Replaced Register, August 1985, No. 356

APPENDIX A

The material contained in the appendix is for clarification purposes only. The notes, illustrations, etc. are numbered to correspond to the number of the rule as it appears in the text of the code.

A-50.21 CERTIFIED MUNICIPALITIES. The following municipalities have been certified by the department to review plans and conduct inspections under this section:

COUNTIES			
Eau Claire			
CITIES			
Antigo	Greenfield	Muskego	Superior
Appleton	Janesville	New Berlin	Two Rivers
Beloit	Kaukauna	Oak Creek	Waukesha
Brookfield	Kenosha	Oshkosh	Wausau
Burlington	La Crosse	Racine	Wauwatosa
Cudahy	Madison	Rice Lake	West Allis
Eau Claire	Manitowoc	Sheboygan	West Bend
Fond du Lac	Marshfield	Sparta	Wisconsin
Glendale	Mequon	Stevens Point	Rapids
Green Bay	Middleton	Sun Prairie	
VILLAGES			
Dousman			
Elm Grove			
Johnson Creek			
Plover			
TOWNS			
Grand Rapids			
Waukesha			

A-50.10-50.25 FORMS. The following forms (SB2, 8, 8A, 118, 198, 224B, SBD-4927 and SBD-5686) are referred to in ss. ILHR 50.10, 50.12, 50.14, 50.18, 50.20 and 50.25. Copies of these forms are available from the Division of Safety and Buildings, P.O. Box 7969, Madison, Wisconsin 53707.

Appendix A

SBI-2
REV. 8-78

Department of Industry, Labor and Human Relations

Building Inspection Report and Orders

INSPECTION DATE			FILE NO. E –
OWNERS NAME		OCCUPANCY INSPECTED	
MAILING ADDRESS		LOCATED AT (STREET ADDRESS)	
CITY	STATE / ZIP CODE	CITY	COUNTY

An Inspection of the above occupancy discloses violations of orders of the Dept. Of Industry, Labor & Human Relations promulgated under authority of Chapter 101 of the Revised Statutes of Wisconsin.

SEE REVERSE SIDE FOR APPLICABLE WISCONSIN STATUTES

Plan No.

NOTE	ITEM	ORDER	REQUIREMENTS:	☑ Done	☒ Not Done

SAMPLE

IMPORTANT

- Please report when orders are completed
- Avoid Delay
- Forfeiture for violations are $10 to $100 each day for each violation.
- Keep us informed.

"Failure of an employer reasonably to enforce compliance by employes with such statute or order of the Department shall constitute failure by the employer to comply with such statute or order." Sec. 102.57 Wis. Stats.

COMPLIANCE DATE	VIOLATIONS EXPLAINED TO	TITLE
		DEPUTY NO
BY	DEPUTY	SAFETY & BUILDINGS DIVISION

Address all Correspondence Safety and Buildings Division, Department of Industry, Labor and Human Relations, P.O. Box 7969, Madison, Wisconsin 53707

PETITION FOR MODIFICATION OF A RULE IN THE WISCONSIN ADMINISTRATIVE CODE

WISCONSIN DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS DIVISION OF SAFETY & BUILDINGS P.O. BOX 7969, MADISON, WI 53707

OFFICE USE ONLY
Petition No.
E–Number E–

Name of Owner	Building Occupancy or Use	Agent, Architect or Engineering Firm
Company	Tenant Name, if any	Street & No.
Street & No.	Building Location, Street & No.	City State & Zip
City State & Zip	City County	Phone

Plan Number(s) –IF KNOWN–

1. Rule Ind. _____ of the Wisconsin Adminstrative code cannot be entirely satisfied because:

2. In lieu of complying exactly with the rule, the following alternative is proposed as a means of providing an equivalent degree of safety:

3. Supporting arguments are:

VERIFICATION BY OWNER–PETITION IS VALID ONLY IF NOTARIZED
For Fee Information See Ind. 69.15 or Contact The Department at (608) 266-1835

_____ being duly sworn, says he is petitioner herein, that he has read the foregoing petition and that the same is true, as he verily believes.

_____
Signature of Owner

Subscribed and sworn to me this _____ day of 19____.

_____ County, Wisconsin.

_____
Notary Public

My commission expires: _____

DILHR SB 8 (R 07 82)

OFFICE USE ONLY		
Date Received	Amount Paid	Receipt No.
Department Action		
Office of The Secretary		Date

POSITION STATEMENT:
To be compiled by
Chief of Fire Department
SB 8-A (2-77)

WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P.O. BOX 7969 MADISON WI 53707

Name of Owner	Building Occupancy or Use	Agent, Architect or Engineering Firm
Company	Tenant Name, if any	Street & No.
Street & No.	Building Location, Street & No.	City State & Zip
City State & Zip	City County	Phone

1. I have read the petition for modification of rule: Ind

2. I recommend (Check appropriate box)	Denial	Approval	Conditional Approval	No Comment *

3. Explanation for Recommendation:

* If desired, Fire Departments may indicate "No Comment" on non-fire safety issues such as sanitary, energy conservation, structural, barrier free environments, etc.

4. ☐ I find no conflict with local rules and regulations
☐ I find that the petition is in conflict with local rules and regulations

Explanation

Signature of Fire Chief	Date

PLEASE COMPLETE AND SUBMIT PROMPTLY TO DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS AT THE ADDRESS SHOWN ABOVE.

Safety & Buildings Division
201 E. Washington Ave.
P.O. Box 7969
Madison, WI 53707

PLANS APPROVAL APPLICATION
Department of
INDUSTRY, LABOR AND HUMAN RELATIONS

E- _____
PLAN NO. _____

INSTRUCTIONS: Fill in all applicable data. Submittal of Plan Approval Application form is required with each plan submittal. Examination and inspection fees, as indicated on back of form, are required to be submitted with a minimum of four sets of plans. Data required on plans is described in code section Ind. 50.12.
Codes can be purchased from the Department of Administration, Document Sales, 202 S. Thornton Ave., Madison, 53702

Name of Owner	Building Occupancy or Use	Designer or Design firm of ☐BLDG ☐HVAC
Company	Tenant Name, if any	Street & No.
Street & No.	Building location, Street & No.	City State & Zip
City State & Zip	City ☐ Village ☐ Town ☐ County	Phone
Previous Owner, if any	Return Plans to ☐Owner ☐Designer ☐*Other*	

THIS APPLICATION IS FOR:
[ ] Building Plan Approval
[ ] HVAC Plan Approval
[ ] *Other*

PLANS FOR:
[ ] New Building
[ ] Addition
[ ] Alteration
[ ] Revision to previously approved plans
[ ] Structural
[ ] Footing & Foundation
[ ] *Other*

Type of Construction (Ind 51.03)
☐ Fire Resistive–Type A #1
☐ Fire Resistive- Type B #2
☐ Metal Frame Protected #3
☐ Heavy Timber #4
☐ Exterior Masonry #5A
☐ Exterior Masonry #5B
☐ Metal Frame Unprotected #6
☐ Wood Frame Protected #7
☐ Wood Frame Unprotected #8

SOIL BEARINGS CAPACITY
Method used ☐Verified
Check one: ☐Presumptive
Value used _____ PSF

☐ Sprinkler System Provided
☐ Fire Alarm Provided
☐ Other Detection System Provided
( ) Emergency Power Provided
Mechanical Information:
Type of Heating _____

FOR OFFICE USE ONLY
Amt. Rec'd. _____
Rept. No. _____

DETERMINATION OF FEES
(See back of form)

Area	Height	Volume
	X	= cu. ft.
	X	= cu. ft.

Total Volume or
Area of Alteration
Unit Vol. /1000 (Building) X 1.10 = Total Vol./1000 (HVAC) X .81 = Alt. Area X .02 =

Minimum Fee $75.00
$ _____
Minimum Fee $70.00
$ _____
Minimum Fee $70.00
$ _____

☐Structural ☐Exhaust ☐Illumination
☐Fig & Found ☐Revision
$ _____

[ ] **PRIORITY PLAN REVIEW.**
FEE IS EQUAL TO THE TOTAL PLAN EXAMINATION FEES ABOVE.
$ _____

[ ] Permit to start $81.00
$ _____
Inspection Fee

PUBLIC RECORDS:
This plan, and related documents, may be subject to public inspection and copying. See Ind. 69.09(8) for additional information regarding public records.
$ _____
Total
$ _____

COMPONENTS INCLUDED WITH THIS SUBMITTAL
NOTE: Must be submitted by building designer

	Designer Name	Reg. No.
METAL BUILDING	Supplier	
TRUSSES	Designer Name	Reg. No.
	Supplier	
PRECAST CONCRETE	Designer Name	Reg. No.
	Supplier	
LAMINATED WOOD	Designer Name	Reg. No.
	Supplier	
OTHER *(SPECIFY)*	Designer Name	Reg. No.
	Supplier	

DESIGN AND SUPERVISION (Ind. 50.07-50.10) Wisconsin Registered Professional required for buildings, containing more than 50,000 cu ft., total volume. This project has been prepared under my supervision. Individual components, submitted herein, may have been designed and sealed by others. I have reviewed those component documents for conformance with the general design concept. I have relied on the seal of the component designers for compliance with codes as they apply to their design.

If this submittal includes building, or building components, the designer and supervising professional below must be that of the building. If submittal is for HVAC, only, blocks below may be completed by HVAC designer and supervisor.

Name of ☐BLDG ☐HVAC Designer Type or Print	Reg. No.	Signature of ☐BLDG ☐HVAC Designer	Date

Plans for buildings over 50,000 cu. ft. will not be approved until the name of the supervising professional is known and the signature provided herein.

Name of Supervising Professional (Type or Print)	Date
Signature of Supervising Professional	Seal

Appendix A

ABBREVIATED FEE SCHEDULE

Ind 69.09 Buildings, structures, heating and ventilating. (1) Plan examination. Fees for the examination and approval of all plans submitted in accordance with the requirements of chapters Ind 50-64 will be determined in accordance with the following schedules.

(a) *Building, heating and ventilating.* Fees for the examination and approval of all building and heating and ventilating plans will be computed on the basis of the total volume of the building and at the following rates:

Total Volume	Building Plans	Heat & Vent Plans	Illumination Plans
0-1,000,000	$1.10 per 1000 cubic feet. Minimum fee—$75.00 per plan.	$0.81 per 1000 cubic feet. Minimum fee—$70.00 per plan.	$16.00 with bldg. or htg. and ventilating plans
Over 1,000,000 cubic feet	$1103 plus $.81/per 1000 cubic feet in excess of 1,000,000 cubic feet	$811 plus $.49/per 1000 cubic feet in excess of 1,000,000 cubic feet	$49.00 when submitted separate.

1. Exceptions.

a. Warehouses. The fees for plan examination and approval of warehouses shall be determined in accordance with Ind 69.09 (1) (a) except that the fee may be reduced by 30%. Minimum fee – $75.00.

b. Replacement of heating equipment. The replacement of a boiler or furnace in an existing heating system with no alterations to the heating system requires no fee. See Ind 69.03 (5) for registration fee for boilers and pressure vessels.

(b) Permit to start . . . . . $81.00 per permit

(c) Building Alterations. The examination fees for alterations of existing buildings and structures undergoing remodeling shall be computed on the basis of two cents per gross square feet of the floor areas, roof areas and external wall surface undergoing remodeling. The minimum fee shall be $70.

1. The fee specified in par. (c), shall be based on the actual gross square footage of the area being remodeled. When the remodeling of an individual building element affects the compliance of the code for the entire area, the examination fee shall be computed on the basis of the total square footage of the affected area.

2. Where the total plan examination calculated under par. (c) exceeds that determined under par. (a), the examination fee may be determined under the requirements specified in par. (a).

3. Where heating, ventilating and air conditioning alterations are submitted with the building alteration plans, no separate examination fee shall be required for the heating, ventilating and air conditioning plan remodeling.

4. Where heating, ventilating and air conditioning alteration plans are submitted separately from the building alteration plans, the examination fees shall be computed on the basis of $3.24 per $1,000 cost of the remodeling. The minimum fee shall be $70.

(d) Revisions. Revisions to previously examined plans . . . . . $65 per plan. This paragraph applies when plans are revised for reasons other than those that were requested by the department.

(e) Footings and foundation plans submitted separately . . . . . $108 per plan
Duplicate plans . . . . . $ 49 per plan.

(g) Stadia, grandstands and bleachers . . . . . $19 per 1000 seats or fraction of 1000 seats.
Minimum Fee – $49.

(h) Industrial exhaust systems for dusts, fumes, vapors and gases (government owned only) . . . . . .$49 per plan.

(i) Spray booth plans (government owned only) . . . . . .$49 per plan.

(j) Structural Plans. The fees for the examination and approval of structural plans shall be determined in accordance with Table 69.09. Trusses, precast concrete, laminated wood beams, and other structural elements when submitted separately and not included with general building plans shall comply with this paragraph.

TABLE 69.09

	Structural Element	
	One Structural Element	Two or More Individual Structural Elements
One Building	$32	$49
Two or More Buildings/Same Site/Submitted Simultaneously	$49	$59

(k) Miscellaneous Plans. Miscellaneous plans such as canopies, a building's structure for "fast track" construction, and approval requests for structures cited in s. Ind 50.12 (1) (a) 1, Wis. Adm. Code . . . . . .$70 per plan.

(3) Inspection Fees. Field inspection fees shall be submitted for each building or structure in accordance with the following schedules:

(a) *General building, heating and ventilating inspection fees.* When plans for the building and the heating and ventilating system are submitted together, inspection fees shall be determined in accordance with the following:

New Building construction	Fee
Up to 25,000	$ 75.00
25,001 to 50,000	$108.00
50,001 to 100,000	$156.00
100,001 to 500,000	$194.00
500,001 to 1,000,000	$243.00
1,000,001 to 2,000,000	$346.00 *
2,000,001 to 4,000,000	$545.00 *
Over 4,000,000	$816.00 *

*Building with no interior partitions (e.g., factory, warehouse) maximum $246

(b) *Heating and ventilating inspection fees* Heating and ventilating inspection fee, when plans are submitted separately from building plans. . . . . $70.00.

(c) Inspection Fees for Alterations to Existing Buildings. Inspection fees for alterations to existing buildings shall be determined in accordance with the following:

Alteration (Gross Area in Sq. Ft.)	Fee
Up to 2,500	$ 69
2,501 to 5,000	$ 97
5,001 to 10,000	$141
10,001 to 50,000	$178
50,001 to 100,000	$222
100,001 to 200,000	$324 *
200,001 to 400,000	$503 *
Over 400,000	$757 *

*Building with no interior partitions (e.g., factory, warehouse maximum $324

(d) Miscellaneous Inspection Fees. Miscellaneous inspection fees include inspections for fire escapes, stadia and grandstands, exhaust systems, spray booths, revisions to previously examined plans and other structures for which plan submission is required . . . $70.

(7) Priority Plan Approval. An appointment may be made with the department to facilitate the examination and approval of plans in less than the normal processing time. The plans shall comply with the provisions of s. Ind 50.12. The fee for this type of plan examination shall be determined at twice the normal rate based on the appropriate category of plan under this section.

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
SAFETY & BUILDINGS DIVISION
P.O. BOX 7969
MADISON, WISCONSIN 53707

PERMISSION TO START CONSTRUCTION
FEE REQUIRED IN ADDITION TO EXAMINATION/INSPECTION FEES

Location of Project:

Street: _____ E _____

City: _____ Plan File Number _____

County: _____ Date Plans Rec'd _____

Occupancy: _____

We, the undersigned, request to begin footing and foundation work prior to approval of the plans in accordance with Ind. 50.14.

Plans have been submitted to the Department of Industry, Labor & Human Relations, Safety and Buildings Division, and all information requested by Code Ind. 50.12 or Ind. 50.13 has been included with the submittal.

We have reviewed the specific code requirements for the building or structure and its use, as set forth in Ind. 50-64, and, where applicable, have shown compliance on the drawings.

We agree to make any changes required after the plans have been reviewed and to remove or replace noncode complying parts of the foundation and or footings.

We agree to proceed with the footings and foundation only and not continue with the remainder of the building or structure until approval has been received.

We understand that, prior to the start of construction, a Building Permit must be obtained from the local authorities having jurisdiction in accordance with their laws and ordinances.

Owner's Signature Date

Name: _____

Address: _____

Designer's Signature Date

Name _____

Address: _____

Accepted by Date

Dept. of Ind., Labor & Human Relations
Safety & Buildings Division

Not Accepted Because _____

Plans will be examined within the next _____ days.

NOTE: This permission is applicable to projects having below grade foundation work only.

SB-198 (R 08/82)

FILE COPY

INSPECTION PROGRESS REPORT

Wisconsin Department of Industry, Labor & Human Relations
SAFETY AND BUILDINGS DIVISION
P.O. Box 7969 Madison, Wisconsin 53707

RE:

TO:

FILE NUMBER

E

DATE OF INSPECTION	PERSON CONTACTED
No. 1.	
2.	
3.	
4.	
BLDG FINAL	
H & V FINAL	
OTHER FINAL	

COMPLIANCE DATE

OFFICE INSTRUCTION (Check one)

- ☐ Voluntary compliance
- ☐ Process SB-2
- ☐ Code violations explained to owner

Supervisor Review

INSP. ✓ Order Corrected ✗ Order Not Corrected					ORDER NUMBER	FINDINGS OF INSPECTION
1	2	3	4	Final		Items listed must be corrected before the next inspection or final inspection. If corrections are not made prosecution by the Attorney Generals Office will result.

SAMPLE

NAME AND ADDRESS OF CONTRACTOR:

OWNER'S NAME (IF DIFFERENT FROM ABOVE)

ADDRESS

CITY STATE ZIP

DEPUTY SIGNATURE REG NO.

IF YOU HAVE ANY QUESTIONS I WILL BE IN MY OFFICE ON

TELEPHONE

DILHR-SB 224B (R. 4/80)

WORK COPY

Wisconsin Department
of Industry, Labor
and Human Relations

Return to:

Safety and Buildings Division
P.O. Box 7969
Madison, Wisconsin 53707

COMPLETION STATEMENT

E-Number:
E-

Receipt Component (16)
98

Administrative Rules require that a Completion Statement be filed by the Supervising Professional or Designer for all buildings having a volume of over 50,000 cubic feet. (Reference Ind 50.10 (3))

Owner	Plan Number (29)
Occupancy	Building Street Address
Municipality	County / Date Submitted (28): Mo / Day / Year

This is to certify that construction of the referenced project was under my supervision, in accordance with Ind 50.10, and that to the best of my knowledge and belief it has been completed in substantial compliance with the approved plans and specifications with the following exceptions: (if none, state 'none')

SAMPLE

This Certificate Covers:
1 (34) ☐ Building
1 (35) ☐ Heating & Ventilation
☐ Other (specify)_____

Supervising Professional Name (Please Print or Type)	Signature	Registration Number (36)
Street Address	City, State, Zip	

Office Use Only
Safety Specialist _____

DILHR SBD-4927 (R. 06/81)

FILE

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
SAFETY & BUILDINGS DIVISION
201 E. WASHINGTON AVE.
P.O. Box 7969
MADISON, WISCONSIN 53707

DATE _____

PLAN EXAMINATION LETTER

FILE NO E-- _____
PLAN NO _____
VOL _____
INSP FEES PAID _____

Note: This Preprinted Plan Review letter is being used at the discretion of the plan examiner to expedite the plan review. This form serves as the review correspondence.

