SCHULTE & ASSOCIATES
Building Code Consultants
3701 Franklin Park Circle
Lawrence, KS 66046
fpeschulte@aol.com
847/312-7617

FIRE PROTECTION HISTORY-PART 195: 1920 (HEIGHT/AREA LIMITATIONS-RESIDENTIAL OCCUPANCIES)

By Richard Schulte

The Committee on Building Construction presented its report on proposed provisions to regulate the construction of residential occupancies at the Annual Meeting of the National Fire Protection Association held in Chicago in May 1920. This report proposes both height and area limitations for residential buildings based upon the fire resistance ratings of the structural elements of the building. The following is the text of the Building Construction Committee's Report:

"*The President: The next item is the report of the Committee on Building Construction, Mr. I. H. Woolson of New York, Chairman.*

Report of Committee on Building Construction.

Ira H. Woolson, Chairman.
H. V. Thayer, Secretary.

W. F. Ballinger, P. H. Bevier, D. Knickerbacker Boyd, Wharton Clay, J. E. Curtis, J. E. Freeman, W. A. Hull, Richard L. Humphrey, J. H. Kenney, Virgil G. Marani, R. P. Miller, R. Palm, A. G. Patton, W. Smedley, A. P. Stradling, R. E. Wilson.

[This report has been submitted to ballot of the Committee which consists of eighteen members, of whom sixteen have voted affirmatively, none negatively, one in favor of a portion and opposed to a portion, and one has refrained from voting.]

ABSTRACT OF THE REPORT.

The three Grades of Apartment House Buildings, A, B, and C, as specified in this Report, embrace all buildings of this class from those moderately fire-resistive to those having the very best practical protection. The structural supporting members in all Grades are incombustible.

The essential differences in the Grades are as follows:

Occupancy:

Grade A – No commercial occupancy allowed.

Grades B and C – Commercial occupancy permitted in the first story and basement with restrictions as to method of construction surrounding same.

Limits of Height and Area:

	Grade A	*Grade B*	*Grade C*
Height	*125 ft.*	*100 ft.*	*75 ft.*
Area	*7500 sq. ft.*	*6000 sq. ft.*	*5000 sq. ft.*

Use of Wood:

Grade A – None allowed except for floor surfacing.
Grade B – Allowed for trim, finish, and floor surfacing.
Grade C – Allowed for any purpose, except wooden lath and supporting structural members.

Wall Materials:

Grade A – Hard burned clay brick or reinforced concrete.

Grades B and C – Any approved type of brick, tile or concrete block, or reinforced concrete. Bearing walls of hollow tile and concrete block limited to 45 ft. in height.

Fire Protection for Columns, Floor Construction and Enclosure of Stairway and Elevator Shafts:

In general these are based upon three-hour, two-hour, and one-hour protection, respectively, for the three Grades A, B, and C. In Grades B and C increased protection is required for all portions of buildings devoted to commercial purposes.

Partitions:

Grade A – Entirely of incombustible construction and one-hour protection.

Grade B – Wooden trim permitted, but one-hour protection required.

Grade C – Hall and supporting partitions one-hour protection.

Wooden studs and metal lath and plaster permitted for minor partitions.

Doors and Windows:

Grade A – AII incombustible, except that grade floor doors not exposed to other buildings within 25 ft. may be of wood.

Grade B – Fire windows for all exterior wall openings within 25 ft. exposure. Doors in hall and main supporting partitions solid cored wooden or better.

Grade C – Same as B.

Protection of openings through fire walls is the same for all three Grades.

SPECIFICATION FOR CONSTRUCTION OF APARTMENT HOUSES – GRADE A.

Definition:

An apartment house is a building used as a home or residence of three or more families living independently of each other and having facilities for cooking upon their own premises.

A Grade A Apartment House shall not be used for the storage or sale of merchandise or for manufacturing purposes.

Height:

The height from grade to roof line shall not exceed 125 feet, nor exceed a height of two and one-half times the width of the widest street upon which it is located.

Area:

The area within enclosing or fire walls shall not exceed 7,500 square feet, with no dimension greater than 125 feet.

EXITS.

Wherever the word "Exit" is used, it shall be one of the two following forms:

(1) Stair Exit: The direct connection of any floor area to an approved stairway built in conformity with the specifications hereafter detailed, either as (a) an enclosed interior stairway, or (b) a smokeproof tower.

(2) Horizontal Exit: The connection of any floor area through a fire exit partition, fire wall, or an open-air balcony or vestibule, to another floor area in the same or an adjoining building having its own independent stair exits; such other area shall be of sufficient size to contain temporarily the joint occupancy of the two areas thus joined.

Note. – For the purpose of the requirements on exits, a floor area is any floor space enclosed on all sides by either the exterior walls, fire walls, or fire partitions, or combination of these.

Exits shall be remote from each other, and no point of any floor area shall be more than 100 feet distant from an exit. Whenever any building is more than four stories high, each floor area of such building shall be connected either directly to a smokeproof tower or indirectly through a horizontal exit to such smokeproof tower.

In case of horizontal exits each of the connected areas shall provide not less than three square feet of unobstructed floor space for each person.

Every apartment shall have at least two separate exits.

The occupants of every story above the first shall be provided with exits computed on the basis of at least 22 inches of width for every fourteen persons for stair exits, or 22 inches of width for every fifty persons for horizontal exits. At least one of the exits provided for every floor area shall be a stair exit.

No width of exit stairway or passageway required by these rules shall be reduced at any subsequent point in the direction of exit travel.

GENERAL TYPES AND ASSUMPTIONS.

The building may be constructed to comply with any of the following types:

Types:

1. Where all loads are carried on walls.

2. Where there are exterior bearing walls and interior bearing columns.

3. Where all loads are carried on a protected structural skeleton of steel or of reinforced concrete.

Assumptions:

The allowable floor loads and wind stresses shall be such as to conform to the best engineering practice.

The allowable stresses, quality of materials and workmanship shall conform to the best engineering practice.

All work shall be installed under the constant supervision of a competent and reliable inspector.

No combustible material shall be used in the structure, partitions, trim, or finish, except floor surfaces.

WALLS.

Foundation Walls:

Foundation walls shall be built of stone or hard burned brick, laid in cement mortar, or of concrete.

Exterior walls shall be impervious to water, or be adequately waterproofed.

The construction of buried footings is not considered a part of these specifications.

Exterior, Interior, Party and Fire Walls:

All such walls shall be built of hard burned brick laid with flush joints of cement mortar, or of reinforced concrete. This is not intended to prohibit properly raked or recessed joints in exterior walls for architectural effect.

Veneered walls shall not be permitted unless veneering materials are of equal fire resistance to the bearing wall and properly bonded, or tied thereto with non-corrodible metal wall ties.

All party or lot line walls shall extend 3 feet above the roof as a parapet, shall be the full minimum thickness and shall be properly coped.

Fire walls shall be continuous from foundation to 3 feet above the roof level and coped, except that interior fire walls need not extend above the roof, but shall extend up to the roof.

Unprotected silicious gravel concrete shall not be used in portions of the building liable to be subjected to fire.

Thickness of Walls:

No exterior party or fire wall shall be less than 12 inches thick when built of brick, or less than 8 inches thick when built of reinforced concrete.

No ducts, chases, or flues shall be permitted within the minimum required thickness of a wall.

Allowable Openings in Walls:

The maximum percentage of openings allowed in any exterior wall shall not exceed 40 per cent of its superficial area per story.

There shall be not less than 4 feet of wall between openings in a vertical line.

Exterior window openings shall not exceed 50 square feet in area, and no single dimension shall exceed 10 feet.

