



SPRA



ADVISORY COMMITTEE FOR ROOFWORK BEST PRACTICE GUIDE

ACR [CP] 003:2008 Rev.1 Recommended practice for use of safety nets for roofwork

FOREWORD

One of the main causes of deaths and injuries at work each year is falling from height, particularly through or from roofs. To ensure safety during roofwork requires the commitment of all those involved in the procurement process. One of the ways of collectively protecting roof workers from falling through roofs is the use of correctly installed safety nets, closely slung under the work area. This publication aims to give advice on how this can be achieved and compliments BS 8411:2007 Code of Practice for Safety Nets on Construction Sites and other Works, by addressing:

- The selection of safety nets to be used;
- Recommendations for their installation; and
- The competence of workers installing them;

The delivery of improvements in the prevention of falls from height will only be achieved with the full involvement of all those with a role to play, i.e. employers, workers, trades unions, trade associations, manufacturers, training providers and others.

This Best Practice Guide gives practical advice on the duties placed on clients, contractors, designers and manufacturers and includes recommendations for good practice when using safety netting. It concentrates on profiled roofs. Nevertheless, those engaged in other similar activities would benefit from the advice given, as many of the principles do apply and offer good practice.

I thank those involved for their valued input and the often lively and wide-ranging debate.

Tony Hutchinson (Chairman)

CONSTITUTION OF THE TASK GROUP

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Health and Safety Executive (HSE):
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INTRODUCTION

Safety nets are used on construction sites and similar works to arrest a person's fall. They reduce injury because they absorb a large proportion of any impact energy, which they do by suffering plastic deformation when impacted, thus dissipating the energy with minimum rebound.

Safety nets are a very cost-effective lightweight means of providing collective fall protection. They provide a passive safety system, i.e., one that requires no input and little co-operation from the workers it is being used to protect. They may also give economic benefits by improving worker confidence and productivity.

In roofwork, safety nets can be provided as part of a safe system of work to protect the roofer when loading out the roof, and when sheeting. While, in many cases the whole roof can be netted before loading out commences, on large projects it is sometimes more practical and cost effective to phase net installation in harmony with the structural steel work handovers, and the sheeting programme.

Safety nets are manufactured from synthetic materials. (Normally high tenacity, multifilament polypropylene) which can be damaged by improper use, handling and storage. They are also affected by ageing, weathering and UV degradation, resulting in strength loss and embrittlement. If care is taken in the design, erection, maintenance and use of safety nets as recommended in this code of practice, these disadvantages can be minimised and controlled.

SCOPE

1. This best practice guide gives recommendations for the design, safe use and erection of safety nets conforming to BS EN 1263-1:2002 and erected within the positioning limits in BS EN 1263-2:2002 and FASET's requirements of installers.
2. This best practice guide is intended for use by all those involved in arranging for work and working on roofs. In addition, it gives working information about the ways in which safety nets should be used properly.

DEFINITIONS

3. For the purpose of this Best Practice Guide the following definitions apply:

Competent person

Person [or persons] who can demonstrate that they have sufficient professional or technical training, knowledge, actual experience and authority to enable them to:

- a) Carry out their assigned duties at the level of responsibility allocated to them;
- b) Understand any potential hazards related to the work (or equipment) under consideration;
- c) Detect any technical defects or omissions in that work (or equipment), recognise any implications for health and safety caused by those defects or omissions; and be able to specify a remedial action to mitigate those implications

Note: For net installation the implied requirements are detailed in Annex A on page 9

Waisting

Effect of the self-weight of a net at an unsupported perimeter where the net pulls horizontally away from an adjacent structure or the required line of the net

Inspection

A visual check carried out by the roofer(s) who may rely upon the safety net system BEFORE work commences.

Examination

Thorough inspection carried out at close-quarters, which may, at the discretion of a competent person, be more than just visual. Normally carried out away from site in a controlled environment and away from programme pressures.

Health and Safety Information Pack

Legal document setting out essential health and safety issues associated with construction work.

Health and Safety File

Legal document as required by CDM 2007, setting out essential health and safety information associated with a completed construction project

Underrolling

A means of reducing the width of a standard net to fit a specific space to provide a strong edge to which the tie rope or attachment system is attached.

