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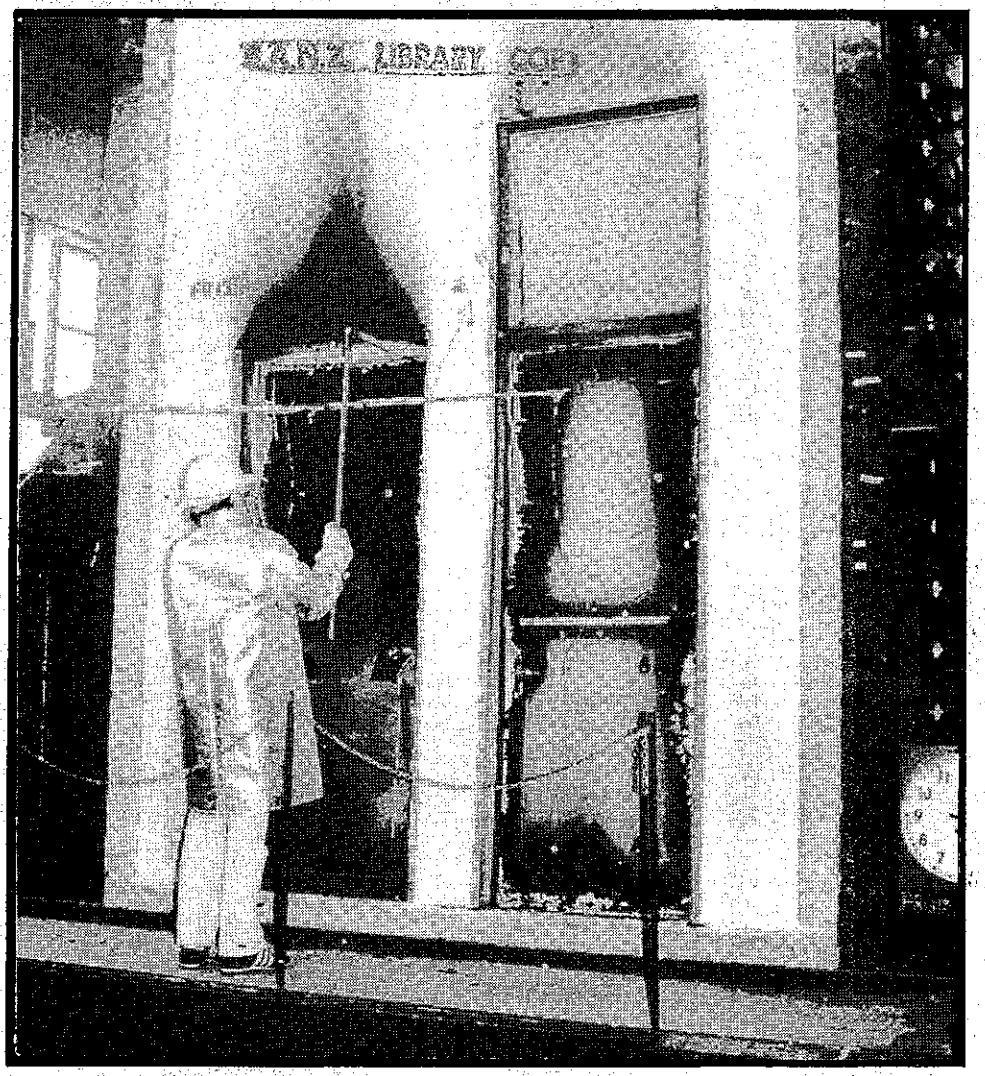

NEW ZEALAND STANDARD

PERFORMANCE CRITERIA FOR FIRE RESISTING CLOSURES

SUPERSEDED

Part 1 – Withdrawn 4/5/5 by AS/NZS 1905-1:1997

INTERNAL AND EXTERNAL FIRE DOORSETS

Part 2

FIRE RESISTING GLAZING SYSTEMS

Part 1 revised, SUPERSEDED replaced by AS/NZS 1905.1:1997

UDC 69.028: 699.814

Pr FF

Standards Association of New Zealand

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RELATED DOCUMENTS

NEW ZEALAND STANDARDS		*Clause reference herein*
NZS 1900:---- Chapter 5:1988	Model building bylaw Fire resisting construction and means of egress	Foreword, 101.1, 101.2, 102.3, 105.1, C107.1, 201.1, 201.2, 202.3, C207.1, D1.1, D1.2
NZS 5807:----	Code of practice for industrial identification by colour, wording, or other coding	
Part 1:1980	Identification of signs, safety colours and fire extinguishers	110.4.2
NZMP 9:1987	Fire properties of building materials and elements of structure	108.1.2.3.2, 212.2
NZMP 101:----	First, second and third schedules to the New Zealand Standard Model Building Bylaw (NZS 1900)	112.2
INTERNATIONAL STANDARDS		
ISO 3008-1976	Fire-resistance tests – door and shutter assemblies	105.1, 107.3.1.2
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AMERICAN STANDARD		
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Section 31.1:1983	Method of measurement under ambient temperature conditions	110.1
GERMAN STANDARD		
DIN 4102:----	Fire behaviour of building materials and building components	
Part 2–09.77	Building components; definitions, requirements and tests	107.2.1

OTHER PUBLICATIONS

Gordon, Butcher and Parnell. Designing for Fire Safety, Wiley 1983, p. 214.
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McGuire, J.H. DP 5925 FOC Tests, Smoke and Control Door Assemblies, Part 0, Commentary.
McGuire, J.H. Heat Transfer by Radiation, DSIR FOC HMSO Special Report No. 2, 1953.
Malhotra, H.L. Safety in Buildings, Building Research Establishment Report, Department of Environment, United Kingdom, December 1986.
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FOREWORD

This Standard has been prepared to replace NZS 1188:1954 *Fire-doors and fire-windows* as the approved means of compliance with NZS 1900:Chapter 5:1988 *Fire resisting construction and means of egress*.

It is also intended to be the agreed basis for the design, manufacture and installation of all fire doors and fire windows required by any regulation, code, or bylaw in New Zealand.

The Standard sets out the performance requirements for fire doors and fire windows rather than laying down detailed prescriptions for their construction and installation as in NZS 1188. It also includes requirements for the installation of fire doors and fire windows which will ensure compliance with the performance requirements, and act as a practical guide to designers and builders.

The Standard ensures technical compatibility with Australian performance criteria, where such criteria are consistent with New Zealand manufacturing and installation practices.

NEW ZEALAND STANDARD

PERFORMANCE CRITERIA FOR FIRE RESISTING CLOSURES

Part 1
Internal and external fire doorsets

101
STATUS

101.1
This Part of this Standard is intended to provide a means of compliance with the requirements for fire doors in NZS 1900:Chapter 5, with or without a specified fire resistance rating (FRR). It will only become an approved means of compliance when referenced in local authority building bylaws by amendment to NZS 1900:Chapter 5.

101.2
Once so identified, proof of compliance with this Part of this Standard shall be sufficient evidence that the requirements for fire doors in NZS 1900:Chapter 5 are satisfied – unless there is proof to the contrary.

102
SCOPE

102.1
This Part of this Standard specifies the range of performance requirements which are to be provided when the term "fire door" or "smoke stop door" is used with or without a specified fire resistance rating. Note that a "fire door", for the purposes of this Standard, comprises a complete doorset, as defined below, after installation of the doorset is completed, in any building.

102.2
Proof of performance is obtained through specified validation methods (including fire test methods) and the specification of pass/fail criteria with permissible variations.

102.3
Appendix D provides guidance on what kinds of insulation performance should be expected of fire doors in different locations in a building, where the requirements of NZS 1900:Chapter 5 are not specific. However, the guidelines in the appendix are not part of the performance requirements of this Standard and should not be regarded as necessary to meet the requirements of NZS 1900:Chapter 5 until and unless NZS 1900:Chapter 5 is amended or revised to include these further performance criteria in its requirements.

103
APPLICATION

103.1
This Part of this Standard is the agreed basis for the design, manufacture, and installation of all fire doors required by any regulation, code, or bylaw, in New Zealand.

103.2
Proof of compliance with the requirements of this Part of this Standard should be established, in the first place, by seeking the specific approval of the Fire Ratings Committee, Standards Association of New Zealand, that a doorset satisfies all the criteria specified below, for the position in which such a doorset is intended to be used. One way of ensuring that production doorsets continue to conform to the terms of a Fire Ratings Committee approval is by use of the SANZ "S" mark as noted on the inside back cover.

104
INTERPRETATION

104.1
In this Part of this Standard the word 'shall' indicates a requirement that is mandatory, to be adopted in order to comply with the Standard, while the word 'should' indicates a recommended practice.

104.2
Clauses prefixed by 'C' and printed in italic type are intended as comments on the corresponding mandatory clauses.

104.3
Cross references to other clauses within this Standard quote the number only, for example: 104.1.

104.4
Material contained in Appendices A and D to this Standard shall be of the same force and effect as if it were contained in the main body of the Standard, subject to any limitations which may be imposed by any part of the Standard.

104.5
The full titles of reference documents cited in this Standard are given in the list of Related Documents immediately preceding the Foreword.

105
DEFINITIONS

105.1
In this Part of this Standard, unless inconsistent with the context:

ACTUATED SENSING DEVICE means a device which operates to effect the closure of an automatic fire door.

AMBIENT TEMPERATURE means a temperature of 25 ±15 °C, representative of that normally found in buildings.

APPROVED means approval by the Fire Ratings Committee, Standards Association of New Zealand.

AUTOMATIC, when applied to a fire door, means designed to close without manual assistance through the operation of an approved sensing device integral with the doorset.

BYLAW means the Model Building Bylaw (NZS 1900) Chapter 5, Fire resisting construction and means of egress.

COMBUSTIBLE means when tested in accordance with AS 1530.1 or BS 476: Part 4.

DOOR STOP means that part of a door frame against which the door leaf stops.

DOORSET means a complete assembly comprising:

. . . the door leaf or leaves including any glazed or solid panels adjacent to or over the leaves within the door frame including hardware or other inbuilt features;

. . . the door frame, if any, with its fixings to the wall and, for a sliding or tilting door, all guides and their respective fixings to the lintel, wall or sill.

DOUBLE-ACTING DOOR means a doorset whose leaf swings around one vertical side and is equally capable of opening in either direction.

DUCT DOOR OR HATCH means a doorset provided to give ready access through a fire rated wall or floor, and may be smaller than is usually provided for normal personnel access.

ENGINEER means the principal Engineer, his deputy or an assistant appointed by the administering local authority to control building.

