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SOUTH AFRICAN NATIONAL STANDARD

The application of the National Building Regulations

Part N: Glazing

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SANS 10400-N:2012

Edition 3.1

Table of changes

Change No.	Date	Scope
Amdt 1	2012	Amended to update the list of parts in the foreword, to make annex A informative, to update referenced standards, to modify the requirements for glazing systems, for fire and energy, for wind and impact loads, for glazing materials in walls of lift enclosures, and for safety glazing (and to renumber subclauses accordingly), to add requirements for an occupancy class, and to update the table on dimensions for flat frameless glass shower enclosures.

Acknowledgement

The SABS Standards Division wishes to acknowledge the work of the Association of Architectural Aluminium Manufacturers of South Africa and the South African Institution of Civil Engineering in interpreting functional regulations and updating many of the deemed-to-satisfy requirements relating to structural performance in this document.

Foreword

This South African standard was approved by National Committee SABS SC 59C, *Construction standards – Glazing in buildings*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in March 2012.

This document supersedes SANS 10400-N:2010 (edition 3).

A vertical line in the margin shows where the text has been technically modified by amendment No. 1.

Compliance with the requirements of this document will be deemed to be compliance with the requirements of part N of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977).

SANS 10400 consists of the following parts, under the general title *The application of the National Building Regulations*:

Part A: General principles and requirements.

Part B: Structural design.

Part C: Dimensions.

Part D: Public safety.

Part F: Site operations.

Part G: Excavations.

Part H: Foundations.

Part J: Floors.

Part K: Walls.

SANS 10400-N:2012
Edition 3.1

Foreword (*concluded*)

Part L: Roofs.

Part M: Stairways.

Part N: Glazing.

Part O: Lighting and ventilation.

Part P: Drainage.

Part Q: Non-water-borne means of sanitary disposal.

Part R: Stormwater disposal.

Part S: Facilities for persons with disabilities.

Part T: Fire protection.

Part V: Space heating.

Part W: Fire installation.

Part X: Environmental sustainability.

Part XA: Energy usage in buildings.

Amdt 1 |

This document should be read in conjunction with SANS 10400-A.

Annex A is provided for information only.

Amdt 1 |

SANS 10400-N:2012
Edition 3.1

Contents

	Page
Acknowledgement	
Foreword	
1 Scope	3
2 Normative references	3
3 Definitions	4
4 Requirements	6
4.1 General	6
4.2 Glazing installations	6
4.3 Transparent glazing	10
4.4 Safety glazing	10
Annex A (informative) National Building Regulations – Part N: Glazing	14
	Amdt 1

The application of the National Building Regulations

Part N: Glazing

1 Scope

This part of SANS 10400 provides deemed-to-satisfy requirements for compliance with part N (Glazing) of the National Building Regulations.

NOTE 1 Part N of the National Building Regulations, issued in terms of the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), is reproduced in annex A.

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. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

SANS 613, *Fenestration products – Mechanical performance criteria.*

Amdt 1 |

SANS 727, *Windows and doors made from rolled mild steel sections.*

SANS 1263-1, *Safety and security glazing materials for buildings – Part 1: Safety performance of glazing materials under human impact.*

SANS 1545-1, *Safety rules for the construction and installation of lifts – Part 1: Electric lifts.*

Amdt 1 |

SANS 1545-2, *Safety rules for the construction and installation of lifts – Part 2: Hydraulic lifts.*

Amdt 1 |

SANS 1545-3, *Safety rules for the construction and installation of lifts – Part 3: Lifts for persons with disabilities (stairlifting platforms).*

Amdt 1 |

SANS 1545-4, *Safety rules for the construction and installation of lifts – Part 4: Lifts for persons with disabilities (vertical lifting platforms).*

Amdt 1 |

SANS 1545-5 *Safety rules for the construction and installation of lifts – Part 5: Electric and hydraulic access, goods only lifts.*

Amdt 1 |

SANS 1553-2, *PVC-U window and door frames for external use – Part 2: Windows with frames made from PVC-U profiles.*

