Inspection and Snagging of Finished Internal Works Using Natural Stone

Federation Stone
Great Britain

Contents

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1. Introduction

This document sets out the framework for installed internal works including dry lays using natural stone to be assessed and approved (snagged). The provisions set out below reflect the available guidance and tolerances within the British Standards and incorporates the guidance issued by Stone Federation Great Britain in respect of completed floors, cladding, lining and worktops. The guidance is applicable to commercial and residential installations.

2. Snagging

“Snagging" is a term used to describe the process of checking the installation (and dry lays) for compliance with the drawings, specification and approved project samples. Those points considered to be non-compliant with the drawings, specification or approved project samples would be considered faults or defects in an installation or at a dry lay inspection. It is probably the most contentious issue in the installation process. Quality is a personal subjective assessment. No two people will agree on exactly the same assessment for the same ‘defect’. It is this 'perception of quality' that can cause the most friction between the architect/designer/contractor/ sub-contractor and client, especially when using natural materials.

There are no specific standards for ‘snagging’ and what is acceptable. The NHBC have a guide "A consistent approach to finishes" (Chapter 9.1) which is used by their inspectors and claims investigators to set down allowable tolerances for guidance in disputes over what is an acceptable quality of finish, but there is no specific guidance for natural stone.

This document sets out what Stone Federation Great Britain members consider to be a snag in order to avoid any misunderstandings that may arise.

Snagging can generally be divided into two categories:

Functionality - to check that everything installed actually works as it should, including slip resistance.

Aesthetic - to check that the quality of the finish is to a mutually acceptable standard and this is discussed in more detail in later sections of this document. While it would be considered that all work should be delivered in a neat and workmanlike manner, establishing what an 'acceptable standard' is, poses a significant question and so it is important that all expectations are properly managed. As a general rule of thumb “if it looks right, generally it is right”. If you would accept this standard in your own home, then it would normally be considered acceptable.

It is typically the aesthetic assessment that is the most contentious aspect when considering the installation of natural stone, as it is invariably an issue with the finish or appearance as opposed to a challenge or problem with the functionality.

3. Materials

BS EN 12057, BS EN 12058 and BS EN 1469 state that final viewing for stone samples for acceptance should be undertaken from a distance of at least 2m in light conditions and orientation similar to those of the project. This is the guidance for the approval of materials at design stage prior to manufacture.

It is appreciated that in some areas such as bathrooms, the size of the room may be such that viewing any one wall or floor from 2m may not be possible and therefore in such instances the stone should be viewed from the centre of the room to assess the material.

With many stones, processing typically involves the use of patching, fillers or other similar products (collectively referred to as 'fills' or 'filling' here) for natural holes, faults or cracks. In some stones where filling is carried out, it is not intended to be noticeable to a great degree, nor is it expected to be perfectly colour matched or "glass" smooth. In other stones fills and surface blemishes can be more visible and apparent but this should not be considered a defect, rather a naturally occurring characteristic of the stone itself. These issues and especially the presence of fills should normally be identified at the stone selection stage and if not aesthetically acceptable, the selected stone may need to be changed before purchase.

All visible natural features of a stone including but not limited to vents, cracks, inclusions, cavities, stylolites and veins are permitted as far as they are typical for the stone and the performance of the stone is not adversely affected. However, it would again be recommended that these features are identified and agreed prior to purchase and these are also typically identified in a project specific range report.

The nature of the material, its name and characteristics should be made perfectly clear at the outset of the project. Many materials are formed geologically from various minerals and these will accept a polish finish to differing degrees.

'Range reports' are documents, often (and ideally) required as part of a contract specification, where the expected appearance of a stone proposed for use on a project has been fully detailed with all the acceptable and rejected features by an independent natural stone consultant. Where a range report has been prepared and agreed this should provide the benchmark against which to assess the material and its appearance including both factory fills and natural inclusions including veining etc.

It would be advised that the person or persons reviewing and approving the material at the design stage should also be involved at the 'snagging' stage to provide continuity. This is often where differences of opinion and subjective views create conflict, especially if the information for the material to be approved prior to manufacture is not accepted in the installed panels.

Table 1 below provides a summary of what is typically acceptable/unacceptable with regard to the material itself – this does not cover installation which is dealt with later.

