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BRITISH STANDARD

Code of practice for lightweight temporary cladding for weather protection and containment on construction works

ICS 91.200; 91.220

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Publishing and copyright information

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 21 and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 28 September 2007. It was prepared by Subcommittee B/514/27, *Nets and sheets*, under the authority of Technical Committee B/514, *Access and support equipment*. A list of organizations represented on this committee can be obtained on request to its secretary.

Use of this document

This British Standard is intended for use by designers, engineers, scaffolding contractors, safety net erectors and authorities having jurisdiction.

As a code of practice, this British Standard takes the form of recommendations and guidance. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

Containment nets, sheets and glass-reinforced polyester (GRP) rigid profiled sheets are materials used to temporarily clad scaffolds or buildings and are intended to:

a) assist in the control of the environment, both inside and outside the contained area, so as to minimize health risks;

b) reduce the impact from environmental effects on the process being carried out in the contained area, in order to improve the quality of the work and productivity;

c) assist in the containment of debris within construction, refurbishment or maintenance sites;

d) provide weather protection to those in the contained area;

e) reduce the risk of injury to people or damage to property by influencing the route of fall of debris and/or objects;

f) provide improved levels of security;

while at the same time minimizing the loss of natural light to the containment area.

In many cases such lightweight temporary cladding (LTC) is fitted by scaffolders, sometimes as a means of protecting themselves, but mostly for use by other construction workers or for the protection of the general public. However, it is essential that those fitting and maintaining the equipment ensure that it is fixed so that it will perform as intended.

1 Scope

This British Standard gives guidance and recommendations on the application and use of lightweight temporary cladding systems on construction and similar sites where weather protection and/or containment of dust and debris is required. It is applicable to containment nets and sheets conforming to BS 7955, and to GRP sheets conforming to BS EN 1013-1 and BS EN 1013-2.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 476-3, *Fire tests on building materials and structures – Part 3: Classification and method of test for external fire exposure to roofs*

BS 476-7, *Fire tests on building materials and structures – Part 7: Method of test to determine the classification of the surface spread of flame of products*

BS 7955:1999, *Containment nets and sheets on construction works – Specification for performance and test methods*

BS EN 1013-1, *Light transmitting profiled plastic sheeting for single skin roofing – Part 1: General requirements and test methods*

BS EN 1013-2, *Light transmitting profiled plastic sheeting for single skin roofing – Part 2: Specific requirements and test methods for sheets of glass fibre reinforced polyester resin (GRP)*

BS EN 12811-1, *Temporary works equipment – Part 1: Scaffolds – Performance requirements and general design*

3 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

3.1 attachment point
designated point within a containment net or sheet through which ties can be threaded

3.2 competent person
person who has training and experience relevant to the matter being addressed, and has an understanding of the requirements of the particular task being approached

NOTE Such a person is expected to understand the hazards and the methods to be implemented to eliminate or reduce the risks that may arise. For example, when on site, such a person is expected to recognize at all times whether it is safe to proceed.

3.3 containment net
wind-permeable or semi-permeable temporary cladding net, conforming to BS 7955, intended to restrain small objects or tools and debris, to restrict dust, to reduce the effects of weather and to provide protection for persons from falling objects

3.4 containment sheet
translucent, semi-permeable or non-permeable LTC sheet, conforming to BS 7955, intended to protect a structure from inclement weather, to contain dust and other pollution, and to prevent small objects, tools and debris from falling

3.5 GRP sheet
rigid profiled translucent impervious LTC sheet conforming to BS EN 1013-1 and BS EN 1013-2, intended for longer term projects or where the cladding is vulnerable to high winds or heavy loads, and for temporary roofing

3.6 lightweight temporary cladding (LTC)
containment net, containment sheet or rigid GRP profiled sheet usually, but not exclusively, supported by scaffold, which provides protection from the environment for workers, or protection of the environment from airborne materials such as dust

3.7 tie
means used to join separate sheets or nets into larger configurations and to secure them in position

4 Selection of lightweight temporary cladding

4.1 Lightweight temporary cladding is particularly vulnerable to cutting and chafing and therefore liable to damage easily.

NOTE 1 For major long-term projects, building control officers might have requirements for LTC, and might require materials of a particular specification.

NOTE 2 The durability and performance of nets and sheets is also dependent on the type, number and quality of the fixings; see Clause ***7****.*

NOTE 3 See Annex A for background information relating to LTC.

NOTE GRP sheets embrittle quite slowly and will retain their strength for many years.

4.2 All synthetic fibres and textiles can be damaged through weathering and UV light. Normally, this results in a reduction in strength and embrittlement. Where the sheets might be in position over several seasons, the material should be regularly replaced or advice should be sought from the supplier or manufacturer. However, if care is taken in the design, positioning, erection, maintenance and use of the temporary cladding, these disadvantages can be largely controlled.

4.3 When ordering the LTC for a temporary structure, at least the following information should be provided:

a) dimensions of the structure to be clad (height, length, width and lift heights), including a drawing of the structure if possible;

b) time to be allowed for the cladding to be erected;

c) time over which the cladding is needed;

d) confirmation that the structure has been designed for the extra loads that could be applied due to the presence of the cladding [see **4.4**a), **4.4**b) and **4.4**j)];

e) what operations are going to be carried out from the structure to be clad;

f) what materials are needed for the operation to be carried out, e.g. chemicals for washing brickwork;

g) any special needs, for example, flame-retardant materials, dust sheets, noise reduction, complete weather-proof enclosure, etc.;

h) site location and likely climatic conditions.

