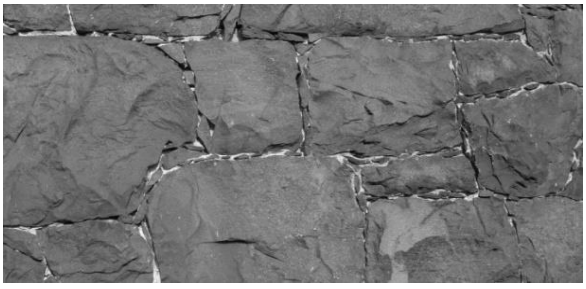
The Conservation of Galleting & Pinning

An assessment of policy and guidance





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References:

BS7913:2013 Guide to the conservation of historic buildings. ©The British Standards Institution.

CONSERVATION PRINCIPLES Policies and Guidance. Historic England.

THE SPAB APPROACH: The Society for the Protection of Ancient Buildings.

Information is provided on the understanding that it is given in good faith and within the limits of current knowledge.

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Old I am, so very old,

Here centuries have been

Mysteries my walls enfold

None know deeds I have seen. *

* Charles P Wade, a former
owner of Snowshill Manor.

The Conservation of Galleting and Pinning

Should missing galleting and pinning be replaced?

A personal assessment and interpretation of available guidance by Colin Arnott

Introduction

The term ‘gallet’ usually refers to a small piece of stone, stone substitute such as a fragment of roof tile, or an oyster shell. In the case of the latter these form part of the mortar bed onto which the next course of masonry is laid. All other gallets are pressed into the prepared mortar joint and become an integral part of the joint. This applies equally to pinning.

Fig. 1 Ragstone galleted wall, Kent

Fig. 2 Typical ragstone gallet

Galleting forms part of the fabric of a large number of masonry buildings on an international scale. Galleted mortar joints have a very long life span, usually measured in centuries, but will eventually deteriorate with the resultant loss of mortar and gallets. Difficult decisions have to be made when repointing becomes necessary in order to preserve the masonry, decisions that are informed by research into the building and by conservation policy and guidelines. Some important extracts from 4 key policies and guides are provided below along with suggestions as to their relevance to galleting.

Legislation and policies

1. Listed Building Consent

“For listed buildings or buildings that are scheduled monuments, consent will usually be needed before any repointing is carried out” whilst “Work to buildings in conservation areas could require consent depending on the degree of planning controls in place.” (Historic England – Repointing Brick and Stone Walls).

The omission of galleting may be considered to be an unacceptable change in the appearance of a building, affecting its architectural interest and aesthetic value whilst, at the same time, impacting upon the structural integrity of its masonry.

2. BS 7913:2013 Guide to the conservation of historic buildings

Section 5 of the B S describes best practice in the management and treatment of historic buildings.

Para 5.2 Heritage management principles "Historic buildings should be maintained for the benefit and enjoyment of current and future generations."

"Where management planning involves change to the fabric - - - the potential impact of that change on its significance should be identified and quantified. Impacts from change can be direct (i.e., affecting the fabric, attributes or character of the historic building)."

NOTE ON GALLETING: Galleting is part of the fabric of a wall and its omission does have an impact in line with all the examples quoted. Research (1) has shown that gallets when inserted into a mortar joint become an integral part of the joint and therefore an integral part of the wall in every respect.

Section 6 of the B S addresses care in the repair of fabric and other interventions.

Para 6.3 Assessments of performance and pathology

Para 6.3.1 General "Considerable resources can be expended in implementing measures that address the symptoms of a problem and not its cause, which can incur recurring costs. This could give a perception that older buildings come with a high maintenance cost and are inherently defective."

"The majority of historic buildings, - - - were constructed from materials assembled using techniques which were well understood at the time. - - - preventative and remedial measures can be taken that allow the retention of original historic fabric and ensure its longevity."

"Pathology - - - encompasses the way the components interact."

Para 6.4 The purpose of repair The main objective of repair is to bring back a historic building into good condition, while retaining its significance."

Para 6.7 Proven techniques "A principle objective of repair is to retain the performance of the existing fabric. This is usually best achieved by using matching materials and traditional repair techniques."

Para 6.10.4 Repointing "The new pointing should match the existing colour and texture of the aggregates. In historic buildings of particular significance the mortar composition should be based on an analysis of the original mortar."

NOTE ON GALLETING: This section emphasises the need to match original materials in order to maintain the structure in accordance with the techniques that were well understood at the time of construction and retain the performance of the structure.

Section 7 of the B S describes maintenance as “the continuous care of a historic building and is the most common and important activity in their care and preservation.”

Para 7 Maintenance

Para 7.1 Maintenance guidance “Good maintenance is cost effective; systematic care can often prevent further decay and avoid the need for major intervention at a later date by establishing a consistent level of good repair.”

