Design Considerations of how to achieve a successful interface between Hydronic (wet) Underfloor Heating and Screed.

Please find the following information that is essential for the successful implementation of floor screeding systems on hydronic (wet) underfloor heating. The terminology of the screed type is important that it remains consistent (wearing screed or leveling screed) with the underfloor heating contractor & M&E designers.

Design Inputs

The designer would need to describe all types of final flooring, whether it is flexible or rigid, tiles, natural stone, conglomerate, carpet tiles, linoleum, wood flooring, etc.

The locations of columns, protrusions, insets should all be identified and described fully to assist in the definition of joints. This is highly important to mark up onto drawings used by all parties.

The screeding specialist would require information from the designers as to detailed knowledge of the pipe work fixings and whether it will sit on the insulation or to the concrete substrate. The information and detail should be provided for all service access points such as pipe work manifolds.

Design Outputs

In addition to the M&E / Underfloor heating Contractor outputs, the following should be provided by the architects / specifier to all parties.

Floor construction, all thicknesses relating to total void / depth of final floor finish / insulation depth / screed depth, joint location and any inherent shrinkage allowance.

Full details of proposed screed system(s) such as cementitious, calcium sulphate, fast drying, water reducing, or any other system should be known.

The proposed final flooring finish and the surface finish of the floor screeding system in relation to the final flooring.

All relevant codes of practice and standards.

Screed Materials

A screed can be described as a layer of material that provides a flat surface to receive final floor finishes at a defined level on a structural base.

There are a number of different terminologies for screed in the industry and it is important that all parties are agreed as to what is expected and what is offered and fit for purpose. Therefore it is important that the proposed floor screeding system(s) falls under BS8204 – Part 1 – 2003 (current standard).

Levelling screed is a suitable finish to provide a level surface to receive final finishes and a wearing screed that is substantial enough to be the final flooring.

The following refers to leveling screeds to avoid confusion and are more popular on underfloor heating systems where insulation is used and the screed construction is floating. This floating system is isolated from other construction components such as walls, pipe penetrations, raised manholes, etc. There are other definitions such as fine concrete screeds which incorporate a greater single sized aggregate and generally used for heavy use and greater depths. There are all types of additives and cement replacements which reduce the risk of cracking, inherent in cementitious products.

Cement / Sand Screeds

Cement / Sand Screeds are mixed to an earthy, semi-dry consistency in order to achieve the desired workability and reduce the water / cement ratio. The screed should be well compacted and thicknesses greater than 75mm should be compacted in layers of 50mm. The surface finish depends on the type and quality of the sand and can vary dramatically from area to area. The sand would need to conform to BS EN 13139 – 0-4mm grade. Levelling compounds are required to install thin sheet floorings as aggregate can be picked up during installation. The standard thickness of screeds should be a minimum of 75mm for commercial use and 65mm for residential / light use and a minimum coverage of 35mm over the top of the underfloor heating pipe. Cementitious screeds enable improved thermal conductivity due to their compaction. There are numerous modified cementitious screed systems that can be laid at thinner section, such as FlexiDry.

Design Considerations continued….

Free Flowing Anhydrite Pumpable Screeds

Free flowing Anhydrite / Hemi Hydrite floor screeding systems are a by-product of the chemical industry and when processed, it forms a gypsum binder and is blended with aggregates and additives. These systems are laid very wet and achieve a dense construction with a low shrinkage value. Free flowing screeds require a degree of preparation to ensure that all joints are taped and perimeter strips are sealed and a tanked system provided to ensure the screed does not weep under the insulation or into cavities, etc. The requirement for minimum depths are 30mm in residential properties and 40mm for commercial but the minimum coverage over the top of the pipes has to be 30mm. It is always best to allow a bit for intolerance in the substrate but always recommend a level survey is carried out prior to commencement.

Fast Drying Screeds

Program should always be considered and quite often the drying time of floor screeds will not suit the project. The standard drying time is 1mm per day for the first 40 days and 0.5mm per day thereafter. This means a standard 75mm screed could take 110 days to dry, based on 20C. There are many types of additives and cement replacements that can dry from as little as three hours and all the way back to natural but the faster the dry time the more expensive the product. Certain products can also allow a thinner screed to be applied and data sheets should be read in conjunction with BS 8204 – 1 – 2003 (current standard).

Drying the Screed

Cementitious Screeds

Standard cementitious screeds need to be cured for seven days after installation in order to keep moisture in the screed and stop the top drying faster than the bottom. The curing method is a thin polythene layer over the screed and applied the morning after installation; this helps to reduce curling and cracking. This method is often overlooked and generally not required due to cost implications and understanding. The screed needs to be well ventilated and protected from direct sunlight. Forced drying should not be applied as this could lead to a reduction in strength and increased random cracking which could affect final floor installation and lead to failure. Curling can sometimes be reversed by re-watering but this could affect dry times for final finishes. Underfloor heating should not be commissioned until the screed is dry. Follow underfloor heating procedures to commission the system and increase temperature incrementally.

Free Flowing Anhydrite Pumpable Screeds

These types of screeds do not require a polythene cure and it is recommended that after three days the screed is exposed to ventilation. Commissioning of underfloor heating can take place after seven days but again on incremental basis and manufacturer's instructions should be followed.

All screeds should be tested prior to installation of sensitive floor coverings and the recognized methods are hair hygrometer or carbide bomb test. 3% moisture content for ceramics and 2% for sensitive coverings.

Floor Construction

Generally the design should be from the top down rather bottom up in order to consider all finishes will work. The condition of the concrete substrate needs to be checked as preparatory work might be required prior to insulation being installed. Severe undulations and steps could cause voids which will lead to future failure.

The bay sizes may differ in relation to different applied finishes and these should be considered and marked up on drawings to avoid confusion. Movement joints need to be agreed as underfloor heating can aggravate residual moisture in the screed and cause random cracking, so aspect ratios generally 3:1 should be considered and irregular shaped rooms.

It is imperative that all joints are considered and absolute detail confirmed as to the construction and location.

We hope this publication helps to understand the design issues around screeding on underfloor heating. All information deemed correct at time of publication 16th November 2009