No window opening shall be less than one foot from the ceiling surface but the wall construction between the window opening and the ceiling may, if desired, be replaced by a fire window in fixed sash.

Openings in fire walls shall not exceed 48 square feet in area, and the distance between adjacent openings shall be not less than 9 feet.

Allowable Loads on Walls:

No brick bearing wall shall be less than 12 inches thick and shall be increased in thickness where necessary in order that the allowable load on walls shall not exceed 15 tons per square foot.

The unsupported height of a wall shall not exceed 15 times the thickness unless adequately reinforced.

Walls Anchored:

All walls shall be securely anchored or bonded at points where they meet. When supported by skeleton structural framework, they shall be properly anchored thereto.

PIERS.

Piers shall be built of hard burned brick laid in cement mortar, or of concrete.

If bonds are used in brick piers, they shall consist of perforated rolled steel plates.

If cap-stones are used, they shall be protected against fire by 4 inches of fireproofing.

If a pier exceeds in height seven times its least dimension, it shall comply with the best practice in column design.

COLUMNS.

Columns shall be constructed of steel or reinforced concrete.

Steel columns shall be protected to meet the three-hour fire test requirements; the material and thickness to be determined later in accordance with recommendations of the Report to be issued based upon the results of the column protection investigation jointly conducted at the Underwriters' Laboratories.

In reinforced concrete columns the metal shall be protected from fire by a minimnm of 2 inches of concrete. The effective area of such columns shall be taken as the area within the protective covering. In hooped columns it shall be taken as the area within the hooping. The corners of columns shall be chamfered or rounded.

All column protection shall make close connection to the floor construction at top and bottom.

No pipes, ducts or wires shall be placed within the area of the required fireproofing of columns or beams.

Plaster shall not be considered a part of any required fireproofing.

FLOOR AND ROOF CONSTRUCTION.

Floor and roof construction shall consist of a series of steel or reinforced concrete beams with interposed arches, or slabs, or of a reinforced girderless floor of such material and construction as shall meet the requirements of the three-hour fire test.

Floor surfaces if of combustible material shall be laid without air spaces beneath.

Roof Structures and Coverings:

All structures above the roof shall meet the requirements of the two hour fire test.

Roof coverings shall be of Class B roofing, or better, as classified by the Underwriters' Laboratories.

STAIR, ELEVATOR AND OTHER SHAFTS.

Enclosing walls of stair, elevator and other shafts shall meet the requirements of the three-hour fire test. When the walls of shafts are self-supporting, they shall be built of hard burned brick laid in cement mortar, or of reinforced concrete. The thickness shall be not less than 8 inches.

All such shafts shall extend at least 6 inches above the roof.

Openings in stair and other shaft enclosures other than elevator shafts shall be protected by approved self-closing fire doors.

Interior windows in stair and elevator shafts are prohibited.

If chutes are provided, they shall be protected in the same manner as elevator shafts.

Elevator doors shall be manually operated and provided with interlocking device so that door can only be operated when car is at landing, and car cannot move until door is closed.

STAIRWAYS AND SMOKEPROOF TOWERS.

Stairways:

All stairs, landings, and openings thereto shall have an unobstructed width throughout of at least 44 inches, except that hand rails may project not more than 3½ inches into such width on each side.

There shall be not more than 12 feet vertically between landings.

All stair landings shall be of sufficient size to permit the swing of the doors without reducing the free passageway to less than the width of the stairavay.

Suitable hand rails or banisters shall be provided on each side of each flight of stairs.

The treads and risers shall be uniform throughout, and the treads constructed and maintained in a manner to prevent persons from slipping thereon.

No winders shall be allowed.

All required exit stairways shall extend to the street level and open on the street, or to an unobstructed passageway affording safe egress to the street.

All exit stairs which extend to the top floor shall continue to the roof, and terminate in a pent house.

Stairways which may be used as a means of exit shall not extend continuously to floors below the street level, unless partitioned off in such manner as will clearly indicate the street level and unless the direction of egress to the street be plainly marked thereon.

Smokeproof Towers:

Smokeproof towers shall not communicate directly with the building on any floor.

Entrance to these enclosures from floors above the street level and roof shall be either from external balconies or through vestibules entirely open to the outer air, and from floors below the street level through ventilated covered areaways or vestibules.

Balconies shall be of substantial fire-resistive construction, with solid floors properly drained. The sides of open-air stairs and balconies shall be protected by sheet-metal or other suitable solid material to a height of not less than 3 feet 6 inches.

One smokeproof tower may serve two buildings if the size of the enclosure and capacity of the stairway is adequate for the number of occupants to be accommodated.

All exits shall be properly and clearly marked both day and night.

Doors:

All exits shall be provided with approved self-closing fire doors, arranged to open in the direction of traffic toward the outside of building. The doors shall be equipped with approved hardware that can be operated in the direction of exit without the use of keys. They shall be securely attached to the wall or partition or to approved frames anchored thereto.

The doors of smokeproof towers shall have a panel of clear wired glass, not more than one-third the area of the doorway.

Lighting:

All stairway enclosures, smokeproof towers and exit passageways shall be lighted by either electricity or gas. If by electricity, the current shall be obtained either from a source outside the building or directly by independent circuit from the main switch-board. If by gas, the piping shall lead directly from the meter outlet to stairways without branches.

Vents and Skylights:

A vent shall be provided over each stairway or elevator shaft equal in area to at least three-quarters of the horizontal area of the shaft, and be protected by approved incombustible skylights or windows of equivalent area placed in the side of the shaft above the roof which is furthest removed from a property line. These windows shall have incombustible frames and sash, and be glazed with thin glass.

Vent shafts shall be protected at the top by approved ventilating skylights or louvres.

All other openings in roof or roof structures shall be protected in an approved manner.

ROOM AND HALL PARTITIONS.

All partitions shall meet the requirements of the one-hour fire test. Doors, windows and all trim or finish in such partitions shall be incombustible.

PROTECTION OF EXTERIOR WALL OPENINGS.

All exterior window openings shall be protected by approved fire windows.

All exterior door openings shall be protected by approved fire doors, except those at grade floor not exposed to other buildings within 25 feet.

PROTECTION OF INTERIOR WALL OPENINGS.

All openings in fire walls shall be equipped with approved automatic fire doors on each side of the wall.

If an opening in a fire wall is made to serve as an emergency exit, it shall not exceed 48 square feet in area, and a self-closing fire door shall be substituted for one of the automatic fire doors.

Interior openings to ventilating shafts shall be protected by approved automatic trap doors or shutters.

SERVICE EQUIPMENT.

All laundries, workshops, storage rooms and the room or rooms in which boilers and all power and operating machinery are located shall be separated from other portions of the building by 8 inch walls, having approved fire doors at each opening; such rooms shall not have unprotected communication with the floor above.

A standpipe shall be installed at each stair shaft.

The installation of standpipe and hose shall conform to the requirements of the standards established by the National Fire Protection Association.

Approved automatic sprinkler equipments shall be provided in all laundries, workshops and storage rooms.

All laundry driers shall be constructed of incombustible material.

All electrical equipment shall be installed in accordance with the requirements of the National Electrical Code.

All heating, ventilating and other service equipment shall be separated from other portions of the building by enclosing walls meeting the requirements of the three-hour fire test, and all openings in same shall be provided with approved fire doors.

Where the heating is by blower or indirect systems, the ducts shall be substantially constructed and supported, and shall be insulated with satisfactory incombustible covering not less than ½-inch thick. The ducts shall be provided with approved automatic cut-off devices, and in other respects shall comply with the "Regulations for Blower Systems," recommended by the National Fire Protection Association.