Typically acceptable	**Typically not acceptable**
Patching, fillers or other similar products for natural holes, faults or cracks where these are typically present in the preparation of the material***1**.	Polishing wheel marks, sawing marks or other scratches on any visible face of the stone caused during the slabbing, polishing or fabrication
Stone repairs (see b below)	Cracks in the surface
Naturally occurring features such as stylolites that do not impact detrimentally on performance (see below including the potential impact on functionality)	Visible chips and spalls on the surface.
Naturally occurring small pits in the surface (see below)	Ragged or chipped edges to joints and external edges

*[1] On the basis that the level of workmanship is of an acceptable level.

Table 1. Summary of acceptable/unacceptable features present in stone.

(a) Small pits and fissures

When any natural stone is polished, pitting and fissuring will inevitably occur. Also, due to the cooling and heating of some types of rock, after it has been formed, these fissures can be more or less

obvious than others, but they are rarely completely absent. Most pitting and fissuring is so microscopic that it is not noticeable. Where these are of a sufficient size they can be filled but many are so small they cannot be filled and these are a naturally occurring feature.

Where these are a common feature of the stone they should be identified at the selection stage.

It is an accepted practice for many types of natural stone to have resin applied to their faces prior to the polishing process for the slabs during manufacture. The resin filling to the face will have an effect on the appearance of the face especially for those materials with micro-cracking of the surface.

(b) Stylolites

In terms of appearance these may be seen as an irregular and interlocking penetration of the two sides of the feature: the columns, pits, and teeth-like projections on one side fit into their counterparts on the other (see Figure 1 below).