4.4 The selection of LTC and its fixings should be made following a risk assessment based on individual site requirements. The risk assessment should take into account:

a) size, nature and weight of any object(s) to be contained;

b) additional loading that might be transferred to the structure or access scaffold from the containment net or sheet;

c) whether the cladding needs to be flame-retardant;

d) degree of protection required from rain or washing-down operations;

NOTE 1 Where high dust concentrations occur inside the clad area, consideration should be given to the use of personal protective equipment for persons working in those areas.

NOTE 2 The appearance of the net or sheet deteriorates as dust builds up on them, their ability to transmit light is reduced, and the flow of air through nets and woven sheets is progressively impeded.

e) need to prevent dust and debris from escaping to the environment;

f) need to exclude airborne dust and debris from the work area;

g) need for ventilation;

h) possible reaction to chemicals used in facade cleaning, etc.;

i) need for light transmission;

j) ability of ties or sheeting to fail at a load below that which would endanger the supporting structure;

k) area and protection required for safe handling of the LTC;

l) need for intermittent access through the cladding;

m) size of sheet, etc., pattern and frequency of attachment points;

n) ability to retain heat;

o) availability of independent test data;

p) level of site security required;

q) durability of cladding for longer term projects.

4.5 Details of material performance should be sought from manufacturers or suppliers when selecting containment nets and sheets for use in highly abrasive, chemically aggressive or extreme temperature situations.

5 Precautions to be taken for particular applications

5.1 Fixing to scaffolds

Advice on scaffold construction is given in BS EN 12811-1. The number and frequency of scaffold fixings from the supporting scaffold framework into the main permanent structure should be calculated in accordance with BS EN 12811-1 to ensure that the loads from the temporary cladding can be carried effectively.

NOTE 1 If LTC is fixed to the inside of the scaffolding, it could have added implications for the scaffold design.

LTC should preferably be fixed to the outside of the scaffold standards so that it will detach easily if the wind load becomes excessive.

NOTE 2 Guard rails provide an additional intermediate fixing position.

LTC on normal scaffolds should be supported by the framework of ledgers and standards.

The containment nets and sheets should be in direct contact with and fixed firmly to the open edges of the platforms, handrails, etc., leaving no gaps where possible. Where they are designed to overlap, the lower edges of the upper nets or sheets should be tucked inside the top edges of the lower nets/sheets to ensure that falling dust and debris is retained inside the cladding. Where the nets and sheets are being used to contain material thrown out by explosions, etc., it will be necessary to allow the upper sheet/net fall outside the lower one (see **5.3**, Note 2).

Where containment nets and sheets are fitted to tube and fitting scaffolds, the projection of scaffold elements, e.g. transoms, should be controlled so that they do not project more than 100 mm over the outside ledger. In all cases transom ends and coupler bolts should be capped where there is danger that the temporary cladding could be damaged.

In the case of GRP sheets, projecting ends of transoms should be avoided to allow the sheets to be firmly clamped to the standards and ledgers (see Annex B).

5.2 Control and retention of fine particles

In order to effectively control all dusts, grits, etc., LTC with low air porosity should be used. It should be correctly positioned to promote the flow of air in a particular direction, and coupled with forced ventilation. Containment sheets that have airtight joints can also be used for the control of fumes. Most applications are reasonably standard. Unusual arrangements will need to be specifically designed to reflect the type of layout, the configurations of the site and the characteristics of the cladding.

Particular care might need to be taken where the fine particles are hazardous (see **8.5**).

NOTE Where the control of dusts, etc., is not so critical it might be possible to encourage the flow in certain directions by the appropriate positioning of the LTC away from the building, while forming gaps in it at top and bottom to promote a rising current of air.

Where LTC is used to control dusts, etc., the dusts should be cleaned from the cladding to prevent any build-up of these materials blowing off into the atmosphere.

Containment nets and sheets should be washed with cold water if contaminated with any kind of chemical. If washing is carried out, measures should be taken to prevent environmental contamination from harmful materials in the wash.

Advice should be taken from the manufacturer or supplier if a net or sheet is to be used in an environment where chemical contamination is likely to take place.

5.3 Control and retention of debris

LTC can be used in diverting the fall or projection of material into a safe zone. When used for this purpose, the LTC should be placed as close as possible to the level where objects could fall.

However, falling debris can also be restrained if there is sufficient inertia in the temporary cladding to absorb the energy of the debris before it can break free. The specification for the cladding material should be checked with the manufacturer if this could be a problem.

When used as a means to control debris, only LTC designed by a competent person should be used. In addition, it should be installed strictly in accordance with the designer's instructions.

NOTE 1 The mass, closeness of the weave, slackness and the strength of the material are all important properties in enabling the cladding to perform in this manner. Additional protection from falling debris might still be necessary.

NOTE 2 Temporary cladding of an appropriate mass can be rigged to assist in absorbing the energy of flying debris and to direct it towards a safe area. The energy of projected or falling fine debris thrown out, for example, by an explosion is quickly reduced by air resistance. However, once these materials are launched into the atmosphere they can be widely dispersed by winds. The use of correctly positioned permeable and semi-permeable containment nets can greatly reduce this dispersion. If these nets are kept relatively slack, with as few fixings as possible, quite large debris with initial high velocities can be caused to fall to the ground, while still allowing the pressure wave from the explosion to disperse. The weight or mass of the netting can also be relevant in controlling the heavier debris.