Occupancy
Tenant
Owner
Location
Municipality
County
Supervising Professionals

Plans have been reviewed by the Department of Industry, Labor and Human Relations for compliance with important code requirements.

The _____ plans are

☐ COND. APPROVED	☐ WITHHELD	☐ NOT APPROVED

If the plans are stamped "CONDITIONALLY APPROVED" construction may proceed, but all items that are required to be changed by this letter must be corrected before commencing that part of the work.

You are hereby advised that the owner as defined in Chapter 101.01(2)(i) of the Wisconsin State Statutes is responsible for all code requirements not specifically cited herein. Code requirements are set forth in Chapters 50 through 64 of the rules of the department.

The building will be inspected during and after construction by a deputy of this Department to insure complete compliance with Wisconsin Codes. The owner may notify the state building inspector listed below if a final inspection is desired before taking possession of the building.

IND. 50.15 *EVIDENCE OF APPROVAL.* The architect, professional engineer, designer, builder or owner shall keep at the building site, one set of plans bearing the stamp of approval.

SAMPLE

THIS BUILDING HAS BEEN CLASSIFIED AS NO _____ CONSTRUCTION SPRINKLERED UNLIMITED AREA

COMMENTS

Plans for the following shall be submitted to this office and approved prior to construction of that component.

Trusses Precast Concrete Heat & Vent Systems Illumination _____

State Inspector Reg. _____ Area Code ( ) Phone _____

Local Inspector _____

BY _____
PLAN EXAMINER
Phone _____

DILHR SBD 5686 (R 05/83)

A-51.01 (12) BUILDING. The intent was to consider permanent awnings as part of a building.

A-51.01 (42) FAMILY. The intent of this definition is to clarify the use of the word "family" in reference to s. ILHR 51.01 (102a); it is not intended as a variance to the definition stated under s. ILHR 51.01 (102a) (b).

A-51.01 (67a) HABITABLE ROOM. It is the intent that rooms designated as recreation, study, den, family room, office, etc. and providing the only space for living and/or sleeping are considered habitable rooms.

A-51.01 (115) SETBACK. The intent was to not include gutters, downspouts, outdoor lighting fixtures, signs and similar attachments as parts of a building.

A-51.01 (121) STORIES, NUMBER OF. For further clarification, refer to A-51.02 (14).

A-51.01 (144) WALL (DIVISION).

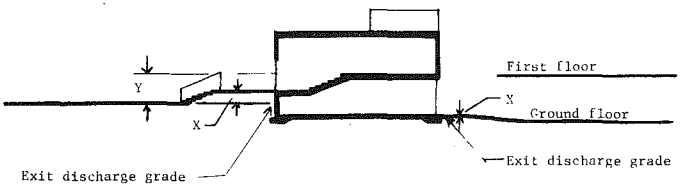
(a) *Building division wall* is intended to denote a wall constructed in a manner sufficient to meet requirements for a party wall [see "Wall (Party)"] and is acceptable as a dividing wall or enclosing wall when determining the volume of a building as referred to in ss. ILHR 50.07, 50.10 and 50.12.

(b) *Fire division wall* is intended to relate to construction that provides separation between portions of a building to satisfy allowable floor area limitations, separation between 2 classes of construction, or separation of hazardous occupancies. For other separations, see "occupancy separations" and isolation of hazards sections of this code.

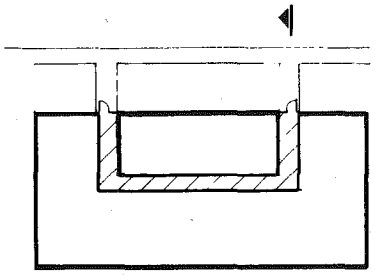
A-51.01 (151) WALL (PARTY). It is intended that a property consisting of joining plotted subdivisions owned by one individual, that can be owned by separate individuals, is included in the definition of party wall.

Appendix A

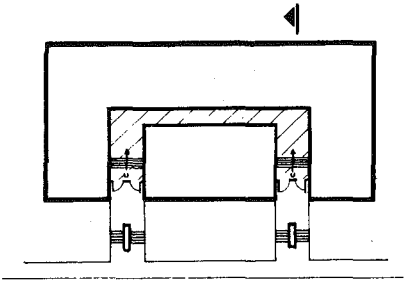
A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of s. ILHR 51.01 (121) Stories, Number of.



Note: X = 3'-0" (maximum)
Y = 3'-0" (maximum)



Ground floor



First floor

A-51.03 (5) (a) EXTERIOR MASONRY CONSTRUCTION. The following Figures 1, 2, 3, 4, 5A and 5B illustrate typical details for various wall construction alternatives, which satisfy the intent of this rule for Type 5—Exterior Masonry Construction.

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

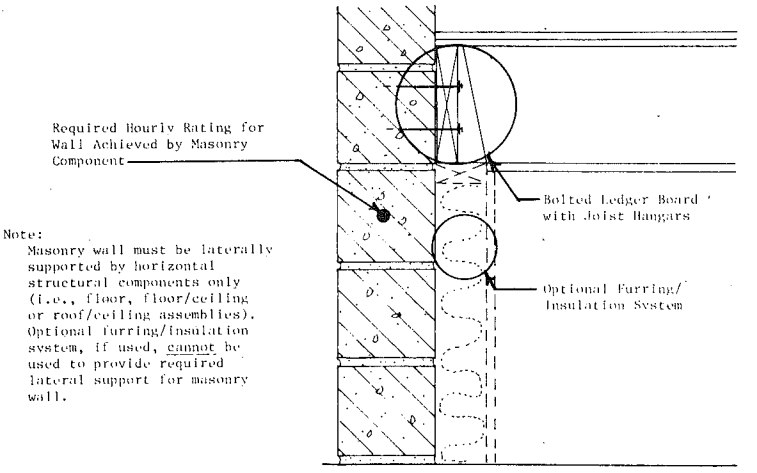


FIGURE 1
Single Wythe Masonry Wall
(Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

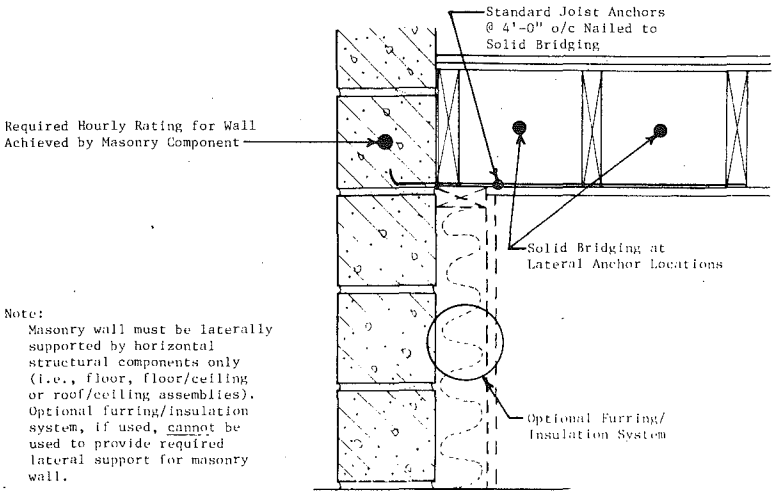


FIGURE 2
Single Wythe Masonry Wall
(Non-Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

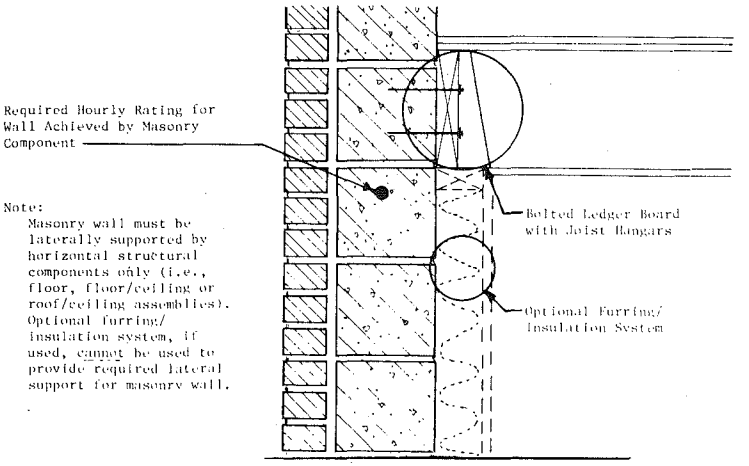


FIGURE 3
Multi-Wythe Masonry Wall
(Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

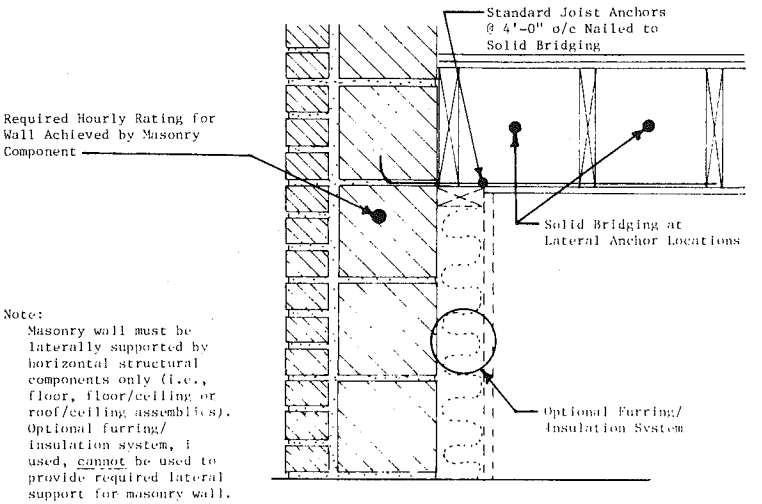


FIGURE 4
Multi-Wythe Masonry Wall
(Non-Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details are also Applicable to Interior Walls.

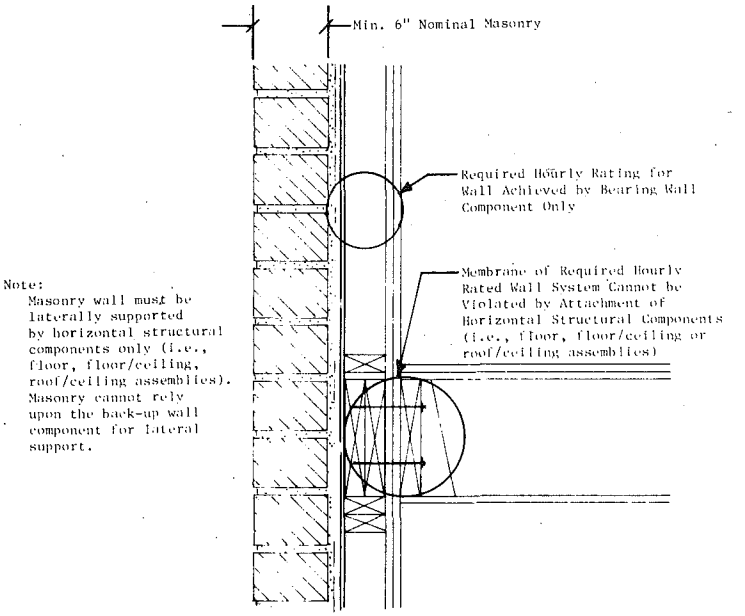
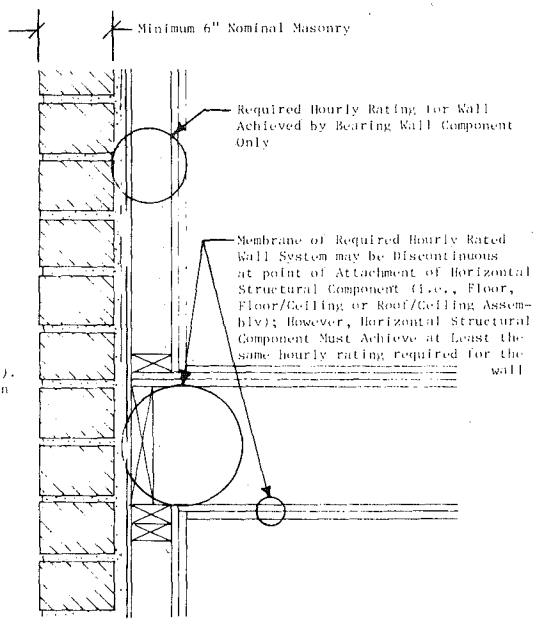


FIGURE 5A
Combination Masonry/Frame Wall
(Bearing and Non-Bearing Condition)

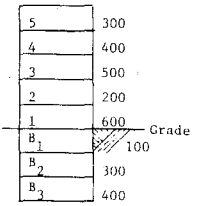
This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.



Note:
Masonry wall must be laterally supported by horizontal structural components only (i.e., floor, floor/ceiling or roof/ceiling assemblies). Masonry cannot rely upon the back-up wall component for lateral support.

FIGURE 5B
Combination Masonry/Frame Wall
(Bearing and Non-Bearing Condition)

A-51.15 (6) EXAMPLE TO DETERMINE TOTAL AGGREGATE EXIT WIDTH.



Type No. 1 sprinklered construction.

Aggregate exit width required from a floor into the stairwell is 30 inches per 100 people on that floor; i.e.,

5th floor to stairwell = 3 x 30 = 90"

4th floor to stairwell = 4 x 30 = 120"

3rd floor to stairwell = 5 x 30 = 150"

etc.

Total stair width required:

5th to 4th - 300 persons (100%) x 30"/100 persons = 90"

4th to 3rd - [400 persons (100%) + 300 persons (50%)] 30"/100 persons = 165"

3rd to 2nd - [500 persons (100%) + 400 persons (50%) + 300 persons (25%)] 30"/100 persons = 232.5"

2nd to 1st - [200 persons (100%) + 500 persons (50%) + 400 persons (25%)] 30"/100 persons = 165" (Use 232.5")

1st to exterior - [600 persons (100%) + (200 persons + 100 persons) (50%) + (500 persons + 300 persons) (25%)] 30"/100 persons = 285"

B_1 to 1st - [100 persons (100%) + 300 persons (50%) + 400 persons (25%)] 30"/100 persons = 105" (Use 150")

B_2 to B_1 - [300 persons (100%) + 400 persons (50%)] 30"/100 persons = 150"

B_3 to B_2 - 400 persons (100%) x 30"/100 persons = 120"

Stair width required from B_1 to 1 is 150" as stair cannot decrease in width along path to exit [Ind 51.16 (2) (c)].

Appendix A

A-51.22 FIRE EXTINGUISHERS. The following information is taken from the National Fire Protection Association Standard #10-1978 - Portable Fire Extinguishers. The information is provided to assist building designers in determining the number, type and location of fire extinguishers needed to comply with the provisions of the standard.

1-3 Definitions.

1-3.1 The basic types of fires are Classes A, B, C and D as defined in the following subsections.

1-3.1.1 Class A fires are fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics.

1-3.1.2 Class B fires are fires in flammable liquids, oils, greases, tars, oil base paints, lacquers, and flammable gases.

1-3.1.3 Class C fires are fires which involve energized electrical equipment where the electrical nonconductivity of the extinguishing media is of importance. (When electrical equipment is de-energized, extinguishers for Class A or B fires may be used safely.)

1-3.1.4 Class D fires are fires in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

1-3.3 Classification of Hazards

1-3.3.1 Light (Low) Hazard. Where the amount of combustibles or flammable liquids present is such that fires of small size may be expected. These may include offices, schoolrooms, churches, assembly halls, telephone exchanges, etc.

1-3.3.2 Ordinary (Moderate) Hazards. Where the amount of combustibles or flammable liquids present is such that fires of moderate size may be expected. These may include mercantile storage and display, auto showrooms, parking garages, light manufacturing, warehouses not classified as extra hazard, school shop areas, etc.

1-3.3.3 Extra (High) Hazards. Where the amount of combustibles or flammable liquids present is such that fires of severe magnitude may be expected. These may include woodworking, auto repair, aircraft servicing, warehouses with high-piled (over 15 ft. in solid piles, over 12 ft. in piles that contain horizontal channels) combustibles, and processes such as flammable liquid handling, painting, dropping, etc.

3-2 Fire Extinguisher Size and Placement for Class A Hazards.

3-2.1 Minimal sizes of fire extinguishers for the listed grades of hazards shall be provided on the basis of Table 3-2.1 except as modified by 3-2.3. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table 3-2.1, except as modified by 3-2.3.

Table 3-2.1

	Light (Low) Hazard Occupancy	Ordinary (Moderate) Hazard Occupancy	Extra (High) Hazard Occupancy
Minimum extinguisher rating	1A	2A	2A
Maximum floor area per unit of A	3000 sq ft	1500 sq ft	1000 sq ft
Maximum floor area per extinguisher	11250 sq ft*	11250 sq ft*	11250 sq ft*
Maximum travel distance to extinguisher	75 ft	75 ft	75 ft

*11250 sq. ft. is considered a practical limit.

Note: Certain smaller extinguishers which are charged with multi-purpose dry chemical or Halon 1211 are rated on Class B and Class C fires, but have insufficient effectiveness to earn the minimum 1-A rating even though they have value in extinguishing smaller Class A fires. They shall not be used to meet the requirements of 3-2.1.

3-2.2 Up to one-half of the complement of extinguishers as specified in Table 3-2.1 may be replaced by uniformly spaced 1½ inch hose stations for use by the occupants of the building. The location of hose stations and the placement of fire extinguishers shall be in such a manner that the hose stations do not replace more than every other extinguisher.

3-2.3 Where the floor area of a building is less than that specified in Table 3-2.1, at least one extinguisher of the minimum size recommended shall be provided.

3-2.4 The protection requirements may be fulfilled with extinguishers of higher rating provided the travel distance to such larger extinguishers shall not exceed 75 feet.

3-2.5 For Class A extinguishers rated under the rating classification system used prior to 1955, their equivalency shall be in accordance with Table 3-2.5.

Table 3-2.5

All Water & Loaded Stream Types	Pre-1955 Rating	Equivalency
1½ to 1¾ gal	A-2	1-A
2½ gal	A-1	2-A
4 gal	A-1	3-A
5 gal	A-1	4-A
17 gal	A	10-A
33 gal	A	20-A

3-3 Fire Extinguisher Size and Placement for Class B Fires Other than for Fires in Flammable Liquids of Appreciable Depth.

3-3.1 Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table 3-3.1.1. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in the table used.

Exception: Extinguishers of lesser rating, desired for small specific hazards within the general hazard area, may be used, but shall not be considered as fulfilling any part of the requirements of Table 3-3.1.1.