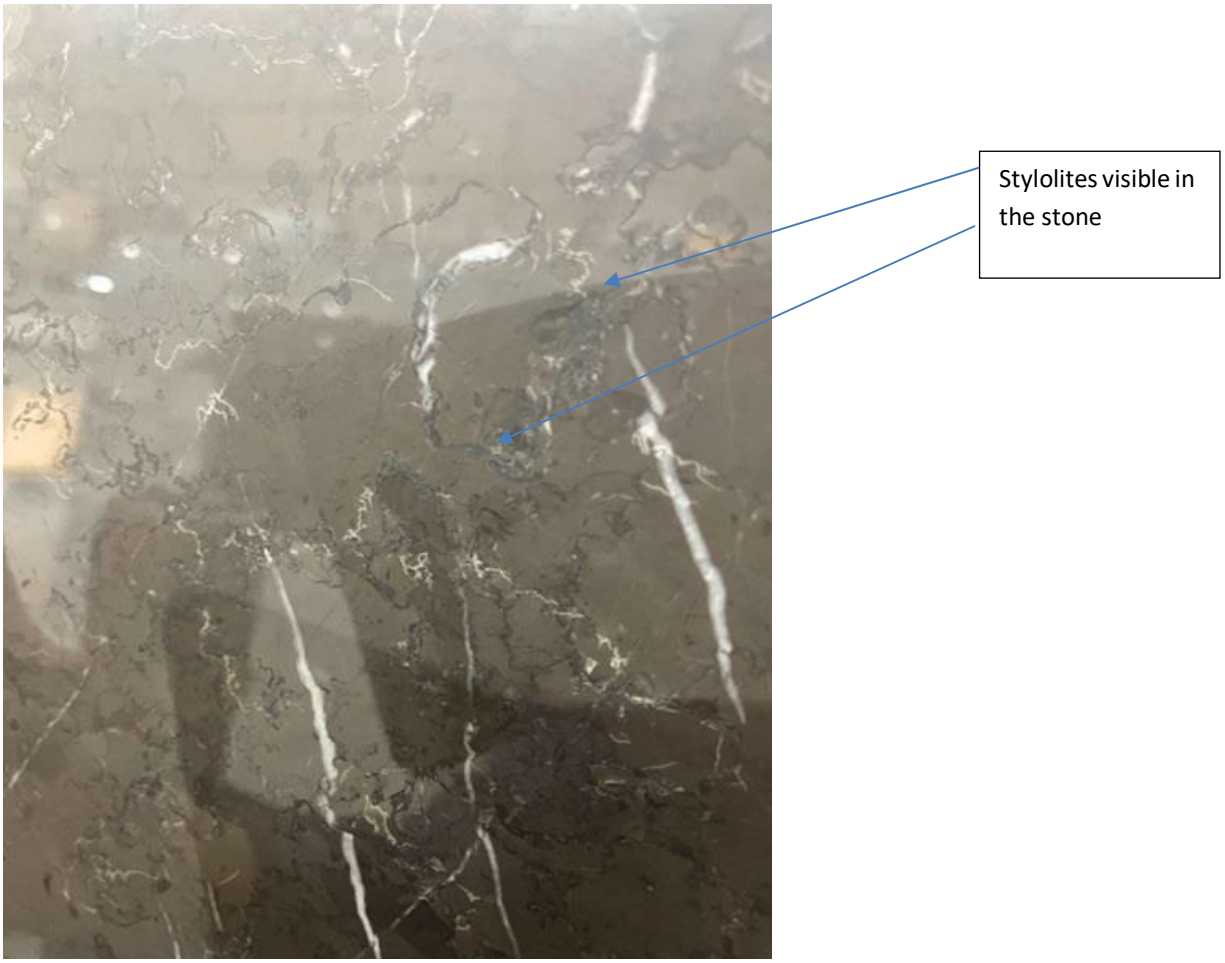

Figure 1. Example of naturally occurring 'stylolites' in Pietra Grey.

Where these are a common feature of the stone they should be identified at the selection stage as a natural feature and a decision taken then if they would be considered an acceptable feature of a stone – consequently their presence should not be 'snag' post installation.

It should be noted that stylolites may have an impact on the functionality as well as the aesthetic of a stone. As stylolites typically contain fine grained clay minerals, in environments where the stone is frequently wetted and dried surface pitting and other potential issues may result.

4. Stone Repairs

When cutting, packing, delivering and installing any natural stone there is always the risk of some minor damage. The risk of damage is increased with large format natural stone slabs used on many projects - bearing in mind the limitations imposed by the size and weight of the slabs, and the obligations under CDM, the architect should consider and identify these risks at design stage.

During the design stage it is common for the natural stone installation company to advise on the type of edge details, profiles, and joints to be considered for the stone panels. These are often designed with the requirement to minimise the potential for damage during manufacture and installation.

If these design requirements are ignored the consequences of the potential for damage and acceptable repairs should be considered. It would be recommended that any proposed repairs should be approved with a sample or benchmark.

Where the stone suffers damage under these circumstances it is an accepted good practice to repair the damage unless the damage is major i.e. renders the stone unsuitable for application, in which case the material should be replaced. In addition, cracks and/or breakage sometimes develop (or may be discovered) after the stone has been installed. It is also acceptable to repair such stones if the damage is not major and does not affect the integrity of the stone.

Repairs should be carried out by skilled personnel and to an acceptable industry standard often demonstrated by an agreed benchmark.

5. Photographing of issues

A photograph of any issue should be taken at 1 x magnification with a reference object such as a scale-rule/bar, pen, coin or anything that allows the viewer to sensibly assess the size of the issue.

Photographs with enhanced magnification can be included but there must be at least one photograph at normal magnification as described above.

6. Installation quality and tolerances

Installation tolerances will be in accordance with those set out in the British Standards and guidance issued by Stone Federation Great Britain, or those set out in the NBS specification for the project or a project specific document which may vary the standard tolerances.

Any change to the tolerances in the specification to accompany the order by the natural stone installer should also be agreed and noted. For example, the joint widths in the specification and the panel manufacture tolerances may be in contradiction and it may be necessary to clarify the minimum and maximum joint widths that can be achieved at design stage.

7. Inspection of the installation

(a) For the material

BS EN 12057, BS EN 12058 and BS EN 1469 suggest that agreed viewing of samples for final acceptance should be undertaken at a distance of at least 2m in light conditions similar to those for the project. There is no specific advice within the British Standards dealing with the inspection of stone once installed.

It is appreciated that for internal stone for walls and floors in smaller rooms e.g. bathrooms or similar, the actual room dimensions may preclude a 2m viewing distance, in such circumstances it should be

accepted that the inspection would take place by viewing the installed stone from the centre of the room but no closer than 1m to the surface being inspected.

Taking guidance from the NHBC Standards for paint finishes, viewing should be in daylight where possible with wall lights/uplighters/downlighters switched off – it should not be done with concentrated beams of light such as torches or site lights as this is likely to create an artificial lighting 'scenario' (and for example 'shadowing') unrepresentative of typical service conditions.

