

# **FIRE HAZARDS REGULATIONS**

**Recommendations to  
Supplement the Rules of  
the Wisconsin Industrial Commission**

Prepared by the  
Interdepartmental Committee on Fire Hazards

May 1962

To: State Agencies

From: Governor Gaylord Nelson

Subject: RECOMMENDATIONS OF INTERDEPARTMENTAL  
COMMITTEE ON FIRE HAZARDS IN STATE  
INSTITUTIONS

Date: May 10, 1962

In March 1960, I established the Interdepartmental Committee on Fire Hazards for the purpose of recommending ways to eliminate fire hazards and protect lives in State buildings and institutions.

As one phase of its activities, the committee considered standards of construction and maintenance and administrative practices relating to fire safety. The requirements of the Wisconsin Industrial Commission Codes were reviewed and requirements in addition to the Codes were recommended. These recommendations do not replace any Code requirements, but compliance with the recommendations will result in additional safeguards for both life and property. I understand that these recommendations have been reviewed and accepted by state agencies.

I am directing that all state agencies comply with the interdepartmental committee's recommendations in regard to state properties. I also encourage state agencies that set standards for county, municipal, and such private properties as nursing homes, educational institutions and hospitals, to adopt these requirements to the extent feasible.

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RECOMMENDATIONS OF INTERDEPARTMENTAL COMMITTEE  
ON FIRE HAZARDS IN STATE INSTITUTIONS

The Interdepartmental Committee on Fire Hazards in State Institutions was created for the purpose of eliminating fire hazards and building deficiencies in public and institutional properties in the State of Wisconsin.

The committee has reviewed the requirements of the Wisconsin Industrial Commission Codes and has made recommendations which are in addition to Code requirements. It is not the purpose of these recommendations to replace any Code requirements, but compliance with the recommendations will result in additional safeguards for both life and property.

It is intended that the recommendations of this committee be made applicable to state properties and to the extent feasible to county, and municipal properties including such private properties as nursing homes, educational institutions, and hospitals which are subject to state regulation.

The term *APPROVED* where used in these recommendations means approved by a recognized laboratory or governing body.

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INTERDEPARTMENTAL COMMITTEE ON FIRE HAZARDS  
IN STATE INSTITUTIONS

E. J. TERRY, Chairman  
Fire Protection Engineer  
Department of Insurance

ROBERT C. KENDALL  
Department of Administration  
Bureau of Engineering

DALE J. JENNERJOHN  
Hospital & Related Services Division  
State Board of Health

C. J. CADDELL, Buildings Engineer  
Industrial Safety & Buildings Division  
Industrial Commission

HUGH MOORE  
State Insurance Fund  
Department of Insurance

HENRY A. OLSON, Assistant Supt.,  
Related Services  
Department of Public Instruction

JOSEPH STEPHENSON  
Fire and Safety Inspector  
State Department of Public Welfare

FRED E. SCHWEHR  
Physical Facilities Specialist  
Board of Regents of State Colleges

FRED B. WILCOX  
Operations Supervisor  
Department of Buildings and Grounds

WILLIAM E. CLARK  
Supervisor Fire Service Training  
State Board of Vocational & Adult Education

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# **ADMINISTRATIVE PRACTICES**

### 1. *Evacuation and Fire Plans*

- a. The administration of the institution should develop and periodically review with the staff the prearranged, written plan for the orderly evacuation of patients, residents, children, students, as the case may be, in an emergency. The plan may contain at least the following information:
  1. What to do in case of an emergency.
  2. When the evacuation plan is to be placed in operation during a specific emergency.
  3. Where evacuation equipment is located and what routes are to be taken.
  4. How the evacuation plan is to operate and who is responsible for each phase.
  5. Why each employe is required to know his task in relation to the entire plan.
- b. The plan should be reviewed by the local fire authorities for recommendation and assistance.
- c. A copy of the approved plan should be submitted to the Department of Insurance.
- d. The following are suggestions in keeping the plan current and in good working order.
  1. Organization of a plan by shifts of adult personnel, with substitutes duly advised of the responsibilities at each station.
  2. Regular rehearsals of those responsible for the safety of those enrolled in each institution.
  3. Evacuation drills at regular intervals for those able to walk.
  4. Variation of evacuation routes to meet emergency requirements.
  5. Plans for shelter should a building be destroyed.
- e. A fire safety program should first recognize deficiencies. If there are deficiencies in utilities, the program must be stepped up to compensate for those. If water supply and distribution is inadequate it is imperative that fire be anticipated at the earliest possible moment and that the information be transmitted to emergency agencies at once. The use of smoke detectors, heat detectors, audio alarms, carbon dioxide or dry chemical total flooding systems for critical areas, and similar preventive measures should be examined.

