

Information and FAQs on reinforced autoclaved aerated concrete (RAAC) from the Construction Leadership Council (CLC)

This information was compiled by the RAAC Industry Response Group of the Construction Leadership Council

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What is RAAC?

1. RAAC is a lightweight, aerated form of concrete in widespread use in construction in the UK from around 1950 until the mid-1990s. The properties of the material and structural behaviour differ significantly from ‘conventional’ reinforced concrete.
2. It is predominantly found as precast panels in roofs (commonly flat roofs but sometimes pitched) and occasionally in floors, walls and cladding. Panels forming flat roof structures are often difficult to access, and are therefore difficult to survey, maintain and replace (due in part to sub-ceiling structures, including services, suspended ceilings, finishes and external roof membranes).
3. Surveys also need to take account of the possible presence of other materials such as asbestos, see the answer below (How do I identify if RAAC is present and what other concerns should I be aware of?). But to note, not all buildings which have RAAC contain asbestos.

How widely was RAAC used in the UK?

4. RAAC gained popularity in the mid-1950s as a cheaper and more lightweight alternative to conventional reinforced concrete. Hundreds of thousands of RAAC structural panels exist across a broad cross-section of buildings, including schools, hospitals, residential accommodation, substations, ambulance stations and many other buildings. In buildings with RAAC there are often many RAAC panels. Some hospitals, for example, have as many as 10,000 RAAC panels.

What are the problems with RAAC?

5. When properly designed, manufactured, installed (and with good bearing, that is supports) and well maintained, RAAC installations are considered as safe as any other form of construction.
6. If overloaded or not maintained well then panels can deflect over time, and this process of deterioration can be exacerbated by water penetration. RAAC buildings can also deteriorate because of general wear and tear, seasonal loading (rain, wind and snow) and excessive loading and poor handling during maintenance procedures, such as roof repairs. Of course, this sort of misuse does not help *any* building material and is not just an RAAC issue.
7. With RAAC, deterioration caused by these factors, particularly when combined with hidden risks from the lack of appropriate bearings, could lead to failure, and in the case of poor bearing, sudden failure. For instance, some buildings with RAAC have been surveyed and found to have bearings which are too small and/or steel reinforcement missing, or have been cut (sawn off) inappropriately, which can mean their structural integrity is compromised. They can fracture and collapse with little or no warning. Problems with inappropriate bearings can go unnoticed. These unnoticed problems with bearings have proved to be the biggest problem of unexpected collapse.

Why is RAAC in the news now?

8. It came to public and media attention when the Department for Education (DfE) updated its approach to RAAC in education settings and published updated guidance for schools and colleges in England in August 2023. This is because of new RAAC cases including one at a school in England in August 2023 where a RAAC panel that had previously been graded as non-critical failed.
9. The DfE also analysed two other examples of RAAC plank failures which quickly changed their perception of the risk of RAAC in education settings.
10. There have been warnings about the problems of RAAC for some time. In the 1990s, there had been other concerns raised relating to structural deficiencies in RAAC by both the Building Research Establishment (BRE) and the Standing Committee on Structural Safety (SCOSS). This is now called CROSS (Collaborative Reporting for Safer Structures).

11. In December 2018, the DfE and the Local Government Association (LGA) made building owners aware of a recent building component failure in a property constructed using RAAC. In May 2019, SCOSS raised an alert to emphasise the potential risks from such construction, highlighting the failure of a RAAC panel roof construction within an operational school. This collapse was sudden, with no apparent warning signs.
12. The DfE then issued guidance on how to identify RAAC in February 2021. In 2022, the Department issued a questionnaire to responsible bodies for schools in England and started a programme of surveys to assess whether RAAC is present. In September 2022, the Office of Government Property (OGP) sent a Safety Briefing Notice to all property leaders, regarding the dangers of RAAC.
13. Organisations like NHS England and schools had already started a programme of remediation before the DfE's latest incident and policy change. The NHS has been surveying, monitoring and remediating their RAAC buildings for more than 10 years.
14. In 2021, they concluded that there was insufficient technical guidance available on old/aged/deteriorated RAAC panels and hence commissioned research into RAAC panels led by Loughborough University. This work has fed into the NHS's remediation programme over the last two years. It has also fed into the guidance from the Institution of Structural Engineers (IStructE), accessible here: www.istructe.org/get-involved/study-groups/reinforced-autoclaved-aerated-concrete-planks/ as well as into recent industry and government discussions and guidance on RAAC, meaning that recent decisions are informed by the latest research and expert knowledge available.

What is happening now to identify and mitigate the problem?

15. A huge amount is happening across the Government estate. The DfE requested that all schools in England check if they contain RAAC. The DfE says that responsible bodies have submitted responses to the questionnaire for 99.9% of schools with blocks built in the target era.

16. As of October 16, the total number of schools where RAAC has been confirmed to be present was 214. Three schools initially thought to have RAAC were found not to contain it after initial tests and another 43 were added to the list. No schools are closed or carrying out remote learning, according to the DfE. Twelve education settings continue delivering a mix of face-to-face and remote arrangements. The remaining 202 schools that have RAAC continue having full in-person education.
17. The DfE is supporting affected schools and colleges to implement mitigation plans. Every school or college with confirmed RAAC is assigned a dedicated caseworker to work with them to assess what support is needed and implement mitigation plans. Project delivery teams are on-site to support schools and colleges, whether that is finding short-term accommodation options or designing and putting in place structural solutions for affected spaces. The Government will fund the emergency mitigation work needed as well as longer-term refurbishment or rebuilding projects to rectify the RAAC issue.
18. The NHS already had mitigations measures in place. According to a statement on the Department of Health and Social Care's (DHSC) website, the NHS' RAAC mitigation programme is backed with additional funding of £689m from 2021 to 2025. The NHS is at the forefront of understanding and tackling the issue and has issued instructions requiring the removal of RAAC planks by 2030.
19. On top of this, Government has announced that the seven NHS hospitals most affected by RAAC will be replaced by 2030 through the New Hospital Programme.
20. Other departments such as the Ministry of Defence and the Ministry of Justice are also surveying their estates.