SANS 10400-N:2012

Edition 3.1

SANS 2001-CG1, *Construction works – Part CG1: Installation of glazing in window and door frames.*

SANS 10137, *The installation of glazing in buildings.*

| SANS 10160-2, *Basis of structural design and actions for buildings and industrial structures – Part 2: Self-weight and imposed loads.* **Amdt 1**

SANS 10400-A, *The application of the National Building Regulations – Part A: General principles and requirements.*

SANS 10400-B (SABS 0400-B), *The application of the National Building Regulations – Part B: Structural design.*

| SANS 10400-T, *The application of the National Building Regulations – Part T: Fire protection.* **Amdt 1**

| SANS 10400-XA, *The application of the National Building Regulations – Part X: Environmental sustainability – Part XA: Energy usage in buildings.* **Amdt 1**

SANS 50572-1/EN 572-1, *Glass in building – Basic soda lime silicate glass products – Part 1: Definitions and general physical and mechanical properties.*

SANS 50572-2/EN 572-2, *Glass in building – Basic soda lime silicate glass products – Part 2: Float glass.*

SANS 50572-3/EN 572-3, *Glass in building – Basic soda lime silicate glass products – Part 3: Polished wire glass.*

SANS 50572-4/EN 572-4, *Glass in building – Basic soda lime silicate glass products – Part 4: Drawn sheet glass.*

SANS 50572-5/EN 572-5, *Glass in building – Basic soda lime silicate glass products – Part 5: Patterned glass.*

3 Definitions

For the purposes of this document, the definitions given in SANS 10400-A (some of which are repeated for convenience) and the following apply.

3.1

competent person

person who is qualified by virtue of his education, training, experience and contextual knowledge to make a determination regarding the performance of a building or part thereof in relation to a functional regulation or to undertake such duties as may be assigned to him in terms of these regulations

3.2

competent person (glazing)

competent person who is recognized by an institute, which has specialist expertise in the field of glazing, as generally having the necessary experience and training to determine glazing requirements in accordance with the requirements of SANS 10137

3.3

deemed-to-satisfy requirement

non-mandatory requirement, the compliance with which ensures compliance with a functional regulation

4

SANS 10400-N:2012

Edition 3.1

3.4

flight

that part of a stairway which consists of consecutive steps between landings

3.5

functional regulation

regulation that sets out in qualitative terms what is required of a building or building element or building component in respect of a particular characteristic, without specifying the method of construction, dimensions or materials to be used

3.6

glazing

glass, plastics and organic coated glass fixed in frames in windows, doors and roof lights, or that form doors

3.7

landing

platform between two consecutive flights of a stairway

3.8

occupancy

particular use or the type of use to which a building or portion thereof is normally put or intended to be put

NOTE Regulation **A20** classifies and designates occupancies (see SANS 10400-A).

3.9

pane

piece of glazing material cut to the size and shape required for glazing

3.10

partition

interior construction less than one storey in height, and which is generally of a light construction and demountable

3.11

pitch line

notional line which connects the nosings of all the treads in a flight of stairs

3.12

safety glass

safety glazing material consisting primarily of glass

3.13

safety glazing material

material which complies with the requirements of SANS 1263-1 for the performance of safety glazing materials

3.14

span

distance between the centres of supports

3.15

stairway

part of a building which provides a route of travel between different levels in such building and is formed by a single flight or by a combination of two or more flights and one or more intervening landings

SANS 10400-N:2012

Edition 3.1

3.16

suitable

capable of fulfilling or having fulfilled the intended function, or fit for its intended purpose

3.17

transparent glazing

glazing through which images can be clearly seen

4 Requirements

4.1 General

4.1.1 The functional regulation **N1(1)** contained in part N of the National Building Regulations (see annex A) shall, provided that transparent glazing is in accordance with the requirements of 4.3 and glazing systems exposed to the natural elements comply with all the requirements of SANS 613, be deemed to be satisfied when **Amdt 1**

a) glazing and its associated frames and fixings are in accordance with the requirements of SANS 10400-B, provided that

1) any panes of glass or polycarbonate panels have a nominal thickness not less than that determined in accordance with the requirements of 4.2, and

2) the requirements of 4.2.2 and 4.2.5 are complied with; or

b) glazing in external walls, internal walls, partitions, shower doors, cupboard doors and lifts within 800 mm of floor level are in accordance with the requirements of 4.2, and installed in a frame in accordance with either the requirements of SANS 2001-CG1 or a suitable method described in SANS 10137.

