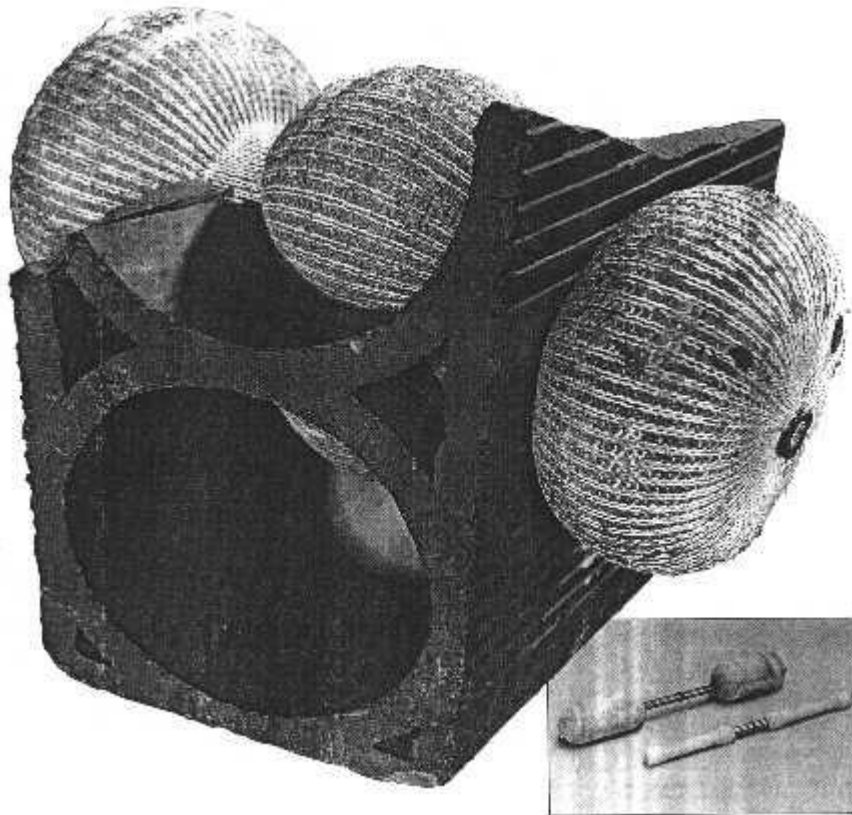


Article from Technology Focus - Put a sock in it
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Put a sock in it

*If the internal blockwork is too fragile or the cavity width too variable for traditional remedial ties, put a sock in it. **Matthew Coomber** examines an alternative system that uses an expanding fabric sock to form a mechanical and chemical bond.*



Sock filler: Cavity Lock's remedial ties (right) feature socks that are inflated with grout to give mechanical and chemical bond.

TYING BACK failing external brickwork to stable internal blockwork is a fairly common remedial practice. But how do you achieve the required support when the internal blockwork is friable?

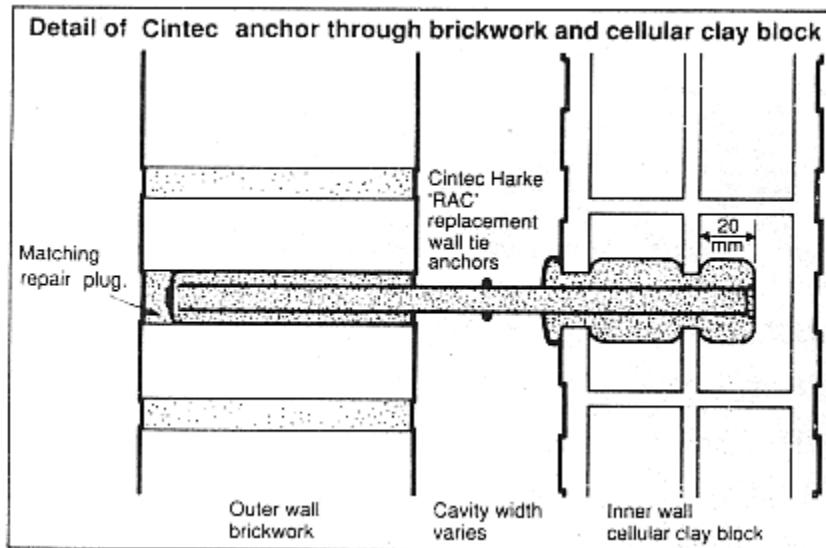
This was the problem facing the London Borough of Barking and Dagenham when it came to treat failing brick cladding on a series of 17-storey 1960s tower blocks on its Beacontree Heath Estate.