No matter how good the preventive maintenance program, electrical devices fail and burn up. Wherever possible, this equipment should be individually fused by means of fused cord connectors or similar devices.

Some employee fire brigade action can produce favorable results in semi-fireproof buildings but might have no value in nonfire-resistive structures where all efforts are required to evacuate personnel. In setting up any type of employee fire brigade program, the availability of personnel must be figured at the minimum and conditions at the worst possible. Under no circumstances should brigade activity preclude prompt summoning of professional fire fighting equipment.

## 2. *Fire Protection Contracts with Volunteer or Local Fire Departments*

Where the institution, school or building in question is located in a city, village or township that does not have an officially established fire department, the administration should obtain and maintain a continuing contract or agreement for fire protection service with the nearest municipality providing such service. A certification of the existence of such contract or agreement should be forwarded by the administration to the Industrial Commission and the State Department of Insurance.

## 3. *Fire Inspections by Volunteer or Local Fire Departments*

The administration should arrange for quarterly inspections of the institution by the local fire departments. A record of the date of the inspection should be kept on file.

## 4. *Smoking Regulations*

In all public buildings smoking should be restricted to those areas where visual supervision can be exercised. Smoking should be prohibited in areas of assembly, corridors, and areas of assembly, corridors, and areas of extra hazard (Woodworking shops, auto body and paint shops, storage and processing areas for flammable liquids, laboratory areas in which flammable liquids are processed, etc.) All the above areas and remote storage areas (areas not constantly occupied) that cannot be supervised should be designated as "No Smoking" areas.

## 5. *Night Watchman and Inspection of the Premises*

It is recommended that each institution provide regularly scheduled patrol of all buildings for the purpose of detection of fire and maintaining security. Particular attention should be given to those times when staffing is at a minimum or buildings unoccupied.

Establishment of special duties for individuals on paper has little value unless these people are qualified and trained to assume those duties. A good watchman service can be invaluable if it is given proper recognition and adequate prestige. With that background and extensive training the services performed by watchmen are respected. The responsibilities entrusted to watchmen demands quality in personnel. Their work cannot be monitored by mechanical devices although watchmen clock systems may have other values. There must, however, be a means for determining remotely whether the watchman service is functioning as intended, whether illness or accident has incapacitated the man. This can be a scheduled telephone communication or other pre-determined signal and the reason for that check should be thoroughly understood. Although frequency of rounds is desirable in a watchman service, thoroughness is of primary importance. Better to establish three deliberately complete rounds than a hit or miss operation with six rounds.

## 6. *Combustible Decorative Materials*

All combustible decorative materials including such materials as curtains, draperies, streamers, surface coverings applied over building interior finish, and also cloth, cotton batting, straw, vines, leaves, trees (including Christmas trees and decorations thereon) and other materials, shall be rendered and maintained flame-resistant. Materials producing excess smoke or toxic fumes shall not be used.

Such materials shall be recognized as flame resistant if they will not ignite or allow a flame to spread over the surface when exposed to a match flame test. Such a test shall be applied to a sample of the material which shall be removed to a safe area for testing. The test piece shall be held vertically and its bottom edge exposed to a flame from a common match held in a horizontal position, one-half inch below the sample and at a constant location for a minimum of 15 seconds. If combustion (open flame) takes place, the material shall be deemed as non flame resistant.



# PHYSICAL PLANT

### 1. Exits, Stairways, Vertical Openings and Shaftways

Enclosure of stairways and shafts. (1) In all buildings all stairways shall be enclosed as provided in sections Ind. 51.17 or Ind. 51.18, with two-hour fire-resistive partitions as specified in Ind. 51.05, or better. (2) Every elevator shaftway, dumbwaiter shaftway, clothes chute, waste paper chute, pipe shafts and other similar vertical shafts in all buildings shall be enclosed with two-hour fire-resistive partitions, as described in section Ind. 51.05. All openings for clothes chutes, waste paper chutes, etc., shall be equipped with self-closing doors of similar rating. (3) All stairways shall exit directly to the outdoors.