5.4 Controlling the risk from fire

5.4.1 General

Local fire officers might have requirements for the fire resistance of LTC and should be consulted, particularly where large quantities are being used in fire-sensitive situations such as in enclosed areas or where there could be risks to persons.

LTC can be used to mitigate to some extent the effects of fire through early release of hot gas and smoke, particularly through the juxtaposition of materials of different melting or burning temperatures.

In areas of fire risk, particularly occupied or inhabited buildings, flame-retardant grades of LTC should always be used.

Fire exits, hydrants and inlet/outlet boxes to dry rising mains should not be obstructed when rigging nets or sheets.

5.4.2 Containment nets and sheets

*NOTE GRP sheets are generally unaffected by sparks (see **5.4.3**).*

Containment nets and sheets should not be subjected to excessive heat, fire or steam, and they should not be used where they could be damaged by flying sparks or molten metal from welding equipment. Fire-retardant containment nets and sheets should conform to BS 7955:1999, Annex C.

Any containment nets or sheets observed to have been in contact with sparks should be carefully inspected and repaired if necessary.

Materials used in the manufacture of containment nets and sheets can give off toxic fumes and smoke when exposed to a fire. It is important that areas below such nets or sheets be kept clear of flammable materials to avoid possible ignition from burning droplets of melted plastics. To minimize these problems only flame-retardant materials conforming to BS 7955 should be used.

WARNING. Containment nets and sheets are usually manufactured from polyolefin fibres (e.g. polypropylene, polyethylene). In general, polyolefin materials are of low flammability. They can, however, flame if the temperature is raised sufficiently above the melting point, and burning might not cease once the heat source is removed. If burning takes place, there can be a risk of molten material dripping onto exposed flesh. Check the manufacturer's specification for the material.

5.4.3 GRP sheets

GRP sheets have a higher calorific value than containment nets or sheets, but are less vulnerable to damage or combustion from flying sparks or molten metal, and do not create burning droplets of melted plastic. This British Standard applies only to GRP sheets that have an appropriate classification in accordance with BS 476-3 and BS 476-7.

For temporary roofing, sheets with ratings of AB or AA can be used (see BS 476-3).

For vertical cladding, sheets with ratings of Class 3 or Class 1 can be used (see BS 476-7).

5.5 Reducing the risk of fire from electrical discharge

LTC with anti-static properties should be used in combustible atmospheres.

Experience has shown that for anti-static purposes the electrical discharge path through a product should normally have an electrical resistance of less than 10Ω at any time through its life. A value of $5 \times 10\Omega$ for anti-static products is recommended as the lowest limit of resistance.

However, during the service life of LTC products, the physical characteristics can significantly change and it is therefore necessary to ensure that the product is capable of fulfilling its designed function of dissipating electro-static charges and conducting electricity during the whole of its life. Where this is anticipated to be a problem, the subject should be discussed with the manufacturer/supplier of the product.

6 Structural recommendations

6.1 Loading

6.1.1 General

LTC can be subject to a wide variety of loads which it will generally resist by sharing these loads through many strands and fibres. The higher the loads placed upon LTC, the more these loads need to be shared over wider areas of the material. However, the loading capacity of LTC will always be restricted at the points where the loads are applied or transferred to, such as at fixings and where heavy objects have small impact areas.

6.1.2 Wind loads

Winds cause both normal and drag loading on LTC and its supports. In most cases where there is also a temporary roof, there could be uplift forces. The effect of the wind loads can be influenced by using porous materials, the frequency of ties, or by incorporating pressure relief panels which would come into effect at a predetermined load. Prior to erecting the LTC, an assessment should be made into the possible effects if the LTC becomes detached and causes damage by falling or blowing onto people, property or vehicles. Pressure relief panels are not an option on GRP sheet, which should be designed to be retained under full wind load.

While the wind load normal to a porous or semi-porous containment net will be reduced by the percentage porosity of the net when compared to a solid wall, where the containment net is supported by a flexible structure such as a scaffold, the local redistribution effect resulting from the flexing of the scaffold members can result in the ties to the containment net being loaded up to twice as high as the load calculated for the nominal area of the net supported by the tie. Therefore, while the supporting structure/scaffold can be designed with a reduced load reflecting the porosity of the containment net, the ties holding the net should be capable of supporting twice that load.

NOTE 1 Even where a building has a low level of permeability, high wind velocities can cause drag along the line of the LTC. This can then be sufficient to cause overloading of the scaffold, particularly at the end of a façade.

NOTE 2 Advice on wind loading is given in BS 6399-2.

NOTE 3 Where containment nets or sheets are used to clad scaffolds that also support temporary roofs, it is possible that in some circumstances the airflow beneath the roof is reduced. The uplift forces could therefore be significantly changed. See the NASC publication Guide to good practice for scaffolding with tubes and fittings *[1].*

Where there is no information on the permeability of the containment nets and sheets, it should be designed on the assumption that they are always on the leeward side of the structure, and the building itself is at maximum permeability to air flow (i.e. without any windows or doors or as appropriate on the assumption that the building is at a lower level than the area of cladding supported by the ties).