Para 7.2 Maintenance strategy “They should specify preventative rather than corrective action with minimum intervention, and repair over replacement.”

Para 7.4 Maintenance in practice “Materials selected should be of appropriate quality, suitable for the intended use and sourced for the particular historic building to achieve best performance match as well as best aesthetic match.”

NOTE ON GALLETING: The comments in the conclusions to the previous sections above which refer to the fabric of a structure and to matching materials apply equally to the care and repair of a structure since the ultimate aim is the same and of equal importance.

3. Historic England Policy

Local Authorities have available to them the guidelines set out by Historic England in **“Conservation Principles, Policies and Guidance”** (CPPG). These are general guidelines that apply to everything, no matter how large or small, that contributes to the local environment and the ‘place’ in which they exist, place being very important in this context.

Managing Change to Significant Places (CPPG p. 44). Although repair and maintenance are not classified as a change it is pointed out here that “There is rarely a single right answer, so adequate information and adopting a consistent, rigorous process are crucial to reaching publicly- justifiable decisions.”

Consider the effects on authenticity and integrity (CPPG p.45 para 93) “A desire to retain authenticity tends to suggest that any deliberate change to a significant place should be distinguishable”.

(para 94) “Integrity (literally, ‘wholeness, honesty’) can apply, for example, to a structural system ---- the way materials are used --- or functionality. Decisions about recovering any aspect of integrity that has been compromised must, like authenticity, depend upon a comprehensive understanding of the values of the place, particularly the values of what might be lost in the process.”

Repair (CPPG p.52 para 117)

“Repair necessary to sustain the heritage values of a significant place is normally desirable if:

a. **There is sufficient information comprehensively to understand the impacts of the proposals on the significance of the place; and**

b. **The long term consequences of the proposals can, from experience, be demonstrated to be benign, or the proposals are designed not to prejudice alternative solutions in the future; and**
c. **The proposals are designed to avoid or minimise harm, if actions necessary to sustain particular heritage values tend to conflict."**

Para 118 "It is important to look beyond the immediate need for action, to understand the reasons for the need for repair and plan for the long term consequences of inevitable change and decay. While sufficient work should be undertaken to achieve a lasting repair, the extent of the repair should normally be limited to what is reasonably necessary to make failing elements sound and capable of continuing to fulfil their intended functions."

Para 119 "The use of materials or techniques with a life span that is predictable from past performance, and which are close matches for those being repaired or replaced, tends to carry a low risk of future harm or premature failure."

NOTE ON GALLETING: Historic England places all the emphasis on the importance of the environment in which a building exists and the need to ensure that work carried out in maintaining a structure does not adversely affect the appearance or durability of a structure. Gallets have been shown by recent research (1) to significantly improve the durability of a structure whilst retaining the original appearance.

4. SPAB

SPAB is a long standing and well-respected society that provides guidance on the care of ancient buildings as well as being very influential in their conservation. The society's policy regarding conservation is summed up in **"The SPAB Approach** to the conservation & care of old buildings"

Historical background Page 6 "Ruskin called restoration 'a lie from beginning to end' because it sought to change the character of an old building by erasing the evidence and record of its true history."

A conservation philosophy Page 7 "The SPAB approach is based on the protection of 'fabric' – the material from which a building is constructed."

"Building fabric is precious. A concern for its protection helps ensure the essence of an old building survives for future generations to appreciate."

Repair not restoration Page 11 "the Society believes that damaged or missing elements of a building do not necessarily need to be replaced, except where there is a functional need. Then small scale, localised reinstatement may be justified, but only if carried out for well-considered, practical reasons."

Conservative repair. Page 14 "Conservative repair can embrace a wide range of techniques. Its aim is to retain as much as possible of a buildings historic fabric. Sometimes it involves matching the existing materials of a building and sometimes the use of compatible alternatives. Conservative repair is based on thorough investigation and understanding of

the whole building and the element directly concerned. It requires careful planning and appropriate craft skills. A good repair deals quietly and modestly with a problem."

NOTE ON GALLETING: Much of The SPAB Approach focuses on the conservation of the fabric of a structure, the protection of which helps to ensure that a building survives for the future. Gallets have been found to be an essential element of the fabric of a structure and fulfil a functional need (1).

What is a gallet?

A gallet or pinning stone is a piece of stone or similar material that is pressed into the mortar of a masonry joint while the mortar is still soft, see Figs 1 and 2 on p.1. It may also be an oyster shell although this is set into the mortar bed.

Gallets have a very specific purpose and to achieve this they must be of a suitable size and shape and installed correctly.

Why use gallets?

