

Construction Industry Council CDM Guidance for Designers

Designing to make management of hazards associated with working on roofs easier

Technical Guidance Note

T 20.009

INTRODUCTION

1. Designers can play a major part in making it easier to manage the hazards associated with roof working.
2. Roofs are hazardous places to work, because they are at height and have coverings, which are lightweight and often fragile and deteriorate over time through being exposed to the elements.
3. While work on roofs is an infrequent activity, the opportunity for a fatal or serious accident is very high. And, designers who see roofs only as a means making the building watertight, exacerbate the situation. They forget that people have to construct roofs and maintain them. Consequently, little provision is made for this.
4. People are often killed or injured when falling from roofs. Therefore, designers need to consider alternative designs to ensure roof work can be eliminated or significantly reduced where reasonably practicable.
5. This guidance note makes designers aware of the issues and gives information on how they can help to make roof work safer through their designs.

HAZARDS ASSOCIATED WITH WORK ON ROOFS

6. Workers on roofs are exposed to the hazard of falling from height. This can either be off an unguarded edge or through a fragile surface.
7. Manual handling and premature collapse hazards also exist.

WHAT DESIGNERS SHOULD DO

8. Designers should consider two phases: the construction phase and the maintenance phase

The construction phase

9. During this phase, it is inevitable that people will need to be on the roof and designers should consider providing for systems that will help a contractor to manage the hazard of falling from height.

Falls off unguarded edges

10. Constructing a roof creates an advancing unprotected leading edge and the risk from falling off this edge. Therefore, designers should consider provisions to protect the workers from this hazard by:
 - a) Providing effective anchor points for safety nets;
 - b) Or, where (a) is not possible, provision should be made for anchoring PPE to structural members with sufficient strength; and
 - c) Optimise the locations of close-under-the-roof obstructions, eg, service ducts, that are in the deflection zone of fall arrest devices.

11. In addition, designers should consider the provision of parapets, as the structural carcass for these will provide the necessary protection at the edges, for workers constructing the roof and for workers carrying out subsequent maintenance.

Falls through roof assemblies

12. Specify liners and top sheets, which are individually non-fragile when fixed down. Information about non-fragility is given in the Advisory Committee for Roofwork's publication ACR[M]001:2000.

Falls caused by premature collapse of structures

13. Individual roof sheets do not weigh a lot. However, the weight of a stack of sheets is significant. Therefore, ensure that the roof structure can carry these loads.

Providing for deliveries

Locate the building to ensure that there is enough space to site a crane so that every part of the building is within its lifting capacity and for incorporating dedicated loading bays, for storing roofing materials, in the scaffolding.

The maintenance phase

14. For this phase, it may not be necessary for people to be on the roof if designers consider solutions, which eliminate the need to go on a roof.

Designing to minimise the need to go on a roof

15. This can be achieved either by minimising the number of items requiring maintenance on a roof or minimising the number of times people have to go on a roof by, for example by:

- a) Routing vent stacks through the building side instead of the roof;
- b) Combining exhaust flues into a single vent;
- c) Ensure that process by-products are effectively removed and discharged high enough above the roof to allow effective dissipation;
- d) Having serious concerns about materials where the manufacturer's guarantee requires annual inspections;
- e) Optimising the number and position of rooflights, taking into consideration the requirements in other legislation for providing natural light; – see **28**. Note that rooflights will require periodic cleaning to maintain correct light levels within a building;
- f) Positioning gutters so that cleaning can be carried out using either cherry-pickers or from other designed safe access routes– but see **20 b)** and **24 b)**.

16. Resealing joints is a common reason for people being on roofs. Therefore, specify durable seals and details at plant penetration points and flashings, to minimise the need for such reactive maintenance.

17. Robust structural details for areas of the roof exposed to high wind suction should ensure that damage is minimised during predictable windstorms, to minimise the need for maintenance after such storms.

18. However, where it is not possible to remove the need for people to be on the roof, designers should consider provisions which:

- a) Minimise exposure to the hazards in **6** and **7**; and
- b) Provide sufficient information to allow persons in control to manage the hazard.

19. Designers should consider design solutions, which minimise the chances of people falling off an unguarded edge or falling through the roof.

Minimising the risk of falling off unguarded edges

20. When people have to go on the roof to carry out maintenance, eg, it is not possible to vent exhaust stacks through the side of the building, designers should locate items that need maintenance at least:

- a) 2m away from rooflights – see **28** and **29**; and
- b) 4m away the edges of roofs to make it unnecessary for people to work close to the edge of the roof and impossible to carry out the work from a ladder;
- c) Rooflights should not be within 2.0m of an edge.

