OFFICE OF THE
DEPUTY PRIME MINISTER

The Building Regulations 2000

Glazing - safety in relation to impact, opening and cleaning

N

APPROVED DOCUMENT

N1 Protection against impact
N2 Manifestation of glazing
N3 Safe opening and closing of windows, skylights and ventilators
N4 Safe access for cleaning windows etc

1998 Edition
amended 2000

MAIN CHANGES IN THE 1998 EDITION

This edition of Approved Document N, Glazing – safety in relation to impact, opening and cleaning, replaces the 1992 edition. The main changes are:

Requirement N3

Safe opening and closing of windows etc: new requirement to reduce the risk of injury when adjusting windows, skylights and ventilators.

Requirement N4

Safe access for cleaning windows etc: new requirement to reduce risk of injury when cleaning glazed surfaces.

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Use of Guidance

THE APPROVED DOCUMENTS

The Building Regulations 2000 (SI 2000/2531), which come into operation on 1st January 2001, replace the Building Regulations 1991 (SI 1991/2768) and consolidate all subsequent revisions to those regulations. This document is one of a series that has been approved and issued by the Secretary of State for the purpose of providing practical guidance with respect to the requirements of Schedule 1 to and regulation 7 of the Building Regulations 2000 for England and Wales.

At the back of this document is a list of all the documents that have been approved and issued by the Secretary of State for this purpose.

Approved Documents are intended to provide guidance for some of the more common building situations. However, there may well be alternative ways of achieving compliance with the requirements. **Thus there is no obligation to adopt any particular solution contained in an Approved Document if you prefer to meet the relevant requirement in some other way.**

Other requirements

The guidance contained in an Approved Document relates only to the particular requirements of the Regulations which the document addresses. The building work will also have to comply with the requirements of any other relevant paragraphs in Schedule 1 to the Regulations.

There are Approved Documents which give guidance on each of the Parts of Schedule 1 and on regulation 7.

LIMITATION ON REQUIREMENTS

In accordance with regulation 8, the requirements in Parts A to K and N of Schedule 1 to the Building Regulations do not require anything to be done except for the purpose of securing reasonable standards of health and safety for persons in or about buildings (and any others who may be affected by buildings or matters connected with buildings).

MATERIALS AND WORKMANSHIP

Any building work which is subject to the requirements imposed by Schedule 1 to the Building Regulations should, in accordance with regulation 7, be carried out with proper materials and in a workmanlike manner.

You may show that you have complied with regulation 7 in a number of ways. These include the appropriate use of a product bearing CE marking in accordance with the Construction Products Directive (89/106/EEC)[1] as amended by the CE Marking Directive (93/68/EEC)[2], or a product complying with an appropriate technical specification (as defined in those Directives), a British Standard, or an alternative national technical specification of any state which is a contracting party to the European Economic Area which, in use, is equivalent, or a product covered by a national or European certificate issued by a European Technical Approval Issuing body, and the conditions of use are in accordance with the terms of the certificate. You will find further guidance in the Approved Document supporting regulation 7 on materials and workmanship.

Independent certification schemes

There are many UK product certification schemes. Such schemes certify compliance with the requirements of a recognised document which is appropriate to the purpose for which the material is to be used. Materials which are not so certified may still conform to a relevant standard.

Many certification bodies which approve such schemes are accredited by UKAS.

Technical specifications

Building Regulations are made for specific purposes: health and safety, energy conservation and the welfare and convenience of disabled people. Standards and technical approvals are relevant guidance to the extent that they relate to these considerations. However, they may also address other aspects of performance such as serviceability, or aspects which although they relate to health and safety are not covered by the Regulations.

When an Approved Document makes reference to a named standard, the relevant version of the standard is the one listed at the end of the publication. However, if this version has been revised or updated by the issuing standards body, the new version may be used as a source of guidance provided it continues to address the relevant requirements of the Regulations.

The appropriate use of a product which complies with a European Technical Approval as defined in the Construction Products Directive will meet the relevant requirements.

The Department intends to issue periodic amendments to its Approved Documents to reflect emerging harmonised European Standards. Where a national standard is to be replaced by a European harmonised Standard, there will be a co-existence period during which either standard may be referred to. At the end of the co-existence period the national standard will be withdrawn.

