

The Use of MgO Boards in the Building Envelope

In recent years the UK building envelope industry has witnessed the introduction of magnesium oxide (MgO) boards into the cladding sector, most typically as the sheathing board on SFS backing walls. MgO has been favoured because it is non-combustible (typically class A1 to EN 13501-1), relatively lightweight and easy to cut.

However, there are a number of manufacturing processes by which MgO boards can be manufactured, one of which involves the use of magnesium chloride. This results in an end product (sometimes referred to as magnesium oxychloride) in which there may be variable amounts of chloride salts and free chloride ions.

Chloride ions and chloride salts are often hygroscopic - they are capable of absorbing moisture like a sponge, even from atmospheric water vapour. In some applications, where the relative humidity at the board is sufficiently high for prolonged periods this can result in so much moisture collecting in the pores in the MgO material, that excess moisture weeps out of the boards, forming droplets ('teardrops') on the surface. In the most severe cases so much liquid water comes out of the MgO product that it runs and soaks into adjacent materials. The presence of dissolved chloride in the water can form a corrosive environment for some metals, including certain grades of aluminium and steel.

This problem becomes particularly serious when the MgO board is concealed, so that the weeping effect is not observed until it becomes severe. At this point structural damage may already have occurred to metal elements in contact with and adjacent to the MgO board.

In cases that have been reported in [Denmark](#), [Canada](#) and [Australia](#) it has been necessary to undertake extensive remedial works to replace MgO boards and affected structural components.

Whilst a number of independent authorities have assessed and approved/certified MgO boards, this has often been done on the basis of test methods developed for other board materials which do not exhibit the same behaviour. As such these assessments and related approvals/certificates must be treated with caution.

A number of authorities are now aware of this potential issue, and some methods of test have already been developed which claim to assess the risk of a particular product 'weeping' in a high humidity environment. However, these test methods vary widely in terms of the size and nature of the test samples (some simply use various-sized pieces of MgO board, ranging from small cubes to large sheets and strips, whilst others use pieces of board joined together with metal fixings), and there is also some variation in the temperature, humidity and duration of the test.

Further work to develop a universal method of test is ongoing, but this process may take some time.

It should also be noted that there are other forms of MgO board which do not contain chlorine, for example those described as magnesium oxysulphate, and whilst these are not believed to suffer from the same problem, there is still sufficiently little experience of the use of these products in building envelopes for it to be categorically stated that they will be durable in all applications.

This is a particular concern in applications where the MgO board is concealed after installation, and cannot be readily inspected. It is not sufficient to protect the boards from exposure to liquid water, due to their potential hygroscopic behaviour.

It must also be noted that in the UK climate, which is prone to periods of prolonged rainfall interspersed with strong sunshine, it is possible for solar heating to drive moisture from the cladding layer deep into the wall construction, raising the relative humidity at the sheathing board to near saturation levels during strong drying conditions (this effect will be much worse if there is a vapour control layer to the warm side of the sheathing board).

It is not yet possible to say that any particular product will be unsuitable for use in a particular cladding project. As such CWCT would urge specifiers and contractors to undertake a proper due diligence exercise before installing any MgO board (or any product new to the market for that matter). Issues that should be considered include:

- Talk to the warranty provider as to their views on the use of MgO board - NHBC, LABC Warranty and Premier Guarantee have all issued statements in this regard;
- Identify the source of the particular product, and ensure that the manufacturer has proper quality control procedures in place;
- Employ a materials specialist (with specialist knowledge of the particular chemistry of the MgO family of materials) to review the proposed product and how/where it is to be used, and to provide a formal report confirming that, in their opinion, the product is suitable for use in the intended application;
- Undertake random sampling of the board used on site, and to subject this to chemical analysis to ensure that the material composition remains consistent.

Contractors should be wary of using any product that is not clearly marked with codes identifying its source (manufacturer), product type and batch/date of manufacture. Such materials are effectively untraceable.

For products that are properly marked, contractors should keep clear records of the batches used, and where they are used on the building.

Further information and guidance on this matter may be forthcoming from the Magnesium Oxide Build Board Association (MOBBTA). However, until then we strongly advise that contractors and specifiers proceed as recommended above.

If you have experience of the issues highlighted in the paper and can share the information with us please contact CWCT via email at cwct@cwct.co.uk.

We aim to update this information when the results of ongoing research are made available.