Table 3-3.1.1

Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers (Ft.)	(m)
Light (low)	5B	30	9.15
	10B	50	15.25
Ordinary (moderate)	10B	30	9.15
	20B	50	15.25
Extra (high)	40B	30	9.15
	80B	50	15.25

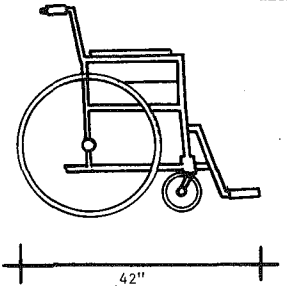
Note: The specified ratings do not imply that fires of the magnitudes indicated by these ratings will occur, but rather to give the operators more time and agent to handle difficult spill fires that may occur.

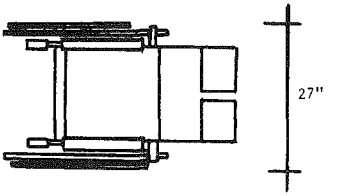
A52.015 FIRE CLASSIFICATIONS. The following information is provided to assist building owners and designers in determining the fire classifications of typical building usage or occupancy:

FIRE CLASSIFICATION	DESCRIPTION OF FUEL LOAD	TYPICAL EXAMPLES
Low Hazard	Buildings or structures used for the manufacture or storage of noncombustible or low hazard materials, that do not ordinarily burn rapidly, such as but not limited to asbestos, chalk, non-alcoholic beverages, brick and masonry, ceramic products, gypsum, food products, glass and metals.	Metal fabricating and assembly; offices; foundries; water pumping and waste water treatment plants; schoolrooms; churches; assembly halls; telephone exchanges; and similar occupancies with slight combustibles.
Moderate Hazard	Buildings and structures used for the manufacture or storage of moderate hazard materials, which are likely to burn with moderate rapidity, but which do not produce either poisonous gases, fumes or explosives, such as but not limited to: cloth, burlap and paper bags; bamboo and rattan; canvas and leather belting; baskets; books and paper in rolls or packs; boots and shoes; buttons; cardboard and cardboard boxes; clothing; cordage; furniture; furs; glue, mucilage, paste and size; linoleum; silk; soap; sugar; tobacco, cigars, cigarettes and snuff; and wax candles.	Mercantile storage and display; auto showrooms; aircraft storage; light manufacturing; warehouses not classified as low or high hazard; school shop areas; leather enameling or japanning operations; livestock shelters; lumber yards; motor vehicle repair shops; petroleum warehouses for storage of lubricating oils with a flash point of 200°F. or higher; photo engraving operations; public garages; stables; and upholstering and mattress manufacturing.
High Hazard	Buildings and structures used for the storage, manufacture or processing of; highly combustible or explosive products or materials, which are likely to burn with extreme rapidity or which may produce poisonous fumes or explosions; highly corrosive, toxic or noxious alkalies, acids or other liquids or chemicals producing flame, fumes, poisonous, irritant or corrosive gases; materials producing explosive mixtures or dusts or which result in the division of matter into fine particles subject to spontaneous ignition.	Woodworking; aircraft servicing; warehouses with material piled 15 feet or higher in solid piles or 12 feet or higher in piles with horizontal channels; ammunition, explosive and firework manufacture; artificial flowers and synthetic leather manufacture; acetylene gas and gases under pressure of 15 pounds or more and in quantities of greater than 2500 cubic feet; celluloid and celluloid products; cereal; feed, flour and grist mills; cotton batting and waste processes; cotton apparel making; dry cleaning establishments using or storing more than 3 gallons of gasoline or flammable liquids with a flash point under 100°F. or more than 60 gallons of flammable liquids with a flash point between 100°F. and 140°F.; feather renovating; fruit ripening processes; grain elevators; hydrogenation processes; industries employing solids or substances which ignite or produce flammable gases on contact with water; storage of kerosene, fuel, lubricating oils and combustible liquids with a flash point under 200°F.; match manufacture and storage; metal enameling and japanning; nitrocellulose film exchanges and laboratories; paint and varnish manufacture; petroleum manufacture; processing of paper or cardboard in loose form; pyroxylin product storage and manufacture; and smoke houses.

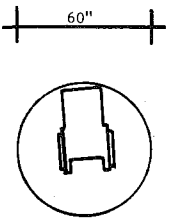
A-52.04 REQUIREMENTS FOR BARRIER-FREE ENVIRONMENTS. The following illustrations are provided to give the designer visual aids for making facilities accessible.

WHEELCHAIR DIMENSIONS



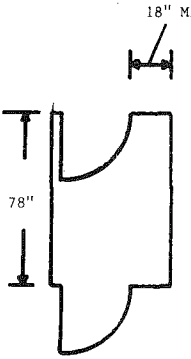


TURNING SPACE



180-360° Turn

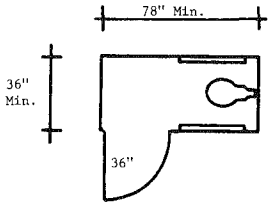
DOORS IN SERIES



Doors in series should be hinged on the same side and should swing in the same direction. A minimum of 18 inches of clear space should be provided on the door knob side of the door. The length of the vestibule should be a minimum of 78 inches.

Appendix A

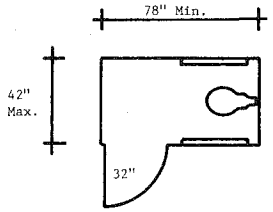
EXAMPLES OF ACCESSIBLE TOILET COMPARTMENTS AS SPECIFIED IN TABLE 52.04-A

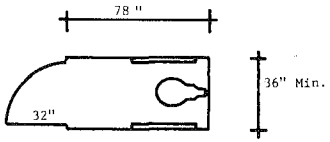


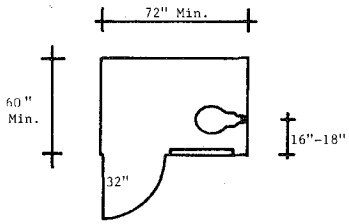
Recommended fixtures:

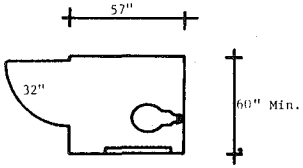
1. Elongated bowl;
2. Wall mounted.

Note: These are examples of toilet room compartments which are located within accessible toilet rooms.



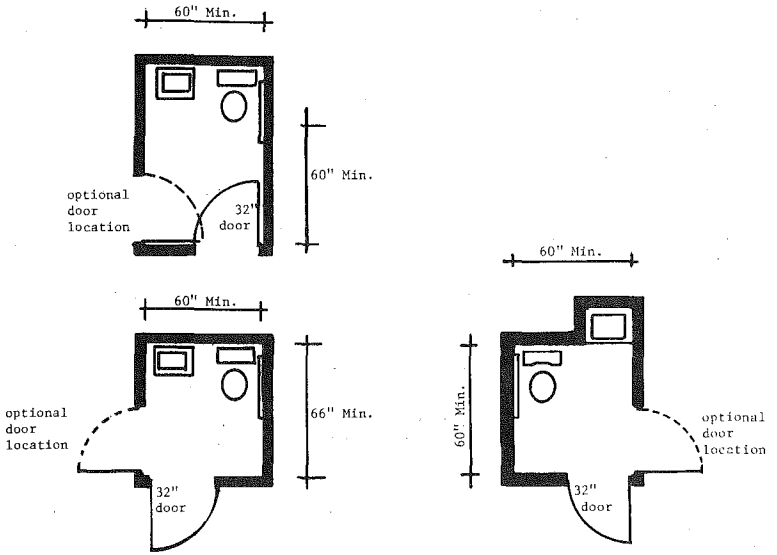






The door of the 60" x 57" water closet compartment having a frontal approach should not align with the placement of the water closet.

EXAMPLES OF ACCESSIBLE TOILET ROOMS
CONTAINING ONE LAVATORY AND ONE WATER CLOSET



Note #1: These examples of accessible toilet rooms may be used in health care facilities in that sufficient room for the attendant is provided.

Note #2: These examples may be modified by substituting pocket sliding doors for the swing doors shown in the examples. Surface-mounted hardware is recommended for pocket sliding doors.

Appendix A

A-52.04 (3) (a) SITE REQUIREMENTS — PARKING SPACE IDENTIFICATION. The following is a reprint of Wisconsin Department of Transportation's administrative rule, s. Trans 200.07, dealing with the signage for parking spaces designated for the physically disabled:

Trans 200.07 Handicapped parking signs. (1) PURPOSE. The purpose of this section is to define and illustrate the design, size and installation requirements of the official traffic signs required under s. 346.503 (1), Stats., related to reserved parking spaces for handicapped persons.

(2) SIGN DESCRIPTION. (a) The sign shall consist of a white rectangle with longer dimension vertical, having green message, a green arrow, if required under this section, and a blue and white international symbol for the barrier-free environments. The sign may be reflective or nonreflective.

(b) The sign shall include the words "reserved parking" and the words "vehicles with VET or DIS plates or state disabled card" or other words with a similar meaning.

(c) The size of the sign shall be not less than 12 inches by 18 inches. When used on a highway with a speed limit of more than 35 miles per hour, it shall be not less than 18 inches by 24 inches.

(d) A right arrow, left arrow or the words "This Stall" or similar wording shall be included near the bottom of the sign.

(3) SIGN PLACEMENT. Each sign shall be erected on an adequate support. On highways, the vertical distance from roadway to the bottom of a sign shall be not less than 7 feet, except when overhead obstructions necessitate a lower height. In off-highway parking lots, the vertical distance from the parking lot surface, or top of curb if any, to the bottom of a sign shall be not less than 4 feet. A single sign with the message "This Space" or similar wording shall be used to designate a single reserved space. At least 2 signs are required for multiple reserved spaces. When 2 signs are used they shall be located at the outermost limits of the spaces reserved and, by arrow, designate the location of the reserved spaces.

(a) A sign shall be located at the end of an angled or right-angled space and shall be set to face a motorist entering the space.

(b) When the reserved space is parallel to the edge of a roadway, a sign shall be set at an angle of approximately 30° degrees with the line of traffic.

(4) Signs which are in place prior to the effective date of this section may remain in place and have the same effect as the signs described herein for 5 years after the effective date of this chapter provided that they include the international symbol for barrier-free environments and the wording required under (2) (b) either as part of the original sign or on a supplementary placque or placques. The requirements under (3) do not apply to these signs.

(5) ENFORCEMENT. The provisions of this rule shall be enforced by order of the department. District transportation directors shall be responsible for the issuance of all orders regarding noncompliance.

A-52.04 (3) (b) SITE REQUIREMENTS — CURB RAMPS. The following is a reprint of s. 66.616 (3) (a), Stats., dealing with the design and construction of curb ramps:

(a) Curb ramping shall be of permanent construction. The ramp shall be at least 40 inches wide. The sides of the ramp shall slope from the sidewalk or apron elevations to the ramp elevation with the widest portion of the side slope not less than 18 inches nor more than 24 inches wide at the curb. The ramp slope may not exceed one inch vertical to 12 inches horizontal from the flow line elevation of the curb. The curb opening shall be not less than 40 inches nor more than 80 inches wide at the flow line of the curb. The taper of the curb from the top of the curb to the flow line of the curb at the curb opening shall be not less than 18 inches nor more than 24 inches wide. The ramp shall be bordered on both sides and on the curb line with a 4-inch-wide yellow stripe or with brick of a contrasting color.

A-52.04 (4) (b) LIFTS FOR THE PHYSICALLY DISABLED. The stair-mounted lifting devices, providing interior circulation for the physically disabled, are either of a platform type accommodating the wheelchair and its user or a seat type which requires the person to transfer from the wheelchair.

In new construction, the seat-type lifting device will be acceptable only in private group type occupancies such as, but not limited to, senior citizen centers, fraternal organizations, small churches with less than 100 occupants, and private residences. In remodeled situations where adequate space for other lifting devices is not available, a seat-type lifting device will be acceptable.

The following guidelines should be used for lifting devices provided for interior circulation:

(1) If the lifting device is to be located in a required exit stairway, the lifting device, in its open position, cannot infringe upon the required exit width for the floor the stairway serves. To determine the required exit width, refer to the specific occupancy chapters of this code.

(2) The department recommends that the building plans submitted for approval indicate the type of lifting device to be used, the location, and the width of the lifting device in its open position.

(3) The guidelines of the elevator section of this department require platform lifts to be designed with proper safety devices such as 42-inch high sides and gates, gate locks and contacts, guarding of space under the lift, etc., to provide safety for the public and persons using the lift with aids such as wheelchairs, crutches, braces or canes.

(4) Vertical lifts having a travel distance in excess of 72 inches are considered to be elevators and must comply with the requirements for passenger elevators, ch. Ind 4, Elevator Code, Wis. Adm. Code.

(5) After the building plans are approved for the location and use, 3 sets of mechanical drawings for the lifting device must be submitted to the elevator section in accordance with ch. Ind 4, Elevator Code, Wis. Adm. Code.

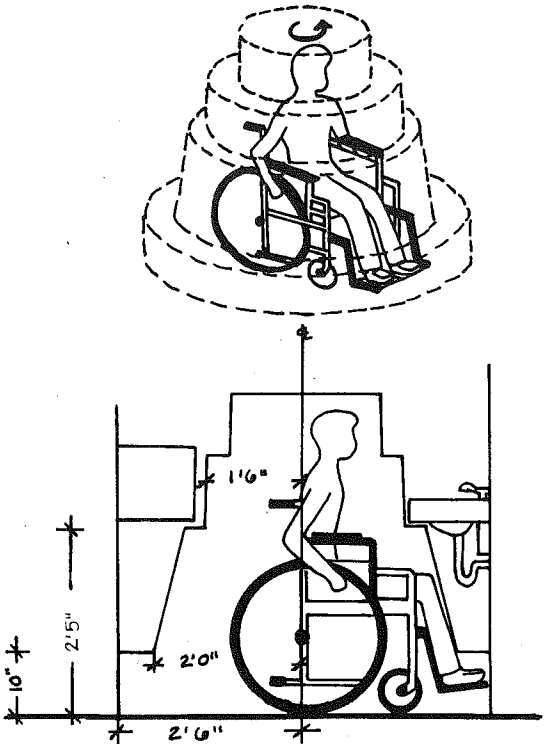
(a) Two copies of the elevator application form are required to be submitted along with an examination fee and an inspection fee.

(b) A copy of the building approval letter should accompany the mechanical drawings.

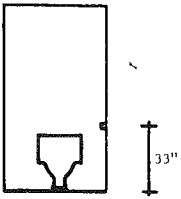
Appendix A

ILHR 52.04 (8) TOILET FACILITY DETAILS. (a) *Accessible toilet rooms and compartments.* Accessible toilet rooms and toilet compartments shall be sized to privide ease of access, usability and uninterrupted mobility. Fixtures, doors and other obstructions shall be arranged to insure accessibility.

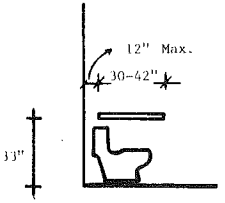
The space underneath lavatories can be utilized in sizing a toilet room for accessibility.

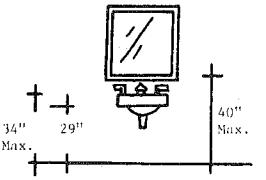


ACCESSIBLE TOILET ROOMS



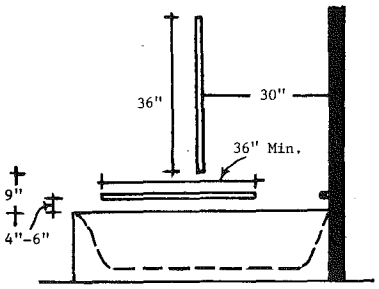
It is recommended that grab bars be from 30 to 42 inches in length and located no more than 12 inches from the back wall.



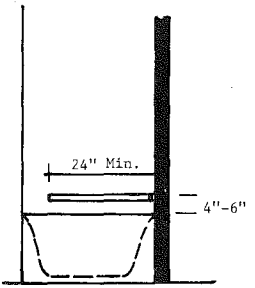


Appendix A

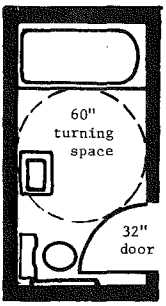
ACCESSIBLE BATHING FACILITIES

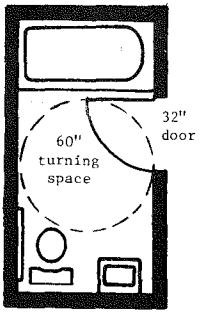


Side Elevation - Bathtub



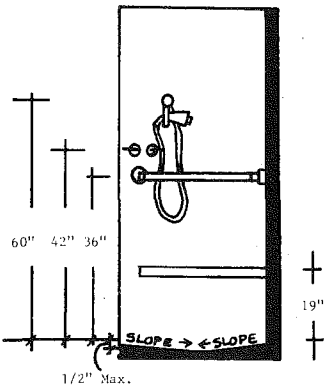
End Elevation - Bathtub



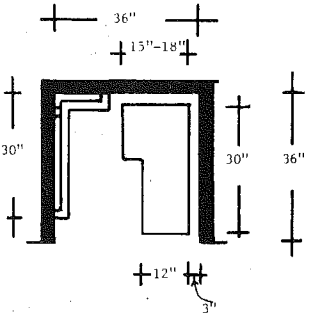


These diagrams are examples of accessible bathrooms which may be used for motels, hotels, hospitals and nursing homes.