6.1.3 Impact loads

Persons installing LTC should provide the support structure designer with information on the characteristic permeability of the cladding material, such as is required in BS 7955, so that the support structure can be suitably designed. Where the support structure is already erected, the persons fitting the LTC should check that the supporting structure has been designed to carry the associated loads arising from its use. Where LTC is required to contain, deflect or reduce the velocity of flying debris, then the greater the area of the LTC utilized to resist these impact forces, the better. This can be achieved by minimizing the number of ties and/or by using flexible ties or fixings.

6.2 Strength

Containment nets and sheets should conform to the strength requirements specified in BS 7955.

GRP sheets should conform to the strength requirements specified in BS EN 1013-1 and BS EN 1013-2.

7 Fixings

Fixings should be positioned at designated attachment points in the temporary cladding, where appropriate. The layout and positioning of the fixings should be compatible with the supporting framework.

Fixings should be:

a) only of a type recommended by the LTC manufacturer or supplier;

b) used as recommended by the manufacturer/supplier;

c) of a known breaking strain that will allow the designer to establish a predetermined maximum load on the supporting structure and so prevent too high a load on this supporting structure that could cause damage.

Fixings used to support containment nets and sheets should conform to BS 7955, should be compatible with the layout of the supporting scaffold members and should be of a type that supports a minimum load of 0.5 kN. Where the wind load/impact load from the containment nets and sheets has to be limited to prevent damage to the supporting structure, a specified failure load for the fixings should be obtained. To ensure that the ties will fail before the supporting structure is damaged, the number of ties used for a particular area of LTC can be calculated to be less than the design load for the area divided by the tie failure load.

*NOTE Too few fixings can result in a containment net or sheet becoming slack. This can increase the wind load on it and therefore on the supporting structure above that calculated by the designer (see also **6.1**).*

Where it is undesirable that ties should be allowed to fail, the frequency of fixings might need to be increased in those locations where severe wind loads are likely to occur, such as at corners of structures, and the strength of the supporting structure increased accordingly. In such situations it is essential that LTC is held securely in place, especially at its edges and against adjoining frameworks and scaffolding, in order to prevent vibration or chafing and progressive damage.

GRP sheets should be fixed at the centres specified by the manufacturer. These might vary depending on the profile of the sheeting, sheet thickness and prevailing conditions. Fixings should not be placed within 50 mm of the sheet edge.

8 Erecting and dismantling temporary cladding

8.1 General

The erection of containment nets and sheets should only be carried out once the scaffolding to which it is to be fixed has suitably safe access to complete the tying/fixing. Figure 1 shows a typical fixing arrangement of containment nets and sheets. Where a support system other than a scaffold is used, it should be designed by competent persons and should be capable of carrying the loads transmitted by the temporary cladding.

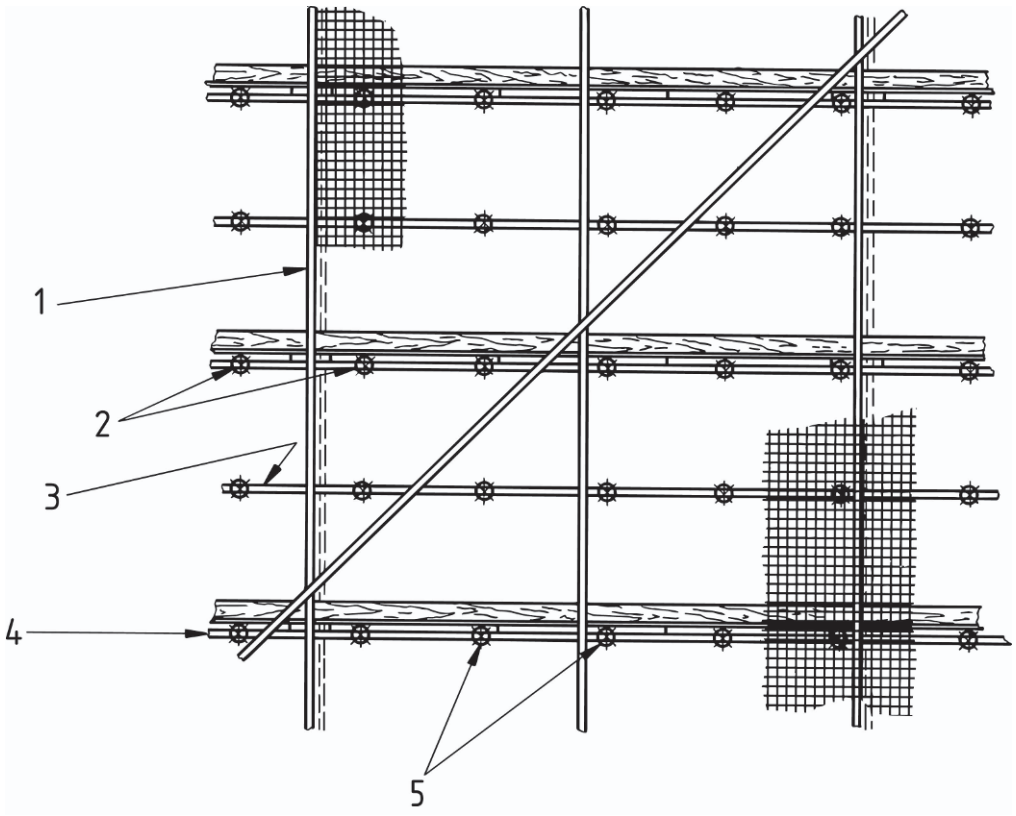
LTC should be installed strictly in accordance with the manufacturer's instructions, by persons competent to do so and only onto structures that are capable of taking the additional loads that arise out of the use of temporary cladding (see also **6.1**).

