Northern Ireland Fire & Rescue Service

FIRE SAFETY LEGISLATION ADVICE NOTE 006

Calculating Occupancy in Places of Assembly

Version 2 - 20 December 2022

The purpose of this advice note is to assist fire risk assessors in the calculation of the maximum occupant capacity when preparing a fire risk assessment for an indoor place of assembly. This is an element of fire safety law that is often misunderstood.

Overview

Northern Ireland Fire & Rescue Service (NIFRS) is the enforcing authority for fire safety in places of assembly as defined by The Fire and Rescue Services (Northern Ireland) Order 2006 and The Fire Safety Regulations (Northern Ireland) 2010.

The duty holder is legally required to ensure a fire risk assessment is prepared in advance of occupation of the premises. Thereafter, the fire risk assessment must be reviewed regularly to keep it up-to-date, or if there is reason to suspect it may no longer be valid, or if there has been a significant change to the premises or working practices.

The information that must be recorded in the fire risk assessment are the significant findings, the persons who may be especially at risk from fire, and the measures which have been (or will be) taken in order to reduce the risk to as low as reasonably practicable.

It is important that in the event of a fire or other emergency, people are able to escape to a place of safety in an appropriate period of time. The time available for escape depends on several factors including the distance that has to be travelled to reach a place of safety and the risk rating of the premises. Established reasonable escape times are 2 minutes for higher risk premises, 2.5 minutes for normal risk premises and 3 minutes for lower risk premises.

In advance of occupation, it will be necessary to determine the maximum number of people that are safe to be in the building (or part thereof), which is referred to as the "maximum occupant capacity". Then, when the building (or part thereof) is occupied, the duty holder must ensure that the number of people permitted to enter does not exceed the maximum occupant capacity.

This is an essential consideration for managers of premises who wish to provide entertainment and require a licence or other authorisation from a licensing authority such as your local council.

This note is limited to only providing advice on the maximum occupant capacity. The other aspects that also require consideration are detailed in technical guides and templates which are available in the Business Safety Advice section of www.nifrs.org. The guides and templates specific to places of assembly include:

- Fire Safety Risk Assessment Small and Medium Places of Assembly (March 2013)
- Fire Safety Risk Assessment Large Places of Assembly (April 2017)
- Fire Safety Risk Assessment Template for Simple Premises

Fire Safety Risk Assessment Guides

The fire safety risk assessment guides are part of a series of twelve guides that cover different types of premises depending on their use. They explain what a fire risk assessment is and how you might go about it. The fire risk assessment should be the foundation for all fire precautions in your premises. The guides also include further guidance on fire precautions that will help when preparing the fire risk assessment or when you are reviewing your precautions.

The small and medium places of assembly guide is intended for premises were the main use of the building, or part of the building, is as a small (i.e. premises accommodating up to 60 people) or a medium (i.e. premises accommodating up to 300 people) place of assembly. These include: public houses; clubs; dance halls/schools; village halls; community centres;

churches; other places of religious worship or study and associated premises; temporary structures and marquees/tents.

The large places of assembly guide is intended for premises where the main use of the building, or part of the building, is a large place of assembly (i.e. premises where more than 300 people could gather). These include: sports stadia; exhibition and conference centres; leisure centres; swimming pools; large nightclubs and large pubs; churches; cathedrals; other places of religious worship or study and associated premises; museums; libraries; common areas of shopping malls; large temporary structures; marquees; tents; air-supported structures; large community centres; large village halls and similar premises.

Fire Risk Assessment Template for Simple Premises

This template will assist small businesses in completing a fire safety risk assessment. It is suitable for use in simple premises, with a simple internal layout and small numbers of people present. For more complicated premises, a more comprehensive risk assessment will be required. Anyone preparing a fire risk assessment must be competent to do so.