Gallets must be carefully prepared to fit comfortably into the mortar joint and fit with each other. They should enter the mortar with the minimum of force. When carried out correctly the effort will be well rewarded by having a structure that will endure for many years without the need for further work.

How does galleting meet the advice given in the guidance?

Listed Building Consent

Historic England provides guidance which helps achieve compliance, see below.

BS 7913:2013 Guide to the conservation of historic buildings

The requirements of this British Standard are encompassed in both the Historic England and SPAB guidelines which seek to match the original construction as the best way to ensure longevity and achieve best performance match as well as best aesthetic match.

Historic England Policy

Gallets are usually used where the mortar joints are wide, such as in masonry of hard, difficult to work stone and in random rubble walling. They are commonly made of stone that matches the masonry and become a part of a uniform overall appearance. Without them the mortar, a white lime mix, can become a stark and over dominant feature which may be damaging to the place that Historic England seeks to protect.

Aesthetics

Take, for example, this important Grade l Listed Building in the heart of Norwich.

Fig. 3 This is a view of the Norwich Guildhall.

It was constructed in 1407 and was the largest and most elaborate medieval City Hall ever put up outside London

The masonry is of black flint with matching gallets, features that distinguish Norwich and help to create the sense of place. This is achieved because, like most of the buildings in the area, the whole building, apart from the chequer work, appears to have black walls as a key feature.

Fig. 4 shows a small area of wall which is located on the same façade as seen in Fig. 3. This illustrates the black effect of the flints in combination with matching gallets. The recent repair may be a temporary intervention to protect the flints from weathering and possible detachment but it helps to illustrate the damaging effect of omitting a significant element of the fabric. The ambience of the area is affected by the sharp contrast.

This will not apply in every case, the example here showing an extreme case, but it demonstrates the dangers of a failure to give due consideration to the implications of an action.

The SPAB Approach

This places emphasis on the importance of the fabric of a structure and is in line with Historic England's requirement for integrity which it describes as applying to for example, "a structural system --- the way materials are used --- or functionality". To better understand how galleting complies it is necessary to look at the way in which it functions.

Structural benefits

There is a mason's rule of thumb that states that any mortar joint that exceeds a finger's width should be galleted. This is a reliable guide and there are good reasons for adhering to it.

The typical "Life cycle" of the lime mortar joint was well described in "Mortars, Plasters and Renders in Conservation" by John Ashurst. He demonstrated how mortar loss could potentially start early in the life of a joint and it was thought this may be down to weathering. However, the very high stresses that occur in the vicinity of the external face due to shear causes a similar failure of the exposed mortar (1). Tests have shown that the inclusion of gallets solves the problem as the gallets take all the stress and will do so until the gallets fail, leaving the mortar less affected (1).

When gallets are inserted into a mortar joint they create pressure within the depth of the joint. Pressure on mortar increases its compressive strength (2) and in the case of a galleted joint the mortar becomes much stronger. This reduces the risk of movement in a wall as its height or loading increases potentially increasing the speed of construction. In the long term the loading capacity is significantly increased.

A further advantage is the considerable reduction in shrinkage that occurs in galleted masonry, greatly reducing the risk of shrinkage cracks. This may lead to a reduction in thermal stresses that occur at the mortar/masonry stone interface (3)

Should missing gallets be replaced?

There is considerable consistency between the policies and guidance of BS 7913, Historic England and SPAB.

In the interest of achieving correct repair and the wholeness of a building or place Historic England indicates a preference for replacement. SPAB takes a slightly more cautious approach stating that replacement should only apply where there is a functional need.

Gallets are a form of reinforcement without which the strength and integrity of a mortar joint are significantly diminished and they therefore serve an important functional need as well as enhancing the life span of a structure for the benefit of future generations. It would appear that our ancestors had an excellent understanding of the materials that they were working with.

The answer is down to an interpretation of the guidance in the light of the latest evidence. This would appear to suggest that replacement is to be preferred. It is important that good repair is encouraged and the necessary information and guidance provided so that disrepair is reduced. Sometimes the cost of repair is used as an excuse to avoid correct repair but this is not an acceptable reason.

Fig. 5 In the picture on the right the original galleting can be seen top right. Below this on the bottom right is a sample of ribbon pointing poorly applied around the gallets (or pinning) and bottom left the correct application of traditional lime mortar repair. This provides a helpful comparison of good and bad contained in a single sample of masonry.

Fig. 6 The picture on the left illustrates how a repair should not be executed. The mortar appears to be applied without any regard for the form of the blocks of masonry, bears no relationship to the original and is already failing.

