Fragile Decks - Guidance

Fragile Decks

Falls through fragile surfaces, account for 22% of all falls from height fatal injuries in the construction industry.

Fragile surfaces and materials are those that will not safely support the weight of a person and any materials they may be carrying.

- Dead loads
- Live Loads
- Wind loads

Everyone involved in this type of work, including clients, designers and contractors should treat falls through fragile surfaces as a priority hazard.

Structural Deck

The structural deck provides the primary support for the roofing system. It must resist dead, live and wind loads, including storms. It must also be suitable for the proposed roofing system, and subsequent use.

Relevant structural and loading codes for each material must be followed, and the requirements of the current building regulations must be checked and observed. A structural engineer should be consulted to confirm compliance.

Note: If the use of the roof is to be changed, the suitability of the deck and the structure must be re-confirmed.

The deck may also be laid or fixed so as to provide a suitable fall for drainage of the roof surface, as required in the current BS6229 Code of Practice for flat roofs with continuously supported coverings.

Working on any roof is a hazardous activity, irrespective of whether it is fragile or non-fragile.

Work on roofs with such decks need a careful risk assessment agreed before commencement.

Strammit decks

Strammit decks are made from straw that has been compressed under heat and pressure and fused together with their own resins to form a slab typically 35mm to 60mm thick which is covered with recycled paper.

Strammit decks were used as a roof deck material from the mid-1950s. However due to the long term structural stability, especially if contaminated by moisture is now regarded as a fragile material under the guidance in HSG33 from the Health and Safety Executive.

All decks where strammit decks are found these must be removed and replaced with a non-fragile alternative.

Wood Particle board Chipboard decks

Wood particle board is manufactured from recycled wood chippings that are bound together with resins under heat and pressure to form a rigid board with a smooth finish. The boards are cut to variable sizes.

Wood particle board (chipboard) was used as a roof deck material from the mid-1950s. However due to the long term structural stability, especially if contaminated

by moisture is now regarded as a fragile material under the guidance in HSG33 from the Health and Safety Executive.

All decks where wood particle board or chip board is found these must be removed and replaced with a non-fragile alternative.

Woodwool Decks

Woodwool is a man-made open textured slab/board material about 50 to 75mm thick comprising shredded timber bound together in a Portland cement paste.

It was used generally during the 1960s until the late 1990s to provide insulation as well as a structural roof decking; it was also used as a permanent shutter to in-situ concrete.

Woodwool slabs were produced in typically 600mm widths, unreinforced for use over short spans and channel reinforced slabs for up to 4m, with a variety of surface finishes (prescreeded or unscreeded).

Woodwool slabs for roof decking were typically type SB to BS 1105:1981. Type SB had a minimum nominal thickness of 50mm and sufficient strength to be used without attracting the requirements of regulation 36(1) of the construction (Working Places) Regulations 1966. These regulations apply to working surfaces which are not considered to provide a safe working platform and restrict the use of woodwool to type SB slabs.

Woodwool in all its forms (Channel reinforced, unreinforced, screeded and unscreeded) is now classified as a fragile material under the HSE - Health and Safety in Roof Work (HSG33)

Survey

An existing woodwool slab deck must be regarded as fragile, and should either be stripped and replaced with a suitable alternative, or possibly over-decked with a quality timber based panel.

In the latter case, the structure and its supports must be confirmed as suitable for additional loadings, and a safe procedure and method of work adopted.

Prior to any specification decisions, it is essential that such substrates are identified, and appropriate solutions and safe methods should be developed – initially for the inspection and then for working on the roof.

Wherever possible, a full visual internal inspection should be undertaken, to determine the type and condition and orientation of the deck. In particular, the signs listed for each woodwool deck type should be checked.

Woodwool slab (unreinforced)

- Visible damage or staining to the underside, or sagging between joists can indicate wetting or cracking

Woodwool slabs (channel Reinforced)

- As for woodwool slab, plus corrosion of channels, or displacement of slabs from the channels.