Legal Requirements

The legal requirements in relation to Means of Escape are specified by Regulation 13 of The Fire Safety Regulations (Northern Ireland) 2010 which states:

Means of escape

13.—(1) Where necessary in order to ensure the safety of relevant persons in respect of harm caused by fire, the person with duties under Article 25 or 26 shall ensure that routes to emergency exits from relevant premises and the exits themselves are kept free from obstruction at all times.

(2) The following requirements shall be complied with in respect of relevant premises where necessary (whether due to the features of the relevant premises, the activity carried on there, any hazard present or any other relevant circumstances) in order to ensure the safety of relevant persons in respect of harm caused by fire:–

(a) emergency routes and exits shall lead as directly as possible to a safe area beyond the relevant premises;

(b) in the event of danger from fire, it shall be possible for persons to evacuate the relevant premises as quickly and as safely as possible;

(c) the number, distribution and dimensions of emergency routes and exits shall be adequate having regard to the use of, equipment contained in, and the dimensions of the relevant premises and the maximum number of persons who may be present there at any one time;

(d) emergency doors shall open in the direction of escape;

(e) sliding or revolving doors shall not be used for exits specifically intended as emergency exits;

(f) emergency doors shall not be so locked or fastened that they cannot be easily and immediately opened by any person who may require to use them in an emergency;

(g) emergency routes and exits shall be indicated by signs; and

(h) emergency routes and exits requiring illumination shall be provided with emergency lighting of adequate intensity in the case of failure of their normal lighting.

In order to comply with Regulation 13(2)(c), it will be necessary to calculate and confirm the maximum occupant capacity when carrying out the fire risk assessment.

Calculating the Maximum Occupant Capacity

Modern fire safety law and the guidance published to support it, has been shaped over many years following consideration of previous tragedies to help prevent them in the future.

To comply with Regulation 13(2)(c), the maximum occupant capacity should be calculated using current guidance, regardless of when a building was constructed. The existing dimensions of the premises will need to be considered when assessing the means of escape.

The maximum occupant capacity will be the lesser number of people who can either:

- safely occupy an area, calculated by using floor space factors; or
- safely escape from an area, calculated by using the width and capacity of exit routes.

The methodology described in this advice note is a summary of the methodology described in the fire risk assessment guides for places of assembly.

The reason for describing this methodology is because these guides were published to directly support The Fire and Rescue Services (Northern Ireland) Order 2006 and The Fire Safety

Regulations (Northern Ireland) 2010. Therefore if you follow this methodology, you will be able to demonstrate legal compliance.

There is no obligation to follow the methodology described in the fire risk assessment guides provided you are able to show how you have complied in some other way. Two alternative methodologies that you could use are described in:

- Technical Booklet E - Fire Safety (October 2012), or
- BS 9999:2017, BSI Standards Publication, Fire safety in the design, management and use of buildings - Code of practice.

Technical Booklet E is published by the Department of Finance to support the Building Regulations and is freely available at:

https://www.finance-ni.gov.uk/articles/building-regulations-technical-booklets

BS 9999 is published by the British Standards Institute and is widely available for purchase.

The methodology you choose to use will need to be clearly stated in the fire risk assessment with the associated calculations to enable NIFRS (or a licensing authority) to assess its' suitability.

Each methodology is a simple step-by-step process. Measurements will need to be taken to confirm door widths, exit widths and the room dimensions so that capacities and floor areas can be calculated.

Methodology

The methodology described overleaf signposts to relevant section of the Fire Safety Risk Assessment Small and Medium Places of Assembly Guide, which should be consulted to gain an understanding of the context around each step of the process.

In large places of assembly, the exact same methodology is described in the Fire Safety Risk Assessment Large Places of Assembly Guide.