Where gas is supplied for heating or lighting purposes, metal pipes shall be used throughout with properly located valves. Any material of an inflammable nature shall be protected from the flame or heat of the gas lighting, heating or ventilating apparatus by metal and asbestos or other fire-resistive, non-conducting material. Where gas is supplied, approved outside cut-off devices shall be provided. No swinging gas fixtures shall be used.

APARTMENT HOUSES–GRADE B.

Definition:

An apartment house is a building used as a house or residence of three or more families living independently of each other and having facilities for cooking upon their own premises.

A Grade B Apartment House shall not be used above the grade floor for the storage or sale of merchandise or for manufacturing purposes.

Height:

Every apartment house exceeding 75 feet in height shall be at least of Grade B construction.

The height from grade to roof line shall not exceed 100 feet, nor exceed a height of two and one-half times the width of the widest street upon which it is located.

Area:

The area within enclosing or fire walls shall not exceed 6,000 square feet, with no dimension greater than 100 feet.

EXITS.

Same requirements as for Grade "A."

GENERAL TYPES AND ASSUMPTIONS.

The building may be constructed to comply with any of the following types:

Types:

1. Where all loads are carried on walls.

2. Where there are exterior bearing walls and interior bearing columns.

3. Where all loads are carried on a protected structural skeleton of steel or reinforced concrete.

Assumptions:

The allowable floor loads and wind stresses shall be such as to conform to the best engineering practice.

The allowable stresses, quality of materials and workmanship shall conform to the best engineering practice.

All work shall be installed under the constant supervision of a competent and reliable inspector.

No combustible material shall be used in the structure or partitions, except trim, finish and floor surfaces.

WALLS.

Foundation Walls:

Same requirement as for Grade "A."

Exterior and Interior Walls:

All such walls shall be built of hard burned clay brick, Portland cement or other approved brick, hollow tile, hollow concrete block, Portland cement or other approved brick, or a combination of these materials properly laid and bonded, or of reinforced concrete.

All lot line walls shall extend 3 feet above the roof as a parapet, shall be the full minimum thickness and be properly coped.

Bearing walls, if of hollow tile or concrete block, shall be laid in cement mortar, and shall not be built to a greater height than 45 feet.

Walls veneered with brick, stone or architectural terra cotta are permitted if properly bonded, or tied with non-corrodible metal ties.

Non-bearing exterior walls carried on protected structural members may be of brick, hollow tile or block, as described above. Veneering may be included in the required thickness of non-bearing walls carried on protected structural members; in bearing walls, veneering with metal ties is not included in required thickness.

Unprotected silicious gravel concrete shall not be used in portions of the building liable to be subjected to fire.

Party and Fire Walls:

All such walls shall be built of hard burned brick laid with flush joints of cement mortar, or of reinforced concrete.

All party walls shall extend 3 feet above the roof as a parapet, shall be of full minimum thickness and shall be properly coped.

Fire walls shall be continuous from foundation to 3 feet above the roof level and be coped, except that interior fire walls need not extend above the roof, but shall extend up to the roof, and have a tight mortar joint connection.

Thickness of Walls:

In walls where the following materials are used no exterior, party or fire wall over 45 feet in height shall be less than 12 inches thick when built of brick, hollow tile or concrete block, or less than 8 inches thick when built of reinforced concrete.

No wall shall be less than 8 inches thick when built of brick, hollow tile or concrete block, or 6 inches when of reinforced concrete.

No ducts, chases or flues shall be permitted within the minimum required thickness of a wall.

Allowable Openings in Walls:

Same requirements as for Grade "A."

See Appendix, page 204.

Allowable Loads on Walls:

No brick, hollow tile or concrete block bearing wall shall be less than 12 inches thick, and shall be increased in thickness where necessary in order than the allowable load on walls shall not exceed the following units in net tons per square foot:

Brickwork laid in lime mortar . . . . . 8 tons
Brickwork laid in cement lime mortar . . . . . 12 tons
Brickwork laid in Portland cement mortar . . . . . 15 tons
Rubble stonework laid in Portland cement mortar . . . . . 10 tons

*The permissible working stress on hollow tile or concrete block when laid in Portland cement mortar, with cells either vertical or horizontal, shall be 1/10 the average ultimate compressive strength as shown by tests approved by the authorities having jurisdiction.**

The unsupported height of a brick, hollow tile, concrete, or concrete block wall shall not exceed 15 times the thickness unless adequately reinforced.

Walls Anchored:

Same requirements as for Grade "A."

PIERS.

Same requirements as for Grade "A."

COLUMNS.

Columns shall be constructed of steel or reinforced concrete.

Steel columns shall be protected to meet the fire test requirements; the material and thickness to be determined later in accordance with the report of the Underwriters' Laboratories based upon the results of the column protection tests now under consideration.

Such column protection shall meet the two-hour fire test requirement except that when the grade story or any story below it is used for the storage or sale of merchandise or for manufacturing purposes the columns in the story having such occupancy shall meet the three-hour fire test requirements.

In reinforced concrete columns the metal shall be protected from fire by a minimum of 1½ inches of concrete. The effective area of such columns shall be taken as the area within the protective covering. In hooped columns it shall be taken as the area within the hooping. The corners of columns shall be chamfered or rounded.

All column protection shall make close connection to the floor construction at top and bottom.

No pipes, ducts or wires shall be placed within the area of the required fireproofing of columns or beams.

Plaster shall not be considered a part of any required fireproofing.

**See Appendix, page 204.*

FLOOR AND ROOF CONSTRUCTION.

Floor and roof construction, including the supporting members, shall meet the requirements of the two-hour fire test, except that when the grade story or any story below it is used for the storage or sale of merchandise or for manufacturing purposes the floor construction immediately above such occupancy shall meet the three-hour fire test requirements.

Floor surfaces, if of combustible material, shall be laid without air spaces beneath.

Roof Structures:

All structures above the roof shall meet the two-hour fire test requirements.

Roof Coverings:

Roof coverings shall be of Class B Roofing, or better, as classified by the Underwriters' Laboratories. Roof cornices and overhanging eaves shall be of incombustible materials.

STAIR, ELEVATOR AND OTHER SHAFTS.

Enclosing walls of stair, elevator and other shafts and lobbies or exit halls leading to them shall meet the requirements of the two-hour fire test, except that when the grade story or any story below it is used for mercantile or manufacturing purposes the walls on these stories shall meet the three-hour fire test requirements. When the walls of these shafts are self-supporting, they shall be built of brick, hollow tile or concrete block laid in cement mortar, or reinforced concrete, and the thickness shall be not less than 8 inches, except that reinforced concrete may be 6 inches. All such shafts shall extend at least 6 inches above the roof.

Stores having show windows along side lobby or exit shall be separated from such windows by a partition meeting the two-hour fire test requirements, with openings protected by approved fire doors.

Openings in stair and other shaft enclosures other than elevator shafts shall be protected by approved self-closing fire doors.

Interior windows in stair or elevator shafts are prohibited.

If chutes are provided, they shall be protected in the same manner as elevator shafts.

Elevator doors shall be manually operated and provided with interlocking devices so that door can only he operated when car is at a landing and car cannot move until door is closed.

STAIRWAYS AND SMOKEPROOF TOWERS.

Stairways:

All stairs, landings, and openings thereto shall have an unobstructed width throughout of at least 44 inches, except that hand rails may project not more than 3½ inches into such width on each side.

There shall be not more than 12 feet vertically between landings.

All stair landings shall be of sufficient size to permit the swing of the doors without reducing the free passageway to less than the width of the stairway.