[1] As implemented by the Construction Products Regulations 1991 (SI 1991/1620)

[2] As implemented by the Construction Products (Amendment) Regulations 1994 (SI 1994/3051)

THE WORKPLACE (HEALTH, SAFETY AND WELFARE) REGULATIONS 1992

The Workplace (Health, Safety and Welfare) Regulations 1992 contain some requirements which affect building design. The main requirements are now covered by the Building Regulations, but for further information see: *Workplace health, safety and welfare, The Workplace (Health, Safety and Welfare) Regulations 1992, Approved Code of Practice and Guidance;* The Health and Safety Commission, L24; Published by HMSO 1992; ISBN 0-11-886333-9.

The Workplace (Health, Safety and Welfare) Regulations 1992 apply to the common parts of flats and similar buildings if people such as cleaners and caretakers are employed to work in these common parts. Where the requirements of the Building Regulations that are covered by this Part do not apply to dwellings, the provisions may still be required in the situations described above in order to satisfy the Workplace Regulations.

Mixed use development

In mixed use developments part of a building may be used as a dwelling while another part has non-domestic use. In such cases, if the requirements of this Part of the Regulations for dwellings and non-domestic use differ, the requirements for non-domestic use should apply in any shared parts of the building.

The Requirements N1 and N2

This Approved Document deals with the following Requirement from Part N of Schedule 1 to the Building Regulations 2000.

Requirement	*Limits on application*
Protection against impact **N1.** Glazing, with which people are likely to come into contact whilst moving in or about the building, shall – (a) if broken on impact, break in a way which is unlikely to cause injury; or (b) resist impact without breaking; or (c) be shielded or protected from impact	
Manifestation of glazing **N2.** Transparent glazing, with which people are likely to come into contact while moving in or about the building, shall incorporate features which make it apparent.	Requirement N2 does not apply to dwellings.

Note: Attention is drawn to the following:

Regulation 3 defines building work. Glazing which is installed in a location where there was none previously as part of the erection, extension or material alteration of a building, other than an exempt building, is building work and is subject to the Requirements of Part N. The installation of replacement windows or glazing (e.g. by way of repair), is not building work but its supply may be subject to consumer protection legislation.

Approved Document B: Fire safety, includes guidance on fire-resisting glazing and the reaction of glass to fire.

The Approved Document for Part K: Protection from falling, collision and impact covers glazing which forms part of protection from falling from one level to another, and which needs to ensure containment as well as limiting the risk of sustaining injury through contact. Recommendations are made for the heights up to which protection from falling should be provided and for means of achieving containment.

Guidance

Performance

Requirement N1

0.1 In the Secretary of State's view, requirement N1 will be met by adopting, in critical locations, measures to limit the risk of sustaining cutting and piercing injuries.

0.2 The most likely locations for impacts leading to such injuries are in doors and door side panels and at low level in walls and partitions. In doors and door side panels, the risk is at its greatest between floor and shoulder level, when near to door handles and push plates: especially when normal building movement causes doors to stick. Hands, wrists and arms are particularly vulnerable. An initial impact between waist and shoulder level may be followed by a fall through the glazing, resulting in additional injury to the face and body.

0.3 In walls and partitions, away from doors, the risks are predominantly at low level. At that level, children are especially vulnerable.

0.4 Glazing in critical locations would be considered reasonably safe were its nature such that, if breakage did occur, any particles would be relatively harmless.

0.5 The requirement may also be met if the glazing is sufficiently robust to ensure that the risk of breakage is low, or if steps are taken to limit the risk of contact with the glazing.

Requirement N2

0.6 In the Secretary of State's view, requirement N2 will be met by including in critical locations, permanent means of indicating the presence of large uninterrupted areas of transparent glazing.

0.7 The existence of large uninterrupted areas of transparent glazing represents a significant risk of injury through collision. The risk is at its most severe between areas of a building or its surroundings which are essentially at the same level and where a person might reasonably assume direct access between locations which are separated by glazing.

0.8 In such locations, some means should be adopted to make glazing more apparent or visible to people using the building.

Section 1

PROTECTION AGAINST IMPACT

Critical Locations

1.1 The following locations may be considered 'critical' in terms of safety;

a. between finished floor level and 800mm above that level in internal and external walls and partitions (see Diagram 1).

b. between finished floor level and 1500mm above that level in a door or in a side panel, close to either edge of the door (see Diagram 1).

Reducing the risks

1.2 Glazing in critical locations should either,

a. break safely, if it breaks (see paragraph 1.3), or

b. be robust or in small panes (see paragraphs 1.4, 1.5 and 1.6 and Diagrams 2 and 3), or

c. be permanently protected (see paragraphs 1.7 and 1.8 and Diagram 4).