Eaves Bagging

A rigging technique that removes the natural waisting form, or horizontal deflection, at an unsupported net perimeter.

Overlapping

Where two smaller nets are overlapped to fill a larger void. The overlap in the middle of the nets **MUST** be greater than 2m.

Tiling

When overlapping nets on a roof slope, the net closest to ridge is laid **OVER** the **LOWER** net.

Pinning

Where the overlap of two nets is less than 2m, (measured mid span) the border rope of the top net is laced to mesh of the lower net and the border rope on the lower net is laced to mesh of the top net. Lacing rope is used (normally 8mm, 7.5kN –type O or 12mm 30kN –type L). Note: a pinned lap should not be less than 1m

Clearance distance

The clear area required below the safety net system to allow for the net to deform when loaded.

Underflown

When a compliant net is rigged under a damaged or non-compliant net to avoid down time waiting for a net to be removed / replaced.

SPECIFYING SAFETY NETS FOR USE ON ROOFWORK

4. Only nets conforming to BS EN 1263-1 should be specified. BS EN1263-1 specifies two classes (A and B) and two mesh sizes (60mm and 100mm) and although both are suitable for use in roofwork, the 100mm mesh net is lighter and will, therefore, have a lower initial sag.
5. In the UK, class A2 safety nets with a 100mm square mesh configuration are normally used. The advice in this document applies to all net classes but if any installation other than class A2 nets are contemplated then further advice should be sought before use from a competent person (e.g. a net manufacturer or installer meeting the requirements of Annex A on page 9).
6. It is unlikely that a net will be in place for longer than 12 months but if installations are planned for longer than this period then the desired working life of the net should also be considered as the energy absorption capacity may reduce as a consequence of exposure to UV radiation. In such cases it is recommended that additional test meshes be considered. It is also advisable to consult with the manufacturer for specific advice.
7. All nets must have sacrificial test meshes / cords which are removed every 12 months for testing. At all times there should be written evidence that the net has been

tested within the last 12 months. (E.g. a certificate and / or a label from the testing facility). The only time when it is valid for a net not to have a test mesh is during the last year of its life.

8. Spot checks should be carried out on all net installations. If nets are found without test meshes / cords in place then the following procedure should be adopted.
 - Establish if the net is in its last year of life.
 - Check that the previous test date is within 12 months by a tag or certificate
 - If neither above apply, the net should not be installed or if installed should be replaced with a compliant net and taken out of service or fly a compliant net beneath.
9. It is not good practise for a net installer to install any net which will require testing during its period of use on that site.

CONFORMITY

10. At all times net installers should be to provide evidence that the safety nets supplied conform to BS EN 1263-1:2002. **This can be achieved through a manufacturers certificate and/or a label**

CLASSIFICATION OF SAFETY NETS AND POSITIONING LIMITS

Classification

11. In accordance with the advice given in the BS 8411, where the fall into the net is less than 2m, any class A safety net is usually sufficient.
12. Where safety nets conforming to class A and in system “S” are subject to falls greater than 2m, their individual area should be not less than 35m² and their shortest side should be not less than 5m. Where either of these two criteria cannot be met then a class B net should be used. Safety nets of smaller areas should be installed only after consultation with the manufacturer.
13. Safety nets are not designed to catch debris. Where it is predictable that objects or other debris can fall into the net, a sewn debris net attached to the top of the safety net should be used. (Debris nets not sewn together will waist and therefore create gaps through which debris can fall through).
14. However nets should never be used in a situation where sharp edged objects and objects in excess of 15kg (i.e. capable of damaging the net and affecting its performance) can fall into them. If such objects are being used on then special site management arrangements need to be in place to control the risk.

Best Practice Guide for use of safety nets in Roofwork of pulling the net may exceed the design capabilities of the tower. Guidance on the use of MAT's can be obtained from FASET / PASMA

Note: the addition of debris netting can give rise to high wind loads on the net anchorages and their use requires special consideration of these effects. Advice should be sought from a competent person.