FIRE AND SMOKE STOP DOOR means a doorset meeting the criteria appropriate for fire resisting and smoke stopping doorsets.

FIRE DOOR means a doorset, single or multileaf, which, except when varied as permitted by this Standard, is identical in assembly, construction and installation with a production model that has been submitted to the standard fire resistance test and has fulfilled all the relevant test requirements.

FIRE TEST – see STANDARD FIRE RESISTANCE TEST

HATCH – see DUCT DOOR

HOLD OPEN DEVICE means a device for use with fire doors that holds the door leaf open during normal use, but releases the leaf by the actuation of a sensing device, allowing the leaf to close under the action of a self-closing device.

PRODUCTION MODEL means a doorset that is totally reproducible in its final form as a standard unit.

C105.1
Production model
The term production model rather than prototype has been specifically chosen to imply that the product tested and approved is the production model. Several 'prototypes' may be used before reaching the production model state for final testing.

SELF CLOSING, when applied to a fire door, means equipped with an approved device designed to bring the door leaf to the fully closed and, where appropriate, latched position immediately after each opening.

STANDARD FIRE RESISTANCE TEST means the fire resistance test specified in the edition of AS 1530.4, ISO 3008 or BS 476:Part 8, current at the time of testing the production model.

106
DESIGN REQUIREMENTS

106.1
General

106.1.1
Self-closing

106.1.1.1
All door leaves shall be self-closing. Automatic doorsets shall revert to self-closing when the hold open device releases or otherwise becomes inoperative, provided that no door which is required by NZS 1900:Chapter 5 to have smoke stopping capabilities shall be fitted with a hold open device except as provided for in NZS 1900:Chapter 5.

106.1.1.2
Provision should be made for the self-closing device to be readily adjustable to satisfy the requirements of 109.5.2 after installation.

C106.1.1
NZ 1900: Chapter 5 requires smoke-stop doors to be self-closing. It also defines self-closing as meaning the door returns to the closed position after each use. The above definition recognizes this definition, but it is noted that there is a practice of wedging open smoke-stop doors for everyday use by building occupants. Such a practice is difficult to police. In a fire situation a wedged open door is of no value in preventing the movement of fire and smoke. It is recommended that, where this practice is likely consideration be given to the use of closers with hold open devices. Ideally the device would be activated by the detection of smoke and heat in the vicinity of the door.

106.1.2
Self-latching (in addition to closer)

106.1.2.1
All doorsets shall be fitted with an appropriate self actuating device that will ensure that a door leaf, when closed, remains tight fitting in the door frame. The device, whether self-latching or otherwise, shall be able to resist the air pressure exerted on the door resulting from its location yet satisfy the requirements of 109.5.2.

106.1.2.2
No bolt or function which could render a door leaf non-self-latching shall be incorporated. Release devices that are intended to be options, and are incorporated in a production model doorset, shall not be engaged during a standard fire-resistance test unless the production model doorset has been tested previously without the optional devices.

106.1.2.3
Access doors to ducts or service shafts may be manually latched.

C106.1.2
Door leaves, except double acting door leaves, are normally self-latching. However with new systems on the market this specific method is no longer appropriate. Whatever system is used must prevent a door from being opened by draught in its particular location, yet enable it to be opened without excessive force during normal operation.

An example of an optional device is a panic bolt. A non-self-latching bolt, if left protruding while the door is open, will prevent the door from closing. Therefore alternative options should be used in fire doorsets.

106.1.3
Selection of hardware and furniture

106.1.3.1
Quality
All hardware and furniture shall be of commercial quality. Variations from that included in the tested production model shall be subject to the requirements of 108.1.2 and 108.2.5.

C106.1.3.1
The use of the term "commercial" is accepted as meaning of robust design, capable of withstanding long term use, as against "domestic" hardware that may not be of such a durable nature.

106.1.3.2
Permanent marking
Latchsets and closer bodies shall be marked in accordance with Appendix A.

106.1.4
Actuated sensing device
All automatic fire doorsets shall be actuated by an approved sensing device.

106.1.5
Clearances
Clearances between the leaf and the frame, finished floor level or wall shall be in accordance with 109.3.

106.1.6
Wall openings
The design of wall openings shall be such that no structural loads are imposed on the door frame unless the frame has demonstrated its ability to sustain such loads under the conditions of a standard fire resistance test.

106.1.7
Latch handles
Latch handles shall be located not less than 900 mm nor more than 1200 mm above the bottom of the door leaf. The recommended height is 1000 mm above the finished floor levels (see NZS 4121 *Code of practice for design for access and use of buildings and facilities by disabled persons*, 213.2).

106.2
Side-hung doors

106.2.1
Hinges
Hinges and pivots shall be of a low-friction type, accurately aligned so that the door leaf swings freely without bias in the opening direction. When the door-leaf is installed, it shall be clear in the frame and the latch bolt shall engage freely with the striking plate.

106.2.2
Materials for essential latching components
Materials used for all essential latching components, namely latch bolt, striking plate, and bolt retaining plate, of side-hung doors shall have

a temperature of fusion not less than:

(a) For doorsets of up to 2 h fire resistance, 890 °C; and

(b) For doorsets of fire resistance in excess of 2 h, 1030 °C.

106.2.3
Pressure relief in closers
All closers that incorporate:

(a) Packing gland type pressure seals

(b) An O-ring seal with a back-up seal; or

(c) Cup seals with a back-up seal

shall incorporate a vent, plugged with material of temperature of fusion below 100 °C and located above the level of oil in the hydraulic chamber.

C106.2.3
Where possible all vents shall be located facing away from the door leaf.

106.2.4
Cushioned back-checking action of closer
The self-closure system shall provide a cushioned back-checking action to prevent shock when the door is forcibly opened. This action shall not commence until the door has opened to not less than 75 % and shall be effective over not less than the last 5 % of opening. If an adjustable valve is provided, that valve shall not be capable of eliminating the cushioned back-checking action.

C106.2.4
The final angle of effectiveness of the cushioned back-checking action depends on the particular location where each fire door is to be installed. For the purposes of fire resistance testing, it is recommended that the maximum opening angle of the door is assumed to be 90 %.

The cushioned back-checking action should preferably be factory set.

106.2.5
Security latching
A side-hung doorset may be fitted with a remote controlled striking-plate release mechanism of the type that was fitted to the production model doorset in the standard fire resistance test. Such a mechanism shall be integral with a sensing device. In the striking plate released condition the doorset shall comply with 109.5.2.

106.2.6
Selective sequence closing devices
Two-leaf doors that are double-acting, shall be designed and installed with no selective sequence closing device.

106.3
Horizontally sliding doors

106.3.1
Flush pulls and grips

106.3.1.1
Where a finger pull or grip is recessed into the face of the door leaf and does not provide for a retractable handle, the size and depth of the recess shall be adequate to allow manual operation of the door leaf, taking into consideration its size and weight.

106.3.1.2
Where pulls or grips are recessed into both faces of the door leaf, they shall be staggered in their location.

106.3.2
Directional arrows
All sliding fire doors shall be provided with sharply delineated arrows of the form and dimensions shown in fig. 1 which shall indicate the direction of opening of the door. Such arrows shall have not less than 3 mm of relief above or below the plane of their surround, and, if not embossed in the material of the door leaf, shall be mechanically affixed in either case at the midpoint of the face of each door leaf.

106.3.3
Door leaves mounted in cavities
Door leaves mounted in cavities or pockets shall have access for adjustment and maintenance of the suspension and fusible link mechanism.

106.4
Glazing
Every glazing panel that consists of non-wired glass with fire resisting properties shall incorporate a permanent identification mark.

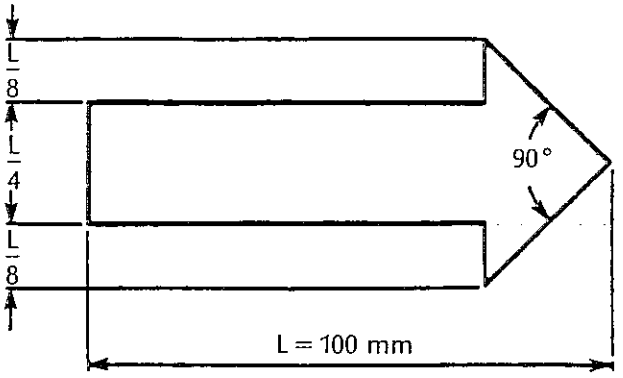

Fig. 1
FORM OF DIRECTIONAL ARROW FOR SLIDING FIRE DOORS

107
DETERMINATION OF FIRE RESISTANCE

107.1
General

The fire resistance of the doorset shall be determined by submitting a production model to the standard fire resistance test, subject to 107.3.1 and 107.3.2.1.

C107.1

For the purpose of conforming to the requirements of the Bylaw NZS 1900:Chapter 5, any doorset satisfying one of the test procedures contained in the Standards for the fire resistance test, as defined, will be accepted. Manufacturers should be aware that the criteria vary for each test Standard. Should doorsets be considered for markets outside New Zealand, the acceptability of the particular test Standard to the appropriate approving authority should be ascertained.

107.2
Cyclic movement endurance test

107.2.1
Test requirements

Before the fire test each leaf of doorsets shall be subjected to the cyclic movement endurance test of 5000 cycles in accordance with Appendix B or DIN 4102:Part 2.* It shall be the responsibility of the manufacturer to provide the fire testing laboratory with a copy of the cyclic movement endurance test certificate prior to the fire test being conducted.

107.2.2
Evidence of compliance

A certificate stating that the production model passed the required number of cycles shall be provided by the testing laboratory. This certificate shall be a pre-requisite for approval.

107.3
Criteria of failure

107.3.1
Integrity

107.3.1.1
Integrity failure

Integrity shall be deemed to be lost when the production model fails to satisfy the integrity criteria of the particular standard fire resistance test.

*See list of Related Documents

107.3.1.2
Additional integrity observations

For all doorsets tested in New Zealand, the following additional requirements shall be observed during the respective fire resistance test and shall be recorded in a statement appended to the test report.

(a) For doorsets tested to AS 1530.4, include the cotton wool pad test in accordance with 7.4 of ISO 3008 or 1.4.4* of BS 476:Part 8

(b) For doorsets tested to ISO 3008 and BS 476:Part 22, include the relevant conditions set out in 7.6.1 of AS 1530.4.

C107.3.1.2

The additional information required under this clause and 7.3.2.2 does not form part of the criteria of failure but will be used by the Standards Association of New Zealand to monitor the relevance of particular requirements of other Standards for New Zealand conditions.