Safe breakage

1.3 Safe breakage is defined in BS 6206: 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*: clause 5.3, and is based on an impact test which requires the result of the impact to be limited to creating:

a. a small clear opening only, with a limit to the size of the detached particles, or

b. disintegration, with small detached particles, or

c. breakage resulting in separate pieces that are not sharp or pointed.

In terms of safe breakage, a glazing material suitable for installation in a critical location would satisfy the requirements of Class C of BS 6206 or, if it is installed in a door or in a door side panel and has a pane width exceeding 900mm, the requirements of Class B of the same standard.

Robustness

1.4 Some glazing materials, such as annealed glass, gain strength through thickness; others such as polycarbonates or glass blocks are inherently strong. Some annealed glass is considered suitable for use in large areas forming fronts to shops, showrooms, offices, factories, and public buildings. Reasonable glass thickness/dimension limits for annealed glass which may be used in these locations are shown in Diagram 2 (see also paragraph 2.1).

Diagram 2 **Annealed glass thickness/ dimension limits**

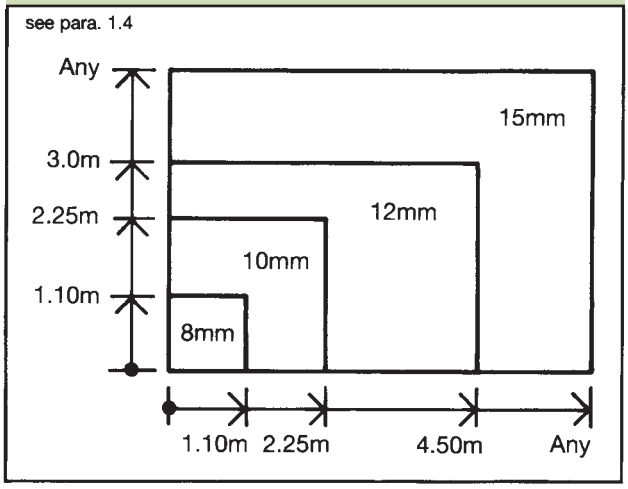
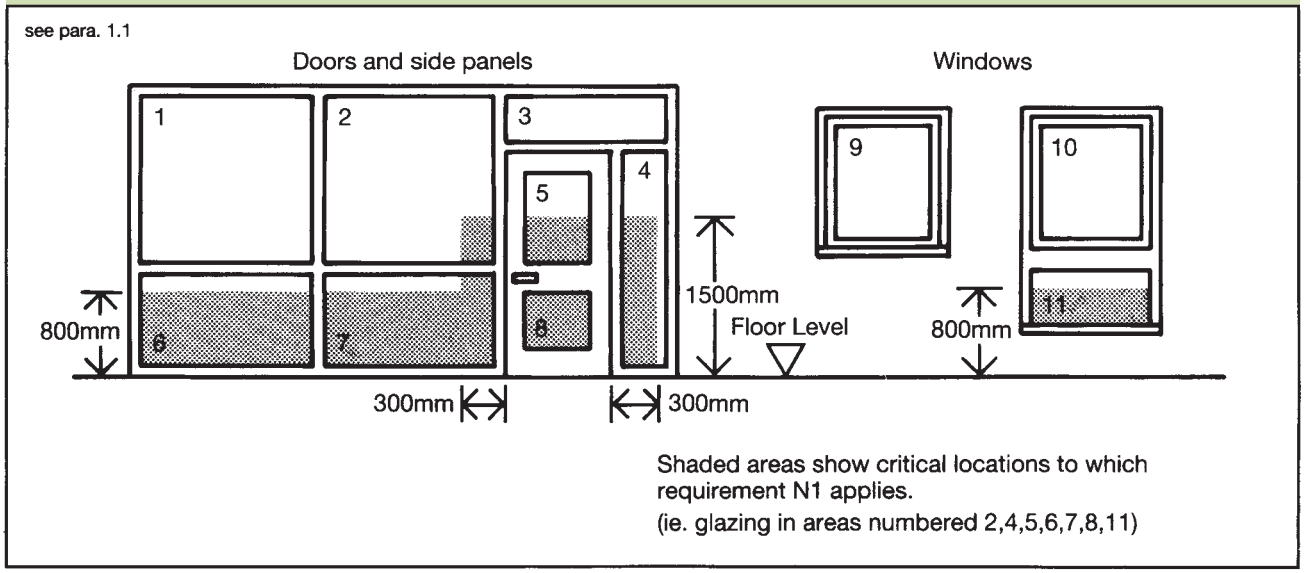