### 2. Interior Finishes

Combustible interior finish walls and ceiling surfaces and adhesives shall not have a flame spread classification in excess of 25 according to the "Fire Hazard Classification of Building Materials," of the Underwriter's Laboratories, Inc., unless the building is sprinklered throughout. Materials producing excess smoke or toxic fumes shall not be used.

### 3. Fire Alarm Systems (And Other Supervisory Devices and Services)

Electrically operated and supervised Fire Alarms are required in all buildings of appreciable size, Ind. 51.24 (basic requirements), Ind. 54.16 (factories and workshops), Ind. 56.19 (Schools and other places of instruction) and Ind. 57.22 (apartment houses, hotels, hospitals and places of detention).

This is only part of the development of a basic fire safety program which must be evaluated before it is determined that the alarm system as proposed does the job which is expected. For example, the code makes no mention of office buildings, which in some institutions are the oldest and least fire resistant structures. If stairways are enclosed, the possibility of an audible alarm is reduced, and it is logical to expand the requirement of a fire alarm system to every office building over two stories in height. The volume of combustible material and the prevalence of smoking makes this even more necessary.

Ind. 51.24 allows considerable variation in design of the alarm system. To acquire an installation best suited to a particular situation it is necessary to state what is expected of the system. For a university building, combining offices, laboratories and classrooms, this is expected of the designer:

1. It must operate as soon as possible after a fire originates. This is enhanced greatly by the use of automatic detectors

in unoccupied areas and in all protected areas during off-duty hours. Rate of rise and fixed temperature thermostats shall be liberally used.

2. The warning must be imperative. One criticism concerning standard fire alarms is that they are neither loud enough nor do they ring for a long enough time. Four rounds of a coded system requires about 60 seconds. This is less than a minimum requirement where a transient or semi-transient occupancy is present and unthinkable in a housing area. In dormitories and apartment buildings the signal shall be repeated continually for a period of 10 minutes, or until manually reset. In all other buildings the alarm shall be repeated 2 to 3 minutes. Too often, silencing of the alarm is construed to mean no further danger.

To insure a loud unmistakable warning 10" diameter single stroke bells shall be used. The squawker type of signal can be confused with construction noises and other signals of a lesser degree. In no case shall the alarm signal be recessed in the walls or so shielded that the intended noise is muffled.

3. The alarm should designate the location or area of a building from which the signal originates. Critical time can be saved if the exact location of the fire can be determined before professional fire fighting personnel arrives. A coded fire alarm system shall be provided in all buildings with the following exceptions: in buildings having three floors or less (including basement) where the area is less than 5000 square feet per floor a common code can be used. An annunciator panel, in a readily accessible location, preserves the coded signal for the fire department. The size and complexity of the building will determine the need for this device.
4. Even though weekly (or more frequent) inspection and testing is performed, a fire alarm system shall be completely self-supervised. All fire alarm systems shall be *double* supervised to assure proper operation at all times. If there is any possibility of a central integration for all fire alarm signals (a remote watchman, police or fire fighting service) the control panel shall be designed for that connection.

#### 4. *Smoke and Fire Barriers and Compartmentation*

- A. The present Industrial Commission codes have adequate requirements for the separation of hazardous rooms and sections of buildings used for schools, institutions and places of detention. In unusual conditions in the event of fire, smoke or suffocating vapors which might spread throughout a large building, the following is recommended:

1. Schools - any corridor 300 or more feet in length shall be divided into sections not to exceed 300 feet in length by smoke barriers. Such smoke barriers shall be of fire-resistive construction. Doors and smoke barriers shall be of metal, metal covered or other approved type appropriate for the construction of the smoke barrier, with clear wired glass panels.

2. Hospitals and Related Facilities - in hospitals and nursing homes and other areas in which patients or persons are in detention, no more than 150 feet of corridor without barrier against the lateral tests of smoke shall be permitted, and the enforcing authority may order fire walls or smoke barriers or both to be built in a new or existing building when he finds that such fire walls or smoke barriers (of at least 1 hour rating) are necessary for the reasonable safety of the occupants of the institution. Each story in which 35 or more patients are housed shall be divided into at least two compartments by smoke barriers. Corridor door openings of smoke barriers shall not be less than 44 inches in width.