107.3.2
Insulation

107.3.2.1
Insulation failure

Insulation shall be deemed to be lost when the production model fails to satisfy the insulation criterion to comply with this Standard. The insulation criterion shall be limited to the average temperature of the relevant thermocouples, attached to the unexposed face of the door leaf of the production model, exceeding the initial temperature by more than 140 °C.

107.3.2.2
Additional insulation requirements

For all doorsets tested in New Zealand the following requirements shall be observed during the fire resistance test and shall be recorded in the test report: the time measurement at which the temperature of any one of the relevant thermocouples attached to the unexposed face of the door leaf of the production model rises by more than 180 °C above the initial temperature.

107.3.2.3
Insulation waiver

Compliance with the insulation criterion of the standard fire test shall be determined by the Bylaw, but shall not be required for metallic roller shutter doors.

C107.3.2.3

When glazing which does not satisfy the insulation criteria is incorporated in the construction, then no insulation rating can be claimed.

In the absence of a specific requirement in the

Bylaw, reference should be made to Appendix D for recommendations on the use of insulation ratings.

The use of metallic roller shutter doors will be limited to specific locations, such as escalator openings, where approved by the Engineer.

107.4
Radiation flux
Measurement of the radiant heat flux emitted by a doorset that incorporates any part not meeting the insulation criterion set out in 107.3.2 shall be made in accordance with the standard fire test. The radiant heat flux shall be measured 1 m from the surface of the door leaf and opposite the hottest point. The result shall be recorded in the test report.

C107.4
This measurement provides data for an estimate of safe distance for location of combustible materials from a protected opening and the effect on persons in an exitway. (See Appendix C).

107.5
Test mounting

107.5.1
Fire doorsets intended for the protection of openings in brick, concrete block and reinforced concrete walls shall be tested when mounted in any one of such types of walling.

107.5.2
Doorsets intended for the protection of openings in other types of fire-resisting walls or in a specific type of fire-resisting light-weight partitioning, shall be tested when mounted in an opening in walls or partitioning of like construction with that in which they are to be used, subject to 108.1.2.3.

C107.5
Mounting systems may include but not be limited to walls of brick, concrete, masonry, structural steel, or dry wall construction using timber or steel studs or combinations of laminations.

Experience in the fire testing of doorsets has emphasized the importance of compatibility between the doorset and the wall or partition in which it is mounted. A doorset which has demonstrated a fire resistance when mounted in an opening (so as to be dependent on the wall or partitioning around that opening for its lateral stability) will require support from a wall or partition during any subsequent fire exposure. Doorsets of this type should not be used in walls that are considered unlikely to provide the required support during exposure to fire.

The incorporation of glazed panels adjacent to or above the frame of a tested doorset will require specific attention and should be subject to an opinion by the testing laboratory.

107.6
Exposure to test

107.6.1
Side-hung doors
Doorsets shall be tested from each direction or as provided by the requirements of the standard fire resistance test.

107.6.2
Other doors
All door leaves, other than side hung doors shall be tested with their suspension or operating mechanism exposed to the test furnace.

107.6.3
Automatic closing and latching
The behaviour of the production model shall be observed to ascertain that any doorset fitted with an automatic self-closing device, closes and where appropriate, latches automatically during the first 90 s of the test. This observation shall be appended to the test report.

108
VARIATION FROM PRODUCTION MODEL

108.1
Variations requiring approval

108.1.1
General

108.1.1.1
All variations to a production model that fall outside the specific areas listed in 108.2 shall require a written opinion of the testing laboratory or other specialist organization or individual. Such opinion shall state that the doorset would continue to serve as an effective barrier if exposed to the standard fire resistance test, and satisfy the test criteria, and if not, what different degree of performance would be expected.

108.1.1.2
The variations listed in 108.1.2.1 to 108.1.2.5 are included in this Standard as being the more common variations encountered in practice. However, changes to a production model need not be restricted to those listed in 108.1.2.

C108.1.1
It is recommended that the choice of testing laboratory or specialist organization or individual be confirmed as being acceptable to the SANZ Fire Ratings Committee, prior to the opinion being sought.

The testing laboratory may consider providing an opinion on the variations listed as an appendix to the original test report.

108.1.2
Variations
The following variations shall require a written opinion in accordance with 108.1.1.

108.1.2.1
Size
Any increase in dimensions of the production model beyond the largest size able to be accommodated in the test furnace.

108.1.2.2
Facing and edging
The substitution of alternative material used for facing and edging of the door leaf except that facings of low carbon steel may be substituted for facings of stainless steel provided that:

(a) Such facings are fixed by adhesive to the face or faces of the door leaf of the tested production model and are not returned around any edge; and

(b) The clearances between the main body of the door leaf and the door frame are not increased beyond those of the tested production model, nor compromised by using materials with an excessive coefficient of expansion; and

(c) The effectiveness of any smoke or heat seals incorporated in the doorset is not compromised.

108.1.2.3
Door frames

108.1.2.3.1
The mounting of a doorset, tested in the most adverse mounting system or position, being mounted in a less adverse mounting system or position.

108.1.2.3.2
The mounting of a doorset in a wall type or orientation other than that tested or approved by the SANZ Fire Ratings Committee (see MP 9:1987*)

108.1.2.4
Internal construction
The substitution of material in the internal construction of a door leaf or frame shall be based on the comparison of results of fire resistance tests of full sized doorsets of the respective construction.

108.1.2.5
Timber species
The substitution of timber species or fire retardant timber treatment in any part of the doorset construction.

108.1.2.6
Door furniture and hardware
Based on observed performance in a pilot or full-scale test of a doorset of similar construction.

108.1.2.7
Viewing lenses
Any opening required to accommodate viewing lenses.

108.1.2.8
Cyclic testing
The necessity to repeat cyclic testing on variations to a door shall be subject to opinion by the testing authority.

108.1.3
Glazing

108.1.3.1
General
All glazing other than that specified in 108.1.3.2 shall be subjected to a pilot or full scale fire test conducted in accordance with 107.1.

108.1.3.2
Vision panel
One glazed vision panel not exceeding 0.065 m^2 in area may be permitted in any door leaf of a side-hung fire doorset up to 3 hr FRR, under the following conditions:

(a) The location of the opening shall be such that it does not encroach on the structural framework of the door leaf in which it occurs

(b) A prototype of such a glazed panel shall, when mounted in a door leaf of similar construction and from the same manufacturer, have demonstrated satisfactory integrity for the required period of time in a pilot or full scale size test.

C108.1.3.2
The problems associated with slump of glazing in long panels is covered by the requirement for a pilot examination.

108.1.4
Louvres
No louvres shall be allowed in any doorset unless a production model incorporating a smoke stopping mechanism has been tested in a pilot or full scale fire test provided that no louvres shall be allowed in any doorset required by the Bylaw to possess smoke stopping capabilities.

*See list of Related Documents

108.2
Variations not requiring approval

108.2.1
General
Variations to the production model may be made in specific areas as listed in 108.2.2 to 108.2.6 without the approval of the Standards Association of New Zealand.

108.2.2
Size
Reduction in height or width or both dimensions of the door leaf, provided tolerances are unaltered.

108.2.3
Facing and edging
Substitution of low carbon steel for facings of stainless steel subject to the requirements of 108.1.2.2.

108.2.4
Door frame

(a) Single-rebate and double-rebate door frames may be interchanged in openings of brick, masonry and concrete

(b) Metallic finishes may be interchanged

(c) The overall depth and width of the frame may be increased.

108.2.5
Door furniture and hardware

(a) Variation may be made in electroplated or other metallic finishes

(b) A push-plate, a metallic plate for a hold-open device, or a kick-plate, which was mounted on the tested production model and which is not held on by or does not form part of the latchset or lockset furniture may be reduced in either dimension but shall not vary in material of construction

(c) The location of the door closer may be varied, provided that the distance of its pivot axis from the lock stile is not increased and there is no increase in the dimensions of any cutout or pocket which was provided in the door leaf of the tested production model to accommodate such closer

(d) The location of the latchset or lockset may be varied by up to 40 mm vertically in either direction provided that its distance from the bottom of the door leaf does not exceed 1200 mm

(e) The backset of a lockset or latchset may be reduced, provided that no encroachment is made on the structural framework of the door leaf

(f) Where locksets or latchsets are operated by a steel shaft, their surface-mounted furniture such as handles, knobs and escutcheon plates may be varied provided that:

(i) The temperature of fusion of any substitutive part is not lower than that of the corresponding part on the tested production model

(ii) Any substitutive handle or knob is not so massive or asymmetrical as to introduce a turning moment about the operating shaft which exceeds 0.07 N.m, or for a substitutive lever is more than 10 % greater than the moment induced by the corresponding part on the tested production model; and

(iii) The new escutcheon plate covers adequately any hole in the door leaf formed to accommodate the lockset or latchset, but does not cover an area of the face of the door leaf which exceeds by more than 20 % the area which was covered by the corresponding plate fitted to the tested production model.

(g) A surface-mounted self-latching lockset may be fitted for additional security in addition to the tested lockset. The diameter of the hole drilled through the door shall not exceed the diameter of the locking cylinder diameter by more than 10 mm. The locking cylinder must be made of brass or metal of higher melting point. The head diameter of the cylinder or its escutcheon must be larger than the cylinder hole in the door leaf. The cylinder assembly must be fixed to the door leaf by steel screws through a steel mounting plate which effectively covers the hole in the door leaf. The connecting bar clearance hole in the mounting plate must be not greater than 15 mm diameter

(h) The fixing of hinges to metal door frames may be effected by welding in lieu of metal thread steel screws, and vice versa.

C108.2.5
Minor changes may be made in the operating characteristics of hardware, provided that these do not require modification of the door leaf or frame and do not otherwise prejudice the fire resistance of the doorset. Typically, such changes are functions of key-in-knob or lever latchsets involving a variation or substitution in the knob or lever only and not in the essential bolt-operating mechanism, or for door closers variations in the hydraulic system controlling

the delay action of the closer. Where doubt arises as to the acceptability of such variations, the opinion should be sought of the laboratory that carried out the fire-resistance test on the production model doorset.

108.2.6
Glazing
Vision panels, when approved under 108.1.3.2, may be increased in height by up to 50 % to a maximum of 900 mm, but with no increase in area.

C108.2.6
The maximum height restriction is not required by AS 1905, but is considered necessary to prevent slumping of glass from the upper beads.

109 INSTALLATION

109.1 General
The method of construction and installation of any fire doorset shall be the same as that of the tested production model, except as permitted by section 108.