Diagram 1 **Critical locations in internal and external walls**



Shaded areas show critical locations to which requirement N1 applies.
(ie. glazing in areas numbered 2,4,5,6,7,8,11)

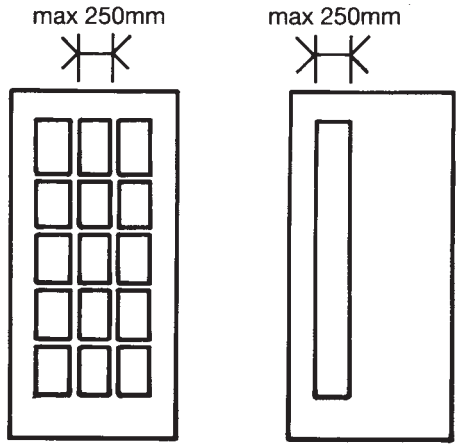
Glazing in small panes

1.5 In the context of this Approved Document, a 'small pane' may be an isolated pane, or one of a number of panes contained within glazing bars, traditional leaded lights or copper-lights.

1.6 Small panes should have a smaller dimension not exceeding 250mm and an area not exceeding 0.5m^2 each measured between glazing beads or similar fixings. Annealed glass in a small pane should not be less than 6mm nominal thick, except in traditional leaded or copper-lights in which 4mm glass would be acceptable, when fire resistance was not a factor. Typical installations are shown in Diagram 3.

Diagram 3 **Dimensions and areas of small panes**

see paras 1.5 & 1.6



Maximum area of single pane not to exceed 0.5m^2, small panes of annealed glass should not be less than 6mm thick

Permanent screen protection

1.7 If, as part of a design solution, glazing in a critical location is installed behind permanent screen protection, the screen should:

a. prevent a sphere of 75mm from coming into contact with the glazing,

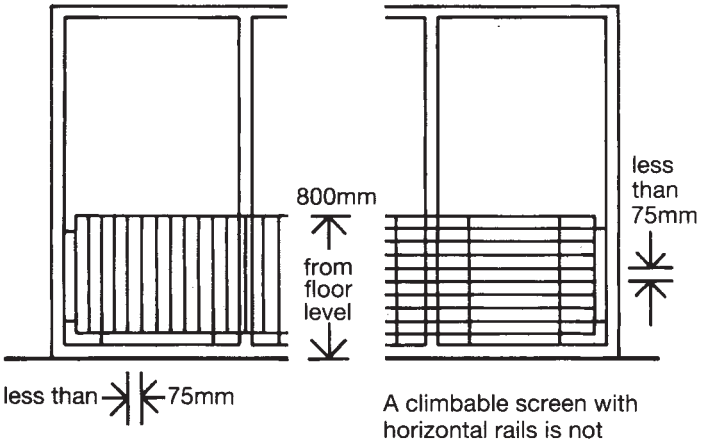
b. be robust and,

c. if it is intended to protect glazing that forms part of protection from falling, be difficult to climb.

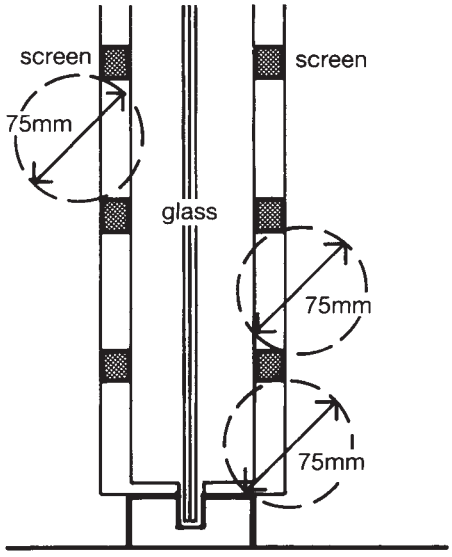
1.8 Glazing in a critical location which is afforded permanent screen protection, does not, itself, need to comply with requirement N1. The principles of screen protection are shown in Diagram 4.