Fig. 7

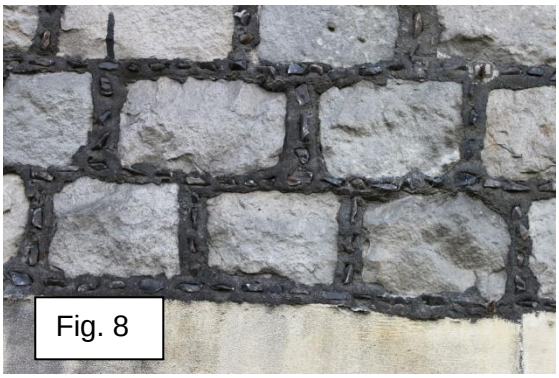

Fig. 8

The masonry at Windsor Castle is galleted throughout although very little of it is original. Fig. 7 illustrates some galleting from the time of Henry Vlll; earlier galleting is to be found elsewhere in the castle. These provide a useful guide to the correct treatment of masonry for a given period when carrying out repair work.

Sir Owen Morshead, the Queen's librarian, wrote of galleting in his 1951 book "Windsor Castle" that it "affords to the practiced eye a convenient indication of date. Here and there

glimpses may yet be seen of galleting in its original condition but for the most part it was done afresh, and after a meanly imitative fashion, by Wyatville, who repointed the castle in a dismal mortar of black ash." (Fig. 8).

What are the long-term implications of replacing galleting?

To satisfy the demands of the policy documents set out above it is necessary to show that:

a. The gallets serve a functional need
b. Gallets help to preserve the precious building fabric
c. Reinstatement can be justified
d. Repair is necessary to sustain the heritage values
e. Life span is predictable from past performance

These are satisfied in the following ways:

1) Gallets fulfil several important functions by:
    i) Increasing the compressive strength of the mortar joints. The size of the gallets is very important, the larger the gallets the greater the increase in compressive strength therefore matching the existing in every detail matters.
    ii) significantly reducing shrinkage of the mortar
    iii) improving the durability and extending the life span
    iv) controlling surface water during rainfall. It is sometimes claimed that they act as drips to dispose of surface water but this is not the way they work. This theory probably derives from the fact that the surfaces of masonry usually stay dry in galleted masonry which is true but the way they achieve this is not through discharging water away from the wall. This is particularly valuable for masonry in vulnerable locations such as at high level, especially parapet walls

2) Smith (1904) observed that only the outer face of pure lime mortar in a joint achieves a set in the short term and that "The result of this is that a heavy pressure is thrown upon the outer edges of the bricks or stones, and they become flushed, that is, chipped off." (Smith P. *Rivington's building construction.* Shaftsbury: Donhead Publishing Ltd.). He fails to note that this damage to the fabric of the building only occurs if gallets are omitted from the mortar joint.

3) Large buildings with a very long history can be repaired many times over the centuries. If this is not continued into the future the record will be gradually lost and the history of the building harder to read. This particularly applies to galleting which defines a building and the different stages in its construction as demonstrated at Windsor Castle.

4) Heritage value is embodied in a building, its contribution to the area and its history. For example, the Norwich building mentioned above was constructed at a significant time for the city when an important hub was needed. Disrepair should be considered unacceptable.

5) The exceptional durability of galleted masonry results in greatly increased life spans. Very wide mortar joints have been found to start deteriorating early on due to the high

stresses that develop near the surface of the mortar. Repointing is common within 50 – 100 years. Galleted masonry can last for 400 – 500years.

To conclude

Let us revisit 3 of the most relevant extracts from above:

B.S. 7913 (Para. 6.10.4) states that repointing mortar should match the composition of the existing. In galleted joints the gallets are an integral part of the mortar and change the composition of the mortar and become part of the composition. It is unlikely that the mortar could be matched without them.

(Para. 7.4) states that materials should achieve the best performance match as well as best aesthetic match. Recent research has proved the importance of the performance of galleted mortar (1) and therefore only a matching repair can achieve this.

C.P.P.G (Para. 119) “The use of materials or techniques with a life span that is predictable from past performance and which are close matches for those being repaired or replaced tends to carry a low risk of future harm or premature failure.” With centuries of history behind it, galleted masonry comes with a valuable provenance and its predictability is unquestionable.

But a comprehensive understanding is vital to its correct use and appropriate training is essential.

References:

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20 years of research including several years full time study at Anglia Ruskin University, a 200-page thesis on different aspects of galleting and its structural benefits, and the creation of a web site has resulted in a large amount of accumulated information on this subject.

The importance of galleting is partly down to its relevance to the environment but more significantly to the increase in the strength and durability of the masonry that is imparted by the act of inserting the gallets into the mortar joints of a masonry structure.

This provides evidence for the need to preserve this traditional craft and to ensure that it is correctly assessed when determining policy.

More information about galleting is available at galleting.com