How do I identify if RAAC is present and what other concerns should I be aware of?

21. Building owners should be identifying the age of construction (including extensions, modifications and so on) and possible locations for RAAC and collating documents that may make reference to the form of construction.
22. RAAC is lightweight and much more aerated than traditional concrete. In many cases, RAAC panels can be identified if a building's structure is not

covered by finishes or decoration (such as ceilings tiles). As a first step, RAAC panels tend to be 600mm wide with chamfered edges.

23. For safety reasons, before any further investigation is carried out, those who are trying to identify if RAAC is present in their buildings should consult the asbestos register and HSE guidance on managing asbestos <https://www.hse.gov.uk/asbestos/> and follow the HSE's standard assessment procedures for working at height. www.hse.gov.uk/work-at-height/
24. RAAC is a softer material than traditional concrete. If the structure can be penetrated relatively easily, the material is unlikely to be traditional concrete – but it might be RAAC. It could also be another building material such as plasterboard, or an asbestos containing material.
25. IStructE has provided guidance on RAAC inspections and surveys (www.istructe.org/resources/guidance/reinforced-autoclaved-aerated-concrete-guidance/) and provides some illustrations and photographs that show the aerated nature of RAAC. So too has the RICS (www.rics.org/news-insights/current-topics-campaigns/raac-advice-and-faqs), and the DfE (<https://www.gov.uk/government/news/new-guidance-for-schools-impacted-by-raac>).
26. The HSE guidance on managing risks and risk assessment at work contains practical steps for carrying out a risk assessment under health and safety law can also be found here: www.hse.gov.uk/simple-health-safety/risk/index.htm.

What about housing?

27. As far as we are aware to date, RAAC has only been associated with two estates which used a trade-marked type of RAAC construction called Siporex – at Basildon, Essex, and a site in Scotland. But landlords need to be vigilant. There was some local authority housing built in the 60s and 70s with flat roofs using RAAC, some of which would have been demolished, and RAAC was used in some student residences. Buildings from the 1960s and 1970s which have been converted into housing could contain RAAC, though, this is unlikely to be widespread.

28. In September, the Regulator of Social Housing wrote to those organisations (mainly housing associations and local authorities) that come under its remit pointing out that it “expects landlords to ensure that they have a good understanding of their homes, including building safety issues and whether homes contain RAAC components and the risk to tenant safety arising from these; that you develop proportionate mitigation and remediation plans where required; and seek suitably qualified advice where necessary.”
29. In line with the requirements of the Building Safety Act, in higher-risk buildings (residential buildings over 7 storeys or 18m in height) the principal accountable person will have to prepare a safety case report that demonstrates that they have taken all reasonable steps to manage the building safety risks (spread of fire and structural failure).

Is all RAAC over 30 years old dangerous and at risk of collapse?

30. The 30 year design life reported in the media is unsubstantiated. Research and surveying has shown that if RAAC that has been manufactured correctly, installed correctly, and if properly maintained and inspected and not overloaded its life can be longer than that. Water ingress can add to the dead weight, induce corrosion of the steel reinforcement and weaken the strength of the panels. As mentioned earlier, the risk of sudden failure can stem from RAAC panels with inadequate bearing (support) size. So, it is important that the bearings of the RAAC panels are inspected and measured.
31. Further research is being undertaken and new guidance is also emerging.

Is RAAC still being used?

32. RAAC is still manufactured and installed in many parts of the world including Germany, North America, Australia, China, India, Mexico and Japan and others. It can be an appropriate construction material if properly designed, manufactured, installed and maintained. As far as we know, use in the UK declined in the 1990s.

Useful RAAC guidance

Professional and trade bodies

The Institution of Structural Engineers (IStructE): www.istructe.org/get-involved/study-groups/reinforced-autoclaved-aerated-concrete-planks/ www.istructe.org/get-involved/study-groups/reinforced-autoclaved-aerated-concrete-planks/

The Royal Institution of Chartered Surveyors (RICS): www.rics.org/news-insights/current-topics-campaigns/raac-advice-and-faqs

Education (including schools), government and local authority buildings

Department for Education (DfE):

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1185593/GUIDE-DFE-XX-XX-T-X-9002-Reinforced Autoclaved Aerated Concrete Identification Guidance-A-C03.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1185593/GUIDE-DFE-XX-XX-T-X-9002-Reinforced_Autoclaved_Aerated_Concrete_Identification_Guidance-A-C03.pdf)

Health & Safety Executive (HSE): www.hse.gov.uk/education/raac.htm Scottish Government: www.gov.scot/publications/parliamentary-statement-reinforced-autoclaved-aerated-concrete-raac/

The Local Government Association (LGA): www.local.gov.uk/topics/housing-and-planning/information-reinforced-autoclaved-aerated-concrete-raac
www.local.gov.uk/parliament/briefings-and-responses/office-government-property-raac-safety-briefing-notice

Universities

Loughborough University: www.lboro.ac.uk/media-centre/press-releases/2023/september/living-with-raac/