109.2 Hinges and pivots

109.2.1
When installed, each door leaf shall be clear in the frame and the latch shall engage freely.

109.2.2
Hinges and pivots shall be checked for alignment both before and after fitting any door leaf.

109.3 Clearances
Clearances shall be as specified by the doorset manufacturer. In all cases where the clearances are not recorded, then clearances between a door leaf and any part of the frame or adjacent leaf in the case of double-acting doors shall not be less than 2 mm. The clearance between a door leaf and the finished floor shall be not less than 3 mm and not greater than 10 mm.

109.4 Door sill

109.4.1
For all fire doors of 1 h FRR or greater the sill of the opening shall be of non-combustible construction, or has been established as preserving the integrity of the doorset in a standard fire test. For sliding doors the extent of a sill plate, if required, shall be specified by the doorset manufacturer. Where a four-sided frame is required, as for access doors to service ducts, the sill member shall be identical with the head member.

109.4.2
The floor covering shall not extend under the door of any opening if it has a critical radiant flux of less than 0.45 W/cm^2 when tested to ASTM E 648.*

109.5 Door hardware and furniture

109.5.1
Attachment
All hardware and furniture shall be attached in a manner that is appropriate to the use for which it is intended over the life of the door. Inserts fusing below 1000 °C shall not be used for fixing.

109.5.2
Frictional forces
Before the closer arm is attached, a force of not more than 2 N continuously applied perpendicular to the face of the door leaf at a radius of 700 mm from the pivot centre shall be capable of moving the door leaf from the fully closed position to the fully open position and return to the striking plate. A force of not more than 20 N similarly applied shall bring the door leaf to the fully latched condition.

109.5.3
Actuated sensing devices
Actuated sensing devices shall be positioned within the stream of air that passes the door opening when the fire door is fully open. A sensing device mounted on the ceiling shall be set back horizontally from the door opening by a distance not less than the distance between the ceiling and the top of the door opening.

109.5.4
Travel limiting device
Every side-hung or double-acting fire door shall be protected by a travel-limiting device to prevent damage where the fire door or its accessories could be subjected to forceful or careless operation. The travel-limiting device shall be located so as to minimize strain or racking of the door leaf.

C109.5.4
A door closer is not considered to be a travel-limiting device for the purpose of this clause unless specifically so designed.

109.5.5
Counterweight system
A counterweight system used to provide automatic closure of a fire door shall be protected to ensure free operation by means of adequate guards or enclosures. Counterweights shall be not less than 150 mm clear of the floor in the door-closed position.

* See list of Related Documents

109.5.6
Adjustment force
The counterweight system shall be adjusted at the time of final installation so that the force required to initially move the door leaf from its closed and stationary position, after the release mechanism has operated, shall not exceed 180 N. The force required to operate the door leaf through its full travel shall not exceed 110 N. However, where the fire door is a final exit leading to a street or open place, neither force shall exceed 110 N.

C109.5.6
Sliding doors are not permitted to be used in exitways except in limited situations as specified in the Bylaw. Any device that will convert a sliding door to a "push out" or side-hung door shall comply with the force requirements of 109.5.2.

109.6
Final check
When the installation is complete the doors shall latch satisfactorily from the fully open and from any intermediate position, and the closers shall demonstrate back-checking action as required by 106.2.4.

110
SMOKE STOPPING

110.1
General
Doorsets required by the Bylaw to possess smoke stopping capabilities shall have a production model evaluated in accordance with ISO 5925/1 or BS 476:Section 31.1.* Such tests shall be based on the performance of the doorsets at ambient temperatures.

C110.1
It should be noted that all doorsets covered by this Standard are primarily fire doors. However it should also be noted that the Bylaw does not lay down any limits on the allowable rate of airflows as measured by the above test. When other methods of smoke control are provided in buildings, e.g. pressurization, the smoke control criteria for doors may not be applicable. The tests simulate the conditions that may be experienced in practice by doors during the very early stages of fire development, or by doors remote from the seat of the fire.

*Evaluation of the performance of doorsets for smoke control under medium or high temperature conditions will become the subject of future Standards; ISO 5925/2 and ISO 5926/3 respectively and sections 31.2 and 31.3 of BS 476.**

Guidance on the use of the information gained from the tests in 110.1 is being formulated by ISO and BSI. A concentration of gases at approximately 1 % is proposed by ISO as an acceptable level based on optical density considerations. This level could not be achieved unless the door gap is reduced to less than 1 mm when the pressure differential is 20 Pa (normal furnace pressure for ISO 834). Stack effects and pressurization systems could increase this figure to 25 Pa for a 50 m building.[1] Therefore the use of close fitting door seals is necessary to restrict the flow of cold smoke.[2]

Intumescent seals act at an average temperature of around 150 °C. By the time this temperature is reached on a fire floor, access through the door that is sealed would not be required by occupants fleeing the building.

Attention is drawn to the importance of ensuring that the barrier effect of the doorset to smoke movement is not negated by the fitting of flooring materials with a high smoke developed index across the sill under the door. [See also 109.4.]

Recommendation
In the absence of a specific recommendation for performance when tested in accordance with BS 476:Section 31.1 or ISO 5925/1, smoke and intumescent seals must be fitted to all edges of the door, excluding the bottom.

110.2
Record of evaluation
The test report shall record the information but the results shall not represent a failure criterion of the doorset.

110.3
Marking
Doorsets evaluated in accordance with 110.1 shall include the appropriate smoke mark as required by section 111.

110.4
Signing

110.4.1
Every doorset required by the Bylaw to possess smoke stopping capabilities shall have a sign fixed to both sides of the door leaf adjacent to the handle or push plate stating "Smoke Stop Door, Please Keep Closed". Provided that door leaves fitted with hold-open devices in accordance with 106.1.1 shall have a sign stating "Smoke Stop Door" only.

110.4.2
The sign shall measure not less than 90 mm x 50 mm and shall be in white letters not less than 8 mm high on a safety green background. (Refer NZS 5807).*

*See list of Related Documents

111
MARKING

111.1
General

111.1.1
On completion of manufacture of the doorset a metal label as specified in 111.4 shall be fixed to both the door frame and each door leaf.

111.1.2
The manufacturer shall also supply an Installer's Declaration. When installation is complete the installer shall complete the declaration and forward it to the manufacturer. This declaration shall only be completed when the installer is satisfied that:

(a) Hardware has been installed in accordance with the specification approved by the SANZ Fire Ratings Committee

(b) Hinges or pivots are correctly aligned

(c) The doorset latches satisfactorily as specified in 109.5; and

(d) The doorset complies with any other requirement of this Standard..

111.1.3
If the declaration is not returned or advice from the installer is not received within a period of 60 days following dispatch of the declaration, the manufacturer shall advise the relevant Local Authority that installation remains incomplete.

C111.1
The effect of this requirement is that it allows the Local Authority to enter a building prior to occupancy and check that all the necessary doors are displaying the door labels.

111.2
Information
The following information shall appear on the labels:

(a) Name of the doorset manufacturer

(b) Identification number of the individual doorset

(c) Year of installation

(d) The Standard under which the fire resistance rating was established

(e) Integrity rating of the doorset

(f) Insulation rating of the doorset

(g) The ability of the doorset to resist the passage of smoke.

(h) The radiant heat flux 1 m from the surface of the leaf and opposite the hottest point, which has been arrived at by calculation or measurement.

111.3
Notation
The notation to be used shall be as follows:

Integrity rating – letter F followed by performance in hours, e.g. F 1.5

Insulation rating – letter N followed by performance in hours, e.g. N 0.5

Smoke resistance – letter S followed by appropriate classification:

e.g. SA ambient temperature
SM medium temperature
SH high temperature

111.4
Metal labels

111.4.1
Size
Metal labels shall measure not less than 80 mm x 30 mm.

111.4.2
Method of marking
The required information shall be etched, embossed or stamped on the metal labels so that it is recessed or projected not less than 0.25 mm below or above the surface of the label. Alphabetic or numeric characters shall be not less than 1.5 mm high.

111.4.3
Location
Labels shall be located in a position that provides access for inspection without comprising door leaf clearances. The fixing method shall be able to withstand 1000 °C.

C111.4.3
Labels to both door leaf and frame should be the same height. The recommended location for sliding and tilting doors is on one edge approximately 1.5 m above floor level. The bottom of a sideways facing label should face the reader.

111.4.4
Sample label
Information layout for labels shall be as shown below:

G SMITH LTD
DOORSET NO XXX
1988
ISO 3008
F 1.5 N O.5
S A

Fig. 2
FIRE DOORSET LABEL

NOTE – The bottom of a sideways fastened label should face the reader.

112
EVIDENCE OF COMPLIANCE

112.1
Approved requirements
Evidence of compliance with this Standard shall be presented to the SANZ Fire Ratings Committee, and include the manufacturing and installation specifications, test reports, product literature, and other such information that may be required from time to time by that organization.

112.2
Publication of approval
Approvals granted by Standards Association of New Zealand will be published in NZMP 9.

112.3
Warranty

112.3.1
Evidence of compliance
Following completion of the installation of any fire door in a building, including the fixing of the door and door frame labels, the manufacturer shall provide the building owner (or his representative), written evidence that as far as can be ascertained, the door frame has been correctly installed and in all respects the fire door has been installed in accordance with this Standard.

C112.3.1
The attention of the building owner is drawn to the necessity to ensure that during the course of maintenance on fire doors any replacement items such as glazing, locks, closers and other hardware are identical to the items being replaced, or are of equal suitability. It is recommended that the opinion of the testing laboratory be obtained before any substitution is undertaken.

112.4
Certification mark
A certification mark (such as the 'S' mark) issued by a national standards body such as SANZ, SAA or BSI shall be deemed to be sufficient evidence of compliance with 112.3.

112.5
Register

112.5.1
The manufacturer shall maintain a register of doorsets, listing the following information:

(a) Building location

(b) Fire integrity rating, insulation rating and smoke rating

(c) Installer's name and address

(d) Date doorset dispatched

(e) Date declaration received.

112.5.2
This register shall be made available for inspection by any person having reasonable cause for such inspection.

REFERENCES

(1) Read, R.E.H. and Shipp, M.P. 1979. An Investigation of Fire Door Closer Forces, Building Research Establishment, Gaston 1979.

(2) McGuire, J.H. DP 5925 FOC Tests, Smoke and Control Door Assemblies, Part 0, Commentary.

