Waterproofing walls

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Building quality and goodconstruction are vital when walls have to act as a defence against flooding, asJessica Lamond, Colin Booth and David Beddoes found in their recent research.

Flooding seems to be becomingan annual issue for homes and businesses across the UK, as demonstrated by the eventsin Cumbria, north-western England, last December. As a consequence, advice onflood protection is increasingly sought by property owners and occupiers.

There is a large array ofproperty-level protection available on the market, with many productskitemarked to certify that they protect openings against the ingress of water.But how watertight is the fabric of a building itself? Are there any ways ofimproving the performance of masonry walls to keep water out during a flood?

Watertightnessof walls

Most of the scientificevidence and the performance standards on the watertightness of walls arepredicated on resistance to wind-driven rain permeating the masonry. However,the hydrostatic pressure of floodwater is a different issue, as water may thenseep through walls and floors, rising inside a property at alarming rates. Theresulting internal devastation comes as a shock to households and businessowners, who believed their properties were protected.

It is well known in theprofessional community that water can exploit the weakest component or joint ina building to gain entry, hence the quality of the construction is important.

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Government-sponsoredresearch suggests that seven litres of water can penetrate a metre ofexternal wall per minute, resulting in a flood depth of 1m inside a propertywithin half an hour. In practice, this means that, unless the building is ofwell-constructed and low-porosity (engineering) brick or protected in some way,the water inside the property can rapidly match the level outside.

Different types of bricksand renders were also tested during the same research programme, and the conclusionswere that well-constructed walls of class A or B engineering bricks can be muchmore water-resistant than traditional construction, and that renders can behelpful, if well applied and maintained. This research contributed to theformulation of advice for new

construction in the floodplain.

Retrofitcoatings

Many existing buildings alsorequire flood protection, however, and the use of retrofit coatings offers apotential solution by boosting the resistance of walls to flooding. There aremany different coatings available; renders have often been applied, or waterproofcoatings. However, waterproof coatings can slow drying, causing potentialpost-flood problems and maybe condensation issues, so new technology developedin recent years aims to allow breathability ? letting water vapour out ? aswell as water resistance.

Newindependent research , carried out with the support of the University of theWest of England, has tested waterproof masonry coating under hydrostaticpressure that simulates a flood.

The work sought to find alow-cost way to waterproof walls, recognising that veneering systems andrenders can be very effective, but also expensive and difficult to maintain.Following research and consultation, a silane-based water repellent wasselected for mortar admixture and impregnation of the surface.

Silane products havepreviously been shown to have water-repellent properties but also, importantly,they allow the treated wall to ?breathe?. This means that the danger of moisturetrapped in the wall leading to frost damage is minimised, and it will also notimpede drying after a flood.

As these products penetratethe fabric of the wall rather than simply remaining on the surface, they arealso thought to be more durable and need less maintenance. Testing was carriedout on Shropshire red-clay-brick walls with a 1:6 Portland cement: sand mix;these were recently constructed, but designed to represent typical walls foundin many nineteenth- and early twentieth-century buildings in the UK. Aninnovative field testing method looked at the rate that water was absorbed intowalls through the bricks and the mortar joints.

The coatings can significantly slow the ingress of water to masonry walls

The research showed that,when properly applied and allowed to cure under plastic sheeting, and with theinclusion of waterproof mortar additives and well-filled joints, the coatingscan significantly slow the ingress of water to masonry walls.

This treatment did notachieve the very low rates of leakage required for barrier products kitemarkedunder PAS 1188 ? 1:2014, but it reduced the ingress rate by two-thirds. Thisreduction means that the water could then be controlled and expelled by pumps,preventing more serious damage arising. Further work is currently beingundertaken to explore whether different combinations of treatments can improveon this.

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Further information

- RICS property-level flood resilience briefing
- BS 85500:2015: Flood-resistant and resilientconstruction. Guide to improving the flood performance of buildings
- A clear, impartial guide to flooding
- Flood recovery guide
- Related competenciesinclude Buildingpathology , Sustainability ,Designand Specification , Constructiontechnology and environmental services
- This feature is taken from the RICS *Building surveying* journal (March/April 2016)