Suitable hand rails or banisters shall be provided on each side of each flight of stairs.

The treads and risers shall be uniform throughout, and the treads constructed and maintained in a manner to prevent persons from slipping thereon.

No winders shall be allowed.

All required exit stairways shall extend to the street level and open on the street, or to an unobstructed passageway affording safe egress to the street.

All exit stairs which extend to the top floor shall continue to the roof, and terminate in a pent house of fire-resistive construction.

Stairways which may be used as a means of exit shall not extend continuously to floors below the street level, unless partitioned off in such manner as will clearly indicate the street level and unless the direction of egress to the street be plainly marked thereon.

Smokeproof Towers:

Same requirements as for Grade "A."

Doors:

Same requirements as for Grade "'A."

Lighting:

Same requirements as for Grade "A."

Vents and Skylights:

Same requirements as for Grade "A."

PARTITIONS.

All partitions shall meet the one hour fire test requirements.

All doors opening into public hallways shall be at least equal to solid-core wood doors one and one-half inches thick and be self-closing.

Trim may be of wood.

Partitions separating stores in the grade story and below it shall be unpierced and meet the two-hour fire test requirements.

PROTECTION OF EXTERIOR WALL OPENINGS.

All exterior window openings exposed to buildings within 25 feet shall be protected by approved fire windows.

Other window openings may have wood frames and sash.

PROTECTION OF INTERIOR WALL OPENINGS.

Same requirements as for Grade "A."

SERVICE EQUIPMENT.

All laundries, workshops, storage rooms and the room or rooms in which boilers and all power and operating machinery are located shall be separated from other portions of the building by 8-inch walls meeting the requirements of the three-hour fire test, and having approved fire doors at each opening; such rooms shall not have unprotected communication with the floor above.

A standpipe shall be installed at each stair shaft.

The installation of standpipe and hose shall conform to the requirements of the standards established by the National Fire Protection Association.

Approved automatic sprinkler equipments shall be provided in the entire basement and portions occupied for mercantile purposes.

All laundry driers shall be constructed of incombustible material.

All electrical equipment shall be installed in accordance with the requirements of the National Electrical Code.

Where the heating is by blower or indirect systems, the ducts shall be substantially constructed and supported, and shall be insulated with satisfactory incombustible covering not less than ½-inch thick. The ducts shall be provided with approved automatic cut-off devices, and in other respects shall comply with the "Regulations for Blower Systems" recommended by the National Fire Protection Association.

Where gas is supplied for heating or lighting purposes, metal pipes shall be used throughout, with properly located valves. Any material of an inflammable nature shall be protected from the flame or heat of the gas lighting, heating or ventilating apparatus by metal and asbestos or other fire-resistive, non-conducting material. Where gas is supplied, approved outside cut-off devices shall be provided. No swinging gas fixtures shall be used.

APARTMENT HOUSES–GRADE C.

Definition:

An apartment house is a building used as a home or residence of three or more families living independently of each other and having facilities for doing their cooking upon their own premises.

A Grade C Apartment House shall not be used above the grade floor for the storage or sale of merchandise or for manufacturing purposes.

Height:

Buildings of this class shall not exceed 75 feet in height.

Area:

The area within enclosing or fire walls shall not exceed 5,000 square feet, with no dimension greater than 100 feet.

EXITS.

Same requirements as for Grade "A."

GENERAL TYPES AND ASSUMPTIONS.

The building may be constructed to comply with any of the following types:

Types:

1. Where all loads are carried on walls.

2. Where there are exterior bearing walls and interior bearing columns.

3. Where all loads are carried on a protected structural skeleton of steel or of reinforced concrete.

Assumptions:

The allowable floor loads and wind stresses shall be such as to conform to the best engineering practice.

The allowable stresses, quality of materials and workmanship shall conform to the best engineering practice.

All work shall be installed under the constant supervision of a competent and reliable inspector.

No combustible material shall be used in the supporting structural members.

WALLS.

Foundation Walls:

Same requirements as for Grade "A."

Exterior and Interior Walls:

*All such walls shall be built of hard burned brick, hollow tile, hollow concrete block, Portland cement or other approved brick, or a combination of these materials properly laid and bonded, or of reinforced concrete.**

All lot line walls shall extend 3 feet above the roof as a parapet, shall be the full minimum thickness and be properly coped.

Bearing walls, if of hollow tile or concrete block, shall be laid in cement mortar, and shall not be built to a greater height than 45 feet.

Walls veneered with brick, stone or architectural terra cotta are permitted if properly bonded, or tied with non-corrodible metal ties.

Non-bearing exterior walls carried on protected structural members may be built of the above-mentioned materials or of any incombustible material meeting the two-hour fire test requirements.

Interior division walls within the 5,000 square foot area in skeleton structures shall be of incombustible material and constructed to meet the requirements of the one-hour fire test.

Veneering of non-bearing walls carried on protected structural members may be included in the required thickness; in bearing walls veneering with metal ties is not included in required thickness.

Unprotected silicious gravel for concrete shall not be used in portions of the building liable to be subjected to fire.

Party and Fire Walls:

All such walls shall be built of hard burned brick laid with flush joints of cement mortar, or of reinforced concrete.

All party walls shall extend 3 feet above the roof as a parapet, shall be of full minimum thickness and shall be properly coped.

Fire walls shall be continuous from foundation to 3 feet above the roof level and be coped, except that interior fire walls need not extend above the roof, but shall extend up to the roof, and have a tight mortar joint connection.

Thickness of Walls:

No exterior, bearing, party or fire wall shall be less than 12 inches thick when built of brick, hollow tile or concrete block, or less than 8 inches thick when built of reinforced concrete, except that, in buildings not more than 25 feet in width, bearing walls of brick, 8 inches in thickness, may be erected to a height of 45 feet, provided such walls do not exceed 50 feet in length between cross walls or adequate buttresses; or such buildings may have their bearing walls constructed of hollow tile or concrete block 8 inches thick for the uppermost 21 feet, 10 inches for the next lower 12 feet, and 12 inches for the following lower 12 feet.

Exterior walls of brick, hollow tile or concrete block supported at each story by girders may be 8 inches in thickness for the entire height. If of reinforced concrete these walls may be 6 inches in thickness.

When a group or combination of such apartments not more than 45 feet in height equals 5,000 square feet in area, it shall be separated from any adjoining building or group of buildings by a wall not less than 12 inches in thickness when built of brick, hollow tile or concrete block, or 8 inches in thickness when built of reinforced concrete.

No ducts, chases or flues shall be permitted within the minimum required thickness of a wall.

**See Appendix, page 204.*

Allowable Openings in Walls:

The maximum percentage of openings allowed in any exterior wall shall not exceed 40 per cent of its superficial area per story.

There shall be not less than 4 feet of wall between openings in a vertical line.

Exterior window openings shall not exceed 50 square feet in area, and no single dimension shall exceed 10 feet.

No window opening shall be less than one foot from the ceiling surface, but the wall construction between the window opening and the ceiling may, if desired, be replaced by a fire window in fixed sash.

Openings in fire walls shall not exceed 48 square feet in area, and the distance between adjacent openings shall be not less than 9 feet.

Allowable Loads on Walls:

The allowable load on walls shall not exceed the following in net tons per square foot:

Brickwork laid in lime mortar . . . . . 8 tons
Brickwork laid in cement lime mortar . . . . . 12 tons
Brickwork laid in Portland cement mortar . . . . . 15 tons
Rubble stonework laid in Portland cement mortar . . . . . 10 tons

The permissible working stresses on hollow tile or concrete block when laid in Portland cement mortar, with cells either vertical or horizontal, shall be 1/10 the average ultimate compressive strength as shown by tests approved by the authorities having jurisdiction.