- B. Concealed spaces. Unoccupied attic spaces under roofs of combustible construction and above combustible ceilings of occupied spaces shall be subdivided by partitions to form subdivisions not to exceed 3,000 sq. ft. area in each, unless the attic is equipped with an automatic sprinkler system, or the ceiling construction beneath the attic has at least a one-hour fire resistive rating. Required partitions dividing attic spaces shall be of one-hour fire resistive construction, and any access openings therein shall be provided with closures at least equivalent to the construction of the partition.

#### 5. *Flammable Liquids and Solvent Storage*

The code is designed to regulate storage, handling and disposal of flammable fuels and solvents having low flash points and explosive features within levels of good judgment. It is the obligation of all administrators to examine this phase of their operation and correct non-conforming hazardous conditions if they exist. Although interpretation of this code is the province of Wisconsin Industrial Commission, the following information may be helpful in determining where hazardous situations exist.

1 - Flammable liquids are classified according to flash point, Class I being most hazardous with a flash point at or below 20° F., Class II above 20° F. but below 70° F. and Class III above 70° F. Commonly used flammable liquids are:

**Class I**

Acetone  
Benzol  
Carbon Bisulphide  
Collodion  
Ether  
Gasoline  
Naptha

**Class II**

Amyl Acetate  
Ethyl Acetate  
Methyl Alcohol  
Toluol

**Class III**

Amyl Alcohol  
Fuel Oil  
Kerosene  
Turpentine

2 - Limits on volumes permitted in buildings of various types of construction are set in Sec. 8.30 (4)(b) of the code. For example, apartment houses of not more than 4 dwelling units, storage other than fuel oil shall be prohibited except that which is required for maintenance or equipment operation which shall not exceed 6 gallons in metal closed containers or safety cans. <sup>1/</sup>

Assembly and office occupancies, apartment houses of more than 4 dwelling units..prohibited except that which is required for maintenance and operation of the building and operation of equipment...in closed metal containers stored in a flammable liquids storage cabinet or in safety cans of not over 5 gals. individual capacity or in specially constructed storage rooms.

Educational and institutional occupancies...limited to that required for maintenance, demonstration, treatment and laboratory work. Flammable liquids in laboratories and at other points of use shall be in containers not larger than 1 qt. or in safety cans or in storage cabinets. An acceptable rule of thumb for solvents in such use has been *not more than one days supply*. This has been modified by the Commission to allow for emergency supplies in hospitals and similar areas.

In many institutional programs the use of flammable liquids approaches industrial volumes, particularly laboratory processes of extraction. The matter of demand and supply may require specially constructed storage vaults, isolated from the main building, and particular attention to dispensing and processing areas.

3 - In allocating space, and in design of buildings and areas within buildings, close attention should be given to non-compatible occupancies and operations. The object is separation and isolation of all programs involving flammable liquids from hazards of adjacent activity, and the reverse danger of explosion or rapid spread of fire. Vapors from flammable liquids settle into lower areas and travel with air currents of ventilating systems, body movement and drafts from open doors or windows. Ordinary electrical wiring and devices furnish a source of ignition. Static electricity is always possible, particularly where transfer is made from metallic containers.

<sup>1/</sup> Safety cans are cans approved by and bearing the label of the Underwriters Laboratories or welded seam steel containers with flash screens in pouring spouts equipped with self-closing caps.

4 - Safety cans should be required wherever more than 1 qt. of solvent is needed. These are welded seam steel containers with flash screens in the pouring spout and self-closing caps. <sup>1/</sup> If purity of the product requires use of glass bottles, breakage can be minimized through use of shock insulated carrying buckets and storage racks. Storage cabinets may be used where it is desired to keep more than 10 gals. of flammable liquids inside building. No individual container should exceed 5 gals. capacity and not over 50 gals. should be stored in one cabinet. These cabinets are constructed of steel, double walled with an air space between, and fitted with substantial doors and raised sills. Openings are provided for gravity or explosion proof mechanical venting to the outside.