4.1.2 The functional regulation **N1(2)** contained in part N of the National Building Regulations (see annex A) shall be deemed to be satisfied where glazing is in accordance with the requirements of 4.4.

4.1.3 Fire-related requirements for glazing shall be in accordance with SANS 10400-T. **Amdt 1**

4.1.4 Energy usage requirements for glazing shall be in accordance with SANS 10400-XA. **Amdt 1**

4.2 Glazing installations

4.2.1 Glazing materials shall comprise either glass that complies with the requirements of parts 1 to 5 of SANS 50572, or polycarbonate sheeting.

4.2.2 Glazing shall comply with all the requirements of SANS 613 for wind and impact loads as determined in accordance with the requirements of SANS 10400-B by a competent person (structures). **Amdt 1**

4.2.3 The thickness of panes of glass and flat solid polycarbonate sheeting, other than in lifts, shall

a) be not less than that given in tables 1 to 6, or

b) be determined by a competent person (glazing) in accordance with the requirements of SANS 10137, and be based on wind loads determined in accordance with the requirements of SANS 10400-B. **Amdt 1**

NOTE SANS 10400-B requires that wind loads be determined by a competent person (structures).

SANS 10400-N:2012

Edition 3.1

4.2.4 The top and bottom of glass fins (see figure 1) installed at butt joints of glass panes shall be fully fixed to the supporting structure and have overall dimensions as given in table 7. Silicone sealant that has a tensile strength of at least 1 MPa shall be used.

NOTE A butt joint is assumed to have no structural strength. Therefore panels which incorporate a butt joint are not considered to be supported on all sides. A glass fin is necessary to provide the support at the joint so that the pane can be considered to be supported on four sides or on two opposite sides.

4.2.5 The thickness and type of pane glass panels in lifts shall be in accordance with the requirements of tables 8 and 9, as relevant.

Table 1 — Dimensions for vertical glass supported by a frame on all sides in external walls in buildings where the height measured from the ground to the top of such wall does not exceed 10 m

1	2	3	4	5	6	7	8
Type of glass	Maximum pane area m ²						
	Nominal glass thickness						
	3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm
Monolithic annealed glass	0,75	1,5	2,1	3,2	4,6	6,0	6,0
Patterned annealed and wired glass	—	0,75	1,2	1,9	2,6	3,4	—
Laminated annealed safety glass	—	—	—	2,9	4,3	5,7	5,7
Toughened safety glass	—	1,9	3,0	4,5	8,0	8,0	8,0

Table 2 — Dimensions for vertical glass supported by a frame on all sides in internal walls

1	2	3	4	5	6	7	8
Type of glass	Maximum pane area m ²						
	Nominal glass thickness						
	3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm
Monolithic annealed glass	0,75	1,5	2,1	3,2	4,6	6,0	6,0
Patterned annealed and wired glass	—	0,75	1,2	1,9	2,6	3,4	—
Laminated annealed safety glass	—	—	—	4,1	6,0	7,2	7,2
Toughened safety glass	—	3,0	4,2	6,4	9,2	9,2	9,2

SANS 10400-N:2012

Edition 3.1

Table 3 — Dimensions for vertical glass supported by a frame on two opposite sides in external walls in buildings where the height measured from the ground to the top of such wall does not exceed 10 m