The unsupported height of a brick, hollow tile or concrete block wall shall not exceed 15 times the thickness unless adequately reinforced.

Walls Anchored:

Same requirements as for Grade "A."

PIERS.

Same requirements as for Grade "A."

COLUMNS.

Same requirements as for Grade "B."

FLOOR AND ROOF CONSTRUCTION.

Floor and roof construction, including the supporting members, shall meet the one-hour fire test requirements, except that when the grade story or any story below it is used for the storage or sale of merchandise or for manufacturing purposes the floor construction immediately above such occupancy shall meet the two-hour fire test requirements.

Floor surfaces, if of combustible material, shall be laid without air spaces beneath.

Roof Structures:

All structures above the roof shall meet the one-hour fire test requirements.

Roof Coverings:

Roof covering shall be of Class C Roofing, or better, as classified by the Underwriters' Laboratories. Roof cornices and overhanging eaves shall be constructed in accordance with regulations of the National Board of Fire Underwriters for roof cornices and gutters.

STAIR, ELEVATOR AND OTHER SHAFTS.

Enclosing walls of stair, elevator and other shafts and lobbies or exit halls leading to them shall meet the requirements of the one-hour fire test, except that when the grade story or any story below it is used for mercantile or manufacturing purposes the walls on these stories shall meet the two-hour fire test requirements. When the walls of these shafts are self-supporting, they shall be built of brick, hollow tile or concrete block laid in cement mortar, or of reinforced concrete, and the thickness shall be not less than 8 inches, except that reinforced concrete may be 6 inches. All such shafts shall extend at least 6 inches above the roof.

Stores having show windows along side lobby or exit hall shall be separated from the show windows by a partition meeting the two hour fire test requirements, with openings protected by approved fire doors.

**See Appendix, page 204.*

Openings in stair and other shaft enclosures other than elevator shafts shall be protected by approved self-closing fire doors.

Interior windows in stair and elevator shafts are prohibited.

If chutes are provided, they shall be protected in the same manner as elevator shafts.

Elevator doors shall be manually operated and provided with interlocking device so that door can only be operated when car is at a landing and car cannot move until door is closed.

STAIRWAYS AND SMOKEPROOF TOWERS.

Stairways:

All stairs, landings, and openings thereto shall have an unobstructed width throughout of at least 44 inches, except that hand rails may project not more than 3½ inches into such width on each side.

There shall be not more than 12 feet vertically between landings.

All stair landings shall be of sufficient size to permit the swing of the doors without reducing the free passageway to less than the width of the stairway.

Suitable hand rails or banisters shall be provided on each side of each flight of stairs.

The treads and risers shall be uniform throughout, and the treads constructed and maintained in a manner to prevent persons from slipping thereon.

No winders shall be allowed.

All required exit stairways shall extend to the street level and open on the street, or to an unobstructed passageway affording safe egress to the street.

All exit stairs which extend to the top floor shall continue to the roof, and terminate in a pent house of fire-resistive construction.

Stairways which may be used as a means of exit shall not extend continuously to floors below the street level, unless partitioned off in such manner as will clearly indicate the street level and unless the direction of egress to the street be plainly marked thereon.

Smokeproof Towers:

Same requirements as for Grade "A."

Doors:

Same requirements as for Grade "A."

Lighting:

Same requirements as for Grade "A."

Vents and Skylights:

Same requirements as for Grade "A."

ROOM AND HALL PARTITIONS.

All partitions forming halls, public corridors and separating different apartments shall meet the requirements of the one-hour fire test.

No windows shall be permitted in these partitions.

All doors opening into public hallways shall be at least equal to solid-core wood doors one and one-half inches thick and be self-closing.

The partitions sub-dividing apartments may be wood studs with metal lath and plaster.

PROTECTION OF EXTERIOR WALL OPENINGS.

All exterior window openings exposed to buildings within 25 feet shall be protected by approved fire windows.

Other window openings may have wood frames and sash.

PROTECTION OF INTERIOR WALL OPENINGS.

Same requirements as for Grade "A."

SERVICE EQUIPMENT.

The room or rooms in which boiler and all power, heating and ventilating and operating machinery are located shall be separated from other portions of building by an 8-inch wall meeting the requirements of the three-hour fire test, and having an approved fire door at each opening; such rooms shall not have direct communication with the floor above.

A standpipe shall be installed at each stair shaft.

The installation of standpipe and hose shall conform to the requirements of the standards established by the National Fire Protection Association.

All laundry driers shall be constructed of incombustible material.

All electrical equipment shall be installed in accordance with the requirements of the National Electrical Code.

Where the heating is by blower or indirect systems, the ducts shall be substantially constructed and supported, and shall be insulated with satisfactory incombustible covering not less than ½-inch thick. The ducts shall be provided with approved automatic cut-off devices, and in other respects shall comply with the "Regulations for Blower Systems" recommended by the National Fire Protection Association.

Where gas is supplied for heating or lighting purposes, metal pipes shall be used throughout, with properly located valves. Any material of an inflammable nature shall be protected from the flame or heat of the gas lighting, heating or ventilating apparatus by metal and asbestos or other fire-resistive, non-conducting material. When gas is supplied, approved outside cut-off devices shall be provided. No swinging gas fixtures shall be used.

APPENDIX TO GRADES A, B AND C.

Materials and construction called for in these specifications shall meet the standards approved by the Engineering Standards Committee or of the American Society for Testing Materials; U. S. Bureau of Standards; National Fire Protection Association, or the National Board of Fire Underwriters.

Where none of these organizations has established standards, the specifications of the Associations of the various industries shall be considered as recommended practice by the Committee.

Pending the adoption of standards by one of the above-mentioned organizations, the specifications of the Hollow Building Tile Association shall govern the use of that material, and those of the American Concrete Institute the use of reinforced concrete, concrete block and concrete-brick, where and as the use of these materials is allowable within these specifications.

Discussion.

Prof. Woolson: Before proceeding with the discussion of this report, the speaker desires to forestall criticism which is very likely to arise. Wherever the term "fire wall" is referred to as a wall which does not extend 3 feet above the roof of a fire-resistive building, just consider that it is a bull on the part of the printer and the proofreader. (Langhter.) It is a well-recognized belief that if you do not blow your own horn, there is always a liability that it will not be blown for you, and the chairman of the committee desires to call the attention of the President of the Association and our honored Secretary to the fact that so far as he has observed, this is the only report presented this year which has been presented in accordance with the rules and regulations of this Association! I refer to the fact that it has a complete abstract of contents, as required by a rule passed unanimously by the Association two or three years ago. I do not know who is responsible for the fact that my good friends who have presented the other reports have slumped, but they have. (Laughter.) Maybe I am a trouble-maker.

One other thing I desire to say, is that the Chairman of the sub-committee which prepared this rather voluminous and painstaking report was Mr. P. H. Bevier. To him is due the credit for the larger portion of the labors involved in its preparation. This is the first report of this Committee which embraces all three grades of buildings, A, B, and C, which classification was outlined in a previous report and has been accepted by this Association.

Mr. John A. Ferguson (Pittsburgh): I notice that the report calls for a three-hour fire test floor and roof construction for Grade A. Had you considered at any time the proposition of allowing a lower test for roof construction than for floors? In going over our building code in Pittsburgh, we adopted a two-hour roof construction fire test tentatively. I would like to get your attitude on this, for if we are wrong, we would want to change it quickly.