21. In addition, provide dedicated walkways to access the items to be maintained, which should be:

- a) Non-fragile and non-slip for the life of the roof; and
- b) Provided with a handrail, if possible. Where this is not feasible, a horizontal line to which a lanyard can be attached should be supplied –see **23**.

22. Workers are also vulnerable at the gables and eaves. Where parapets are not desirable, design in brackets to which temporary edge protection can be fixed. Discuss solutions with suppliers of temporary edge protection.

23. Where horizontal running lines are provided, design the anchorage points. If dead-weights are the intended means of anchorage, check that the roof can support the weight of the anchor. Work-positioning systems are preferred to fall arrest systems.

Minimising the risks of falls off work areas

24. Gutters will, inevitably, need regular cleaning so, for:

- a) Eaves gutters, consider providing a solid base around the building perimeter, which will allow MATs to be used – see **T 20.006**. Only when this is impractical should ladders be used, for which you should provide ladder-tying points at 2m centres close under the gutter and a hard and level base for the ladder for the full length of the gutter.
- b) Valley gutters, consider making them strong enough and wide enough for people to walk in. And, for an upslope distance of 2 m either side of the gutter, specify a non-fragile ACR Class B roof assembly, where this is available – see **35**. In addition, provide dedicated access to these areas.

25. In addition, designers should provide for dedicated access points, with a solid base for either:

- a) A ladder, ladder brackets at the eaves [to stop sliding] and a solid landing area on the roof; or
- b) A stair tower.

Minimising the risk of falling through roofs

26. To prevent people falling through roofs, specify a non-fragile assembly. You do not have to work in isolation. Discuss your options with a supplier and ask them to supply a roof assembly, including rooflights, in accordance with one of the classifications in ACR [M]001:2000.

27. Where people have to go on a roof, eg, high maintenance roofs – see **34** c), the pitch should not exceed 6° and there should be dedicated access points and walkways, with handrails, to the work area.

28. As rooflights should never be walked on, since this may damage the surface and impair light transmission, rooflight layouts should allow cleaning from the opaque areas and passage across the roof can be in straight lines without walking on rooflights.

29. Highlight hazardous and non-walk areas, by visual warnings, eg, poppy-red fixings around rooflights.

30. When incorporating rooflights, find out how weathering will change the colour of the roof and the rooflights to avoid the whole roof ending up as the same colour. For this reason, always specify rooflights to have a non-fragile design life better than the opaque area and design the opaque colour to avoid the whole roof looking the same.

31. Where fragile assemblies are unavoidable, eg, some translucent assemblies, design in systems for their safe cleaning and maintenance.

Minimising the manual handling risks

32. Roof sheets have to be manoeuvred into position by people. Limit their size. If joints are undesirable, discuss the options with a supplier and try to accommodate his requirements in your design. Provide space around the building to site a crane [or other lifting device] of the correct size – further information on cranes is given **I 002**.

Providing information

After completing the design, which should as far as possible follow the principles set out **10** to **30**, designers should provide contractors with enough information to allow them to control the residual hazards, including information about the issues discussed in **10(a)** & **(b)**, **12**, **21**, **23**, & **24**.

BACKGROUND INFORMATION ON ROOFS

33. Even non-fragile assemblies can be made fragile if the wrong type of material is specified. Therefore, pay careful attention to the environment in which the building is being erected. Known harsh environments include:

- a) Coastal areas, which are highly corrosive;
- b) Industrial polluted areas, which contain airborne agents of deterioration;
- c) Industrial processes, which release harmful agents;
- d) Animal housing

34. There are three basic types of roof:

- a) *Low maintenance roofs*, which require very infrequent access, e.g. simple duo-pitched roofs requiring only maintenance that can be done from ladders or MATs. The minimum standard for this roof is a Class C assembly to ACR[M]001:2000;
- b) *Medium maintenance roofs*, which require regular access for maintenance but only by experienced roof workers. The minimum standard for this roof is a Class B assembly to ACR[M]001:2000;
- c) *High maintenance roofs*, which require frequent access for maintenance, e.g. roofs with penetrations for plant exhausts, etc. The minimum standard for this roof is a Class B assembly to ACR[M]001:2000.

35. Under the current state-of-the-art, not all assemblies achieve class B. However, while most can achieve class C, some are still fragile – see **31**.

36. Manufacturers' recommendations for compatible components in non-fragile assemblies should not be changed without consultation.

USEFUL REFERENCES

ACR[M]001:2000 - Test for Fragility of Roof Assemblies
ACR[CP]001:2003 – Recommended Practice for Work on Profiled Sheeted Roofs [ACR]
HS(G) 33 – Health and Safety in Roofwork [HSE]