1	2	3	4	5	6	7	8
Type of glass	Maximum span m						
	Nominal glass thickness						
	3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm
Monolithic annealed glass	–	0,4	0,5	0,6	0,85	1,0	1,3
Patterned annealed and wired glass	–	0,25	0,3	0,35	0,5	0,6	–
Laminated annealed safety glass	–	–	–	0,55	0,8	0,95	1,2
Toughened safety glass	–	0,55	0,7	0,85	1,15	1,3	1,8

Table 4 — Dimensions for vertical glass supported by a frame on two opposite sides in internal walls

1	2	3	4	5	6	7	8
Type of glass	Maximum span m						
	Nominal glass thickness						
	3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm
Monolithic annealed glass	–	0,65	0,8	0,95	1,3	1,55	2,0
Patterned annealed and wired glass	–	0,4	0,48	0,57	0,78	0,9	–
Laminated annealed safety glass	–	–	–	0,9	1,25	1,5	1,95
Toughened safety glass	–	0,9	1,1	1,3	1,75	2,0	2,7

Table 5 — Dimensions for polycarbonate panels supported by a frame on all sides in external walls where the height measured from the ground to the top of such wall does not exceed 10 m

1	2	3	4
Thickness mm	Aspect ratio (short dimension:long dimension)		
	$1:1 \leq 1,5:1$	$> 1,5:1 \leq 2,5:1$	$> 2,5:1 \leq 3,5:1$
	Maximum pane area m^2		
2	0,2	0,24	0,32
2,5	0,275	0,52	0,44
3	0,425	0,52	0,70
4	0,625	0,78	1,05
5	0,85	1,05	1,45
15 mm edge cover shall be provided.			

SANS 10400-N:2012
Edition 3.1

Table 6 — Dimensions for polycarbonate panels supported by a frame on all sides in internal walls

1	2	3	4
Thickness mm	Aspect ratio (short dimension:long dimension)		
	$1:1 \leq 1,5:1$	$> 1,5:1 \leq 2,5:1$	$> 2,5:1 \leq 3,5:1$
	Maximum pane area m^2		
2	0,35	0,4	0,525
2,5	0,45	0,55	0,725
3	0,725	0,85	1,2
4	1,05	1,3	1,75
5	1,4	1,75	2,75

15 mm edge cover shall be provided.

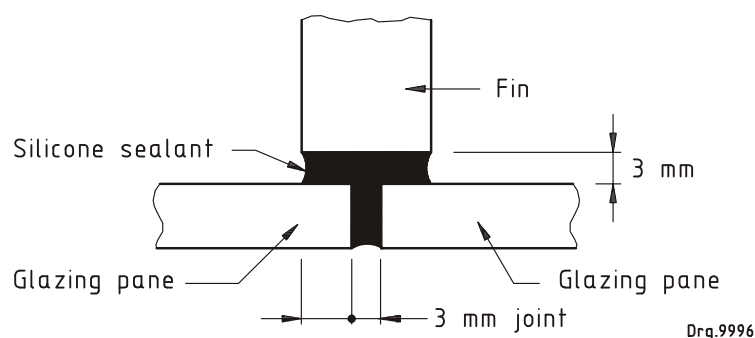


Figure 1 — Detail of fin assembly

Table 7 — Minimum glass fin dimensions

1	2	3
Fin height m	Pane area	
	Internal applications mm × mm	External applications mm × mm
1,5	150 × 12	150 × 15
2	150 × 12	150 × 19
2,5	150 × 12	175 × 19
3	175 × 15	200 × 25
3,5	225 × 15	275 × 25
4	275 × 15	300 × 25

SANS 10400-N:2012

Edition 3.1

Table 8 — Flat glass panels to be used in walls of lifts^a

1	2	3
Type of glass	Diameter of inscribed circle	
	1 m max.	2 m max.
	Minimum thickness mm	
Laminated, toughened	8 (4 + 4 + 0,76)	10 (5 + 5 + 0,76)
Laminated	10 (5 + 5 + 0,76)	12 (6 + 6 + 0,76)

^a Additional requirements for glazing materials used for walls of lift enclosures shall be in accordance with SANS 1545-1, SANS 1545-2, SANS 1545-3, SANS 1545-4 and SANS 1545-5.