Part 2
Fire resisting glazing systems

201
STATUS

201.1
This Part of this Standard is intended to provide a means of compliance with the requirements for fire windows and fire resistant glazing in NZS 1900:Chapter 5, with or without a specified resistance rating (FRR). It will only become an approved means of compliance when referenced in local authority building bylaws by amendment to NZS 1900:Chapter 5.

201.2
Once so identified, proof of compliance with this Part of this Standard shall be sufficient evidence that the requirements for fire windows in NZS 1900:Chapter 5 are satisfied – unless there is proof to the contrary.

202
SCOPE

202.1
This Part of this Standard specifies the range of performance requirements which are to be provided when the term "fire window" or "wired glass" is used. Note that a "fire window", for the purposes of this Standard, comprises a complete window, as defined below, after installation of the window is completed, in any building.

202.2
Proof of performance is obtained through specified validation methods (including fire test methods) and the specification of pass/fail criteria with permissible variations.

202.3
Appendix D provides guidance on what kinds of performance should be expected of fire windows in different locations in a building, where the requirements of NZS 1900:Chapter 5 are not yet specific. However, the guidelines in the appendix are not part of the performance requirements of this Part of this Standard and should not be regarded as necessary to meet the requirements of NZS 1900:Chapter 5 until and unless NZS 1900:Chapter 5 is amended or revised to include these further performance criteria in its requirements.

203
APPLICATION

203.1
This Part of this Standard is the agreed basis for the design, manufacture, and installation of all fire windows required by any regulation, code, or bylaw, in New Zealand.

203.2
Proof of compliance with the requirements of this Part of this Standard should be established, in the first place, by seeking the specific approval of the SANZ Fire Ratings Committee that a fire window satisfies all the criteria specified below, for the position in which such a fire window is intended to be used. One way of ensuring that production fire windows continue to conform to the terms of a Fire Ratings Committee approval is use of the SANZ "S" mark as noted on the inside back cover.

204
INTERPRETATION

204.1
In this Part of this Standard the word 'shall' indicates a requirement that is mandatory, to be adopted in order to comply with the Standard, while the word 'should' indicates a recommended practice.

204.2
Clauses prefixed by 'C' and printed in italic type are intended as comments on the corresponding mandatory clauses.

204.3
Cross references to other clauses within this Standard quote the number only, for example: 204.1.

204.4
The full titles of reference documents cited in this Standard are given in the list of Related Documents immediately preceding the Foreword.

205
DEFINITIONS

205.1
In this Part of this Standard, unless inconsistent with the context:

ACTUATED SENSING DEVICE means a device which operates to effect the closure of an opening fire window.

AMBIENT TEMPERATURE means a temperature of 25 ±15 °C, representative of that normally found in buildings.

APPROVED means approval by the Fire Ratings Committee, Standards Association of New Zealand.

AUTOMATIC, when applied to a fire window, means designed to close without manual assistance through the operation of an approved sensing device integral with the fire window.

COMBUSTIBLE means when tested in accordance with AS 1530.1 or BS 476: Part 4.

FIRE RESISTING GLAZED PARTITION means a partition complete with fire resistant glazing that satisfies a specified fire resistant rating.

FIRE RESISTING GLAZING means fixed or opening glazing, complete with frame, fixings, mullions, transoms and glazing beads, with a specified fire resistance rating.

FIRE WINDOW means a window, which, except when varied as permitted by this Standard, is identical in assembly, construction and installation with a production model that has been submitted to the standard fire resistance test and has fulfilled all the relevant test requirements.

FIRE TEST – see STANDARD FIRE RESISTANCE TEST

HOLD OPEN DEVICE means a device for use with fire windows that holds the sash open during normal use, but releases the sash by the actuation of a sensing device, allowing the sash to close under the action of a self-closing device.

PRODUCTION MODEL means a fire window that is totally reproducible in its final form as a standard unit.

C205.1
Production model

The term production model rather than prototype has been specifically chosen to imply that the product tested and approved is the production model. Several 'prototypes' may be used before reaching the production model state for final testing.

Note that a production model may have approved variations – see Fire Window definition.

SELF CLOSING, when applied to a fire window, means equipped with an approved device designed to bring the sash immediately on release to the fully closed and latched position.

STANDARD FIRE RESISTANCE TEST means the fire resistance test specified in the edition of AS 1530.4, ISO 3009 or BS 476: Part 8, current at the time of testing the production model.

WINDOW means a complete light assembly comprising fixed or opening sashes, closable louvres, or curtain wall system including all frames and fixings to an element of structure, satisfying the performance standards of NZS 4211 *Specification for performance of windows.*

206
DESIGN REQUIREMENTS

206.1
Self-closing

206.1.1
All opening fire windows shall be self-closing. Opening sashes shall revert to self-closing when the hold open device releases or otherwise becomes inoperative. Provision should be made for the self-closing device to be readily adjustable to satisfy the requirements of 207.4.2 after installation.

206.1.2
All self-closing devices shall be effective for varying degrees of opening appropriate to the use of the window.

C206.1
Concern has been expressed in the past about the reliability of closing devices used on opening fire windows.

However, such a prohibition is not justified as some windows may be used as alternative exitways (5.40 of Chapter 5), for window cleaning access and natural ventilation.

The aim is to ensure that the closing device is reliable and practical to enable the window to be used for its intended function.

206.2
Self-latching
All opening sashes shall be self-latching. No catch or function which could render an opening sash non-self-latching shall be incorporated.

206.3
Materials for essential latching components
Materials used for all essential latching components, shall have a temperature of fusion not less than 890 °C for windows up to 2 h FRR.

206.4
Security latching
A fire window may be fitted with a remote controlled striking-plate release mechanism integral with a sensing device subject to 208.1.2.6. In the striking plate released condition the fire window shall comply with 209.3.2.

206.5
Selection of hardware and furniture

206.5.1
Quality
All hardware and furniture shall be of commercial quality. Variations from that included in the

tested production model shall be subject to the requirements of 208.1.2 and 208.2.4.

C206.5
The use of the term "commercial" is accepted as meaning of robust design, capable of withstanding long term use, as against "domestic" hardware that may not be of such a durable nature.

206.5.2
Hinges
Hinges and pivots shall be of a low-friction type, accurately aligned so that the sash swings freely without bias in the opening direction. When the sash is installed, it shall be clear in the frame and the keeper shall engage freely with the striking plate.

206.6
Actuated sensing device
All opening fire windows shall incorporate an actuated sensing device integral with the sash.

206.7
Wall openings
The design of wall openings shall be such that no structural loads are imposed on the fire window unless the frame has demonstrated its ability to sustain such loads under the conditions of a standard fire resistance test.

206.8
Glazing
Every glazing panel that consists of unwired glass with fire resistant qualities shall incorporate a permanent identification mark.

207
DETERMINATION OF FIRE RESISTANCE

207.1
General
The fire resistance of the fire window shall be determined by submitting a production model to the standard fire resistance test, subject to 207.2.1.1.

C207.1
For the purpose of conforming to the requirements of the Bylaw NZS 1900:Chapter 5, any fire window satisfying one of the test procedures contained in the Standards for the fire resistance test, as defined, will be accepted. Manufacturers should be aware that the criteria vary for each test Standard. Should fire windows be considered for markets outside New Zealand, the acceptability of the particular test Standard to the appropriate approving authority should be ascertained.

207.2
Criteria of failure

207.2.1
Integrity

207.2.1.1
Integrity failure
Integrity shall be deemed to be lost when the production model fails to satisfy the integrity criteria of the particular standard fire resistance test.

207.3
Test mounting

207.3.1
Fire windows intended for the protection of openings in brick, concrete block and reinforced concrete walls shall be tested when mounted in any one of such types of walling.

207.3.2
Fire windows intended for the protection of openings in other types of fire-resisting walls, or in a specific type of fire-resisting light-weight partitioning, shall be tested when mounted in an opening in walls or partitioning of like construction with that in which they are to be used.

C207.3
Mounting systems may include but not be limited to walls of brick, concrete, masonry, structural steel, dry wall construction using timber or steel studs or combinations of laminations.

207.4
Exposure to test

207.4.1
Test orientation
Fire windows shall be tested from the direction required by the standard fire resistance test, or as determined by the testing laboratory.

207.4.2
Automatic closing and latching
The behaviour of the production model shall be observed to ascertain that any fire window fitted with an automatic self-closing device, closes and where appropriate, latches automatically during the first 90 s of the test. This observation shall be included in the test report.

C207.4.2
This requirement is written in as an observation only. However, if the closing and latching requirements are not met this would constitute a failure of the fire windows, and should be treated as such.

208
VARIATION FROM PRODUCTION MODEL

208.1
Variations requiring approval

208.1.1
General

208.1.1.1
All variations to a production model that fall outside the specific areas listed in 208.2 shall require, in writing, an opinion of the testing laboratory or other specialist organization or individual. Such opinion shall state that the fire window would continue to serve as an effective barrier if exposed to the standard fire resistance test, and satisfy the test criteria, and if not, what different degree of performance would be expected.

208.1.1.2
The variations listed in 208.1.2 are included in this Standard as being the more common variations encountered in practice. However, changes to a production model need not be restricted to those listed below.

C208.1.1
It is recommended that the choice of testing laboratory or specialist organization or individual be confirmed as being acceptable to the SANZ Fire Ratings Committee, prior to the opinion being sought.

The testing laboratory may consider providing an opinion on the variations listed as an appendix to the original test report.

208.1.2
Variations
The following variations shall require a written opinion in accordance with 208.1.1.

208.1.2.1
Size
Any increase in dimensions of the production model beyond the largest size able to be accommodated in the test furnace. This opinion shall include the maximum spacing of mechanical joints for the erection of continuous glazed screens on site.

208.1.2.2
Beads and weatherstrip
The substitution of alternative material used for beads and weatherstrip.

208.1.2.3
Window frames
The mounting of a fire window, in a wall type or with its orientation other than that tested, or approved by the SANZ Fire Ratings Committee.

208.1.2.4
Substitution of material
The substitution of material in the construction of a sash or frame shall be based on the results of full scale tests.

208.1.2.5
Timber species
The substitution of timber species or fire retardant timber treatment in any part of the fire window construction.

208.1.2.6
Furniture and hardware
Approval based on observed performance in a pilot or full-scale test of a fire window of similar construction, is required for:

(a) The repositioning or the fitting of a specific alternative item of furniture or hardware that requires an increase in any dimension of any material which was removed from the sash to accommodate the item on the production model window assembly, and

(b) If such an increase is likely to affect the strength of the fire window.