NOTE Attention is drawn to the Manual Handling Operations Regulations 1992 [2]. Further information is given in the associated HSE publication L23 [3].

The risk assessment (see **4.4**) should determine ways in which the risks to the installer or other site personnel, and damage caused by or to partially fixed cladding, could be controlled. In windy conditions, partially fixed LTC can be difficult or dangerous to handle. If necessary the installation should be delayed until conditions improve.

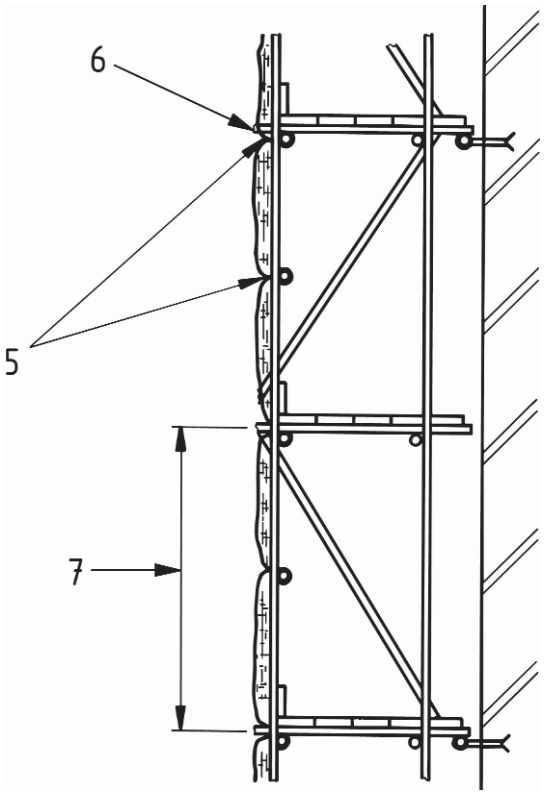
It is normally recommended that rigid sheeting should not be handled in wind speeds exceeding 6 m/s (13.2 mph).

Figure 1 **Typical fixing arrangement for nets and sheets**



a) Elevation

Figure 1 **Typical fixing arrangement for nets and sheets** (*continued*)



b) Section

Key

1 Standard
2 Eyelet positions
3 Guard rail
4 Ledger
5 Nets/sheets to be fixed at every available eyelet (not more than 1 m^2 apart)
6 Ends of transoms to be capped
7 2 m lift

8.2 Supervision and access

NOTE 1 Attention is drawn to the legal requirement for safe access for those erecting, dismantling and especially maintaining LTC.

Erection of all types of LTC should be supervised by a competent person to ensure that:

a) the correct type of LTC has been supplied (see also **9.3**);

b) LTC is erected with sufficient and suitable overlap or is correctly jointed to ensure continuity as recommended by the manufacturer (see Figure 2);

c) LTC is erected and maintained at the correct level relative to the working positions;

d) fixings to the scaffold are adequate as recommended by the manufacturer (see Clause **7**);

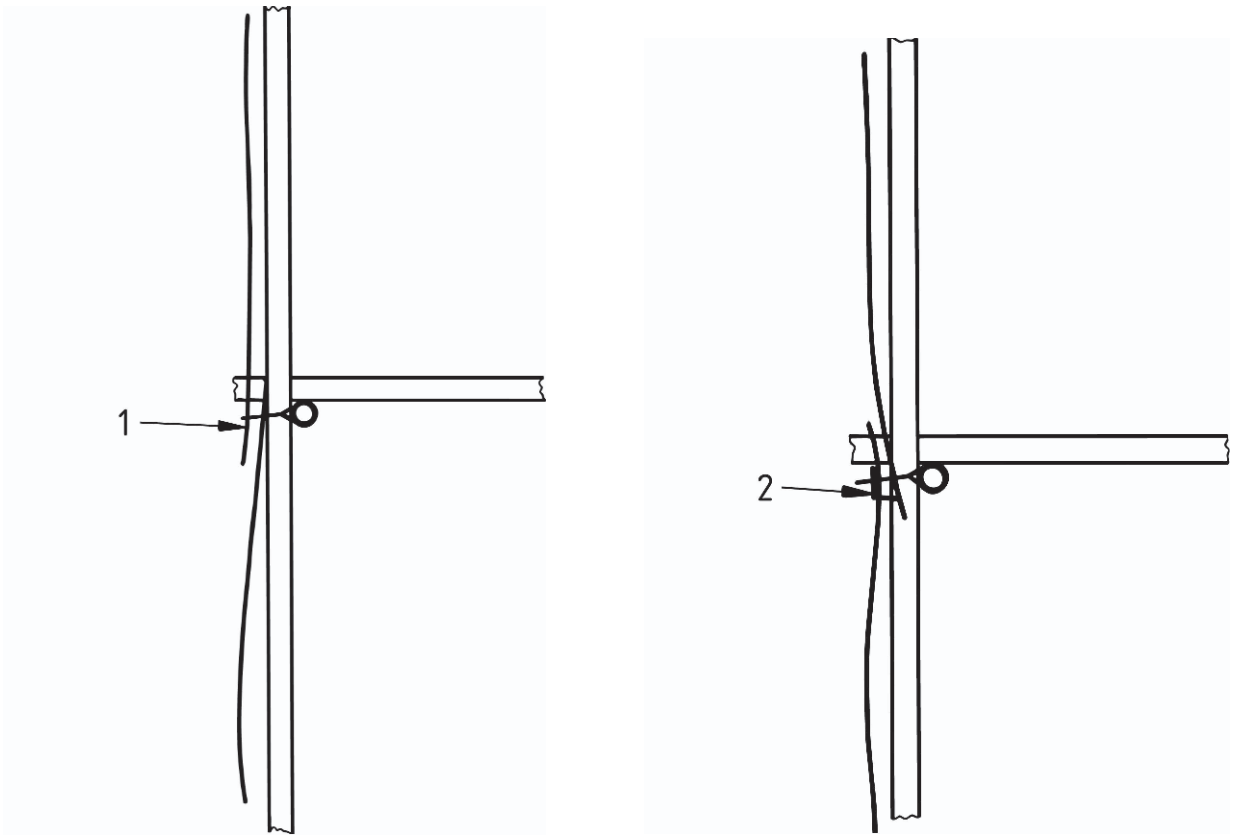
e) the scaffold has been designed and erected to carry the LTC;