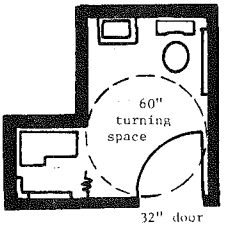
ACCESSIBLE BATHING FACILITIES



Section View - Shower

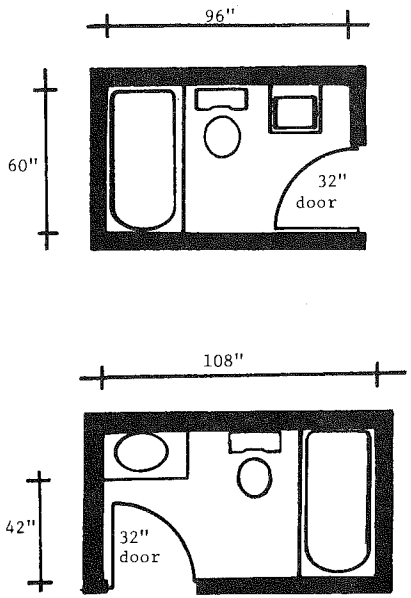


Plan View - Shower



Appendix A

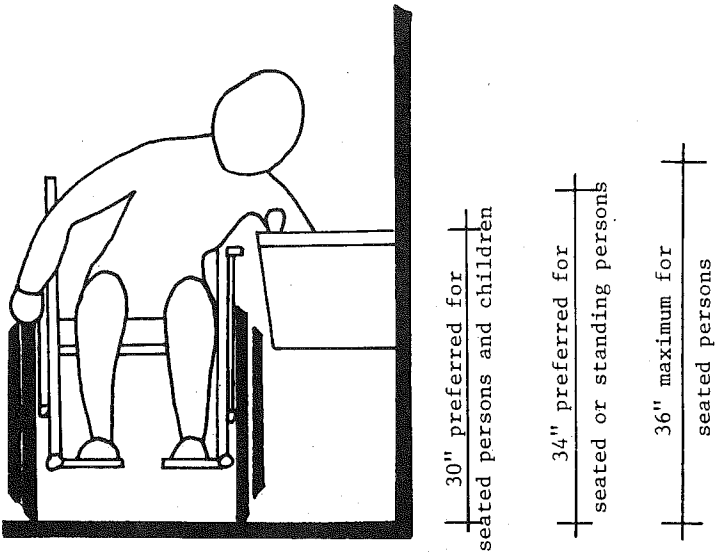
EXAMPLES OF ADAPTABLE BATHROOM LAYOUTS
FOR RESIDENTIAL LIVING UNITS
(not including hotels and motels)

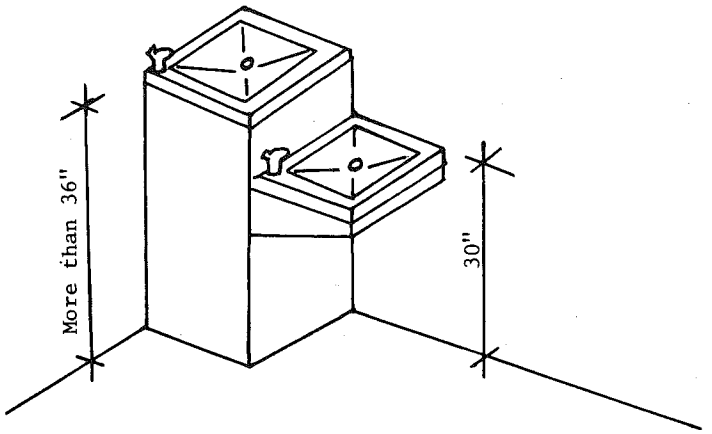


These examples may be modified for accessibility by using outward swinging doors or pocket sliding doors.

EXAMPLES OF ACCESSIBLE WATER COOLERS

Note: Conventional floor-mounted water coolers can be serviceable to patrons with functional limilations if a small fountain is mounted on the side of the cooler 30 inches above the floor. Fully recessed water fountains are not recommended and should not be recessed in an alcove unless the alcove is wider than the wheelchair.



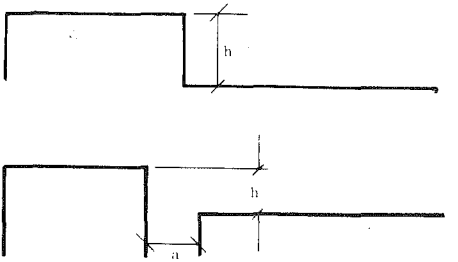


Floor-mounted water cooler with side-mounted cooler

INTERNATIONAL SYMBOL FOR BARRIER-FREE ENVIRONMENTS

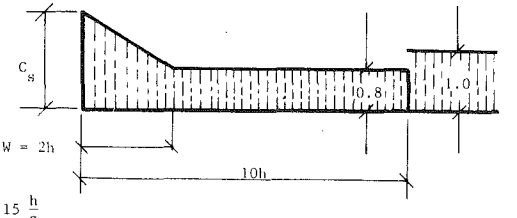
A-53.11 (4) (b) *Increase in roof loads.* The following design provisions may be used to determine the increase in roof loads as required by this section.

ROOF SHAPES



Lower level of multi-level roofs (when upper roof is part of the same building or on an adjacent building not more than 15 feet away).

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



$C_s = 15 \frac{h}{g}$

when $15 \frac{h}{g} < 1.0$ use $C_s = 1.0$

when $15 \frac{h}{g} > 3.0$ use $C_s = 3.0$*

$W = 2h$

when $h \leq 5$ ft use $W = 10$
$h > 15$ ft use $W = 30$

h = difference of roof heights in ft.

g = roof live load in psf [Ind 53.11 (4)]

w = width of drift from higher building in ft.

a = distance between buildings $\leq$ 15 ft.

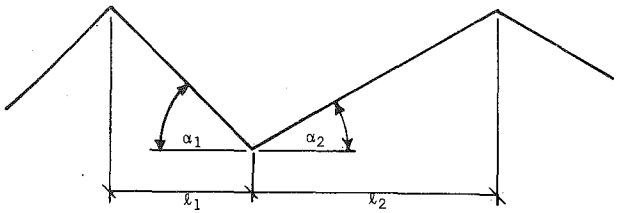
Design upper roof for loads applicable to single-level roofs.

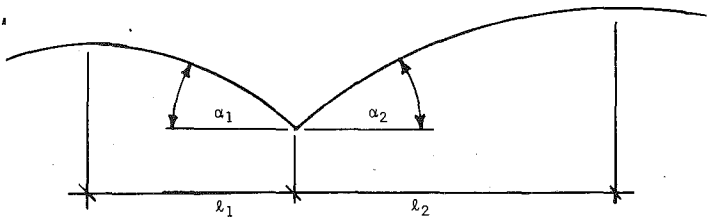
*An upper limit of 3 times the basic roof load has been suggested. It should be noted, however, that higher loads have been observed where an upper roof was very long (measured perpendicularly to the step between the upper and lower roofs). On the other hand, for relatively short upper roofs (say less than 50 ft), a reduction below the calculated C_s value may be judged adequate by the designer.

Appendix A

ROOF SHAPES

Valley areas of two-span and multi-span sloped or curved roofs



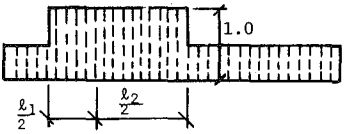


SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS

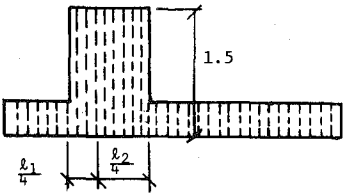
CASE I

$C_s = 1.0$

CASE II

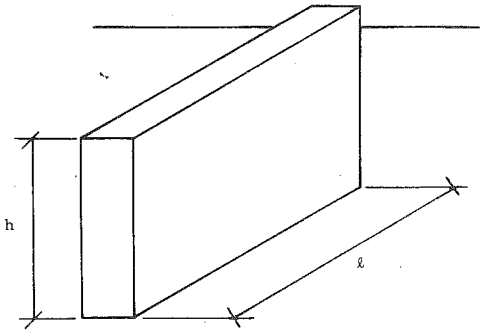


CASE III



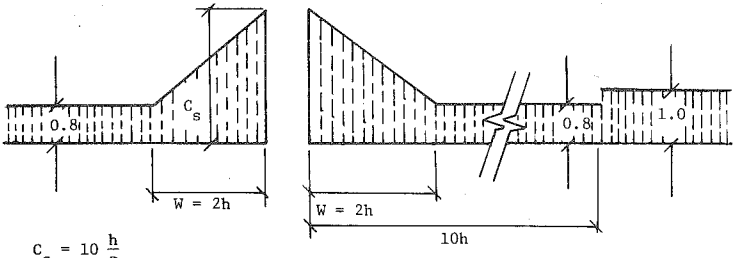
For both α_1 and $\alpha_2 \leq 10°$ use Case I only; otherwise use Case I, II and III

ROOF SHAPES



Roof areas adjacent to projections and obstructions on roofs

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



$C_s = 10 \frac{h}{g}$

when $10 \frac{h}{g} < 1.0$ use $C_s = 1.0$

when $10 \frac{h}{g} > 2.0$ use $C_s = 2.0$

when $\ell < \frac{g}{6}$ use $C_s = 1.0$

$W = 2\ h$

when h < 5 ft use W = 10
when h > 15 ft use W = 30

h = height of projection in ft.

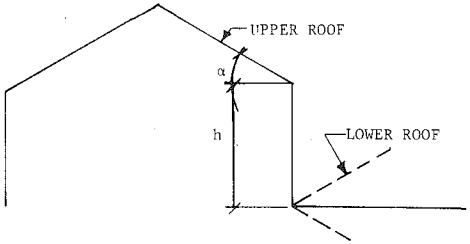
g = roof live load in psf

w = width of snow drift in ft.

ℓ = length of projection in ft.

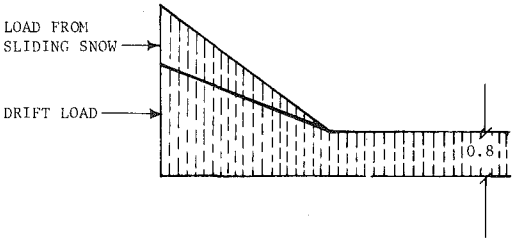
Appendix A

ROOF SHAPES



Lower of multi-level roofs with upper roof sloped towards lower roof, where α exceeds 10°.

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



Design lower roof for loads applicable to multi-level roof plus a portion of the sliding snow from the upper roof.*

Design upper roof for loads applicable to single-level roofs.

*Where snow is likely to slide onto a lower roof from an upper roof, the lower roof should be designed for the load as provided for multi-level roofs plus an additional load produced by the snow that may slide from the upper roof. It is not possible to provide coefficients for this situation, but the following guide is recommended. Because of the remote probability that both upper and lower roofs will have their full load over the full areas simultaneously when sliding occurs, it may be assumed that the lower roof would be carrying its full load and that sliding of 50% of the total weight of the applicable uniformly distributed snow load from the upper roof would occur.

A-53.11 (4) (e) *Roof Designed for Control Flow Drainage.* This section refers to the requirements of the Plumbing Code (ch. ILHR 82) for storm drain sizes where control flow drainage roof design is used. The following information from the plumbing code is provided for use by the building designer:

ILHR 82.05 (3) (b) *Storm.* The building storm drain size shall be determined on the total area to be drained thereby and other wastes tributary to the drain. The minimum size of the roof leaders shall be determined from table 5 or shall be calculated using the formula following the table. The size of the building storm drain shall be not less than that specified in tables 11, 11a and 11b. See s. ILHR 82.12 (3) (c).

Table 5

Type of Roof	Allowable Roof Area in Square Feet for Given Size of Inside Leader					
	2½"	3"	4"	5"	6"	8"
Roof covered with gravel, slag or similar material with incline ¼" to 1' or less	Up to 1,645	1,646 to 2,120	2,121 to 3,780	3,781 to 5,885	5,886 to 8,490	8,491 to 15,125
Same with incline ½" to 1' or more and sawtoothed roofs	Up to 1,220	1,221 to 1,770	1,771 to 3,150	3,151 to 4,905	4,906 to 7,075	7,076 to 12,600
Metal, tile, brick, slate, or similar roofs of any incline	Up to 975	976 to 1,415	1,416 to 2,520	2,521 to 3,925	3,926 to 5,660	5,661 to 10,080

Tables 11, 11a and 11b of s. ILHR 82.12 (3) (c)

Table 11

SIZE OF HORIZONTAL STORM DRAINS ACCORDING TO ROOF AREA SERVED

Pipe Size	Pitch 1/16" per 1' sq. ft. area	Pitch ⅛" per 1' sq. ft. area	Pitch ¼" per 1' sq. ft. area	Pitch ½" per 1' sq. ft. area
3"	650	910	1,300	1,820
4"	1,300	1,950	2,990	3,770
5"	2,470	3,640	5,070	7,020
6"	4,160	5,980	8,320	11,700
8"	9,320	13,000	18,200	26,000
10"	17,680	24,700	33,800	50,440
12"	27,300	41,080	57,200	81,900
15"	52,000	72,800	105,300	146,640
18"	85,800	121,550	174,200	247,000
21"	156,520	179,660	256,880	374,400
24"	187,200	261,560	382,200	546,000

Table 11a
MINIMUM SIZE OF HORIZONTAL STORM DRAINS SERVING PAVED OR GRAVELED GROUND SURFACE AREAS

Pipe Size	Pitch 1/16" per 1' sq. ft. area	Pitch ⅛" per 1' sq. ft. area	Pitch ¼" per 1' sq. ft. area	Pitch ½" per 1' sq. ft. area
3"	810	1,140	1,625	2,270
4"	1,625	2,430	3,740	4,720
5"	3,090	4,550	6,350	8,760
6"	5,200	7,470	10,400	14,600
8"	11,650	16,250	22,750	32,600
10"	22,100	30,850	44,250	63,000
12"	34,150	52,300	71,500	102,200
15"	65,000	91,000	131,500	183,000
18"	107,000	152,000	210,800	321,000
21"	195,000	224,000	321,000	468,000
24"	234,000	336,000	478,000	682,000

Table 11b
MINIMUM SIZE OF HORIZONTAL STORM DRAINS SERVING LAWNS, PARKS AND SIMILAR LAND SURFACES

Pipe Size	Pitch 1/16" per 1' sq. ft. area	Pitch ⅛" per 1' sq. ft. area	Pitch ¼" per 1' sq. ft. area	Pitch ½" per 1' sq. ft. area
3"	2,600	3,640	5,200	7,280
4"	5,200	7,800	11,960	15,080
5"	9,880	13,560	20,280	28,080
6"	16,640	23,920	33,280	46,800
8"	37,280	52,000	72,800	112,000
10"	69,720	98,800	135,200	201,760
12"	109,200	164,320	228,800	327,600
15"	208,000	291,200	421,200	586,560
18"	343,200	490,200	596,800	988,000
21"	526,080	718,640	1,027,520	1,497,600
24"	748,800	1,046,240	1,528,800	2,184,000

A-53.15 LOAD COMBINATIONS. It is the intent of this section that the loads specified in ss. ILHR 53.10 through 53.14 be considered to act in the following combinations, whichever is critical, for the design of the building frame, foundation or structural member:

1. Dead load plus live load.

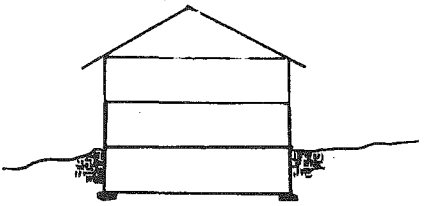
2. Dead load plus wind load.

3. Dead load plus live load plus wind load.

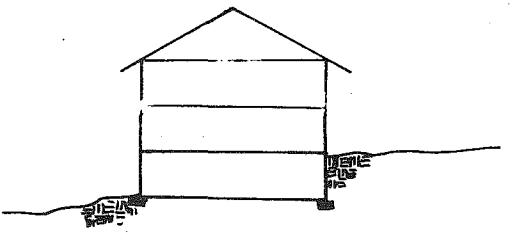
4. Dead load plus live load plus crane loads.

Distribution of live loads which would cause the maximum shear, bending moment or stress in structural members should be investigated.

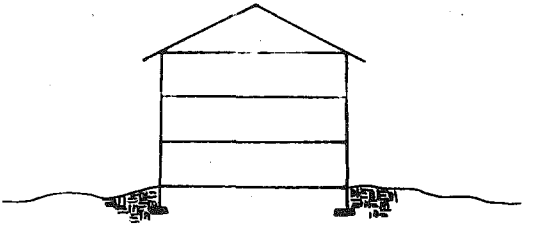
A-53.64 WOOD FOUNDATIONS. The following illustrations are provided to give visual aid to the limitations specified in this rule and to indicate the three typical designs permitted by the rule.



Two -story with full basement



Two-story with ground floor



Three -story with wood foundation
(No basement or crawl space)

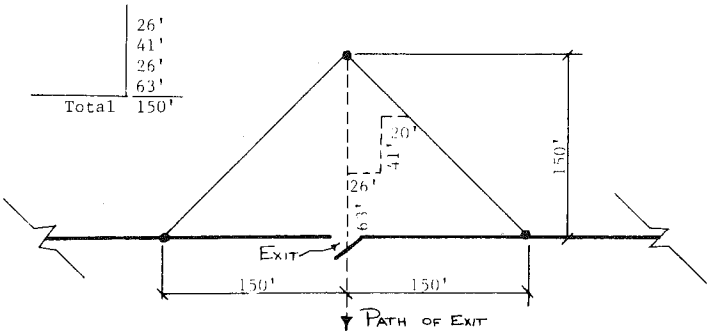
Appendix A

A-54.02 (4). EXIT DISTANCE. The following illustrations and text are provided to explain the procedure and intent of using the triangulation method of exit distance determination.

Exit travel must terminate at one of the following types of exits:

1. Standard exit to grade (Ind 51.15)
2. Enclosed stairways (Ind 51.17 and 51.18)
3. Horizontal exits (Ind 51.19)
4. Fire escapes (Ind 51.20)

Therefore, exit distance must be measured from one of these exit types. All exits must lead to a street, alley or open court which is connected to a street or alley.



Procedure:

1. Beginning at designated exit type, measure required exit distance (100 feet, for example) at right angles to and parallel with (on both sides) the exit.
2. Connect end points to form the "exit triangle."
3. All areas within the triangle are within the required exit distance when traveling toward or at right angles to the exit.
4. All the interior space of a building must fall within the "exit triangles" formed by using the required exits for the building.
5. When measuring exit distance in stairways, only the horizontal travel distance is included in the determination.

A-57.02 (2) (b) VERTICAL DIVISION WALLS. See drawings and illustrations in s. A 51.03 (5) (a) for typical floor/ceiling-wall connection details for vertical division walls. Disregard masonry components shown in drawings when masonry is not used in the construction of the vertical division wall.

A-57.07 (3) CHANGES OF ELEVATION WITHIN INDIVIDUAL LIVING UNITS. Section ILHR 57.07 (3) permits the steps, stairs and ramps within individual living units to conform with s. Ind 21.04 of the Uniform Dwelling Code. The following is a reprint of the subject rules:

Ind 21.04 Stairs. Every exterior or interior exit stairs shall conform to the requirements of this section. [See s. ILHR 57.07 (3) (a)]

(1) MINIMUM WIDTH. Every required exit stairs shall measure at least 3 feet 0 inches in width, except that stairs leading to basements may measure 2 feet 8 inches in width.

(2) HEADROOM. Every stairs shall be provided with a minimum headroom clearance of 6 feet 4 inches. The minimum clearance shall be measured vertically from a line parallel to the edge of the treads to the ceiling or soffit directly above that line.

(3) TREADS AND RISERS. Risers shall not exceed 8¼ inches in height, measured vertically from tread to tread. Treads shall be at least 9 inches wide, measured horizontally from riser to riser. There shall be no variation in uniformity exceeding 3/16 inch in the depth of tread or in the height of risers. No flight of stairs shall exceed 12 feet in height vertically unless landings are provided.

(4) LANDINGS. (a) *Intermediate landings.* Intermediate landings located in a flight of stairs shall be at least as wide as the stairs and shall measure at least 3 feet 0 inches in the direction of travel. Trim and handrails may project no more than 3½ inches into the required width.