The methodology and working examples are detailed in the following sections to assist:

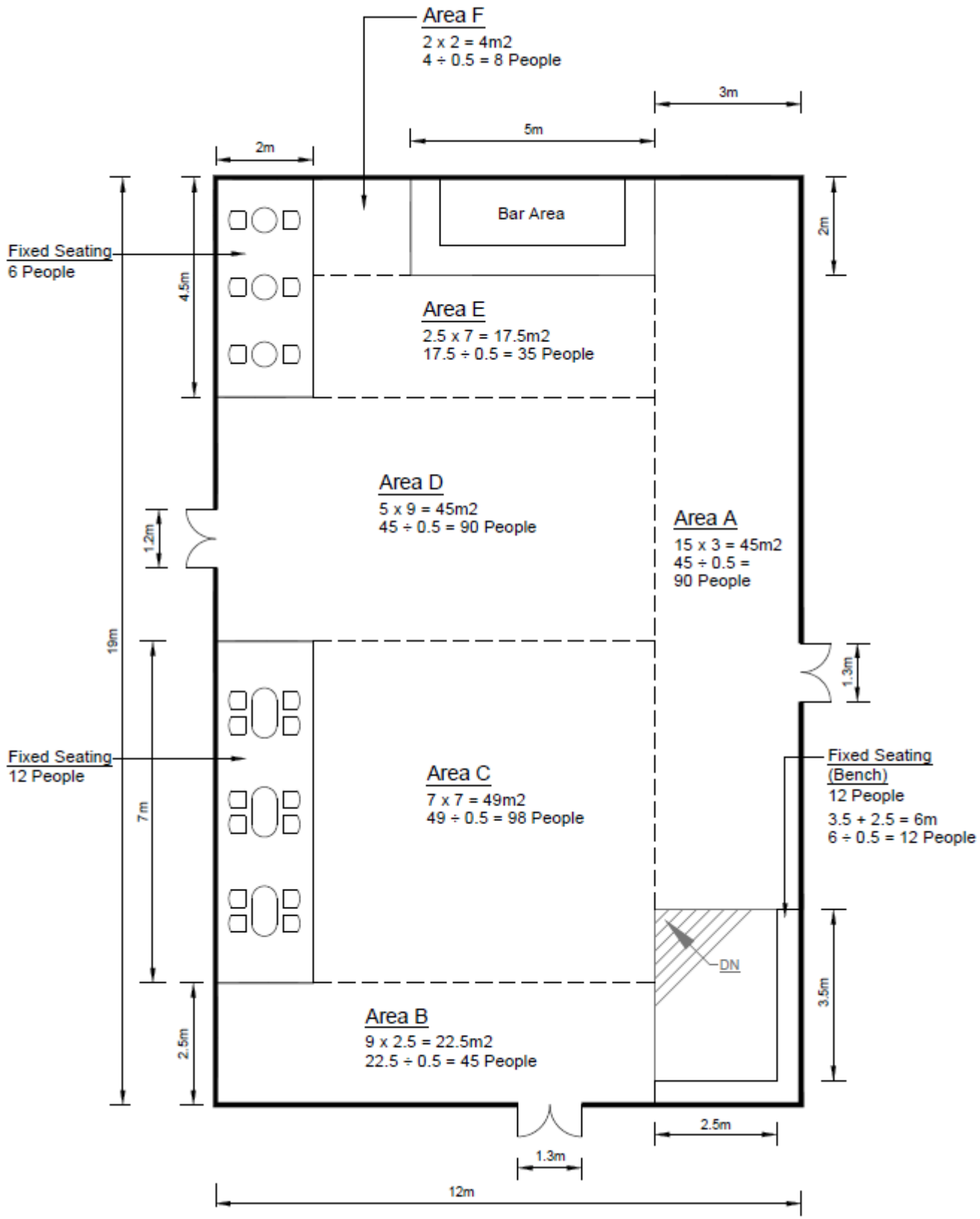
- Table 1 - Methodology
- Example 1 - Floor Plan with 3 Final Exits to External Air
- Example 1 - Calculations
- Example 2 - Floor Plan with 2 Final Exits to External Air
- Example 2 - Calculations
- Appendix 1 - Floor Space Factors
- Appendix 2 - Measuring the Width of a Doorway
- Appendix 3 - Widths and Capacity of Escape Routes and Stairways