5 - Bulk storage in closed drums or shipping containers can be handled in two ways, specially constructed vaults as specified in an adopted standard accompanying this information, or 2 hour rated storage buildings separated from the main structure and nearby structures by 30 to 50 ft. or more. Section 8.30 (6) details this type of building. Ratings are increased as distance is reduced. The vault as specified may serve as a dispensing room. Any other storage area, if it is to serve for dispensing, should incorporate a ventilation system designed to reduce vapor concentrations below explosive limits, and the other features of the standard for vaults. Heating should be by means of hot water or steam. All drums from which Class I and Class II liquids are being drawn off should be equipped with approved relief valves. Transfer can be made by specially designed flammable liquids pumps or faucets approved for this purpose. The method of disposing a solvent with compressed air is not recommended. Emp-tied drums, if allowed to remain around the premises, should first be completely filled with water to remove all remaining explosive vapors.

6 - Processing rooms, pilot plants, high volume use laboratories and similar areas within buildings should be constructed and protected as dispensing rooms. In every instance where flammable liquids are in use there should be readily available first aid fire extinguishers of the dry chemical or carbon dioxide type. Wherever possible, work with Class I and II flammable liquids should be carried on within hoods having positive ventilation by means of fans operated by explosion proof motors. Disposal of unwanted solvents should never be to the sewer system. Drain off to a vented sump or protected area and allow to evaporate, or provide a facility for igniting and burning under controlled conditions.

7 - When remodeling or new buildings are being planned, architects must be informed of operations which involve the storage

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and use of flammable liquids so that hazards are not built into the new structure. Assistance will be given in these matters by the Safety Department of the Industrial Commission and the Department of Administration, Bureau of Engineering.

8 - Standards for storage vaults for solvents and flammable liquids:

- a. Unit should have three (3) hour fire rating: floor and roof 4" thick concrete. Separation wall between vault and main building must have three (3) hour rating.
- b. *Any opening* between main building and solvents vault should have a three (3) hour self-closing fire door. Should conform to NBFU No. 80. <sup>1/</sup>
  - (1) Doors - three (3) hour self-closing door and hardware. Sill shall be raised 6" and be liquid tight.
  - (2) Transfer grilles or ventilation ducts entering vault from adjacent building should have a *three (3) hour fire damper* which is closed by a pneumatic device actuated by the rate of rise temperature device of the CO<sub>2</sub> extinguishing system. Damper shall be a small three (3) hour fire door, or if opening or duct is less than 18" in diameter or 18" x 18" in size, a 3/8" steel plate on both sides of the wall is acceptable. The damper on the inside of the vault should be controlled by a pneumatic device actuated by the rate of rise temperature device of the CO<sub>2</sub> system. The damper outside the vault should be controlled by a fusible link device located outside the vault.
  - (3) Vent openings to the outside walls of the vault shall have a single 3/8" steel plate damper which is actuated by the rate of rise device of CO<sub>2</sub> system.
- c. *Electrical work* shall be "explosion proof" and shall conform to NBFU No. 70 and Wisconsin State Electrical Code for Hazardous Locations.
- d. *Floor drains* are not required. If they are used they should not lead directly to the municipal sewer system.
- e. *Ventilation* - Exhaust duct at floor level. Exhaust fan "explosion proof" if within vault; non-sparking wheel sufficient if located outside vault. Exhaust duct to run directly outside from vault, not through other rooms. Fan sized to change air in vault every five (5) minutes. Fan should operate continuously. Supply may be from outside or from adjacent room by transfer grille. Supply and exhaust fire dampers shall conform to Item No. 2 above. All fans should be shut off by the rate of rise temperature device of the CO<sub>2</sub> extinguishing system.

<sup>1/</sup> National Board Fire Underwriters

- f. *Heating* - shall be by direct or indirect radiation. Pipe openings should be completely filled after pipe is installed.
- g. Vault shall have a carbon dioxide fire extinguishing system that conforms to NBFU No. 12. System shall be actuated by a rate of rise temperature device (fusible link system not acceptable). The cylinders and manifold shall be protected by a cage enclosure.
9. Refrigeration units for the containment of flammable liquids.

## 6. Fire Extinguishers

### a. FIRE EXTINGUISHER REQUIREMENTS

Reference to class of occupancy in the following standard shall describe properties occupied in the following manner:

- (1) Light occupancies include those occupied as hospitals, schools, city halls or municipal buildings, office buildings, fire and police stations, dormitories, halls (including armories, auditoriums, etc.), libraries, museums and other properties similarly occupied except portions occupied as kitchens, laundries, woodworking, painting or otherwise described herein.
- (2) Ordinary occupancies include those properties or areas occupied as laundries, automobile garages with over five motor vehicles, kitchens, warehouse storage areas for groceries, etc., shoe repair shops, etc.
- (3) Extra hazardous processing occupancies includes those areas occupied as woodworking, auto body and paint shops, painting areas except water colors, flammable liquids storage and/or processing (including school laboratories of the graduate research variety which process 60 gallons or more in one day), incinerator areas and rubbish rooms.
- (4) Extra hazardous, occupancy includes prisons, reformatories and other places of detention including mental institutions.
- (5) Class "C" includes areas occupied by electrical equipment.