(b) *Landings at the top and base of stairs.* A level landing shall be provided at the top and at the base of every stairs. The landing shall be at least as wide as the stairs and shall measure at least 3 feet 0 inches in the direction of travel.

(c) *Doors at landings.* Where a door is provided at the head or foot of a stairs, a level landing on each side of the door shall be provided between the door and the stairs, regardless of the door swing.

1. Exception. No landing shall be required between the door and the basement stairs or stairs leading to a garage, provided the door does not swing over the stairs.

2. Exception. A storm door or screen door shall be permitted to swing over an exterior platform or sidewalk provided the platform or sidewalk is located not more than 8¼ inches below the floor level and provided the platform has a length at least equal to the width of the door.

(5) HANDRAILS AND GUARDRAILS. (a) *Handrails.* Every stairs of more than 3 risers shall be provided with at least one handrail. Handrails shall be provided on all open sides.

(b) *Guardrails.* All openings between floors, open sides of landings, platforms, balconies or porches which are more than 24 inches above grade or a floor shall be protected with guardrails.

(c) *Handrail and guardrail details.* 1. Height. Handrails shall be located at least 30 inches, but not more than 34 inches, above the upper surface of the tread. Guardrails shall be located at least 36 inches above the upper surface of the floor.

2. [See s. ILHR 57.07 (3) (b)]

3. Clearance. The clearance between the handrail and the wall surface shall be at least 1½ inches.

(6) WINDERS. Winder steps may be used in required exit stairs where the length of the tread is at least 3 feet 0 inches and the wider tread measures at least 7 inches in width at a point one foot from the narrow end of the tread.

(7) SPIRAL STAIRS. Spiral stairs may be used as required exit stairs. The tread shall measure at least 26 inches from the outer edge of the supporting column to the inner edge of the handrail and at least 7 inches in width at a point one foot from the narrow end of the tread.

A-57.11 The intent of this section is to apply to floor levels not more than one story below grade (at building).

A-57.11 (1) (f) It is the intent of this subsection that each living unit needs only one means of exit from within the unit and that the entire building be provided with no less than 2 exits.

A-59.14 (2) (c) *Exit distance.* See the information and illustration contained in A-54.02 (4).

A-60.19 (4) The standard is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

Appendix A

A-60.24 Class A fires are fires in ordinary combustible materials such as wood, cloth, paper, rubber, and many plastics. Class B fires are fires in flammable liquids, gases and greases.

A-60.35 See A-60.24.

A-60.36 (1) (a). See A-60.19 (4).

A-62.25 (1) CLEARANCE LIMITATIONS. The intent is to require the minimum 7 feet 0 inches clearance only in traffic lanes and in all areas normally used by the public to leave from and return to their vehicles.

A-62.50 FIRE EXTINGUISHERS. See A-51.22 for related information

A-63.41 FORM. Copies of the following form (SBD 5315) are available from the Division of Safety and Buildings, P.O. Box 7969, Madison, Wisconsin 53707. This form may be used to verify compliance with the illumination requirements of this section.

ILLUMINATION BUDGET CALCULATION

Department of
INDUSTRY, LABOR AND HUMAN RELATIONS

Safety & Building Division
Box 7969
201 E Washington Avenue
Madison, Wisconsin 53707

SEE BACK OF SHEET FOR NOTES AND INSTRUCTIONS

PROJECT INFORMATION

Name of Owner	Building Occupancy or Use	Designer or Design Firm
Company	Tenant Name, if any	Street & No.
Street & No	Building Location, Street & No.	City State & Zip
City State & Zip	City ☐ Village ☐ Town ☐ County	Phone

ALLOWABLE ILLUMINATION BUDGET				INSTALLED ILLUMINATION			
Room or area desig. (1)	Room area (Sq. Ft.) (2)	Allowable watts Per Sq. Ft. Ind 63.41 (3)	Room wattage (4)	Fixture type (5)	No. of fix. (6)	Watts per fix (7)	Total wattage (8)
				Sheet Totals			
				Building Totals (Final Sheet)			

SAMPLE

Signature of designer

Registration Number Date

(SEAL)

Sheet ____ of ____

DILHR-SBD-5315(R. 10/81)

Appendix A

NOTES AND INSTRUCTIONS

1. Fixture schedules must accompany this form, or be shown on the plans, or in the specifications. If this form is used in lieu of illumination plans, four copies of the form shall be submitted.

2. A completed SB-118, *Plans Approval Application Form,* must accompany these calculations if they are submitted separately from the building plans.

3. The first sheet of this form must be signed and sealed by a Wisconsin registered architect, engineer or electrical designer if the total building volume is greater than 50,000 cubic feet.

4. All electric discharge lighting must meet the minimum power factor requirements of Ind 63.40.

5. Use of form:
   A. Calculations are on an individual room or area basis.
   B. Enter room or area designation in column (1). This should correspond to the designations shown on the building plans.
   C. Calculate the floor area, in Sq. Ft., of the room or area. Enter area in column (2).
   D. Determine the allowable "Watts per Sq. Ft." from Ind 63.41. Enter this value in column (3).
   E. Multiply value in column (2) by value in column (3). Enter product in column (4).
   F. Enter fixture type(s) from fixture schedule in column (5).
   G. Enter number of fixtures of each type, located in the room or area, in column (6).
   H. Enter the wattage for one fixture of that type in column (7).
   I. Multiply value in column (6) by value in column (7). Enter product in column (8).
   J. Total columns (4) and (8), entering sheet totals at the bottom of each sheet, and the total of all sheets at the bottom of the final sheet.
   K. Column (8) building total must be less than, or equal to, the building total in column (4).

A-64.20. EQUIPMENT RATINGS AND SAFETY CONTROLS. The department recognizes the following reference standards for the testing and installation of heating and ventilating equipment:

(1) American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018:
(a) GAS-FIRED ROOM HEATERS, Vol. 1, ANSI Z21.11.1;
(b) GAS-FIRED LOW PRESSURE STEAM AND HOT WATER BOILERS, ANSI Z21.13;
(c) GAS UNIT HEATERS, ANSI Z21.16;
(d) DOMESTIC GAS CONVERSION BURNERS, ANSI Z21.17;
(e) GAS APPLIANCE PRESSURE REGULATORS, ANSI Z21.18;
(f) AUTOMATIC GAS IGNITION SYSTEMS AND COMPONENTS, ANSI Z21.20;
(g) AUTOMATIC GAS VALVES, ANSI Z21.21;
(h) RELIEF VALVES AND AUTOMATIC GAS SHUTOFF DEVICES FOR HOT WATER SYSTEMS, ANSI Z21.22;
(i) GAS APPLIANCE THERMOSTATS, ANSI Z21.23;
(j) GAS-FIRED DUCT FURNACES, ANSI Z21.34;
(k) GAS FILTERS ON APPLIANCES, ANSI Z21.35;
(l) GAS-FIRED GRAVITY AND FAN TYPE DIRECT VENT WALL FURNACES, ANSI Z21.44;
(m) GAS-FIRED GRAVITY AND FORCED AIR CENTRAL FURNACES, ANSI Z21.47;
(n) GAS-FIRED GRAVITY AND FAN TYPE FLOOR FURNACES, ANSI Z21.48;
(o) GAS-FIRED GRAVITY AND FAN TYPE VENTED WALL FURNACES, ANSI Z21.49;
(p) VENTED DECORATIVE GAS APPLIANCES, ANSI Z21.50;
(q) GAS-FIRED SINGLE FIREBOX BOILERS, ANSI Z21.52;
(r) GAS-FIRED HIGH PRESSURE STEAM AND HOT WATER BOILERS (Inputs not over 400,000 Btu/hour), ANSI Z21.59;
(s) DECORATIVE GAS APPLIANCES FOR INSTALLATION IN VENTED FIREPLACES, ANSI Z21.60;
(t) DIRECT GAS-FIRED MAKE-UP AIR HEATERS, ANSI Z83.4;
(u) GAS-FIRED HEAVY DUTY FORCED AIR HEATERS, ANSI Z83.5; and
(v) GAS-FIRED INFRARED HEATERS, ANSI Z83.6.

(2) Canadian Standards Association, Certification Division, Rexdale, Ontario Canada, M9W IR3;

(a) Solid-Fuel Fired Appliances for Residential Use, CSAB 366M.

(3) Energy Testing Laboratory of Maine, South Maine Vocational Technical Institute, South Portland, Maine 04106.

(a) Testing for Safety—Requirements and Test Procedures for Solid-Fuel Burning Central Heating Appliances and Combination Oil- and Solid-Fuel Burning Central Heating Appliances, ETLM Standard #78-1.

(4) International Conference of Building Officials, Inc., 5360 South Workman Mill Road, Whittier, California 90601:

(a) Research Committee Acceptance Criteria for Fireplace Heat Exchangers.

(5) Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611:

(a) CHIMNEYS, FACTORY-BUILT, RESIDENTIAL TYPE AND BUILDING HEATING APPLIANCES, UL 103;

(b) FACTORY BUILT FIREPLACES, UL 127;

(c) OIL BURNERS, UL 296;
(d) CONTROLS, PRIMARY SAFETY FOR GAS- AND OIL-FIRED APPLIANCES, UL 372;
(e) SOLID-FUEL FIRED CENTRAL FURNACES, UL 391;
(f) GAS VENTS, UL 441;
(g) HEATING APPLIANCES, ELECTRIC, UL 499;
(h) HEAT PUMPS, UL 559;
(i) TYPE L LOW-TEMPERATURE VENTING SYSTEMS, UL 641;
(j) OIL-FIRED BOILER ASSEMBLIES, UL 726;
(k) OIL-FIRED CENTRAL FURNACES, UL 727;
(l) OIL-FIRED FLOOR FURNACES, UL 729;
(m) OIL-FIRED WALL FURNACES, UL 730;
(n) OIL-FIRED UNIT HEATERS, UL 731;
(o) HEATERS, AIR AND DIRECT-FIRED HEATERS, OIL-FIRED, UL 733;

(p) FIREPLACE STOVES, UL 737;
(q) COMMERCIAL-INDUSTRIAL GAS HEATING EQUIPMENT (Inputs over 400,000 Btu/hour), UL 795;
(r) HEATERS, ELECTRIC, FOR USE IN HAZARDOUS LOCATIONS; Class I, Groups A, B, C and D, and Class II, Groups E, F and G, UL 823;
(s) ELECTRIC BOILERS, UL 834;
(t) HEATERS, ELECTRIC DRY BATH, UL 875;
(u) FAN COIL UNITS AND ROOM FAN HEATER UNITS, UL 883;
(v) OIL-BURNING STOVES, UL 896;
(w) HEATERS, ELECTRIC AIR, UL 1025;
(x) HEATING EQUIPMENT, ELECTRIC BASEBOARD, UL 1042;
(y) HEATING EQUIPMENT, ELECTRIC CENTRAL AIR, UL 1096; and
(z) ROOM HEATERS, SOLID-FUEL TYPE, UL 1482.

Note: The table on the following page is a tabular summary of UL 296 and UL 795.

TABULAR SUMMARY UL STANDARD 296 AND UL STANDARD 795

FUNCTION/BURNER INPUTS	OIL BURNERS UL 296				COMMERCIAL/INDUSTRIAL GAS UL 795				
					Mechanical Draft Burners				
	3 GPH 400,000 Btu or less	7 GPH 1 million Btu or less	20 GPH 3 million Btu or less	Over 20 GPH 3 million Btu	Over 400,000 to 2,500,000	Over 2,500,000 to 5,000,000	Over 5,000,000 to 12,500,000	Over 12,500,000	ATM Draft
Prepurge timing	--	--	--	--	4	4	4	4	90 sec[3]
Air changes	--	--	--	--	4	4	4	4	--
Interlock Controls (Recycle)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Proven combustion air	[8]	[8]	[8]	[8]	Yes	Yes	Yes	Yes	--
Valve seal overtravel[9]	--	--	--	--	--	Optional	Yes	Yes	13
Low gas pressure	--	--	--	--	--	Yes[20]	Yes[20]	Yes[20]	13
High gas pressure	--	--	--	--	--	Yes[20]	Yes[20]	Yes[20]	13
Low fire start	[11]	[11]	11	11	11	11	11	11	13
High limit (press. or temp.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Low water cutoff	Boilers[21]	Boilers[21]	Boilers[21]	Boilers[21]	Boilers	Boilers	Boilers	Boilers	13
Pilot - Intermittent	Optional	Optional	Optional	--	Optional	Optional	Optional	Optional	12
Pilot - Interrupted	[19]	[19]	[19]	Yes[5]	Optional	Optional[2]	Optional[2]	Optional[2]	2, 10
Direct spark ignition	Yes	Yes	Yes	[5]	--	--	--	--	--
System & sequence approved safety control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Approved safety shutoff valves (SSOV)	IN	BURNER	DESIGN		Yes[14]	Yes[14]	Yes[14]	Yes[14]	Yes[13, 14]
No vent valve	--	--	--	--	--	--	--	Yes	13
Pilot valve	[18]	[18]	[18]	Yes	Yes[5]	Yes	Yes	Yes	Yes
Proved pilot	Optional	Optional	Optional	Yes	Yes	Yes	Yes	Yes	Yes
Trial for pilot	[17]	[17]	[17]	15 sec	15 sec	10 sec	10 sec	10 sec	13
Trial for main flame	90 sec[2,17]	30 sec[2, 17]	15 sec[2, 17]	10/30 sec[7]	15 sec[22]	10 sec	10 sec	10 sec	13
Flame failure response time	90 sec[17]	4 sec max[16,17]	4 sec max[15,17]	4 sec max	4 sec max	4 sec max	4 sec max	2 sec max	13
Valve closing time (max.)	[23]	[23]	[23]	[23]	5 sec max	1 sec max	1 sec max	1 sec max	13
Supervise main flame	[17]	[17]	[17]	Yes	--	Yes[2]	Yes[2]	Yes[2]	2, 10
Action on flame failure	Recycle optional[1]	1	1	Lockout or recycle	Lockout or recycle[6]	Lockout	Lockout	Lockout	13
Action on limit open	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	13

See following page for footnotes.

Appendix A

FOOTNOTES TO TABULAR SUMMARY UL STANDARD 296 AND UL STANDARD 795:

SSOV = Safety shutoff valve.

[1]May relight if ignition is re-energized within 0.8 sec. See 15 and 16.

[2]Where intermittent pilot is desired, it is allowable to switch from pilot detector to main flame detector if main flame detector responds to main flame only.

[3]Without shutters, no prepurge required.

[4]Options (whichever is chosen, a minimum of 4 air changes must be provided): 30 sec at high fire rate; OR
60 sec at ½ high fire rate; OR
90 sec at ⅓ high fire rate.

[5]With 2-stage lightoff, direct ignition is permitted if first stage is 20 gph or less (requirements for 20 gph or less apply). Pilot is required if igniting more than 20 gph.

[6]Lockout on interrupted pilot applications; recycle on intermittent pilot applications.

[7]10 sec for distillate fuel (No. 1 or No. 2); 30 sec for residual fuel (No. 4, 5, 6).

[8]Conventional type pressure burner—none needed. Needed for applications with combustion air supply separate from oil supply.

[9]Valve seal overtravel switch can be wired into either the start circuit or pre-ignition interlock circuit (if provided).

[10]Interrupted pilot over 2.5 million Btuh if modulating or high low firing rate. Otherwise over 5 million Btuh.

[11]If low fire start is not proved, UL will test for smooth lightoff at high fire.

[12]Intermittent up to 5 million Btuh unless firing rate control is over 2,500,000 Btuh.

[13]Requirements same as mechanical draft burners.

[14]See Table 1 at end of footnotes for main gas valves.

[15]Up to 15 sec is permitted if intermittent ignition is employed, or if the ignition system is re-energized in not more than 0.8 sec after flame is extinguished.

[16]Up to 30 sec is permitted if intermittent ignition is employed, or if the ignition system is re-energized in not more than 0.8 sec after flame is extinguished.

[17]If proved pilot igniter is used, timings for over 20 gal flame safeguard control may be applied.

[18]Required for electrically ignited, gas-piloted systems.

[19]Interrupted pilot may be required if using flame safeguard control with a proved pilot. Otherwise, interrupted pilot is optional.

[20]Safety shutdown by this limit can be accomplished either by manual reset limits or in the programmer limit circuit.

[21]Required on boilers fired by oil burners—not a requirement of UL 296.

[22]If intermittent pilot is used, no main burner flame-establishing period is required.

[23]If a separate oil valve is used, it must close within 5 sec max when de-energized.

TABLE 1—AUTOMATIC MAIN GAS SAFETY SHUTOFF VALVES (SSOV) FOR MECHANICAL OR ATMOSPHERIC BURNERS—UL 795 REQUIREMENTS, EFFECTIVE OCTOBER 1, 1974

	400,000 to 2,500,000 BTUH	Over 2,500,000 to 5,000,000 BTUH	Over 5,000,000 to 12,500,000 BTUH	Over 12,500,000 BTUH
Main Valve Requirement	One valve rated for safety shutoff services (SSOV). Closing time 5 sec.	Two SSOV's in series, or one SSOV of the type incorporating a valve seal overtravel interlock. Closing time 1 sec max.	Two SSOV's in series, one of which incorporates a valve seal overtravel interlock. Closing time 1 sec max.	Two SSOV's in series, one of which incorporates a valve seal overtravel interlock. When fuel gas has specific gravity of less than 1.0, include a N.O. ¾ inch or larger electrically operated valve in a vent line between the two SSOV's.

Appendix A

A 64.57 Health Care Facilities heating, ventilating and air conditioning. The following HVAC related rules are taken from the "Minimum Requirements for Construction and Equipment for Hospitals and Medical Facilities", DHEW publication No. (HRA) 79-14500, revised Aug., 1979. This document is adopted by reference and the following information is being reprinted to assist the system designer and building inspector.

GENERAL HOSPITAL

7.31. MECHANICAL REQUIREMENTS

A. General.

(1) In view of our national concern for energy conservation, mechanical systems will be subject to special review for overall efficiency and life cycle costing including operational. The intent of this paragraph is to recognize that maximum savings can be made through implementation of a multitude of interrelated procedures which would be too numerous (and basic) to list. In most instances, a well designed system can be energy efficient at minimal added cost and at the same time provide for better patient comfort. However, it must be emphasized that energy conservation cannot be used as a argument for lessening patient care or safety.

(2) Prior to completion and acceptance of the facility, all mechanical systems shall be tested, balanced, and operated to demonstrate to the owner or his representative that the installation and performance of these systems conform to the requirements of the plans and specifications.

(3) Upon completion of the contract, the owner shall be furnished with a complete set of manufacturer's operating, maintenance, and preventive maintenance instructions, and parts lists and procurement information with numbers and description for each piece of equipment. He shall also be provided with instructions in the operational use of systems and equipment as required.

B. Thermal and Accoustical Insulation.

(1) Insulation shall be provided for the following within the building:

(a) Boilers, smoke breeching, and stacks.