Table 1 - Methodology

No.	Step	Fire Safety Risk Assessment Small and Medium Places of Assembly (March 2013)
1	Determine level of risk for premises.	Page 73.
2	Determine floor space factor.	Page 77. (See Appendix 1 of this note)
3	Calculate the area(s) proposed for entertainment.	See Examples 1 and 2.
4	Calculate the occupant capacity by dividing the floor area by the floor space factor and considering fixed seating, etc.	See Examples 1 and 2.
5	Determine minimum number of escape routes and exits required, taking maximum travel distances into consideration.	Page 29. Page 74. Pages 80 to 82. Page 81, Table 2. (See Appendix 2 of this note)
6	Determine width of available escape route(s) and storey exit(s).	Pages 79 to 80.
7	Discount largest storey exit.	Page 29. Page 80.
8	Confirm remaining door widths (available exit capacity after discounting) are suitable for the occupant capacity.	Page 29. Page 80.
9	Confirm that fastenings on doors are suitable	Page 29. Page 99 to 100. Appendix B3.
10	Confirm direction of opening of doors	Page 29. Page 74.
11	Where applicable determine width of escape stairway(s) are appropriate.	Page 80.
12	Provide a summary of results.	

Two examples are provided on the following pages.

Example 1 - Floor Plan with 3 Final Exits to External Air



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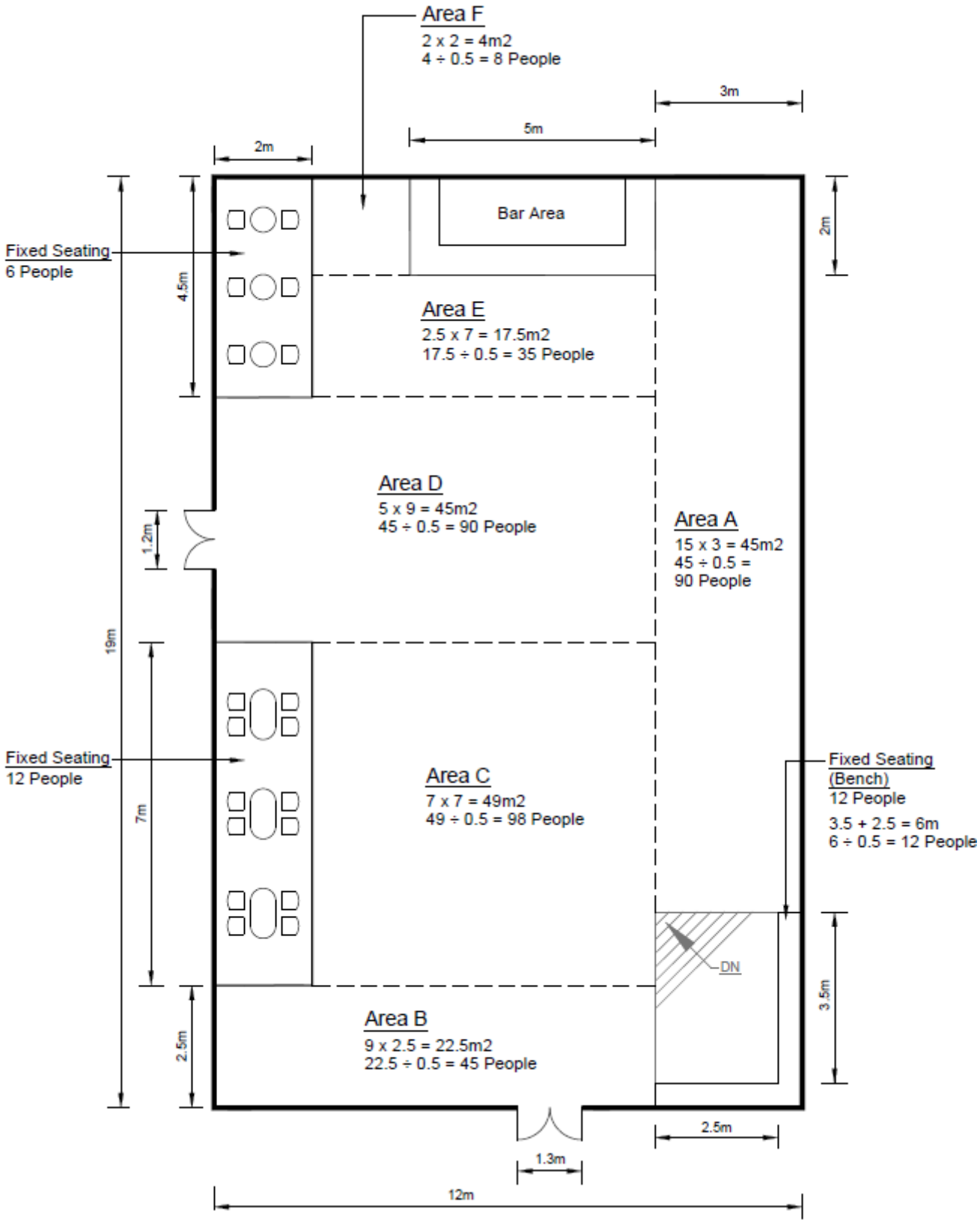
Example 1 - Calculations