(b) For the installation

Joints, levels, squareness, flatness and the like can be assessed in the usual manner using measuring aids – the compliance with the stated tolerances will be a matter of fact.

These tolerances will be by reference to the applicable British Standards or to the relevant specification provided (e.g. H51/M40).

8. Acceptance and snagging of rooms prior to the start of the installation of natural stone

The ability for the stone installation to meet the exacting tolerances required in many projects requires the base and grounds to which the stone is to be fitted to be built to tolerances which are often more restrictive than those identified in British Standards and trade guidelines for that trade.

It is, therefore, not acceptable for the stone installer to be expected to overcome variations in the backgrounds which are greater than the tolerances that they are expected to achieve with the finished installation.

Tolerances for the finished works and the associated substrates should be agreed and ideally documented prior to the commencement of the project for each element where stone is to be installed. It may be that it is agreed that the stone installer is instructed to level the floors or skim the walls, but this would be works which need to be clearly instructed and fully documented.

The stone installer should ideally be given the opportunity to inspect the offered surfaces before accepting the areas where the stone is to be installed. The stone installer should reject these areas and inform the contractor should they be out of the agreed tolerances in any way. The contractor should arrange to rectify the areas before making them available to the stone installer. These events should be recorded in writing.

Adequate time should also be allowed for screed beds to cure and dry prior to stone installation.

9. Respect for the material and value

For internal installations, the stone is essentially a decorative finish – it cannot be considered as a base building material. It is inherently fragile, and the surface of the material is easily damaged by unacceptable contact with other building materials, equipment or products – in solid or liquid form (as stone may stain or be etched), or by lack of care by subsequent trades.

In many cases the stone is the most expensive finish and also the most fragile, which is not always appreciated on site. Very often the stone installer is pressured into installing before the site or areas are in an appropriate state to facilitate the stone being safely handled on the site or at a point when the risk of damage to the installed stone by following trades is high.

Examples would include:

- The progress of the site is not far enough advanced and there is inadequate clear passage and space to safely move the material
- The progress of the area in which the stone is being installed is such that there is significant works required following the installation of the stone by following trades which puts the stone at risk regardless of protection strategies.

It would be strongly advised that every action is taken to avoid these situations occurring.

10. Timing of inspections/snagging on completion of installation or after all other trades have finished

The timing of any inspection of the stone installation and snagging should be agreed prior to works commencing and should be documented within 'Inspection and Test Plans' (ITPs).

There will be individual parts of the installation that may warrant inspection at pre-determined points – however the snagging inspection by the contractor should only take place after the following:

- The stone installation has been fully completed (including grouting and sealing).
- The completion of the stone installer's own snagging, and rectification of those snags.
- The handing-over of the stone installer's snagging and clearance document to the contractor.
- All other works by other trades being completed.

In the event that the contractor deems that the inspection should take place before other trades are complete, the inspection should be completed, documented with photographs and acknowledged that at the time of handing back to the contractor the installation was defect free. Any further items arising following the works by other trades are not snags but damage caused by others which are the responsibility of the main contractor.

11. Programme and time allowed for the completion

It is imperative that programmes are agreed between the main contractor and the stone installer and that they are sufficient to carry out the works to the highest standard. This will include;

- Consideration within the programme to allow for safe movement of stone to the fixing point.
- Sufficient time for finishes such as screeds and plastering to dry and cure.
- Sufficient time for the curing of all adhesives, grouts, glues and sealants as per the manufacturer's instructions.
- Allowance for the finishing of edges such as mitred corners or similar.
- Allowance for appropriate protection to be installed.
- Sufficient time for the above before other trades are allowed to work on the stone.

The programmes and duration of the works agreed at the outset must be maintained throughout the project regardless of any adjustments to the start dates unless agreed by the stone contractor.

Lack of a sufficient time allowance will undoubtedly have an adverse impact on the quality of the completed installation.

12. Distinction between damage by others and snagging of the work

The stone installer and the main contractor (and where appropriate architect, designer and/or client) should inspect the installation prior to the stone installer applying protection (at whatever stage that my occur). Photographs should be taken to record the condition of the installation and any damage to the material documented and agreed. It may be that at this stage the stone installer will rectify the issues and then re-inspect with the main contractor.