(b) Steam supply and condensate return piping.

(c) Hot water piping above 120° F. (49° C.) and all hot water heaters, generators, and converters.

(d) Chilled water, refrigerant, other process piping and equipment operating with fluid temperatures below ambient dew point.

(e) Water supply and drainage piping on which condensation may occur.

(f) Air ducts and casings with outside surface temperature below ambient dew point or temperature above 80° F. (27° C.).

(g) Other piping, ducts, and equipment as necessary to maintain the efficiency of the system.

(2) Insulation required above may be omitted from hot water and steam condensate piping not subject to contact by patients when the heat loss from such piping without insulation does not increase the energy requirements of the system.

(3) Insulation on cold surfaces shall include an exterior vapor barrier.

(4) Insulation, including finishes and adhesives on the exterior surfaces of ducts and equipement, shall have a flame spread rating of 25 less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A. Smoke development rating for pipe insulation shall not exceed 150.

(5) Linings in air ducts and equipment shall meet the Erosion Test Method described in Underwriters' Laboratories, Inc., Publication No. 181. These linings, including coatings and adhesives, and insulation on exterior surfaces of pipes and ducts in building spaces used as air supply plenums, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A.

(6) Duct linings shall not be used in systems supplying operating rooms, delivery rooms, recovery rooms, nurseries, isolation rooms, and intensive care units unless terminal filters of at least 90 percent efficiency are installed downstream of linings.

C. Steam and Hot Water Systems.

(1) BOILERS. Boilers shall have the capacity, based upon the net ratings published by the Hydronics Institute, to supply the normal requirements of all systems and equipment. The number and arragement of boilers shall be such that, when one boiler breaks down or routine maintenance requires that one boiler be temporarily taken out of service, the capacity of the remaining boiler(s) shall be sufficient to provide hot water service for clinical, dietary, and patient use; steam for sterilization and dietary purposes; and heating for operating, delivery, labor, recovery, intensive care, nursery, and general patient rooms except that capacity for space heating is not required in areas with a design temperature of 20° F. (− 7° C.) or more, based on the Median of Extremes in the ASHRAE Handbook of Fundamentals.

(2) BOILER ACCESSORIES. Boiler feed pumps, heating circulating pumps, condensate return pumps, and fuel oil pumps shall be connected and installed to provide normal and standby service.

(3) VALVES. Supply and return mains and risers of cooling, heating, and process steam systems shall be valved to isolate the various sections of each system. Each piece of equipment shall be valved at the supply and return ends except that vacuum condensate returns need not be valved at each piece of equipment.

D. Air Conditioning, Heating and Ventilating Systems.

(1) TEMPERATURES AND HUMIDITIES.

(a) The designed capacity of the systems shall provide the following temperatures and humidities in the area noted:

AREA DESIGNATION	TEMPERATURE		RELATIVE HUMIDITY (%)	
	°F.	°C.	Min.	Max.
Operating Rooms	68-76*	20-24*	50	60
Delivery Rooms	70-76*	21-24*	50	60
Recovery Rooms	75	24	50	60
Intensive Care Rooms	72-78*	22-26*	30	60
Nurseries Units	75	24	30	60
Special Care Nursery Unit	75-80*	24-27*	30	60

*Variable Range Required With Individual Room Control.

(b) For other areas occupied by inpatients, the indoor winter design temperature shall be 75° F. (24° C.). (A minimum relative humidity of 30 percent is recommended but not required.) For all other occupied areas, the indoor winter design temperature shall be 72° F. (22° C.).

(2) VENTILATION SYSTEM DETAILS. All air-supply and air-exhaust systems shall be mechanically operated. All fans serving exhaust systems shall be located at the discharge end of the system. The ventilation rates shown in table 3 shall be considered as minimum acceptable rates and shall not be construed as precluding the use of higher ventilation rates.

(a) In the interest of energy conservation, the applicant is encouraged to utilize recognized procedures such as variable air volume and load shedding systems in areas not listed in table 3 and where direct patient care is not affected such as administrative and public areas, general storage, etc. Consideration may be given to special design innovations in areas of table 3 provided that pressure relationship as an indication of direction of air flow and total number of air changes as listed are maintained. All such proposed design innovations are subject to review and approval by the funding agency.

(b) Outdoor intakes shall be located as far as practical but not less than 25'0" (7.62 m) from exhaust outlets of ventilating systems, combustion equipment stacks, medical-surgical vacuum systems, plumbing vents stacks, or from areas which may collect vehicular exhaust and other noxious fumes (plumbing and vacuum vents that terminate above the level of the top of the air intake may be located as close as 10'0" (3.05 m)). The bottom of outdoor air intakes serving central systems shall be located as high as practical but not less than 6'0" (1.83 m) above ground level, or if installed above the roof, 3'0" (.91 m) above the roof level.

(c) The ventilation systems shall be designed and balanced to provide the pressure relationship as shown in table 3.

(d) All air supplied to operating rooms, delivery rooms, and nurseries shall be delivered at or near the ceiling of the area served, and all return air from the area shall be removed near floor level. At least 2 return air outlets shall be used in each operating and delivery room.

(e) Each space routinely used for the administering of inhalation anesthetizing agents shall be provided with a separate scavaging system for venting of waste anesthetizing gases. Pressure balance must be such that the gas collecting system does not interfere with required room pressure relationship or with breathing circuit that may affect patient safety. The intake shall be appropriately located in relation to the patient and the equipment designed so that gases are exhausted directly to the outside.

Note: Potential harmful effects upon personnel subject to constant exposure to anesthetizing gases are generally recognized but acceptable levels of concentration are unknown at this time. In the absence of specific figures, any scavaging system should be designed to remove as much of the anesthetizing gas as possible. Maximum effectiveness of the scavaging system may also require careful attention to selection and maintenance of anesthetizing equipment use.)

(f) The bottoms of ventilation (supply/return) openings shall be not less than 3 inches (7.6 cm) above the floor of any room.

(g) Corridors shall not be used to supply air to or exhaust air from any room, except that air from corridors may be used to ventilate bathrooms, toilet rooms, janitors' closets, and small electric or telephone closets opening directly on corridors provided that ventilation can be accomplished by undercutting of doors.

(h) Isolation rooms and intensive care rooms may be ventilated by induction units if the induction units contain only a reheat coil and if only the primary air supplied from a central system passes through the reheat coil.

(i) All central ventilation of air conditionins systems shall be equipped with filters having efficiencies no less than those specified in table 4. Where 2 filter beds are required, filter bed No. 1 shall be located upstream of the air conditioning equipment and filter bed No. 2 shall be downstream of the supply fan, any recirculating spray water systems, and water reservoir type humidifiers.

Where only one filter bed is required, it shall be located upstream of the air conditioning equipment unless an additional prefilter is employed. In this case, the prefilter shall be upstream of the equipment and the main filter may be located further downstream.

All filter efficiencies shall be average atmospheric dust spot efficiencies tested in accordance with ASHRAE Standard 52-76 except as noted in section 7.31D (2) (o) (i).

Filter frames shall be durable and carefully dimensioned and shall povide an airtight fit with the enclosing ductwork. All joints between filter segments and the enclosing ductwork shall be gasketed or sealed to provide a positive seal against air leakage.

Table 7
GENERAL PRESSURE RELATIONSHIPS AND VENTILATION
OF CERTAIN HOSPITAL AREAS

Area Designation	Pressure Relationship to Adjacent Areas	Minimum Air Changes of Outdoor Air per Hour Supplied to Room	Minimum[8] Total Air Changes per Hour Supplied to Room	All Air[7] Exhausted Directly to Outdoors	Recirculated within Room Units
Operating Room (for recirculating air system)	P	5	25	Optional	No[4]
Operating Room (all-outdoor-air system)[6]	P	15	15	Yes	No
Trauma Room	P	5	12	Optional	No[4]
Examination and Treatment Room	E	2	6	Optional	Optional
Delivery Room	P	5	12	Optional	No[4]
Nursery Unit	P	5	12	Optional	No[4]
Recovery Room	P	2	6	Optional	No[4]
Intensive Care	P	2	6	Optional	No[4,5]
Patient Room	E	2	2	Optional	Optional
Patient Room Corridor	E	2	2	Optional	Optional
Isolation Room	E	2	6	Yes	No[3]
Isolation Room-Alcove or Anteroom	E	2	10	Yes	No[3]
Examination Room	E	2	6	Optional	Optional
Medication Room	P	2	4	Optional	Optional
Pharmacy	P	2	4	Optional	Optional
Treatment Room	P	2	6	Optional	Optional
X-ray, Fluoroscope[6]	N	2	6	Yes	No
X-ray, Other Diagnostic Rooms	V	2	6	Optional	Optional
Physical Therapy and Hydrotherapy	N	2	6	Optional	Optional
Soiled Workroom or Soiled Holding	N	2	10	Yes	No
Clean Workroom or Clean Holding	P	2	4	Optional	Optional
Autopsy	N	2	12	Yes	No
Darkroom	N	2	10	Yes	No
Nonrefrigerated Body Holding Room	N	Optional	10	Yes	No
Toilet Room	N	Optional	10	Yes	No
Bedpan Room	N	Optional	10	Yes	No
Bathroom	N	Optional	10	Yes	No
Janitors' Closet	N	Optional	10	Yes	No
Sterilizer Equipment Room	N	Optional	10	Yes	No
Linen and Trash Chute Rooms	N	Optional	10	Yes	No
Laboratory, General[1]	N	2	6	Optional	Optional
Laboratory, Media Transfer[2]	P	2	4	Optional	No[3]
Food Preparation Centers	E	2	10	Yes	No
Warewashing	N	Optional	10	Yes	No
Dietary, Day Storage	V	Optional	2	Optional	No
Laundry, general	V	2	10	Yes	No
Soiled Linen Sorting and Storage	N	Optional	10	Yes	No
Clean Linen Storage	P	Optional	2	Optional	Optional
Anesthesia Storage[3]	V	Optional	8	Yes	No
Central Services					
Soiled or Decontamination Room	N	2	6	Yes	No
Clean Workroom	P	2	4	Optional	Optional
Equipment Storage	V	Optional	2	Optional	Optional

P = Positive N = Negative E = Equal V = May Vary

[1]See sections 7.31.D (2) (m), 7.31.D (2) (n), and 7.31.D (2) (o) for additional requirements.
[2]See section 7.31.D (2) (m) for additional requirements.
[3]See section 7.31.D (2) (q) for additional requirements.
[4]Recirculating room units meeting the filtering requirements for sensitive areas in section 7.31.D (2) (j) may be used.
[5]See section 7.31.D (2) (h).
[6]For maximum energy conservation, use of a recirculated filtered air system is preferred. An all outdoor air system may be used, where required by local codes, provided that appropriate heat recovery procedures are utilized for exhaust air.
[7]Heat recovery systems should be utilized where appropriate especially for those areas where all air is required to be exhausted to the outside.
[8]Requirements for outdoor air changes may be deleted or reduced and total air changes per hour supplied may be reduced to 25% of the figures listed when the affected room is unoccupied and unused provided that indicated pressure relationship is maintained. In addition, positive provisions such as an interconnect with room lights must be included to insure that the listed ventilation rates including outdoor air are automatically resumed upon reoccupancy of the space. This exception does not apply to certain areas such as toilets and storage which would be considered as "in use" even though "unoccupied".
[9]Rooms normally used for diagnostic X-rays and only occasionally for fluoroscopic procedures may utilize recirculated air without requirements for all air to be exhausted directly to outdoors.

General Note. The outdoor air quantities for central systems employing recirculating and serving more than a single area designation may be determined by summing the individual area air quantity requirements rather than by providing the maximum listed ratio of outdoor air to total air. This does not apply to sensitive areas such as operating and delivery rooms, recovery rooms, nurseries, and intensive care rooms.

Appendix A

Table 4

FILTER EFFICIENCIES FOR CENTRAL VENTILATION AND AIR CONDITIONING SYSTEMS IN GENERAL HOSPITALS

AREA DESIGNATION	MINIMUM NUMBER OF FILTER BEDS	FILTER EFFICIENCIES (Percent) FILTER BED NO. 1	FILTER BED NO. 2
Sensitive Areas*	2	25	90
Patient Care, Treatment, Diagnostic, and Related Areas	2	25	90**
Food Preparation Areas and Laundries	1	80	--
Administrative, Bulk Storage and Soiled Holding Areas	1	25	--

*Includes operating rooms, delivery rooms, nurseries, recovery rooms, and intensive care units.

**May be reduced to 80 percent for systems using all-outdoor air.

Note: Ratings shall be with tolerances of ARI Standard 680-74.

A manometer shall be installed across each filter bed serving sensitive areas or central air systems.

(j) Air handling duct systems shall meet the requirements of NFPA Standard 90A, and those serving sensitive areas shall also comply with section 7.31.B(6).

(k) Ducts which penetrate construction intended for x-ray or other ray protection shall not impair the effectiveness of the protection.

(l) Fire and smoke dampers shall be constructed, located, and installed in accordance with the requirements of NFPA Standard 90A-1975, except that all systems, regardless of size, which serve more than one smoke or fire zone, shall be equipped with smoke detectors to shut down fans automatically as delineated in paragraph 4-3.2 of that standard. Access for maintenance shall be provided at all dampers.

Switching for restart of fans may be conveniently located for fire department use to assist in evacuation of smoke after the fire is controlled, provided that provisions are made to avoid possible damage to the system because of closed dampers.

Supply and exhaust ducts which pass through a smoke seperation of required compartmentation and through which smoke can be transferred to another area shall be provided with dampers at the separation controlled to close automatically to prevent flow of air or smoke when the fan, which moves the air through the duct, stops. Dampers shall be equipped with remote control reset devices except that manual reopening will be permitted if dampers are conveniently located.

Return air ducts which pass through a smoke separation of required compartmentation shall be provided with a damper at the separation actuated by smoke or products of combustion (other than heat) detectors. These dampers shall be operated by the detectors located to sense smoke in the return air duct from the smoke zone. On high velocity systems, a time delay is required so that fan will be stopped prior to damper closing. Engineered smoke exhaust systems may be considered for approval as described by NFPA on a case by case basis.

(m) If the air changes required in table 3 do not provide sufficient air for use by hoods and safety cabinets, the required makeup air shall be provided as necessary to maintain required room pressure relationship.

(n) Laboratory hoods shall meet the following general requirements:

(I) Have an average face velocity of not less than 75 feet per minute (0.38 meters per second).

(II) Be connected to an exhaust system which is separate from the building exhaust system.

(III) Have an exhaust fan located at the discharge end of the system.

(IV) Have an exhaust duct system of noncombustible corrosion-resistant material as needed to meet the planned usage of the hood.

(o) Laboratory hoods shall meet the following special requirements:

(I) Each hood which processes infections or radioactive materials shall have a minimum face velocity of 100 feet per minute (0.51 meters per second), shall be connected to an independent exhaust system, shall have filters with a 99.97 percent efficiency (based on the DOP, dioctyl-phthalate, test method) in the exhaust stream, and shall be designed and equipped to permit the safe removal, disposal, and replacement of contaminated filters.

(II) Duct systems serving hoods in which radioactive and strong oxidizing agents (e.g. perchloric acid) are used shall be constructed of stainless steel for a minimum distance of 10'0" (3.05 m) from the hood and shall be equipped with washdown facilities. Washdown facilities are *not* required for hoods used primarily for radioactive material.

(p) Exhaust hoods in food preparation centers shall have an exhaust rate of not less than 50 cfm per square foot (0.25 cubic meters per second per square meter) of face area. Face area is defined for this purpose as the open area from the exposed perimeter of the hood to the average perimeter of the cooking surfaces. All hoods over cooking ranges shall be equipped with grease filters, fire extinguishing systems, and heat-actuated fan controls. Cleanout openings shall be provided every 20'0" (6.10 m) in horizontal exhaust duct system serving these hoods.

(q) The ventilation system for anesthesia storage rooms shall conform to the requirements of NFPA Standard 56A, including the gravity option. The mechanically operated air systems required of section 7.31.D (2) is optional in this room only.

(r) Boiler rooms shall be provided with sufficient outdoor air to maintain combustion rates of equipment and to limit temperatures in working stations to 97° F. (36° C.) Effective Temperature (ET*) as defined by ASHRAE Handbook of Fundamentals.

(s) See section 7.28.A (26) for additional boiler room, food preparation center, and laundry ventilation requirements.

LONG TERM CARE FACILITY
(NURSING HOME)

8.19 MECHANICAL REQUIREMENTS

A. General

(1) In view of our national concern for energy conservation, mechanical systems will be subject to special review for overall efficiency and life cycle that maximum savings can be made through implementation of a multitude of interrelated procedures which would be too numerous (and basic) to list. In most instances, a well designed system can be energy efficient at minimal added cost and at the same time provide for better patient comfort. However, it must be emphasized that energy conservation cannot be used as an argument for lessening patient care or safety.

(2) Prior to completion and acceptance of the facility, all mechanical systems shall be tested, balanced, and operated to demonstrate to the owner or his representative that the installation and performance of these systems conform to the requirements of the plans and specifications.

(3) Upon completion of the contract, the owner shall be furnished with a complete set of manufacturers' operating, maintenance, and preventive maintenance instructions, and parts list with numbers and description for each piece of equipment. He shall also be provided with instruction in the operational use of systems and equipment as required.

B. Thermal and Acoustical Insulation.

(1) Insulation shall be provided for the following within the building:

(a) Boilers, smoke breeching and stacks.

(b) Steam supply and condensate return piping.

(c) Hot water piping above 120° F. (49° C.) and all hot water heaters, generators, and converters.

(d) Chilled water, refrigerant, other process piping and equipment operating with fluid temperatures below ambient dew point.

(e) Water supply and drainage piping on which condensation may occur.

(f) Air ducts and casings with outside surface temperatures below ambient dew point.

(g) Other piping, ducts and equipment as necessary to maintain the efficiency of the system.

(2) Insulation required above may be omitted from hot water and steam condensate piping not subject to contact by patients where the heat loss from such piping without insulation does not increase the energy requirements of the building.

(3) Insulation on cold surfaces shall include an exterior vapor barrier.

(4) Insulation including finishes and adhesives on the exterior surfaces of ducts and equipment shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A. Smoke development rating for pipe insulation shall not exceed 150.

(5) Linings in air ducts and equipment shall meet the Erosion Test Method described in Underwriters' Laboratories Publication No. 181. These linings, including coatings and adhesives and insulation on exterior surfaces of pipes and ducts in building spaces used as air supply plenums, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A.

C. Steam and Hot Water Systems.

(1) BOILERS. Boilers shall have the capacity, based upon the net ratings published by the Hydronics Institute, to supply the normal requirements of all systems and equipment. The number and arrangement of boilers shall be such that when one boiler breaks down or routine maintenance requires that one boiler be temporarily taken out of service, the capacity of the remaining boiler(s) shall be at least 70 percent of the total required capacity, except that in areas with a design temperature of 20° F. (-7° C.) or more, based on the Median of Extremes in the ASHRAE Handbook of Fundamentals, the remaining boiler(s) do not have to include boiler capacity for space heating.