f) adequate protection has been provided to guard against the wear caused by wind loading, particularly around sharp edges.

All areas of the LTC should be accessible for periodic inspection.

NOTE 2 In most cases it is probable that GRP sheets will require maintaining, and possibly inspecting, at less frequent intervals than other types of LTC.

Figure 2 **Methods of ensuring continuity of cladding**



a) Type A

b) Type B

Key

1 Lap over for weather protection

2 Lap under for demolition and sand-blasting operations

8.3 Methods of erection

8.3.1 General

NOTE 1 Attention is drawn to the Manual Handling Operations Regulations 1992 [2].

NOTE 2 The limitations on the load being carried are related to reach and distance of carry.

The main hazard to which workers erecting temporary cladding will be exposed is likely to be falling from height. Therefore, the persons erecting the cladding should always be provided with a platform from which they can carry out their work, with suitable protection against falls. Where these persons are working on multiple levels, safe access between levels should be provided.

There are two methods of erection for containment nets and sheets: vertical and horizontal. The following factors should be taken into account when selecting the method of erection.

a) When erecting vertically:

   1) the difficulty of fixing to varying lift heights is more easily overcome;

   2) the complete scaffolding can be contained at one operation;

   3) all vertical joints should be tied/stitched;

   4) the LTC is fixed on the outside face of the scaffold;

   5) the full weight of the LTC will be held at the top of the scaffolding during erection;

   6) a predetermined width of LTC will generally be required dependant on the spacing of the scaffold standard.

b) When erecting horizontally:

   1) the temporary cladding is normally fixed on the outside of the scaffold standards;

   2) each scaffold lift can be contained as it is erected and greater control can be maintained over the material;

   3) selected scaffold lifts can be contained;

   4) a predetermined width of LTC is needed dependant on the scaffold lift height.

8.3.2 Erecting containment nets and sheets vertically

A roll of containment net or sheet of the required length to reach the ground from the highest boarded out point at which it is needed, should have the end of the roll fixed at both corners at this highest level and the roll should be carefully lowered down the outside of the scaffold. It should be secured at the edges and intermediate points as necessary to conform to the manufacturer's recommended fixings in accordance with BS 7955. It should be tied off at the lowest point to prevent any flapping and obstruction. Where possible, it should be tied to standards, or to ledgers at each lift, and the vertical joints secured.

8.3.3 Erecting containment nets and sheets horizontally

To fix on the inside of scaffold, the containment net or sheet should be taken to the height at which it is needed and laid on the boarded level. Starting at one end, the two corners should be tied to the upper and lower ledgers and guard-rail of the lift. Additional ties should be fixed at required centres as the containment net or sheet is unrolled. Containment nets or sheets should not be fully unrolled on a boarded level before fixing.

Two people should be used to fix containment nets or sheets on the outside of scaffold. The roll of containment net or sheet should be taken to the level at which it is needed. One person should take the free end while the other gradually unrolls from the main roll. The free end should then be passed around the outside of the standards. When the required length is unrolled, the free end should be fixed to the framework. The containment net or sheet should be cut at the required length and pulled taut. The remainder of the fixings should then be inserted.

8.3.4 Erecting GRP sheets

Profiled GRP sheets may be laid with the corrugations running vertically or horizontally. The corrugations should not span more than 2 m and thus the sheets are usually fixed with the corrugations running vertically.

Cladding should commence from the bottom of the scaffold. Each sheet above should overlap the sheet below by a minimum of 150 mm and line up with the corrugations so that the sheets fully nest together.

The next sheet along (horizontally) should be laid to overlap the neighbouring sheet by one full corrugation.

All GRP sheets should be offered up using a minimum of two people. The sheets should be pre-drilled so as to accommodate a suitable size "J" or "U" bolt. These bolts should be fed around the scaffold pole and through the sheet and secured with a nut and washer using a washer of at least 29 mm diameter. Five fixings per metre width of sheet should be used. Where severe wind loadings are anticipated, additional fixings might be needed, in accordance with the manufacturer's recommendations.