208.2
Variations not requiring approval

208.2.1
General
Variations to the production model may be made in specific areas as listed in 208.2.2 to 208.2.4 without the approval of the Standards Association of New Zealand.

208.2.2
Size
Reduction in height or width or both dimensions of the sash or fixed glazing.

208.2.3
Window frame

(a) Any steel may be interchanged provided that clearances are not affected by variation in the expansion characteristics

(b) Metallic finishes may be interchanged.

208.2.4
Furniture and hardware

(a) Variation may be made in electroplated or other metallic finishes

(b) A metallic plate for a hold-open device, which was mounted on the tested production model and which is not held on by or does not form part of the latchset furniture may be reduced in either dimension but

shall not vary in material of construction

(c) Hinges of materials with a melting point greater than 890 °C may be interchanged.

C208.2.4
Minor changes may be made in the operating characteristics of hardware, provided that these do not require modification of the sash or frame and do not otherwise prejudice the fire resistance of the fire window. Where doubt arises as to the acceptability of such variations, the opinion should be sought of the laboratory that carried out the fire resistance test on the prototype fire window.

209
INSTALLATION

209.1
General
The method of construction and installation of any fire window shall be the same as that of the tested production model, except as permitted by section 208.

209.2
Hinges and pivots

209.2.1
When installed, each sash shall be clear in the frame and the latch shall engage freely.

209.2.2
Hinges and pivots shall be checked for alignment both before and after fitting any sash.

209.3
Hardware and furniture

209.3.1
Attachment
All hardware and furniture shall be attached in a manner that is appropriate to the use for which it is intended over the life of the window. Inserts fusing below 890 °C shall not be used for fixing.

209.3.2
Actuated sensing devices
Actuated sensing devices shall be positioned within the stream of air that passes the window opening when the fire window is fully open.

209.4
Glazing
The cover of the glazing by the sealing beads and frame shall not be less than that specified by the manufacturer for the production model.

209.5
Final check
When the installation is complete the fire windows shall latch satisfactorily from the fully open and from any minimum position specified by the manufacturer.

210
SMOKE STOPPING

210.1
Smoke seals
Any fire window or fire resistant glazed partition opening into an area required by the Bylaw to comply with smoke stopping criteria, shall be fitted with smoke seals.

211
MARKING

211.1
General

211.1.1
On completion of manufacture of the fire window a metal label as specified in 211.4 shall be fixed to the window frame.

211.1.2
The manufacturer shall also supply an Installer's Declaration. When installation is complete the installer shall complete the declaration and forward it to the manufacturer. This declaration shall only be completed when the installer is satisfied that:

(a) Hardware has been installed in accordance with the specified instructions of the relevant hardware manufacturer, as approved by the Fire Ratings Committee, Standards Association of New Zealand

(b) Hinges or pivots are correctly aligned

(c) The fire window latches satisfactorily as specified in 209.5; and

(d) The fire window complies with any other requirement of this Standard.

211.1.3
If the declaration is not returned or advice from the installer is not received within a period of 60 days following dispatch of the declaration, the manufacturer shall advise the relevant Local Authority that installation remains incomplete.

C211.1
The effect of this requirement is that it allows the Local Authority to enter a building prior to occupancy and check that all the necessary fire windows are displaying the labels.

211.2
Information
The following information shall appear on the label:

(i) Name of the fire window manufacturer

(ii) Identification number of the individual fire window

(iii) Year of manufacture

(iv) The Standard under which the fire resistance rating was established

(v) Integrity rating of the fire window

(vi) The radiant heat flux measured at a distance of 1 m.

211.3
Notation
The notation to be used shall be as follows:

Integrity rating – letter F followed by performance in hours, e.g. F1.5

Radiant heat flux – letter R followed by performance in kW/m^2, e.g. R4.5

211.4
Metal labels

211.4.1
Size
The metal label shall measure not less than 60 mm x 20 mm.

211.4.2
Method of marking
The required information shall be etched, embossed or stamped on the metal labels so that it is recessed or projected not less than 0.25 mm below or above the surface of the label. Alphabetic or numeric characters shall be not less than 1.5 mm high.

211.4.3
Location
The label shall preferably be located at a top internal corner of all fire window frames or other reasonable, yet visible, internal location.

211.4.4
Fixing
Fixing of the labels shall not compromise sash clearances. The fixing method shall be able to withstand 890 °C.

211.4.5
Sample label
Information layout for labels shall be as shown below:

G SMITH LTD
WINDOW NO XXX
1986
ISO 3009
F 1.5 R 4.5

Fig. 3
FIRE WINDOW LABEL

212
EVIDENCE OF COMPLIANCE

212.1
Approved requirements
Evidence of compliance with this Standard shall be presented to the Fire Ratings Committee, Standards Association of New Zealand and include the manufacturing and installation specifications, test reports, product literature, and other such information that may be required from time to time by that organization.

212.2
Publication of approval
Approvals granted by Standards Association of New Zealand will be published in NZMP 9.

212.3
Warranty

212.3.1
Evidence of compliance
Following completion of the installation of any fire window in a building, including the fixing of the label, the manufacturer shall provide the building owner (or his representative), written evidence that:

(a) Each such fire window is identical with the tested production model or, where there are variations from such prototype, that such variations are in accordance with this Standard; and

(b) As far as can be ascertained, the window frame has been correctly installed and in all respects the fire window has been installed in accordance with this Standard.

C212.3
The attention of the building owner is drawn to the necessity to ensure that during the course of maintenance on fire windows any replacement items such as glazing, catches, closers and other hardware are identical to the items being

replaced, or are of equal suitability. It is recommended that the opinion of the testing laboratory be obtained before any substitution is undertaken.

212.4
Certification mark
A certification mark (such as the 'S' mark) issued by a national standards body such as SANZ, SAA or BSI shall be deemed to be sufficient evidence of compliance with 212.3.

212.5
Register
The manufacturer shall maintain a register for each fire window installed, listing the following information:

(a) Building location

(b) Fire resistance rating and smoke rating

(c) Installer's name and address

(d) Date fire window dispatched

(e) Date declaration received.

This register shall be made available for inspection by any person having reasonable cause for such inspection.

APPENDIX A
MARKING OF HARDWARE ITEMS
(See 6.1.3.2)

A1
General

Latchsets and closer bodies shall be permanently marked by means of engraving, embossing or stamping, and in accordance with A2 and A3.

The marks shall be readily discernible and shall be located so that they are either directly visible or can be exposed by removal of a decorative plate or cover.

A2
Latchsets

A2.1
Fixed cover plate

Sufficient information shall be provided to enable identification of the manufacturer of the latchset.

A2.2
Essential latching components

In cases where alternative essential latching components are available for use with the one latchset, these components shall each bear marks that enable the manufacturer to identify the combination that was employed with the tested production model.

A2.3
Closer body

Sufficient information shall be provided to enable identification of the following:

(a) Manufacturer of the closer

(b) Model or series number if the closer is not of such a unique appearance as to be readily identifiable

(c) Metallic composition of the closer. Materials of construction to be represented by the following symbols:

Brass	B
Nickel Silver	NS
Aluminium Bronze	AB
Stainless Steel	SS
Steel	S

APPENDIX B
CYCLIC MOVEMENT ENDURANCE TEST

B1
Scope

This Appendix sets out the requirements for a cyclic movement endurance test to be applied to production model side-hung doorsets. Duct access doors and hatch covers shall be excluded from these requirements.

B2
General requirements

B2.1
Each doorset shall be subjected to 5 000 cycles of continuous opening and closing.

B2.2
After completion of the test the doorset shall be capable of closing properly, maintaining all clearances from leaf to frame and floor. It shall not show evidence of undue wear or damage on any part of the assembly or other defects which may impair its reliability of function.

B3
Test specimen
The doorset to be tested shall be the production model doorset to be used for the subsequent fire resistance test mounted in its intended manner in a rigid test frame.

B4
Procedure

B4.1
Adjustment of closer
Before the test is commenced, the self-closing mechanism shall be adjusted to provide the optimium closing force as contained in the manufacturer's specification to bring the door to the closed position.

B4.2
Side hung and double acting doorsets
The test door shall be opened and closed continuously for 5 000 cycles. Opening of the door shall be by mechanical means from a completely closed position to an opening of not less than 75° but not more than 90°. The test door shall then be allowed to close by itself, thereafter starting a new cycle.

B4.3
Latchbolt
The latchbolt of the specimen doorset may be held in a retracted position throughout the cycling test, but shall be returned to its normal position after the test for the purpose of checking that the doorset closes and latches properly.

B4.4
Sliding doors
Sliding or lifting doors or gates or roller shutters should be tested in a similar manner according to their type.

B5
Variation from prototype

B5.1
Size
A cyclic movement endurance test need not be a prerequisite for any production model in which the effects of size and weight distribution on the pivot and closing mechanism is less than for the production model tested.

CB5.1
Where a manufacturer is offering a doorset of a particular type and fire resistance in a range of door leaf sizes, the application of the test in 107.2 may be limited to the doorset with the maximum size of door leaf.

APPENDIX C
RADIANT HEAT FLUX MEASUREMENTS

C1
Scope
This Appendix provides guidelines on the use of measurements of radiant heat flux emitted by an element of construction which undergoes the fire resistance test. (See 107.4, Part 1).

C2
General

C2.1
In a fire, radiant heat emitted from the unexposed face of an element of construction can cause the ignition of combustible materials in the vicinity.

Commentary C2.1
In addition to the radiant heat emitted from the element of construction energy is transferred by conduction from the unexposed face of the element to the atmosphere off the element.

Furthermore the radiation heats up the wall surface opposite the element of construction, which in turn emits heat back to the element, which becomes hotter thereby emitting even more energy. Such a situation may develop where there is glazing in the side wall of a long corridor. The ultimate temperature is controlled by the surface area of the space, its thermal resistivity and the amount of ventilation. As a result of the above factors, caution is essential on the use of the method described in this Appendix. In general, the method should be limited to relatively wide open spaces, and circumstances resembling the fire test environment.

C2.2
The insulation criteria of the fire resistance test would ensure that radiant heat flux levels would be below those necessary to ignite combustible materials or to cause burns to humans in the vicinity. However, with uninsulated types of construction it would be possible for radiant heat flux levels to exceed those which would be safe for occupants or combustible materials in the vicinity.

C2.3
The measurement of radiant heat flux during the test provides information on the likely intensity of the emitted radiant heat flux during a fire and enables safe distances to be calculated.

