
- **ii** Allowances for building around openings has not been considered.
- **iii** Installation of lintels has not been considered.
- **iv** Internal loadbearing walls have not been included.
- **v** Preparation of the base course for thin joint construction has not been included.
- **vi** One day has been calculated on the basis of 8 productive hours of a team consisting of two people.