No.	Step	Calculation
1	Determine level of risk for premises.	Normal.
2	Determine floor space factor.	Bar = 0.5m² per person
3	Calculate the area(s) proposed for entertainment.	Area A = 15 x 3 = 45m² Area B = 9 x 2.5 = 22.5m² Area C = 7 x 7 = 49m² Area D = 5 x 9 = 45m² Area E = 2.5 x 7 = 17.5m² Area F = 2 x 2 = 4m² Total Area = 183m²
4	Calculate the occupant capacity by dividing the floor area by the floor space factor and considering fixed seating, etc.	Floor Area 183m² / 0.5m² = **366** people. Fixed Seating = 6 + 12 + 12 = **30** people. Staff in Bar Area = **5** people. Total = 366 + 30 + 5 = **401** people.
5	Determine minimum number of escape routes and exits required, taking maximum travel distances into consideration.	For 401 people minimum of **2** exits required therefore complies.
6	Determine width of available escape route(s) and storey exit(s).	Available: 1 x 1.2 m exits, and 2 x 1.3 m exits.
7	Discount largest storey exit.	After largest storey exit discounted: 1 x 1.2 m exits, and 1 x 1.3 m exits.

No.	Step	Calculation
8	Confirm remaining door widths (available exit capacity after discounting) are suitable for the occupant capacity.	1.2m exit calculation: 1050mm door = 200 people and for every additional 75mm another 15 people 1200 - 1050 = 150mm 150 / 75 = 2 2 x 15 = 30 200 + 30 = 230 people 1.2m exit suitable for **230** people 1.3m exit calculation: 1050mm door = 200 people and for every additional 75mm another 15 people. 1300 - 1050 = 250mm 250 / 75 = 3.33 Rounding down to 3 3 x 15 = 45 200 + 45 = 245 people 1.3m exit suitable for **245** people 230 + 245 = 475 Total of **475** people. Therefore, the remaining door widths are suitable for an occupant capacity of **401** people.
9	Confirm that fastenings on doors are suitable	More than 60 people therefore doors are to be free from fastening or fitted with panic fastening in accordance with BSEN 1125.
10	Confirm direction of opening of doors	More than 60 people therefore doors to open outward.
11	Where applicable determine width of escape stairway(s).	Not applicable in this example.

No.	Step	Calculation
12	Provide a summary of results.	• Maximum Occupant Capacity = **401** people. • Doors on final exits are to be free from fastening or fitted with panic fastening in accordance with BSEN 1125 or BS EN 179. • Doors on final exits to open outward.