Diagram 4 **Permanent screen protection**

see para 1.7 & 1.8



A climbable screen with horizontal rails is not suitable where guarding is required



Detail of screen

Section 2

MANIFESTATION OF GLAZING

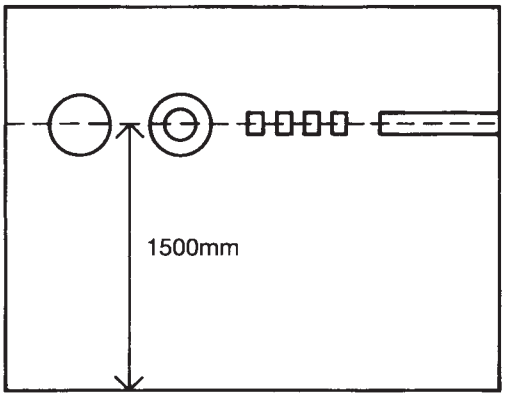
Critical locations

2.1 Manifestation of glazing is only necessary in critical locations in which people moving in or about the building might not be aware of the presence of the glazing and may collide with it. 'Critical locations' include large uninterrupted areas of transparent glazing which form, or are part of, the internal or external walls and doors of shops, showrooms, offices, factories, public or other non-domestic buildings.

2.2 The risk of collision is most severe when two parts of the building, or the building and its immediate surroundings, are essentially at the same level but separated by transparent glazing and a person might reasonably have the impression that they are able to walk from one part to the other without interruption.

Diagram 5 **Height of 'manifestation' of large areas of transparent glazing**

see para 2.4



Manifestation can take various forms e.g. broken or solid lines, patterns or company logos

Permanent manifestation of glazing

2.3 Permanent manifestation of large uninterrupted areas of transparent glazing is only necessary when other means of indicating the presence of the glazing are not used. These other means may include mullions, transoms, door framing or large pull or push handles.

2.4 Where 'manifestation' is necessary, it may take the form of broken or solid lines, patterns or company logos at appropriate heights and intervals (see Diagram 5).

2.5 Diagram 6 includes examples of a number of methods of indicating the presence of glazing.

Alternative indications of glazing

2.6 Examples of installations of glazing which would not normally warrant 'manifestation' include:

a. door height transparent glazing less than 400mm in width;

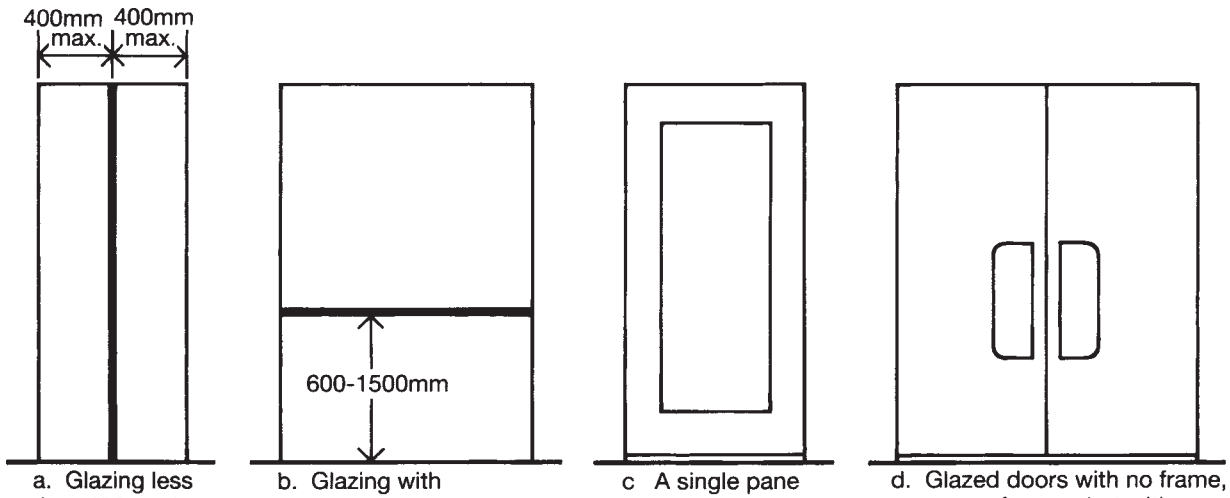
b. door height transparent glazing with a rail at a height of between 600mm and 1500mm above finished ground or floor level;

2. a single pane glazed door with substantial framing; or,

d. a single pane glazed door which is either not framed, or which has very narrow framing, but is provided with large easily seen push or pull plates or handles.

Diagram 6 **Examples of door height glazing not warranting 'manifestation'**

see para 2.5 & 2.6



a. Glazing less than 400mm in width between frames

b. Glazing with a rail between 600 and 1500mm above the floor

c A single pane glazed door with a substantial frame

d. Glazed doors with no frame, or narrow frames, but with a large handle or push plate on each single pane

The Requirement N3

This Approved Document deals with the following Requirement from Part N of Schedule 1 to the Building Regulations 2000.