GENERAL RECOMMENDATIONS FOR INSTALLATION AND USE OF SAFETY NETS

Installation of nets under roofwork

15. Safety nets should be handled strictly in accordance with the manufacturer's recommendations and be installed as close as possible to the underside of the roof being worked on. In addition, where it is necessary, the netted area should be of sufficient width to provide both vertical fall protection and to catch anyone falling from the edge of the work areas if edge protection is not provided.

16. The optimum self weight deflection of a net is 10% of its shortest span. Nets should be installed so that this deflection is achieved. Over-tensioning should be avoided, because this will affect the designed energy absorption performance of the net.

Note: over tensioning has greater significance in knotted nets than knotless nets.

Note: In achieving the required sag any excess net should be under rolled around the border rope as opposed to gathering.

17. The net should have been fitted so that

- No gaps in the netted area exceed 100mm.

Note: In exceptional circumstances (e.g. around large diameter service pipes or ducts) a gap of 225mm may be acceptable.

- Overlaps are at least 2m (measured from the middle) and tiled with the slope (e.g., top net over bottom net)
- Where overlaps of less than 2m (20 mesh squares) have not been achieved the nets have to be pinned together
- Particular care should be taken at the eaves, to ensure that the net does not "waist in" across the bay, leaving a gap through which a person could fall.
- Eaves bagging techniques will remove this (see definition), although where a perimeter beam with sufficient capacity is available, then consideration should be given to tying the net to it.
- Nets should not be attached to cold rolled steel sections because it is unlikely they will take the required loads (6kN @45°), without first confirming that they have the capacity to act as anchors.
- Safety net systems should therefore not be attached to scaffold hand rails, gutter supports, purlins or sheeting rails unless designed for that purpose. Safety nets should be rigged to ensure that any debris likely to injure persons falling into them can be removed with ease.
- Standard mobile access towers (MAT's) should not normally be used for access to net rigging because the act

18. On large roofs, where it is not economical to net out under the whole roof, it is normal practice to *leap-frog* nets as the work progresses. However, under class C assemblies, this operation should be carried out only as described in Annex B.

Use of nets in roofwork

General issues regarding the use of safety nets

19. In roofwork, where it is reasonably practicable to provide other means of fall prevention, such as perimeter edge protection, these must be provided, **safety nets should never be the sole means of fall protection**,

20. Safety nets should not be used as the means to catch debris.

21. Where nets have been provided exclusively for the purpose of catching people, site management arrangements should ensure that the risk of sharp-edged or heavy objects, e.g., roof sheets falling into the net is minimised, e.g., where possible such objects or materials should be stored in a place from where it is impossible for them to fall into the net.

22. Safety nets must only be provided where there is sufficient clearance below the net to allow them to deflect and perform correctly. As a guide, there should always be a minimum of 3m clearance measured from the attachment point.

Note: As a rule of thumb (if the deflection chart is not available) assume a minimum required clearance distance of

$$\left(2 + \frac{\text{the least span of the net (in metres)}}{5}\right) \text{ metres}$$

for a net rigged close to the underside of the work position

Note: If the fall distances are greater than 1 metre consult BS EN 1263-2:2002

Note: It is a statutory requirement of the Work at Height Regulations that the clear zone is maintained

23. Safety nets should never be used as a means of leaving or accessing the work area and site managers should never condone such practice.

24. When carrying out works likely to generate agents that will damage the net, the nets must be protected.

Note: see paragraph 84 below on page 9

SPECIFIC ACTIONS ON THE ROOFING CONTRACTOR

25. Roofing contractors should check that arrangements are in place which ensures that, following an impact of heavy objects, the nets are examined, taken out of service for examination or testing and, if necessary, repaired by a competent person authorised by the manufacturer. It is good practice for nets to be disposed of once they have been loaded.

Note: This is best achieved by supervising the removal of the label, serial number and border rope. The mesh should then be cut randomly to render it unusable.

26. Before starting work on a roof, roofing contractors should check that arrangements to have safety nets, examined and maintained on a regular basis, in accordance with the manufacturer's recommendations, are in place.

Note: It is recommended that Safety nets in use should be inspected every day by the user for whom the net is providing protection and site managers should treat nets as scaffolding and carry out a recorded inspection at least once in every seven days, after change or after adverse weather conditions throughout the duration of their use.

