TECHNICAL BULLETIN – TB078

OVERLAYING MAGNESITE FLOORING

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Introduction & Scope

In this Technical Bulletin we shall discuss the issues relating to Magnesite and similar flooring materials as Ardex Technical Services receives inquiries relating to applying toppings for vinyl or carpet and also tiling over such substrates. This is commonly where the building occupiers are looking at renovations of existing floors, but occasionally new installations as well.
Basically Ardex does not recommend the use of any of its Flooring, Waterproofing or Ceramic Tile Adhesive products over Magnesite floor topping.

Historical Background

This type of flooring is an in-situ composition that was commonly laid in the 1960's and 70's and is rarely applied today, though some types are still available. Modern versions are more common in the US and Europe, but are also available in Australia. Magnesite was used both as a levelling underlayment and sound deadening for multistorey buildings, typically home units, and as a feature floor. It has the additional property of being of being fire retardant.

What is Magnesite?

Magnesite (*senso stricto* – as an applied topping) and its more modern variants are a specialised cementitious product that is based on Magnesium Oxychloride (or Magnesium Oxysulphate) cements. The most common form involves the reaction between a Magnesium Chloride solution and Magnesium Hydroxide powder to form the cement binder. The finished product also contains a filling material which is commonly sawdust, wood fibres, cork or can also be asbestos. Colourants may have been added. The product is mixed and then poured onto the surface to be topped. These floorings are normally at least 25mm thick, except where worn down and are not usually well bonded to the base slab.
In the last couple of years, Magnesite has also appeared in the guise of 19-25mm thick flooring sheets, similar in appearance to the traditional compressed fibre-cement sheets. We will examine these 'Magnesia' sheets after discussing the topping material.

Why is Magnesite not a Recommended Substrate?

This type of flooring is moisture sensitive and will gradually breakdown if it remains wet for an extended period. As the filler consists of sawdust and wood particles bound together with Magnesium Oxychloride, it will swell up and the filler can also rot and produce unpleasant odours. Magnesite flooring is hydroscopic and in high humidity environments, close to water (e.g. lakes, coastal), or when exposed to regular wetting from situations such as constant steam cleaning of carpets, washing of vinyl where the water penetrates joints or where there is an inadequate slab membrane and rising damp is present, the material absorbs moisture with the resultant effect as detailed above.

Prolonged exposure to high humidity or moisture will release chlorides, either by leaching of un-reacted Magnesium Chloride, or possible break down of the cement. These chlorides are highly corrosive and can attack concrete and metal fittings or reinforcement, and are part of the 'concrete cancer' phenomena. This problem has been identified in a number of buildings in coastal areas of NSW and the resultant damage to steel reinforcement produced concrete failures with considerable expense and inconvenience to repair damaged floors.
There is always an element of risk in covering such composition floorings with new impervious floorings, especially where the sub-floor is on the ground. They are sometimes laid where the protection from rising damp is barely adequate, and whilst the Magnesite surface can breathe so that the flooring remains dry, once covered, the moisture levels can rise to an extent that failure occurs.

Recommendations where Magnesite is in Place

The normal procedure recommended is to remove the old Magnesite flooring and prepare the base by applying a bonded screed at least 25mm thick, incorporating some form of bonded D.P.M where necessary.

Alternatively, if the Magnesite has been laid to a thickness of less than 25mm, then consideration should be given to removing the Magnesite Flooring then using ARDEX self-levelling compounds.

Additionally Ardex recommends that Magnesite floors be inspected by an independent Testing Authority such as Mahaffey Associates (http://www.mahaffey.com.au/), or ARUP Engineers (http://www.arup.com/Global_locations/Australia.aspx) for possible steel re-inforcement damage.

Also, given that older Magnesite installations may contain asbestos, removal will require observance of relevant statutory and health and environmental requirements for dealing with asbestos disposal by suitably licensed and approved contractors. Expert advice should be sort in this area.

ARDEX Australia is unable to warrant the performance of any of its products, including Floor Smoothing Cements and Repair Mortars, Waterproof Membranes or Ceramic Tile Adhesives applied over Magnesite and therefore recommends its removal.
Ardex is aware that non-Ardex approved advice exists, for using Ardex Floor Smoothing Cements over Magnesite or similar, but these are against Ardex's Technical recommendations and users following such advice do so at their own risk.

Magnesia Board

These sheets are made from a compressed version of magnesite type materials and may be sealed. The compression moulding makes the material more impermeable and less subject to immediate moisture damage.They are used for applications such as decks and wet area floors. Ardex has examined some of these boards and found that it is feasible to apply tile adhesives to them provided that the surface is primed with Ardex WPM300 hydrepoxy. However, we have also noted that when subjected to immersion for adhesive tensile testing, that swelling can occur and that in some cases the matrix appears to have started decomposing.
Ardex has made a number of recommendations after testing, for the application of tile adhesives and waterproofing for specific magnesia board products, but not for application of smoothing cements. Further, Ardex accepts no responsibility for any defects or issues that occur with these boards in service.

References

ACRA 2002. Submission to the Joint Select Committee on the Quality of Buildings by the Australian Concrete Repair Association.

CSIRO 1971. Magnesite Flooring. Commonwealth Experimental Building Station. Notes on the Science of Building No. 117.

NOHSC:2002 1988. Guide to the Control of Asbestos Hazards in Building or Structures. The National Health and Occupational and Safety Commission.

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