

This technical article provides additional guidance on the use of natural stone outer leaf in cavity construction. It is important that all workmanship carried out during construction is completed in accordance with the relevant tolerances.

Background

Natural stone has been used in construction for centuries – it is attractive, hardwearing, relatively impervious and capable of supporting the loads found in normal domestic housing.

The main stone types used in the UK are sandstones, limestones and granites. The rocks vary in a significant way with sandstone and limestone being sedimentary rocks formed from pieces of mineral, rock, animal, or vegetable matter settled from flowing water or wind. This is important to understand and sandstone can be identified from its layered appearance, sandstone is weaker than other rock types and is therefore more commonly used due to workability and availability.

Igneous rocks are formed when magma cools and solidifies. On land the most common form is granite, it is a hard rock and associated with particular areas of the UK, for example Edinburgh and Aberdeen.

BS 8298-1:2010 covers the use of natural stone as a cladding material. However, reference should be made to the building regulations and associated guidance, our own [Technical Manual Section 6 External Walls](#) and BS 5628-3:2005.

This article is intended to cover natural stone used as a rain-screen cladding in masonry cavity walling, for low rise properties.

Details

Stone must be carefully selected based on location and therefore exposure, any stone type from outside the UK should be referred to our Technical Services Department for suitability assessment – speak to your risk management surveyor. Any fixings, nuts, bolts and ties should be stainless steel; other materials can be considered but must be assessed with consideration for their location and importance in achieving overall performance.

Mortars used in the construction of stone walling must be appropriate for the stone type and exposure. For any mix ratio to be appropriate, however, it is likely an increased lime content will be required, particularly with sedimentary rock types. Sand must be from natural sources and calcium chloride or admixtures containing calcium chloride should be avoided. Any mortar mix should not be stronger than the rock type. When ready mixed mortar is used, it is important that the sand and aggregate have the correct grading sizes. Mortar should not be harder than the stone.

A clear cavity must be provided to the rear of stone cladding: a 50mm minimum residual cavity should be provided. Cavities wider than 100mm should be provided with supplementary restraint designed by a suitably qualified and experienced engineer, who should also specify any required movement joints.

The provision of cavity trays, weep holes and DPCs will be the same as for other masonry external cladding.

The selection of stone for a project should be based on aesthetic and geological features considered appropriate based on exposure. The availability of sufficient stone for a project and in the dimensions required should be checked and confirmed before commencing. It should be noted that a soft porous type stone in a severe exposure zone is not recommended.

Stone should be cut to the size specified on the drawings. There are specific tolerances based upon the stone block size which should be specified by the quarry.

Random stone walls must include stone carefully selected to provide the required random dimensions. Any stone used must have appropriate dimensions for the structural integrity of the wall and all faces facing into the cavity must be straight cut so as not to provide ledges for water to collect on and drip down.

Where uncut random stone is proposed, this should not be used as the primary rain-screen.

Recommendations

Natural stone can provide a hardwearing and long lasting rain-screen, however stone must be carefully selected and suppliers should be able to demonstrate sampling and testing of stone samples. Normal cavity construction methods apply and the design should include any DPCs, cavity trays, flashings and weep-holes as normally required and specified in BS 5628. Any cavity must be separated and provided with cavity barriers in accordance with regional building regulations/standards.

Consideration of rainwater run-off onto stone must be carefully considered. For example, parapets should not allow water to flow down the face of stone walls. Check falls and avoid forming shelves, for example, above openings. Details such as string courses should be covered with lead adequately secured.

Careful selection of wall ties, mortar and any required fixings, including additional pegs or other mechanical fixings must be undertaken to ensure appropriate for the chosen stone and mortar.

Insulation selection will be critical, and must be considered to enable not only adequate weather resistance but also appropriate thermal performance leaving sufficient residual cavity as outlined above.

In the case of random rubble stonework used as a facing in a cavity wall, the rubble should have a minimum thickness of 150 mm, which may be increased depending on the type of stone supplied by the quarry.

The rubble facing may be built in two ways:

- As a facing to a standard two-leaf cavity wall that will be typically post-fixed to the outer leaf, or
- Forming the outer leaf itself – in this case the rubble stonework will normally be built up at the same time as the inner leaf. Steps to the rear of this rain-screen must be avoided to prevent water running down the inner face and 'splashing' the insulation and inner leaf

With ashlar and random stone, where the stone facing extends to a height of three storeys (9m) or more, the stonework should be supported by a stainless-steel angle at every floor (3m), and fixed back to the structural frame/loadbearing structure.

Provision for movement must be considered and an engineer or the quarry satisfying the above criteria should provide the required specification.

Please note that the use of stone as a rain-screen is a complex and specialist subject. The above is only meant as a very high level guide and where in doubt refer any particular concerns to your risk management surveyor.

Every care was taken to ensure the information in this article was correct at the time of publication (March 2021). Guidance provided does not replace the reader's professional judgement and any construction project should comply with the relevant Building Regulations or applicable technical standards. For the most up to date Premier Guarantee technical guidance please refer to your Risk Management Surveyor and the latest version of the [Premier Guarantee Technical Manual](#).

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