The internal blockwork was found to be made from hollow terracotta pots -- a lightweight construction form used frequently in the 1960s.

The solution was to use a novel grout-based anchor system supplied by Cavity Lock Systems of Newport to tie across the cavity without destroying the clay blockwork.

Remedial ties are generally inserted into drilled holes and achieve pullout resistance by means of expanding bolts or mechanical strength developed by a resin-based compound. Alternatively, the external leaf can be pinned back to a steel frame fixed to the inside of the inner leaf. But none of these options were suitable for treating the Beacontree blocks.

Consulting engineers Fordham Johns considered the terracotta pots were too fragile to stand the expansion forces of conventional tying methods.



Gluing the ties with resin was ruled out because of the height of the buildings -- the Building Research Establishment recommends that resin-anchored ties should not be used above four storeys because, in case of fire, the resin softens at temperatures above 100C. The size of the pot cavities and the relative thinness of their walls also helped to eliminate this option.

Finally, the council's decision to keep the flats occupied throughout the remedial work ruled out a new steel frame.

The Cavity Lock RAC anchor system selected by Barking and Dagenham achieves both mechanical and chemical bond in a different way.

The system relies on a special expanding fabric sock that is slipped around the loadbearing metal section of the remedial tie. These socks are positioned where the tie penetrates either leaf. At Barking, the tie was an 8-mm diameter stainless steel tube, but the system can be designed with a tie of virtually any diameter, length and section.

However, it must be hollow as it forms the conduit for the cementitious grout. This is pumped out into the sock through small drilled holes under a pressure of around 2 or 3 bar. Unrestrained, the socks expand to around twice their normal size. In the predrilled hole in the external leaf, they swell to fill the entire bore cavity, giving good mechanical bond. In the hollow pots, the sock is designed to swell beyond the diameter of the drilled hole, forming a plug that also resists pullout.

This resistance is strengthened by a chemical bond developed where the sock fabric touches the porous brickwork or clay because a bonding agent is dissolved in the grout water.

Finely tuned

The weave of the fabric and the recipe of the grout are "tuned" for each application so that no grout can flow out of the sock. Pressure is maintained after the sock is full, forcing water through the fabric and concentrating the cement.

According to John Dimmuk, Cavity Lock's marketing director, the ties are exceptionally easy to install, although the process must be done by certificated installers to qualify for the system guarantee. "All you do is insert the ties in a predrilled hole, attach the nozzle and pump the grout in until you can see the

outermost sock is full. You then count to 10, and stop pumping." If any grout runs back out of the hole, the sleeves are not full -- no running grout and the job is done.

Working pullout strength is achieved in 24 hours for test purposes, but for high strength applications, seven days' curing is advised.

More than 15 000 ties were inserted into each of the eight tower blocks at Barking. According to Robert Davies of Fordham Johns, the total contract sum for each block, less access and preliminary items, was around £55 000. That works out at around £23.60 per tie, installed -- equivalent to a standard double-headed expansion bolt.

"But you can't really put a comparative price on these ties as they rely are the only ones that could have done the job." comments Davies. "The problem was finding something which would latch into the cellular pots without damaging them."

But where the Cavity Lock System wins is in the flexibility of its design. At Barking, poor workmanship on the original buildings had resulted in varied cavity widths. With this system, it provided no problem as special ties of 230 mm could be made as well as the standard 215 mm.



First, diamond drill the hole...



...then insert the tubular ties and pump in the grout.

Cavity Lock Systems

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