Prof. Woolson: The Committee did consider that, but as this is a Grade A building, it is somewhat ideal in its conception, and the highest standard of building. It is a building in which no commercial occupancy is allowed and is supposed to fulfill all the requirements that you could possibly expect from a high-grade fire-resistive building, even if you are a bit critical. With that idea in view, the Committee felt that the difference between a two-hour and three-hour fire test requirement for the roof and floor was too small to be considered. Of course it is one of those questions that are always open for discussion, and no doubt there are many members who feel that this requirement might be too rigid considering the occupancy, but it reflects the opinion of the committee.

Mr. Ferguson: A building code must call for what is the minimum allowable type of construction for safety, and sometimes the minimum is not always ideal. For that reason, we of course want to find out whether we have a safe requirement or an unsafe requirement.

Prof. Woolson: Under Grade B, two hours only is required for floors and roofs.

Mr. Benjamin Richards (Chicago): I notice that under walls you make provision for anchoring, but under roofs there is nothing mentioned for anchoring. Is that so purposely?

Prof. Woolson: No, I cannot remember that the matter was brought up. Have you any suggestion to offer?

Mr. Richards: I think we should consider the anchoring of the roof to the walls as well as the walls to each other.

Prof. Woolson: We will take that under consideration.

Mr. S. H. Inberg (Associate Physicist, Bureau of Standards, U. S.): Would it not be better to let re-inforced concrete columns come in under whatever fire test requirement you specify?

Prof. Woolson: I did not get that.

Mr. Inberg: Under "Columns," instead of specifying the two-inch thickness for concrete protection let it come under the hour fire test requirement?

Prof. Woolson: Yes, I think it would be better, but you will notice that the Committee has distinctly called attention to the fact that the requirements for columns may have to be modified as a result of the column test investigation. Not knowing at the time this report was prepared, when the report of that investigation would be made public, the Committee thought they would follow the general practice of the day until something more permanent was established. That will be considered.

Mr. Ferguson: Why is it that in vents and skylights thin glass is required? We were a little afraid that a stairway shaft might become a smoke tower or chimney, in case the shaft was so arranged that the smoke would draw towards it and go up.

Prof. Woolson: That was done deliberately, because of the advice of our firemen friends, who always desire to open up the top of a shaft through a building as quickly as possible. If a stairway shaft is properly enclosed and has self-closing fire doors, the amount of smoke that is going to get into it is a minimum; and what does get in should pass out as soon as possible. It is not presumable that sufficient heat will get into such a shaft to break the glass until long after the people are out, and it was desired to have a glass that could be easily broken.

Mr. Ingberg : Under Apartment Houses, Grade B, Partitions, I would like to know the basis for the one-hour fire test requirement for partitions in apartments. I understand you divide the apartment into allowable areas, but there is nothing said in the report about partitions between separate apartments. Would it not be well to specify a given resistance for partitions between apartments and a different one for the room partitions? In the room partitions we have doors and openings that may not be closed at a time of fire; so that the fire resistance of those partitions would not be as important as that of the partitions that divide apartments and therefore have no openings.

Prof. Woolson: Your idea is that partitions separating apartments should be superior in fire resistance to ordinary room partitions?

Mr. Ingberg: Yes.

Prof. Woolson: I do not remember whether that matter was considered. Do you remember, Mr. Bevier?

Mr. Bevier: No, it was not considered.

Prof. Woolson: I think the thought is a good one. Naturally, if the fire occurs in one room of an apartment, the desire would be to control the fire within the apartment and not allow it to get beyond. We will take that matter into consideration.

Mr. J. E. Freeman, (Portland Cement Association): In reference to Mr. Ingberg's comments, the thought occurs to me the matter might be covered in the section under walls, where we have exterior, interior, party and fire walls. Possibly the word "party wall" would cover the division between one apartment and another.

Prof. Woolson: I should say that an "interior wall" might cover it. I would not consider a party wall as doing it. The Committee will consider that.

Mr. R. S. Doull (American Gas Association): When we get to the report of the Committee on Gases, in order that this report shall not be antagonistic to that, I would suggest that in next to the last line under Service Equipment, which reads, "where gas is supplied, approved outside cut-off devices shall be provided," the following words be added: "when the supply pipe is of two inches diameter or over," and the next sentence should be made to read "No swinging wall brackets shall be used." I make those two suggestions.

The President: The Committee will be very glad to take the suggestions under consideration.

*Prof. Woolson: It will be noted that the height of apartment houses of Grade B has been reduced to 100 feet, the area to 6000 square feet, and certain other changes in the construction are permitted. * * * Under the head of "thickness of walls," a change has been made by which two-thirds of the first line is omitted, beginning with the word "no" in the first line and omitting the word "exterior." As worded the rule would have permitted eight-inch party walls, which was not the intention. The requirement will now read "No party, bearing or fire wall over 45 feet in height shall be less than 12 inches thick when built of brick," and omit "hollow tile and concrete block," which are not intended to be used for fire walls or party walls, and then continue: "or less than eight inches thick when built of reinforced concrete." Then change the following line to read: "No other wall shall be less than eight inches thick when built of brick, hollow tile or concrete block, or six inches when built of reinforced concrete." These changes have been accepted by the Committee.*

Mr. Richards: It seems to me that the first paragraph under Service Equipment in this section, as well as in Grade A, would indicate where automatic sprinklers should be called for. Was it purposely arranged to omit the requirement for automatic sprinklers in boiler rooms and laundries, Class B?

Prof. Woolson: You will notice that the paragraph below reads: "Approved automatic sprinkler equipments shall be provided in the entire basement and portions occupied for mercantile purposes."

Mr. Richards: But if the laundry is on the first floor, you would not ask for sprinklers?

Prof. Woolson: I never saw one on the first floor. I do not think the Committee felt it necessary to provide specifications for such a situation.

Mr. Richards: How about the boiler room?

Prof. Woolson: I do not remember whether any consideration was given to that or not. Is it not covered the same way?

Mr. Richards (Reading): "All laundries, workshops, storage rooms and the room or rooms in which boilers and all power and operating machinery are located shall be separated from other portions of the building by eight inch walls meeting the requirements of the three-hour fire test and having approved fire doors at each opening; such rooms shall not have unprotected communication with the floor above." Then the item covering sprinklers reads: "Approved automatic sprinkler equipments shall be provided in the entire basement and portions occupied for mercantile purposes."

Prof. Woolson: Do you remember, Mr. Bevier, whether that matter was considered or not?

Mr. Bevieu: No, I do not. The floor construction was of such value that we did not think it necessary to specify sprinkler equipment in the boiler room; it would stand a three-hour fire test and then take an explosion to injure the floor.

Mr. Richards: I am simply asking for information.

Prof. Woolson: The surrounding wall is high-grade and the ceiling over it is high-grade. Personally I do not think it necessary to specify sprinklers. We do not consider it necessary to separate the boiler room from the operating room.

Mr. Doull: For the reason stated before, I would ask that the same amendments accepted in Grade B also be accepted in Grade C, where the gas supply and swinging fixtures are referred to.

Prof. Woolson: That will be done.

Mr. F. D. Weber (Portland, Oregon): I would like to ask why the stairways and smoke towers are to be lighted separately from the main switch board and service section?

Prof. Woolson: An independent source of supply is desirable that shall not be affected by the lighting of the building. Under Service Equipment, it is required that all electrical equipment shall be installed in accordance with the requirements of the National Electrical Code.

Mr. Weber: I would suggest a service ahead of the main service switch, the same as in a theatre. Such an arrangement is required in many city ordinances at the present time.

Prof. Woolson: The Chairman does not know enough about electrical matters to pass on that. If it is considered advisable by the Association, we shall be glad to put it in.