Example 2 - Floor Plan with 2 Final Exits to External Air



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Example 2 - Calculations

No.	Step	Calculation
1	Determine level of risk for premises.	Normal.
2	Determine floor space factor.	Bar = 0.5m² per person
3	Calculate the area(s) proposed for entertainment.	Area A = 15 x 3 = 45m² Area B = 9 x 2.5 = 22.5m² Area C = 7 x 7 = 49m² Area D = 5 x 9 = 45m² Area E = 2.5 x 7 = 17.5m² Area F = 2 x 2 = 4m² Total Area = 183m²
4	Calculate the occupant capacity by dividing the floor area by the floor space factor and considering fixed seating, etc.	Floor Area 183m² / 0.5m² = **366** people. Fixed Seating = 6 + 12 + 12 = **30** people. Staff in Bar Area = **5** people Total = 366 + 30 + 5 = **401** people.
5	Determine minimum number of escape routes and exits required, taking maximum travel distances into consideration.	For 401 people minimum of **2** exits required therefore complies.
6	Determine width of available escape route(s) and storey exit(s).	Available: 1 x 1.2 m exit. 1 x 1.3 m exit.
7	Discount largest storey exit.	After largest storey exit discounted: 1 x 1.2 m exit.
8	Confirm remaining door widths (available exit capacity after discounting) are suitable for the occupant capacity.	1.2m exit calculation: 1050mm door = 200 people and for every additional 75mm another 15 people 1200 - 1050 = 150mm 150 / 75 = 2 2 x 15 = 30 200 + 30 = 230 people 1.2m exit suitable for **230** people To accommodate more people additional exit capacity would be required.
9	Confirm that fastenings on doors are suitable	More than 60 people therefore doors are to be free from fastening or fitted with panic fastening in accordance with BSEN 1125 or BS EN 179.
10	Confirm direction of opening of doors	More than 60 people therefore doors to open outward.

No.	Step	Calculation
11	Where applicable determine width of escape stairway(s).	Not applicable in this example.
12	Provide a summary of results.	• Maximum Occupant Capacity = **230** people. • Doors are to be free from fastening or fitted with panic fastening in accordance with BSEN 1125. • Doors to open outward.

Appendix 1 - Floor Space Factors

This table has been extracted from Technical Booklet E, Table 2.2.

Item	Type of accommodation [1][2]	Floor space factor m^2 per person
1	Standing spectator areas	0.3
2	Amusement arcade, assembly hall (including a general purpose place of assembly), bar (including a lounge bar), bingo hall, dance floor or hall, club, crush hall, venue for pop concert and similar events, queuing area	0.5
3	Concourse (other than in a shopping complex)[3]	0.75
4	Committee room, common room, conference room, dining room, licensed betting office (public area), lounge (other than a lounge bar), meeting room, reading room, restaurant, staff room, waiting room	1.0[4]
5	Exhibition hall	1.5
6	Shop sales area[5],skating rink	2.0
7	Art gallery, dormitory, factory production area, office (open-plan exceeding 60 m^2), workshop	5.0
8	Kitchen, library, office (other than in item 7 above), shop sales area[6]	7.0
9	Bedroom or study-bedroom	8.0
10	Bed-sitting room, billiards room	10.0
11	Storage and warehouse accommodation	10.0
12	Car park	Two people per parking space

Notes:

(1) Where accommodation is not directly covered by the descriptions given, a reasonable value based on a similar use may be selected.

(2) If there is to be mixed use, the most onerous factor should be applied.

(3) Refer to Section 4 of BS 5588-10 for detailed guidance on the calculation of occupancy and means of escape in common areas in shopping complexes.

(4) Alternatively, the occupant capacity may be taken as the number of fixed seats provided, if the occupants will normally be seated.

(5) Shops, other than those included under item 8, including – supermarkets and department stores (all sales areas), shops for personal services such as hairdressing and shops for the delivery or collection of goods for cleaning, repair or other treatment or for members of the public themselves carrying out such cleaning, repair or other treatment.