27. Safety nets should never be altered without the net installers consent and then only by persons competent to do so.

28. Where safety nets are used specifically as fall arrest systems, they should be used strictly in accordance with the manufacturer's instructions.

29. Where the work on a roof specifically uses or generates the agents described in paragraph 84, roofing contractors should make the main contractor aware of this to allow him to arrange for any necessary protection to the net based on the agent involved.

30. Roofing contractors **must** report any net damage to both the net installer and the principle contractor.

31. If a net has been used to arrest a fall or is found to be defective, the area above and below the fall or defect should be cleared of operatives and should not be worked on again until a competent person advises it is safe to do so. This is especially important where nets are the only form of protection. See paragraph 25 above

32. All debris, e.g., off-cuts from sheets, should be prevented from falling into the nets.

Issues for consideration with nets installed under new roof construction

33. Generally the nets should be supported from the truss or rafter members of the building, and rigged to follow the line of the roof as close as possible.

Note: this is usually achieved by attaching it to the portal rafter (depending on rafter depth and spacing). Or using proprietary attachment systems taking care to follow manufacturer's instructions.

34. In most cases the required anchorage capacity will be achieved by fastening to hot rolled steel members, purlin support cleats and to node points in trusses. Similarly, safety nets should generally not be fitted to cold-formed sections such as purlins or sheeting rails without first confirming that they have the capacity to act as anchors.

Note: FASET's general rule of thumb is "If you wouldn't hang a car from it don't rig the net to it."

Note: With certain types of new build roofing, the structural liner will span across the truss / portal bays, and will sit flush on top of the primary steelwork. In this case the nets may need to be fitted to proprietary attachments onto the steelwork, or other suitable attachments, e.g., hooks welded to the structural members at regular intervals

Note: The use of pairs of girder clamps and butt tubes may be used, but never single girder clamps on their own.

35. Where nets have been extended into overhung eaves, or raised up the outside of clad parapets to provide the edge protection as well, they should have been attached to suitable structures. Normal scaffold handrails are not suitable to act as primary net anchorages unless evidence to demonstrate the structural capacity is available.(6kN@45°)

36. Installation should have considered the need to restrict the fitting of gutters and cladding. This can only be achieved if the rigging company have been made aware of the roofers needs in advance.

37. Overhung gables and eaves can present rigging problems, as often in these situations the only structure available will be the rail across the end of the cantilevered purlins. Specific consideration by a competent person should have been given to the structural capacity of these purlins and the need to provide an alternative support systems if necessary (e.g. eaves bagging)

38. It is important that there is a plan in place detailing how to rescue people who fall into the nets.

Note; this could be difficult when the nets are located at a significant height and the substructure beneath the nets restricts what can be used to carry out the rescue.

39. The contractor should ensure that all site operatives are aware of the contents of the plan and their part in it should it be called into use.

40. The contractor should ensure the rescue plan is workable at all times there is the potential for a worker to fall.

Issues for consideration with nets installed under roofs being refurbished

41. Existing suspended services and floor level access restrictions may complicate the rigging process and in some cases make it difficult to rig a safety net effectively.
42. In refurbishment situations it is likely that debris could fall into the net, particularly during the removal of old roof sheets. This should be taken into account when specifying the net type

Note: it may be possible to maintain activity within the premises (depending on the activity and the impact of dust and debris) whilst the roof is being repaired.

43. These same obstacles may be a source of danger to anyone falling into the net.
44. When the purlins built into the gable wall have been used to support the net, attachment can usually be achieved directly adjacent to their point of support (thus minimising any bending load in the purlin). The structural capacity should be confirmed by a competent person. However, avoid using anything that will impede the fitting of the roof sheets.

PLANNING OF SAFETY NET INSTALLATIONS

45. The proper provision of safety nets for work on roofs should be a planned activity and should be achieved through the co-operation of the designer of the permanent works, the manufacturer or supplier of the safety nets, the main contractor and the roofing contractor. Where CDM applies, the CDM Coordinator should also participate in this process.
46. Matters for consideration should include at least the following:
- The sequence of work during installation and dismantling;
 - The provision of effective pre-installed anchorages (see BS EN 1263-2: 2002 for the maximum load at anchorages);
 - Access for inspection, repair and removal of debris;
 - Clearance distance below the safety net.
 - Issues described in paragraphs 33 to 37 above where relevant.