The President: I suppose the Chairman will be glad to consider the suggestion, perhaps in conference with the Electrical Committee.

Prof. Woolson: Perhaps that is the easiest solution. In Grade C, it will be noted that the height is limited to 75 feet, and the area to 5000 square feet. You will also notice that the requirement for fire test of roof protection is dropped to one hour, because this is a lower grade of building. A one-hour fire test will give a fair degree of fire resistance.

Mr. Ferguson: May I ask a question right here that has appeared important in our work? The limit of fire fighting is important as regards the height of a building. In Pittsburgh we have an "80-foot" fire department, as we call it, for short; it cannot rescue persons above 80 feet, nor can it fight fire efficiently in buildings over 80 feet in height without considerable assistance from the interior of the building. We made our limit on height of construction 80 feet, which is not far from the 75 feet given here. It is significant that the two are so close together as probably to make an average for the country because of the fact that Pittsburgh has not far from an average fire department as regards the height to which it can reach readily.

There is one thing I think ought to be considered very carefully, and that is what requirements we shall make for the use by the fire department of standpipes in buildings over 80 feet in height. The use of them is better than dragging hose up the stairways. I, for one, admire this requirement in all these sections; that every stairway must have a standpipe." In some respects that provision has been criticized in Pittsburgh, because it appears to some to demand more standpipes than would appear necessary; but in fire-fighting nobody is going to stop in the haste and excitement to pick out a stairway that has a standpipe in it. It is a mighty wise proposition to have such standpipes in each stairway, as I see it.

Prof. Woolson: In reference to the last speaker's suggestion regarding a standpipe in each stairway, I would like to call attention to the wording of the requirement under Service Equipment. It reads: "In all cases a standpipe shall be installed at each stair shaft." The word "at" was used advisedly; the Committee thinking that sometimes it might be convenient to have a standpipe just outside a stairway door so that the firemen could get in and the stairway door could be closed and prevent smoke passing to the upper stories of the building, possibly in the early stages of a fire, before the people had all gotten out. We have had some criticism of this. One fire chief told me he thinks it would be much better to require it inside the stairway, for this reason: that, no matter what the condition of the fire is, the firemen can then always have a comfortable place to make their connection, and get ready to apply the water. If the fire is such that they can open the door, and get in the full width, all right; if not, they can fight it through the crack of the door. If they are driven back, they can pull their hose out and get back into the stairway and close the door. Further than that, he suggested that a standpipe outside might become crippled from a fire in some one story, and interfere with the fighting on the floors above. If Chief McDonnell is here this morning, or Chief Conway, I would like to have an expression of opinion from them.

Chief John C. McDonnell (Chicago Fire Department): As I understand it, the stairs are enclosed in masonry?

Prof. Woolson: All enclosed and with self-closing fire doors.

Chief McDonnell: That idea is very well if putting it inside the stairway would not remove the standpipe too much from the balance of the building. We require standpipes for every 100 feet; that is, we only allow 100 feet of hose, and if there is a greater building area than 100 feet of hose would cover we should require two standpipes. In that case we could not always have the standpipes in the stair shafts.

Prof. Woolson: There might not be sufficient stair shafts.

Chief McDonnell: Yes sir. I think your provision for standpipes is reasonable for any department or city. However, I do not think it is necessary to spend too much time discussing that particular point. I think "at the stairs," or "convenient to the stairs" might very well be accepted by any department.

Prof. Woolson: And leave the interpretation of "at" as being "at or within?"

Chief McDonnell: Yes.

The President: The Chair is inclined to endorse the view expressed by the Chief. There was another point we once encountered when we discussed putting the standpipe in the stair shaft; many of the towers are not heated, and difficulty is encountered in preventing the standpipes from freezing when within the stair shaft. We compromised by putting the standpipe outside the shaft and bringing the hose connection through the wall.

Mr. Charles H. Fischer (Newark): I am wondering if the installation of the standpipe outside the stair tower will not be a big disadvantage to some departments in fighting a fire on a certain floor using the connection to the standpipe from the floor above or the floor below? They do that, as I understand it, for the purpose of having flexibility. To back up to an outlet on the floor on which the fire is burning and retreat into the stair tower with a charged line is almost a physical impossibility; and to advance a line a short distance from the connection is also a physical impossibility at times. For that reason, many departments adopt the practice of fighting a fire on a floor, using the connection to the standpipe from the floor above or the floor below, or both.

Prof. Woolson: Are there any other comments to be made on this report?

Mr. Geo. A. Madison (St. Louis): I note that Grades B and C apartments "shall not be used above the grade floor for the storage or sale of merchandise or for manufacturing purposes." That would indicate that the ground floor or basement may be used for any manufacturing or mercantile purposes, and I would ask the committee if it would not be advisable to impose some restrictions upon those occupancies. There are some manufacturing occupancies which might be a menace. I have in mind an apartment house in which I found, in the basement, 35 gasoline automobiles and quantities of oily waste and rags. Some of the auto owners had five-gallon cans of gasoline standing around, which they used for emergencies. A fire under those conditions in an apartment house might have very serious results. I would ask the committee whether it would not be advisable to consider some restrictions upon the processes carried on in Grade B and Grade C apartments where manufacturing and mercantile establishments are allowed to be conducted.

Prof. Woolson: We will be glad to take that matter under consideration.

Mr. E. R. Hardy (New York): Such occupancy would de-class the building. If they make a garage of it, it becomes a garage and ceases to be a Grade A or Grade B or Grade C apartment house; it de-classes itself.

Mr. Ferguson: We have adopted in Pittsburgh an expedient for such cases, which we speak of as "joint occupancies." We call attention to joint occupancies that are prohibited and class them and clearly describe them at the time we are writing the ordinance for the occupancy; so that while we are talking of apartments or hotels, we would say that "Class 7, A, B, and C buildings," which are garages – and this remark is typical – "are hereby prohibited within this classification of buildings." That is short and direct.

Mr. Gorham Dana (Boston): I understand that this is not a report that need be adopted tentatively. If I am correct, I move that it be received and referred back to the committee with authority to submit it to the Executive Committee for promulgation.

Motion seconded.

Mr. W. C. Robinson (Chicago): I perhaps was not here when the classification methods were discussed originally, and I would like to ask whether the Association is committed to this particular form of classification of buildings? It rather seems to me that, as the severity of the requirements decreases, you permit an increase of hazards; you are more liberal in your Grade C building and less stringent in your requirements. Is that to be the policy of the Association? Why do we divide apartment buildings into three classifications of fireproof construction? Why do we not set up one standard?

Prof. Woolson: We cannot very well have one standard, because there is such a great variety of buildings, and the Committee's effort is to grade these buildings; get them into groups where they can be considered as units. You may remember that the Committee started out originally with a Standard Building over which there was a great deal of discussion, and that was finally adopted as something to work up to in all practical classes of building.

Now the Grade A type is the very highest type of practical construction which the Committee felt it was reasonable to demand with any particular class of occupancy. In this grade no commercial occupancy is allowed; it must all be used for apartment purposes. I think it is fair to say that if we have two buildings of that type of construction, both of equal fire resistance, and allow a commercial occupancy in the basement or in the first story of one building, we increase the fire hazard in that building. In other words, the building drops down in its fire resistance a certain amount. It was simply a means of measuring the fire resisting ability of these buildings, – their ability to resist fire and protect life – that the grading was done.

