



## **UNDERSTANDING THE REQUIREMENTS OF GYPSUM CALCIUM SULPHATE – ANHYDRITE OR ALPHA –HEMIHYDRATE SCREED IN FLOORING AND INSTALLING WOOD FLOORING**

**THIS DOCUMENT HAS BEEN PREPARED FOLLOWING EXTENSIVE RESEARCH, AND IS BASED UPON MANY YEARS EXPERIENCE AND KNOWLEDGE OF HISTORICAL ISSUES WHEN INSTALLING WOOD FLOORING OVER THESE TYPES OF SCREEDS. IF THE RULES OF INSTALLATION FOR BOTH THE SCREED AND WOOD FLOORING ARE NOT STRICTLY ADHERED TO YOU WILL LIKELY EXPERIENCE PROBLEMS WITH WOOD FLOORS MONTHS IF NOT YEARS AFTER INSTALLATION. IT IS EXTREMELY IMPORTANT TO UNDERSTAND ALL THE REQUIREMENTS ASSOCIATED WITH THE INSTALLATION OF A NATURAL PRODUCT LIKE WOOD FLOORING OVER CALCIUM SULPHATE SCREEDS. FAILURE TO PLAN ADEQUATELY IS INHERENT WITH EVERY FAILED INSTALLATION.**

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## **1. General Comments**

Gypsum, Anhydrite or Alpha-Hemihydrate (calcium sulphate) screeds have become increasingly popular due to the versatility of the materials with regards to the speed and ease of installation, lack of shrinkage, flowability, low cost of placement and lower carbon footprint. They are often specified with water fed in floor heating systems because of their rapid strength gain, thinner sections, thermal characteristics and ability to flow around intricate pipework and manifold outlets. They are not generally suited as a wearing layer.

Calcium Sulphate is a naturally occurring white crystalline rock and is mostly found in Gypsum and Anhydrite. Dependent upon the method of calcination, Alpha-Hemihydrate is formed from Anhydrite and is better known as Plaster of Paris. Although essentially the same material Alpha-hemihydrate crystals are more prismatic than Gypsum or Anhydrite crystals and when mixed with water they form a much stronger and harder superstructure.

## **2. General Comments on Wood Flooring**

Due to its sustainability, reduced impact on the environment, and stability in use, engineered wood flooring is now widely accepted as the preferred option for commercial and residential projects. The thickness of the engineered floor will depend on the individual requirements of the client and subfloor structure. We recommend either a 4mm or 6mm top layer especially if there is underfloor heating. Using an underlay as a vapour barrier is not a good option with this type of screed as underlays never really work effectively to prevent moisture from penetrating into the wood floor. Using the SW 890 adhesive made for us by Sika Limited is always our preferred option but even this will not prevent problems if the rules appertaining to these types of screeds are not followed to the letter.

## **3. Mixing & Placing**

Whatever formulation of Calcium Sulphate screed you choose to use, they all have one thing in common that is they require approximately 33% more water than a standard sand/cement screed. The additional water is required to assist hydration and make the mix super flowable, this ensures the placed material can achieve the required flatness of SR2 in accordance with BS8204 and if particular care is taken during placing and finishing SR1, and following correct dapping by the operative safeguards compaction and the final density of the cured screed. In general Calcium Sulphate screeds can be installed over larger areas without joints than sand & cement screed and also be laid in lot thinner sections. The table below shows typical installations.

<b>APPLICATION</b>	<b>MINIMUM DEPTH</b>
• Fully Bonded	25mm
• In contact with Substrate	30mm
• Floating Commercial	40mm
• Floating Domestic	35mm



- Cover to Conduits/UFH Pipes

30mm

#### **4. Post Installation Requirements**

The process of using a dapple bar ensures that the fluid screed is void of as much air entrapment as possible and assists in the even distribution of aggregates and fine salts and is critical in achieving a perfectly flat strong floor. However, this process also causes a layer of dense salts and binding agents to form on the surface (laitance) and once cured creates an almost vapour proof crust which prevents the newly laid screed from drying out. Some manufacturers are now formulating mix designs based on [Alpha-Hemihydrate](#) which are claimed to be laitance free but they rely heavily on the operatives achieving the correct mix ratios of water to powder and the right amount of finishing.

#### **5. Drying**

Calcium Sulphate screeds will not normally start to dry properly until the laitance have been removed.

The sooner this process is done the easier it is to eradicate. This is normally the responsibility of the screeding contractor who is best placed to know when the screed has cured sufficiently to proceed. The conditions on site and the thickness of surface laitance play a large part in the drying times that will be required.

As a general rule of thumb if the laitance are removed at the end of the 1<sup>st</sup> week of placing a light sanding action is all that will be needed. In the 2<sup>nd</sup> week a courser aggregate maybe required. In weeks 3 and 4 you may well require a rotary carborundum stone or a heavy weight diamond grinder. In short, the longer the laitance are left the denser they become and more difficult they are to remove.