THE ROLES OF PERSONS INVOLVED WITH USE OF SAFETY NETS

Role of the designer of the permanent works

47. Designers should:
- Avoid design details that can make nets difficult or dangerous to erect;
 - Be aware of the likely arrest forces and assess the effect, if any, on the structure and fixing points;
 - Either specify or provide information about the need for additional [temporary] bracing or other support if appropriate;
 - Specify clearly which bracing, if any, can be removed and the conditions under which they can be removed;
 - Design and indicate clearly suitable fixing points on the drawings to facilitate rapid erection of safety nets and communicate this information to the contractor;
 - Take into consideration the need for access during rigging and striking when determining sequence of erection.
48. The structure will need to support loads of 6 kN @45° distributed as shown in BS EN 1263-2.

Role of the CDM Coordinator

49. CDM Coordinator should ensure the following:
- Where safety nets are the industry norm as a specific precaution to protect against the risk of falls from height, they should check that the designer has discharged his duties, as specified in paragraph 47 and that information concerning any provisions made or checked is clearly stated in the pre-tender health and safety plan for the project.
 - That there is co-operation between designers;
 - If nets are likely to be in use for more than 1 year consideration should be given to requirements for UV testing and in particular arrangements for accessibility to the test meshes.
 - When the Health and Safety File implies or specifies the use of nets for future maintenance that appropriate provision is made for their use, e.g., anchorages.

Role of the Principal Contractor

50. When the net erectors arrive on the site, the Principal Contractor should:

- a) Ensure that the erectors are competent to erect the nets. (e.g. CSCS safety net rigger card provides such evidence) If there is no proof of competence – see Annex A, they should not be allowed to start work;
- b) Check that the nets have been examined by a competent person authorised by the manufacturer before being put into use.
- c) Indicate clearly what the erector can and cannot anchor nets to;
- d) Ensure that the nets supplied for a project conform to the relevant standard.

Note: Safety nets manufactured to BS EN 1263-1 should be clearly and obviously marked with their class, system and manufacturer.

- e) Ensure that, in the unlikely event that a net under a roof will remain in use for longer than one year, arrangements are made for test meshes to be removed and returned for testing.
51. Where safety nets are used, ensure that the following issues are covered in the Health and Safety Plan:
- a) Access requirements for the rigging of safety nets;
 - b) Provision of suitable ground conditions where mobile access equipment is required;
 - c) That there is always adequate clearance under the net;
 - d) That suitable post-erection access for inspection is provided.
 - e) Arrangements are in place for inspecting the nets every seven days, by a suitably competent person.
 - f) And that they are taken into account in determining that the sequencing of work does not prevent such inspection.

52. It is important that there is a plan in place detailing how to rescue people who fall into the nets.

Note; This could be difficult when the nets are located at a significant height and the substructure beneath the nets restricts what can be used to carry out the rescue.

- 53. The Principal contractor should ensure that all site operatives are aware of the contents of the plan and their part in it should it be called into use.
- 54. The principle contractor should seek written guidance from the rigging contractor on how to affect rescue.
- 55. The principle contractor should ensure the rescue plan is workable at all times there is the potential for a worker to fall.

56. In addition, Principal Contractors should ensure that the roofing contractor is aware:
- a) Of the purpose and function of safety nets, and that this is included in a site induction programme if necessary;
 - b) That all events in which the net has been loaded (fall arrest & debris collection) must be reported.

Role of the Suppliers / erectors of safety nets

57. Suppliers should only erect nets which have been bought from manufacturers who can demonstrate that all their nets comply with the requirements of current relevant standards. **All the data to prove this should be available, on request to any party involved in the project.**

- 58. In addition, they should have all information relevant to the safe use and storage of the nets.
- 59. Before erecting any net, suppliers should obtain a brief from the Roofing subcontractor which states exactly what the nets will be required for, i.e., fall arrest of persons only or fall arrest for persons and small objects and any roofing contractor requirements re space allocations they specifically need. See paragraphs 41.