(2) BOILER ACCESSORIES. Boiler feed pumps, heating circulating pumps, condensate return pumps, and fuel oil pumps shall be connected and installed to provide normal and standby service.

(3) VALVES. Supply and return mains and risers of cooling, heating and process steam systems shall be valved to isolate the various sections of each system. Each piece of equipment shall be valved at the supply and return ends, except that vacuum condensate return need not be valved at each piece of equipment.

D. Heating and Ventilating Systems.

(1) In the interest of energy conservation, the applicant is encouraged to utilize recognized procedures such as variable air volume and load shedding systems in areas not listed in table 8 and where direct patient care is not affected such as administrative and public areas, general storage, etc. Consideration may be given to special design innovations in areas of table 8 provided that pressure relationship as an indication of direction of air flow and total number of air changes as listed are maintained. All such proposed design innovations are subject to review and approval by the funding agency.

(2) TEMPERATURES. For all areas occupied by patients, the indoor winter design temperature shall be 75° F. (24° C.). For all other occupied areas, the indoor winter design temperature shall be 72° F. (22° C.). (Note: This does not preclude operation at lower temperatures where appropriate and patient safety is not affected. This requirement is for *capacity*.)

(3) VENTILATION SYSTEM DETAILS. All air-supply and air-exhaust systems shall be mechanically operated. All fans serving exhaust systems shall be located at the discharge end of the system. The ventilation rates shown in table 8 shall be considered as minimum acceptable rates and shall not be construed as precluding the use of higher ventilation rates.

(a) Outdoor air intakes shall be located as far as practical but not less than 25'0" (7.62 m) from exhaust outlets of ventilating systems, combustion equipment stacks, medical vacuum systems, plumbing vent stacks, or from areas which may collect vehicular exhaust and other noxious fumes (plumbing and vacuum vents that terminate above the level of the top of the air intakes may be located as close as 10'0" (3.05 m)). The bottom of outdoor air intakes serving central systems shall be located as high as practical but not less than 6'0" (1.83 m) above ground level, or if installed above the roof, 3'0" (.91 m) above roof level.

Table 8
PRESSURE RELATIONSHIPS AND VENTILATION OF CERTAIN AREAS OF LONG-TERM CARE FACILITIES

AREA DESIGNATION	PRESSURE RELATIONSHIP TO ADJACENT AREAS	MINIMUM AIR CHANGES OF OUTDOOR AIR PER HOUR SUPPLIED TO ROOM	MINIMUM TOTAL AIR CHANGES PER HOUR SUPPLIED TO ROOM	ALL AIR EXHAUSTED DIRECTLY TO OUTDOORS	RECIRCULATED WITHIN ROOM UNITS
Patient Room	E	2	2	Optional	Optional
Patient Area Corridor	E	Optional	2	Optional	Optional
Examination and Treatment Room	E	2	6	Optional	Optional
Physical Therapy	N	2	6	Optional	Optional
Occupational Therapy	N	2	6	Optional	Optional
Soiled Workroom or Soiled Holding	N	2	10	Yes	No
Clean Workroom or Clean Holding	P	2	4	Optional	Optional
Toilet Room	N	Optional	10	Yes	No
Bathroom	N	Optional	10	Yes	No
Janitors' Closet(s)	N	Optional	10	Yes	No
Sterilizer Equipment Room	N	Optional	10	Yes	No
Linen and Trash Chute Room	N	Optional	10	Yes	No
Food Preparation Center	E	2	10	Yes	No
Warewashing Room	N	Optional	10	Yes	No
Dietary Day Storage	V	Optional	2	Yes	No
Laundry, General	V	2	10	Yes	No
Soiled Linen Sorting and Storage	N	Optional	10	Yes	No
Clean Linen Storage	P	Optional	2	Optional	Optional

P = Positive N = Negative E = Equal V = Variable

The outdoor air quantities for central systems employing recirculation and serving more than a single area designation may be determined by summing the individual area quantity requirements rather than by providing the maximum listing ratio of outdoor air to total air.

(b) The ventilation systems shall be designed and balanced to provide the pressure relationship as shown in table 8.

(c) The bottom of ventilation openings shall be not less than 3 inches (7.6 cm) above the floor of any room.

(d) Corridors shall not be used to supply air to or exhaust air from any room, except that air from corridors may be used to ventilate bathrooms, toilet rooms, janitors' closets, and small electric or telephone closets opening directly on corridors, provided that ventilation can be accomplished by undercutting of doors.

(e) All central ventilation or air conditioning systems shall be equipped with filters having efficiencies no less than those specified in table 9. The filter bed shall be located upstream of the air conditioning equipment, unless a prefilter is employed. In this case, the prefilter shall be upstream of the equipment and the main filter bed may be located further downstream.

(f) All filter(s) efficiencies shall be average atmospheric dust spot efficiencies tested in accordance with ASHRAE Standard 52-76.

Filter frames shall be durable and carefully dimensioned and shall provide an airtight fit with the enclosing ductwork. All joints between filter segments and the enclosing ductwork shall be gasketed or sealed to provide a positive seal against air leakage.

A manometer shall be installed across each filter bed serving central air systems.

(g) Air handling duct systems shall meet the requirements of NFPA Standard 90A.

(h) Fire and smoke dampers shall be constructed, located, and installed in accordance with the requirements of NFPA Standard 90A except that all systems, regardless of size, which serve more than one smoke or fire zone, shall be equipped with smoke detectors to shut down fans automatically as delineated in paragraph 4-3.2 of that Standard. Access for maintenance shall be provided at all dampers.

Switching for restart of fans may be conveniently located for fire department use to assit in evacuation of smoke after the fire is controlled, provided that provisions are made to avoid possible damage to the system because of closed dampers.

Supply and exhaust ducts which pass through a required smoke separation and through which smoke can be transferred to another area shall be provided with dampers at the barrier, controlled to close automatically to prevent flow of air or smoke in either direction when the fan, which moves the air through the duct, stops. Dampers shall be equipped with remote control reset devices except that manual reopening will be permitted if dampers are conveniently located.

Return air ducts which pass through a required smoke barrier shall be provided with a damper at the barrier actuated by smoke or products of combustion (other than heat) detectors. These dampers shall be operated by the detectors located to sense smoke in the return air duct from the smoke zone. On high velocity systems, a time delay is required so that fan will be stopped prior to damper closing. Engineered smoke exhaust systems may be considered for approval as described by NFPA on a case by case basis.

(i) Exhaust hoods in food preparation centers shall have an exhaust rate of not less than 50 cfm per square foot (0.25 cubic meters per second per square meter) of face area. Face area is defined for this purpose as the open area from the exposed perimeter of the hood to the average perimeter of the cooking surfaces. All hoods over cooking ranges shall be equipped with grease filters, fire extinguishing systems, and heat actuated fan controls. Cleanout openings shall be provided every 20'0" (6.10 m) in horizontal exhaust duct sytems serving these hoods.

(j) Boiler rooms shall be provided with sufficient outdoor air to maintain combustion rates of equipment and to limit temperatures in working stations to 97° F. (36° C.) Effective Temperature (ET*) as defined by ASHRAE Handbook of Fundamentals.

(k) See section 8.16.A (25) for additional boiler room, food preparation center, and laundry ventilation requirements.

OUTPATIENT FACILITIES

9.11 MECHANICAL REQUIREMENTS.

A. General.

(1) In view of our national concern for energy conservation, mechanical systems will be subject to special review for overall efficiency and life cycle costing including operational. The intent of this paragraph is to recognize that maximum savings can be made through implementation of a multitude of interrelated costing including operational. The intent of this paragraph is to recognize procedures which would be too numerous (and basic) to list. In most instances, a well designed system can be energy efficient at minimal added cost and at the same time provide for better patient comfort. However, it must be emphasized that energy conservation cannot be used as an argument for lessening patient care or safety.

(2) Prior to completion and acceptance of the facility, all mechanical systems shall be tested, balanced, and operated to demonstrate to the owner or his representative that the installation and performance of these systems conform to the requirements of the plans and specifications.

(3) Upon completion of the contract, the owner shall be furnished with a complete set of manufacturers' operating, maintenance, and preventive maintenance instructions, and parts lists with numbers and description for each piece of equipment. He shall also be provided with instructions in the operational use of systems and equipment as required.

B. Thermal and Acoustical Insulation.

(1) Insulation shall be provided for the following within the building:

(a) Boilers, smoke breeching, and stacks.

(b) Steam supply and condensate return piping.

(c) Hot water piping above 120° F. (49° C.) and all hot water heaters, generators, and converters.

(d) Chilled water, refrigerant, other process piping and equipment operating with fluid temperatures below ambient dew point.

(e) Water supply and drainage piping on which condensation may occur.

(f) Air ducts and casing with outside surface temperature below ambient dew point.

(g) Other piping, ducts, and equipment as necessary to maintain the efficiency of the systems.

(2) Insulation required above may be omitted from hot water and steam condensate piping not subject to contact by patients when the heat loss from such piping without insulation does not increase the energy requirements of the building.

(3) Insulation on cold surfaces shall include an exterior vapor barrier.

(4) Insulation, including finishes and adhesives on the exterior surfaces of ducts and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A. Smoke development rating for pipe insulation shall not exceed 150.

(5) Linings in air ducts and equipment shall meet the Erosion Test Method described in Underwriters' Laboratories, Inc., Publication No. 181. These linings, including coating and adhesives, and insulation on exterior surfaces of pipes and ducts in building spaces used as air supply plenums, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A.

C. Steam and Hot Water Systems.

(1) BOILERS. Boilers shall have the capacity, based upon the net ratings published by the Hydronics Institute, to supply the normal requirements of all systems and equipment.

(2) VALVES. Supply and return mains and risers of space heating and process steam systems shall be valved to isolate the various sections of each system. Each piece of equipment shall be valved at the supply and return ends except that vacuum condensate returns need not be valved at each piece of equipment.

Appendix A

D. Heating and Ventilating Systems.

(1) TEMPERATURES. For all areas occupied by patients, the indoor winter design temperature shall be 75° F. (24° C.). For all other occupied areas, the indoor winter design temperature shall be 72° F. (22° C.).

(2) VENTILATION SYSTEM DETAILS. Mechanically operated systems shall be used to supply air to and/or exhaust air from dental rooms, general laboratories, x-ray and film processing areas, soiled workrooms or soiled holding rooms, observation rooms, janitors' closets, soiled storage areas, toilet rooms, and from spaces which are not provided with openable windows or outside doors. All fans serving exhaust systems shall be located at the discharge end of the system.

(a) Air handling duct systems shall meet the requirements of NFPA Standard 90A.

(b) Ducts which penetrate construction intended for X-ray and other ray protection shall not impair the effectiveness of the protection.

(c) Laboratory hoods shall meet the following general requirements:

(I) Have an average face velocity of not less than 75 feet per minute (0.38 meters per second).

(II) Be connected to an exhaust system which is separate from the building exhaust system.

(III) Have an exhaust fan located at the discharge end of the system.

(IV) Have an exhaust duct system of noncombustible corrosion-resistant material as need to meet the planned usage of the hood.

(d) Laboratory hoods shall meet the following special requirements:

(I) Each hood which processes infectious or radioactive materials shall have a minimum face velocity of 100 feet per minute (0.15 meters per second), shall be connected to an independent exhaust system, shall have filters with a 99.97 percent efficiency based on the dioctylphthalate (DOP) test method in the exhaust stream, and shall be designed and equipped to permit the safe removal, disposal, and replacement of contaminated filters.

(II) Duct systems serving hoods in which radioactive and strong oxidizing agents (e.g., perchloric acid) are used shall be constructed of stainless teel for a minimum distance of 10'0" (3.05 m) from the hood and shall be equipped with washdown facilities.

REHABILITATION FACILITIES

10.29. MECHANICAL REQUIREMENTS.

The requirements noted below shall apply to rehabilitation facilities which serve inpatients. Rehabilitation facilities which serve outpatients only shall comply with the mechanical requirements for outpatient facilities as shown in section 9.11.

A. General.

(1) In view of our national concern for energy conservation, mechanical systems will be subject to special review for overall efficiency and life cycle that maximum savings can be made through implementation of a multitude of interrelated costing including operational. The intent of this paragraph is to recognize procedures which would be too numerous (and basic) to list. In most instances, a well designed system can be energy efficient at minimal added cost and at the same time provide for better patient comfort. However, it msut be emphasized that energy conservation cannot be used as an argument for lessening patient care or safety.

(2) Prior to completion and acceptance of the facility, all mechanical systems shall be tested, balanced, and operated to demonstrate to the owner or his representative that the installation and performance of these systems conform to the requirements of the plans and specifications.

(3) Upon completion of the contract, the owner shall be furnished with a complete set of manufacturers' operating, maintenance, and preventitive maintenance instructions, and parts list with numbers and description for each piece of equipment. He shall also be provided with instruction in the operational use of systems and equipment as required.

B. Thermal and Acoustical Insulation.

(1) Insulation shall be provided for the following within the building:

(a) Boilers, smoke breeching, and stacks.

(b) Steam supply and condensate return piping.

(c) Hot water supply piping above 120° F. (49° C.) and all hot water heaters, generators, and converters.

(d) Chilled water, refrigerant, other process piping and equipment operating with fluid temperatures below ambient dew point.

(e) Water supply and drainage piping on which condensation may occur.

(f) Air ducts and casings with outside surface temperature below ambient dew point.

(g) Other piping, ducts, and equipment as necessary to maintain the efficiency of the system.

(2) Insulation required above may be omitted from hot water and steam condensate piping not subject to contact by patients when the heat loss from such piping without insulation does not increase the energy requirements of the building.

(3) Insulation on cold surfaces shall include an exterior vapor barrier.

(4) Insulation, including finishes and adhesives on the exterior surfaces of ducts and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A. Smoke development rating for pipe insulation shall not exceed 150.

(5) Linings in air ducts and equipment shall meet the Erosion Test Method described in Underwriters' Laboratories, Inc., Publication No. 181. These linings, including coatings and adhesives and insulation in building spaces used as air supply plenums, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A.

C. Steam and Hot Water System.

(1) Boilers shall have a capacity, based upon the net ratings published by the Hydronics Institute, to supply the normal requirements of all systems and equipment. The number and the arrangement of boilers in facilities having inpatient units shall be such that when one boiler breaks down or routine maintenance requires that one boiler be temporarily taken out of service, the capacity of the remaining boiler(s) shall be at least 70 percent of the total required capacity, except that in areas with a design temperature of 20° F. (−7° C.) or more, based on the Median of Extremes in the ASHRAE Handbook of Fundamentals, the remaining boiler(s) do not have to include boiler capacity for space heating.

(2) BOILER ACCESSORIES. Boiler feed pumps, heating circulating pumps, condensate return pumps, and fuel oil pumps shall be connected and installed to provide normal and standby service.

(3) VALVES. Supply and return mains and risers of cooling, heating, and process steam system shall be valved to isolate the various sections of each system. Each pience of equipment shall be valved at the supply and return ends except that vacuum condensate drains need not be valved at each piece of equipment.

D. Heating and Ventilating Systems.

(1) In the interest of energy conservation the applicant is encouraged to utilize recognized procedures such as variable air volume and load shedding systems in areas not listed in table 13 and where direct patient care is not affected such as administrative and public areas, general storage, etc. Consideration may be given to special design innovations in areas of table 13 provided that pressure relationship as an indication of direction of air flow and total number of air changes as listed are maintained. All such proposed design innovations are subject to review and approval by the funding agency.

(2) TEMPERTURES. For all areas occupied by patients, the indoor winter design temperature shall be 75° F. (24° C.). For all other occupied areas, the indoor winter design temperature shall be 72° F. (22° C.).

(3) VENTILATION SYSTEM DETAILS. All air-supply and air-exhaust systems shall be mechanically operated. All fans serving exhaust systems shall be located at the discharge end of the system. The ventilation rates shown in table 13 shall be considered as minimum acceptable rates and shall not be construed as precluding the use of higher ventilation rates.

(a) Outdoor air intakes shall be located as far as practical but not less than 25'0" (7.62 m) from exhaust outlets of ventilating systems, combustion equipment stacks, medical-surgical vacuum systems, plumbing vent stacks, or from areas which may collect vehicular exhaust and other noxious fumes. (Plumbing and vacuum vents that terminate above the level of the top of the air intake may be located as close as 10'0" (3.05 m)). The bottom of outdoor air intakes serving central systems shall be located as high as practical but not less than 6'0" (1.83 m) above ground level, or if installed above the roof, 3'0" (.91 m) above roof level.

(b) The ventilation systems shall be designed and balanced to provide the pressure relationship as shown in table 13.

(c) The bottoms of ventilation openings shall be not less than 3 inches (7.6 cm) above the floor of any room.

(d) Corridors shall not be used to supply air to or exhaust air from any room except that exhaust from corridors may be used to ventilate bathrooms, toilet rooms, janitors' closets, and small electrical or telephone closets opening directly on corridors provided that ventilation can be accomplished by undercutting of doors.

(e) All central ventilation or air conditioning systems shall be equipped with filters having efficiencies no less than those specified in table 14. The filter bed shall be located upstream of the air conditioning equipment, unless a prefilter is employed. In this case, the prefilter shall be upstream of the equipment and the main filter bed may be located further downstream.

All filter(s) efficiencies shall be average atmospheric dust spot efficiencies tested in accordance with ASHRAE Standard 52-76.

Filter frames shall be durable and carefully dimensioned and shall provide an airtight fit with the enclosing ductwork. All joints between filter segments and the enclosing ductwork shall be gasketed or sealed to provide a positive seal against air leakage.

A manometer shall be installed across each filter bed serving central air systems.

(f) Air handling duct systems shall meet the requirements of NFPA Standard 90A.

(g) Ducts which penetrate construction intended for X-ray or other ray protection shall not impair the effectiveness of the protection.

(h) Fire and smoke dampers shall be located and installed in accordance with the requirements of NFPA Standard 90A, except that all systems, regardless of size, which serve more than one smoke or fire zone, shall be equipped with smoke detectors to shut down fans automatically as delineated in paragraph 4-3.2 of the Standard. Access for maintenance shall be provided at all dampers.

Switching for restart of fans may be conveniently located for fire department use to assist in evacuation of smoke after the fire is controlled, provided that provisions are made to avoid possible damage to the system because of closed dampers.