Amdt 1

Table 9 — Flat glass panels to be used in horizontally sliding doors in lifts

1	2	3	4	5
Type of glass	Minimum thickness mm	Width mm	Free door height m	Fixing of the glass panels
Laminated, toughened	16 (8 + 8 + 0,76)	360 to 720	2,1 max.	Two fixings upper and lower
Laminated	16 (8 + 8 + 0,76)	300 to 720	2,1 max.	Three fixings upper/lower and one side
	10 (6 + 4 + 0,76) (5 + 5 + 0,76)	300 to 870	2,1 max.	All sides

NOTE These values are only valid provided that, in the case of a three-side or four-side fixing, the fixings are rigidly connected to each other.

4.3 Transparent glazing

Where transparent glazing is used and is not likely to be apparent to, or suspected by, any person approaching it, such glazing shall bear markings that shall render it apparent to such person.

4.4 Safety glazing

4.4.1 The performance of safety glazing material shall be in accordance with the requirements of SANS 1263-1 and the individual panes of safety glazing material shall be permanently marked by the installer in such a manner that the markings are visible after installation. **Amdt 1**

4.4.2 Safety glazing materials that comply with SANS 1263-1 shall be used where (see figures 2 to 4)

a) doors and sidelights form part of any entrance up to 2 100 mm from finished floor level; **Amdt 1**

b) a window has a sill height of less than 500 mm from the floor or external ground level; **Amdt 1**

c) a window has a sill height of less than 800 mm from the floor or external ground level without any permanent barrier that prevents persons from coming into contact with the glass panel, and is so placed that persons are likely, on normal traffic routes, to move directly towards such window; **Amdt 1**

NOTE A barrier could be any feature, i.e. a heavy bar across a window, or a flower box placed in front of the window, that will provide a physical or visual barrier between the glass and a person.

SANS 10400-N:2012

Edition 3.1

- d) a bath enclosure or shower cubicle is glazed, or where glazing occurs immediately above and within a distance of 1 800 mm horizontally or vertically from a bath or shower; **Amdt 1**
- e) glazing is used in any shop front or display window within 2 100 mm from the finished floor level; **Amdt 1**
- f) glazing is used in any wall or balustrade to (or immediately adjacent to) a stairway, ramp, landing, pathway, patio, veranda or balcony; **Amdt 1**
- g) glazing is used within 1 800 mm of the pitch line of a stairway or the surface of a ramp, landing, pathway, patio, veranda or balcony; **Amdt 1**
- h) glazing applications are sloped or horizontal; **Amdt 1**
- i) a mirror is installed as a facing to a cupboard door less than 800 mm above floor level and there is no solid backing; **Amdt 1**
- j) glazing is used around areas such as swimming pools and ice rinks; and **Amdt 1**
- k) glazing is used in internal partitions, which are within 2 100 mm of floor level. **Amdt 1**

4.4.3 All glazing for occupancy or building classification A3 (place of instruction), E1 (place of detention), E2 (hospital), E3 (other institutional (residential) buildings) and H2 (dormitory), where such is associated with a building of occupancy classification A3, E1, E2 or E3 (see SANS 10400-A), shall be safety glazing material that complies with the requirements of SANS 1263-1. **Amdt 1**

4.4.4 Glass in balustrades shall be toughened safety glass unless rigidly supported on all sides. Glazing material in balustrades is subject to the impact and line loads determined in accordance with the requirements of SANS 10160-2. **Amdt 1**

4.4.5 Glass in horizontal or sloping applications shall be laminated or toughened safety glass. Toughened safety glass shall only be used where individual panes are framed on all sides. **Amdt 1**

4.4.6 Wired glass that has two-edged support may be used in vertical glazing in sawtooth roofs. **Amdt 1**

4.4.7 The thicknesses and maximum panel dimensions of frameless bath and shower enclosures shall be as given in table 10. **Amdt 1**

Table 10 — Dimensions for flat frameless glass shower enclosures

1	2	3
Toughened safety glass thickness mm	Maximum panel size m ²	
	Doors and panels supporting doors	Fixed panels
6	1,6	2,1
8	2	3,3
10	2,2	4,00

NOTE This table does not apply to curved glass.