C2.4
The theory presented in this Appendix assumes that the source of radiant heat is uniform in intensity although this is seldom realized in practice. However, if the distance at which the intensity of radiant heat is measured in the test is similar to the distance of interest, a useful approximation of the emitted flux can be obtained. If the non-uniformity of the source of radiant heat is known or can be estimated, this can be incorporated in the calculations of radiant heat.

C2.5
The curve of emitted radiant heat flux is applicable to the specimen during the test. This will not necessarily relate to the time history of emitted radiant heat during a real fire. Real fires have been shown to increase their temperature more rapidly than in that indicated by the standard time-temperature curve. The most appropriate value for calculations would normally be the value at the end of the rating period.

C3
Intensity of radiant heat flux [AS 1530.4]

C3.1
The intensity of radiant heat flux received at any point in front of a source of radiant heat may be calculated from the following equation:

$$I_r = \phi \times I_o$$

where

I_r = intensity of radiant heat flux received at the point under consideration, in kilowatts per square metre

ϕ = a geometric view factor called the configuration factor, which is related to the solid angle subtended by the source at the point under consideration

I_o = emitted radiant heat flux, in kilowatts per square metre

C3.2
The test data provides the values of I_o during the test. The configuration factor applicable to a particular installation can be calculated and then the intensity of radiant heat flux to be received at a point in front of the element can be determined by the above equation.

C3.3
Alternatively, if what is needed is to limit to a safe value the received radiant heat flux, a safe distance can be evaluated at which the configuration factor will yield sufficient attenuation of the emitted radiant heat flux.

C3.4
Typical radiant heat flux intensities to cause various phenomena are tabulated in table C1.

Table C1
TYPICAL RADIANT HEAT INTENSITIES FOR VARIOUS PHENOMENA

Phenomena	*Intensity*
	kW/m^2
Maximum for indefinite exposure for humans	1
Pain after 10 s to 20 s	4
Pain after 3 s	10
Piloted ignition of cotton fabric after a long time	13
Piloted ignition of timber after a long time	13
Non-piloted ignition of cotton fabric after a long time	25
Non-piloted ignition of timber after a long time	25
Non-piloted ignition of gabardine fabric after a long time	27
Non-piloted ignition of black drill fabric after a long time	38
Non-piloted ignition of cotton fabric after 5 s	42
Non-piloted ignition of timber in 20 s	45
Non-piloted ignition of timber in 10 s	55

C4
Configuration factor
Means for calculating the configuration factor for a specific situation are outlined in 'Heat Transfer by Radiation' by J.H. McGuire, DSIR FOC HMSO Special Report No.2 1953. Two special cases are included below:

(a) Circular source with receiver on axis of source and with plane of receiver and source parallel:

$$\phi = \frac{R^2}{R^2 + D^2}$$

where

ϕ = the configuration factor
R = the radius of source
D = the distance between source and receiver

(b) Rectangular source with receiver on centreline of source and with plane of receiver parallel to plane of source:

$$\phi = \frac{2}{\pi}\left[\frac{W}{\sqrt{(W^2+4D^2)}}\tan^{-1}\frac{H}{\sqrt{(W^2+4D^2)}} + \frac{H}{\sqrt{(H^2+4D^2)}}\tan^{-1}\frac{W}{\sqrt{(H^2+4D^2)}}\right]$$

where

ϕ = the configuration factor
W = width of source
H = height of source
D = the distance between source and receiver

NOTE – Formula (b) is based on radian measure.

C5
Estimating safe distance
The safe distance, i.e. the distance at which the radiant heat intensity falls below a nominated value I_r, can be determined for rectangular sources from calculations of configuration factor, or estimated from table C2, provided the source is uniformly radiating. Where this condition is not true the calculation should follow first principles.

The required configuration factor is first calculated from the equation:

$$\phi = I_r/I_o$$

To utilize table C2, the aspect ratio of source, i.e. the ratio of the shorter side to the longer side, needs to be evaluated.

The factor C is then obtained from table C2.

The 'safe distance' (the distance at which the radiant heat intensity has decreased to I_r) is calculated from the equation:

$$\text{Safe distance} = C\sqrt{A_s}$$

where

C = a dimensionless factor, obtained from table C2
A_s = the area of the source

Table C2
FACTOR 'C' FOR USE IN THE DETERMINATION OF SAFE DISTANCE

Configuration factor	*Factor C Aspect ratio*									
F	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.001	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
0.002	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
0.003	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
0.004	8.82	8.88	8.89	8.89	8.89	8.89	8.89	8.91	8.91	8.91
0.005	7.88	7.93	7.94	7.95	7.95	7.95	7.96	7.96	7.96	7.96
0.006	7.16	7.23	7.25	7.25	7.26	7.26	7.26	7.26	7.27	7.27
0.007	6.62	6.68	6.70	6.71	6.71	6.72	6.72	6.72	6.72	6.72
0.008	6.17	6.24	6.26	6.26	6.28	6.28	6.28	6.28	6.28	6.28
0.009	5.80	5.87	5.89	5.90	5.91	5.91	5.92	5.92	5.92	5.92
0.010	5.50	5.56	5.59	5.60	5.60	5.60	5.61	5.61	5.61	5.61
0.020	3.78	3.88	3.92	3.93	3.94	3.94	3.94	3.94	3.94	3.94
0.030	3.00	3.13	3.17	3.18	3.19	3.20	3.20	3.20	3.21	3.21
0.040	2.53	2.67	2.71	2.74	2.75	2.75	2.76	2.76	2.76	2.76
0.050	2.20	2.35	2.40	2.43	2.44	2.45	2.45	2.45	2.46	2.46
0.060	1.95	2.12	2.17	2.20	2.21	2.22	2.23	2.23	2.23	2.23
0.070	1.76	1.93	1.99	2.02	2.03	2.04	2.05	2.05	2.05	2.05
0.080	1.60	1.78	1.85	1.87	1.89	1.90	1.90	1.91	1.91	1.91
0.090	1.47	1.66	1.72	1.75	1.77	1.78	1.78	1.79	1.79	1.79
0.100	1.35	1.55	1.62	1.65	1.67	1.68	1.68	1.69	1.69	1.69
0.200	0.75	0.94	1.02	1.07	1.09	1.11	1.12	1.12	1.12	1.12
0.300	0.50	0.66	0.75	0.79	0.82	0.84	0.85	0.85	0.85	0.86
0.400	0.36	0.49	0.57	0.62	0.65	0.66	0.67	0.68	0.68	0.68
0.500	0.27	0.38	0.45	0.49	0.52	0.54	0.55	0.55	0.56	0.56
0.600	0.21	0.29	0.35	0.39	0.42	0.43	0.44	0.45	0.45	0.45
0.700	0.16	0.23	0.27	0.31	0.33	0.34	0.35	0.36	0.36	0.36
0.800	0.12	0.17	0.20	0.23	0.25	0.26	0.27	0.27	0.28	0.28
0.900	0.08	0.11	0.13	0.15	0.16	0.17	0.18	0.18	0.18	0.18

APPENDIX D
RECOMMENDATIONS ON INSULATION REQUIREMENTS
(See 107.3.2)

D1
NZS 1900:Chapter 5 requirements

D1.1
NZS 1900:Chapter 5 makes reference to smoke-stop doors and doors with a specified fire resistance rating. Past practice has allowed glazing to be introduced into doors with fire resistance ratings of up to 1 h on the assumption that:

(a) The doors are located in exitways
(b) No storage will take place at the doorway
(c) The wired glass will maintain integrity for 1 hour.

D1.2
The requirements of the NZS 1900:Chapter 5 (clause 5.25) relating to early fire hazard properties of linings in the exitways support this approach. However, no cognizance is currently taken in NZS 1900:Chapter 5 of the effect of radiation on people using the exitway or moving past a glazed doorway.

D1.3
Where openings are permitted in fire walls, NZS 1900:Chapter 5 requires that a fire door of the same fire resistance rating must be provided. The inference is that, where such openings do not form part of a continuous or permanent corridor, then the protection from radiation of adjacent goods and linings must be maintained. Therefore, full insulation ratings in doorsets must be achieved.

D1.4
Where such an opening in a fire wall is part of a permanent corridor system the requirements of the Bylaw with respect to the doorset are relaxed (clause 5.19.3). As the fire-rated partitions forming the passageway are clear of goods and if an exitway early fire hazard requirements for linings are enforced, it is reasonable to reduce the insulation requirements accordingly.

D1.5
An alternative approach is to define a zone of a specific area around a doorset with a reduced insulation rating, in which special conditions apply (BSCP 153:Part 4). These could prohibit storage and require restrictions on lining materials. However, such an approach, whilst satisfying fire protection requirements at the building permit stage, would be difficult to police in practice.

D1.6
Of more significance is the actual location of a door with respect to a fire floor and an exitway. Provided that a person is not prevented, either by fear of, or pain from, radiation, from crossing in front of a glazed door giving access to the exitway, then glazing should be permitted. The quantity of glazing is governed by:

(a) The radiant heat flux emitted by the door
(b) The radiant heat flux tolerated by a person passing the door
(c) The time of exposure by person passing the door
(d) The safe distance from the door available to persons passing the door.

D1.7
Also of significance is the increase in temperature of the air in a confined space such as a lobby or stair. Hot dry air up to 150 °C is about the maximum survivable temperature at which a person can breathe, but this will reduce if moisture is present.

The radiation emitted by the glazing will also heat up the wall opposite, which in time will emit heat back to the glass.

The radiant heat flux emitted by the door is measured as required by 107.4, Part 1.

Commentary D1
The probability of a fire reaching the intensity implied by the standard fire test needs to be taken into account, otherwise glazing clearances can be excessive. The probability of ever achieving this intensity is very low, particularly in sprinklered buildings, and therefore in most cases glazed areas may be larger, or safe distances may be shorter, without risk to people passing.

D2
Radiant heat tolerance

D2.1
The radiant heat flux tolerated by a person passing a door should not exceed 4 kW/m^2 for an exposure of 10 s to 20 s or 10 kW/m^2 for an exposure of 3 s. (Refer Appendix C).

D2.2
Mobility will vary from a fast walk 2 m/s to 0.2 m/s in a congested corridor. Severely handicapped people shuffle at 0.05 m/s.[3] Malhotra proposes a figure of 0.4 m/s for stairs and corridors.[4]

Using a conservative evacuation speed of 0.4 m/s a person passing a door leading to an exitway of 2 units of width (945 mm) will take only 2 s to pass any glazing in the door leaf (or 4 s for double doors).

D2.3
By limiting the radiant heat flux at the safe distance to 4 kW/m^2 an exposure time of 15 seconds may elapse before the pain threshold is reached.

