FACT SHEET

# CALCULATING OCCUPANT LOAD

The design of a building's egress system—that is, the ways out of a building—is critical to ensuring everybody can safely evacuate in the event of a fire. To determine how many exits are required, how wide they have to be, and the anticipated number of people in the building, *the occupant load* needs to be estimated. This fact sheet uses an example to illustrate the method for determining occupant load based on NFPA 101®, *Life Safety Code*®.

## CALCULATION EXAMPLE (Imperial measurements)

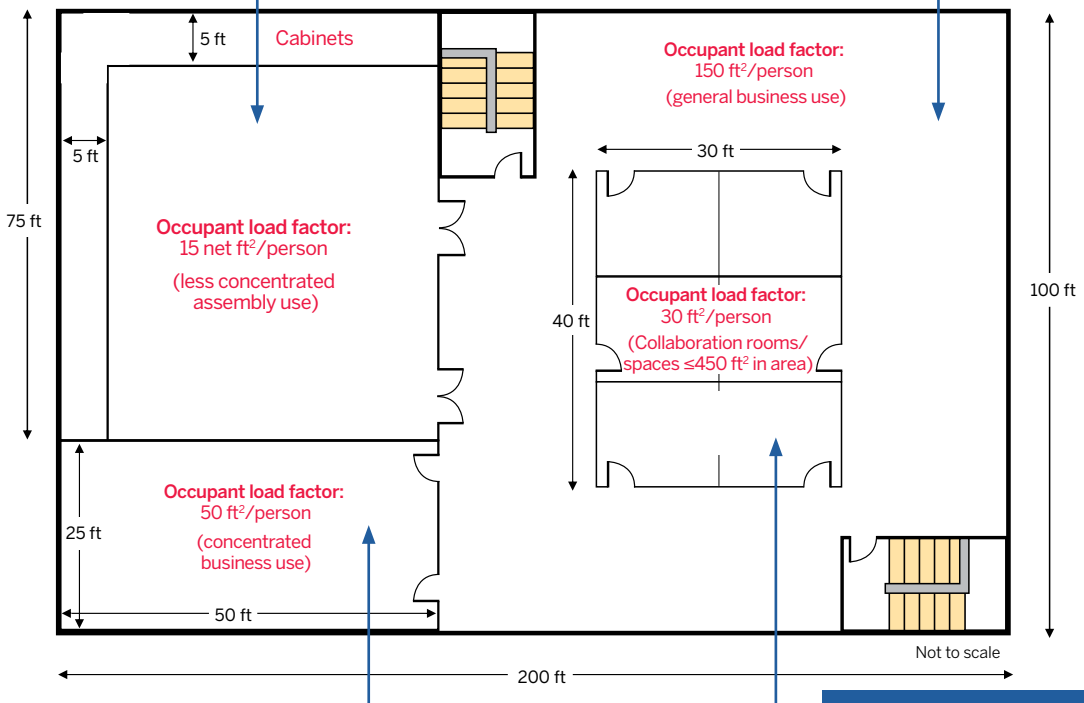
The floor plan below shows an example of occupant load calculations for several types of rooms commonly found in an office. The occupant load factors used for each room come from Table 7.3.1.2 in NFPA 101.

**CONFERENCE ROOM**

Subtract cabinets: (75 ft – 5 ft) x (50 ft – 5 ft) = 70 ft x 45 ft
70 ft x 45 ft = 3,150 ft²
3,150 ft²/15 ft² per person = 210 people

**OPEN OFFICE**

100 ft x 150 ft = 15,000 ft²
Subtract small meeting rooms: 15,000 ft² – (30 ft x 40 ft) = 13,800 ft²
13,800 ft²/150 ft² per person = 92 people




| TOTAL OCCUPANT LOAD OF FLOOR: | |
|---|---|
| Conference room | 210 |
| Call center | 25 |
| Open office | 92 |
| Small meeting rooms | 42 |
| **Total** | **369** |

**CALL CENTER**

50 ft x 25 ft = 1,250 ft²
1,250 ft²/50 ft² per person = 25 people

**SMALL MEETING ROOMS**

40 ft x 30 ft = 1,200 ft²/6 rooms = 200 ft² per room
200 ft²/30 ft² per person = 6.66 people
round up: 7 people per room
7 x 6 = 42 people