Requirement	*Limits on application*
Safe opening and closing of windows etc **N3.** Windows, skylights and ventilators which can be opened by people in or about the building shall be so constructed or equipped that they may be opened, closed or adjusted safely.	Requirement N3 does not apply to dwellings.

Note

Attention is drawn to the Workplace (Health, Safety and Welfare) Regulations 1992

Compliance with Building Regulation requirement N3 would, in accordance with Section 23(3) of the Health and Safety at Work, etc Act 1974, prevent the service of an improvement notice with regard to the requirements for opening, closing or adjusting windows, skylights and ventilators in regulation 15(1) of the Workplace (Health, Safety and Welfare) Regulations 1992.

Guidance

Performance

Requirement N3

In the Secretary of State's view, requirement N3 will be met if windows, skylights and ventilators which open, can be operated safely.

Section 3

SAFE OPENING AND CLOSING OF WINDOWS ETC

Introduction to provisions

3.1 This Approved Document sets out some ways of complying with the requirement.

Location of controls

3.2

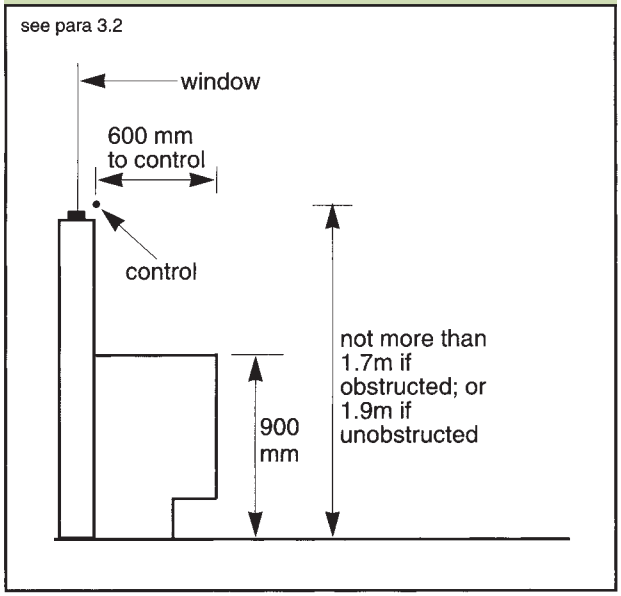
a. Where controls can be reached without leaning over an obstruction they should not be more than 1.9m above the floor or other permanent stable surface provided to give access. Small recesses, such as window reveals, should be ignored.

b. Where there is an obstruction the control should be lower, eg not more than 1.7m, where there is a 600mm deep obstruction (including any recess) not more than 900mm high. See Diagram 7.

Prevention of falls

3.3 Where there is a danger of the operator or other person falling through a window above ground floor level, suitable opening limiters should be fitted or guarding should be provided (see Approved Document K, Protection from falling, collision and impact).

Diagram 7 Height of controls



The Requirement N4

This Approved Document deals with the following Requirement from Part N of Schedule 1 to the Building Regulations 2000.

Requirement	*Limits on application*
Safe access for cleaning windows etc **N4.** Provision shall be made for any windows, skylights, or any transparent or translucent walls, ceilings or roofs to be safely accessible for cleaning.	Requirement N4 does not apply to: (a) dwellings, or (b) any transparent or translucent elements whose surfaces are not intended to be cleaned.

Note

Attention is drawn to the Workplace (Health, Safety and Welfare) Regulations 1992

Compliance with Building Regulation requirement N4 would, in accordance with Section 23(3) of the Health and Safety at Work, etc Act 1974, prevent the service of an improvement notice with regard to the requirements for cleaning windows and skylights etc in regulation 16 of the Workplace (Health, Safety and Welfare) Regulations 1992.

Guidance

Performance

Requirement N4

In the Secretary of State's view, requirement N4 will be met if provision is made for safe means of access for cleaning both sides of glazed surfaces where there is danger of falling more than two metres.