Once the laitance are removed Calcium Sulphate screeds dry similarly to that of sand/cement, which given the optimum conditions is 1mm per day up to 40mm thick and an additional 2 days per 1mm over this thickness.

For example, with the correct ventilation and site conditions a 50mm thick screed will take approximately 60 days to reach a level of moisture content that is acceptable for the application of further finishes. However this is completely dependent upon the ambient conditions and therefore the moisture content of the screed should be monitored on a regular basis using the appropriate measuring equipment.

The use of dehumidifiers can accelerate the drying process for Anhydrite screeds but not usually in isolation. A strategy that employs dry air being passed over the screed combined with good ventilation will vastly speed up drying compared to de-humidifiers alone.



## **6. Underfloor Heating Systems and Wood Flooring**

Water fed under floor heating [UFH] systems offer a very efficient way of heating a property and are becoming ever more popular on large multi dwelling projects. More often than not they are encased within a Calcium Sulphate based screed. These screeds are laid in thinner sections than standard sand/cement screeds and therefore will regularly provide electronic moisture readings that indicate a screed is dry after a relatively short period of time. This can lead to a false positive reading being obtained as the residual moisture that is trapped within the screed will vapourise into a gaseous form once the UFH is commissioned. At this point the moisture readings will go off the scale for approximately 1 – 2 weeks depending on the thickness, ambient conditions and ventilation while the screed completely dries out. Because of this it is imperative that no floor finishes are installed until the UFH system has been fully commissioned in accordance with BS EN1264. [For information only; below we have noted the pertinent points for commissioning a typical UFH system prior to the application of the final floor covering. This does not negate the need to completely familiarise yourself with the full BS EN1264 standard.]

## **7. Initial Start Up – Commissioning before installing wood flooring**

In accordance with BS EN 1264, the start-up procedure following installation and should be as follows:

- The screed should be allowed to cure in accordance with the manufacturer's instructions and British Standards.
- Set the room thermostat temperature to the required level.
- Initial heating should commence with the flow water temperature at no more than 25°C. This should be maintained for at least 3 days. This can be achieved by use of a mixing valve and overheat thermostat in combination.
- After 3 days the thermostat can be increased by 5° - 10°C per day until a temperature of 47°C is reached where the mixing valve will take control and automatically manage the flow water temperature at the design temperature.
- At this point the overheat thermostat should be set 10° - 15°C higher than the design flow water temperature and is then used as a safety device. The working temperature should be maintained for a minimum of a further 4 days.
- If using natural materials such as wood flooring, this temperature should be maintained until the moisture content of the screed has been reduced to the level specified by the floor covering supplier.



- The system should be run for a minimum of 2 weeks before any coverings are laid.

#### Heat introduction

- The heating should not be switched on until 72 hours after fitting has been completed
- The under floor heating should then be switch on at it's lowest heat probably approximately 18°C at finished floor level
- The heat should then be gradually increased by 1°C every 24 hours and **THE HEAT SHOULD NEVER EXCEED 27°C AT FINISHED FLOOR LEVEL**
- It is recommended that monitoring devices are designed into the floor to ensure that the temperature is controlled at finished floor level.

#### **8. Membranes**

At its lowest level Calcium Sulphate is mined as a mineral and once processed into powder form if added to water will solidify, this is the binder that we use in Anhydrite and Gypsum screeds. The residual free water used during the placing of these screeds has to vent off before other finishes can be applied. If you try to circumvent this process by applying a surface mounted damp proof membrane which acts as a complete vapour barrier, the residual moisture rising to the surface through capillary action cannot escape and culminates just below the vapour barrier.

Once this moisture reaches saturation level the Gypsum/Anhydrite screed starts to break down and return to its original constituent mineral and become very soft as if it were rotting. Any stress placed onto the surface of the membrane through expansion or contraction of floor finishes at this point will result in the failure of the floor finish and screed. It should also be noted that Calcium Sulphate is corrosive to steel and as such should never be laid over a wet/damp concrete slab which contains rebar without a functioning membrane in place to protect the reinforcement beneath.

Once a Gypsum/Anhydrite screed is deemed dry [usually 0.5%CM or in the case of UFH 0.3%CM] it is often good practice to protect the screed from moisture ingress from spillages, burst pipes, wet trades etc. In this instance and only when the screed is completely dry the use of a liquid applied damp proof membrane can be applied to the surface.