60. All safety nets should be supplied with test meshes so that one can be removed and tested in the manner described in BS EN 1263-1. This should have been done on an annual basis, regardless of whether they have been used in the interim.

Note: All parties need be aware that this testing is to confirm that the safety net will have a breaking strength in excess of the manufacturer's minimum test mesh performance value for at least the next 12 months.

- 61. Before arriving on the site, they should inform the Principal Contractor and or the Roofing Sub Contractor of their requirements for erection. As a minimum, they should let the Roofing Sub Contractor know:
 - a) What plant they intend to use and the form of the surface needed to support such plant;
 - b) What access requirements they will require;
 - c) About requirements for anchorage of the nets and the steps that he needs to take to ensure that they are suitable and sufficient;
 - d) Proposed arrangements for any rescue during erection.
- 62. While on the site, suppliers / erectors of safety nets should:
 - a) Check that the anchorages provided or allowed to use are adequate – see paragraphs 47a) and 47c) above;

- b) Never rig a net with a temporary repair in it.
- c) Ensure clear distance is maintained below the net at all times.

63. Before leaving the site, suppliers / erectors should:

Note: If the net erector is also the roofing contractor, he should perform the duties below.

- a) Ensure that the Principal Contractor and / or roofing sub contractor has all the necessary information to enable him to ensure that the nets are used in accordance with requirements;
- b) Provide the principal contractor with information about the clearance that must be maintained under each net.
- c) Ensure that all handover certification is in order and handed over; before leaving site

Note: this should include, instructions for use, itemise areas completed by grid line reference name of installer, date of handover, confirmation of compliance to EN1262 part 2

It is good practice for the safety net installer to provide the following information PRIOR to commencing work.

- a) Confirmation that the safety nets to be used comply with EN1263-1:2002
- b) Proof that they have been properly managed. (Can the net installer evidence a maintenance system; the examination being carried out by a competent person authorised by the manufacturer).
- c) Evidence of UV testing
- d) Confirmation that ALL repairs have been carried out by a competent person authorised by a manufacturer.
- e) That all safety nets are traceable i.e. labels and serial numbers.
- f) That they have identified risks specific to the task in hand (job specific risk assessment?).
- g) That a recovery plan is in place and understood by all those on site who may need to implement it.
- h) That all installers are competent (CSCS safety net rigger card).

Once the nets have been installed;

- a) Is a handover certificate in place?
- b) Have they rigged the safety net system as close as possible?
- c) Is the sag set at 10%?

- d) Are the attachment systems properly installed, (not greater than 2.5m or in line with the manufacturer's instructions)?
- e) Gaps at the perimeter should not exceed 100mm (exceptional circumstances 225mm).
- f) Is it clear to the roof workers where it is safe / unsafe to operate?
- g) Is there sufficient clearance distance and does the principle contractor understand the importance of maintaining this at all times?

Role of the Contractor carrying out the roofing work

- 64. Supply relevant information, associated with the roof work, for the Health and Safety File.
- 65. Understand the implications of the rescue plan and the need to ensure its workability at all times.
- 66. Before commencing any roof work on site a programme should have been prepared and provided to the net supplier, which states exactly how the work will be carried out (sequencing etc). This information needs to be discussed, agreed and passed to the principle contractor who will need to consider other construction activity that may affect the roofing contractors' requirements.
- 67. Everybody working on a roof should be competent to do so. It is important that each team include at least one person who has an awareness of what constitutes a safety net system, to carry out an inspection before work starts. This is especially important after adverse weather conditions
- 68. If an inspection highlights suspect areas of net the provisions of paragraph 31 must be implemented.
- 69. Roofing contractors must ensure that there is sufficient clearance distance under the net – see paragraph 22, and must not start work unless it is.
- 70. Roofing contractors should make arrangements to ensure that their work methods do not jeopardise the ability of a net to perform. This means that they should avoid: -
 - Roofing components or debris falling into the net,
 - The need for unauthorised alteration of the net anchorages;

DESIGN OF NET INSTALLATIONS

- 71. Net installations should only be designed by persons who are competent to do so. Designers should consider the pre-installation of designed anchor points, provided at appropriate centres

72. The design and specification of a net installation should be governed by the principles of paragraphs 19,20,21 & 22 and should have sufficient coverage of the area into which a person would fall;

Net area and leading edge protection

73. As a general rule, when nets are correctly installed and used in accordance with this document, it should not normally be necessary to provide additional means of leading edge protection

74. Where appropriate, the net should project out from the point of a fall to ensure that the person falling is caught in the net. Generally an extension of at least 1.5m beyond the theoretically calculated point where the person's centre of gravity would impact the net should suffice.

