

Guidance on non-fragility

for specifiers of in-plane rooflights

Introduction

Natural light improves the environment within a building and helps the building's functionality. Invariably people will concentrate and perform better, feel more comfortable and will tend to spend longer in a naturally lit building than if it were completely dependent on artificial light. In addition natural light will reduce running costs, energy consumption and associated CO₂ emissions, which has been recognised in the Building Regulations (Approved Documents L2A and L2B), where the inclusion of rooflights is a major factor in achieving the CO₂ emission targets.

In-plane rooflights are the most practical way of getting natural light into most large span buildings. They ensure that the requirements for weatherability, safety, thermal performance, fire and all other regulatory requirements can be simply achieved in the long term, whilst allowing the building designer to be able to provide natural light to improve the ambience inside the building and aid comfort and productivity of people working there, and making a major contribution to the requirements of the Part L regulations.

There are two commonly used materials for in-plane rooflights, GRP which offers naturally diffused daylight, and is extremely stable, unaffected by most aggressive chemicals, with a low coefficient of thermal expansion and high resistance to permanent stress, and Polycarbonate which is a high performance material, offering high levels of light transmission; it is extremely strong and is well suited for in-plane rooflights when treated correctly.

The Health and Safety Executive clearly state that those persons responsible for the design of a roof structure should consider carefully the potential to eliminate or reduce the hazard of using materials which are of a fragile nature. Both in-plane rooflight materials can be specified to be non-fragile when new; this document details the considerations regarding long term non-fragility.

Durability and guarantees

Correctly specified in-plane rooflights can be extremely durable. They are highly resistant to degradation by the elements, do not rust or corrode, and can safely be specified as non-fragile to ACR[M]001, providing that they have been manufactured to industry standards, fixed to manufacturers specifications, and used in conjunction with structurally compatible roofing components.

Long term performance is dependant on the quality of the sheet and quality of the surface protection, but good quality rooflights manufactured by NARM members can often retain their physical properties for well in excess of 25 years, and rooflight manufacturers can provide durability guarantees on in-plane rooflight sheets to support this, giving total confidence in this level of performance.

Factors affecting long term non-fragility

Non-fragility is not a characteristic of any individual component, so cannot be guaranteed by the supplier of any particular component. Instead, it is a measure of performance of an entire roof assembly. This is particularly true of profiled metal (or fibre cement) roofs incorporating in-plane rooflights where the non-fragile performance of in-plane rooflights (or the surrounding metal or fibre cement sheet) is affected by the strength of the rooflight sheet, but is also heavily dependant on both correct installation and performance of all other components, including fasteners, surrounding materials and supporting structure.

Non-fragility of the roof assembly can be affected by many factors beyond the control of rooflight manufacturers such as:

- poor design and specification
- incorrect initial installation
- corrosion of the fasteners
- fasteners which have worked loose
- seals which have hardened or perished
- corrosion of surrounding metal sheeting
- poor design or condition of secondary steelwork or other supporting material
- mechanical damage to the sheet
- chafing around the fixings (which can be accelerated by failure to install additional fixings around areas of high wind load)

Any deterioration of the installation can jeopardise the non-fragility classification, even when there is no deterioration of the rooflight sheet itself, and therefore cannot be guaranteed by manufacturers or suppliers of in-plane profiled rooflights.

Guidance for long term non-fragility

Whilst rooflight manufacturers and suppliers cannot guarantee non-fragility in the long term, they can provide guidance on specifications necessary in order to reasonably expect non-fragility to be maintained for 25 years

Where the full non-fragile classification of an assembly incorporating high quality rooflights is achieved solely at the liner level, protected by a separate weather sheet which does not contribute to the non-fragile classification, the non-fragile classification of the assembly is likely to be maintained for 25 years provided all other components in the rooflight assembly are specified and perform accordingly (for example, stainless steel fixings will normally be required), although the long term non-fragile classification cannot be guaranteed.

Where the non-fragile performance of an assembly is partially or fully dependant on the performance of a rooflight outer sheet, even if the strength of the rooflight sheets is fully maintained in the long term, non-fragility would only be maintained if comprehensive inspection and maintenance of the whole roof assembly could ensure there was no deterioration to any aspect of the original installation in the long term.

In practice, with typical maintenance regimes, many roof assemblies incorporating rooflights which can achieve non-fragility when new with minimum safety margins, may become fragile at some point in the future due to deterioration of other aspects of the assembly, even when there is no deterioration whatsoever of the rooflights themselves. Typically, these roofs may stay non-fragile for 5-20 years, depending on application but the period at which one or more of the above factors may render the assembly fragile cannot be determined exactly.

In such cases non-fragility can usually be maintained by use of rooflights that provide an increased safety margin, to reduce dependence on method and condition of fixing.

However, incorrect installation, serious deterioration or total failure of associated components, or lack of any inspection or maintenance regime could all jeopardise non-fragility even when there is no deterioration of the rooflight sheet itself, whilst abuse and exceptional circumstances such as storm damage, accidental foot traffic or impact, mechanical damage to the rooflight sheets themselves or to the UV absorbing surface protection layer, or exposure of polycarbonate to certain chemicals or adverse environmental conditions, could also cause damage to the rooflight sheets themselves which may also affect non-fragile performance.

Non-fragility therefore cannot be guaranteed by rooflight manufacturers even when it may be expected that it will be maintained for 25 years.

Whilst there are rooflight options available using advanced technology which retain their non-fragile classifications with a further increase in margin of safety, the designer should determine the risks, the required life and period of non-fragility and the higher safety margins to consider in order to maintain long-term non-fragility and then has the responsibility to specify accordingly.

Read More Further guidance on durability and long term structural performance of both GRP and polycarbonate rooflights is given in *NARM Technical Document NTD09, page 6*. This can be downloaded from the NARM website: www.narm.org.uk

Published by:

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Advisory Committee
for **Roofsafety**