Using pertinent safety measures, an external inspection should follow, which may reveal deflections due to collapse between joists, or other deck damage.

Core sampling of the roof build up in several different locations should then be used to establish the full build up and history of the roof. If documentation is unavailable, and/or an internal inspection is impractical, such core sampling is essential.

Remove it or retain it?

Once the exact nature and condition of the deck has been established, the primary decision will be whether to:

1. Strip out the deck with the waterproofing, and replace it with a new non fragile substrate, or
2. Retain the deck, prepare the surface and over deck and overlay, or
3. Retain the deck, prepare the surface, and overlay.

The above points should be considered as:

1. Wherever possible, a fragile roof deck should be replaced with a non-fragile alternative, in order to remove or minimise future risks.

2. Only if it is not possible to remove and replace a fragile deck, should the over-deck and overlay option be considered.

   It should also be remembered that an existing deck could compress or collapse when over decking, leading to premature failure.

3. In such cases, the full consequences and technical risks must be investigated and considered, and the decisions made by the client and/or his surveyor or other professional/competent person whom should confirm the proposed imposed loads are capable of being supported by the existing deck and its supports.

In all cases, the deck must be capable of spanning the existing structure, be fastened to the structure, through the existing build up, and be adequate for the expected

- Dead loads for the proposed new build up
- Imposed loads
- Wind uplift

Note:
A simple overlay with new waterproofing, even with insulation, might not be an acceptable solution; safety both during and after the works have been completed may well be compromised.

A safe and suitable method of work, together with a full risk assessment and associated method statement must be developed and used, in accordance with HSG33 Health and safety in Roof Work.

Precautions

Effective precautions are required for all work on or near fragile surfaces, no matter how short the duration, whether the work concerns construction, maintenance, repair, cleaning or demolition.
Health and safety in roof work HSG33 [paras 170-202] provides full details of the dangers presented by fragile surfaces and the precautions available. This guidance should be consulted by all involved in such work.

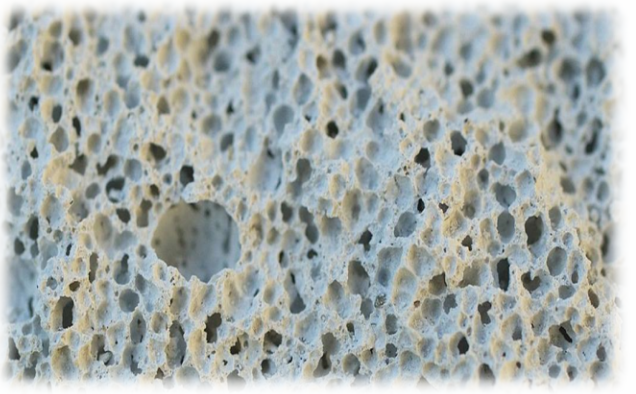
Reinforced Aerated Autoclave Concrete

Reinforced Aerated Autoclaved Concrete (RAAC) can have the appearance of reinforced or precast concrete units. However, this material is fragile, and suitable precautions should be taken.

Attention is drawn to Health and Safety Executive publications HSG33 and Health and Safety in roofing and the report issued by SCOSS (Standard Committee on Structural Safety) in May 2019, raising concerns regarding a roof collapse on a school in 2018. In 2021 the department of Education issued a guidance for identification and initial action that should be referred to when encountering Reinforced Autoclave aerated concrete.

History

RAAC planks were predominantly used in the 1960-80s and despite being called concrete; you cannot treat them as traditional concrete. Due to the way they were made they were much weaker and have an expected life of around 30 years. Until the mid-1980s, RAAC planks were often selected for the use of roof decks in school buildings and similar structures; being lightweight, they enabled economies in the design of supporting structures, as well as improved thermal performance.