Note 1: FASET's current recommendation is that the catching width (leading edge extension) on roofs should be 3m.

Note 2: where the requirements of this paragraph cannot be fully met an alternative means of leading edge protection MUST be used.

Fixing points

75. Fixing points should be capable of supporting at least 6kN @45°, which should be verified before being used. If the anchorages are being left in situ, their performance must be verified for future use with specific consideration for corrosion

76. The structure / sub structure should be capable of carrying the loads detailed in paragraph 48 .

Provision of access to the net

77. Access provision should be designed and sited so that the ability to reach the nets is safe and possible particularly to rescue any person who has fallen into them.

SITE INSPECTION

General

78. The aim of inspections should be to ensure that safety nets remain fit for purpose throughout their service life. Therefore, inspections should be carried out immediately following erection, when a handover certificate should be issued. Further inspections should be at intervals not exceeding seven days thereafter. A record of these inspections should be kept.

79. A suitably competent person, see Appendix A, must carry out the inspection of the safety net system including its supporting framework and anchorages. If any suspect areas are found, they must be reported to a

responsible person immediately and the provisions of paragraph 31 implemented until the areas have been properly assessed.

80. When inspecting, note should be made of whether the net has been loaded, that the anchorages remain in good order, that it is clear of debris and that no mesh cords have been cut and there is adequate clearance distance

81. It is important that safety nets should be kept free of all debris that may cause injury to persons falling into them. If this requires the net to be disconnected and reinstalled, it must be carried out by a competent rigger.

82. Any debris likely to cause damage to the net or any person likely to fall into it identified at the inspection should be reported to the responsible person.

83. Special attention should be given to safety nets systems which are adjacent to operations giving rise to agents, which may damage the net – see paragraph 84. In such areas the frequency of inspection should be increased. If any deformations, fraying or discoloration is noticed the manufacturer should be asked for advice.

AGENTS LIKELY TO DAMAGE A NET

84. The following agents can affect the integrity of the safety net installation while in use:

- a) Sparks, etc from welding, grinding and burning operations, hot gases from blow lamps, hot ash from chimneys or furnaces.
- b) The erector should supply the roofing contractor with a list of agents that may cause harm to the safety net. This list may vary from manufacturer to manufacturer.

Note: Prolonged Exposure to UV radiation will affect the integrity of the material. Safety nets should be stored out of direct sunlight when not in use.

- c) Adverse weather, e.g., strong winds;
- d) Significant loads or impact;
- e) Accumulation of debris in the net;
- f) Persons jumping or throwing objects into the net.

ANNEX A:

SUPERVISION, TRAINING AND COMPETENCE

General

A1. Safety nets achieve the aims of arresting a fall and dissipating the energy of a fall by utilising the strength of as many mesh cords as possible to carry the load and through progressive slipping between the cords and cord

yarns. Therefore, persons who rig, inspect, or examine safety nets should be suitably trained and competent to ensure that these mechanisms are not restricted.

A2. Three different types of competence are associated with the use of safety nets: competent rigging, competent inspection and competent examination, defined as follows:

A2.1 Competent riggers are those who have who have taken and passed a riggers course under the management of the relevant trade association and have had sufficient [or the specified amount of] practical experience rigging safety nets to the application areas within which they work.

A2.2. Competent inspectors are those who have attended and passed a safety net inspector's course available through approved training centres operating under the control of the relevant trade association.

A2.3. Competent examiners are those who have been trained and authorised by the manufacturer to carry out full examination and repair of safety nets. They are able to assess the level at which a net is repairable and at which a net should be withdrawn from service.

