

REINFORCED AUTOCLAVED AERATED CONCRETE (RAAC)

At the time of writing this publication, the education sector has seen a further 27 education settings within which Reinforced Autoclaved Aerated Concrete (RAAC) is present, added to the 147 announced previously by the Department for Education (DfE). It is posing without doubt a significant strain upon the education sector, not only from a financial perspective but also and more critically impacting the ability to provide the highest quality teaching and learning environment for our young people.

The DfE have in recent weeks revised their guidance in connection with this process. Published on 30th August 2023, this is the third revision of the document, and provides brief guidance into the identification of RAAC and advice around appointing a specialist to support this process.

Baily Garner have supported a number of our Clients in undertaking inspections to identify the potential presence of RAAC within their estates. This includes a number of Local Authorities and Multi-Academy Trusts.

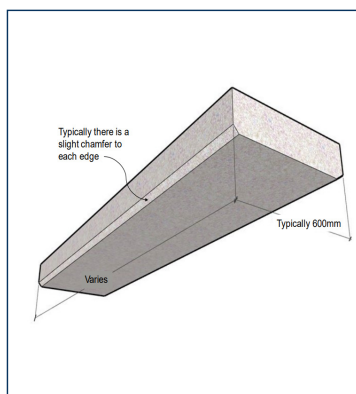
We also understand the impact on wider building stock, and in particular emergency services, healthcare, housing

and commercial portfolios where we are also supporting our clients in developing strategies for undertaking surveys and wider management should RAAC be discovered.

What is RAAC?

RAAC is a lightweight pre-cast concrete, utilised in construction between 1950 - mid 1990's. Although mostly found in flat roofing, it was also used in construction of pitched roofs, floors and walls. Formed in panels, or "planks", studies of this lightweight concrete have identified that the material has limited structural integrity, meaning it is susceptible to failure without any evident defects.

The most well documented incident occurred in 2018, where a school roof constructed using RAAC collapsed. In 2021 and 2022, the DfE sought to engage with responsible bodies to further understand the presence of RAAC in schools to inform the extent of the issues. During the summer period of 2023, it was reported that a confirmed RAAC installation previously considered low risk had collapsed, leading to a change in policy and approach from the DfE.



Taken from DfE Guidance document, dated August 2023.

What are the risks and causes of failure?

Inadequate Bearing

One perceived reasoning behind the failure is poor bearing of the panels – this is the structural support provided by the building structure onto which the RAAC panels are installed. The codes of practice of design during the period (CP114 and CP116) recommended end bearings of only 45mm for roof panels and 60mm for floor panels. This differs significantly from modern methods of construction and good practice of 150mm and poses a significant risk of failure.

A further item linked closely to this is the condition of the end bearing itself. Where inspections are undertaken utilising the DfE guidance, the visual inspection alone shall seek to only identify the presence of RAAC in the first instance, not necessarily the condition of aspects such as the bearing. It is recommended by The Institution of Structural Engineers (April 2023) that not only is the bearing width verified but the condition is considered as one of the primary areas of concern in identifying the condition of RAAC.

Adaption of Panels

During installation, it was possible for panels to be altered to suit their purpose. This may be to reduce the length of the panels or for service penetrations. Where original construction steel hangers may have been used to support panels, any adaption to the panels may not provide such support, therefore also presenting inadequate bearing of the panels.

It is also possible that further modifications have been made through the life of a building which may have impacted the integrity of the panels. This may be due to an absence of professional support in project delivery or lack of contractor knowledge and understanding of this type of construction.

Imposed loadings

The way in which we use and interact with our buildings has changed significantly since RAAC was introduced, none more so than our schools. This includes adaptations to meet the complex needs of students or accommodating and adapting to suit modern methods of teaching and learning. A common risk is imposed loading to flat roof areas and in particular the introduction of mechanical plant.

Where RAAC is present and such additions have been installed without due consideration for the construction or structural integrity of the roof, this can impact the integrity of the element. This includes deflection of the panels which, coupled with the insufficient bearings and minimal reinforcement, is considered a major risk factor in assessing the integrity of any RAAC installation.

Water Ingress

A perhaps more obvious risk to RAAC is failure of roof coverings and saturation of the panels which leads to increased weight. This will also impact the material strength, and corrosion of the reinforcement leading to spalling of the concrete. Noting the aerated nature of the material, considerable corrosion may occur before spalling becomes evident. Any water ingress and saturation will also increase the weight of the panels over time, impacting the strength of the panels.

Site investigations – Our approach

There are a number of key stages we are undertaking to support our clients in considering the above and identifying the presence of RAAC within their estate.

Stage 1 – Desktop Review

The first key activity is the desktop review. By reviewing existing building information, it is critical that a copy of asbestos records (discussed further in this document), site drawings and where possible historical aerial photography is reviewed. It is important to consider changes to the building over its life, which will determine the extent of the survey required.