(6) Shops, excluding those in covered shopping complexes and department stores, trading predominantly in furniture, floor coverings, cycles, perambulators, large domestic appliances or other bulky goods, or trading on a wholesale self-selection basis (cash and carry).

Additional considerations:

> For bench seats or similar continuous seating, divide the total width of such seating by 500mm to calculate the occupant capacity.

> In Note 3 above, BS 5588-10 has since been withdrawn and replaced by BS 9999.

Appendix 2 - Measuring the Width of a Doorway

The width of a doorway should be measured as the clear width when the door is open as shown in Figure 1 below.

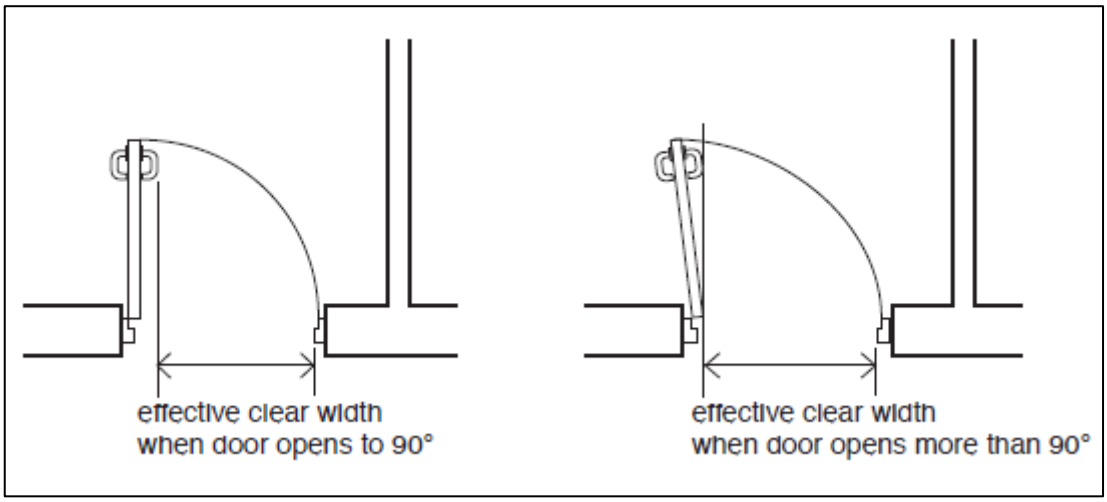

Figure 1 - Width of Doorway (Source - Technical Booklet E, Diagram B.6)

Appendix 3 - Widths and Capacity of Escape Routes and Stairways

Source: Fire Safety Risk Assessment Guides, Section 4 - Further Guidance on Escape Routes

Exit width (mm)	Maximum Number Of People		
	Higher Risk	Normal Risk*	Lower Risk
Below 750	4	4	4
750 to 1049	80	100	120
1050 to 1124	160	200	240
1125 to 1199	175	215	255
1200 to 1274	190	230	270
1275 to 1349	205	245	295
1350 to 1424	220	260	310
1425 to 1499	235	275	325
1500 to 1574	250	290	340
1575 to 1649	265	305	355
1650 to 1724	280	320	370
1725 to 1799	295	335	385
1800 to 1874	310	350	400
1875 to 1949	325	365	415
1950 to 2024	340	380	430
2025 to 2099	355	395	445
Over 2100	75mm for every additional 15 persons (or part of 15)	75mm for every additional 15 persons (or part of 15)	75mm for every additional 15 persons (or part of 15)

*In most cases, the risk will usually be ‘Normal’.

Further Information & Guidance

Further information and guidance about this advice can be obtained from:

Group Commander (Protection)

NIFRS Headquarters

1 Seymour Street | Lisburn | BT27 4SX

T 028 9266 4221

E protection@nifrs.org