In 1982, production of RAAC in the UK stopped amid concerns over its structural performance and life expectancy. So Pre-1980 RAAC planks are now past their expected service life and it is recommended that consideration is given to their replacement.

The stability of more modern, imported panels has been called into question too. As a result, RAAC planks are not considered to be durable materials, and references to them in BS 8110 and EN 12602 have been dropped for fear of lending respectability to a relatively short-lived material.

Composition

The material is usually light grey or off-white in colour, easily broken or damaged with hand tools or sharp implements.

Typically, planks vary in width from 300mm to 750mm, and spans up to 6m are not unknown. A thickness of 100–250mm is common

Failures

In late 2018, the Local Government Association (LGA) and the Department for Education (DfE) contacted all school building owners. To draw attention to a recent failure involving a flat roof constructed using Reinforced Autoclaved Aerated Concrete (RAAC) planks. There was little warning of the sudden collapse.

Although the failure was in a school, it is believed that RAAC planks are present in many types of buildings. This Alert is to emphasise the potential risks from such construction, most of which dates back to between the 1960-80s.

It is not the first time problems have arisen with the planks. According to the report there have been many failures of RAAC planks which had been installed during the mid-1960s with a large number of buildings demolished as a result.

The report concludes that the collapse occurred with little warning and that a similar, near failure was reported in 2019 in a retail unit which incorporated the same type of concrete planks.

There is no central register of buildings with RAAC roof planks and the collapse of a school roof in late 2018 shows they're still out there. Therefore, those appointed to work on these buildings need to know what to look out for...

Warning signs

- Excessive deflection and transverse cracking were early warning signs of the potential failure of aerated autoclave concrete adjacent to a support where the reinforcement had stopped short. Planks may have small bearing widths and any increased loading or deflection may reduce this.
- The roof has been re-surfaced since original construction - this is particularly an issue if the load has been increased or the re-surfacing has a black finish where thermal expansion has an impact.
- There is significant ponding on the roof and led to deflections in the planks
- The roof is leaking or has leaked in the past resulting in corrosion of the reinforcement from water damage.

Summary

This type of roof structure should be raised to a structural engineer and IKOs recommendation will be to remove this type of deck and replace it with an alternative structural deck and supports.

Magnesium Oxide ("MgO") Building Boards

The use of magnesium Oxide (MgO) building boards or similar have been recently proposed for use as sheathing or backing board to rendered system, and in some cases as a structural deck or substrate for flat roofing application in an attempt to comply with the changes within the Building Regulations. This is strictly prohibited and must not be undertaken.

In Dec 2020 the NHBC stated they will no longer accept MgO building boards on buildings where the foundations are begun on or after 30 April 2020 under its insurance warranty. In these circumstances, alternative suitable building boards, compliant with Technical Requirements R1 and R3, should be specified.

This is as a result of the NHBC concerns that some products they came across did not have suitable levels of performance and that similar products had been known to have failed overseas. It was found that magnesium Oxide boards contain salts that absorb humidity from ambient temperature, and begin to leak salty water, to which is highly corrosive and leads to moisture problems in timbers. MgO were not tested for their hygrothermal function before being used in exterior wall structures, and can have detrimental consequences.

Alternative cement particle boards are available with suitable fire performance ratings or BBA certifications as a sheathing or backing board.

Note

Other types of deck can eventually become fragile, due to extreme age or constant wetting by leaks or condensation. Even a plywood or T&G timber deck could rot and become fragile.
Stramit and chipboard decks must be replaced, without exception.

Disclaimer

Whilst every precaution is taken to ensure that the information given in this literature is correct and up to date it is not intended to form part of any contract or give rise to any collateral liability, which is hereby specifically excluded.

IKO reserve the right to amend and/or withdraw this document without notice.

Users of published guidance for the installation of IKO materials should therefore verify with the company whether any changes in our specification, application details, withdrawals or otherwise have taken place since this literature was issued.