Section 4

SAFE ACCESS FOR CLEANING WINDOWS ETC

Introduction to provisions

4.1 This Approved Document sets out some ways of complying with the requirement.

4.2 Where glazed surfaces cannot be cleaned safely by a person standing on the ground, a floor, or other permanent stable surface, the requirement could be satisfied by provisions such as the following:

a. provision of windows of a size and design that allow the outside surface to be cleaned safely from inside the building (see Diagram 8). Windows which reverse for cleaning should be fitted with a mechanism which holds the window in the reversed position. Additional guidance is given in BS 8213: Part 1 *Windows, doors and rooflights* (Approved Document K contains guidance on minimum sill heights.);

b. provision of an adequate area of firm level surface, in a safe place, to allow use of portable ladders not more than 9m long (measured from the ground to the upper support). Where ladders up to 6m long will be used, normal soil will provide a suitable standing surface (see Diagram 9). Where ladders over 6m long will be used, suitable tying or fixing points should be provided (see Diagram 10);

c. provision of walkways at least 400mm wide, either with guarding at least 1100mm high, or with anchorages for sliding safety harnesses (see Diagram 10);

d. provision of access equipment such as suspended cradles or travelling ladders, with attachments for safety harnesses;

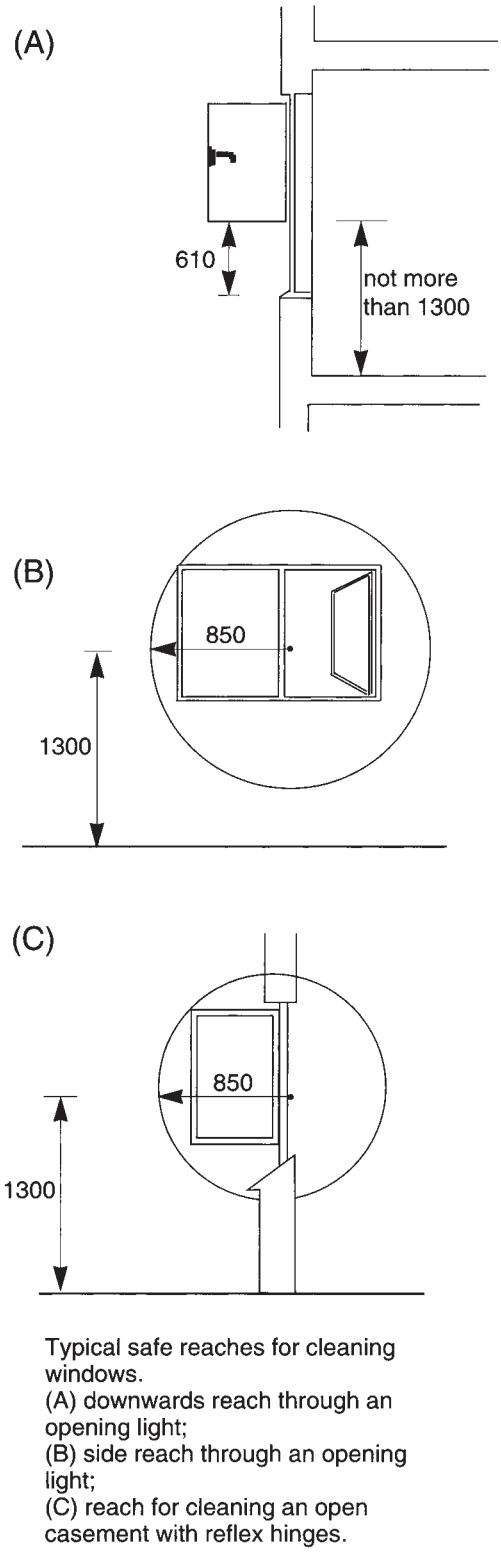
e. provision of suitable anchorage points for safety harnesses or abseiling hooks;

f. only in circumstances where other means cannot be used, space for scaffold towers should be provided, and located so that glazed surfaces can be cleaned.

Diagram 8 Safe reaches for cleaning

see para 4.2

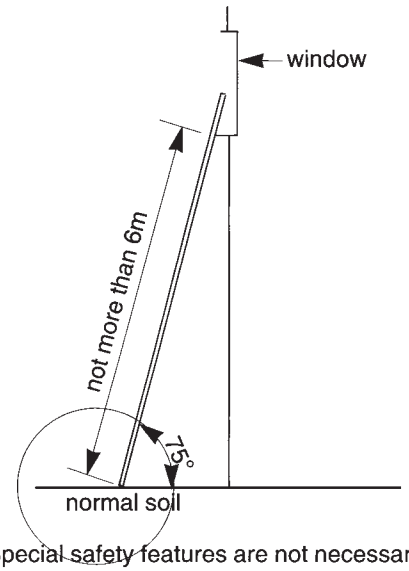
All dimensions are in mm.



Typical safe reaches for cleaning windows.
(A) downwards reach through an opening light;
(B) side reach through an opening light;
(C) reach for cleaning an open casement with reflex hinges.