This limit of 4 kW/m^2 provides a factor of safety of 2 before the blister threshold is reached. It will have a lesser influence on the increase in air temperature in the exitway than if a higher allowable radiant flux level of 8 or 10 kW/m^2 was introduced.

D3
Use of nomogram
BSCP 153 : Part 4 includes a nomogram to permit the evaluation of widths of escape routes bordered by wired glass screens (see fig. 4). The nomogram was developed using the assumption that heated 6 mm thick wired glass transmits about 50 % of radiation from a fire.[5]

As an example of the use of the nomogram consider a "worst case" of an exitway that is bordered by a double leaf doorset consisting of virtually full size glazing:

Width of glazing	2 m
Velocity of travel	0.4 m/s
Height of glazing	2 m

Find the distance a person must be away from the glazing.

For a low intensity fire (up to 60 minutes) the person must be 1100 mm from the double doorset. For a single fully glazed door leaf the distance reduces to about 400 mm.

D4
Effect of glazed doorsets
For an exitway of 2 or more units (1020 mm) of width, glazing in doors is not considered to be a problem to people evacuating a building within the first 30 minutes.

However, where glazed panels are incorporated in a fire partition alongside a glazed doorset, the combined effect of the radiation through the doorset and glazed panels must be considered in accordance with Part 2.

D5
Behaviour of building materials
Spontaneous ignition of wood, cotton, paper or other flammable materials under influence of heat radiation is only expected at a radiation intensity of greater than 30 kW/m^2. [2]

As the Early Fire Hazard Indices of materials forming exitways are restricted by the Bylaw, the problem of ignition from glazed doorways is not a significant problem. Thus, limited areas of glazing for vision panels could be permitted in all doors up to and including 3 h.

D6
Limitations in glazing in doorsets
BS 5588:Part 3 table 7, recommends limitations on glazing where fire resistance is in terms of integrity only, when installed in stairways, lobbies and corridors to office areas. The amount of glazing is dependent on the location of the doorset and is related to the number of exitways from the area served by the doorset.

D7
Recommended approach
In the absence of specific directives in the Bylaw, the following recommendations are proposed for doorsets that are required to have specific fire resistance ratings:

(a) Doorsets in firewalls (5.19.2, NZS 1900:Chapter 5)	– Insulation rating to be equal to the integrity rating
(b) Doorsets in firewalls forming part of a permanent passageway (5.19.3, NZS 1900:Chapter 5)	– Insulation rating may be waived after 0.5 h
(c) Doorsets opening into exitways (5.22.1, 5.27.2 and 5.30.1, NZS 1900:Chapter 5)	– Insulation rating may be waived
(d) Doorsets in locations subject to specific radiant heat flux design calculations	– Radiant heat flux at safe distance not to exceed 4 kW/m^2

Notwithstanding the above, vision panels in doorsets up to and including 3 h FRR may be incorporated in accordance with 108.1.3.2, Part 1.

REFERENCES

(3) Gordon, Butcher & Parnell. Designing for Fire Safety, Wiley 1983, p.214.

(4) Malhotra, H.L. Fire Safety in Buildings, Building Research Establishment Report, Department of Environment, United Kingdom, December 1986.

(5) Law, Margaret. Safe Distances from Wired Glass Screening a Fire, Instn Fire Engineers Q.29.(73) 1969, pp. 62–70.

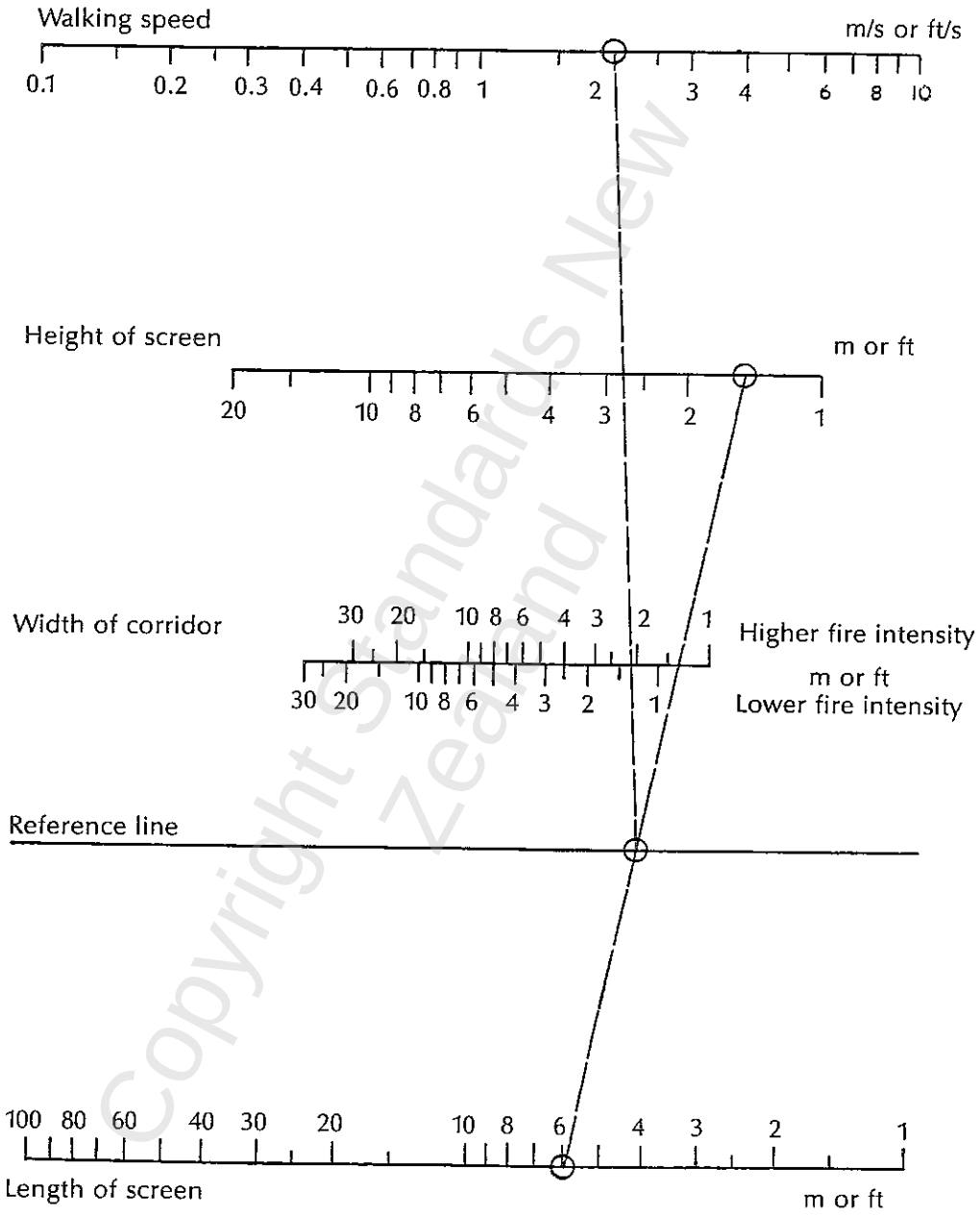

Fig. D1
NOMOGRAM FOR THE WIDTH OF AN ESCAPE ROUTE BORDERED BY A WIRED-GLASS SCREEN

NOTES

NZS 4232 : 1988

NZS 4232 : 1988

COMMITTEE REPRESENTATION

This Standard was prepared under the direction of the Building and Civil Engineering Divisional Committee (30/-) for the Standards Council established under the Standards Act 1965.

The Fire Doors and Windows Committee (42/13) was responsible for the preparation of the Standard and consisted of representatives of the following organizations:

Building Research Association of New Zealand
Insurance Council of New Zealand
Ministry of Works and Development
Municipal Association of New Zealand
New Zealand Fire Service
New Zealand Institute of Architects
New Zealand Manufacturers Federation

ACKNOWLEDGEMENT

The draft of this Standard was prepared for Associations of Fire Door and Fire Window Manufacturers by Mr J H Hunt of Morrison Cooper and Partners, Consulting Engineers and Architects of Wellington. Mr Hunt assisted the 42/13 project committee in his capacity as technical adviser to the above associations.

STANDARDS ASSOCIATION OF NEW ZEALAND

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AMENDMENTS

Date of Issue	*Description*

NEW ZEALAND STANDARD

NZS 4232:1988

Pr AA

PERFORMANCE CRITERIA FOR FIRE RESISTING CLOSURES

AMENDMENT No. 1

February 1991

EXPLANATORY NOTE – Amendment No. 1 to NZS 4232:1988 provides limits on the allowable rate of air leakage of smoke-stop doorsets and updates the list of Related Documents.

NOTE – This amendment is a consequential change arising from Amendment No. 2 to NZS 1900:Chapter 5 *Fire resisting construction and means of egress.*

To ensure receiving advice of the next amendment to NZS 4232:1988 please complete and return the amendment request form.

APPROVAL

Amendment No. 1 was approved on 15 February 1991 by the Standards Council to be an amendment to NZS 4232:1988 pursuant to the provisions of section 10 of the Standards Act 1988.

(Amendment No. 1, February, 1991)

RELATED DOCUMENTS

NEW ZEALAND STANDARDS

Delete NZMP 9:1987 and **substitute** "NZMP 9:- - -".

AUSTRALIAN STANDARDS

Delete AS 1530:Part 4:1985 and **substitute** "AS 1530:Part 4:1990".

BRITISH STANDARDS

Add "BS 476:Part 20:1987 Method for determination of the fire resistance of elements of construction (general principles)".

(Amendment No. 1, February, 1991)

105
DEFINITIONS

105.1
STANDARD FIRE RESISTANCE TEST. **Delete** the reference to BS 476:Part 8 and **substitute** "BS 476:Part 22".

(Amendment No. 1, February, 1991)

107.3.1.2
Additional integrity observations. **Delete** reference to 1.4.4. of BS 476:Part 8 and **substitute** "6.4.2.3 of BS 476:Part 20".

(Amendment No. 1, February, 1991)

110
SMOKE STOPPING

110.1
General
Add "When so evaluated smoke stopping doorsets shall have a leakage level of not more than 16 $m^3/h/m$ of the leakage path at the maximum pressure of 100 Pa".

C110.1
Delete the second sentence "However it should also be noted that the Bylaw does not lay down limits on the allowable rate of airflows as measured by the above test."

Delete "Recommendation" at end of C110.1.

(Amendment No. 1, February, 1991)

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NZS 4232 : 1988
Amendment No. 1

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