The sheeting should be applied to the external face of the scaffolding and a suitable external platform such as mobile elevated working platform should be used, together with a person on the inside of the scaffold to feed the "J" or "U" bolts.

The sheet length should normally be not more than 6 m, as longer sheets are more difficult for one person to handle manually.

8.4 Methods of dismantling

8.4.1 Dismantling containment nets and sheets vertically

Two fixings at the lowest level should remain in position.

Working in an upward direction the intermediate fixings should be removed. The containment nets or sheets should be tied to ropes at the highest level and lowered to the ground. The bottom fixings should then be removed and the containment nets or sheets folded.

8.4.2 Dismantling containment nets and sheets horizontally

A minimum of two people are needed to dismantle containment nets and sheets horizontally. One person should remove the fixings while the other rolls the containment net or sheet. The roll should then be tied and lowered to the ground as in **8.4.1** or by using a rope and gin wheel.

8.4.3 Dismantling GRP sheets

NOTE If handled with care the sheets can be salvaged for reuse on another scaffold tower.

Dismantling of the GRP sheets is the reverse process of erection. The work should start at the top. The sheets should be carefully unbolted and manhandled to the working platform or lowered to the ground.

8.5 Disposal of LTC materials

Because of possible toxic smoke and fumes, LTC should not be disposed of by fire.

NOTE In some cases it might be possible to have the cladding recycled but it might need to be washed before dispatch as the cladding could contain contaminants from the construction site, e.g. cement dusts, mud, paints and greases.

The disposal of these materials after use, e.g. at an approved landfill site, can be affected by both the nature of the cladding itself and that of any contaminants that might be on it. In those cases where there could be suspect contaminants on the cladding, advice should be sought from the Environment Agency as to the method of disposal and the location of the most suitable waste tip.

9 Care of lightweight temporary cladding

9.1 General

NOTE Such damage would normally include cuts of 300 mm, holes with over 100 mm minimum width or torn attachment points.

In general, LTC, or sections of LTC, which are found to be damaged should be replaced. However, damage to containment nets and sheets that is not too excessive may be repaired (see **9.4**).

Temporary cladding might need regular cleaning by a competent person. Where high dust concentrations occur inside the sheeted area, protective equipment for personnel working in those areas might be required. Any potentially hazardous contaminants should be dealt with (see **8.5**).

9.2 Protection from damage

Care should be taken to reduce to a minimum unnecessary wear and mechanical damage likely to weaken the LTC. The following situations should be avoided as far as possible:

a) dragging over rough surfaces;

b) contact with sharp edges;

c) stacking material on the LTC;

d) accumulation of debris in the LTC;

e) persons jumping or throwing objects into the LTC;

f) chemical attack;

g) unauthorized interference, particularly the cutting of windows;

h) walking on LTC.

Where any of these hazards cannot be avoided, precautions should be taken to protect the LTC and supporting framework. LTC should be inspected to determine whether it remains serviceable (see **9.3**). Expert advice, e.g. from the manufacturer, should be sought when there is any doubt about the suitability of LTC for use after any known contamination.

NOTE Annex B gives details of potential causes of deterioration.

Precautions should be taken to ensure that LTC is not overexposed to the agents that cause deterioration.

When erecting LTC in the vicinity of live electrical conductors or overhead power cables, the supply provider should be consulted before work is commenced.

9.3 Inspection

New LTC should be checked before use to determine whether it is of the correct specification.

Re-used containment nets and sheets should be thoroughly examined immediately before being erected. This can be done by spreading the net or sheet out on a clean flat floor and looking for damaged areas. In the case of containment sheets it might be necessary to turn them over and repeat the examination on the other side. A record should be kept of the examination.

If the examination of LTC reveals any deterioration or defects that give rise to doubts about its quality, it should be taken out of use. (See **9.4** regarding repairs to containment nets and sheets.)

Visual inspection of containment sheets should be carried out during initial erection and thereafter at weekly intervals, at the same time as the scaffold inspection. In addition, the containment sheets should be examined after any incident or severe climatic condition likely to have affected their strength, effectiveness and stability. Assessing the degree of deterioration during use is difficult, but particular attention should be paid to anchorage points, overlap jointing and any rips or tears. Anchorage points that are working loose or broken should be refitted, and any tears or holes which could impair the function of the containment sheet should be repaired.

9.4 Repairing LTC

Although the resistance of man-made materials used in LTC to damage due to loading is generally good, when damaged the affected area should be replaced or reinforced by additional LTC as described below.

If conditions are suitable it might be possible to repair minor local damage to containment nets and sheets, e.g. isolated 100 mm cuts, on site under the supervision of a competent person. The manufacturer should be consulted before any such repairs are made.

It is important that repairs are not detrimental to the strength and performance of the containment sheet. Care should be taken in assessing the suitability of repaired containment sheets for continued use, in particular to ensure that there can be effective load sharing among the strands or sheet areas.

Generally GRP sheets should be replaced if damaged, rather than repaired.

9.5 Storage

LTC will not rot if damp, but can become unserviceable through other causes, e.g. mildew.

LTC should be stored so as to minimize damage through handling and kept in a cool, dry place out of direct sunlight.

All rolls of materials and sheets should be stored with care in order to avoid mechanical damage, for example, by tearing or abrasion.