#### **9. Levelling Compounds**

In some instances where the finished floor height has been incorrectly set or the screed has suffered mechanical damage it may be necessary to apply a levelling compound. As a general rule you should never use a cement based levelling compound over a Calcium



Sulphate screed without first applying an acrylic or epoxy resin based primer. When cement based materials come into contact with Calcium Sulphate screeds a reaction with the aluminate in the cement causes the formation of Ettringite crystals which grow beneath the compound and eventually build up enough pressure to cause delamination of the levelling material. The use of an acrylic or epoxy primer will ensure that contact between the two materials is isolated.

### **10. SikaBond Flooring Adhesives**

All SikaBond flooring adhesives whether they be elastic to accommodate differential expansion/contraction for wooden floors or Acrylic based pressure sensitive for luxury vinyl tiles are all compatible with Sika Levelling compounds and damp proof membranes.

### **11. Installing Engineered wood flooring over these type of screeds**

Moisture content of the screed, humidity and temperature readings should be carried out using appropriate equipment across the entire floor surface and recorded in the "Site Log" for future reference. Ensure moisture readings are accurate and correspond to the full thickness of the screed.

The points below are for guidance only to help understand how a natural product should be installed to get the best for the material at hand. For detailed installation advice and a full NBS specification please contact the technical department.

#### Fitting

Flooring to be laid fully bonded and to be fitted in accordance with BS 8201:1987 (updated in 2011) Code of Practice for Flooring of Timber, Timber Products and wood based panel products.

#### Aethetics

It is the art of the fitter to ensure that fitting is conducted to achieve an acceptable blend of shade variation, colour and knotting which are all inherent characteristics of any natural wood product

#### Moisture

Moisture content of the boards at the time of laying to be 6-8%.

#### Bonding

Engineered boards are to be laid fully bonded using SW890 adhesive, and the adhesive is to be applied with a 6mm notched trowel to provide a solid bed of adhesive between the base of each board and the substrate



### Expansion

*Perimeter* – A 10mm expansion gap is required around the perimeter of the floor and/or where the wood flooring meets differing materials.

*Long Rooms* - Should the floor dimensions exceed 8 linear metres in any one direction, then extra provision should be made for expansion and expansion gaps of up to 8mm should be designed into the floor.

*Day Work Joints* - Day work joints are not appropriate in this instance, but can be bridged if necessary

*Construction Joints* - Any construction joints that run across the floor must not be bridged and expansion joints should be installed at these points and designed to follow the line of the construction joint.

### Fitter

The wood flooring fitter will be responsible for:

- Ensuring that the site conditions comply with BS8201:1987.
- Using the wood boards to create a finished floor that complies fully with the architects/contractors instructions in accordance with BS8201:1987.
- Ensuring that the contractor understands what the finished floor will look like before starting fitting.
- Checking that every board is of the desired quality and suitable for use before, during and after fitting and if there is any doubt, boards should not be fitted.

### Protection

- A covering such as 2mm to 3mm foam then a layer of 6mm hardboard taped at the joints should be considered to protect the floor – but it is important that whilst covered no under floor heating is working and the heating should not be switched on until all protection has been removed.
- If other trades are having to complete works after the floor is installed only use the above covering.

Fitters/ Builders Clean

On completion of fitting:

- The surface of the boards should be vacuumed to remove any particles of wood or sawdust, and the fitter should ensure that no residues from any of the fitting remains attached to the surface of the boards.
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- The fitter should clean the boards with the recommended cleaner and ensure that the contractor and client (if appropriate) understand how the wood flooring should be cleaned and maintained.

The Contractor

Should request an Operations and Maintenance manual from The Solid Wood Flooring Company to give to the client to ensure that they know how to clean and maintain the wood floor.

**[FOR INSPIRATION VISIT OUR SITE HERE see more>>](#)**

THE SOLID WOOD FLOORING COMPANY Wood Flooring and SIKA LIMITED Flooring Systems

To ensure single source responsibility and free of charge technical assistance for your specific project, please ensure you contact THE SOLID WOOD FLOORING COMPANY on 01666 504015 for wood flooring and SIKA LIMITED on 01707 394444 for further advice on adhesives and other flooring products including NBS+ specifications or to arrange a site visit or meeting. Further information can also be obtained by visiting [www.thesolidwoodflooringcompany.com](http://www.thesolidwoodflooringcompany.com) or [www.sika.co.uk](http://www.sika.co.uk) or by emailing: [martyn@thesolidwoodflooringcompany.com](mailto:martyn@thesolidwoodflooringcompany.com) or [chris@thesolidwoodflooringcompany.com](mailto:chris@thesolidwoodflooringcompany.com) or [hooper.mick@uk.sika.com](mailto:hooper.mick@uk.sika.com) .

The information, and, in particular, the recommendations relating to the application and end-use of Engineered wood flooring and Sika products, are given in good faith based on The Solid Wood Flooring Company and Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with The Solid Wood Flooring Company and Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. The Solid Wood Flooring Company and Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.