# CALCULATING OCCUPANT LOAD *CONTINUED*

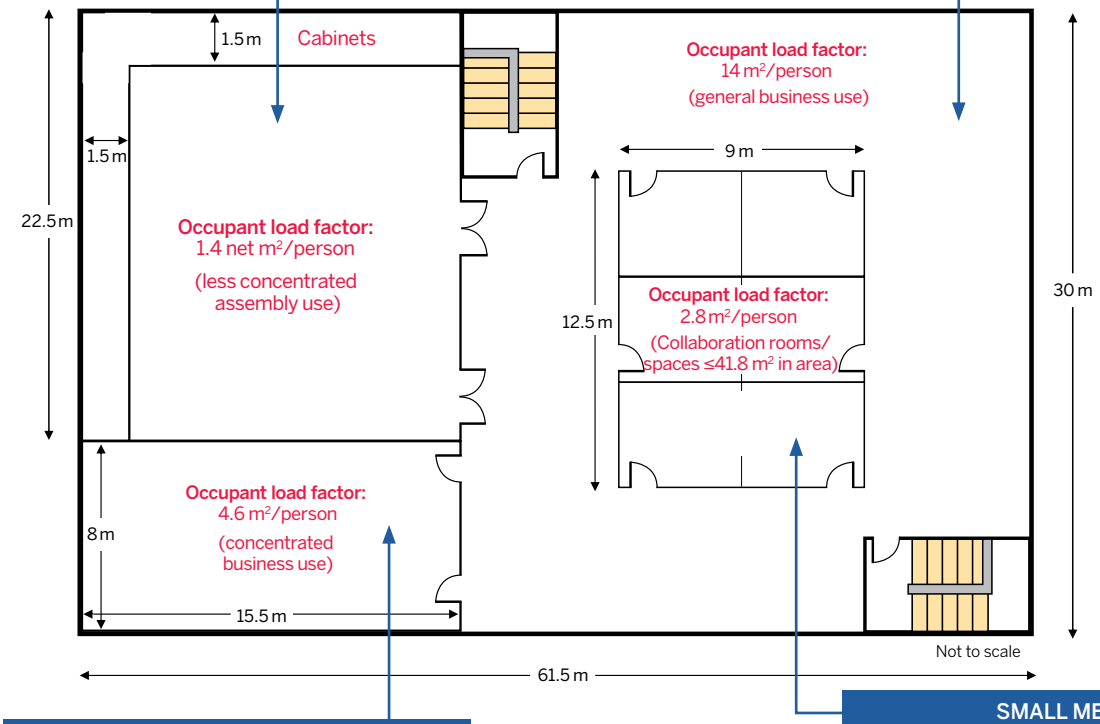
## CALCULATION EXAMPLE (Metric measurements)

**CONFERENCE ROOM**

Subtract cabinets: (22.5 m - 1.5 m) x (15.5 m - 1.5 m)= 21 m x 14 m
21 m x 14 m = 294 $m^2$
294 $m^2$ / 1.4 $m^2$ per person = 210 people

**OPEN OFFICE**

30 m x 46 m = 1380 $m^2$
1380 $m^2$ - (12.5 m X 9 m) = 1267.5 $m^2$
1267.5 $m^2$ / 14 $m^2$ per person = 91 people




**TOTAL OCCUPANT LOAD OF FLOOR:**

| | |
|---|---|
| Conference room | 210 |
| Call center | 27 |
| Open office | 91 |
| Small meeting rooms | 42 |
| **Total** | **370** |

**CALL CENTER**

8 m X 15.5 m = 124 $m^2$
124 $m^2$ / 4.6 $m^2$ per person = 27 people

**SMALL MEETING ROOMS**

12.5 m X 9 m = 112.5 $m^2$ / 6 = 18.75 $m^2$ per room
18.75 $m^2$ / 2.8 $m^2$ = 6.70 people
round up: 7 people per room
7 x 6 = 42 people

## EGRESS CAPACITY VS. OCCUPANT LOAD

**Egress Capacity:** The number of people for which the egress system is credited. Egress capacity is calculated based on the available width of egress components (doors, stairs, corridors, walkways, etc.). Further requirements in Chapter 7 of NFPA 101 provide the details for calculating egress capacity of the space.

**Occupant Load:** The total number of people that might occupy a building or space at any one time. The occupant load reflects the maximum number of people anticipated to occupy the building rooms or spaces at any given time and under all possible situations. The occupant load is the greater of either the calculated value OR the maximum probable number of people expected in the space.

# CALCULATING OCCUPANT LOAD *CONTINUED*

## FREQUENTLY ASKED QUESTIONS

**Q: Is the calculated occupant load the maximum number of people allowed in an occupancy?**

**A:** Not necessarily. The calculated occupant load is the *minimum* number of people for which the number and capacity of means of egress must be provided. A building can be occupied by as many people for whom there are sufficient egress routes as required by the code. Occupant load is the calculated number of people, or the maximum probable number, whichever is greater.

**Q: What is the difference between a net and a gross occupant load factor?**

**A:** A gross factor is applied to the entire floor area, including the area occupied by interior walls, corridors, columns, fixed furnishings, shafts, and the like. A net factor is applied only to the floor area available for use, excluding the aforementioned areas.

**Q: How is occupant load determined when a building has areas used for different purposes, such as a multipurpose room?**

**A:** Occupant load is based on how areas are used and not on the building's occupancy classification. On one day, a multipurpose room might be set up with tables and chairs for dining. This arrangement is typically considered to be a less-concentrated assembly use and the occupant load factor of 15 $ft^2$ (1.4 $m^2$)/person (net) applies. On another day, the tables might be removed and rows of chairs set up for a presentation. This is typically considered to be a concentrated assembly use and the factor of 7 $ft^2$ (0.65 $m^2$)/person (net) applies.

For the purpose of determining the required number and capacity of means of egress, the occupant load is based on the worst-case scenario—in this example, the rows of chairs, which yield the greater occupant load. A room like this might have a maximum occupancy sign with two limits: one for when the room is arranged with tables and chairs (to ensure that the required aisle accessways between tables are maintained) and another for rows of chairs.

**Q: Can it be assumed that people will not be in two places at once? For example, in a school with a cafeteria, students are either in classrooms or in the cafeteria. Aren't we counting them twice if we have to provide egress for the calculated number of people in the classrooms and in the cafeteria simultaneously?**

**A:** Once a building is designed and built, it is very difficult to control how it will be used over its lifetime. Remember, building and life safety codes prescribe *minimum* requirements for safety; providing adequate egress facilities is critical and is not an area in which to cut corners.

While it's true that students can't be in two places at once, a school could use the cafeteria for some other purpose during school hours (e.g., a local polling place). An authority having jurisdiction might judge that a highly controlled facility, such as a prison, will never have a fully occupied dining hall while the cells are fully occupied. The code would permit the authority having jurisdiction (AHJ) to adjust the occupant load accordingly using the provisions for equivalency in Section 1.4 of NFPA 101.

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