Diagram 9 Ladders not more than 6m long

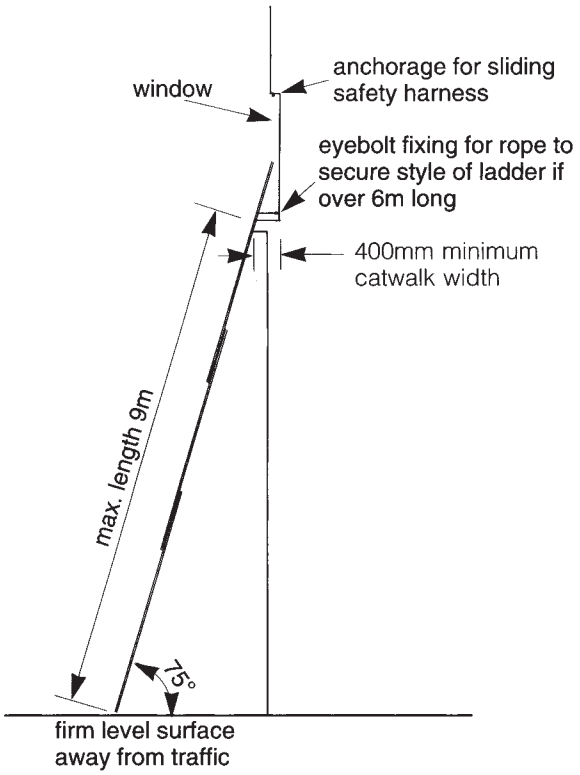
see para 4.2



Special safety features are not necessary if the ladder is not more than 6m long.

Diagram 10 Ladders not more than 9m long

see para 4.2



Access to window from a catwalk. Diagram shows:
- fixing for ladder (see 4.2b) required if it is over 6m long
- anchorage for sliding safety harness (see 4.2c) for working on a catwalk.

Standards referred to

BS 6206: 1981 *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings.*

BS 8213: Part 1: 1991
Windows, doors and rooflights.
Part 1. *Code of practice for safety in use and during cleaning of windows and doors (including guidance on cleaning materials and methods).*

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Approved Documents

The following documents have been approved and issued by the Secretary of State for the purpose of providing practical guidance with respect to the requirements of the Building Regulations 2000.

Approved Document A - Structure: 1992 Edition, fourth impression (with amendments) 1994, further amended 2000

Approved Document B - Fire safety: 2000 Edition, amended 2000

Approved Document B Amendment 2002 – Fire Safety

Approved Document C - Site preparation and resistance to moisture: 1992 Edition, second impression (with amendments) 1992, further amended 2000

Approved Document D - Toxic Substances: amended 1992, further amended 2000

Approved Document - E Resistance to the passage of sound: 2003 Edition

Approved Document F - Ventilation: 1995 Edition, amended 2000

Approved Document G - Hygiene: 1992 Edition, second impression (with amendments) 1992, further amended 2000

Approved Document H - Drainage and Waste Disposal: amended 1992, further amended 2000

Approved Document J - Heat Producing Appliances: amended 1992, further amended 2000

Approved Document K - Protection from falling, collision and impact: 1998 Edition, amended 2000

Approved Document L - Conservation of fuel and power: 1995 Edition, amended 2000

Approved Document M - Access and facilities for disabled people: 1999 Edition, amended 2000

Approved Document N - Glazing - safety in relation to impact, opening and cleaning: 1998 Edition, amended 2000

Approved Document to support regulation 7 - materials and workmanship: 1999 Edition, amended 2000

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Approved Document - E Resistance to the passage of sound: 2003 Edition

Approved Document F - Ventilation: 1995 Edition, amended 2000

Approved Document G - Hygiene: 1992 Edition, second impression (with amendments) 1992, further amended 2000

Approved Document H - Drainage and waste disposal: 2002 Edition

Approved Document J - Combustion appliances and fuel storage systems: 2002 Edition

Approved Document K - Protection from falling, collision and impact: 1998 Edition, amended 2000

Approved Document L1 - Conservation of fuel and power in dwellings: 2002 Edition

Approved Document L2 - Conservation of fuel and power in buildings other than dwellings: 2002 Edition

Approved Document M - Access and facilities for disabled people: 1999 Edition, amended 2000

Approved Document N - Glazing - safety in relation to impact, opening and cleaning: 1998 Edition, amended 2000

Approved Document to support regulation 7 - Materials and workmanship: 1999 Edition, amended 2000

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