WARNING. Accidental burning of containment net and sheet materials in bulk can create dense fumes and smoke and could create extremely hazardous conditions. All bulk quantities of these should be stored in lockable, ideally well ventilated, enclosed areas away from exit access routes, stairwells, etc.

Annex A (informative) Sources of information relating to LTC products

Table A.1 and Table A.2 provide details on where information on the properties of different LTC products can be found. The tables list the normally significant properties that might be required in designing the application of LTC to the needs of a particular job.

Table A.1 **Properties of containment nets and sheets**

Property	Specified in BS 7955	Manufacturer	Installer
Ultimate tear resistance	Yes	✓	✓
Flame retardant	Yes	✓	✓
Total mass	Yes	✓	✓
Range of sizes	No	✓	✓
Permeability/porosity	Yes	✓	✓
Light transmission	Yes	✓	✓
Melting point	No	✓	✓
Spacing of cladding attachment positions	No	✓	✓
Tensile strength	Yes	✓	✓
Attachment point strength	Yes	✓	✓
Useable temperature range	No	✓	●
UV resistance	No	✓	●
Strength of ties	Yes	✓	✓
Puncture resistance	Yes	✓	●

✓ = Information that could be available from manufacturer and might need to be taken into account by designer.
● = Information that could be available from manufacturer and might be useful to know in special applications.

Table A.2 provides details of the properties of GRP sheets. The table can be used to indicate where help can be found for the various properties required in designing the application of LTC to the needs of a particular job.

Table A.2 **Properties of rigid GRP profiled sheets**

Property	Specified in BS EN 1013	Specified in BS 5427-1	Manufacturer	Installer
Light transmission	Yes	—	✓	●
Impact resistance	Yes	—	✓	●
Thickness/weight	Yes	—	✓	✓
Tensile property	Yes	—	✓	●
Protective coatings	Yes	—	✓	●
Fasteners and washers	—	Yes	✓	✓
Laps and seals	—	Yes	✓	✓
Structure loading	—	Yes	✓	✓
Thermal movement	—	Yes	✓	●
Fire performance	—	Yes	✓	✓
Durability	—	Yes	✓	✓
Profile and sheet size	—	—	✓	✓
Fixing centres	—	—	✓	✓
Chemical resistance	—	—	✓	●

✓ = Information that could be available from manufacturer and might need to be taken into account by designer.
● = Information that could be available from manufacturer and might be useful to know in special applications.

Annex B (informative) Causes of deterioration of LTC and its fixings

B.1 Temperature

Resistance of polyolefins to moderate heat is generally good. They perform well and can be stored satisfactorily within the temperature range of –20 °C to +40 °C.

However, continued exposure to extremes of temperature (i.e. outside the range –20 °C to +40 °C) can increase the ageing process, and it is essential to consult with the manufacturer or supplier before allowing such exposure.

GRP, being a thermoset material, is generally unaffected by the normal temperature range experienced in the British climate and generally unaffected in the temperature range of –20 °C to +100 °C. GRP does not become brittle at low temperatures.

B.2 Chemical attack

The resistance of polyolefins and GRP to both acids and alkalis is good, and resistance to hydrocarbons and organic solvents is good at low temperatures.

B.3 Mechanical damage

Containment nets and sheets can be susceptible to mechanical damage from applied loads such as wind, and from abuse. Small holes can increase rapidly in size, seriously affecting their ability to perform satisfactorily.

The following list, whilst not exhaustive, identifies some of the areas where mechanical damage can occur:

a) protruding transoms, ledgers and bracing;

b) chafing over scaffold fittings;

c) incorrect use of fixings;

d) insufficient fixings used;

e) temporary repositioning of the cladding;

f) temporary repositioning of scaffolding components;

g) building materials stacked in too close proximity;

h) unstable stacks of building materials;

i) reduced access for site personnel;

j) demolition of buildings;

k) walking on cladding.

B.4 Strong sunlight

Strong sunlight causes degradation of polyolefins, which is reduced by the inclusion of UV inhibitors. Information can usually be obtained from the manufacturer about the levels of UV protection that have been incorporated in the product during manufacture. Fabric after-treatments are inadequate. High humidity can contribute to leaching out of additives over a long period, leading to reduction in tensile strength. GRP sheets are normally supplied with a UV surface protection. Some GRP can turn yellow on prolonged exposure but this does not significantly reduce the level of light transmitted.

B.5 Ageing

Temperature fluctuation, temperature extremes, exposure to UV light and wind-induced flexing (flutter) all contribute to a reduction in the strength and performance of cladding materials. These factors are primarily influenced by the geographical location of the site. For example, northern European latitudes are generally windier than southern European latitudes, whereas southern European latitudes have a greater exposure to UV light than northern European latitudes. The location of the site in relation to other buildings or structures also has an effect on wind acceleration and the resultant pressure and suction forces on LTC.

Resistance to weathering can be gauged, for example, by studying the manufacturer's temperature range, melting point, flex resistance and UV stability data.

Indications of weathering include discoloration and embrittlement.

GRP sheets are normally manufactured for long-term use and can have a serviceable life in excess of 10 years.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 5427-1, *Code of practice for the use of profiled sheet for roof and wall cladding on buildings – Part 1: Design*

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[1] NATIONAL ACCESS AND SCAFFOLDING CONFEDERATION. *Guide to good practice for scaffolding with tubes and fittings*. TG 20:05. London: National Access and Scaffolding Confederation, 2005.

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