The record created will form the basis against which future damage will be assessed. Any damage following this inspection and hand-back to the stone installer will be deemed damage caused by others.

Typical examples of damage are;

- Scratches from metal screws (or similar) which get under the protection.
- Scratches and damage when installing sanitaryware – the most common being scratches from tools used to tighten taps (or similar).
- Cracking of the stone due to over tightening of taps (or similar).
- Stains from products used by other trades.

13. Failure arising from inadequacies or failure of the substrate

There may be instances where there is failure of the stone during the installation process which arises as a result of issues or defects in the underlying substrates. It is important that the following steps are undertaken during the pre-installation period;

- Assessment and comments by the stone installer to the main contractor of the substrates proposed against the relevant standards and best practice.
- The main contractor should agree to make any changes to ensure that substrates are compliant with the relevant standards and best practice.
- The main contractor should be aware of the importance of their sign off of the preceding trades work – that the construction is in accordance with the agreed design and has been properly constructed.

Therefore, in such circumstances failure of the stone as a result of inadequate or incorrectly constructed substrates rests with the main contractor.

14. Time between installation and inspection with natural stone protected and covered

The installed stone should be protected before any other trades are re-admitted to the area – ideally this will be following the completion of the stone installation with due allowance for curing and setting of all adhesives, grouts and sealants.

It is appreciated that this process cannot/does not always happen when the work is complete and there may be times when the protection needs to be applied prior to completion of the works. Where this is required the stone installer should ensure that it happens at a suitable point where the stone is not compromised.

15. Management of the stone installation process by the client/design/contractor team to ensure consistency

The selection of stone can be an involved process which covers both aesthetic considerations (which can be quite subjective as already discussed) but also covers the inherent features of the stone that include but are not limited to stylolites, fissures, and pits (which are objective) and technical considerations such as manufacturing tolerances and where appropriate a review of Declaration of Performance and UK CA Marking information. This is often recorded in the range selection report (see Section 3) which should be used in both the selection and procurement process.

Too frequently the range selection report is effectively discarded at the installation stage and the inspection and snagging process becomes a subjective exercise based on the opinion of a person who may have had little or no experience in stone and who did not participate in the original inspection and selection process.

It is recommended that whenever possible there is continuity of the contractor's personnel throughout the process from selection to installation to ensure that there is an understanding of the material selected and installed.

It is incumbent on the stone installer to ensure that any characteristics of the material being used are documented at the outset and explained during the selection process so that they can all be considered in context during the installation inspection/snagging process.

16. Snagging and the withholding of payment

It is the purpose of the 'retention' to ensure that the work under the contract is properly completed – this includes snagging. The inspection and snagging process should not be related in any way to release of payment or monies due and this should ideally be made clear in the contract.

Generally snagging items will be items that require attention but are not sufficiently significant to delay practical completion

In Walter Lilly & Company Ltd v Mackay and DMW Developments [2012] EWHC 1773 (TCC) it was recognised that there will always be minor deficiencies or incomplete items of work which will be required to be completed before handover, however, if there is an excessive amount of snagging and therefore more time than would otherwise have been reasonably necessary to perform the de-snagging exercise has to be expended, it can potentially be a cause of delay in itself.

It is therefore both in the interests of both the stone installer and the main contractor to ensure that there is a robust system in place to snag and de-snag in good time – and the time for this should be reflected in the agreed programme.

Selected References

1. British Standards Institution. BS EN 12057; Natural stone products — Modular tiles — Requirements.
2. British Standards Institution. BS EN 12058; Natural stone products — Slabs for floors and stairs — Requirements.
3. British Standards Institution. BS EN 1469; Natural stone products — Slabs for cladding — Requirements.
4. Marble Institute of America. Marble Soundness Classification; January 2005
5. Marble in Architecture. Types, characteristics and processing of natural stone; F.Bradley, A. Cordiviola, P.Primavori 2002.
6. NHBC Standards. Chapter 9.1 A consistent approach to finishes.

Stone Federation Great Britain believes that this advice contained in this document is in accordance with the latest technical developments and good practice. No responsibility is accepted by the Federation, its servants or agents, in respect of the application of this advice to a specific project.

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