Review of historical building information, including planning history or historical aerial photography will assist in this process and provide clear direction for a thorough, targeted inspection to be undertaken. From this point, we shall identify the areas of the building requiring inspection based on age and construction.

We shall review the asbestos records within our identified survey areas. To streamline the inspection process, it may be necessary to appoint a specialist asbestos contractor to undertake opening up in defined areas to facilitate the inspection. As part of the desktop review, areas requiring inspection shall be determined allowing the appointment of specialists in a timely manner. This may be, for example, where a textured coating to a ceiling is a confirmed Asbestos Containing Materials (ACM). This initial review ensures abortive visits are avoided, and inspections are thorough.

Stage 2 – Identification Inspection

Once confirmed and appropriately coordinated, the inspection can take place. The DfE have identified key characteristics by way of an “RAAC Checklist” within their guidance which should form the basis of all initial, visual inspections to identify the potential presence of RAAC.

These are as follows;

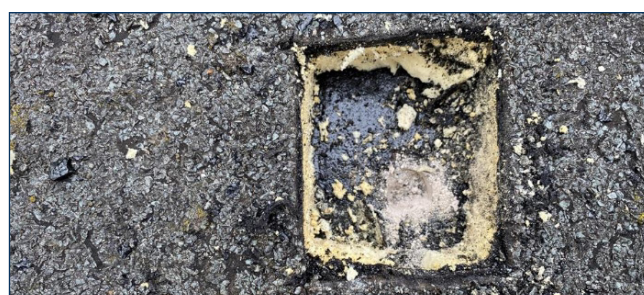
- Concrete panels, typically 600mm wide
- Distinctive chamfer to the edge of the panels, forming a “V” shape where panels meet
- Appearance of white or light grey
- Lightweight and “softer” than traditional concrete – A screwdriver can be pressed into the panels and will leave an indentation.

During our inspection we shall identify the construction of the appropriate elements as defined in the guidance, and clearly identify on our survey data the findings within the specific rooms inspected.

Utilising this data and in summarising the findings of both the desktop review and inspection, we shall produce a report identifying the rationale and findings.

Stage 3 – Intrusive Investigations

It may be necessary to undertake intrusive investigations should the inspection be inconclusive; an example again being a plaster/decorated finish to a solid ceiling/floor. Once confirmed as not an ACM, we shall discuss with our Client’s the potential for further intrusive investigations. In this instance, we would follow guidance from both The Standing Committee on Structural Safety (SCOSS) and The Institution of Structural Engineers. This would be a small and intrusive drill sample to assist in discreet locations. Given the potential softness of RAAC in contrast to traditional concrete, this must be undertaken with considerable care.



Core sample of flat roof, RAAC identified.

Stage 4 – Risk Appraisal and Remediation

Should RAAC be identified, we shall implement an immediate risk appraisal of the element in line with the key risk areas, including recording the condition and width of the bearing and any deflection or cracking which may be present. Utilising the recommendations of The Institution of Structural Engineers, we shall also support in defining the extent of remedial works, and strategy for monitoring and managing RAAC and consideration of steps in altering building use or occupation accordingly.

We shall appoint and work collaboratively with a Structural Engineer in such instances to agree practical and effective solutions, whilst prioritising at all times the safety of the building users.

Understanding your assets

Although the importance of identifying RAAC and aspects on the previous pages cannot be underestimated, this should act as a timely reminder for all responsible persons to ensure a full understanding of their assets. It is important to consider when inspecting for RAAC other potential deleterious materials and impact this may have on both the operation of the building and the safety of those using and maintaining the asset.

A significant consideration must be asbestos, noting advice from wider industry professionals that RAAC may be encapsulated, or impacted by, the presence of ACM's. As such, any surveys seeking to confirm the presence of RAAC must be subject to a thorough desktop review alongside the person responsible for managing the building(s) to ensure the safety of both surveyors and building users.

In our experience this can be a time consuming but essential process as part of a desktop exercise and, if inconclusive, or ACM's are indeed present in the inspection areas, this may require further testing and intrusive investigations in

controlled conditions to undertake the survey. This should be appraised in embarking on RAAC surveys to identify the input required by other specialists and how this may impact the prompt conclusion of surveys.

Baily Garner have expertise and experience through our multi-disciplinary teams to support our clients in identifying the presence of RAAC. Our surveyors have both the technical knowledge around identifying RAAC and hands on experience undertaking the surveys, underpinned by our rigorous quality assurance process and review by a Chartered Surveyor to verify the findings. For those yet to embark on this process in their estate and would benefit from our support, please contact us to provide further information and work with you to carry out an inspection in line with the above.



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References:

The Institution of Structural Engineers, 2023, "Reinforced Autoclaved Aerated Concrete (RAAC) Investigation and Assessment – Further Guidance"

Department for Education, 2023, "Reinforced Autoclaved Aerated Concrete (RAAC): Identification guidance"

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