### b. EXTINGUISHERS - TYPE AND PLACEMENT

- (1) Light occupancy - Buildings and Areas - require one (1) unit of extinguishing capacity for each 2,500 square feet of floor area. Thus, a standard 2½ gallon soda-acid, water, etc., extinguisher is classified as a 2-A extinguisher, with two (2) units of extinguishing capacity. One 2½ gallon extinguisher may be credited with protecting 5,000 square feet of area.

The extinguisher should be so placed as to be within 100 feet of any point of the area intended to be covered. As an example, a building 9,000 square feet in area would require two (2) "A" type extinguishers - if the building were 60 x 150 feet, it is recommended that the extinguishers be placed 50 feet in from either end so that they are within easy reach.

- (2) Ordinary occupancy - Buildings and Areas - For these areas it is also recommended that the "A" type extinguisher be used, but the difference lies in coverage, since in these buildings, extinguisher requirements call for (1) unit for each 1,250 square feet of floor area. As an example, one 2½ gallon soda-acid, water, etc. which is credited with two (2) units of extinguishing credit, would cover 2,500 square feet of floor area, with a maximum travel distance of 50 feet from any point of the floor to the unit.
- (3) Extra hazardous processing class - This class includes such processes as spray painting, paint dipping, woodworking, oil storage, etc. and requires the "B" type of extinguisher. Here the carbon dioxide, dry chemical or foam type of extinguishers are recommended. The foam type is listed both as "A" and "B" and is an effective extinguisher where a combination is desired such as in connection with a woodworking shop. On the other hand, the dry type of extinguisher would not be recommended for protection against a wood fire but would be useful on fires involving flammable liquids or electrical fires.

Most of the occupancies which require "B" type extinguishers should also be protected by "A" type units, exception being a location involving "Deep Layer" fires involving flammable liquids where the "B" alone is recommended. Wherever an area is protected by both "B" and "A" type extinguishers, the "A" requirements may be reduced by fifty percent. The "B" designation qualifies the unit for coverage of 625 square feet for each unit of capacity - thus, a 2½ gallon foam is rated 2 "A" - 4 "B," and would be rated to cover 2,500 square feet.

- (4) Extra hazardous - occupancy - The presence of the soda-acid extinguisher in this classification is hazardous in that it or its components may be used in a detrimental manner.

The soda-acid type of extinguisher is therefore not to be used in prisons or correctional institutions. Instead, pressure water is highly recommended. It is also recommended that soda-acid be replaced by water in mental institutions where patients have access to the equipment.

Placement of extinguishers in these areas shall follow specifications outlined above, i.e., the dormitory, school, and recreation areas being light occupancy whereas woodworking, and other processing areas shall be treated as above.

- (5) Class "C" or electrical equipment areas - In these areas a nonconducting agent is required. This may include carbon tetrachloride, carbon dioxide or dry chemical. Of these, carbon tetrachloride is not recommended unless the extinguisher is to be operated by a qualified individual who has been trained in its use. If used in a confined space, its gas could result in the death of the operator because of its toxic effects. Carbon dioxide is effective on this class of fire. Here again, caution should be observed when using this unit in confined spaces to avoid smothering effects.

#### c. AREAS REQUIRING PROTECTION

It should be pointed out here that all occupied floors are to be protected. A basement, if not used and not usable may be disregarded as may an attic area which is not used and sealed off.

#### d. EXTINGUISHER MOUNTING

Extinguishers should be mounted on a wall or a post where they are clearly visible and at a height which is convenient (the top of the unit should be not over five feet from the floor) and within easy reach of any person qualified to use them. They should not be tied down or locked in a cabinet, nor, is it accepted practice to place them in a closet or on the floor.

