



Epoxy Resin Grouting as Underpinning

Various ASUCplus members have recently been approached with a view to having them carry out underpinning work using Epoxy Resin Grouting (ERG).

This is a type of work which several ASUCplus members do carry out in appropriate circumstances however the official position of ASUCplus is that this technique is not suitable to use as structural underpinning to load bearing walls. Indeed as underpinning by conventional excavated and piled means is subject to Building Regulations and ERG is not it is possible to argue that this technique cannot be described as underpinning by definition. Also if the generally accepted definition of underpinning as “the extension of the foundation of an existing structure down to competent strata at a lower level” is taken then any form of grouting is not underpinning unless accompanied by a complementary technique such as pin piling.

Remember that underpinning requires Building Regulations approval and ASUCplus members provide the ASUCplus guarantee on all their work which therefore has an additional independent check. You get two independent checks, Building Regulations site inspections and an insurance backed guarantee when ASUCplus members underpin your property.

John Wood of Ridd Wood Partnership Ltd, (the firm of Consulting Engineers who administer and technically supervise the ASUC Plus Guarantee) says

“Currently I believe the uncertainties implicit in the use of this technique (ERG) outweigh its advantages. It will always be dependent on the precise suitability of the ground and it can never be known whether all voids have been filled. Members of ASUC Plus have carried out their own research and are yet to be convinced of the technique’s reliability. I will not therefore be recommending acceptance of this technique to our underwriters.”

It is of course entirely appropriate to use ERG to fill voids and stabilise subsidised floor slabs in both domestic and commercial applications but it is not, in the opinion of ASUCplus, possible to say that ERG can transfer the load of an existing structural wall through inadequate ground to a sound bearing strata at a lower level as is implied by some trade literature. Due to the random nature of the results of all grouting techniques as well as ERG it is unlikely to be possible to analyse whether the existing foundations are suitable to span between whatever points of physical support that the grouting technique provides. In addition any attempt to carry out underpinning work using ERG in clay where subsidence problems are usually caused by clay shrinkage clearly cannot include any anti-heave element.

Several ASUC members have carried out research and development work on ERG and summarise their findings as follows:

Roger Bullivant

“Latterly, we at Roger Bullivant Ltd have carried out and are still in the process of carrying out an extensive number of R & D projects which are looking at the viability of using polyurethane foams for a number of construction processes. The products being used are widely available on the UK market.



One of the clear problems associated with this method is the controllability. There appears to be much dependency on the ability of the operators to read the situation and act accordingly.

With cement or chemical injection when the “tap is closed” the movement generated by the injection process ceases and is absolutely controllable; when the “tap is closed” using the foam injection process, this is only just the start of the chemical reaction which is not controllable.”

Van Elle

“Van Elle have carried out extensive testing into the use of Polyurethane injection methods for stabilising subsidence related structures. Tests included the injection of cohesive and non-cohesive material under controlled conditions. The results showed that there would appear to be no benefit where cohesive soils such as clay are concerned, as the Polyurethane was unable to penetrate and as a result, refusal was encountered very early on in the injection operation. In the cases of non-cohesive material, the injection proved to be more successful, but once the areas had been exposed, it was found that voids still existed within the material. The conclusions reached were that this type of system could be used as a void filler in non-cohesive soils but that no guarantee could be given that all voids had been filled. In addition, great care has to be taken where injection takes place near services or drains and it is recommended that a CCTV survey is carried out both before and after to confirm that no contamination or ingress of the injection material has entered the drainage systems.”

Abbey Pynford

“Grouting works were carried out in prepared samples of a variety of materials. In clay the only observed effect was to fill the hole formed by the introduction of the grouting lance and any adjacent fissures. In granular and fill material voids were filled and by inspection and from plate loading tests the ground was densified to some extent. This however occurred in a random way and any ground improvement could not be accurately controlled or said to provide additional support at a specific location.”

To safeguard potential clients the position of ASUCplus is that grouting of any kind does not constitute a guaranteeable underpinning scheme to a structure unless allied with other mini piling or excavated underpinning works. ERG is not a panacea applicable to all subsidence problems and can, at best, only be expected to succeed in a limited number of appropriate cases as a permanent solution.

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