



## Fire Marshal's Offices

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# **Excel Automated Fire Flow Worksheet Instructions**

## **1. Scope**

The following lists the procedure for determining required fire-flows using the Excel spreadsheet located on the TVF&R website. The calculations are derived from the 2003 IFC Appendix B as amended by TVF&R Fire Prevention Ordinance 04-01.

## **2. Definitions**

- A. Fire Area is the floor area used to determine the required fire flow (sq ft).
- B. Occupancy Hazard is the degree of fire hazard for a particular business or building use. This is related to the amount of available fuel and the intensity of the fire.
- C. Fire Flow is the flow rate of water supply available for fire fighting measured at 20 psi residual pressure.
  - 1. Applicable fire flow is maximum amount of water flow the fire department resources can produce (3,000 GPM). It also describes the acceptable levels of loss the fire district is willing to occur in a single fire.
  - 2. Required fire flow is calculated water flow required to fight a fire in a specific building and occupancy hazard (GPM).

## **3. Modifications to Required Fire Flow**

The Fire Marshal may reduce fire flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical. The fire flow requirements may be increased where conditions indicate an unusual susceptibility to group fires or conflagrations. A modification shall not be more than twice that required for the building under consideration.

## **4. Fire Area**

### A. General:

The fire area shall be the total floor area of all floor levels within the exterior walls and under the horizontal projections of the roof of a building, except as modified in this section.

### B. Area Separation:

Portions of buildings separated by fire walls without openings constructed in accordance with the Oregon Structural Specialty Code may be considered as separate fire areas for determining the required fire flow.

### C. Type IA and Type IB Construction:

The fire area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

### D. Open Parking Garages:

Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

## **5. General Building Information**

- a. Complete the building information.
- b. Choose a construction type from the drop down list.
- c. Enter Total Bldg and Fire Area (see definitions above for details)
- d. At this point the spreadsheet will automatically calculate the Bldg Fire Flow.

## 6. Occupancy Hazard (Section A)

- a. If building is a single occupancy hazard, enter total fire area in square footage under a single hazard class (see occupancy hazard factors below).
- b. If building contains multiply occupancy hazards, enter the fire area in square footage for each occupancy hazard class (see occupancy hazard factors above).
- c. The Building Fire Flow will automatically to be calculated and entered on Line A3.

<u>Occupancy Hazard</u>	<u>Multiple Factor.</u>
Light Hazard Occupancies	1.00
Ordinary Hazard (Group 1)	1.20
Ordinary Hazard (Group 2)	1.30
Extra Hazard (Group 1)	1.40
Extra Hazard (Group 2)	1.50

Example of hazard classification - The following examples represent the norm for those occupancy types. Unusual or abnormal fuel loading, combustible characteristics and potential changes in these characteristics must be considered when classifying the occupancy.

### A. Light Hazard.

Occupancies or portions of occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected. This would include occupancies having conditions similar to:

- Churches
- Clubs
- Eaves and overhangs, if combustible construction with no combustibles beneath
- Educational
- Hospitals
- Institutional
- Libraries, except large stack rooms
- Museums
- Nursing or Convalescent Homes
- Office, including Data Processing
- Residential
- Restaurant seating areas
- Theaters and Auditoriums excluding stages and prosceniums
- Unused attics.

### B. Ordinary Hazard (Group 1).

Occupancies or portions of occupancies where combustibility is low, quantity of combustibles is moderate, stock piles of combustibles do not exceed 8 ft (2.4m). and fires with moderate rates of heat release are expected. This includes occupancies having conditions similar to:

- Automobile parking garages
- Bakeries
- Beverage manufacturing
- Canneries
- Dairy products manufacturing and processing
- Electronic plants
- Glass and glass products manufacturing
- Laundries
- Restaurant service areas.

### C. Ordinary Hazard (Group 2).

Occupancies or portions of occupancies where quantity and combustibility of contents is moderate, stock piles do not exceed 12 ft (3.7m) and fires with moderate rate of heat release are expected. This includes occupancies having conditions similar to:

- Cereal mills

Chemical Plants - Ordinary  
Confectionery products  
Distilleries  
Dry cleaners  
Feed mills  
High Piled Storage-low to moderate hazard material  
Horse stables  
Leather goods manufacturing  
Libraries-large stack room areas  
Machine shops  
Metal working  
Mercantile  
Paper and pulp mills  
Paper process plants  
Piers and wharves  
Printing and publishing  
Repair garages  
Stages  
Textile manufacturing  
Tire manufacturing  
Tobacco products manufacturing  
Wood product assembly  
Wood machining.

D. Extra Hazard (Group 1)

Extra hazard occupancies or portions of occupancies where quantity and combustibility of contents is very high. These occupancies have little or no flammable or combustible liquids but may have dust, lint or other materials present which may produce severe fires. This includes occupancies having conditions similar to:

Combustible hydraulic fluid use areas  
Die casting  
High Piled Storage-moderate to high hazard material  
Metal extruding  
Plywood and particle board manufacturing  
Printing (using inks with flash points below 100°F)[37.8°C]  
Rubber reclaiming, compounding, drying, milling, vulcanizing  
Saw mills  
Textile picking, opening, blending, garnetting, carding, combining of cotton, synthetics, wool shoddy or burlap  
Upholstering with plastic foams.

E. Extra Hazard (Group 2)

These are Extra Hazard Occupancies with moderate to substantial amounts of flammable or combustible liquids or where shielding of combustibles is extensive. This includes occupancies with conditions similar to:

Asphalt saturating  
High Piled Storage-high hazard materials  
Flammable liquids spraying  
Flow coating  
Mobile Home or modular building assemblies (where finished enclosure is present and has combustible interiors)  
Open oil quenching  
Solvent cleaning  
Varnish and paint dipping

**8. Fire Hydrants Required (Section B)**

- a. The number of required fire hydrants is automatically calculated and entered here. The number of fire hydrants is calculated based on the fire flow prior to applying the reductions allowed in Section D. The actual number of required fire hydrants may be more than indicated in this section due to distance requirements.

## 9. Reduction of Fire Flow (Section C)

A. Use this section to determine the amount of reduction in fire flow to be used for Section D

- a. Residential Occupancies – The minimum required fire flow shall be permitted to be reduced by 25 percent for Group R occupancies without fire sprinklers only. **(Line C1)**
- b. Fire Protection Reductions – The total required fire flow for a building may be reduced by one of the following options. The resulting fire flow must be no less than 1500 GPM @ 20 psi residual.
  1. Flow may be reduced by 75 percent where a complete approved automatic fire extinguishing system is installed throughout the building meeting the requirements of NFPA 13. The system shall be electronically supervised and monitored by an approved central receiving station. **(Line C2)**
  2. Flow may be reduced by 25 percent where an approved automatic and manual fire alarm system is installed throughout the building meeting the requirements of NFPA 72 and is monitored by an approved central receiving station. **(Line C3)**

## 10. Required Fire Flow (Section D)

- a. Select “Yes” in the box on Line D1 if calculating for a Group R occupancy without fire sprinklers. If “Yes” is chosen, the spreadsheet will automatically reduce the fire flow by 25 percent.
- b. If applicable, select the reduction amount from the drop-down list in Line D2, as determined in Section C. (Total required fire flow listed in Line D1 or D2 shall not be less than 1,500 gpm and shall not exceed 3,000 gpm @ 20 psi, after reductions are applied).

## 11. Available Fire Flow (Section E)

Enter the available fire flow to the site as indicated by a recent hydrant flow test. The fire flow shall be the flow available at 20 psi residual.