#### e. EXTINGUISHER CARE

It is important that extinguishers be examined several times a year for the detection of possible injuries to the tank and hose and to make sure that the nozzle is not clogged. Once each year the extinguisher should be discharged and recharged (in many cities this work is done by the fire departments), and the unit should be tagged showing the date of this service.

#### f. ANTI-FREEZE

In areas where freezing temperatures might be expected, anti-freeze solution extinguishers should be used.

### 7. Sprinkler Protection

- a. All hospitals, children's homes, homes for the aged and infirm, nursing homes, convalescent hospitals, convalescent homes, asylums, mental hospitals, jails, and other places of abode or detention and schools or any living, boarding or care facility of nonfire-resistive construction should be protected by an approved automatic sprinkler system.

- b. Linen and trash chutes, spray paint booths, paint storage areas and combustible storage rooms, rubbish and dirty linen rooms and welding areas should have approved automatic sprinkler protection regardless of the class of construction or height of the building.

#### 8. Windows

Windows of public buildings shall be of such design as to be available for human egress. Small children shall not be kept in rooms in which the windows are at such height from the floor as to prohibit such egress unaided. As an extra safeguard, areas below windows on the outside should be kept free and unobstructed.

Every building more than one story in height, which does not have window openings directly upon the street side in each story above the first, shall be provided with suitable access for fire department use. Such access shall be a window or door opening through the wall on each floor above the first story. The opening shall be at least 36 inches in width and not less than 48 inches in height with the sill not more than 32 inches above the floor. The openings shall be so spaced that there will be at least one opening in each 100 feet of wall length of any accessible wall of the building.

This requirement for accessible openings does not apply where a building is equipped throughout with a system of automatic sprinklers, approved for fire protection purposes, or in buildings where the nature of the occupancy will not permit additional openings in outside walls.

#### 9. Ventilation

1 - All potential air passageways, such as shafts, chases, or ducts, the use of which has been discontinued, and which are not constructed in accordance with the latest requirements of the Heating, Ventilation and Air Conditioning Code requirements for ducts in new buildings, shall be completely blocked off between adjacent rooms and/or stories with material(s) accepted as having an overall fire-rating no less than that of the partition or floor through which it passes.

2 - Duct dampers which are required to be arranged to close automatically in case of fire shall also be arranged to shut down the mechanical ventilation system by an approved means such as by an approved mercury-type electrical switch.

3 - Approved fire dampers shall be provided

- a. Wherever the passing of ducts through fire walls cannot be avoided;

- b. At all other openings through fire walls which equal or exceed 20 square inches in area and are not protected by approved self-closing fire doors;
- c. Where duct systems serve two or more floors, at each point where a floor is pierced.

Ducts totally encased in, or whose walls are totally constructed of, materials approved for a 2-hour fire rating, may instead be provided with dampers at each opening in the 2-hour enclosure which equals or exceeds 20 square inches in area. Access for inspection and maintenance must be provided at all such fire dampers. (Preferable to above wording would be the pertinent requirements of NFPA bulletin 90A. Air conditioning Systems, paragraphs 120 through 137, and Appendix A, Paragraph 6. Requirements are distinguished in the bulletin from recommendations by the use of the word "shall" instead of "should." Inclusion of the pertinent parts of the bulletin's accompanying diagrams is also recommended.)

4 - Each ventilation system shall be equipped with a manual emergency stop, located at an approved location conveniently accessible during fire. In systems utilizing re-circulation, and in exhaust systems, serving more than one story of a building, or more than one fire section of a single story, fans shall be arranged to be shut down automatically when the temperature in the duct reaches 125° at an approved thermostatic device located in the return air duct ahead of the fresh air intake. Restarting the fan shall be possible only by manual act.

#### 10. Construction Standards

1. Fire-resistiveness. All buildings of two or more stories should be of fire-resistive construction as specified in the Wisconsin state building code, order no. 5100.

2. Fire-resistive enclosures. All boiler and furnace rooms, including fuel rooms and breeching, all laundries, drying rooms, carpenter shops, paint shops and other hazardous work rooms and storage rooms, should be enclosed with four-hour fire-resistive enclosures and all openings should be protected by Class A fire doors.

3. Vertical openings and shaftways, 2 stories or more. It is recommended that every vertical opening and shaftway in buildings two stories or more in height be enclosed with two-hour fire-resistive partitions, and provided with self-closing doors of equivalent two-hour resistive construction.