Mr. Robinson: I do not quite follow that line of reasoning. It seems to me that in the highest type of building we can afford to be most liberal with our occupancy. Why can we not, design a building that will resist the hazards of the occupancies which are contained within it? I do not think it is within our province to say how a building must be used. We might specify how good a fire resistance it must have, but I have not, from the start, followed this scheme of three standards; for one thing, grading the possibilities of fire in buildings because of, perhaps, we might say, commercial conditions. Is not that a question for the underwriters to take care of?

Prof. Woolson: It seems to me Mr. Robinson has been a little remiss in not attacking this problem more forcibly in years gone by; because this grading was done in 1916. As I understand him, it is not our province to say how a building shall be built or occupied, but should leave that to the insurance men, who will grade it and rate it according to the character of construction. Well, that is just what we have been doing in the past, and our cities are filled with buildings, in many cases built improperly for their use. The Committee thought possibly they could improve the grade of construction in general by grading buildings and allowing a man if he is going to put up an apartment house, to find out what would be the requirements for the best grade. If he wants to put up an A1 first-class building in every respect why shouldn't we give him something to go by?

Mr. Robinson: I do not mean that it is not proper for us to make standards for apartment houses, but that we should have one standard. If a building so erected is occupied for something besides an apartment house, then it seems to me to become an underwriting question.

Prof. Woolson: You think we should have only one grade for an apartment house, and tell how that apartment house should be built; but the moment any change is made in the occupancy from an apartment, what is going to happen? Is it an apartment house still, or is it not?

Mr. Robinson: You design it and recommend it for an apartment house; if a man establishes a garage in it, it immediately becomes a garage.

Prof. Woolson: Then I do not see where the work of this Committee comes in; I do not see that we have anything further to do.

Mr. Ingberg: Could not the objection be overcome by requiring uniform fire resistance for the three types, but permitting different construction. I understand that the objection raised is chiefly based on the fact that for a less severe fire exposure we make a higher requirement. We are working towards improved materials for fire protection and interpreting our results in such a way as to assign fire resistance periods to constructions tested so that the poorest one likely to be constructed will come within a given such period; but the supposition is that in applying that, it will be rated against the same probable exposure. I notice the same question presents itself in regard to the thickness of the wall. As near as I can tell, we propose to permit eight-inch walls of brick laid in limestone mortar.

Prof. Woolson: That has been changed to 12; bearing, party and fire walls are all to be 12 inches thick.

Mr. Ingberg: But even so, if the reading here is followed, we could build a 12-inch bearing wall 45 feet high.

Prof. Woolson: Any height; of course it all has to come within good engineering practice; that is fundamental.

Mr. Ingberg: What I wish to bring out is this, that what is safe for the Grade C building is equally safe for the Grade B structure. We might go further and apply it to the floor loads and to unit stresses, and say we want to use a stress of 8000 pounds per square inch for a Grade A building and 16,000 for a Grade C building. As to how much they should be, of course our knowledge is so incomplete as to make that a fair field for argument; but we could say that if the one-hour requirement is sufficient for a Grade C building to carry it through a fire that will burn out its contents (which are more combustible than in a Grade A building), why should not that requirement be all that is necessary for a Grade A building?

Prof. Woolson: Grade C is a smaller and a lower building; the chances of the firemen successfully fighting the fire at 75 feet elevation and with the smaller area, are very much increased, and the Committee did not feel they would be justified in making the same requirements for it as for Grade A. If we are going to have but one grade, there is no necessity for any attempt at such gradation. The Chairman of this Committee is rather confused to know just what the trend of this criticism is, whether it tends to reverse all the grades of hotels, club houses, office buildings, etc., that we have already adopted and that have become a part of the proceedings and standards of this Association.

Mr. Doull: I think there are distinct advantages in three grades; all over the United States today we are suffering from the lack of housing conditions, and some stimulus must be applied to induce builders to build homes. Are we going to make restrictions so drastic as to discourage building? We have got to make liberal conditions; cities are recognizing this today, and letting down the bars to encourage the erection of homes for the people.

The question of occupancy is a hard one. I had considerable to do with drawing up the building code of New York City. We can regulate occupancy afterwards, but we cannot during construction, because we cannot definitely forseee what the future use of the building will be. We can and do prohibit hazardous occupancies by municipal action. That can be safely left to municipal regulation; we cannot do it in a building code. In the smaller apartment houses we should permit a different form of construction than that demanded for Grade A, because the hazard is much less. As Prof. Woolson has said, in them the fire departments can extinguish a fire much more readily than in a large apartment house. We are facing a situation in the United States that is promoting shameful profiteering, encouraging the taking advantage, in all sections of the country, of the lack of home facilities. We have got to meet that situation, and not only encourage building operations but also encourage great monetary corporations to loan money for building operations. (Applause.)

Mr. Ferguson: We have three fire zones in Pittsburgh, Nos. 1, 2 and 3. In zone No. 1 we have included all congested value districts; in that zone we require Class A buildings. In zone No. 2, we reach the fire limits; in that zone we have requirements for Class B buildings. Zone 3 is outside the fire limits and we put a Class C building requirement on this district as the minimum allowable for safety. Zone 1 is better equipped for fire fighting; zone 2 is less well equipped, and zone 3, still less. Consequently the modified hazard of the lower building with its smaller floor areas, etc., is recognized. However, zone 3 is well equipped to extinguish fires in the lowest class of building as we provide it. We have done this to promote the building of buildings; to meet the housing demand, especially for houses, apartments, hotels, etc. It appears to me there should be a distinct demand for three grades or classes of construction, for the same occupancy, to meet the financial needs of the people. The fire department should, of course, in each section be competently equipped to fight fire in the lowest grade permitted. That should be taken into account in every case.

The President: Gentlemen, if you feel that the subject of classifications should be further considered, I think it would be desirable for the members to communicate with the Committee; it is not a matter we can discuss very much further this morning. It is a far-reaching one and will involve the reconsideration of a number of our standards.

Mr. John H. Kenney (Baltimore): The members may recall that at the meeting in Ottawa last year, the name of this Committee was changed from "Fire Resistive" Construction to "Building" Construction. During the war period, the attention of the Committee was demanded for other than fire resistive construction. The Committee will now have the prerogative of making and submitting recommendations for buildings of much lower type of construction than strictly fire resistive buildings. There are, in some cities, apartment houses built of wood, and there may be a demand for standardized frame buildings, buildings of the best type of frame construction. If that is kept in mind, it may clear the atmosphere.

The motion to adopt the report was then carried.

The President: The next item is the report of the Committee on Standardization of Ripe and Pipe Fittings, Mr. Walter Teague of Providence, Chairman. I believe Mr. W. C. Robinson will present the report."

It is quite remarkable how similar the proposal for residential occupancies developed in 1920 is to the provisions contained in building codes utilized in the United States today. The proposal for residential occupancies outlined above specifies three different degrees of structural fire resistance, three hour, two hour and one hour, and the height/area limitations which are applicable varies with the fire resistance ratings of the structural elements.

It should be noted the height of the most fire resistive type of building, buildings with a structural fire resistance of three hours, is limited to 125 feet. The height of buildings with a structural fire resistance rating of two hours is limited to 100 feet, while the height of buildings with a structural fire resistance rating of one hour is limited to 75 feet.

Similarly, the floor area of buildings with the fire resistance rating of the structural elements varying from one hour to three hours varies from 5,000 square feet per floor to 7,500 square feet per floor, with the larger floor areas permitted for buildings with a greater structural fire resistance rating.

Also note that this proposal introduces the concept of fire loading with three hour structural elements required where tenant spaces on either the basement levels or the first floor are utilized for manufacturing or for retail sales.

* * * * *

Source: "*Proceedings of the Twenty-fourth Annual* [NFPA] *Meeting*", Chicago, Illinois, 1920.