Amdt 1

SANS 10400-N:2012
Edition 3.1

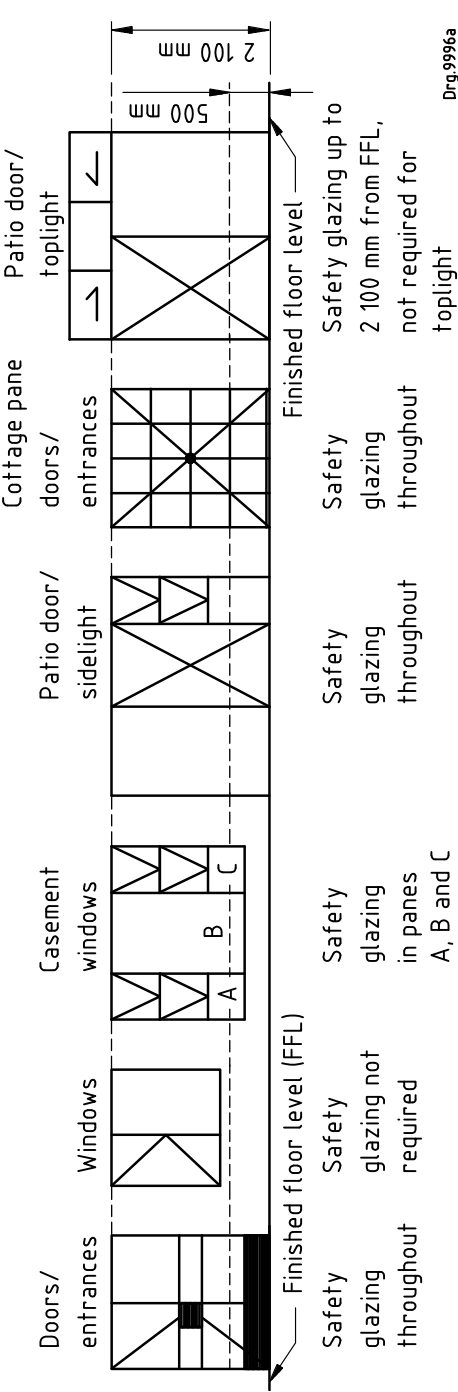


Figure 2 — Examples of safety glazing requirements in doors and windows

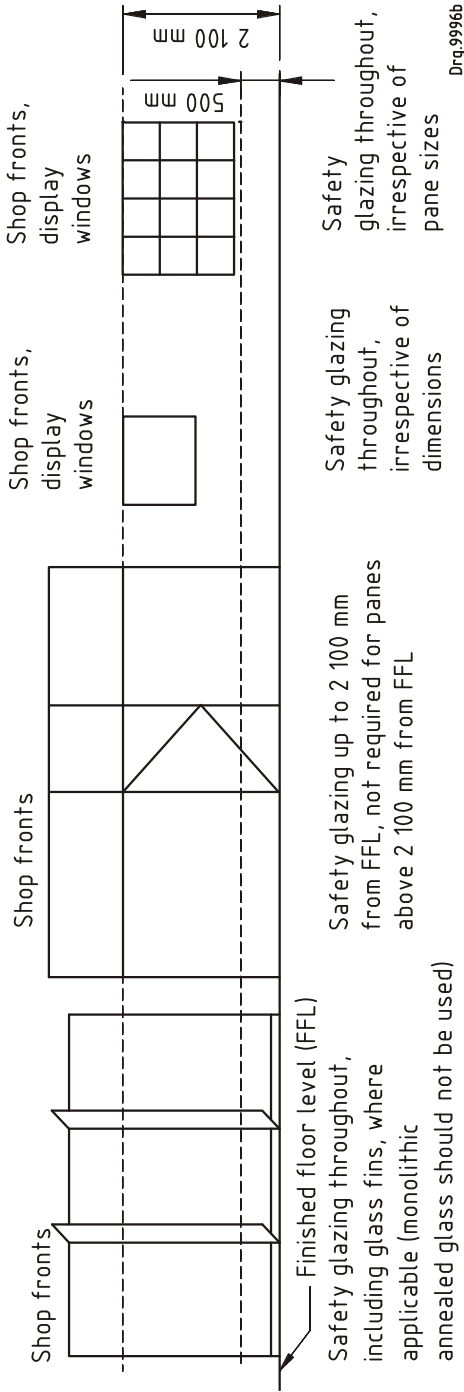


Figure 3 — Examples of safety glazing requirements in shop fronts or display windows

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Edition 3.1

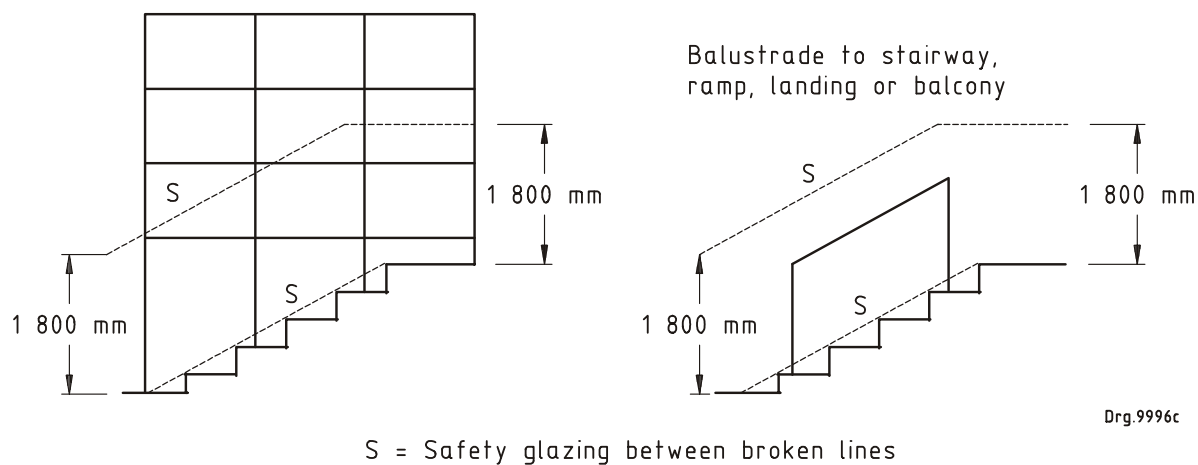


Figure 4 — Examples of safety glazing requirements around staircases and landings

SANS 10400-N:2012

Edition 3.1

Annex A (informative)

Amdt 1

National Building Regulations Part N: Glazing

N1 Type and Fixing of Glazing

- (1)** Any material used in the glazing of any building shall be of a secure and durable type and shall be fixed in a manner and position that will ensure that it will –
 - (a)** safely sustain any wind actions which can reasonably be expected;
 - (b)** not allow penetration of water to the interior of the building; and
 - (c)** be apparent, in the case of clear glazing, to any person approaching such glazing.
- (2)** Glass, plastics and organic coated glass shall be selected in order to provide, in the case of human impact, a degree of safety appropriate in relation to –
 - (a)** the position of the glazed area; and
 - (b)** the number and likely behaviour pattern of persons expected to be in close proximity to such glazed area.
- (3)** The requirements of sub regulations **(1)** and **(2)** shall be deemed to be satisfied where the glazing material is selected, fixed and marked in accordance with SANS 10400-N.

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Amendments and Revisions

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The SABS continuously strives to improve the quality of its products and services and would therefore be grateful if anyone finding an inaccuracy or ambiguity while using this standard would inform the secretary of the technical committee responsible, the identity of which can be found in the foreword.

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