4. Vertical openings and shaftways, one story. It is recommended that all vertical openings and shaftways in one-story buildings with basements be of one-hour fire-resistive construction and provided with self-closing doors of equivalent fire protection.

5. Doorways — minimum width. Doorways for all patient bedrooms, treatment rooms, surgical and delivery rooms, labor rooms and solaria should be at least 3 feet 8 inches in width, preferably 3 feet 10 inches.
6. Doors — toilet room. Small private toilet rooms adjoining patient bedrooms should have the door opening in the direction of the bedroom.
7. Corridors. Corridor widths of at least 7 feet should be required in patient areas of all buildings. The corridors referred to herein are those in patient sections and in other areas where patients may be transported by beds or wheeled stretchers. The corridors shall be kept clear and unobstructed at all times in accordance with the industrial commission exit requirements.
8. Emergency lighting. Recommendation. Adequate emergency lighting should be provided for exits, stairs and patient corridors. The typical motor generator type source of emergency power is recommended. An automatic transfer switch is recommended which will throw the circuits to the emergency service in case of power failure. Battery operated unit is acceptable.
9. Corridor Borrow Lights. Corridor Borrow Lights for doorways, nurseries, windows, etc., should be of wire glass where 1 hour partitions are required.

#### 11. Hydrant Protection

##### HYDRANT ACCESS:

Hydrants shall be located no closer than fifty feet from the building protected. Where existing hydrants are closer than twenty five feet, they shall not be considered as protection units for that building, but may be considered as protection for other buildings in the proximity.

Hydrants shall be so located as to permit easy access from the street (within three feet of the curb line), but at such a distance as to afford protection from passing vehicles. Where existing hydrants are located away from roads, they may be accepted if provision is made for fire department access, and access is kept free from snow at all times and so marked. Acceptance shall be determined at the discretion of the inspecting authority in cooperation with the responding fire department. Hose outlets shall be located eighteen inches from the ground.

##### NUMBER AND LOCATION:

Hydrants shall be so located as to provide two hose streams for every part of the interior of each building. Standpipes may be substituted for one such hydrant.

Hydrants shall be no further than 750 feet of the furthest exterior point of a building. A 500 foot maximum hose lay-out is more desirable. All distances shall be measured by paved roads. Hydrants on public systems will be accepted, if they meet the standards contained herein.

##### SIZE OF MAINS:

Main size shall not be less than six inches. On large systems it might be desirable to run an eight inch trunk main out with six inch feeder mains taking off to hydrants.

Where the mains are supplied by a public water source, and become integral with a city system, it is desirable to effect a circulating system so that the hydrants will be fed from two directions.

In any event a circulating system is desirable in anticipation of having to shut off part of the system for reason of damage to the main.

**Exception:** Where an existing system has four inch mains, the four inch may be credited as stubs or tie-ins from the six inch main if lengths are not excessively long.

##### WATER SUPPLY:

Minimum fire-flow requirements should not be less than 1,000 g.p.m. hose stream in dormitory and living areas, but 500 g.p.m. shall be deemed satisfactory for protection of outlying shop buildings, frame buildings and non-residential types of buildings which are not of large area.

##### PROTECTION OF MAIN:

Mains shall be placed below frost line. No main shall be run under or through a building. Where mains run under a railroad or principal highway, special attention shall be given by way of culverts, etc., to prevent undue pressure on the main. Pipe shall not be less than A.W.W.A. class "C" or class 150 weight, for pressure up to 150 p.s.i.



#### **FLOW TESTS:**

In order to evaluate the system described herein, capacity flow tests on the system so described, and the parent system, shall be recorded from two or more open hydrants, and a residual pressure on a non-flowing outlet shall be recorded in the proximity of the flowing hydrants.

Where regular water works operation is based on intermittent pumping, a sufficient number of tests should be made with pumps shut down to indicate the minimum volume obtainable. In order to arrive at a total evaluation of the system, the above records should be considered in respect to industrial and domestic demand as reflected in the waterworks records.

#### **FIRE DEPARTMENT TESTS:**

An annual test of the system shall be made by the fire department responding with pumper tests as part of the routine.

#### **VALVES:**

Valves are to be spaced at such intervals as to make it possible to shut off parts of the system for repairs and extensions without putting large sections out of service. Valves should be spaced 500 feet to 800 feet apart depending upon congestion and value of the area serviced.