Table 13
PRESSURE RELATIONSHIPS AND VENTILATION OF
CERTAIN REHABILITATION AREAS

AREA DESIGNATION	PRESSURE RELATIONSHIP TO ADJACENT AREAS	MINIMUM AIR CHANGES OF OUTDOOR AIR PER HOUR SUPPLIED TO ROOM	MINIMUM TOTAL[2] AIR CHANGES PER HOUR SUPPLIED TO ROOM	ALL AIR[1] EXHAUSTED DIRECTLY TO OUTDOORS	RECIRCULATED WITHIN ROOM UNITS
Dental Operatory	N	2	6	Optional	No*
Patient Room	V	2	2	Optional	Optional
Patient Area Corridor	N	2	2	Optional	Optional
Occupational Therapy	N	2	6	Optional	Optional
Physical Therapy and Hydrotherapy	N	2	6	Optional	Optional
Speech and Hearing Unit	V	2	2	Optional	Optional
Soiled Workroom and Soiled Holding	N	2	10	Yes	No
Clean Workroom and Clean Holding	P	2	4	Optional	Optional
Activities of Daily Living	V	2	4	Optional	Optional
X-ray Diagnostic	V	2	6	Optional	Optional
Treatment Room	V	2	6	Optional	Optional
Laboratory	N	2	6	Optional	Optional
Dark Room	N	2	10	Yes	No
Toilet Room and Locker Rooms	N	Optional	10	Yes	No
Bedpan Room	N	Optional	10	Yes	No
Bathroom	N	Optional	10	Yes	No
Janitors' Closet	N	Optional	10	Yes	No
Sterilizer Equipment Room	N	Optional	10	Yes	No
Linen and Trash Chute Room	N	Optional	10	Yes	No
Food Preparation Center	E	2	10	Yes	No
Warewashing Room	N	Optional	10	Yes	No
Personal Care Room	N	2	8	Optional	Yes
Dietary Day Storage	V	Optional	2	Optional	No
Laundry, General	V	2	10	Yes	No
Soiled Linen Sorting and Storage	N	Optional	10	Yes	No
Clean Linen Storage	P	Optional	2	Optional	Optional

P = Positive N = Negative E = Equal V = May Vary

***Recirculating room units meeting the filtering requirements for recirculated central air systems (see sec. 10.19.D (2) (e)) may be used.**

[1]Heat recovery systems should be utilized where appropriate especially for those areas where all air is required to be exhausted to the outside.

[2]Requirements for outdoor air changes may be deleted or reduced and total air changes per hour supplied may be reduced to 25% of the figures listed when the affected room is unoccupied and unused provided that indicated pressure relationship is maintained. In addition, positive provisions such as an interconnect with room lights must be included to insure that the listed ventilation rates including outdoor air are automatically resumed upon reoccupancy of the space. This exception does not apply to certain areas such as toilets and storage which would be considered as "in use" even though "unoccupied."

General Note: The outdoor air quantities for central systems employing recirculating and serving more than a single area designation may be determined by summing the individual area quantity requirements rather than by providing the maximum listed ratio of outdoor air to total air.

Appendix A

Table 14

FILTER EFFICIENCIES FOR CENTRAL VENTILATION AND AIR CONDITIONING SYSTEMS IN REHABILITATION FACILITIES

AREA DESIGNATION	MINIMUM NUMBER OF FILTER BEDS	FILTER EFFICIENCIES (Percent) MAIN FILTER BED
Patient Care, Treatment, Diagnostic, and Related Areas	1	80*
Food Preparation Areas and Laundries	1	80
Administrative, Bulk Storage, and Soiled Holding Areas	1	

*May be reduced to 35 percent for all-outdoor air systems.

Note: Ratings shall be with tolerances of ARI Standard 680-74.

Supply and exhaust ducts which pass through a required smoke barrier and through which smoke can be transferred to another area shall be provided with dampers at the barrier, controlled to close automatically to prevent flow of air or smoke in either direction when the fan, which moves the air through the duct, stops. Dampers shall be equipped with remote control reset devices except that manual reopening will be permitted if dampers are conveniently located.

Return air ducts which pass through a required smoke barrier shall be provided with a damper at the barrier actuated by smoke or products of combustion (other than heat) detectors. These dampers shall be operated by the detectors used to actuate door closing devices located to sense smoke in the return air duct from the smoke zone. On high velocity systems, a time delay is required so that fan will be stopped prior to damper closing. Engineered smoke exhaust systems as described by NFPA may be considered for approval on a case by case basis.

(i) Exhaust hoods in food preparation centers shall have an exhaust rate of not less than 50 cfm per square foot (0.25 cubic meters per second per square meter) of face area. Face area is defined for this purpose as the open area from the exposed perimeter of the hood to the average perimeter of the cooking surfaces. All hoods over cooking ranges shall be equipped with grease filters, fire extinguishing systems and heat actuated fan controls. Clean-out openings shall be provided every 20'0" (6.10 m) in horizontal exhaust duct systems serving these hoods.

(j) Boiler rooms shall be provided with sufficient outdoor air to maintain combustion rates of equipment and to limit temperatures in working stations to 97° F. (36° C.) Effective Temperature (ET*) as defined by ASHRAE Handbook of Fundamentals.

(k) See section 10.26A (26) for additional boiler room, food preparation center, and laundry ventilation requirements.

SMALL PRIMARY HEALTH CARE FACILITIES

14.9. MECHANICAL REQUIREMENTS.

A. Prior to completion and acceptance of the facility, all mechanical systems shall be tested and operated to demonstrate to the owner that the installation and performance of these systems conform to the minimum requirements herein and/or the approved drawings and specifications.

B. An owner's manual shall be provided for all new equipment which shall include a set of manufacturers' operating and maintenance instructions and a complete parts list.

C. Heating and Ventilation.

(1) A minimum indoor winter design temperature of 75° F. (24° C.) shall be used for all patient occupied areas.

(2) Waiting, examination and treatment areas shall be furnished with ventilation air by natural or mechanical means. If a mechanical system is used, it shall be arranged to provide not less than 2 air changes per hour of outside air.

(3) (a) Air handling duct systems shall meet the requirements of NFPA No. 90A.

(b) Ducts which penetrate construction intended for X-ray and other ray protection shall not impair the effectiveness of the protection.

(c) Laboratory hoods shall meet the following general requirements:

(I) Have an average face velocity of not less than 75 feet per minute (0.38 meters per second).

(II) Be connected to an exhaust system which is separate from the building exhaust system.

(III) Have an exhaust fan located at the discharge end of the system.

(IV) Have an exhaust duct system of noncombustible corrosion-resistant material as needed to meet the planned usage of the hood.

(d) Laboratory hoods shall meet the following special requirements:

(I) Each hood which processes infectious or radioactive materials shall have a minimum face velocity of 100 feet per minute. (0.15 meters per second), shall be connected to an independent exhaust system, shall have filters with a 99.97 percent efficiency (based on the DOP, dioctyl-phthalate test method) in the exhaust stream, and shall be designed and equipped to permit the safe removal, disposal, and replacement of contaminated filters.

(II) Duct systems serving hoods in which radioactive and strong oxidizing agents (e.g., perchloric acid) are used shall be constructed of stainless steel for a minimum distance of 10'0" (3.05 m) from the hood and shall be equipped with washdown facilities.

OUTPATIENT SURGICAL FACILITIES

15.13 MECHANICAL REQUIREMENTS.

A. General.

(1) In view of our national concern for energy conservation, mechanical systems will be subject to special review for overall efficiency and life cycle costing including operational. The intent of this paragraph is to recognize that maximum savings can be made through implementation of a multitude of inter-related procedures which would be too numerous (and basic) to list. In most instances, a well designed system can be energy efficient at minimal added cost and at the same time provide for better patient comfort. However, it must be emphasized that energy conservation cannot be used as an argument for lessening patient care or safety.

(2) Prior to completion and acceptance of the facility, all mechanical systems shall be tested, balanced, and operated to demonstrate to the owner or his representative that the installation and performance of these systems conform to the requirements of the plans and specifications.

(3) Upon completion of the contract, the owner shall be furnished with a complete set of manufacturers' operating, maintenance, and preventive maintenance instructions, and parts list with numbers and description for each piece of equipment. He shall also be provided with instruction in the operational use of systems and equipment as required.

B. Thermal and Acoustical Insulation.

(1) Insulation shall be provided for the following within the building:

(a) Boilers, smoke breeching and stacks.

(b) Steam supply and condensate return piping.

(c) Hot water piping above 120° F. (49° C.) and all hot water heaters, generators and converters.

(d) Chilled water, refrigerant, other process piping and equipment operating with fluid temperatures below ambient dew point.

(e) Water supply and drainage piping on which condensation may occur.

(f) Air ducts and casings with outside surface temperature below ambient dew point.

(g) Other piping, ducts, and equipment as necessary to maintain the efficienty of the systems.

(2) Insulation required above may be omitted from hot water and steam condensate piping not subject to contact by patients when the heat loss from such piping without insulation does not increase the energy requirements of the system.

(3) Insulation on cold surfaces shall include an exterior vapor barrier.

(4) Insulation, including finishes and adhesives on the exterior surfaces of ducts, pipes, and equipment shall have a flame spread rating of 50 or less and a smoke developed rating of 150 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A.

(5) Linings in air ducts and equipment shall meet the Erosion Test Method described in Underwriters' Laboratories, Inc., Publication No. 181. These linings, including coatings and adhesives, and insulation on exterior surfaces of pipes and ducts in building spaces used as air supply plenums, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less as determined by an independent testing laboratory in accordance with NFPA 255-1972 as required by NFPA 90A.

(6) Duct linings shall not be used in systems supplying operating and recovery rooms unless terminal filters of at least 90 percent efficiency are installed downstream of linings.

C. Steam and Hot Water Systems.

(1) BOILERS. Boilers shall have the capacity, based upon the net ratings published by the Hydronics Institute, to supply the normal requirements of all systems and equipment.

(2) VALVES. Supply and return mains and risers of space heating and process steam systems shall be valved to isolate the various sections of each system. Each piece of equipment shall be valved at the supply and return ends except for vacuum condensate drains.

D. Air Conditioning, Heating, and Ventilating Systems.

(1) TEMPERATURES AND HUMIDITIES.

(a) The designed capacity of the systems shall provide the following temperatures and humidities in the areas noted:

Area Designation	Temperature °F.	Temperature °C.	Relative Humidity (%) Min.	Relative Humidity (%) Max.
Operating Rooms	68-76*	20-24*	50	60
Recovery Rooms	75	24	50	60

*Variable Range Required

(b) For other areas occupied by patients, the indoor winter design temperature shall be 75° F. (24° C.). For all other occupied areas, the indoor winter design temperatures shall be 72° F. (22° C.).

(2) VENTILATION SYSTEM DETAILS. All air-supply and air-exhaust sytems shall be mechanically operated. All fans serving exhaust systems shall be located at the discharge end of the system. The ventilation rates shown in table 16 shall be considered as minimum acceptable rates and shall not be construed as precluding the use of higher ventilation rates.

(a) In the interest of energy conservation, the applicant is encouraged to utilize recognized procedures such as variable air volume and load shedding systems in areas not listed in table 16 and where direct patient care is not affected such as administrative and public areas, general storage, etc. Consideration may be given to special design innovations in areas noted in table 16 provided that pressure relationship as an indication of direction of air flow and total number of air changes as listed are maintained. All such proposed design innovations are subject to review and approval by the funding agency.

(b) Outdoor intakes shall be located as far as practical but not less than 25'0" (7.62 m) from exhaust outlets of ventilating systems, combustion equipment stacks, medical-surgical vacuum systems, plumbing vents stacks, or from areas which may collect vehicular exhaust and other noxious fumes (plumbing and vacuum vents that terminate above the level of the top of the air intake may be located as close as 10'0" (3.05 m)). The bottom of outdoor air intakes serving central systems shall be located as high as practical but not less than 6'0 (1.83 m) above ground level, or if installed above the roof, 3'0" (.91 m) above the roof level.

Table 16
GENERAL PRESSURE RELATIONSHIPS AND VENTILATION
OF CERTAIN OUTPATIENT SURGERY AREAS

AREA DESIGNATION	PRESSURE RELATIONSHIP TO ADJACENT AREAS	MINIMUM AIR[6] CHANGES OF OUTDOOR AIR PER HOUR SUPPLIED TO ROOM	MINIMUM TOTAL AIR CHANGES PER HOUR SUPPLIED TO ROOM	ALL AIR[5] EXHAUSTED DIRECTLY TO OUTDOORS	RECIRCULATED WITHIN ROOM UNITS
Operating Room (for recirc. air syst.)[3]	P	5	25	Optional	No[2]
Operating Room (for all outdoor air syst.)[3,4]	P	15	15	Yes	No
Examination and Treatment Room	V	2	6	Optional	Optional
Recovery Room (Post-anesthesia)	P	2	6	Optional	No[2]
Medication Room	P	2	4	Optional	Optional
Pharmacy	P	2	4	Optional	Optional
X-ray Room	E	2	6	Optional	Optional
Soiled Workroom or Soiled Holding	N	2	10	Yes	No
Clean Workroom or Clean Holding	P	2	4	Optional	Optional
Darkroom	N	2	10	Yes	No
Toilet Room	N	Optional	10	Yes	No
Bathroom	N	Optional	10	Yes	No
Janitors' Closet	N	Optional	10	Yes	No
Sterilizer Equipment Room	N	Optional	10	Yes	No
Linen and Trash Chute Rooms	N	Optional	10	Yes	No
Laboratory, General[1]	N	2	6	Optional	Optional
Soiled Linen Sorting and Storage	N	Optional	10	Yes	No
Clean Linen Storage	V	2	2	Optional	Optional
Anesthesia Storage[3]	V	Optional	8	Yes	No
Central Services					
Soiled or Decontamination Room	N	2	6	Yes	No
Clean Workroom	P	2	4	Optional	Optional
Equipment Storage	V	Optional	2	Optional	Optional

P = Positive N = Negative E = Equal V = May Vary

[1]See sections 15.12.D (2) (j,k, & l) for additional requirements.
[2]Recirculating room units meeting the filtering requirement for sensitive areas in section 15.12.D (2) (f) may be used.
[3]See section 15.12.D (2) (m) for additional requirements.
[4]For maximum energy conservation, use of a recirculated filtered air system is preferred. An all outdoor air system may be used, where required by local codes, provided that appropriate heat recovery procedures are utilized for exhaust air.
[5]Heat recovery systems should be utilized where appropriate especially for those areas where all air is required to be exhausted to the outside.
[6]Requirements for outdoor air changes may be deleted or reduced and total air changes per hour supplied may be reduced to 25% of the figures listed when the affected room is unoccupied and unused provided that indicated pressure relationship is maintained. In addition, positive provisions such as an interconnect with room lights must be included to insure that the listed ventilation rates including outdoor air are automatically resumed upon reoccupancy of the space. This exception does not apply to certain areas such as toilets and storage which would be considered as "in use" even though "unoccupied".

General Note: The outdoor air quantities for central systems employing recirculation and serving more than a single area designation may be determined by summing the individual area air quality requirements rather than by providing the maximum listed ratio of outdoor air to total air. This does not apply to sensitive areas such as operating and delivery rooms, recovery rooms, nurseries, and intensive care rooms.

Appendix A

Table 17

FILTER EFFICIENCIES FOR CENTRAL VENTILATION AND AIR CONDITIONING SYSTEMS IN OUTPATIENT SURGERY FACILITIES

AREA DESIGNATION	MINIMUM NUMBER OF FILTER BEDS	FILTER EFFICIENCIES Percent FILTER BED NO. 1	FILTER BED NO. 2
Sensitive Areas*	2	25	90

*Includes operating rooms and recovery rooms.

Note: Ratings shall be with tolerances of ARI Standard 680-74.

(c) The ventilation systems shall be designed and balanced to provide the pressure relationship as shown in table 16.

(d) All air supplied to operating rooms shall be delivered at or near the ceiling of the area served; all return air from the area shall be removed near floor level. At least 2 return air outlets shall be used in each operating room.

(e) Each space routinely used for the administering of inhalation anesthetizing agents shall be provided with a seperate scavaging system for venting of waste anesthetizing gases. Pressure balance must be such that the gas collecting system does not interfere with required room pressure relationship or with breathing circuit that may affect patient safety. The intake shall be appropriately located in relation to the patient and the equipment and design so that gases are exhausted directly to the outside.

(NOTE: Potential harmful effects upon personel subject to constant exposure to anesthetizing gases are generally recognized but acceptable levels of concentration are unknown at this time. In the absence of specific figures, any scavaging system should be designed to remove as much of the anesthetizing gas as possible. Maximum effectiveness of the scavaging system may also require careful attention to selection and maintenance of anesthetizing equipment used.)

(f) All central ventilation or air conditioning systems shall be equipped with filters having efficiencies no less than those specified in table 17. Where 2 filter beds are required, filter bed No. 1 shall be located upstream of the air conditioning equipment and filter bed No. 2 shall be downstream of the supply fan, any recirculating spray water systems, and water reservoir type humidifiers.

All filter efficiencies shall be average atmospheric dust spot efficiencies tested in accordance with ASHRAE Standard 52-76.

Filter frames shall be durable and carefully dimensioned and shall provide an airtight fit with the enclosing ductwork. All joints between filter segments and enclosing ductwork shall be gasketed or sealed to provide a positive seal against air leakage.

A manometer shall be installed across each filter bed serving sensitive areas or central air systems.

(g) Air handling duct systems shall meet the requirements of NFPA Standard 90A.

(h) Ducts which penetrate construction intended for X-ray or other ray protection shall not impair the effectiveness of the protection.

(i) Fire and smoke dampers shall be constructed, located, and installed in accordance with the requirements of NFPA Standard 90A-1975, except that all systems, regardless of size, which serve more than one smoke or fire zone, shall be equipped with smoke detectors to shut down fans automatically as delineated in paragraph 4-3.2 of that Standard. Access for maintenance shall be provided at all dampers.

Switching for restart of fans may be conveniently located for fire department use to assist in evacuation of smoke after the fire is controlled, provided that provisions are made to avoid possible damage to the system because of closed dampers.

Supply and exhaust ducts which pass through a smoke separation of required compartmentation and through which smoke can be transferred to another area shall be provided with dampers at the separation controlled to close automatically to prevent flow of air or smoke when the fan, which moves the air through the duct, stops. Dampers shall be equipped with

remote control reset devices except that manual reopening will be permitted if dampers are conveniently located.

Return air ducts which pass through a smoke seperation of required compartmentation shall be provided with a damper at the separation actuated by smoke or products of combustion (other than heat) detectors. These dampers shall be operated by detectors located to sense smoke in the return air ducts from the smoke zone. On high velocity systems, a time delay is required so that fan will be stopped prior to damper closing. Engineered smoke exhaust systems may be considered for approval as described by NFPA on a case-by-case basis.

(j) The ventilation systems for anesthesia storage rooms shall conform to the requirements of NFPA Standard 56A, including the gravity option. The mechanically operated air systems required of section 15.13.D (2) is optional in this room only.

(k) Boiler rooms shall be provided with sufficient outdoor air to maintain combustion rates of equipment and to limit temperatures in working stations to 97° F. (36° C.) Effective Temperature (ET*) as defined by ASHRAE Handbook of Fundamentals.

(1) See section 15.9.A (17) for additional boiler room ventilation requirements.