ANNEX B:

NETS UNDER FRAGILITY CLASS C ASSEMBLIES

Moving of nets under Class C assemblies

B1. Roofing assemblies classified as class C under ACR [M] 001:2000 (the "Red Book") are non-fragile. To obtain Class C, the assembly has to survive a single impact applied in the worst possible position on that assembly. Thus whilst being a single drop of exactly the same magnitude as the SIR 30 test, it is actually a more onerous test¹, which has been demonstrated by testing. An assembly just attaining Class C is, therefore, likely to be safer than a material just attaining non-fragility under SIR 30.

Note 1: The SIR 30 test was a single drop into the centre of an unfixed sheet. Experience has shown that the worst location is invariably elsewhere because of the influence of the fixings, sheet profiles, etc.

B2. That Class C is non-fragile means the following:

- a) Once the Class C assembly [sheet or liner] is **fully** fixed, safety nets may be withdrawn from under them and leapfrogged. But note:
 - (i) The netting, which remains in place, must protect at least 2.5m behind the leading edge and 2.5m in front of the leading edge, unless alternative leading edge protection is provided. In practice, because of the way nets are supplied, this will usually mean that the netting remaining in place would be 1[one] full bay behind the leading edge and the full bay containing the leading edge.

- (ii) Special consideration needs to be given to the 1st tier [strip] at the gable eaves, as the edge supports are different. Therefore, evidence that the installation achieved Class C in the support condition adopted at this location should be provided.

- b) In a built up roof assembly [with a Class C liner], if the top sheet is subsequently removed, no additional precautions need to taken whilst working alongside the Class C liner, provided it is still **fully** fixed, undamaged and was unaffected by the removal process of the top sheet (or the reason for it's removal).

B3. Class C is the lowest class of non fragile assembly and, particularly if engineered to pass the test criteria, may be close to the boundary between fragile and non-fragile. Its classification and use therefore requires the following points to be taken into account:

- a) Normal industry recommended best practice is that Class 'C' assemblies should **never** intentionally be walked upon² and appropriate temporary access equipment, such as crawling boards, etc, should always be used.
Note 2: Accidental damage to such assemblies might render the classification void.
- b) A Class C assembly **must** be treated like any other safety critical item, e.g., a safety net. Therefore, any adverse occurrence that could affect its fitness for purpose should trigger an inspection. If an assembly has been subjected to an impact load (such as a trip or stumble), it **and** the adjoining panels **must** subsequently be treated as fragile and identified and protected accordingly, until it has been replaced and the adjoining panels inspected by a competent person. Procedures to ensure this happens **must** be in place.
- c) The workforce **must** be aware of these limitations, as required by Reg. 3 and 8 of the MHSWR.
- d) Any person falling on a class C assembly may make it fragile for subsequent loads. Persons may be capable of recovering themselves from a fall or stumble. However, where they are unable to, the additional weight of a rescuer may cause the assembly to fail. And, because all non-fragility classifications depend on the fixings of assemblies, any adjoining assemblies may also have become fragile³. In such situations the incident panel and all adjoining panels **must** be treated as **fragile**. This is a foreseeable risk of selecting Class C assemblies. Therefore, where class C assemblies are being used, rescue plans **must** be developed in advance of work starting. Again, in accordance with Reg. 5 and 8 of the MHSWR, the workforce needs to be aware of the Rescue Procedures.
Note 3: This includes adjoining Class B assemblies unless they have been tested as achieving non-fragility when only fastened on three edges
- e) All current non-fragility classifications depend upon correct workmanship during installation. In particular the manufacturer's specification for fixings and other components is of absolute importance and must not be altered, without the manufacturer's written

agreement. The type, number, location and spacing of fixings must be clear and **completely unambiguous** in their meaning. An assembly **must** be fully fixed before the assembly may be treated as non-fragile. In particular partially fixing of sheets (commonly known as ‘stitching’) to progress the work quickly, followed on by fully fixing later, is dangerous. Any roof found in such a state **must** be treated as fragile regardless of the classification of the components being used in its construction.

This document can be downloaded free of charge from the ACR website at <http://www.roofworkadvice.info> where the up to date list of members can also be found

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